National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

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**CERTIFIED MAIL – RETURN RECEIPT REQUESTED**

James Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road East, Bldg. 1
Santa Fe, NM 87505

Subject: Submittal of the *"Mixed Waste Landfill (MWL) Toluene Investigation Report"* by the Department of Energy/National Nuclear Security Administration (DOE/NNSA) and Sandia Corporation (Sandia)

Dear Mr. Bearzi:

On behalf of DOE/NNSA and Sandia, the "*Mixed Waste Landfill Toluene Investigation Report"* is being submitted as requested in your letters dated April 30 and June 4, 2010. The report presents an evaluation of MWL and Sandia National Laboratories/New Mexico (SNL/NM) site wide groundwater monitoring toluene results, results of the recent purging/sampling study conducted at all of the MWL groundwater monitoring wells, and other studies designed to determine the source(s) of the toluene detected in groundwater samples.

Toluene is a common laboratory contaminant and is present in many workplace and consumer products. It has been detected at very low concentrations at or near the analytical laboratory method detection limit in groundwater samples collected from the new wells installed in 2008 at the MWL and throughout the SNL/NM site wide groundwater monitoring network. The results of this investigation indicate the MWL is not the source of the toluene. The very low concentrations of toluene detected in samples from the MWL groundwater monitoring wells are similar to detections at other SNL/NM site wide wells, and are consistent with a laboratory and/or ambient environmental source(s), and are expected to continue in the future. The toluene groundwater data reflect the ubiquitous nature of toluene and the very low analytical detection limit (0.25 micrograms per liter). The detections do not represent a release to the environment or widespread low-concentration toluene contamination in the regional aquifer. All detected concentrations of toluene are orders of magnitude lower than the regulatory standards.

Should you have any questions regarding correspondence, please feel free to contact me at (505) 845-6036 or John Gould of my staff at (505) 845-6089.

Sincerely,

Patty Wagner

Patty Wagner
Manager

Enclosure

cc w/enclosure:
W. Moats, NMED (Via Certified Mail)
L. King, EPA, Region 6 (Via Certified Mail)
T. Skibitski, NMED-OB
B. Birch, NMED-OB
Records Center, SNL/NM, Org. 6765, MS-0718

cc w/o enclosure:
A. Blumberg, SNL/NM, Org. 11100, MS-0141
M. Walck, SNL/NM, Org. 6700, MS-0701
D. Miller, SNL/NM, Org 6765, MS-0718
J. Cochran, SNL/NM, Org. 6765, MS-0719
S. Saltzstein, SNL/NM, Org. 6702, MS-0701
B. Langkopf, SNL/NM, Org. 6765, MS-0718
C Daniel, SNL/NM, Org. 6765, MS-0718
J. Estrada, SSO, MS-0184
J. Gould, SSO, MS-0184

AOP 95-45, 06

# CERTIFICATION STATEMENT FOR APPROVAL AND FINAL RELEASE OF DOCUMENTS

**Document title:** **Mixed Waste Landfill Toluene Investigation Report**

**Document author:** **Mike Mitchell, Department 06765**

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I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

Signature: Marianne C Walck 8/13/2010

**Marianne Walck, Director**
Nuclear Energy & Global Security Technologies
Center 6700
Sandia National Laboratories/New Mexico
Albuquerque, New Mexico 87185
Operator

Date

and

Signature: Patty Wagner 8-18-10

**Ms. Patty Wagner, Manager**
U.S. Department of Energy
National Nuclear Security Administration
Sandia Site Office
Owner and Co-Operator

Date

Sandia National Laboratories

# Sandia National Laboratories/New Mexico Environmental Restoration Project

# MIXED WASTE LANDFILL TOLUENE INVESTIGATION REPORT

# AUGUST 2010

United States Department of Energy
Sandia Site Office

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

# EXECUTIVE SUMMARY

The Sandia National Laboratories/New Mexico (SNL/NM) Mixed Waste Landfill (MWL) is a 2.6-acre Solid Waste Management Unit located in the north-central portion of Technical Area III. The MWL was established in 1959 as a disposal area for low-level radioactive and mixed waste generated by SNL/NM research facilities and accepted low-level radioactive and minor amounts of mixed waste from March 1959 through December 1988. The MWL has been extensively characterized, and groundwater monitoring has been conducted since 1990 for major ion chemistry, volatile organic compounds (VOCs), semivolatile organic compounds, nitrate plus nitrite, metals, radionuclides, and perchlorate. Toluene is not a constituent of concern at the MWL based upon the Phase 1 and Phase 2 Resource Conservation and Recovery Act Facility Investigations (SNL/NM September 1990 and Peace et al. September 2002).

Low concentrations of toluene have been historically detected during groundwater monitoring activities at the MWL and at other SNL/NM groundwater monitoring locations. Toluene is a common laboratory contaminant (EPA April 1992 and SNL/NM July 2007), and detections in SNL/NM groundwater samples have been relatively infrequent and at very low concentrations, typically at or near the analytical laboratory detection limits (ranging from 0.25 to 1 micrograms per liter [µg/L]). The U.S. Environmental Protection Agency maximum contaminant level for toluene in drinking water is 1,000 µg/L (EPA 2009), and the New Mexico Environment Department (NMED) maximum allowable concentration is 750 µg/L (Title 20, New Mexico Administrative Code, Chapter 6, Part 2, Section 3103A).

Toluene is a common solvent that is present in many workplace and consumer products, including gasoline, kerosene, heating oil, paints, lacquers, adhesives, nail polish, cosmetics, rubber cement, fabric dyes, and inks. Toluene is essentially ubiquitous in the ambient environment and is present in the ambient air as confirmed by SNL/NM air monitoring program results documented in the Annual Site Environmental Reports, the most recent of which is for Calendar Year (CY) 2008 (SNL/NM September 2009).

During CY 2009, toluene was detected in groundwater samples collected from all four of the new groundwater monitoring wells that were installed in 2008 at the MWL (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). Toluene concentration ranges were consistent with historical monitoring results (i.e., very low); however, the frequency of detections was higher in 2009 with no unusual indications of laboratory contamination. As a result, in late CY 2009 SNL/NM project personnel initiated an investigation to determine the source of the toluene. The NMED provided further direction in a letter dated April 30, 2010, for conducting a purging/sampling study of the groundwater along with any other studies necessary to determine the toluene source(s) (Bearzi April 2010).

The results of this investigation indicate the MWL is not the source of the toluene. The very low concentrations of toluene detected in groundwater samples from the MWL monitoring wells are consistent with detections reported for samples from other SNL/NM sitewide monitoring wells and a laboratory and/or ambient environmental source(s). In addition, the toluene detections are at concentrations that are orders of magnitude lower than the regulatory standards and are expected to continue in the future. The toluene groundwater results reflect the ubiquitous nature of toluene and the very low analytical detection limit (0.25 µg/L). The detections do not represent a release to the environment or widespread low-concentration toluene contamination in the regional aquifer.

The key findings of this investigation are as follows:

- A review of the MWL inventory, subsurface soil sampling results, and soil-vapor survey results demonstrate that toluene contamination capable of impacting regional groundwater at a depth of approximately 500 feet below ground surface is not present at the MWL.

- Toluene detections have been reported in groundwater samples collected throughout the SNL/NM sitewide monitoring network, as well as in laboratory and field quality control (QC) samples.

- All detections of toluene in groundwater samples from October 2001 through April 2010 occur within a narrow concentration range (0.217 to 2.2 µg/L) at or near the laboratory method detection limit (typically 0.25 µg/L); of the total results, 88% are less than 1 µg/L, and 63% are less than 0.50 µg/L.

- The number of toluene detections significantly increased across the sitewide groundwater monitoring network in 2009 (2008: 163 samples, 8 detections; 2009: 174 samples, 63 detections). At the MWL, the same trend is evident (2008: 15 samples, 1 detection; 2009: 23 samples, 15 detections). Because a majority of the samples for the new wells installed in 2008 at the MWL (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and Technical Area V (TAV-MW10) are from 2009 quarterly sampling events when this increase in toluene detections occurred, they have some of the highest toluene detection frequencies as compared to other wells with more pre-2009 results.

- Toluene has also been detected in trip blank (TB) samples (laboratory water in sealed containers never opened in the field) within a concentration range similar to that for groundwater samples (0.184 to 1.21 µg/L).

- The widespread occurrence of toluene detections in groundwater and TB samples from the sitewide monitoring well network, the detection frequency, and the very low concentration range indicate that the toluene detections do not reflect low-level contamination present in the regional aquifer.

- The April 2010 MWL purging/sampling study results showed only laboratory-related toluene contamination in 5 of the 34 groundwater samples. The results for the June 2010 purging/sampling study performed at well TAV-MW10 vary from the MWL results and are consistent with drilling/well materials and/or inadvertent contamination introduced during the drilling/well installation process as possible toluene sources. The purging/sampling study results are not consistent with low-concentration toluene in the regional aquifer.

- Laboratory QC data and the data validation process confirm the presence of toluene sources within the laboratory for some, but not all, cases of low-concentration toluene detections in groundwater samples.

- Other potential sources of toluene are very low levels of toluene present in the ambient environment that impact the groundwater samples as they are being collected and transported to the laboratory and contaminated sample containers.

- Evaluation of the groundwater sampling process for all monitoring wells and the drilling/well installation processes, equipment, and materials for the new wells installed in 2008 (MWL-BW2, MWL-MW7,MWL-MW8, MWL-MW9, and TAV-MW10) supports the conclusion that they are not a source of toluene, but they cannot be ruled out as potential sources. The TAV-MW10 purging/sampling study results and the fact that all five new wells installed in 2008 have detection frequencies ranging from 19 to 58% are consistent with a possible toluene source related to drilling and/or well construction materials.

Based upon the results of this MWL Toluene Investigation, additional investigation into the potential source(s) of toluene at the MWL is not required to confirm the MWL is not the source of toluene. However, the following recommendations are provided that represent best management practices, will build upon this investigation, and will provide additional supporting information:

- Collect additional field blank samples as part of ongoing MWL groundwater monitoring and continue to promote groundwater sampling team awareness of potential cross-contamination issues and sampling process improvement.

- Follow up with the laboratory to tighten the VOC sample container certification process (i.e., process used to certify the sample containers are clean prior to shipment to SNL/NM) and include additional method blank samples when batching and analyzing SNL/NM groundwater samples (i.e., for large sample batches include more than one method blank sample) to reduce the analysis time between method blanks and environmental samples.

- For the MWL Long-Term Monitoring and Maintenance Plan, develop trigger levels for toluene and other identified VOCs at technically reasonable concentrations relative to historic monitoring results to minimize resampling and reporting requirements.

SNL/NM personnel participate in the National Nuclear Security Administration Analytical Management Program, a collaborative effort between the Sample Management Offices (SMOs) at SNL/NM, the Pantex Plant (Pantex), and Los Alamos National Laboratory (LANL) and the third-party data validation and analytical chemistry technical assistance contractor (Analytical Quality Associates [AQA]). Staff from the SMOs and AQA share information and have been working toward the common goal of improving the quality of analytical data since 1994. This effort has intensified over the past year, due in part to the increase in low-concentration toluene detections, and has resulted in a better understanding of the complex issues associated with the extremely low analytical detection limits and corresponding results that are not consistent with known conditions. The combined staff from AQA and the SMOs at SNL/NM, Pantex, and LANL represent well over 100 years of environmental sampling and analysis experience that have been leveraged for this MWL Toluene Investigation. The information and conclusions presented in this report draw upon this experience base. This collaborative effort should continue as it is critical to the cost-effective implementation and management of the Environmental Restoration Project and Long-Term Environmental Stewardship Program missions at these U.S. Department of Energy (DOE) facilities and throughout the DOE complex.

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**Appendix**

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ALS | ALS Laboratory Group |
| AOP | Administrative Operating Procedure |
| AQA | Analytical Quality Associates, Inc. |
| ARCH | air-rotary casing hammer |
| bgs | below ground surface |
| CMIP | Corrective Measures Implementation Plan |
| CMS | Corrective Measures Study |
| COC | constituent of concern |
| CWL | Chemical Waste Landfill |
| CY | Calendar Year |
| DI | deionized |
| DOE | U.S. Department of Energy |
| EB | equipment blank |
| EPA | U.S. Environmental Protection Agency |
| ERCL | Environmental Restoration Chemistry Laboratory |
| ET | evapotranspirative |
| FB | field blank |
| GEL | GEL Laboratories, Inc. |
| KAFB | Kirtland Air Force Base |
| LANL | Los Alamos National Laboratory |
| MDL | method detection limit |
| µg/L | microgram(s) per liter |
| $mg/m^3$ | milligram(s) per cubic meter |
| mL | milliliter(s) |
| MWL | Mixed Waste Landfill |
| NMED | New Mexico Environment Department |
| NNSA | National Nuclear Security Administration |
| NOD | Notice of Disapproval |
| NSF | National Sanitation Foundation |
| OB | Oversight Bureau |
| Pantex | Pantex Plant |
| ppb | part(s) per billion |
| ppmv | part(s) per million by volume |
| PQL | practical quantitation limit |
| PVC | polyvinyl chloride |
| QA | quality assurance |
| QC | quality control |
| RCRA | Resource Conservation and Recovery Act |
| RFI | RCRA Facility Investigation |
| Sandia | Sandia Corporation |
| SAP | Sampling and Analysis Plan |
| SMO | Sample Management Office |
| SNL/NM | Sandia National Laboratories/New Mexico |
| SOP | Standard Operating Procedure |
| SOW | Statement of Work |
| SVOC | semivolatile organic compound |
| SW | Solid Waste |

## ACRONYMS AND ABBREVIATIONS (Concluded)

| | |
|---|---|
| TA | Technical Area |
| TB | trip blank |
| TCE | trichloroethene |
| VOC | volatile organic compound |
| WDC | WDC Exploration & Wells, Inc. |

# 1.0 INTRODUCTION

The Sandia National Laboratories/New Mexico (SNL/NM) Mixed Waste Landfill (MWL) is located on Kirtland Air Force Base (KAFB), four miles south of the SNL/NM Technical Area (TA)-I facilities and 5 miles southeast of Albuquerque International Sunport. The MWL is a 2.6-acre Solid Waste Management Unit 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 and accepted low-level radioactive and minor amounts of mixed waste from March 1959 through December 1988.

Groundwater in the area of the MWL has been extensively characterized and monitored since 1990 for major ion chemistry, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), nitrate plus nitrite, metals, radionuclides, and perchlorate. Nineteen years of quarterly, semiannual, and annual data indicate that groundwater has not been contaminated by releases from the MWL (Goering et al. December 2002; Lyon and Goering January 2006; SNL/NM December 2001a, December 2001b, January 2002, March 2002, July 2002, August 2002, October 2002, June 2003, September 2003, July 2004, November 2006, January 2008, May 2009a, and June 2010). Groundwater monitoring is ongoing and is documented in groundwater monitoring reports submitted annually to the New Mexico Environment Department (NMED). The annual reports and historic quarterly and semiannual reports describe the field activities conducted during the sampling events and present the analytical results (detailed references are provided in Sections 2.0 and 6.0).

The scope of this report describes the investigations performed to determine the potential source(s) of toluene that has been recently detected in MWL groundwater samples at a higher frequency than during previous groundwater monitoring events. The purpose of this report is to present information describing the investigations performed and the results, conclusions, and recommendations.

Figure 1-2 shows the groundwater monitoring well network at the MWL. The current well network consists of seven wells completed within the interfingering, fine-grained, alluvial fan deposits and coarse-grained, Ancestral Rio Grande deposits. Together the alluvial fan and Ancestral Rio Grande deposits form the geologic framework for the regional groundwater aquifer beneath KAFB and the MWL. The monitoring well network consists of one background well (MWL-BW2), one on-site monitoring well (MWL-MW4) with two screen sections completed in different parts of the regional aquifer, and five downgradient wells (MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9).

The MWL groundwater monitoring well network was modified in 2008 due to declining water levels (SNL/NM May 2009a). Four monitoring wells were plugged and abandoned (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) and four new monitoring wells were installed (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). The background well, MWL-BW2, was installed in January 2008 (SNL/NM April 2008), and monitoring wells MWL-MW7, MWL-MW8, and MWL-MW9 were installed in May 2008 (September 2008a). The NMED approved the well installation reports in October 2008 and January 2009 (Bearzi October 2008a and January 2009). TA-V monitoring well TAV-MW10 was installed in February 2008 as part of the same drilling effort.

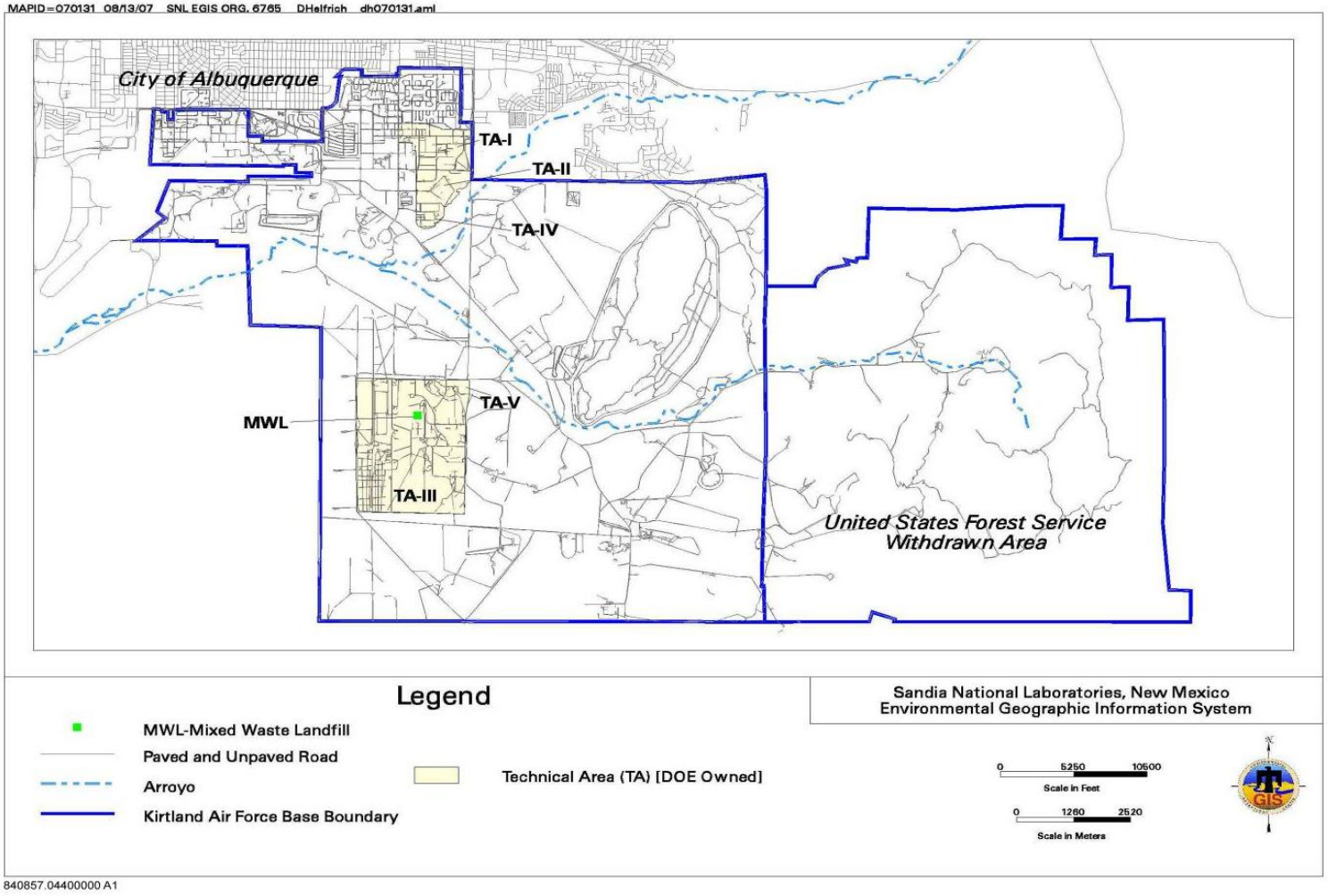


Figure 1-1
Location of Sandia National Laboratories and Kirtland Air Force Base

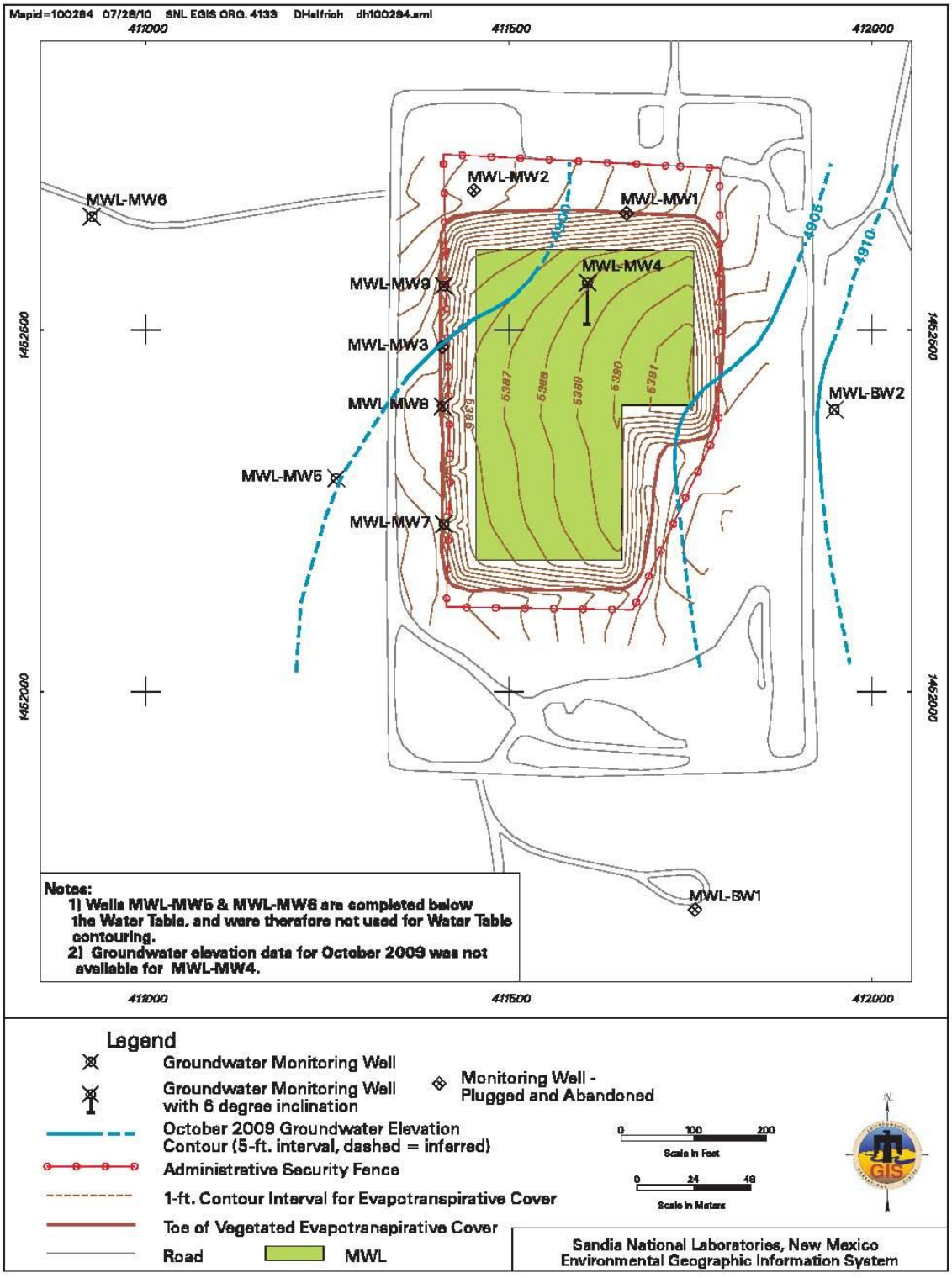


Figure 1-2
Regional Groundwater Elevation and Location of Monitoring Wells at the Mixed Waste Landfill

## 1.1 Toluene Investigation Background

Toluene and three other organic compounds (methylene chloride, acetone, and bis[2-ethylhexyl]phthalate) have been historically detected during groundwater monitoring activities at the MWL and other SNL/NM groundwater monitoring locations. These compounds are common laboratory organic contaminants (EPA April 1992 and SNL/NM July 2007) and the detections have been relatively infrequent and at very low concentrations, typically at or near the analytical laboratory method detection limit (MDL). All of these organic constituents have been detected in various quality control (QC) and/or quality assurance (QA) samples that in many cases confirm the analytical laboratory as the source.

Toluene is a common solvent, one of the primary components of gasoline, and present in many workplace and consumer products. It is also present in some food products, ambient air, vehicle exhaust, and cigarette smoke. It is a common constituent in kerosene, heating oil, paints, thinners, lacquers, glues, nail polish, cosmetics, rubber cement and products, paints, paintbrush cleaners, stain removers, fabric dyes, inks, and adhesives. Because toluene is a primary component of gasoline, a common solvent, and is found in many consumer and workplace products, it is often present in the ambient air and other environment media at very low concentrations (i.e., it is a ubiquitous environmental contaminant [Eco-USA.Net 2010]). Appendix A summarizes pertinent information on toluene.

The four new MWL wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) have been sampled quarterly since installation. During Calendar Year (CY) 2008, MWL-BW2 was sampled three times and MWL-MW7, MWL-MW8, and MWL-MW9 were sampled two times. In CY 2008, only one detection of toluene was reported (July 2008 sample from MWL-MW9). In CY 2009, all four wells were sampled four times and although the toluene concentration ranges were consistent with historical monitoring results (i.e., very low), the frequency of detections was significantly higher as shown in Table 1-1. Data validation of the CY 2009 results indicates the laboratory may not have been the primary source of the toluene detections in groundwater samples.

Table 1-1
Summary of CY 2009 Toluene Detection Frequency in
Groundwater Samples Collected from MWL Wells Installed in 2008

| MWL Well | Number of Samples[a] | Number of Detections | Detection Frequency (%) | Concentration Range (µg/L)[b] |
|---|---|---|---|---|
| MWL-BW2 | 5 | 2 | 40% | 0.366–0.759 |
| MWL-MW7 | 4 | 3 | 75% | 0.267–0.645 |
| MWL-MW8 | 5 | 5 | 100% | 0.253–0.496 |
| MWL-MW9 | 5 | 5 | 100% | 0.306–0.852 |

[a]Includes duplicate samples.
[b]All results from off-site laboratory analysis in units of µg/L per EPA Method 8260 (EPA November 1986) and associated method updates.
CY = Calendar Year.
EPA = U.S. Environmental Protection Agency.
µg/L = Microgram(s) per liter.
MWL = Mixed Waste Landfill.

As a result, SNL/NM project personnel initiated an investigation in late CY 2009 to determine the source of the toluene in the MWL groundwater samples. The investigation included preliminary testing of sampling equipment and well materials (i.e., sample tubing and polyvinyl chloride [PVC] well casing) and a detailed review of laboratory QC and field QA data. In addition, as of November 2009, several changes were made to the sampling process as best management practices (sample tubing materials, custody tape, etc.). After receiving preliminary VOC results for the January 2010 quarterly sampling event, where again groundwater samples from all four wells (including the background well) had low-concentration detections of toluene, SNL/NM project personnel decided to expand the toluene source investigation. Activities that were identified for this expanded investigation included collecting VOC samples at intermediate steps in the well purging process (i.e., at the beginning, during the middle, and at the end) at each MWL monitoring well during the next quarterly sampling event and investigating in more detail the drilling/well installation process, equipment, and materials.

The NMED provided further direction in a letter dated April 30, 2010, for conducting a purging/sampling study of the groundwater along with any other studies necessary to determine the source of toluene (Bearzi April 2010). The NMED letter referenced the NMED/U.S. Department of Energy (DOE) Oversight Bureau (OB) groundwater split sampling results for the July 2009 sampling event at the MWL, where samples from all four new wells showed detections of toluene at low concentrations (NMED/DOE OB February 2010). The NMED approved a 30-day extension request to allow the April purging/sampling study results to be received, validated, evaluated, and included in this report and established a final submittal date for this report of August 30, 2010.

The NMED-issued Compliance Order on Consent (the Consent Order) transferred the regulatory requirements for groundwater sampling at the MWL to the Consent Order (NMED April 2004). This MWL Toluene Investigation Report was prepared in accordance with Section X.C of the Consent Order. The April 30, 2010 NMED letter (Bearzi April 2010) provided written notification that further investigation was required to determine the source of the toluene in groundwater samples at the MWL pursuant to Section VI.A of the Consent Order. This document represents an investigation report consistent with Section VI.C of the Consent Order that "…presents the results of field activities, summarizes the data collected, and presents the recommendations and conclusions of the investigation."

SNL/NM personnel participate in the National Nuclear Security Administration (NNSA) Analytical Management Program, a collaborative effort between the Sample Management Offices (SMOs) at SNL/NM, the Pantex Plant (Pantex), and Los Alamos National Laboratory (LANL) and the third-party data validation and analytical chemistry technical assistance contractor Analytical Quality Associates (AQA). Personnel from the SMOs, AQA, and GEL Laboratories, Inc. (GEL) communicate on a regular basis to address and resolve analytical issues that arise from the enormous analytical programs associated with these three DOE facilities. It is a team effort with the goal of continuous improvement, targeting the analytical process and methods, field collection methods, and the data review and documentation process. This effort has intensified over the past year, due in part to the increase in low-concentration toluene detections, and has resulted in a better understanding of the complex issues associated with the extremely low analytical detection limits and corresponding results that are not consistent with known conditions. The combined staff from AQA and the SMOs at SNL/NM, Pantex, and LANL represent well over 100 years of environmental sampling and analysis experience that have been leveraged for this MWL Toluene Investigation. The information and conclusions presented in this report draw upon this experience base.

## 1.2 MWL Site Description and Regulatory Background

The MWL consists of two distinct disposal areas: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres). Approximately 100,000 cubic feet of low-level radioactive waste and minor amounts of mixed waste containing approximately 6,300 curies (at the time of disposal) were disposed of in the MWL. Low-level radioactive and mixed waste was disposed of in both areas. Classified wastes were buried in cylindrical pits in the classified area. Unclassified wastes were buried in shallow trenches in the unclassified area.

A Phase 1 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was conducted in 1989 and 1990 to determine whether a release of RCRA-regulated contaminants had occurred at the MWL. The Phase 1 RFI indicated that tritium had been released to the environment (SNL/NM September 1990). A Phase 2 RFI was conducted from 1992 to 1995, and the report was submitted to the NMED in September 1996 for technical review and comment. The report went through numerous review and comment response actions. The original report was revised based upon these review and comment response actions, approved by the NMED in December 2002, and published in its final technical format (Peace et al. September 2002). The complete MWL groundwater quality data set was provided to the NMED in the "Responses to NMED Technical Comments on the Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation Dated September 1996, Volumes I and II" (SNL/NM June 1998). The Phase 2 RFI Report confirmed that tritium is the contaminant of primary concern at the MWL and includes a detailed summary of the MWL waste inventory as Appendix A (Peace et al. September 2002).

On October 11, 2001, the NMED directed the DOE and Sandia Corporation (Sandia) to conduct a Corrective Measures Study (CMS) for the MWL. The MWL CMS Report was submitted to the NMED on May 21, 2003 (SNL/NM May 2003). Based upon detailed evaluation and risk assessment using guidance provided by the U.S. Environmental Protection Agency (EPA) and NMED, the DOE and Sandia recommended that an alternative vegetative soil cover (i.e., evapotranspirative [ET] Cover) be constructed as the preferred corrective measure for the MWL.

The NMED held a public comment period on the MWL CMS from August 11 to December 9, 2004. A public hearing was held for the MWL CMS from December 2 to December 3 and December 8 to December 9, 2004. Groundwater monitoring results from 1990 through 2004 and well construction issues were addressed as part of the public hearing process. On May 26, 2005, the Secretary of the NMED selected a vegetative soil cover with a biointrusion barrier as the remedy for the MWL. The selection was based upon the administrative record, including the Hearing Officer's report, and was documented in the NMED "Final Order In the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill" (Final Order) (NMED May 2005). The Secretary requested that a Corrective Measures Implementation Plan (CMIP) incorporating the selected remedy be developed within 180 days following the selection of the remedy.

The MWL CMIP (SNL/NM November 2005) was submitted to the NMED in November 2005 and incorporates the remedy selected by the NMED. In September 2006, approval to proceed with MWL security fence removal and ET Cover subgrade construction was received from the NMED (Bearzi September 2006). The NMED issued the first of two Notices of Disapproval (NODs) on the CMIP in November 2006 (Bearzi November 2006). Sandia responded to the first NOD in two parts (Wagner December 2006 and January 2007). The majority of the second NOD comments (Bearzi October 2008b) were holdover issues from the first NOD. The response to

the second NOD (Davis November 2008) resolved these remaining comments, and the CMIP was conditionally approved by the NMED (Bearzi December 2008).

The MWL ET Cover construction began in May 2009 and was completed in September 2009 in accordance with the MWL CMIP (SNL/NM November 2005). The MWL Corrective Measures Implementation Report (SNL/NM January 2010) documenting ET Cover installation was submitted for NMED review and approval on January 26, 2010.

## 1.3 Toluene Investigation Report Structure

Information on the groundwater data review process, analytical laboratory toluene detection limit, and a comprehensive evaluation of MWL and sitewide groundwater monitoring results are presented in Section 2.0. This information provides the context for the evaluation of potential toluene sources presented in Section 3.0. Potential sources of toluene are evaluated in Section 3.0, including the MWL, the analytical laboratory, the groundwater sampling process, and the well drilling and installation process. The summary and conclusions of this investigation are presented in Section 4.0, and recommendations are presented in Section 5.0. References cited are provided in Section 6.0.

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# 2.0 GROUNDWATER MONITORING AND DATA EVALUATION

Groundwater monitoring at the MWL was initiated in September 1990. All MWL groundwater monitoring results for the period 1990 through 2001 are comprehensively summarized in "Mixed Waste Landfill Groundwater Report, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico" (Goering et al. December 2002). This summary report contains detailed sampling information for the 28 sampling events that occurred between 1990 and 2001, including the wells sampled by date and the corresponding MWL report that documents the results of the sampling event. Table 2-1 summarizes the MWL Annual Groundwater Monitoring Reports from 2002 through 2009. The well installation dates, well decommissioning dates (if applicable), and frequency of groundwater sampling at each MWL monitoring well are summarized in Table 2-2. The current 2010 MWL groundwater monitoring network is comprised of one background (i.e., hydraulically upgradient) well (MWL-BW2), one on-site well (MWL-MW4), and five hydraulically downgradient wells (MWL-MW5 through MWL-MW9).

This section presents information on the groundwater data review process and analytical laboratory toluene detection limit and provides a comprehensive evaluation of MWL and sitewide groundwater monitoring toluene results. This information provides the context for the evaluation of potential toluene sources presented in Section 3.0. Section 2.1 describes the data validation process that is applied to all final MWL and SNL/NM sitewide groundwater monitoring results as well as the laboratory QA/QC process. Changes in the laboratory toluene detection limit over time are presented in Section 2.2. The variation in detection limits has impacted both the number of reported detections and the frequency of detection for toluene in samples from the SNL/NM monitoring network. Sections 2.3 through 2.5 present data evaluations summarized as follows:

- MWL Toluene Results from 1990 through April 2010 (Section 2.3)
- Sitewide Toluene Results from October 2001 through April 2010 (Section 2.4)
- Sitewide Air Monitoring Results (Section 2.5)

Section 2.6 presents the summary and conclusions.

## 2.1 Data Validation

All analytical laboratory (contracting, audits, data management, data review and validation, etc.) and sample management activities associated with the SNL/NM groundwater monitoring program are performed by or through the SNL/NM SMO. Since 1995, the majority of groundwater samples have been shipped to GEL in Charleston, South Carolina, for analysis.

Analytical results received from GEL, including laboratory QC data, are first reviewed by the SMO to verify compliance with contract requirements and are then validated by an independent, third-party contractor, AQA, according to the "Data Validation Procedure for Chemical and Radiochemical Data," Revision 2 (SNL/NM July 2007). The analytical data are evaluated using the analytical method performance and QC parameters specified in the analytical methods (i.e., EPA SW [Solid Waste]-846 Method 8260 and subsequent revisions for VOCs [EPA 1986]) and the SMO Analytical Laboratory Statement of Work (SOW) (SNL/NM May 2009b). These parameters are compared with fixed or statistically derived criteria and compared with criteria presented in EPA guidance documents to determine the quality of the

Table 2-1
Summary of Mixed Waste Landfill Annual
Groundwater Monitoring Reports – 2002 through 2009

| Year | Title | Report Date | Comments |
|---|---|---|---|
| 2002 | Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2002 | August 2002 | Annual sampling conducted April 10–May 14, 2002, at MWL-BW1, MWL-MW1, MWL-MW2, MWL-MW3, and MWL-MW4. Quarterly sampling conducted at MWL-MW5 and MWL-MW6. |
| 2003 | Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2003 | June 2003 | Annual sampling conducted April 2–April 22, 2003 at MWL-BW1, MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW4, MWL-MW5, and MWL-MW6. |
| 2004 | Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2004 | July 2004 | Annual sampling conducted April 12–April 26, 2004 at MWL-BW1, MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW4, MWL-MW5, and MWL-MW6. |
| 2005 | Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2005 | January 2006 | Annual sampling conducted April 4–April 19, 2005 at MWL-BW1, MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW4, MWL-MW5, and MWL-MW6. Quarterly sampling conducted April, August, November 2004, and February 2005 at MWL-BW1 and MWL-MW1 for perchlorate. |
| 2006 | Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2006 Sampling Event | November 2006 | Annual sampling conducted April 3–April 18, 2006 at MWL-BW1, MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW4, MWL-MW5, and MWL-MW6. |
| 2007 | Mixed Waste Landfill Annual Groundwater Monitoring Report ,Spring 2007 Sampling Event | January 2008 | Annual sampling conducted April 2–April 11 and June 4–June 5, 2007 at MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW4, MWL-MW5, and MWL-MW6. |
| 2008 | Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2008 | May 2009 | Annual sampling conducted April 8–April16, 2008 at MWL-MW4, MWL-MW5, and MWL-MW6. Quarterly sampling conducted April 8-April 16, July 14-July 17, and October 1-October 8, 2008 at MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9. |
| 2009 | Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2009 | June 2010 | Sampling conducted January 5–January 8, April 1–April 13, July 7–July 9, and October 5–October 8, 2009 at MWL-BW2, MWL-MW4, MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9. |

Table 2-2
Groundwater Monitoring Sampling Frequency Summary for the Mixed Waste Landfill

| Monitoring Well | Installation Date | Sampling Frequency Summary |
|---|---|---|
| MWL-BW1 MWL-MW1<br>MWL-MW2<br>MWL-MW3 | July 1989<br>October 1988<br>August 1989<br>August 1989 | Quarterly sampling from September 1990 through January 1992.<br>Semiannual sampling from January 1992 through April 1999.<br>Annual sampling from April 1999 through present.<br>Confirmatory sampling of MWL-BW1 for toluene and methylene chloride in October 2000.<br>*Notes:* MWL-BW1 decommissioned in January 2008, MWL-MW1 and MWL-MW3 in April 2008, and MWL-MW2 in May 2008 |
| MWL-MW4 | February 1993 | Quarterly sampling from April 1993 through April 1999.<br>Semiannual sampling from April 1999 through April 2000.<br>Annual sampling from April 2000 through present.<br>Confirmatory sampling of MWL-MW4 for toluene and methylene chloride in October 2000.<br>*Notes:* Sampled two times in 2001 (February and April) due to Baski® packer issue. |
| MWL-MW5<br>MWL-MW6 | November 2000<br>October 2000 | Sampled quarterly January through October 2002.<br>Sampled annually April 2003 through present.<br>*Notes:* The 2007 annual sampling event was conducted in April and June 2007. |
| MWL-BW2 | January 2008 | Sampled quarterly from April 2008 through present. |
| MWL-MW7<br>MWL-MW8<br>MWL-MW9 | May 2008<br>May 2008<br>May 2008 | Sampled quarterly from July 2008 through present.<br>*Notes:* MWL-MW7, MWL-MW8, and MWL-MW9 were installed in May 2008, but well development was not completed until June 2008. |

results through a rigorous review process. The quality parameters are measures of the following: (1) the analytical precision and accuracy, (2) potential contamination from both the field and the laboratory, (3) sample matrix effects, (4) sample inhomogeneity, and (5) correct implementation of method performance requirements (calibration protocols, internal standard and surrogate acceptance, etc.). One hundred percent of the VOC analytical data undergoes this level of validation.

Table 2.1-1 summarizes the 16 validation elements that AQA uses to validate data packages containing VOC data. In the data validation procedure, toluene is identified as a common laboratory contaminant. When laboratory contamination is identified in laboratory QC samples (i.e., method blank samples), the associated environmental and field QC blank samples (i.e., trip blank [TB], equipment blank [EB], and field blank [FB] samples) are qualified using the EPA "Rule of 10" for blank contamination (EPA 1999). This qualification of the data occurs because the laboratory method blank results indicate the toluene contamination for those specific samples is occurring in the laboratory. The Rule of 10 adjusts for this contamination by taking the concentration detected in the laboratory method blank(s), multiplying it by 10, and qualifying all results that fall below that concentration. For low-concentration detections of common laboratory contaminants such as toluene in environmental and field QC blank samples, this typically results in a qualification of "not detected" or "U."

It is important to note that laboratory QC measures, including the analysis of method blank samples, are not perfect and will not catch every instance when the laboratory is the cause of the toluene detection. This is because laboratory blanks represent a "spot check" and not 100% real-time coverage for environmental sample analyses. For instance, for a batch of groundwater samples analyzed late in the afternoon the laboratory method blank may have been analyzed earlier in the morning of that day. Conditions in the laboratory environment may have changed by the time the environmental samples are analyzed. Sensitive gas chromatograph/mass spectrometer equipment used in the EPA Method 8260 VOC analysis can detect low levels of toluene contamination at any time. For example, if someone wearing aftershave, perfume, or slightly contaminated clothing/personal protective equipment walks by the equipment during sample runs, the instrument can report a toluene detection above the MDL. Also, if contaminated environmental samples are run after the method blank and contaminate the instrument, toluene detections can result in the environmental samples analyzed after the contaminated samples. Because the method blank may have been run many hours before the environmental samples, it may not be a reliable indicator of contamination that may be present throughout the entire analytical process. Nevertheless, the required method blanks do provide a reasonably good indicator of laboratory performance and contamination issues.

## 2.2 Laboratory Method Detection Limit

The laboratory reports VOC analytical results according to two detection limits. The statistically derived MDL is the lower of two detection limits and represents a detection concentration limit with a 99% confidence level that the compound is actually present. However, the concentration is qualified as estimated (i.e., with "J" by the laboratory) when it falls above the MDL but below the practical quantitation limit (PQL) because the PQL, set equal to the lowest calibration standard concentration, is the lowest level at which measurements become quantitatively meaningful. In other words, the PQL represents the concentration limit at which results are reproducible within a fairly narrow uncertainty window on a routine day-to-day basis. The PQL is often roughly 5 to 10 times the MDL. In very general terms, a concentration below

Table 2.1-1
Data Validation Elements for Review of EPA Method 8260 VOC Data

| Validation Element |
|---|
| Data Package completeness |
| Holding times |
| Sample preservation (including assessment for 2-chloroethyl vinyl ether) |
| GC/MS instrument tune |
| Initial calibration<br>• Number and TAL of standards<br>• Response factors, % Relative Standard Deviation (average Response Factor curve)<br>• Linear regression curve (slope, $r^2$, intercept) |
| Calibration verification<br>• Initial Calibration Verification frequency, TAL, %Difference<br>• Continuing Calibration Verification frequency, TAL, %Difference |
| Blanks<br>• Method blanks<br>• Field blanks, equipment blanks, trip blanks |
| Surrogate recovery |
| Internal standard<br>• Recovery<br>• Retention time |
| MS/MSD<br>• Parent sample source<br>• TAL<br>• Frequency<br>• Recovery<br>• MS/MSD RPD |
| LCS<br>• Frequency<br>• TAL<br>• %Recovery |
| Sample carry-over |
| Dilutions |
| Mass spectra evaluation (upon request for focused validation) |
| Manual integration evaluation (upon request for focused validation) |
| TIC (when TIC reports are requested) |

EPA = U.S. Environmental Protection Agency.
GC/MS = Gas Chromatograph/Mass Spectrometer.
LCS = Laboratory control sample.
MS/MSD = Matrix spike/matrix spike duplicate.
RPD = Relative percent difference.
TAL = Target analyte list.
TIC = Tentatively identified compound.
VOC = Volatile organic compound.

the MDL cannot be “seen” or detected by the laboratory instrumentation; a concentration between the MDL and PQL indicates the compound is present, but the actual concentration value is uncertain and is considered to be an estimate, whereas a concentration at or above the PQL is an accurate value with small uncertainty.

As part of its QC protocol the laboratory prepares and analyzes method blank samples comprised of ultra-clean, laboratory-provided water with each batch of samples from clients such as SNL/NM. The purpose of a method blank is to help identify any contamination from the laboratory reagents, standards, and ambient environment that might affect sampling results. In preparing a method blank, surrogate and internal standard compounds are added to clean water following the sample process the environmental samples go through prior to analysis.

Figure 2.2-1 shows the GEL MDL for toluene over time according to the EPA SW-846 Method 8260 and subsequent revisions (EPA 1986). Prior to 1995, the SNL/NM SMO required off-site laboratories to provide reporting limits that were approximately equivalent to PQLs. The toluene reporting limit and corresponding MDL equivalent during this time period were generally 5 and 1 micrograms per liter (µg/L), respectively. However, in some cases lower values were reported during this time period, including results from the on-site SNL/NM Environmental Restoration Chemistry Laboratory (ERCL). Although the MDL and PQL can change for an individual analysis depending upon many factors, the toluene MDL has generally been consistent with Figure 2.2-1 for MWL groundwater sample analyses. Between May 1998 and May 2005, the toluene MDL changed several times, ranging from 0.5 to 0.17 µg/L. Since May 2005, the MDL has remained relatively stable at a concentration of 0.25 µg/L.

GEL must verify the MDL for every organic constituent at least annually. This verification includes both the analysis of standards for each analyte prepared at concentrations at or near the MDL and the examination of the population of method blank results acquired over the previous year. Method blank results are a good indicator of potential laboratory contamination issues but are not perfect, particularly where VOCs are concerned, as discussed in Section 2.1.

## 2.3 MWL Toluene Groundwater Monitoring Results

Groundwater monitoring results have been and will continue to be documented and submitted to the NMED through MWL Annual Groundwater Monitoring Reports. All MWL groundwater monitoring results for the period 1990 through 2001 are comprehensively summarized in the “Mixed Waste Landfill Groundwater Report, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico” (Goering et al. December 2002) that also presents the hydrogeologic setting and conceptual site model. Table 2.3-1 summarizes all toluene detections in MWL annual, semiannual, and quarterly groundwater samples by monitoring well for the period from 1990 through April 2010. In most cases, these results are from an off-site analytical laboratory under contract through the SMO, although a few of the pre-2001 sampling event results are from ERCL. Since 1995, most quarterly and annual sampling results have been from GEL.

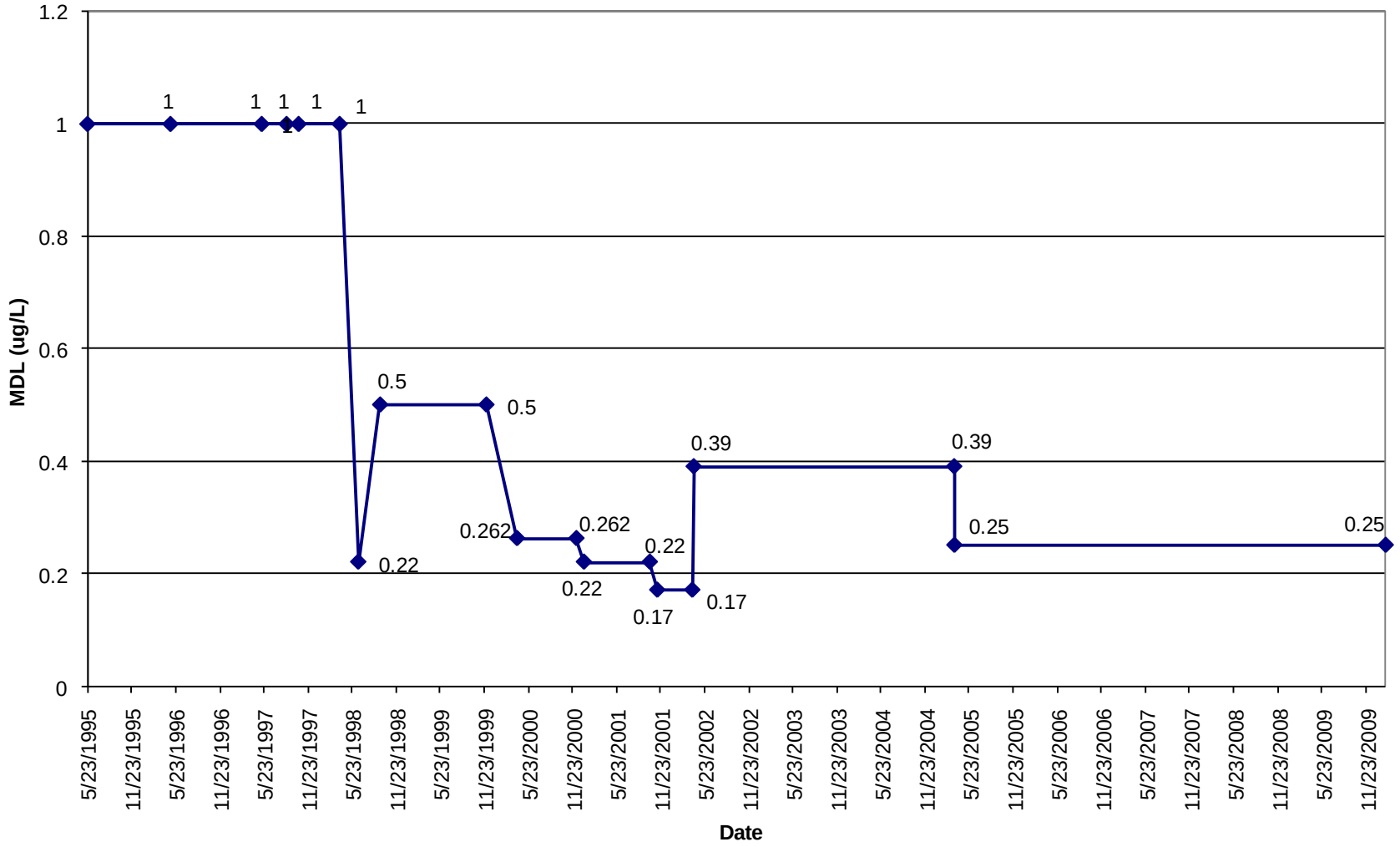


Figure 2.2-1
Toluene Method Detection Limit for GEL Laboratories, Inc., 1995 to present

Table 2.3-1
Summary of Toluene Detected in MWL Groundwater Samples – 1990 through 2010

| Well | Sample Date | Result (µg/L)[a] | Comments |
|---|---|---|---|
| **Original Monitoring Wells** | | | |
| MWL-BW1<br>Well installed June 1989<br>Well decommissioned January 2008 | 04-28-97 | 0.83 J | ERCL result (on-site laboratory) |
| | 04-06-00 | 2.54 | |
| | 04-06-01 | 0.31 J | |
| MWL-MW1<br>Well installed September 1988<br>Well decommissioned April 2008 | 11-06-98 | 0.59 J | |
| | 04-13-01 | 0.246 J | |
| MWL-MW2<br>Well installed July 1989<br>Well decommissioned May 2008 | 04-15-96 | 1.84 J | |
| | 04-24-97 | 0.53 J | ERCL result (on-site laboratory) |
| | 04-19-99 | 0.57 J | |
| | 04-23-01 | 0.537 J | |
| MWL-MW3<br>Well installed August 1989<br>Well decommissioned April 2008 | 04-12-99 | 0.98 J | |
| | 04-11-07 | 0.275 J | |
| MWL-MW4<br>Well installed February 1993 | 05-31-94 | 0.54 J | |
| | 10-15-97 | 4.4 | |
| | 11-06-98 | 13 | |
| | 11-06-98 | 11 | Duplicate sample |
| | 04-14-99 | 4.2 | |
| | 04-07-00 | 2.7 | ERCL result (on-site laboratory) |
| | 02-07-01 | 1.27 | |
| | 02-07-01 | 1.36 | Duplicate sample |
| | 02-09-01 | 0.679 J | |
| | 02-09-01 | 0.709 J | Duplicate sample |
| | 04-04-01 | 0.359 J | |
| | 04-05-01 | 0.225 J | Duplicate sample |
| | 06-05-07 | 0.321 J | |
| MWL-MW5<br>Well installed November 2000 | 01-17-01 | 0.765 J | |
| **New Monitoring Wells Installed in 2008** | | | |
| MWL-BW2<br>Well installed January 2008 | 01-05-09 | 0.759 J | |
| | 07-06-09 | 0.366 J | |
| | 01-04-10 | 0.438 J | |
| MWL-MW7<br>Well installed May 2008 | 01-06-09 | 0.510 J | |
| | 04-08-09 | 0.267 J | |
| | 07-07-09 | 0.645 J | |
| | 01-05-10 | 0.320 J | |
| | 01-05-10 | 0.285 J | Duplicate sample |
| MWL-MW8<br>Well installed May 2008 | 01-07-09 | 0.496 J | |
| | 01-07-09 | 0.495 J | Duplicate sample |
| | 04-07-09 | 0.457 J | |
| | 07-08-09 | 0.475 J | |
| | 10-07-09 | 0.253 J | |
| | 01-06-10 | 1.45 | |

Refer to footnotes at end of table.

Table 2.3-1 (Concluded)
Summary of Toluene Detected in MWL Groundwater Samples – 1990 through 2010

| Well | Sample Date | Result (µg/L)[a] | Comments |
|---|---|---|---|
| **New Monitoring Wells Installed in 2008 (Continued)** | | | |
| MWL-MW9<br>Well installed May 2008 | 07-15-08 | 0.510 J | |
| | 01-08-09 | 0.852 J | |
| | 04-09-09 | 0.306 J | |
| | 07-09-09 | 0.711 J | |
| | 07-09-09 | 0.692 J | Duplicate sample |
| | 10-05-09 | 0.513 J | |
| | 01-07-10 | 1.10 | |

[a]All results from off-site laboratory analysis in units of µg/L per EPA Method 8260 (EPA November 1986) and associated method updates except as noted in the comment field.

EPA = U.S. Environmental Protection Agency.
ERCL = Environmental Restoration Chemistry Laboratory (on-site laboratory).
J = Estimated value by the laboratory, above the method detection limit but below the practical quantitation limit.
µg/L = Microgram(s) per liter.
MWL = Mixed Waste Landfill.

Toluene has been detected in groundwater samples from the MWL at very low concentrations since 1994. Except for MWL-MW6, samples from all wells, including the two background monitoring wells (MWL-BW1 and MWL-BW2), have had at least one detection of toluene. From the start of groundwater monitoring at the MWL in 1990 through April 2010, there have been 47 detections of toluene in MWL groundwater monitoring samples collected for quarterly, semiannual, or annual sampling events, of which 14 are from MWL-MW4 samples. The MWL-MW4 results are related to a unique situation (the Baski® packer) that is described in Section 2.3.1; the results are not included in the following discussion.

Toluene concentrations range from 0.246 µg/L (MWL-MW1) to 2.54 µg/L (MWL-BW1). The maximum detection of 2.54 µg/L occurred in the April 2000 sample from the original background monitoring well, but there were no other toluene detections during sampling conducted through 2008 when MWL-BW1 was decommissioned. Only four results exceed 1 µg/L. Of the 33 toluene detections (excluding the 14 MWL-MW4 results) all but 4 results are qualified as estimated concentrations (i.e., "J" values). These results are qualified as estimated by the laboratory because the result falls between the MDL and PQL. Only five detections were reported from the time period prior to 1998 when the MDL was 1 µg/L. Of the 21 detections in samples from the new monitoring wells installed since 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9), 16 occurred in 2009 and only 2 would have been reported with the pre-1997 MDL of 1 µg/L (Section 2.2). In addition, the existing wells (MWL-BW1 and MWL-MW1 through MWL-MW6) were sampled on an annual basis for many years (Table 2-2), whereas the new wells installed in 2008 have been sampled quarterly since installation. The relationship between sampling frequency, toluene detection frequency, and the timing of well installation is discussed in Section 2.4.

A concentration of 1 µg/L equals 1 part per billion (ppb). In summary, the toluene results for the MWL groundwater monitoring samples represent extremely low concentrations that are close to the MDL and orders of magnitude less than the EPA maximum contaminant level of 1,000 µg/L (EPA 2009) and the NMED maximum allowable concentration of 750 µg/L (Title 20, New Mexico Administrative Code, Chapter 6, Part 2, Section 3103A).

As discussed in Section 2.1, the toluene results for MWL groundwater samples are reviewed according to the contract requirements and data validation process (SNL/NM July 2007). From October 2001 through April 2010, the toluene results for 10 environmental samples were qualified as not detected during data validation because of laboratory contamination documented in method blank samples. Of these 10 results, 5 were from the April 2010 quarterly sampling event. These data confirm that in some instances the source of toluene detected in MWL groundwater samples is the analytical laboratory.

### 2.3.1 MWL-MW4 Toluene Summary

As presented in the "MWL Annual Groundwater Monitoring Report, FY 2001" (SNL/NM December 2001a) and "MWL Groundwater Report, 1990 through 2001" (Goering et al. December 2002), the toluene detections in samples from MWL-MW4 through 2001 are most likely related to the Baski® inflatable packer that separates the two discrete screen intervals that are 20 feet apart (Peace et al. September 2002). Nitrogen gas pressure is maintained in the packer to inflate a rubber element that seals against the well casing between the two screen intervals.

In February 2001, a purging/sampling test was performed to evaluate the packer as a potential source of the detected toluene. The results for samples collected after purging were lower in concentrations than the samples collected before MWL-MW4 was purged, suggesting that toluene was originating from the packer.

In May 2001, the packer was removed for servicing, and the rubber element of the packer showed significant damage and deterioration from a pinhole leak. After inspecting and repairing the packer, personnel from Baski Inc., the manufacturer of the packer, informed Sandia that the damaged rubber element was the likely source of low-level detections of toluene, as it is used in the manufacturing process for the exposed rubber element and can leach from the element if it is damaged. The packer was repaired and a Teflon® sleeve was used to cover the rubber element when it was reinstalled. Since the annual sampling event in April 2002, there has been only one detection of toluene in MWL-MW4 samples, reported for the June 2007 sample at a concentration of 0.321 J µg/L.

### 2.3.2 NMED/DOE OB Split Sampling

The NMED/DOE OB performs periodic split sampling during SNL/NM groundwater monitoring sampling events and sends its split samples to the ALS Laboratory Group (ALS) in Fort Collins, Colorado. The NMED/DOE OB samples are split samples collected from the monitoring wells at the same time the SNL/NM samples are collected, following the same procedures and using the same equipment. Not all wells are split-sampled during each event, and the analytical results requested by the NMED/DOE OB are often a subset of the full MWL monitoring analytical suite. Samples for VOCs are collected in ALS-provided containers with hydrochloric acid preservative and shipped to ALS with TB samples. The SNL/NM and NMED/DOE OB toluene results for four sampling events conducted from 2008 through January 2010 are presented in Table 2.3-2 for comparison.

The NMED/DOE/OB results correlate closely with the SNL/NM results indicating the source of the low-concentration toluene results for these samples is not the analytical laboratory. For this time period, no SNL/NM or NMED/DOE OB TB results showed detections of toluene, and none of the results were qualified during data validation.

### 2.3.3 April and June 2010 Purging/Sampling Study Results

During the April 2010 annual sampling event at the MWL, samples for VOC analysis were collected from all groundwater monitoring wells during the purging process. The purpose of the purging/sampling study was to evaluate potential toluene sources related to drilling/well materials and/or inadvertent contamination that may have occurred during the drilling/well installation process. Although samples from wells MWL-MW4 through MWL-MW6 have not shown as many toluene detections as the new wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9), these wells were included in the purging/sampling study.

During June 2010, a similar purging/sampling study was conducted at monitoring well TAV-MW10 because it was drilled and installed in February 2008 during the same drilling effort and by the same drilling contractor as the new wells at the MWL (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). Toluene was also detected three times in TAV-MW10 samples during the eight sampling events prior to June 2010 (one result was qualified as a nondetection during data validation).

Table 2.3-2
Comparison of Split-Sampling Toluene Results for Groundwater Samples Collected by SNL/NM and the NMED/DOE OB at the MWL – 2008 through 2010

| Well | Sample Date | SNL/NM Result[a] (µg/L) | NMED/DOE OB Results[b] (µg/L) |
|---|---|---|---|
| MWL-BW2 | 04-09-08 | ND (0.25) | ND (0.17) |
| | 07-17-08 | ND (0.25) | ND (0.17) |
| | 07-06-09 | 0.366 J | 0.37 J |
| MWL-MW7 | 07-16-08 | ND (0.25) | ND (0.17) |
| | 01-06-09 | 0.510 J | 0.5 J |
| | 07-07-09 | 0.645 J | 0.7 J |
| | 01-05-10 | 0.32 J | ND (0.17) |
| MWL-MW8 | 07-14-08 | ND (0.25) | ND (0.17) |
| | 07-08-09 | 0.475 J | 0.52 J |
| | 01-06-10 | 1.45 | 1.1 |
| MWL-MW9 | 07-15-08 | 0.510 J | 0.35 J |
| | 07-09-09 | 0.711 J | 0.97 J |
| | 01-07-10 | 1.1 | 0.77 J |

[a]SNL/NM results from GEL Laboratories, Inc., validated by AQA.
[b]NMED/DOE OB results from ALS Laboratory Group, validated by AQA.
AQA = Analytical Quality Associates Inc.
DOE = U.S. Department of Energy.
J = Estimated value, above the method detection limit but below the practical quantitation limit.
µg/L = Microgram(s) per liter.
MWL = Mixed Waste Landfill.
ND = Not detected above the method detection limit, shown in parentheses.
NMED = New Mexico Environment Department.
OB = Oversight Bureau.
SNL/NM = Sandia National Laboratories/New Mexico.

### *2.3.3.1 MWL Purging/Sampling Study*

Samples were collected at the beginning of and during the purging process, as well as at the end. The last sample collected represents the quarterly groundwater monitoring result. The samples collected at the start of and during the purging process were collected to determine whether toluene concentrations are higher in the groundwater prior to and during the purging process, as might be the case if a toluene source exists in the well itself (i.e., if toluene was leaching from the PVC screen material or contaminated filter pack material). Purging/sampling study results helped to identify the Baski® packer as the source of past toluene detections in samples from MWL-MW4 (SNL/NM December 2001a).

Table 2.3-3 presents the number of samples collected from each MWL well for the purging/sampling study as well as the toluene results. No detections of toluene were reported for any of the environmental or field QC blank samples, in contrast to the numerous detections reported in the 2009 and January 2010 sampling results where toluene detections at low concentrations were frequent. Two toluene detections for samples from MWL-BW2 (0.310 and 0.570 µg/L), three for samples from MWL-MW8 (0.260 to 0.660 µg/L), two for TB samples (0.630 and 0.660 µg/L), and one for an EB sample (0.330 µg/L) were qualified with “U” as not

Table 2.3-3
Summary of April 2010 Toluene Purging/Sampling Study Results for MWL Wells

| MWL Well | Number of Samples | Toluene Results/Comments |
|---|---|---|
| MWL-BW2 | 6 | 3 results not detected at 0.25 µg/L.<br>3 results qualified as not detected at 1.0 µg/L during data validation. |
| MWL-MW4 | 4 | All results not detected at 0.25 µg/L. |
| MWL-MW5 | 6 | All results not detected at 0.25 µg/L. |
| MWL-MW6 | 5 | All results not detected at 0.25 µg/L. |
| MWL-MW7 | 5 | All results not detected at 0.25 µg/L. |
| MWL-MW8 | 4 | 1 result not detected at 0.25 µg/L.<br>3 results qualified as not detected at 1.0 µg/L during data validation. |
| MWL-MW9 | 4 | All results not detected at 0.25 µg/L. |
| Trip Blanks | 10 | 8 results not detected at 0.25 µg/L.<br>2 results qualified as not detected at 1.0 µg/L during data validation. |
| Equipment Blanks | 2 | 1 result not detected at 0.25 µg/L.<br>1 result qualified as not detected at 1.0 µg/L during data validation. |
| Field Blanks | 2 | All results not detected at 0.25 µg/L. |
| **Total** | **48** | 34 environmental sample results, 14 field QC sample results |

µg/L = Microgram(s) per liter.
MWL = Mixed Waste Landfill.
QC = Quality control.

The results of the April 2010 purging/sampling study, which was specifically requested by the NMED (Bearzi April 2010), support the conclusion that toluene is not present in the groundwater or derived from drilling/well materials. If drilling/well materials or inadvertent contamination introduced during the drilling/well installation process were the source of toluene, the initial sample should have had a detectable toluene concentration. All toluene results reported for the April 2010 sampling event (0.260 to 0.660 µg/L), including detections in the EB and TB samples, are associated with the laboratory process and were qualified as not detected during the data validation process.

### *2.3.3.2 TAV-MW10 Purging/Sampling Study*

Since installation in February 2008, monitoring well TAV-MW10 has been sampled eight times (April, September, and December 2008; February, June, September, and December 2009; and February 2010). Three toluene detections have been associated with the eight sampling events (April 2008, February 2009, and June 2009), with toluene concentrations ranging from 0.252 to 0.39 µg/L. The April 2008 result (0.39 µg/L) was qualified as not detected during data validation due to toluene contamination detected in the associated laboratory method blank sample. The other two detections from 2009 samples were not qualified. The nondetected results from September 2008 and September 2009 were rejected during the data validation process due to laboratory QC issues. These two rejected nondetected results are not considered in the toluene detection frequency for this well, which is 25% (two detections out of eight samples, including two duplicate samples; Appendix B).

During the recent sampling event completed in June 2010, a purging/sampling study was performed following the same procedure that was used for the MWL monitoring wells. Four samples were collected during the purging process prior to collection of the final environmental and duplicate sample. Toluene was detected in two of the purging samples (first and third samples collected), but was not detected in any of the other samples. The toluene results are presented in Table 2.3-4.

Table 2.3-4
Summary of June 2010 Toluene Purging/Sampling
Study Results for Monitoring Well TAV-MW10

| Sample Time | Volume of Water Purged (gallons) | Toluene Result (µg/L) | Comments |
|---|---|---|---|
| June 7, 2010 – 8:30 a.m. | Initial groundwater | 0.350 J | Purging test sample |
| June 7, 2010 – 8:53 a.m. | 8 | ND (0.25) | Purging test sample |
| June 7, 2010 – 9:12 a.m. | 16 | 0.330 J | Purging test sample |
| June 7, 2010 – 9:30 a.m. | 24 | ND (0.25) | Purging test sample |
| June 7, 2010 – 9:48 a.m. | >31 gallons | ND (0.25) | Environmental sample |
| June 7, 2010 – 9:48 a.m. | >31 gallons | ND (0.25) | Duplicate sample |

J = Estimated value, above the method detection limit but below the practical quantitation limit.
µg/L = Microgram(s) per liter.
MW = Monitoring well.
ND = Not detected at the method detection limit, shown in parentheses.
TAV = Technical Area V.

The results for the June 2010 purging/sampling study performed at well TAV-MW10 vary from the MWL results. The fact that very low concentrations of toluene were detected only in samples collected early in the purging process and not in the final samples is consistent with drilling/well materials and/or inadvertent contamination introduced during the drilling/well installation process as possible toluene sources.

## 2.4 Sitewide Toluene Data Evaluation

Toluene results for all six SNL/NM groundwater monitoring programs (i.e., sitewide groundwater) were evaluated to determine whether the toluene detections at the MWL represent a unique situation or are occurring at other locations. Section 2.4.1 presents an evaluation of the sitewide environmental groundwater sampling results, and Section 2.4.2 presents an evaluation of the results for sitewide environmental field QC samples. Supporting summary information is provided in Appendix B for each monitoring well, including the number of toluene detections and nondetections, concentration range, number of results qualified as not detected during data validation, and the year the well was installed.

### 2.4.1 Sitewide Groundwater Sampling Results

Groundwater sampling results from October 2001 through April 2010 were evaluated for 93 monitoring wells and Coyote Springs, including a total of 1,606 results (environmental, split, and duplicate samples). The monitoring wells are located within six SNL/NM groundwater project areas and are collectively referred to as “sitewide monitoring wells and results” in this

report. These project areas are summarized in Table 2.4-1, which also presents the regulatory designation for each and the identification prefixes used for labeling associated monitoring wells. An important factor in this data analysis effort is that toluene is not a primary constituent of concern (COC) at any of the groundwater project areas. Toluene detections may have been expected based on the use of fuels at the Burn Site Groundwater Area of Concern. However, only one detection of toluene was reported for the samples collected from seven Burn Site Groundwater monitoring wells included in this study, and 101 nondetected results for toluene were reported. Figure 2.4-1 shows the locations of all sitewide monitoring wells across KAFB; Figure 1-1 shows the location of the MWL; and Figure 1-2 shows the location of the MWL groundwater monitoring wells. Supporting information is provided in Appendix B for this sitewide data evaluation.

Table 2.4-1
Summary of SNL/NM Groundwater Project Areas

| Program or Project Area | Designation | Well Identification Prefix |
|---|---|---|
| Groundwater Protection Program | Groundwater Surveillance Monitoring | NWTA3-, SWTA3-, PL-, CTF-, TRE-, SFR-, MRN-, GREYSTONE-, EOD HILL, COYOTE SPRING |
| Chemical Waste Landfill | Regulated Unit | CWL- |
| Mixed Waste Landfill | SWMU | MWL- |
| Technical Area V | Groundwater AOC | LWDS-, TAV-, AVN- |
| Tijeras Arroyo Groundwater | Groundwater AOC | EUBANK-, PGS- , TA1-, TA2-, TJA-, WYO- |
| Burn Site Groundwater | Groundwater AOC | CYN- |

AOC = Area of Concern.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

Of the 1,638 results evaluated (environmental, split, and duplicate samples). 118 detections of toluene were reported. Twenty-three of these detections (19%) are for samples from the MWL wells (21 from the new wells installed in 2008). These totals do not include 71 detections that were qualified as not detected during the data validation process due to contamination identified in laboratory QC blank samples. An additional 20 nondetected results were also qualified during data validation for the same reasons. Four results were rejected due to other laboratory QC issues and are not included in the evaluation.

Figure 2.4-2 shows all toluene detections for groundwater samples from this time period from all SNL/NM monitoring wells, with MWL groundwater sampling results shown in red and results for all other wells in blue. The red vertical lines indicate 2008 through 2010 MWL quarterly sampling events. Several important points are illustrated in this graph, which are summarized as follows:

- All 118 detections occur at very low concentrations within a narrow concentration range (0.17 to 2.2 µg/L), with only 3 detections exceeding 1.5 µg/L (no MWL samples), and only 14 detections exceeding 1 µg/L (2 only in MWL samples). Of the total results, 88% are less than 1 µg/L (104 out of 118 results), and 63% are less than 0.50 µg/L (74 out of 118).

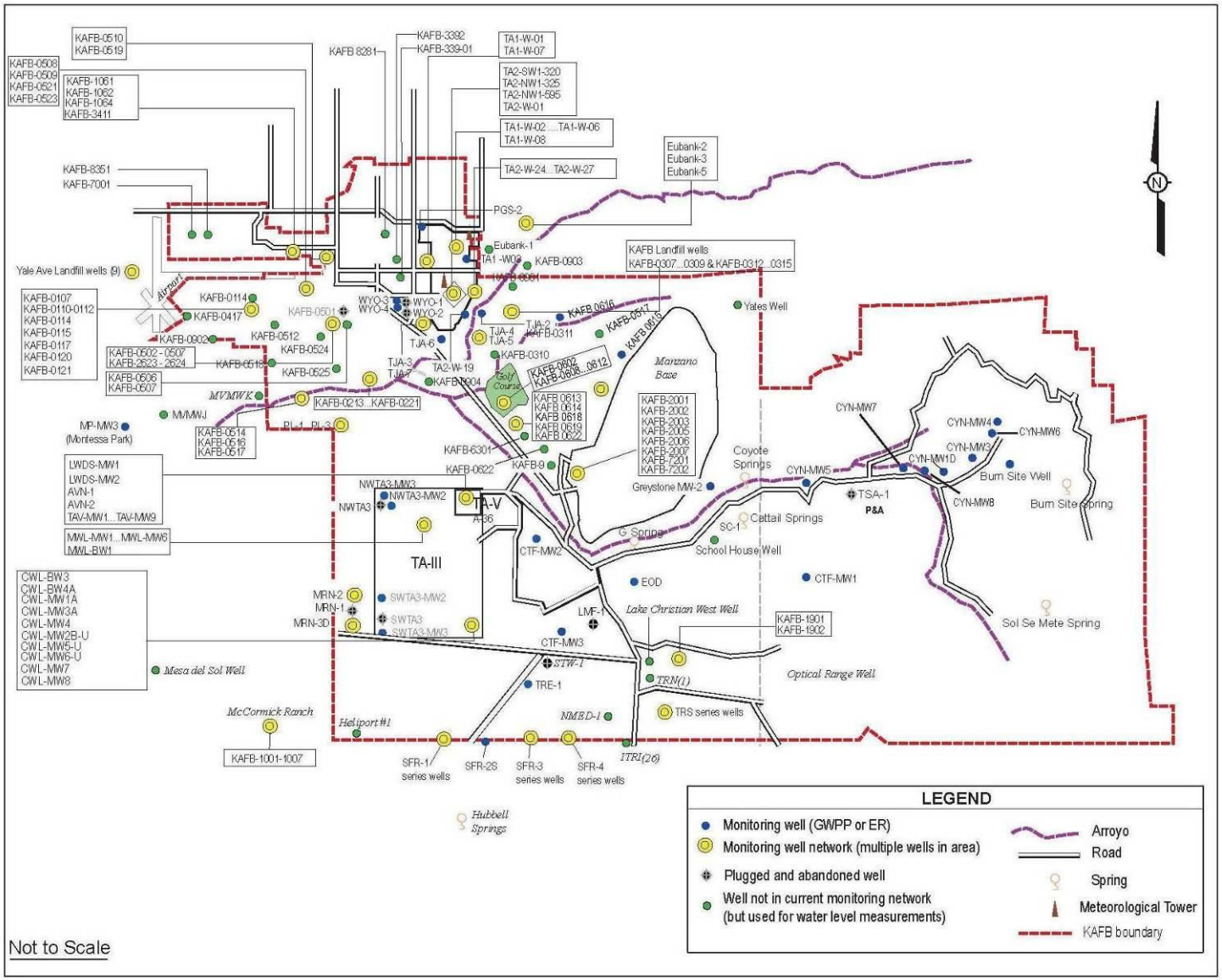


Figure 2.4-1
Location of SNL/NM Sitewide Monitoring Wells and Coyote Springs

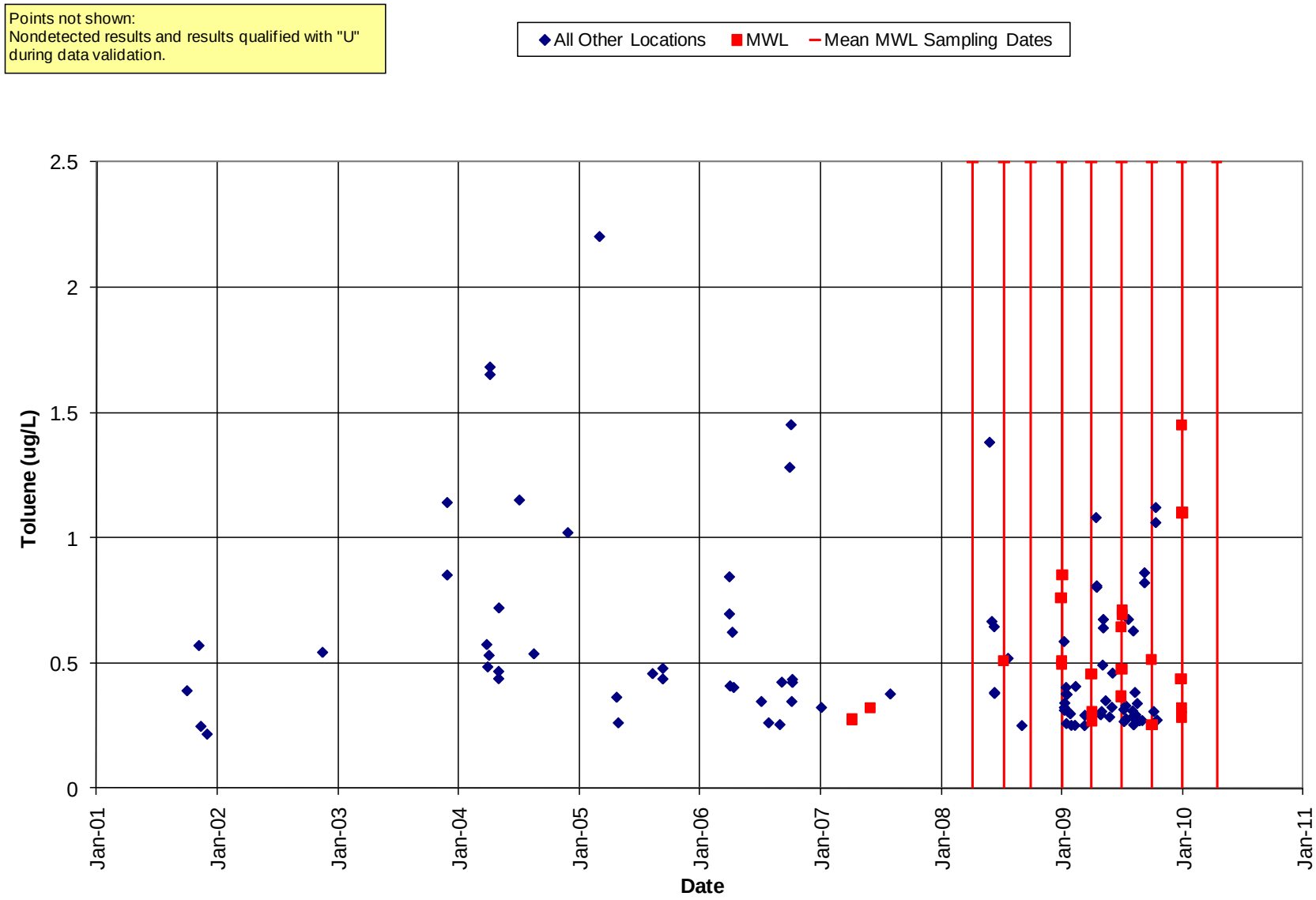


Figure 2.4-2
Sitewide Groundwater Monitoring Toluene Results for October 2001 through April 2010

- In a general sense toluene detections appear to cluster with respect to time, with more detections occurring in the years 2004, 2006, and 2009 in comparison to 2002, 2003, and 2008.

- Between 2008 and 2009, the number of samples remained relatively constant, but the number of toluene detections significantly increased across the sitewide groundwater monitoring network (2008: 163 samples, 8 detections; 2009: 174 samples, 63 detections).

- For the same time period at the MWL, the same trend is evident (2008: 15 samples, 1 detection; 2009: 23 samples, 15 detections).

Toluene contamination occurring at the laboratory, as confirmed during data validation, accounted for 71 detections, which represents 58% of the total unqualified detections (118 unqualified detections versus 68 qualified detections) and 4% of the total sample population. An evaluation of the laboratory as a source of toluene in MWL groundwater samples is presented in Section 3.2.

The number of detections versus the number of samples, or the frequency of detection at a given monitoring well, allows comparison of wells that have been sampled at different frequencies or a different number of times. Figure 2.4-3 shows the detection frequency at all of the monitoring wells with at least one toluene detection. MWL monitoring wells are shown in red and all other wells are shown in blue. The new MWL monitoring wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) show a higher relative detection frequency, ranging from 19% in background well MWL-BW2 to 58% in MWL-MW9. Four Chemical Waste Landfill (CWL) wells (background wells CWL-BW3 [25%] and CWL-BW4A [25%] and monitoring wells CWL-MW5U [28%] and CWL-MW6U [32%]) also show a relatively high detection frequency, as does Groundwater Protection Program well EUBANK-2 (25%). Also of note is well TAV-MW10 (25%) that was installed during the same drilling effort as the new MWL wells in 2008. In addition to the new MWL and TA-V wells installed in 2008, 20 monitoring wells have a detection frequency greater than or equal to 10%.

A different perspective is presented in Figure 2.4-4, which shows the percentage of toluene detections that occurred in 2009 for all the monitoring wells with a detection frequency greater than or equal to 10%. The percentage of toluene detections in 2009 for the new MWL wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and TAV-MW10 ranges from 60 to 100%. For other wells that have been sampled more extensively prior to 2009, the impact of the 2009 detections is less. Figures 2.4-2 and 2.4-3 taken together reflect the impact of the higher number of overall toluene detections in 2009 on the wells that were installed and began quarterly sampling in 2008. The fact that these wells were installed just prior to 2009 and were sampled four times throughout 2009 has resulted in a detection frequency that is biased high versus monitoring wells that were installed prior to 2008 and sampled only twice (semiannually) or once (annually) during 2009.

Even considering the 2009 bias for the newly installed MWL wells, the detection frequencies shown in Figure 2.4-3 are all below 60%, with the majority below 30%, and do not suggest the presence of a toluene plume beneath the MWL (i.e., if environmental contamination were present in the groundwater, the detection frequencies would be higher). Of the 13 wells with the highest detection frequency (19 to 58%), 3 are background wells (CWL-BW3, CWL-BW4A, and MWL-BW2), with detection frequencies of 25, 25, and 19% respectively. The fact that toluene is

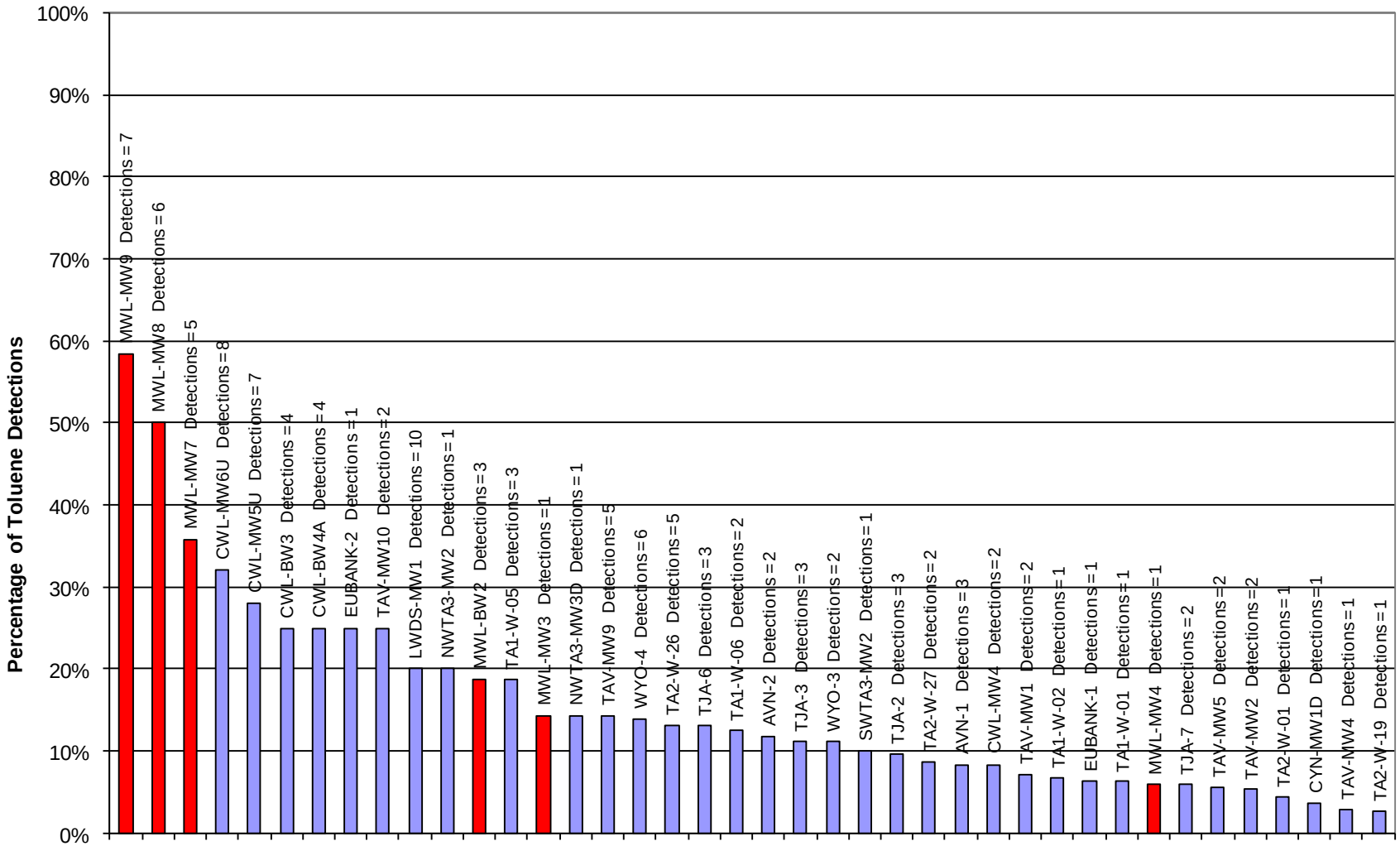


Figure 2.4-3
Frequency of Toluene Detections in Sitewide Monitoring Well Samples – October 2001 through April 2010

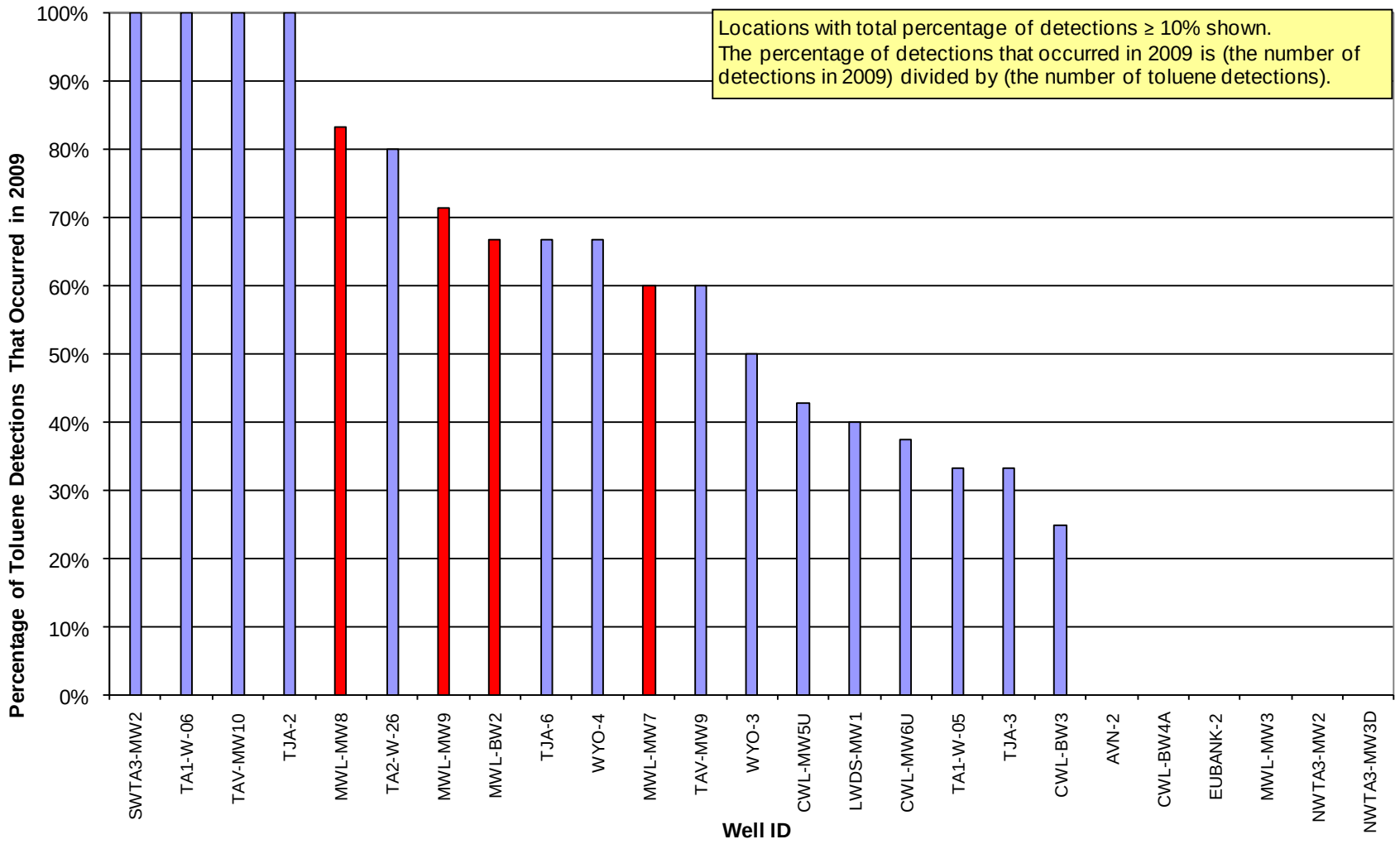


Figure 2.4-4
Frequency of 2009 Toluene Detections in Sitewide Monitoring Well Samples – October 2001 through April 2010

being detected in samples from background wells that are installed hydraulically upgradient at sites where toluene is not a COC further supports the conclusion that the very low-concentration toluene detections are not related to contamination in the regional aquifer. In addition, Figure 2.4-4 shows that the five new wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, MWL-MW9, and TAV-MW10) have detection frequencies ranging from 19 to 58%, suggesting a possible toluene source related to drilling and/or well construction materials.

### 2.4.2 Sitewide Quality Control Blank Data Evaluation

Field QC samples are collected or maintained with environmental groundwater samples as part of the groundwater sampling process. These field QC samples include TB, EB, and FB samples. A TB sample is prepared by the laboratory and kept with environmental VOC samples after collection through transport to the laboratory to assess whether contamination occurred during storage and shipment. An EB sample is collected after decontamination of sampling equipment to verify the effectiveness of the decontamination process. An FB sample is collected in the field where the environmental sample is collected to check for potential contamination sources that may be present during actual sample collection in the field.

Figure 2.4-5 shows the toluene detection frequency for EB, FB, and TB data associated with the October 2001 through April 2010 environmental sampling data. As part of the data validation process, blank data are qualified following the same procedure that is followed for validating environmental sample data. If contamination is detected in the associated laboratory method blank, the related environmental and TB-EB-FB data are qualified accordingly. For the very low concentrations reported for the sitewide October 2001 through April 2010 data set, this results in a qualification of not detected (i.e., "U"-qualified).

Table 2.4-2 summarizes the total number of TB, EB, and FB samples, the number of detections, and the detection frequency. Both Figure 2.4-5 and Table 2.4-2 also show the number of blanks qualified as nondetected results during the data validation process due to laboratory contamination. The percentage of data qualified as nondetected ranges from 2% for TB samples to 4% for FB samples.

Table 2.4-2
Summary of Toluene Results for Field QC Blank Samples

| Field QC Blank Samples | Number of Detections | Number of Samples | % Detections | Number of DV-Qualified Detections | % Detections Including DV-Qualified Data | Concentration Range in µg/L |
|---|---|---|---|---|---|---|
| Equipment Blanks | 19 | 269 | 7% | 8 | 10% | 0.194–10.6[a] |
| Field Blanks | 6 | 122 | 5% | 5 | 9% | 0.272–0.7 |
| Trip Blanks | 126 | 1453 | 9% | 29 | 11% | 0.184–1.21 |
| **TOTAL** | **151** | **1,844** | **—** | **42** | **—** | |

[a]Two EB sample results exceeded 1 µg/L from CWL (5.16 µg/L, June 2008) and TA-V (10.6 µg/L, March 2005). All other EB results ≥ 0.882 µg/L.

CWL = Chemical Waste Landfill.
DV = Data Validation.
EB = Equipment blank.
µg/L = Microgram(s) per liter.
QC = Quality Control.
TA = Technical Area.

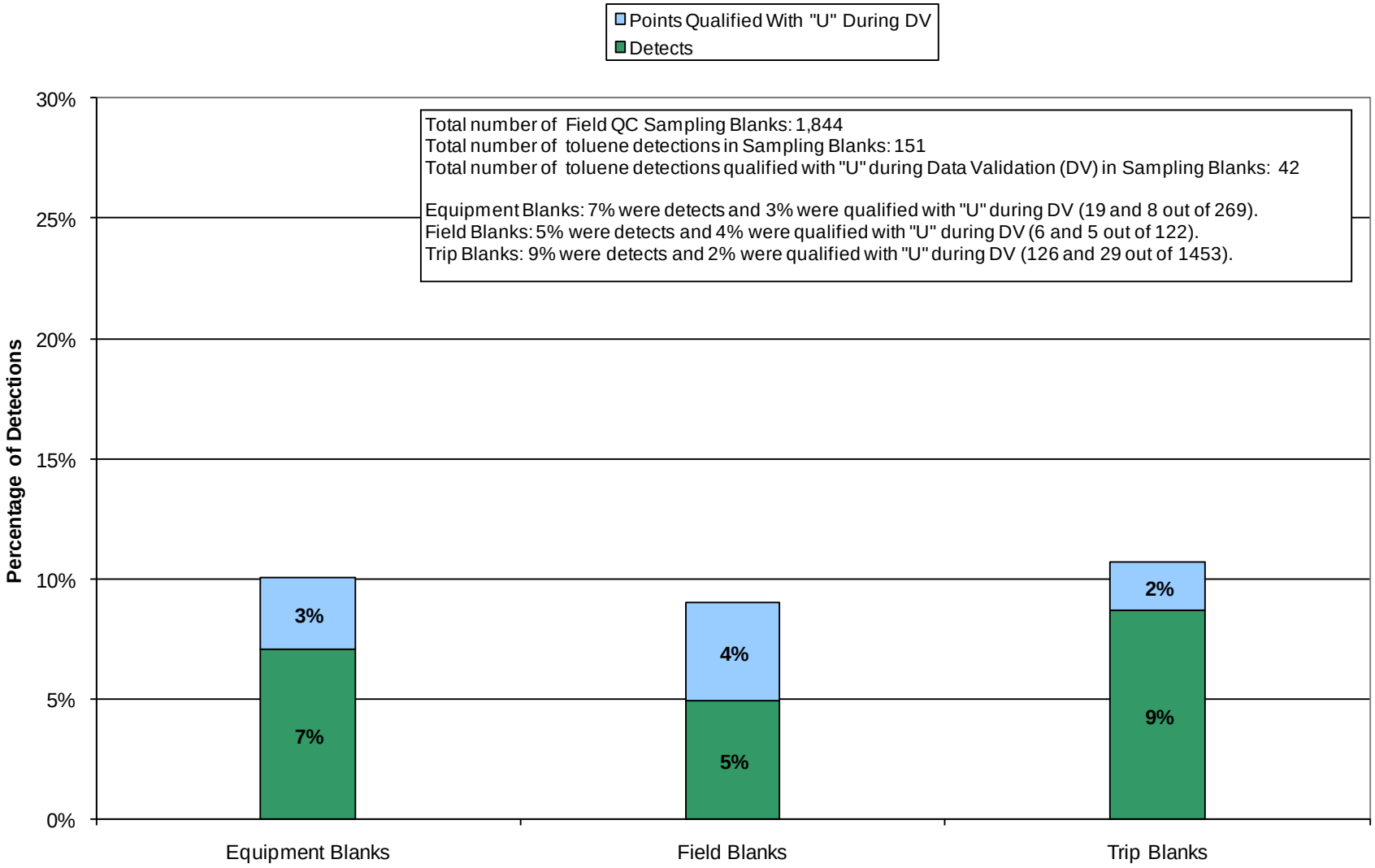


Figure 2.4-5
Frequency of Toluene Detections in Sitewide Field QC Blank Samples – October 2001 through April 2010

The number of TB samples far exceeds the number of FB and EB samples because TBs accompany every shipment of VOC samples. Due to the relatively short holding time for the EPA Method 8260 VOC analysis (14 days for aqueous samples), VOC samples from multiple wells cannot be batched together, resulting in multiple shipments that all contain TB samples. The detection frequency of the field QC blank samples does not indicate systematic problems with the shipping, decontamination, or sampling process. Instead, the results for all three types of field QC blank samples suggest that they are subject to the same contamination source(s) as the environmental samples.

The TB samples should not be indicating contamination at all as they are prepared by the laboratory with ultra-clean water and never opened during the sampling and shipping process. They simply travel with the samples from the field to the laboratory in the sample shipping container (typically a cooler) to monitor for cross-contamination during shipment, which can occur if there are contaminated samples in the shipping container or if a contaminated sample breaks during shipment. Because the environmental samples show only very low toluene concentrations, cross-contamination during sampling and shipment should not be occurring, even if an environmental sample broke open during shipment. Based upon more than a thousand sampling results, there is simply not enough toluene in the environmental groundwater samples to diffuse from the environmental sample through the sealed TB container.

If the sampling process (i.e., equipment and method) was flawed, the percentage of detections in FB samples should be higher. Instead, FBs show the lowest detection frequency of all the field QC blanks. Similarly, the EB results should only show measureable contamination if there were significant concentrations of toluene in the groundwater being sampled. The fact that both the environmental samples and all the field QC blanks show very low concentrations at or near the laboratory MDL further supports the conclusion that the field QC blank samples are being affected by the same non-groundwater source(s) as the environmental samples. Only three field QC blank samples had toluene detections exceeding 1 µg/L (two EB samples and one TB sample). The two EB sample results of 10.6 and 5.16 µg/L appear to be outliers as they were significantly higher than any of the environmental sample results.

While the sampling equipment and method do not appear to be the source of toluene, some cases of toluene contamination do appear to be occurring during the sampling process. In other words, ambient environmental sources of toluene outside the sampling process appear to be impacting the field QC blank and environmental samples during the sampling process. In addition, some cases where the laboratory is the source of the toluene detections are probably not being identified. As discussed in Section 2.1, the laboratory QA/QC processes provide a valid check for laboratory contamination, but they are not perfect.

## 2.5 Sitewide Air Monitoring Data Evaluation

The VOC Air Monitoring Program at SNL/NM was developed using DOE orders and EPA standards to ensure accurate data and good comparability with ambient air surveillance data obtained by the City of Albuquerque Environmental Health Department. Ambient air sampling is performed at four strategic monitoring locations across SNL/NM, one of which is located at the northern end of the MWL along the site access road. A sample is collected once a month at each site during a 24-hour period on a weekday (Monday through Friday). Air is sampled at the breathing zone, generally around 2 meters above the ground, to assess ambient conditions to which people could be exposed.

Results for 2008 through 2009 show no anomalously high detections of toluene at the MWL air monitoring station; however, the results are collected only one day each month. Toluene is routinely detected at low concentrations at all four monitoring locations (SNL/NM September 2008b and September 2009). For 2009, the toluene results ranged from 0.16 to 0.825 milligrams per cubic meter ($mg/m^3$) at the MWL monitoring station. In April 2009, an elevated detection at the TA-II air monitoring station (37.8 $mg/m^3$) was attributed to a vehicle idling adjacent to the monitoring station.

## 2.6 Groundwater Data Evaluation Summary and Conclusions

Groundwater monitoring has been conducted at the MWL for VOCs, including toluene, since 1990. Except for MWL-MW6, toluene has been detected in groundwater samples from all MWL monitoring wells at very low concentrations since 1994. There have been 47 detections of toluene in MWL groundwater monitoring samples, of which 14 are from MWL-MW4 samples. The probable source for most of the 14 detections in samples from MWL-MW4 is the Baski® packer (Section 2.3.1). Of the 33 toluene detections (excluding the 14 MWL-MW4 detections), 21 are from the new monitoring wells installed in 2008, and all but 4 results are qualified as estimated concentrations (i.e., "J" values) because they are below the laboratory PQL (1 µg/L). Samples from both background monitoring wells (MWL-BW1 and MWL-BW2) have had three detections of toluene.

The April 2010 purging/sampling study results for the MWL wells showed only laboratory-related toluene contamination in 5 of the 34 groundwater samples. The results for the June 2010 purging/sampling study performed at well TAV-MW10 vary from the MWL results and are consistent with drilling/well materials and/or inadvertent contamination introduced during the drilling/well installation process as possible toluene sources. The purging/sampling study results are not consistent with the presence of low-concentration toluene in the regional aquifer.

An evaluation of more than 1,600 sitewide groundwater sampling results from October 2001 through April 2010 reveals that low-concentration detections of toluene are occurring in samples from across the SNL/NM sitewide monitoring well network. The number of toluene detections at low concentrations in samples from across the sitewide monitoring well network increased dramatically in 2009, coinciding with quarterly sampling of the newly installed MWL monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and TAV-MW10. As a result, the toluene detection frequency is significantly higher in samples from these wells than in those from other sitewide wells with more sampling results from the pre-2009 period.

An evaluation of more than 1,800 sitewide field sampling QC blank results from October 2001 through April 2010 shows a pattern of low-concentration toluene detection very similar to the environmental groundwater sampling results. The relatively consistent toluene detection frequency of approximately 10% for the three types of field QC blanks (accounting for qualified results) suggests the sampling process (equipment decontamination, sample collection, and sample shipment) is not the source of toluene. These sampling results indicate an ambient environmental and/or laboratory source that is affecting both the environmental and field QC blank samples during the sampling process.

Laboratory QC method blank samples analyzed with sitewide and MWL groundwater samples confirm the laboratory is also a source of toluene. This is documented through the data validation process and evident in the number of results for environmental and field QC samples that are qualified as not detected. However, GEL is not the only contamination source, as

demonstrated by the abundant unqualified 2009 toluene results and the NMED/DOE OB split sampling results that show very similar concentrations from analyses performed at a different laboratory from 2008 through January 2010.

A review of the 2008 and 2009 air monitoring data collected for the SNL/NM Air Monitoring Program indicates low concentrations of toluene are present in the ambient air across the facility and at the MWL. Because these data are collected only one day per month, the data set is not large enough to support conclusions beyond confirming that toluene is present in the ambient air at measurable concentrations.

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# 3.0 EVALUATION OF POTENTIAL SOURCES

This section presents an evaluation of potential toluene sources considered, which include the following:

- **MWL.** Toluene from the waste disposal areas migrating to the regional aquifer and then being detected in groundwater samples from the monitoring wells (Section 3.1)
- **Analytical Laboratory.** Sample contamination occurring during laboratory processing and/or analysis (Section 3.2)
- **Sampling Process.** Sample contamination through contact with sampling materials or equipment that contain toluene or by the introduction of toluene contamination during the sampling method or overall sampling process (Section 3.3)
- **Drilling and Well Installation Process.** Toluene transferring to the groundwater within the monitoring well from equipment and/or materials used to drill and install the monitoring well (Section 3.4)

The conclusions of this evaluation are presented at the end of each section and in Section 4.0.

## 3.1 Mixed Waste Landfill

A detailed review of records and interviews of employees who worked at the MWL were conducted as part of the initial MWL investigation process. The first major field investigation was conducted as part of the Phase 1 RFI in 1989 and 1990 to determine whether a release of RCRA-regulated contaminants had occurred at the MWL. The Phase 1 RFI indicated that tritium had been released to the environment (SNL/NM September 1990). The Phase 2 RFI was conducted from 1992 through 1995 and consisted of reconnaissance radiological surveys, air monitoring, passive and active soil-vapor surveys, nonintrusive geophysical surveys, soil sampling for background metals and radionuclides, surface soil sampling, borehole drilling and subsurface soil sampling, vadose zone tests, aquifer tests, and risk assessment. The Phase 2 RFI confirmed the findings of the Phase 1 RFI; tritium is the contaminant of primary concern at the MWL. After numerous reviews and comment response actions, the Phase 2 RFI Report was revised and approved by the NMED in December 2002, and published in its final technical format (Peace et al. September 2002). A detailed summary of the waste inventory was included as Appendix A.

The Phase 2 RFI did not identify toluene as a COC based upon the inventory information and the results of the field investigation, including soil-vapor surveys and subsurface borehole soil sampling results. No free liquids were disposed of in the MWL with the exception of the May and June 1967 discharge to Trench D of approximately 204,000 gallons of coolant wastewater from the SNL/NM Engineering Reactor Facility. Based upon a review of the inventory, the only waste items that contained liquids prior to solidification and disposal are summarized as follows:

- 1 waste container with 5 gallons of oil adsorbed onto vermiculite
- 1 waste container with 1.5 gallons of solvents adsorbed onto vermiculite
- 2 waste containers, each with 1 gallon of toluene adsorbed onto vermiculite
- 1 gallon of tritium-contaminated acetone solidified with Safe-T-Set

This represents a total of approximately 9.5 gallons of liquid waste that were solidified or adsorbed onto vermiculite and then disposed of in the MWL.

In 1995, fifteen boreholes were drilled and subsurface soil samples were collected. Two of the boreholes were drilled vertically on the east side of the MWL; the remaining boreholes were inclined 30 degrees from vertical at locations on all four sides of the MWL. These 13 boreholes thus projected beneath the disposal areas. A total of 88 soil samples were collected from the 15 boreholes at depths ranging from 10 to 122 feet below ground surface (bgs). These samples were analyzed for VOCs, including toluene, using EPA Method 8260.

No VOCs were detected in soil samples from four of the boreholes. Low concentrations of nine VOCs were reported for soil samples collected from the other 11 boreholes. Of the 27 detections reported for the nine VOCs, 23 detections were qualified by the laboratory (less than the PQL) or during data validation as estimated (i.e., "J"-qualified). Four of the reported VOCs (toluene, 2-butanone, acetone, and methylene chloride) are considered common laboratory contaminants (EPA April 1992). These 4 VOCs are responsible for 14 of the 27 detections in the soil samples. Toluene was detected once below the PQL at a concentration of 20.4 J micrograms per kilogram (equivalent to ppb) reported for the sample collected at a depth of 119 feet bgs from BH-13.

Subsurface soil-vapor sampling was performed across the entire MWL area in 1994 as part of the Phase 2 RFI, and then again in 2008 as requested by the NMED (Bearzi November 2006). The purpose of the 2008 soil-vapor survey was to confirm that conditions had not changed significantly since completion of the Phase 2 RFI work in the mid-1990s (SNL/NM August 2008). The results for both surveys are summarized in Table 3.1-1.

Table 3.1-1
Summary of 1994 and 2008 Soil-Vapor Survey Toluene Results

| | |
|---|---|
| **Total Number of Samples** | 96 (72 from 1994; 24 from 2008) |
| **Depth of Samples** | 10 to 50 feet below ground surface |
| **Number of Toluene Detections** | 15 |
| **Frequency of Toluene Detections** | 16% (15 detections in 96 samples) |
| **Concentration Range for Toluene Detections** | 1.2 to 26 parts per billion by volume |

To determine whether these soil-vapor concentrations of toluene pose a significant risk to groundwater quality, a conservative phase partitioning model was prepared (Appendix C). This calculation is designed to determine the concentration of toluene that would result in groundwater using Henry's Law assuming that the maximum concentration of toluene soil vapor from the upper 50 feet of the vadose zone beneath the MWL was in direct contact and in equilibrium with the capillary fringe above the water table approximately 450 feet beneath the deepest soil-vapor sampling depth. Previous soil-vapor surveys have determined that the maximum toluene soil-vapor concentration was 26 parts per billion by volume. For the fine-grained alluvial deposits that overlie the water table beneath the MWL, the capillary fringe is several feet thick. This calculation is hypothetical, unrealistic, and does not take into account

many processes and factors that would result in a much lower toluene concentration in groundwater, such as dilution of the toluene in the groundwater once it has diffused through the capillary fringe. It is provided only to demonstrate that the known concentrations of toluene in soil vapor at the MWL are not capable of producing the very low concentrations of toluene measured in the groundwater samples collected from beneath the site.

The calculated toluene concentration in groundwater at the top of the water table would be 0.015 µg/L. This concentration is an order of magnitude below the laboratory MDL (0.25 µg/L) that would not be detectable. This calculation demonstrates that the concentrations of toluene in soil vapor cannot produce the very low levels of toluene measured in the MWL groundwater samples even assuming a hypothetical, unrealistic scenario (i.e., where the maximum concentration of toluene soil vapor from the upper 50 feet beneath the disposal areas is projected 450 feet downward to the water table with no attenuation and no dilution once it has diffused into the groundwater).

At the CWL, located south of the MWL in TA-III, a release of trichloroethene (TCE) to the groundwater via a VOC soil-vapor plume has been documented, investigated, and soil-vapor extraction/landfill excavation voluntary corrective measures completed (SNL/NM December 2004). Subsurface TCE soil-vapor concentrations in the upper 50 feet of the vadose zone beneath the disposal areas were initially characterized in the thousands to tens of thousands of parts per million volume (ppmv) basis (i.e., 10,000 ppmv), which resulted from liquid solvent disposal (thousands of gallons) into unlined pits and trenches (SNL/NM December 2004). Based upon the experience gained investigating, remediating, and monitoring both VOC soil vapor in the vadose zone and VOCs in groundwater, these extremely high concentrations of VOC soil vapor are required to drive advective-dispersive soil-vapor transport necessary for contamination to reach groundwater (SNL/NM December 2004, Annex E). Even with the amount of liquid disposal at the CWL, liquid solvent penetrated no deeper than approximately 30 feet into the subsurface (SNL/NM April 2003 and December 2004). In contrast, the highest detection of toluene in soil-vapor sampling performed at the MWL in 1994 and 2008 was 0.026 ppmv. There is no evidence of these types of conditions that would be required to create a VOC/toluene soil-vapor plume of sufficient mass and concentration to impact groundwater at the MWL.

Summary and Conclusion

The inventory information, subsurface soil sampling results, and soil-vapor survey results (Peace et al. September 2002 and SNL/NM August 2008) confirm that toluene is not a COC at the MWL. Based upon this information, there is no evidence of toluene contamination capable of impacting groundwater beneath the MWL.

## 3.2 Analytical Laboratory

This section evaluates the analytical laboratory as a source of toluene contamination that can occur during groundwater sample processing and analysis. Section 3.2.1 discusses laboratory method blank samples, and Section 3.2.2 addresses the data validation review of laboratory sampling results.

### 3.2.1 Method Blank Samples

As discussed in Section 2.2, the analytical laboratory (GEL) analyzes QC method blank samples with every batch or group of environmental samples from clients such as SNL/NM. The results for these method blank samples are used to determine whether the laboratory is the source of contaminants detected in the client samples and to verify that the MDL for specific compounds, such as toluene, are technically sound. According to the SMO analytical laboratory SOW (SNL/NM May 2009b), if a contaminant such as toluene is detected in the method blank sample population above the MDL at a frequency of greater than 10% over an annual period, corrective action is required and would likely result in the laboratory raising the associated MDL.

Figure 3.2-1 shows the detections of toluene in the GEL method blanks for the period from January 2008 through May 2010. There were 43 detections out of 3,783 method blank samples analyzed for a detection frequency of approximately 1%. These data demonstrate that GEL was in full compliance with the SOW requirements relative to the toluene MDL and does not appear to be the primary source of toluene contamination for the 2008 through early 2010 sitewide groundwater monitoring results. The concentration range for the method blank detections is very similar to the range for the sitewide environmental samples (0.25 to 0.8137 µg/L).

Figure 3.2-1 shows that detections appear to cluster during relatively narrow time periods. Figure 3.2-2 focuses on the March though May 2010 time period and shows how the early 2010 method blank cluster resolves into two clusters: one in March and one in April 2010 (there are method blank samples analyzed between these dates but the results were nondetected). Some of the April 2010 detections were associated with the MWL April sampling event and resulted in eight toluene detections in samples associated with MWL-BW2 and MWL-MW8 being qualified as not detected during the data validation process.

Summary and Conclusion

While the laboratory method blank protocol and results demonstrate that GEL's performance is excellent, it is unrealistic to assume that even the best analytical laboratory will not occasionally (randomly) have false positive results and cross-contamination issues. This is particularly true for volatile compounds that are found in many common materials throughout industrialized society. As discussed in Sections 2.1 (Data Validation) and 2.2 (Laboratory Method Detection Limit), method blank analysis and data validation protocols provide a rigorous approach to identifying data quality issues and have identified many specific cases where the laboratory was the source of toluene contamination. Even so, they are not perfect. While it is accurate to say that the GEL method blank results indicate exemplary performance, it is not realistic to say that all cases of toluene laboratory contamination have been identified and addressed for this time period. Based on the extremely low detection limit and ubiquitous nature of toluene, identifying every case of contamination in the laboratory is neither feasible nor possible.

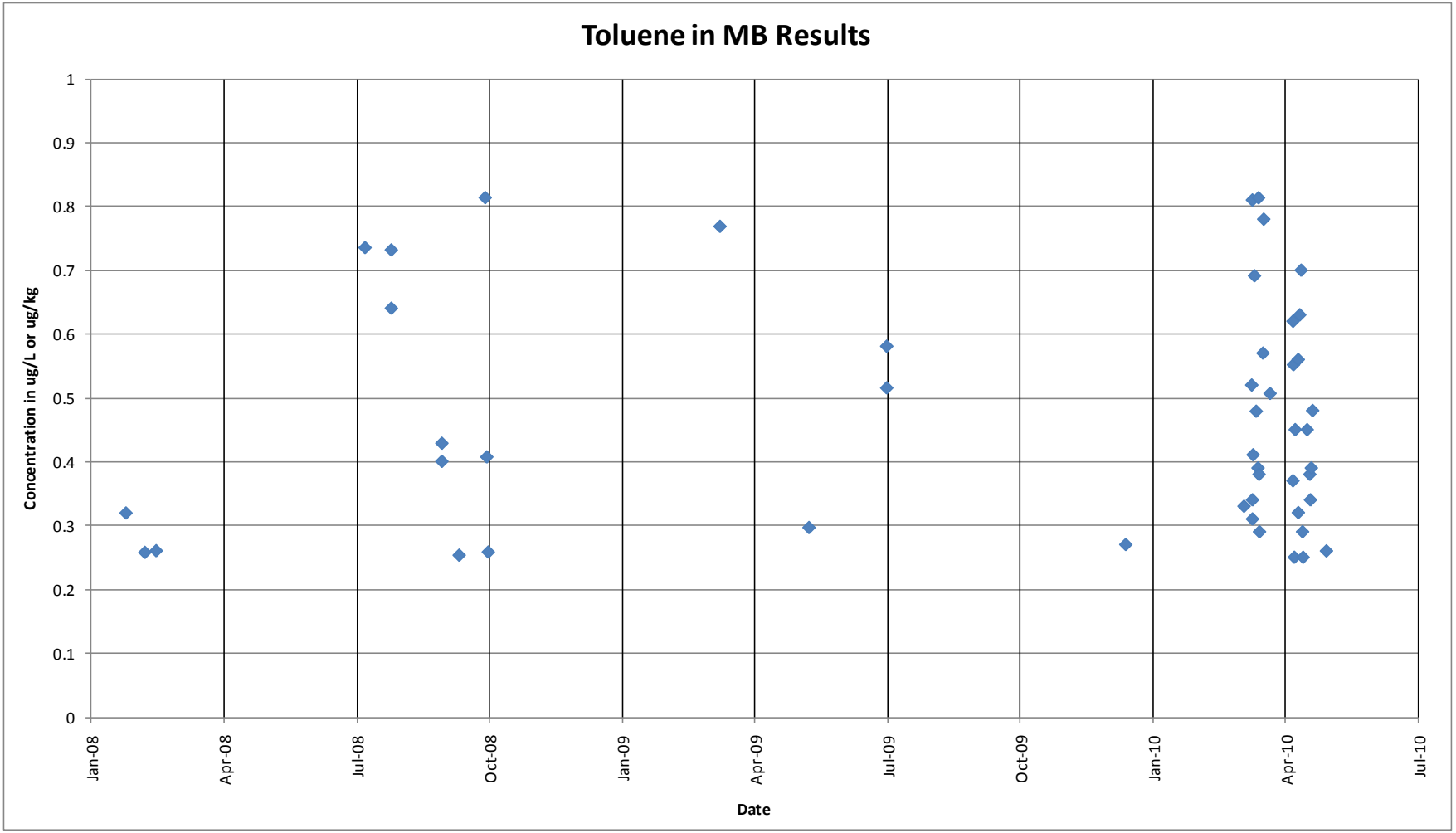


Figure 3.2-1
Toluene Concentrations in GEL Laboratories, Inc. Method Blank Samples – January 2008 through May 2010

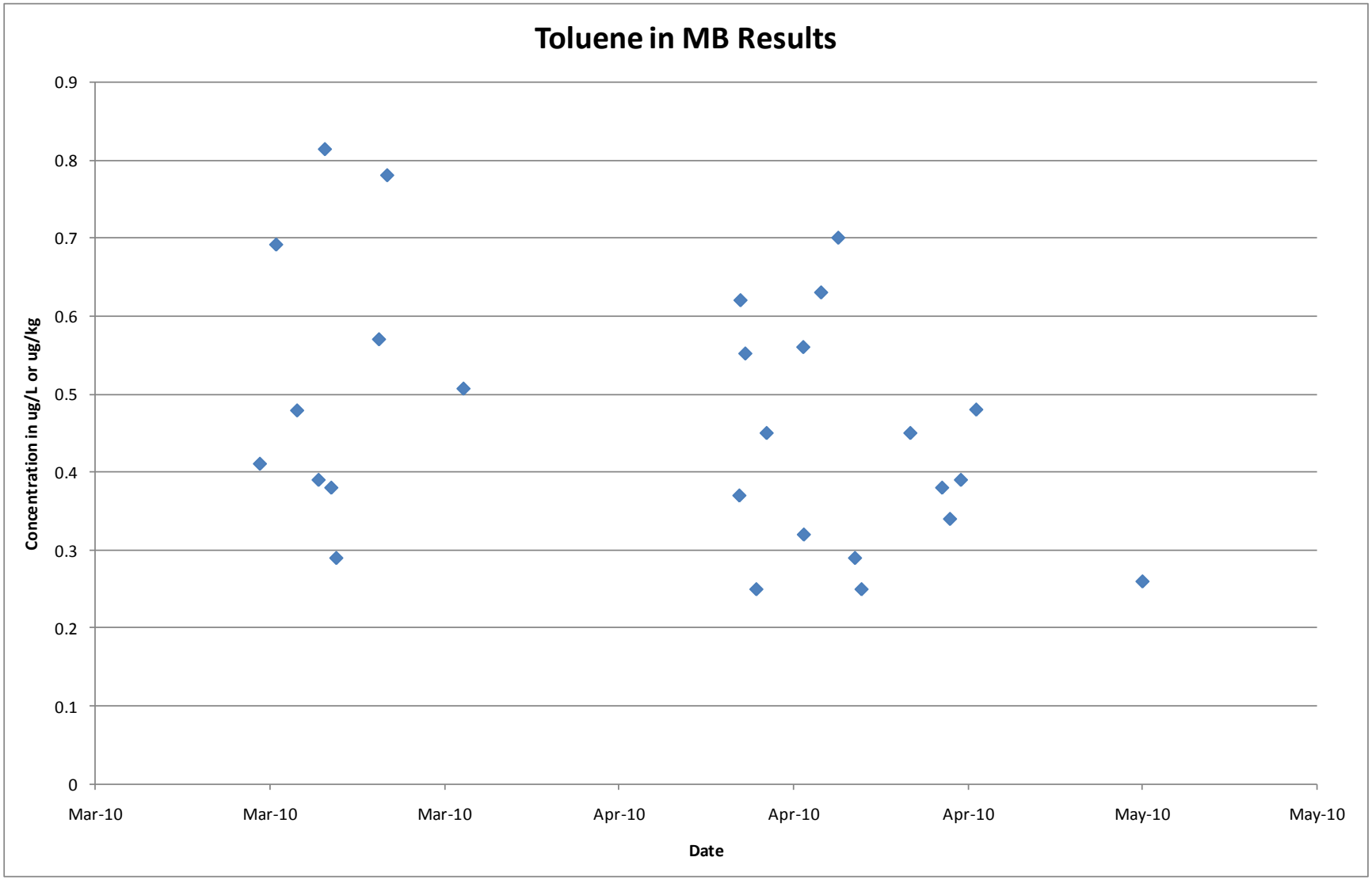


Figure 3.2-2
Toluene Concentrations in GEL Laboratories, Inc. Method Blank Samples – March through May 2010

### 3.2.2 Data Validation Review

As described in Section 2.1, all SNL/NM sitewide and MWL groundwater monitoring data are validated according to the SNL/NM "Data Validation Procedure for Chemical and Radiochemical Data," AOP [Administrative Operating Procedure] 00-003, Revision 2 (SNL/NM July 2007). Because of the significant increase in toluene detections in 2009 at both the MWL and across the entire sitewide monitoring network, a review was conducted of all the data validation reports for this period. Based upon this review, there were no findings that indicated the laboratory was the primary source of the increase in toluene detections.

Conclusions

The laboratory method blank data demonstrate that GEL is in compliance with EPA Method 8260 and SMO SOW requirements for VOC analysis. While its performance is exemplary with a method blank toluene contamination frequency of approximately 1% for 2008 through early 2010, toluene contamination is occurring at the laboratory as documented by the GEL QA/QC Program and the SNL/NM data validation process. However, GEL does not appear to be the primary source of the increased toluene detection frequency for 2009 that is discussed in Section 2.3.

## 3.3 Sampling Method and Equipment

This section evaluates the groundwater sampling equipment, methods, and process as a potential source of toluene contamination in groundwater samples. Groundwater sampling methods and procedures are described in the MWL Annual Groundwater Monitoring Reports and Sampling and Analysis Plans (SAPs) that are prepared for each sampling event. A Bennett™ sampling system permanently mounted in the SNL/NM water sampling truck is used to purge the monitoring wells and collect the groundwater samples after depth-to-water measurements are collected. The pump intake is set near or at the bottom of each screen interval, and the minimum achievable flow rate, given limitations of equipment and well characteristics, is used for all purging and sampling activities. All groundwater samples are collected directly from the pump discharge tubing located in the water sampling truck into pre-preserved, laboratory-provided sample containers. A description of the sampling equipment used is presented in Table 3.3-1. A photograph of the water sampling truck is shown in Figure 3.3-1. A view of the in-flow and discharge tubing inside the water truck is shown in Figure 3.3-2.

Prior to sampling each monitoring well, the portable Bennett™ sampling system; including the pump, tubing bundle (portion that is exposed to groundwater), and the water lines inside the truck are decontaminated at the Building 9925 field office. As appropriate, based upon SAP requirements, an EB sample may also be collected prior to mobilizing to the site for sampling. In accordance with SNL/NM FOP [Field Operating Procedure] 05-03, "Long-Term Environmental Stewardship Groundwater Sampling Equipment Decontamination" (SNL/NM November 2009), the following solutions are pumped through the sampling system: 5 gallons of deionized (DI) water mixed with 20 milliliters (mL) of nonphosphate laboratory detergent; 5 gallons of DI water; 5 gallons of DI water mixed with 20 mL of reagent-grade nitric acid; and 15 gallons of DI water. In addition, the outside of the pump tubing is rinsed with DI water. The EB (or rinsate) samples are collected from the pump discharge tubing in the water truck to verify the effectiveness of the equipment decontamination process.

Table 3.3-1
MWL Groundwater Sampling Equipment

| |
|---|
| **Bennett™ Portable Sampling System:**<br>• Model 1800 submersible piston pump<br>• 700-foot polypropylene tubing bundle. Three lines consisting of the pneumatic tubing, air exhaust tubing, and water discharge tubing<br>• Bennett™ tubing bundle reel, equipped with an electric power drive motor |
| **Water Sample Field Equipment:**<br>• YSI 6920 V2 water quality meter with pH probe, EC probe, ORP probe, DO probe, and temperature probe<br>• HACH 2100P turbidity meter<br>• Model 101 Solinst water level meter (750-foot tape) |
| **Water Truck Equipment:**<br>• Stainless steel (laboratory grade) and Teflon® tubing lines for water discharge. Water discharges from the Bennett™ system through a flow meter, to a flow cell (YSI water quality meter), to a sampling port (with valves for sampling), then empties to buckets or waste containers<br>• Nitrogen gas cylinders (for powering the downhole pump) and pressure regulator<br>• Laptop computer |

Note that MWL-MW4 has a dedicated Bennett™ pump sampling system.
DO = Dissolved oxygen.
EC = Electroconductivity.
MWL = Mixed Waste Landfill.
ORP = Oxidation-reduction potential.

Figure 3.3-1
Groundwater Sampling Truck with Bennett™ Pump and Solinst Water Level Meter (red reel in left foreground) Deployed in the Monitoring Well

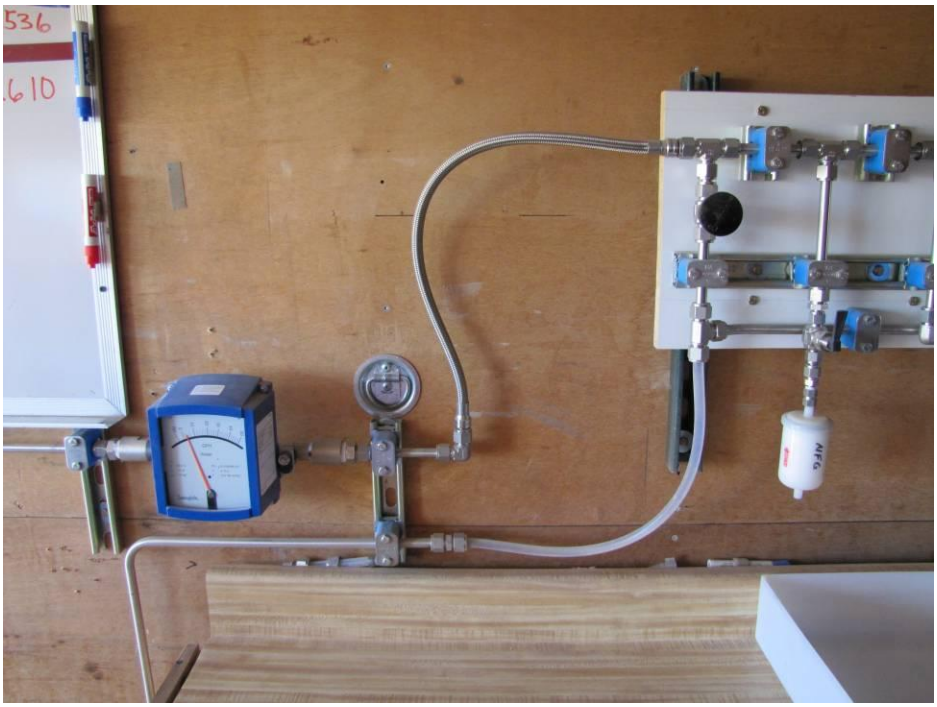


Figure 3.3-2
View of the Tubing Inside the Groundwater Sampling Water Truck

Groundwater is pumped from the well into the water truck in a closed system. Electrical power for the sampling system is provided by the water truck battery through AC/DC inverters (engine is off during all sampling activities). Nitrogen gas is used to pressurize the Bennett™ pump system through pneumatic tubing. Figure 3.3-2 shows the laboratory-grade, stainless steel tubing inside the water truck. Groundwater flows through the tubing shown on the far left side under the white board through the flow meter (blue box on left side of photograph) to discharge lines (vertical stainless steel tubing) on the panel on the right side of photograph where the groundwater sample containers are filled.

The one vertical discharge line shown in Figure 3.3-2 has a filter attached for the collection of the filtered sample for total metals. The flow cell where groundwater field readings are measured with the YSI 6920 V2 water quality meter is located just out of view on the right-hand side of the tubing panel shown in Figure 3.3-2. The clear tubing in the lower left side of the tubing panel carries water not collected in the sampling process to waste containers. The tubing system is equipped with valves so that once stabilized field parameters are documented and recorded, the groundwater can flow directly though the discharge tubing into containers, bypassing the flow cell. The only part of the sampling process that is not closed to the atmosphere is when the groundwater is discharged into the sample containers and waste containers (excess groundwater not needed for samples) inside the back of the truck. Sample management and custody procedures are performed in accordance with AOP 95-16, Revision 02, “Sample Management and Custody” (SNL/NM March 2007).

### 3.3.1 Field Quality Control Blank Sample Results

Field QC sample results are discussed and evaluated in Section 2.4.2. The same equipment is used to sample all the monitoring wells at SNL/NM, and the sampling is performed by the same field personnel. As summarized in Section 2.4.2, there is no clear evidence in the various field QC blank samples to indicate that the source of the toluene contamination is related to the sampling equipment or method/process. Both the environmental samples and all the field QC blanks that have detections of toluene, including those associated with the MWL, show very low concentrations at or near the laboratory MDL. This is the case for TB samples that are prepared by the laboratory with ultra-clean water and only travel with the environmental samples; they are not opened until they reach the laboratory. These data support the conclusion that the sampling equipment and method/process is not the source of toluene contamination in the groundwater samples. Instead, these field QC blank samples appear to be affected by the same ambient environment and/or laboratory toluene source as the environmental samples.

### 3.3.2 Sample Tubing Bath Test Results

In November 2009, SNL/NM submitted various tubing materials used in the groundwater sampling process to GEL for bath testing to determine whether toluene may be leaching out of the tubing and contaminating groundwater samples. Tubing material included nylon tubing, Tygon® tubing, Teflon® tubing, and polypropylene tubing; all tubing samples were new material. SNL/NM requested GEL to place the material in a DI water bath inside a sealed laboratory glass container, collect samples of the water after 24-hour, 7-day, and 14-day time intervals, and analyze each water sample for VOCs and SVOCs to identify any compounds from the material. A control test was also set up by the laboratory that was identical except that it contained no tubing materials. No VOCs or SVOCs were detected in any water bath samples, except for

acetone, chloroform, and methylene chloride; toluene was not detected. These compounds were detected in nylon and Tygon® samples. Detected VOCs are summarized in Table 3.3-2. No VOCs or SVOCs were detected in the control samples, Teflon® tubing samples, or polypropylene tubing samples.

Table 3.3-2
Summary of Detected VOCs in the Sample Tubing Bath Test

| Compound | Nylon Tubing | | | Tygon® Tubing | | |
|---|---|---|---|---|---|---|
| | 24-hour | 7-day | 14-day | 24-hour | 7-day | 14-day |
| Acetone (µg/L) | ND (3.50) | 7.61 | ND (3.50) | ND (3.50) | ND (3.50) | ND (3.50) |
| Chloroform (µg/L) | ND (0.250) | ND (0.250) | ND (0.250) | ND (0.250) | 0.562 | ND (0.250) |
| Methylene Chloride (µg/L) | 11.1 | 11.5 | 9.42 | 8.85 | 7.70 | 5.35 |

µg/L = Microgram(s) per liter.
ND = Not detected above the method detection limit, shown in parentheses.
VOC = Volatile organic compound.

A summary report of the bath tests is provided in Appendix D. The results are not definitive proof but do support the conclusion that the tubing is probably not the source of toluene. In addition, the tubing is probably not the source of the detected acetone, chloroform, and methylene chloride, all of which are common laboratory contaminants, except for chloroform (EPA April 1992).

### 3.3.3 Sample Containers

All VOC sample containers (40-mL glass vials with plastic screw-on caps with septum) are supplied by GEL and certified clean by the supplier who provides the containers to GEL. The containers are compliant with the requirements specified in EPA 540/R-93/051, "Specifications and Guidance for Contaminant-Free Containers" (EPA December 1992). Each batch/lot of VOC sample collection vials are tested by GEL in accordance with its "Standard Operating Procedure (SOP) for Container Suitability Testing" (GL-LB-E-02, Revision 3). In accordance with this SOP, 1% of a container lot is analyzed and verified clean by GEL prior to sending the vials to SNL/NM for sample collection. According to the certification and GEL SOP, all VOC target analyte concentrations are required to be less than 0.5 µg/L. Container batches/lots are certified clean as long as 80% of the results for any given target analyte are nondetections. Although this procedure meets EPA requirements, the MDL used for container verification is higher than the MDL used for environmental samples (0.50 versus 0.25 µg/L), and the acceptable failure criterion is relatively high (i.e., less than 20%). This is significant because of the 118 detections of toluene in the sitewide environmental sample set evaluated for this report, 74 detections, or 63%, were less than 0.50 µg/L. The SNL/NM SMO is working with GEL to address this issue. Contaminated VOC sample containers are a possible source of the toluene detected in both the environmental and field QC samples. The vials could have been inadvertently contaminated while at the supplier, during shipment and handling at the laboratory, or during shipment and handling at SNL/NM.

The use of hydrochloric acid as a VOC preservative is also under review. The preservative (dilute hydrochloric acid) is added to the bottles by the supplier before they are sent to the laboratory, which in turn ships them to SNL/NM. The acid may react with the VOC vial septum in the screw-on cap. Although this is not likely a source for toluene, it may be a source of other contaminants. This is currently under investigation by the SNL/NM SMO and is addressed in new guidance from the EPA (EPA SW-846 Method 8260 and subsequent revisions for VOCs [EPA 1986], Chapter 2, Table 2-40[A] and Chapter 4, Table 4-1).

In addition, based upon SMO collaborative efforts, adhesive materials on the custody tape were identified as presenting a potential contamination source.

### 3.3.4 Modifications to the Sampling Process and Conclusions

As a result of the evaluation of the entire sampling process, the following modifications were made as of November 2009. These changes were implemented as best management practices and do not reflect measures that are expected to eliminate toluene detections based upon the results of this toluene source investigation:

- All nylon and Tygon® tubing water lines in the water sampling truck were replaced with stainless steel tubing.
- Coordination with the vendor has resulted in better quality (higher purity) DI water used during both the equipment decontamination process and for the collection of EB and FB samples.
- No custody tape is placed around the lids of VOC sample vials. Instead, sample vials are placed into plastic bags and the custody tape is secured to the outside of the bag.
- Prior to the January 2010 sampling event, the field team replaced the Bennett™ pump and polypropylene tubing bundle with new equipment.

During the January 2010 quarterly sampling event that was performed with new polypropylene tubing, all of the groundwater samples from the newly installed MWL wells had low concentrations of toluene. During the April 2010 sampling event, no detections of toluene were reported for any of the groundwater samples collected from the same wells. The impacts of the modifications listed are uncertain; however, they do represent sampling process improvements based upon the information evaluated to date.

### 3.3.5 Conclusions

The evaluation of the sampling equipment, methods, and overall process suggests that this is not the source of low concentrations of toluene detected in groundwater samples. However, it is clear that in some cases the very low concentrations of toluene are present in the groundwater samples received and analyzed by GEL (i.e., the contamination is not occurring at the laboratory). This is most strongly indicated by the results for the NMED/DOE OB split samples, which showed similar detections of toluene in split samples analyzed by a different laboratory, and the detection frequency and concentration range in the results for the field QC blank samples (in particular TB results). The data collectively indicate an ambient environmental

source(s) of very low-level toluene that is/are impacting the samples during the collection and/or shipment process, in addition to documented cases of toluene contamination by the laboratory as determined by laboratory QC data and the data validation process. Drilling/well materials, inadvertent contamination that may have occurred during the drilling/well installation process, and/or contaminated sample containers may also be a source of toluene detected in the groundwater samples.

## 3.4 Drilling and Well Installation

This section evaluates the drilling and well installation equipment, methods, materials, and process as a potential source of toluene contamination in groundwater samples. During January through May 2008, five monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, MWL-MW9, and TAV-MW10) were installed at the MWL and TA-V (SNL/NM April 2008, June 2008, and September 2008a). The five wells were installed during two field programs (Table 3.4-1). The SNL/NM contractor, WDC Exploration & Wells, Inc. (WDC), is a licensed driller with the New Mexico Office of the State Engineer (NMOSE June 2010). WDC installed each well in accordance with standard environmental procedures as set forth in the SNL/NM drilling contract SOW. Since July 1988, WDC has installed 68 monitoring wells at SNL/NM. An SNL/NM geologist oversaw the drilling operations, logged the drill cuttings, and subsequently prepared the well installation reports. NMED staff visited the drilling site during both field programs on February 1, 2008, and May 15, 2008.

Prior to the drilling at each of the five well sites, the drill rig and equipment were decontaminated using a pressurized steam cleaner at the TA-III decontamination pad using KAFB potable water. The air-rotary casing hammer (ARCH) technique was used to advance each borehole to an approximate depth of 500 feet bgs. The ARCH technique typically consists of a conventional air-rotary drill string that is drilled through a driven, large-diameter, nonrotating steel casing. Air circulation is used to lift the drill cuttings from the drill bit to the ground surface. The drive casing reduces borehole sloughing and eliminates the need for drilling mud. Upon completion of drilling and reaching total depth, the drill string is pulled from the drive casing. The PVC well casing is then installed down through the drive casing. The sand pack, bentonite pellets, and grout are installed in the annulus as the drive casing is extracted. After construction of the well is complete, the well is developed by swabbing, bailing, and pumping.

Materials used for constructing the five monitoring wells are summarized in Table 3.4-1. The materials were supplied by the drilling contractor and consisted of materials that do not contain chemicals that would be of concern relative to environmental monitoring situations. Most manufacturers of the well materials voluntarily participate in industry-led certification programs. For example, Halliburton-Baroid is enrolled in the National Sanitation Foundation (NSF)/American National Standards Institute-certified program in which random audits are conducted at the manufacturing facility, and samples are collected for subsequent analyses at the NSF laboratory. Materials that meet the requirements of the appropriate standard are then certified and appear in the NSF Listings (NSF, 2010).

Certifications of the well materials used for construction of the five monitoring wells at SNL/NM in 2008 are summarized in Table 3.4-2.

Table 3.4-1
Materials and Contractors Used for Constructing the MWL and TA-V Monitoring Wells in 2008

| | Field Program One | | Field Program Two | | |
|---|---|---|---|---|---|
| | **MWL-BW2** | **TAV-MW10** | **MWL-MW7** | **MWL-MW8** | **MWL-MW9** |
| **Details** | **Company or Manufacturer** | **Company or Manufacturer** | **Company or Manufacturer** | **Company or Manufacturer** | **Company or Manufacturer** |
| **Drilling** Contractor and rig number | WDC Exploration & Wells, Inc., Rig #105 | WDC Exploration & Wells, Inc., Rig #105 | WDC Exploration & Wells, Inc., Rig #111 | WDC Exploration & Wells, Inc., Rig #111 | WDC Exploration & Wells, Inc., Rig #111 |
| Drill rig model | Speedstar 30K | Speedstar 30K | Speedstar 50K | Speedstar 50K | Speedstar 50K |
| Well Installation Date | 14 Jan–22 Jan 2008 | 31 Jan–6 Feb 2008 | 25 Apr–1 May 2008 | 2 May–12 May 2008 | 13 May–20 May 2008 |
| Drilling fluids, mud, additives | None used | None used | None used | None used | None used |
| Injected water for removing cuttings at total depth | KAFB potable water, 100–150 gallons used | KAFB potable water, yes, no estimate | KAFB potable water, used – 100 gallons | KAFB potable water, used 250 gallons | KAFB potable water, yes, no estimate |
| Thread compound for drill string and drive casing | Matex Thread Compound ES | Matex Thread Compound ES | Matex Thread Compound ES | Matex Thread Compound ES | Matex Thread Compound ES |
| Lubricant for casing hammer | Matex RDO | Matex RDO | Matex RDO | Matex RDO | Matex RDO |
| Well casing, screen, sump, bottom cap, centralizers | Monoflex PVC, Schedule 80, 5-inch diameter | Monoflex PVC, Schedule 80, 5-inch diameter | Monoflex PVC, Schedule 80, 5-inch diameter | Monoflex PVC, Schedule 80, 5-inch diameter | Monoflex PVC, Schedule 80, 5-inch diameter |
| Thread compound for PVC casing materials | None used | None used | None used | None used | None used |
| Glue for PVC materials | None used | None used | None used | None used | None used |
| Sand pack, primary | CSSI #20-40 | CSSI #10-20 | CSSI #40-60 | CSSI #40-60 | CSSI #40-60 |
| Grout, from annular seal to ground surface | M-I SWACO Smooth Grout 20 | Baroid Quik-Grout | M-I SWACO Smooth Grout 20 | M-I SWACO Smooth Grout 20 | M-I SWACO Smooth Grout 20 |
| Annular seal, above secondary sand pack | Volclay Coarse Chips | Volclay Coarse Chips | Volclay Coarse Chips | Volclay Coarse Chips | Volclay Coarse Chips |
| Sand pack, secondary | CSSI #60 | CSSI #40-60 | CSSI #60 | CSSI #60 | CSSI #60 |
| Grout, bottom plug | Volclay Coarse Chips | Not installed | Not installed | Volclay Coarse Chips | Volclay Coarse Chips |
| Screened interval, ft bgs | 467–497 | 508–528 | 464–494 | 465–495 | 465–495 |
| Total depth of casing, ft bgs | 502 | 533 | 499 | 500 | 500 |
| Total depth of borehole, ft bgs | 519 | 539 | 499 | 535 | 535 |
| **Well Development**, WDC | 10–11 Mar 2008 | 12–13 Mar 2008 | 25 Apr–1 May 2008 | 2–12 May 2008 | 13–20 May 2008 |
| Steel pipe for bailing, swabbing, and pumping | No thread compound or additives used | No thread compound or additives used | No thread compound or additives used | No thread compound or additives used | No thread compound or additives used |

Refer to footnotes at end of table.

Table 3.4-1 (Concluded)
Materials and Contractors Used for Constructing the MWL and TA-V Monitoring Wells in 2008

| | Field Program One | | Field Program Two | | |
|---|---|---|---|---|---|
| | **MWL-BW2** | **TAV-MW10** | **MWL-MW7** | **MWL-MW8** | **MWL-MW9** |
| **Details** | **Company or Manufacturer** | **Company or Manufacturer** | **Company or Manufacturer** | **Company or Manufacturer** | **Company or Manufacturer** |
| **Geophysical Logging,** Jet West Company | Natural gamma and thermal neutron, 1 Jan 2008 | Not conducted | Natural gamma and thermal neutron, 15 May 2008 | Natural gamma and thermal neutron, 15 May 2008 | Natural gamma and thermal neutron, 15 May 2008 |

Monoflex is registered trademark of Campbell Manufacturing, Inc., which is owned by Baker Manufacturing Company, LLC.
Volclay® is manufactured by CETCO.
M-I SWACO Smooth Grout 20™ is manufacture by M-I LLC.
Baroid Quik-Grout® is manufactured by Halliburton.
Matex Thread Compound ES and RDO are vegetable oil based and manufactured in Canada by Chemical Control (1989) Corporation.
bgs = Below ground surface.
CSSI = Colorado Silica Sand® Inc. (previously owned by Oglebay Norton Industrial Sands, now owned by Carmeuse Industrial Sands). Sand for monitoring wells is quarried at locations in Colorado, Texas, and California.
ft = Foot (feet).
KAFB = Kirtland Air Force Base.
MWL = Mixed Waste Landfill.
PVC = Polyvinyl chloride.
RDO = Rock drill oil.
TA-V = Technical Area V.
WDC = WDC Exploration & Wells, Inc.

Table 3.4-2
Certifications for Well Materials Used at SNL/NM in 2008

| Trade Name | Certification | Manufacturer | Use |
|---|---|---|---|
| Quik-Grout[a] | NSF Standard 60 | Halliburton-Baroid | Grout |
| CSSI Sand[b] | NSF Standard 61 | Carmeuse Industrial Sands | Sand pack |
| Matex Thread Compound ES[c] | None | Chemical Control (1989) Corporation | Pipe dope(vegetable oil-based) |
| Matex RDO (rock drill oil)[c] | None | Chemical Control (1989) Corporation | Lubricant for casing hammer (vegetable oil-based) |
| M-I Smooth Grout 20[d] | NSF Standard 61 | M-I LLC | Grout |
| Monoflex PVC[e] | ASTM F-480, D-1784, D-1785 | Campbell Manufacturing Inc. | Well Casing and Screen |
| Volclay Coarse Chips[f] | NSF Standard 61 | CETCO | Bentonite Chips |

Notes:
[a]Quik-Grout® is manufactured by Halliburton-Baroid.
[b]CSSI = Colorado Silica Sand® Inc. (Carmeuse Industrial Sands). Sand for monitoring wells is quarried at locations in Colorado, Texas, and California.
[c]Matex Thread Compound ES and RDO are manufactured in Canada by Chemical Control (1989) Corporation.
[d]M-I SWACO Smooth Grout 20™ is manufactured by M-I LLC.
[e]Monoflex is registered trademark of Campbell Manufacturing, Inc., which is owned by Baker Manufacturing Company, LLC.
[f]Volclay® is manufactured by CETCO (Colloid Environmental Technologies Company).
ASTM = ASTM International (American Society for Testing and Materials).
NSF = National Sanitation Foundation.
PVC = Polyvinyl chloride.
SNL/NM = Sandia National Laboratories/New Mexico.

The well casings and screens were constructed of PVC, which is the most commonly used monitoring well casing material in the environmental field (Nielsen 2006). PVC is widely accepted for monitoring purposes because of its inertness, durability, and resistance to corrosion. Monoflex brand materials are manufactured by the Campbell Manufacturing Inc. using PVC Type 1 stock in accordance with engineering specifications set forth in various ASTM International [American Society for Testing and Materials] procedures. Pipe extruders ship blank PVC pipe to Campbell Manufacturing where the threads and slots are machined. The pipe extruders adhere to NSF standards, but their company names are confidential and therefore cannot be searched in the NSF listings. After machining, the Monoflex well casing is shipped inside sealed polyethylene bags. The PVC therefore does not need to be cleaned at the drill site.

Rigid PVC, sometimes identified as uPVC, is by design an inert material and typically ideal for potable water-supply piping and monitoring wells. As a result, few technical articles discuss the potential leaching of chemicals from PVC. Rather, the opposite issue has been of more concern in the environmental field. For example, the National Ground Water Association has published several articles that discuss the potential sorption of chemicals onto the PVC pipe surface or into the pipe matrix. However, the actual impact of sorption in typical environmental site conditions is considered to be negligible because groundwater continuously migrates through the well screen (Nielsen 2006).

PVC is a thermoplastic polymer composed of repeating vinyl groups. PVC formulations also contain various stabilizers, fillers, pigments, and lubricants (Nielsen, 2006). The NSF has set specifications for certain chemical constituents in PVC to ensure that PVC Type 1 is suitable for potable water supplies. By design, PVC formulations do not incorporate toluene. Due to the concern that chemicals could be inadvertently present in, and subsequently leached from, PVC piping used in potable water distribution systems, the NSF and American Water Works Association has conducted extensive testing of piping materials (Tomboulian et al. 2004). This testing did not identify toluene as being one of the chemicals that leached from PVC.

Another DOE facility, Pantex, has studied the role that well materials can have on the spurious detection of toluene in groundwater samples (BWXT April 2002). In 2001, Pantex installed a series of six FLUTe monitoring wells equipped with multi-level sampling ports. Instead of rigid well casing, the FLUTe wells used a flexible borehole liner that was constructed of nylon fabric with a urethane coating. Multiple sampling ports along the length of the liner were constructed of nylon, polypropylene, and polyester. Leaching tests of the well materials determined that toluene leached from both the liner and the sampling ports (BWXT April 2002 and Charbeneau et al. 2002). Because the chemical composition of the FLUTe materials is different from the PVC well materials used at SNL/NM, the Pantex study is not directly analogous to this report. However, the Pantex study demonstrates that in some instances well materials may be sources for contaminants detected in associated groundwater samples and should be considered carefully.

In summary, a comprehensive review of the drilling and well installation process, including the equipment and materials used, supports the conclusion that they are not the source of toluene detected in groundwater samples collected from the new wells installed in 2008. The most likely way in which the drilling or well installation process and/or materials could be a source of toluene is through inadvertent contamination of the equipment or materials prior to or during the fieldwork. At the drilling site both the air compressor and drill rig contain diesel fuel and emit exhaust. Although a clean and well organized drilling site is maintained as a rule, drilling by nature is a challenging operation with the potential for cross-contamination.

### 3.4.1 PVC Bath Test Results

In November 2009, SNL/NM submitted samples of PVC casing used on past well installations to GEL for bath testing to determine whether toluene may be leaching out of the PVC and contaminating groundwater samples. The PVC well casing was collected from the Environmental Restoration Field Office storage area and the manufacturer and lot number of the PVC are not known. SNL/NM requested that GEL place the material in a DI water bath inside a sealed laboratory glass container, collect samples of the water after 24-hour, 7-day, and 14-day time intervals, and analyze each water sample for VOCs and SVOCs to identify compounds leached from the material. A control test was also set up by the laboratory that was identical except that it contained no PVC materials. No VOCs or SVOCs were detected in either the water bath or control test samples.

A summary report of the bath tests is provided in Appendix D. The results are not definitive proof, but do support the conclusion that PVC well casing and screen are probably not the source of toluene.

### 3.4.2 April and June 2010 Purging/Sampling Study Results

The April and June 2010 purging/sampling study results are presented in Section 2.3.3. This testing was originally planned, as required by the NMED letter (Bearzi April 2010), to test the hypothesis for the new wells installed in 2008 that the well materials, or contamination introduced during drilling/well installation, were the source of toluene in groundwater samples. If this were the case, the concentration of toluene would be higher in the initial samples and decrease through the purging process. For the MWL, including the new wells installed in 2008, all 48 results (34 environmental samples and 14 field QC samples) for toluene were nondetected except for laboratory contamination detected in 5 environmental and 3 field QC blank samples. The results for the June 2010 purging/sampling study performed at well TAV-MW10 vary from the MWL results. Low concentrations of toluene were detected early in the purging process (first and third samples) and not in the final samples, which is consistent with drilling/well materials and/or inadvertent contamination during the drilling/well installation process as possible toluene sources.

### 3.4.3 Drilling and Well Installation Summary and Conclusions

The evaluation of the drilling and well installation equipment, materials, and process for the five new wells installed in 2008, along with the PVC bath tests and purging/sampling study results, supports the conclusion that they are not the source of toluene detected in the corresponding groundwater samples. Although the purging/sampling study results at well TAV-MW10 are consistent with a drilling/well material source, the overall toluene detection frequency in samples collected from this well previous to the June 2010 study was 25%. This means that three out of four groundwater samples contained no detectable concentrations of toluene. If the drilling/well construction materials were the source of toluene, a higher detection frequency would be expected. In contrast, samples from wells MWL-MW9 and MWL-MW8 have the two highest reported toluene detection frequencies (58 and 50%, respectively), and toluene was not detected in the purging/sampling study samples at these two wells. Although they cannot be entirely ruled out, drilling/well materials and/or inadvertent contamination introduced during the drilling/well construction process do not appear to be the sources of the low concentrations of toluene detected in associated groundwater samples.

# 4.0 SUMMARY AND CONCLUSIONS

As directed by the NMED (Bearzi April 2010), this report presents the results of the MWL Toluene Investigation. This section presents the summary and conclusions of this investigation.

## 4.1 Summary

Toluene detections in all samples, including SNL/NM sitewide and MWL groundwater samples, occur within a very narrow concentration range at or near the laboratory MDL. This is also the case for laboratory QC method blank samples and field QC blank samples. Most groundwater sample toluene results (88%) are less than 1 µg/L and qualified as estimated by the laboratory. Low concentrations of toluene were detected in groundwater samples from wells across the SNL/NM site, including the MWL, where toluene is not a COC. Furthermore, detections were reported in samples from hydraulically upgradient background wells and sitewide perimeter wells. TB samples are comprised of ultra-clean laboratory water, travel with the groundwater samples during collection and shipment, and are only opened during preparation and analysis at the laboratory. These samples have a toluene detection frequency of 11% and a concentration range very similar to the environmental samples and other field QC blank samples.

Approximately 2% of all TB sampling results and 4% of all environmental sampling results have been qualified through the data validation process as not detected due to confirmed laboratory contamination. Low-level toluene results in samples from MWL wells have also been qualified as not detected due to confirmed laboratory contamination as recently as April 2010.

In 2009, the number of sitewide samples remained constant relative to previous years, but the number of toluene detections significantly increased in samples from across the sitewide groundwater monitoring network (2008: 163 samples, 8 detections; 2009: 174 samples, 63 detections). At the MWL and TA-V during this time period, the new wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, MWL-MW9, and TAV-MW10) were being sampled quarterly, and the detection frequency of low levels of toluene was also higher than historic results for samples from the existing MWL and TA-V wells. Data validation reviews and a more detailed review of laboratory QC method blank results for this time period indicate the laboratory is not the primary source of this toluene detection frequency increase.

## 4.2 Conclusions

The results of this investigation provide the context and technical basis for interpreting the widespread, very low concentrations of toluene reported in groundwater sampling results at the MWL and across SNL/NM. The very low concentrations of toluene detected in samples from the MWL groundwater monitoring wells are consistent with detections in samples from other SNL/NM sitewide monitoring wells and a laboratory and/or ambient environmental source(s) and are expected to continue in the future. The toluene groundwater data reflect the ubiquitous nature of toluene and the very low analytical detection limit; the detections do not represent a release to the environment or widespread low-concentration toluene contamination in the regional aquifer. While it is important to investigate and identify potential sources of toluene contamination, trying to determine every potential source is not warranted considering the

ubiquitous nature of toluene and the fact that the regulatory standards are orders of magnitude higher than the detected concentrations.

The key findings and conclusions of this investigation are presented as follows:

- The MWL is not the source of the toluene in groundwater samples. A review of the MWL inventory, subsurface soil sampling results, and soil-vapor survey results confirm that toluene is not a COC and demonstrate that toluene contamination capable of impacting regional groundwater at a depth of approximately 500 feet bgs is not present at the MWL.

- The widespread occurrence of toluene detections in groundwater and TB samples from the sitewide monitoring well network, the detection frequency, and the very low concentration range indicate that the toluene source is not low-level contamination present in the regional aquifer. All toluene detections in groundwater samples from October 2001 through April 2010 occur within a very narrow concentration range (0.217 to 2.2 µg/L) at or near the laboratory MDL (typically 0.25 µg/L); of the total detections, 88% are less than the PQL of 1 µg/L, and 63% are less than 0.50 µg/L.

- The number of toluene detections significantly increased across the sitewide groundwater monitoring network in 2009 (2008: 163 samples, 8 detections; 2009: 174 samples, 63 detections). At the MWL, the same trend is evident (2008: 15 samples, 1 detection; 2009: 23 samples, 15 detections). Because a majority of the samples for the new wells installed in 2008 at the MWL (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and TA- V (TAV-MW10) are from 2009 quarterly sampling events when this increase in toluene detections occurred, they have some of the highest toluene detection frequencies as compared to other wells with more pre-2009 results.

- Detections of toluene in field QC samples support the conclusion that the sampling equipment, method, and overall process are not the source of toluene contamination in the groundwater samples. Instead, these field QC blank samples appear to be affected by the same ambient environmental and/or laboratory toluene source(s) as the environmental samples. In particular, toluene detections in TB samples (ultra-clean laboratory water in sealed containers never opened in the field) occur within a concentration range similar to that for groundwater samples (0.184 to 1.21 µg/L) and have a toluene detection frequency of 11%.

- The April 2010 MWL purging/sampling study results showed only laboratory-related toluene contamination in 5 of the 34 groundwater samples. The results for the June 2010 purging/sampling study performed at well TAV-MW10 vary from the MWL results and are consistent with drilling/well materials and/or inadvertent contamination introduced during the drilling/well installation process as possible toluene sources. The purging/sampling study results are not consistent with low-concentration toluene in the regional aquifer.

- Laboratory QC data and the data validation process confirm the presence of toluene sources within the laboratory for some, but not all, cases of low-concentration toluene detections in groundwater samples. The increase in toluene detections observed in 2009 does not appear to be related to laboratory sources.

- Other potential sources of toluene are very low levels of toluene present in the ambient air/environment that impact the groundwater samples during the sampling process and transportation to the laboratory and contaminated sample containers.

- Evaluation of the groundwater sampling process for all monitoring wells and the drilling/well installation processes, equipment, and materials for the new wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, MWL-MW9, and TAV-MW10) supports the conclusion that they are not a source of toluene, but they cannot be ruled out as potential sources. The TAV-MW10 purging/sampling study results and the fact that all five new wells installed in 2008 have detection frequencies ranging from 19 to 58% are consistent with a possible toluene source related to drilling and/or well construction materials.

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# 5.0 RECOMMENDATIONS

Based upon the results of this MWL Toluene Investigation, additional investigation into the potential sources of toluene at the MWL is not required to confirm the MWL is not the source of toluene. However, several recommendations are provided that represent best management practices, will build upon this investigation, and will provide additional supporting documentation.

- Collect additional FB samples as part of ongoing MWL groundwater monitoring and continue to promote groundwater sampling team awareness of potential cross-contamination issues and sampling process improvement.

- Follow up with the laboratory to tighten the VOC sample container certification process (i.e., process used to certify the sample containers are clean prior to shipment to SNL/NM) and include additional method blank samples when batching and analyzing SNL/NM groundwater samples (i.e., for large sample batches include more than one method blank sample) to reduce the analysis time between method blanks and environmental samples.

- For the MWL Long-Term Monitoring and Maintenance Plan, develop trigger levels for toluene and other identified laboratory contaminants that are set at technically reasonable concentrations relative to historic monitoring results and process knowledge to minimize resampling and additional reporting. Setting a trigger level at the MDL or PQL would be counterproductive.

In addition, the NNSA Analytical Management Program collaborative effort should continue between the SNL/NM, Pantex, and LANL SMOs; AQA; and GEL to share information and work toward a well-defined process to address issues such as these types of low-level VOC results, as it is critical to the cost-effective implementation and management of the Environmental Restoration Project and Long-Term Environmental Stewardship Program missions at these DOE facilities and throughout the DOE complex.

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# APPENDIX A
# Mixed Waste Landfill Toluene Investigation Report – General Information on Toluene

## Introduction, Sources, and Use

Toluene (or methylbenzene, toluel, phenylmethane; $C_7H_8$) is a clear, colorless, noncorrosive, flammable liquid with a distinctive, sweet, benzene-like odor. Toluene is an aromatic hydrocarbon and is volatile at standard temperatures and pressures (i.e., changes from liquid to vapor). It is the lowest-molecular-weight alkylbenzene, which possesses properties similar to benzene. It is a primary additive to gasoline along with benzene and xylene. Toluene occurs naturally in crude oil and in the tolu tree. It is produced in the process of making gasoline and other fuels from crude oil, in making coke from coal, and as a by-product in the manufacture of styrene. Toluene is used in making paints, paint thinners, nail polish, lacquers, adhesives, and rubber, and in some printing and leather tanning processes. It is common solvent (a substance that can dissolve other substances) and used in the manufacture of benzoic acid, benzaldehyde, TNT [trinitrotoluene], and other organic compounds.

Toluene concentrations in urban air range from 0.01 to 0.05 parts per million (ppm) (Bentley-Phillips and Baylor 1974). It is released from manufacturing plants, automobile and coke-oven emissions, and gasoline evaporation. It is also released to the air by cigarette smoke (NIOSH 1984). Toluene is a component of high-flash aromatic naphthas, which are produced from crude oil by primary distillation and as by-products in the coal tar industry.

## Physical Properties

Physical properties for toluene are summarized in the following table below:

| | |
|---|---|
| **Flammability Limits % (lower and upper limits)** | 1.4–6.7 |
| **Flash Point** | 4.4°C and 40°F |
| **Freezing Point** | -94.99°C |
| **Melting Point** | -95°C |
| **Molecular Weight** | 92.14 |
| **Specific Gravity at 25°C** | 0.87 |
| **Vapor Pressure millimeters mercury (Hg) (°C)** | 36.7 |

°C = Degree(s) Celsius.
°F = Degree(s) Fahrenheit.

At a concentration of approximately 8 ppm, toluene produces a detectable odor in the air; at a concentration of 0.04 to 1 ppm, it has a detectable taste in water.

## Fate and Transport

Toluene enters the environment when materials that contain it, such as gasoline, paints, paint thinners, adhesives, nail polish, etc. are used. The toluene evaporates (i.e., volatilizes) and becomes mixed with the air. Toluene can potentially impact surface water, soil, and groundwater from spills of solvents and petroleum products, leaking underground storage tanks containing gasoline, and disposal of materials containing toluene in landfills or waste disposal sites.

Based upon experience with trichloroethene (a chlorinated solvent) at the Sandia National Laboratories/New Mexico (SNL/NM) Chemical Waste Landfill (CWL), transport in the subsurface of volatile organic contamination to the regional aquifer will occur only through soil-

vapor migration. The very thick, dry vadose zone (unsaturated zone between the ground surface and the top of the regional groundwater aquifer or water table, approximately 500 feet beneath the CWL and Mixed Waste Landfill) severely limits the downward migration of volatile organic liquids. The liquids volatilize (i.e., change from liquid to vapor) in the shallow subsurface (0 to 30 feet below ground surface) to form soil vapor, which in turn migrates through the vadose zone controlled by molecular diffusion through the soil-vapor medium, advection-dispersive transport via soil-vapor flow, and reversible and irreversible attenuation processes (SNL/NM December 2004).

Toluene does not usually remain in the environment for long periods of time as it is readily broken down to other chemicals by microorganisms in soil and will evaporate from surface water and surface soil. Toluene dissolved in groundwater does not break down quickly as there are fewer microorganisms in groundwater.

Toluene can be taken up into fish and shellfish, plants, and animals living in water containing toluene, but it does not concentrate or build up to high levels because most animal species can convert the toluene into other compounds that are excreted.

**Exposure Pathways**

Humans may be exposed to toluene from many sources, including drinking water, eating food, breathing air, and inhaling toluene volatilizing from various products. Exposure to toluene may also occur through breathing the chemical in the workplace, during fueling of vehicles, and/or in the ambient air. People who work with gasoline, kerosene, heating oil, paints, lacquers, and toluene-containing solvents and/or products are at the greatest risk of exposure. Because toluene is a common solvent and is found in many consumer products, exposure to toluene can occur at home and outdoors while using gasoline, nail polish, cosmetics, rubber cement, paints, paintbrush cleaners, stain removers, fabric dyes, inks, and adhesives. Smokers are exposed to small amounts of toluene from cigarette smoke.

Toluene can enter the body by breathing vapors (i.e., inhalation) or eating or drinking contaminated food or water. Toluene can also be absorbed through the skin into the bloodstream. When breathing air containing toluene, the chemical is introduced directly into the blood from the lungs. Daily exposure to toluene can occur in the home, at work, or during travel. Factors such as age, sex, body composition, and health status affect what happens to toluene once it enters the body. After being taken into the body, more than 75% of the toluene is eliminated within 12 hours. It may leave the body unchanged in the air exhaled or in urine excreted after some of the toluene has been chemically altered to become more water soluble. Generally, the body converts toluene into less harmful chemicals, such as hippuric acid.

The toluene level in the air outside residential areas is usually less than 1 ppm in cities and suburbs that are not in close proximity to an industrial area. The toluene inside homes is also likely to be less than 1 ppm. The amount of toluene in food has not been reported but is likely to be low. Traces of toluene have been found in eggs that were stored in polystyrene containers containing toluene.

The average person may be exposed to only about 300 micrograms (µg) of toluene a day unless they smoke cigarettes or work with toluene-containing products. If a person smokes a pack of cigarettes a day, exposure increases by approximately 1,000 µg.

## Health Effects

Toluene is a central nervous system depressant and a skin and mucous membrane irritant. Toluene can cause headaches, confusion, and memory loss. Symptoms depend upon many factors, including the amount of toluene taken in and length of exposure. Low to moderate, day-after-day exposure in the workplace can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, and loss of appetite. These symptoms usually disappear when exposure ceases. The effects of long-term exposure to low levels of toluene are not well known.

If exposed to a large amount of toluene within a short period of time (such as deliberately sniffing paint or glue), the first symptom is light-headedness. If exposure continues, dizziness, sleepiness, unconsciousness, or even death can occur. Toluene causes death by interfering with breathing and heart function. When exposure ceases, the symptoms typically abate.

Studies in workers and animals exposed to toluene indicate that toluene does not cause cancer. The International Agency for Research on Cancer and the Department of Health and Human Services have not classified toluene for carcinogenic effects. The U.S. Environmental Protection Agency (EPA) has not classified toluene as a human carcinogen.

## Regulatory Standards for Toluene in Drinking Water

In 1974, the U.S. Congress passed the Safe Drinking Water Act. This law requires the EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur. These nonenforceable health goals, based solely on possible health risks and exposure over a lifetime with an adequate margin of safety, are called maximum contaminant level goals (MCLGs). The MCLG for toluene is 1 milligram per liter (mg/L) or 1 ppm. The EPA has set an enforceable regulation for toluene, the maximum contaminant level (MCL), at 1 mg/L or 1 ppm (EPA 2009). MCLs are set as close to the health goals as possible, considering cost, benefits, and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. In the case of toluene, the MCL equals the MCLG because analytical methods and treatment technology pose no limitations.

States may set more stringent drinking water MCLGs or MCLs. The New Mexico Environment Department has set a slightly lower regulatory standard for toluene (maximum allowable concentration or MAC) of 0.750 mg/L or 0.750 ppm (Title 20, New Mexico Administrative Code, Chapter 6, Part 2, Section 3103).

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# APPENDIX B
# Mixed Waste Landfill Toluene Investigation Report – Sitewide Data Evaluation Supporting Information

Table B-1
Mixed Waste Landfill Toluene Investigation
Toluene Detections – All Sitewide Locations – October 2001 through April 2010

| Well ID | Number of Toluene Detections | Number of Nondetections | Toluene Detection Frequency | Toluene Concentration Range | Number of Qualified Detections[1] | Well Installation Date |
|---|---|---|---|---|---|---|
| AVN-1 | 3 | 33 | 8% | 0.255-0.285 | 1 | May 1995 |
| AVN-2 | 2 | 15 | 12% | 1.02-2.2 | 2 | June 1995 |
| COYOTE SPRINGS | 0 | 7 | 0% | N/A | 0 | N/A |
| CTF-MW1 | 0 | 10 | 0% | N/A | 0 | August 2001 |
| CTF-MW2 | 0 | 14 | 0% | N/A | 0 | August 2001 |
| CTF-MW3 | 0 | 11 | 0% | N/A | 1 | August 2001 |
| CWL-BW2 | 0 | 1 | 0% | N/A | 1 | September 1985 |
| CWL-BW3 | 4 | 12 | 25% | 0.273-1.45 | 2 | September 1988 |
| CWL-BW4A | 4 | 12 | 25% | 0.696-1.38 | 1 | May 1994 |
| CWL-MW2A | 0 | 5 | 0% | N/A | 2 | August 1988 |
| CWL-MW2BL | 0 | 20 | 0% | N/A | 1 | June 1994 |
| CWL-MW2BU | 0 | 16 | 0% | N/A | 1 | June 1994 |
| CWL-MW4 | 2 | 22 | 8% | 0.379-0.383 | 1 | May 1990 |
| CWL-MW5L | 0 | 19 | 0% | N/A | 1 | April 1994 |
| CWL-MW5U | 7 | 18 | 28% | 0.423-1.12 | 1 | April 1994 |
| CWL-MW6L | 0 | 18 | 0% | N/A | 1 | May 1994 |
| CWL-MW6U | 8 | 17 | 32% | 0.307-0.808 | 5 | May 1994 |
| CWL-MW7 | 0 | 12 | 0% | N/A | 0 | March 2003 |
| CWL-MW8 | 0 | 13 | 0% | N/A | 0 | April 2003 |
| CYN-MW1D | 1 | 26 | 4% | 0.248 | 0 | December 1997 |
| CYN-MW3 | 0 | 21 | 0% | N/A | 1 | June 1999 |
| CYN-MW4 | 0 | 22 | 0% | N/A | 2 | June 1999 |
| CYN-MW5 | 0 | 13 | 0% | N/A | 1 | August 2001 |
| CYN-MW6 | 0 | 11 | 0% | N/A | 0 | December 2005 |
| CYN-MW7 | 0 | 4 | 0% | N/A | 0 | December 2005 |
| CYN-MW8 | 0 | 4 | 0% | N/A | 0 | January 2006 |
| EOD HILL | 0 | 3 | 0% | N/A | 0 | Unknown |
| EUBANK-1 | 1 | 15 | 6% | 0.292 | 0 | July 1988 |
| EUBANK-2 | 1 | 3 | 25% | 0.72 | 0 | November 1996 |
| EUBANK-3 | 0 | 4 | 0% | N/A | 0 | November 1996 |
| EUBANK-5 | 0 | 4 | 0% | N/A | 0 | November 1996[2] |
| GREYSTONE-MW2 | 0 | 9 | 0% | N/A | 1 | April 2002 |
| LWDS-MW1 | 10 | 40 | 20% | 0.251-1.68 | 5 | May 1993 |
| LWDS-MW2 | 0 | 34 | 0% | N/A | 1 | October 1992 |
| MRN-2 | 0 | 9 | 0% | N/A | 1 | January 1995 |
| MRN-3D | 0 | 5 | 0% | N/A | 2 | July 2003 |
| MWL-BW1 | 0 | 6 | 0% | N/A | 1 | July 1989 |
| MWL-BW2 | 3 | 13 | 19% | 0.366-0.759 | 2 | January 2008 |
| MWL-MW1 | 0 | 8 | 0% | N/A | 1 | October 1988 |
| MWL-MW2 | 0 | 9 | 0% | N/A | 1 | August 1989 |
| MWL-MW3 | 1 | 6 | 14% | 0.275 | 1 | August 1989 |
| MWL-MW4 | 1 | 16 | 6% | 0.321 | 0 | February 1993 |
| MWL-MW5 | 0 | 22 | 0% | N/A | 1 | November 2000 |
| MWL-MW6 | 0 | 23 | 0% | N/A | 0 | October 2000 |

Table B-1 (Continued)
Mixed Waste Landfill Toluene Investigation
Toluene Detections – All Sitewide Locations

| Well ID | Number of Toluene Detections | Number of Nondetections | Toluene Detection Frequency | Toluene Concentration Range | Number of Qualified Detections[1] | Well Installation Date |
|---|---|---|---|---|---|---|
| MWL-MW7 | 5 | 9 | 36% | 0.267-0.645 | 0 | June 2008 |
| MWL-MW8 | 6 | 6 | 50% | 0.253-1.45 | 3 | June 2008 |
| MWL-MW9 | 7 | 5 | 58% | 0.306-1.1 | 0 | June 2008 |
| NWTA3-MW2 | 1 | 4 | 20% | 0.458 | 0 | August 2000 |
| NWTA3-MW3D | 1 | 6 | 14% | 1.15 | 1 | July 2003 |
| PGS-2 | 0 | 16 | 0% | N/A | 0 | September 1995 |
| PL-2 | 0 | 8 | 0% | N/A | 0 | November 1994 |
| PL-3 | 0 | 5 | 0% | N/A | 0 | December 1994 |
| SFR-2S | 0 | 8 | 0% | N/A | 0 | August 1992 |
| SFR-4T | 0 | 9 | 0% | N/A | 0 | September 1993 |
| SWTA3-MW2 | 1 | 9 | 10% | 0.251 | 0 | May 2002 |
| SWTA3-MW3 | 0 | 7 | 0% | N/A | 1 | February 2004 |
| SWTA3-MW4 | 0 | 5 | 0% | N/A | 0 | August 2005 |
| TA1-W-01 | 1 | 15 | 6% | 0.315 | 0 | March 1997 |
| TA1-W-02 | 1 | 14 | 7% | 0.267 | 0 | February 1998 |
| TA1-W-03 | 0 | 17 | 0% | N/A | 1 | January 1998 |
| TA1-W-04 | 0 | 17 | 0% | N/A | 2 | October 1998 |
| TA1-W-05 | 3 | 13 | 19% | 0.33-0.364 | 0 | November 1998 |
| TA1-W-06 | 2 | 14 | 13% | 0.275-0.278 | 1 | February 1998 |
| TA1-W-07 | 0 | 3 | 0% | N/A | 0 | August 1998 |
| TA1-W-08 | 0 | 20 | 0% | N/A | 0 | August 2001 |
| TA2-NW1-325 | 0 | 3 | 0% | N/A | 0 | April 1993 |
| TA2-NW1-595 | 0 | 24 | 0% | N/A | 2 | July 1993 |
| TA2-SW1-320 | 0 | 31 | 0% | N/A | 0 | November 1992 |
| TA2-W-01 | 1 | 22 | 4% | 0.586 | 0 | June 1994 |
| TA2-W-19 | 1 | 37 | 3% | 0.383 | 0 | November 1995 |
| TA2-W-24 | 0 | 2 | 0% | N/A | 0 | February 1998 |
| TA2-W-25 | 0 | 2 | 0% | N/A | 0 | April 1997 |
| TA2-W-26 | 5 | 33 | 13% | 0.259-0.309 | 0 | January 1998 |
| TA2-W-27 | 2 | 21 | 9% | 0.312-0.323 | 3 | February 1998 |
| TAG-W-27 | 0 | 1 | 0% | N/A | 0 | February 1995 |
| TAV-MW1 | 2 | 26 | 7% | 0.479-0.57 | 2 | February 1995 |
| TAV-MW10 | 2 | 6 | 25% | 0.252-0.324 | 1 | February 2008 |
| TAV-MW2 | 2 | 36 | 5% | 0.271-0.531 | 1 | March 1995 |
| TAV-MW3 | 0 | 35 | 0% | N/A | 1 | April 1997 |
| TAV-MW4 | 1 | 34 | 3% | 0.574 | 0 | April 1997 |
| TAV-MW5 | 2 | 34 | 6% | 0.252-0.485 | 0 | April 1997 |
| TAV-MW6 | 0 | 43 | 0% | N/A | 2 | April 2001 |
| TAV-MW7 | 0 | 38 | 0% | N/A | 0 | April 2001 |
| TAV-MW8 | 0 | 40 | 0% | N/A | 1 | April 2001 |
| TAV-MW9 | 5 | 30 | 14% | 0.298-0.543 | 0 | March 2001 |
| TJA-2 | 3 | 28 | 10% | 0.254-0.492 | 0 | July 1994 |
| TJA-3 | 3 | 24 | 11% | 0.217-0.39 | 1 | August 1998 |

Table B-1 (Concluded)
Mixed Waste Landfill Toluene Investigation
Toluene Detections – All Sitewide Locations

| Well ID | Number of Toluene Detections | Number of Nondetections | Toluene Detection Frequency | Toluene Concentration Range | Number of Qualified Detections[1] | Well Installation Date |
|---|---|---|---|---|---|---|
| TJA-4 | 0 | 34 | 0% | N/A | 1 | August 1998 |
| TJA-5 | 0 | 2 | 0% | N/A | 0 | August 1998 |
| TJA-6 | 3 | 20 | 13% | 0.323-0.403 | 0 | February 2001 |
| TJA-7 | 2 | 32 | 6% | 0.294-0.307 | 1 | March 2001 |
| TRE-1 | 0 | 10 | 0% | N/A | 0 | July 1995 |
| WYO-3 | 2 | 16 | 11% | 0.519-0.674 | 3 | July 2001 |
| WYO-4 | 6 | 37 | 14% | 0.262-0.674 | 1 | July 2001 |
| **Grand Total** | **118** | **1,516[3]** | **7%[4]** | **0.217-2.2** | **71** | **--** |

[1]Detections qualified as "not detected results" during data validation due to toluene laboratory contamination detected in laboratory method blank and/or control samples.
[2] City of Albuquerque monitoring well – installation date estimated.
[3]Total does not include 4 nondetect results that were qualified as "rejected" during data validation for wells CWL-BW4A (2 results) and TAV-MW10 (2 results).
[4]Overall detection frequency calculated as follows: total number of detections (118) divided by the total number of samples (118 + 1,516).
Wells highlighted in yellow are wells with a toluene detection frequency greater than or equal to 10%.
ID = Identification.
N/A = Not Applicable.

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# APPENDIX C
# Mixed Waste Landfill Toluene Investigation Report – Phase Partitioning Calculations to Determine the Potential Toluene Concentration in Groundwater Using Maximum Soil-Vapor Concentrations

# Technical Memorandum

## Mixed Waste Landfill Toluene Investigation Report
## Phase Partitioning of Toluene in Soil Vapor and Groundwater

### Background

For evaluating the Mixed Waste Landfill (MWL) as a potential source of the toluene detections in groundwater monitoring samples, the relationship between concentrations of toluene in soil vapor and groundwater were evaluated. The phase partitioning approach is highly conservative and does not represent actual conditions; it is being used only to illustrate the fact that a sufficient source term of toluene in soil vapor does not exist at the MWL to contaminate the groundwater, which is located at a depth of approximately 500 feet below ground surface (bgs).

The approach used for this phase partitioning calculation assumes that a hypothetical toluene soil-vapor plume exists in equilibrium in the subsurface immediately above the capillary fringe, which in turn immediately overlies the regional water table. This hypothetical toluene soil-vapor plume is also assumed to be laterally extensive across the entire capillary fringe beneath the MWL and at the maximum toluene concentration detected in soil-vapor samples collected from within 50 feet of the ground surface at the MWL. This scenario is not realistic because (1) toluene soil-vapor data (Peace et al. December 2002 and SNL/NM August 2008) indicate its distribution in the subsurface immediately beneath the former disposal areas is sporadic with most (85%) of the results for soil-vapor samples being nondetected; (2) no dilution is assumed for the concentrations of toluene in the aquifer; and (3) other real-world factors such as stratigraphic discontinuities in the vadose zone that would further attenuate the toluene concentrations are not considered.

This hypothetical phase partitioning calculation is provided to evaluate whether or not the MWL could be the source of toluene contamination detected in the MWL groundwater samples assuming extremely conservative, unrealistic conditions. This calculation builds upon previous SNL/NM work performed at the Chemical Waste Landfill (CWL) over the past 16 years, as described in CWL reports (SNL/NM October 1995 and December 2004, and Peterson June 1999).

### Phase Partitioning Calculations

Phase partitioning of toluene is dependent on the Henry's Law constant. This constant is a ratio that relates the concentrations of toluene in vapor and aqueous phases at equilibrium conditions, such that

$$C_V = H\, C_W \qquad \textit{(equation 1)}$$

Where,
- $C_V$ = Equilibrium concentration of toluene in the vapor-phase (mass/volume)
- $C_W$ = Equilibrium concentration of toluene in the aqueous phase (mass/volume)
- H = Henry's Law constant for toluene (unitless).

The Henry's Law constant for toluene was developed using U.S. Environmental Protection Agency (EPA) guidance (EPA 1996) and determined to be 0.272 (NMED 2009). This phase partitioning represents what would occur in a laboratory setting under ideal conditions. However, the actual interface between saturated and unsaturated materials, where partitioning is occurring in the vadose zone, is far more complex such that calculations are far more difficult to quantify and defend. For example, vapor phase toluene mass is lost in the capillary fringe before reaching the water table. Although the maximum soil-vapor concentration at depth provides the maximum toluene concentration in groundwater at the upper extent of the capillary fringe, the groundwater at this horizon is rarely sampled because it is essentially "trapped" in the sediments and not mobile. The downwardly increasing water saturation between the upper horizon of the capillary fringe and the water table further dilutes the toluene.

For calculating the predicted toluene concentration at the water table, it is necessary to consider dilution as follows:

$$C_{Wt} = C_{Wc}/DAF \qquad \textit{(equation 2)}$$

Where,
- $C_{Wt}$ = Toluene concentration in groundwater at the water table (mass/volume)
- $C_{Wc}$ = Toluene concentration in groundwater at the upper extent of the capillary fringe in equilibrium with soil vapor (mass/volume)
- DAF = Dilution Attenuation Factor (unitless)

Using calculations provided in the EPA Soil Screening Guidance (EPA 1996), the DAF cited is 20.

**Site-Specific Calculations**

Using the phase partitioning relationships described in Equations 1 and 2, it is possible to evaluate the phase partitioning of toluene using site-specific data. Because the soil-vapor and groundwater samples collected at the MWL were analyzed using different analytical methods and the results presented in different units ("ppb v/v" for soil-vapor results and "µg/L" [micrograms per liter] for groundwater results), a conversion was necessary. In order to be comparable, the soil-vapor results were converted to units of µg/L using the following formula (NMED 2000):

$$C_v = (ppmv)(MW)(P)/(R)(T) \qquad \textit{(equation 3)}$$

Where,
- $C_v$ = Equilibrium concentration of toluene in the vapor-phase (µg/L)
- ppmv = Parts per million by volume
- MW = Molecular weight (calculated to be 92.14 grams per mole for toluene)
- P = Pressure in atm (assumed to be 0.83)
- R = Ideal gas constant at 293K (0.082 atm/L/mole/K)
- T = Temperature in K (= $^{o}$C + 273) (assumed to be 20$^{o}$C)

For example, 9.5 ppmv of soil vapor would convert to:

$$C_v = (ppmv)(MW)(P)/(R)(T)$$
$$= (0.026)(92.14)(0.83)/(0.082)(293)$$
$$= 0.083\ \mu g/L$$

Using Equation 1, this results in an aqueous phase concentration of 0.3 µg/L in the capillary fringe. Using Equation 2, the toluene concentration in the water table would be 0.015 µg/L.

## Conclusion

The calculated toluene concentration in groundwater at the water table is 0.015 µg/L. This concentration is equivalent to 15 parts per trillion and approximately an order of magnitude below the laboratory method detection limit (0.25 µg/L), and thus would not be detectable in groundwater samples. This calculation demonstrates that the known concentrations of toluene in soil vapor at the MWL are not capable of producing the very low concentrations of toluene measured in the groundwater even assuming a hypothetical, unrealistic scenario (i.e., a scenario where the maximum concentration of toluene soil vapor from the upper 50 feet beneath the disposal areas is assumed to have migrated through the entire vadose zone via advective transport to the water table with no appreciable attenuation and thereafter no dilution occurring within the aquifer).

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# APPENDIX D
# Mixed Waste Landfill Toluene Investigation Report – Bath Test Study of Groundwater Sampling Tubing and Monitoring Well Polyvinyl Chloride Materials

**Potential Leaching of VOCs and SVOCs from Sample Tubing and Well Materials Used at Sandia National Laboratories/New Mexico**

## Objective

Toluene has historically been detected at very low concentrations (less than 3 micrograms per liter [µg/L]) in Mixed Waste Landfill (MWL) groundwater samples. Bath tests were conducted to determine whether toluene could potentially leach from tubing and well casing materials used by Sandia National Laboratories/New Mexico (SNL/NM) during groundwater monitoring well installation and collection of groundwater samples.

## Process

### Testing Materials

Sample tubing and well-casing materials were obtained from storage sheds at the Environmental Restoration Field Office on November 10, 2009. The materials were shipped to GEL Laboratories, Inc. (GEL) in Charleston, South Carolina, using standard SNL/NM Sample Management Office shipping procedures. The materials arrived at GEL on November 13, 2009. The materials were delivered with proper analysis request/chain-of-custody documentation (AR/COC 612482) and signatures. All sample containers arrived without any visible signs of tampering or breakage.

The sample tubing consisted of four types: nylon tubing, Tygon® tubing, Teflon® tubing, and polypropylene tubing. All tubing was 0.5-inch inner diameter (ID) in size. The well casing was 5-inch ID, Schedule 80 polyvinyl chloride (PVC) blank well casing.

### Experimental Method

An informal leaching procedure was designed by SNL/NM and GEL. Five baths and one control blank were used. Laboratory-grade glass beakers were used for each of the five baths and the control blank. Thus, six glass beakers were used. Each bath was dedicated to a particular type of material. A single piece of material was placed into each of the five beakers; the beakers were then filled with deionized (DI) water and sealed. The sixth beaker, the control blank, was filled with DI water and sealed in a manner consistent with the other five beakers. All six beakers were stored at room temperature. The materials remained submerged during the exposure time. Water samples were drawn from each beaker at time intervals of 24 hours, 7 days, and 14 days.

### Sample Analyses

Each water sample was analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Samples were analyzed for VOCs by Gas Chromatograph/Mass Spectrometer (GC/MS) using U.S. Environmental Protection Agency (EPA) Method SW846 8260B. Samples were analyzed for SVOCs by GC/MS using EPA Method SW846 8270C. Sample preparation, analysis, and reporting were conducted in accordance with GEL Standard

Operating Procedure GL-OA-E-038 REV#12. Tables D-1 and D-2 summarize the laboratory instruments used to analyze the water samples.

Table D-1
Instrument Systems Used to Perform the VOC Analyses

| Instrument ID | Instrument | System Configuration | Column ID | Column Description | P&T Trap |
|---|---|---|---|---|---|
| VOA1.I | Gas Chromatograph/ Mass Spectrometer | HP6890/HP5973 | RTX-624 | Restek, 60m x 0.25mm x 1.4um | Trap 10 |
| VOA9.I | Gas Chromatograph/ Mass Spectrometer | HP6890/HP5973 | DB-624 | J&W, 60m x 0.25mm x 1.4um | Trap 10 |

Table D-2
Instrument Systems Used to Perform the SVOC Analyses

| Instrument ID | Instrument | System Configuration | Column ID | Column Description |
|---|---|---|---|---|
| MSD2.I | Agilent 5975 Mass Spectrometer | HP7890A/HP5975C | DB-5MS | 25m x 0.2mm, 0.33um (5% Phenylmethylpolysiloxane) |
| MSD4.I | HP Mass Spectrometer | HP6890/HP5973 | DB-5MS | 25m x 0.2mm, 0.33um (5% Phenylmethylpolysiloxane) |
| MSD1.I | HP 5973 Mass Spectrometer | HP6890/HP5973 | ZB-5ms | 25m x 0.2mm, 0.33um (5% Polysilarylene-95% Polydimethylsiloxane) |

## Analytical Results

The VOC and SVOC analytical results for water samples drawn from the glass beakers are summarized as follows. The laboratory Certificates of Analysis are attached.

### Toluene

As shown in Table D-3, toluene was not detected in any of the 18 water samples drawn from the glass beakers. None of the 24-hour, 7-day, or 14-day water samples for the five test material contained detectable concentrations of toluene. Similarly, the control blanks contained no detectable toluene concentrations for the three time periods.

### Other Compounds

SVOCs were not detected in any of the 18 water samples. Three VOCs (acetone, chloromethane, and methylene chloride) were the only VOCs detected in any of the water samples. These three VOCs were mainly detected in water samples associated with the nylon and Tygon® tubing materials, but chloromethane was present in the water sample associated with the PVC well casing material and in one of the control blank samples. The detected VOCs are summarized in Table D-4.

Table D-3
Toluene Analytical Results for Water Samples Drawn from the Glass Beakers

| Beaker Contents | Exposure Time | Toluene (µg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Nylon tubing and DI water | 24 hour | ND | U | 0.250 | 1.00 |
| Tygon tubing and DI water | 24 hour | ND | U | 0.250 | 1.00 |
| Teflon tubing and DI water | 24 hour | ND | U | 0.250 | 1.00 |
| Polypropylene tubing and DI water | 24 hour | ND | U | 0.250 | 1.00 |
| PVC Well casing and DI water | 24 hour | ND | U | 0.250 | 1.00 |
| Control blank (DI water only) | 24 hour | ND | U | 0.250 | 1.00 |
| Nylon tubing and DI water | 7 day | ND | U | 0.250 | 1.00 |
| Tygon tubing and DI water | 7 day | ND | U | 0.250 | 1.00 |
| Teflon tubing and DI water | 7 day | ND | U | 0.250 | 1.00 |
| Polypropylene tubing and DI water | 7 day | ND | U | 0.250 | 1.00 |
| PVC Well casing and DI water | 7 day | ND | U | 0.250 | 1.00 |
| Control blank (DI water only) | 14 day | ND | U | 0.250 | 1.00 |
| Nylon tubing and DI water | 14 day | ND | U | 0.250 | 1.00 |
| Tygon tubing and DI water | 14 day | ND | U | 0.250 | 1.00 |
| Teflon tubing and DI water | 14 day | ND | U | 0.250 | 1.00 |
| Polypropylene tubing and DI water | 14 day | ND | U | 0.250 | 1.00 |
| PVC Well casing and DI water | 14 day | ND | U | 0.250 | 1.00 |
| Control blank (DI water only) | 14 day | ND | U | 0.250 | 1.00 |

DI = Deionized.
MDL = Effective method detection limit.
µg/L = Microgram(s) per liter.
ND = Result is less than MDL (not detected).
PQL = Effective practical quantitation limit.
PVC = Polyvinyl chloride.
U = The analyte was analyzed for but not detected. The associated numerical value is the sample quantitation limit.

Table D-4
Summary of Detected Volatile Organic Compounds in Tubing and PVC Water Samples

| | Nylon Tubing | | | Tygon Tubing | | | PVC Well Casing | Control Blank |
|---|---|---|---|---|---|---|---|---|
| Compound | 24-hr | 7-day | 14-day | 24-hr | 7-day | 14-day | 24-hr | 14-day |
| Acetone, µg/L MDL = 3.50 | ND | 7.61 (J) | ND | ND | ND | ND | ND | ND |
| Chloromethane, µg/L MDL = 0.300 | ND | ND | ND | ND | 0.562 (J) | ND | 0.473 (J) | 0.371 (J) |
| Methylene chloride, µg/L MDL = 0.300 | 11.1* | 11.5* | 9.42 (J) | 8.85 (J) | 7.70 (J) | 5.35 (J) | ND | ND |

DL = Detection limit.
MDL = Method detection limit
µg/L = Microgram(s) per liter.
ND = Not detected.
PQL = Practical quantitation limit.
PVC = Polyvinyl chloride.
RL = Reporting limit.

Qualifiers:
J = Estimated value; the analyte concentration fell above the effective DL and below the RL.
* = The analyte concentration fell above the PQL.

Quality Control

An aliquot of the 14-day water for the Teflon® tubing (Sample 087938-C01) was designated for spike analysis. The spiking chemical was reagent-grade toluene. The matrix spike designations are indicated as "PS" or "PSD." The "PS" designation (post spike) indicates that the matrix was fortified prior to analysis but after applying any preparation factors, such as a dilution. A summary of the quality control analysis for toluene is shown in Table D-5.

Table D-5
Summary of Matrix Spike Quality Control Water Samples for the Teflon® Tubing Test

| Sample | NOM (µg/L) | Toluene (µg/L) | Qual | QC (µg/L) | RPD% | REC% | Acceptance Limit |
|---|---|---|---|---|---|---|---|
| Method Blank (MB) | — | — | U | ND | — | — | — |
| Laboratory Control Sample (LCS) | 50 | — | — | 52.7 | — | 105 | (74–120%) |
| Method Blank (MB) | — | — | U | ND | — | — | — |
| Laboratory Control Sample (LCS) | 50 | — | — | 43.96 | — | 87.9 | (74–120%) |
| Post Spike (PS) | 50 U | ND | — | 39.1 | — | 78.1 | (65–124%) |
| Post Spike Duplicate (PSD) | 50 U | ND | — | 45.2 | 14.6 | 90.5 | (RPD 0–20%) (REC 65–124%) |

ND = Result is less than detection limit (not detected).
NOM = Nominal concentration of the spiking compound.
Qual = Qualifier.
QC = Quality control. Amount of compound found in the QC sample.
REC = Recovery for the control samples.
RPD = Relative percent difference between PS/PSD.
U = The analyte was analyzed for but not detected. The associated numerical value is the sample quantitation limit.

GEL conducted a standard internal data validation for the VOC and SVOC analytical results. All holding times were met. The method blank and laboratory control samples met the acceptance limit criteria. The spike recoveries and spike duplicate recoveries were within the required acceptance limits. Relative percent difference between the matrix spike pair met the acceptance limits.

## Conclusions

Toluene was not detected in any of the water samples drawn from the beakers containing the SNL/NM test materials. This suggests that neither the tubing used in groundwater sampling nor the well casing materials are the source of toluene recently detected in the groundwater samples at the MWL.

**VOC Analyses**

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087940-A01
Sample ID: 241350011
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: PVC Well Casing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 | 12/02/09 | 1244 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| Chloromethane | J | 0.473 | 0.300 | 1.00 | ug/L | 1 | | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | | |

**The following Analytical Methods were performed**

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087940-A01
Sample ID: 241350011

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 61.6 ug/L | 50.0 | 123 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 50.3 ug/L | 50.0 | 101 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 55.7 ug/L | 50.0 | 111 | (76%-129%) |

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Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-D01
Sample ID: 241350006
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Control Blank
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1011 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-D01
Sample ID: 241350006

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 52.4 ug/L | 50.0 | 105 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 47.4 ug/L | 50.0 | 94.8 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 53.8 ug/L | 50.0 | 108 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-A01
Sample ID: 241350007
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Nylon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1041 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | | 11.1 | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-A01
Sample ID: 241350007

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 54.3 ug/L | 50.0 | 109 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 47.8 ug/L | 50.0 | 95.5 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 56.2 ug/L | 50.0 | 112 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087937-A01
Sample ID: 241350008
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Tygon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1112 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | J | 8.85 | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087937-A01
Sample ID: 241350008

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 55.3 ug/L | 50.0 | 111 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 47.7 ug/L | 50.0 | 95.4 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 56.1 ug/L | 50.0 | 112 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087938-A01
Sample ID: 241350009
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Teflon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1143 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087938-A01
Sample ID: 241350009

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 55.4 ug/L | 50.0 | 111 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 48.4 ug/L | 50.0 | 96.8 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 55.8 ug/L | 50.0 | 112 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087939-A01
Sample ID: 241350010
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Polypropylene Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1213 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087939-A01
Sample ID: 241350010

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 55.6 ug/L | 50.0 | 111 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 48.1 ug/L | 50.0 | 96.2 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 54.3 ug/L | 50.0 | 109 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-D02
Sample ID: 241350012
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Control Blank
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1315 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-D02
Sample ID: 241350012

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 57.7 ug/L | 50.0 | 115 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 47.9 ug/L | 50.0 | 95.8 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 55.8 ug/L | 50.0 | 112 | (76%-129%) |

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# Certificate of Analysis

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Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-B01
Sample ID: 241350013
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Nylon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1346 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | J | 7.61 | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | | 11.5 | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

**GEL LABORATORIES LLC**
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-B01
Sample ID: 241350013

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 59.1 ug/L | 50.0 | 118 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 49.0 ug/L | 50.0 | 97.9 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 56.7 ug/L | 50.0 | 113 | (76%-129%) |

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087937-B01
Sample ID: 241350014
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Tygon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1417 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | J | 0.562 | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | J | 7.70 | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087937-B01
Sample ID: 241350014

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 60.2 ug/L | 50.0 | 120 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 46.4 ug/L | 50.0 | 92.9 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 56.4 ug/L | 50.0 | 113 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087938-B01
Sample ID: 241350015
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Teflon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1448 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087938-B01
Sample ID: 241350015

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 58.4 ug/L | 50.0 | 117 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 47.5 ug/L | 50.0 | 95.0 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 55.6 ug/L | 50.0 | 111 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087939-B01
Sample ID: 241350016
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Polypropylene Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1519 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087939-B01
Sample ID: 241350016

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 52.7 ug/L | 50.0 | 105 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 47.2 ug/L | 50.0 | 94.4 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 51.0 ug/L | 50.0 | 102 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087940-B01
Sample ID: 241350017
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: PVC Well Casing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXM4 12/02/09 | 1550 | 928279 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087940-B01
Sample ID: 241350017

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 55.1 ug/L | 50.0 | 110 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 47.4 ug/L | 50.0 | 94.8 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 53.4 ug/L | 50.0 | 107 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-D03
Sample ID: 241350018
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Control Blank
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXY1 12/09/09 | 1154 | 930872 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | J | 0.371 | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-D03
Sample ID: 241350018

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 45.7 ug/L | 50.0 | 91.3 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 41.2 ug/L | 50.0 | 82.3 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 44.2 ug/L | 50.0 | 88.5 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-C01
Sample ID: 241350019
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Nylon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXY1 12/09/09 | 1221 | 930872 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | J | 9.42 | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087936-C01
Sample ID: 241350019

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 49.1 ug/L | 50.0 | 98.3 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 43.5 ug/L | 50.0 | 87.0 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 48.4 ug/L | 50.0 | 96.8 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087937-C01
Sample ID: 241350020
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Tygon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXY1 12/09/09 | 1249 | 930872 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | J | 5.35 | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087937-C01
Sample ID: 241350020

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 47.9 ug/L | 50.0 | 95.8 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 42.2 ug/L | 50.0 | 84.5 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 45.8 ug/L | 50.0 | 91.7 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087938-C01
Sample ID: 241350021
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Teflon Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXY1 12/09/09 | 1317 | 930872 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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# Certificate of Analysis

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087938-C01
Sample ID: 241350021

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 47.0 ug/L | 50.0 | 93.9 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 41.4 ug/L | 50.0 | 82.9 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 46.3 ug/L | 50.0 | 92.7 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087939-C01
Sample ID: 241350022
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Polypropylene Tubing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXY1 12/09/09 | 1345 | 930872 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087939-C01
Sample ID: 241350022

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 45.6 ug/L | 50.0 | 91.3 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 41.6 ug/L | 50.0 | 83.2 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 45.2 ug/L | 50.0 | 90.4 | (76%-129%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087940-C01
Sample ID: 241350023
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: PVC Well Casing
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics Federal** | | | | | | | | | | |
| *8260B TCL Liquid Federal "As Received"* | | | | | | | | | | |
| 1,1,1-Trichloroethane | U | ND | 0.325 | 1.00 | ug/L | 1 | RXY1 12/09/09 | 1413 | 930872 | 1 |
| 1,1,2,2-Tetrachloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1,2-Trichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,1-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloroethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 1,2-Dichloropropane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| 2-Butanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 2-Hexanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| 4-Methyl-2-pentanone | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Acetone | U | ND | 3.50 | 10.0 | ug/L | 1 | | | | |
| Benzene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Bromodichloromethane | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromoform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Bromomethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Carbon disulfide | U | ND | 1.25 | 5.00 | ug/L | 1 | | | | |
| Carbon tetrachloride | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chlorobenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloroethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Chloroform | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Chloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Dibromochloromethane | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Ethylbenzene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Methylene chloride | U | ND | 3.00 | 10.0 | ug/L | 1 | | | | |
| Styrene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Tetrachloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| Toluene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Trichloroethylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| Vinyl acetate | U | ND | 1.50 | 5.00 | ug/L | 1 | | | | |
| Vinyl chloride | U | ND | 0.500 | 1.00 | ug/L | 1 | | | | |
| Xylenes (total) | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| cis-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |
| trans-1,2-Dichloroethylene | U | ND | 0.300 | 1.00 | ug/L | 1 | | | | |
| trans-1,3-Dichloropropylene | U | ND | 0.250 | 1.00 | ug/L | 1 | | | | |

**The following Analytical Methods were performed**

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 11, 2009

Client Sample ID: 087940-C01
Sample ID: 241350023

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8260B DOE-AL | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 8260B TCL Liquid Federal "As Received" | 44.5 ug/L | 50.0 | 89.0 | (59%-130%) |
| Bromofluorobenzene | 8260B TCL Liquid Federal "As Received" | 38.7 ug/L | 50.0 | 77.5 | (71%-126%) |
| Toluene-d8 | 8260B TCL Liquid Federal "As Received" | 42.8 ug/L | 50.0 | 85.7 | (76%-129%) |

**SVOC Analyses**

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# Certificate of Analysis Report
for

SNLS003 Sandia National Labs (691436)

Client SDG: 241350 GEL Work Order: 241350

**The Qualifiers in this report are defined as follows:**

* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.

** Indicates analyte is a surrogate compound.

U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the Decision Level

**Review/Validation**

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this case narrative:

**Signature:** Dan Beacham **Name: Daniel Beacham**

**Date: 30 DEC 2009** **Title: Data Validator**

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# Certificate of Analysis

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-A01
Sample ID: 241350011
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: PVC Well Casing 24 Hour
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | AGS1 12/01/09 | 2250 | 926148 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.72 | 18.9 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.292 | 0.943 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |

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Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-A01
Sample ID: 241350011

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.943 | 9.43 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | RXC1 | 11/27/09 | 1536 | 926147 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 38.8 ug/L | 47.2 | 82.2 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 39.2 ug/L | 47.2 | 83.0 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 37.2 ug/L | 47.2 | 78.9 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-A01
Sample ID: 241350011

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 76.1 | ug/L | 94.3 | 80.7 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 43.2 | ug/L | 94.3 | 45.8 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 26.1 | ug/L | 94.3 | 27.7 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D01
Sample ID: 241350006
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Control Blank 24 Hour
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | AGS1 12/01/09 | 2108 | 926148 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.81 | 19.2 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.298 | 0.962 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D01
Sample ID: 241350006

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.962 | 9.62 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | RXC1 | 11/27/09 | 1536 | 926147 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 43.4 ug/L | 48.1 | 90.2 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 43.2 ug/L | 48.1 | 89.9 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 44.3 ug/L | 48.1 | 92.2 | (46%-130%) |

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D01
Sample ID: 241350006

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 33.8 | ug/L | 96.2 | 35.1* | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 16.5 | ug/L | 96.2 | 17.2* | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 12.4 | ug/L | 96.2 | 12.9* | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-A01
Sample ID: 241350007
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Nylon Tubing 24 Hour
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | AGS1 12/01/09 | 2128 | 926148 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.81 | 19.2 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.298 | 0.962 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-A01
Sample ID: 241350007

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.962 | 9.62 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | RXC1 | 11/27/09 | 1536 | 926147 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 40.4 ug/L | 48.1 | 84.1 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 39.8 ug/L | 48.1 | 82.8 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 42.8 ug/L | 48.1 | 89.0 | (46%-130%) |

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Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-A01
Sample ID: 241350007

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 72.2 | ug/L | 96.2 | 75.1 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 37.6 | ug/L | 96.2 | 39.1 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 24.8 | ug/L | 96.2 | 25.7 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-A01
Sample ID: 241350008
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Tygon Tubing 24 Hour
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | AGS1 12/01/09 | 2149 | 926148 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.76 | 19.0 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.295 | 0.952 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |

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Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-A01
Sample ID: 241350008

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.952 | 9.52 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | RXC1 | 11/27/09 | 1536 | 926147 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 37.3 ug/L | 47.6 | 78.3 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 36.7 ug/L | 47.6 | 77.0 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 42.9 ug/L | 47.6 | 90.2 | (46%-130%) |

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-A01
Sample ID: 241350008

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 69.0 | ug/L | 95.2 | 72.4 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 34.9 | ug/L | 95.2 | 36.7 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 21.5 | ug/L | 95.2 | 22.5 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-A01
Sample ID: 241350009
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Teflon Tubing 24 Hour
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | AGS1 12/01/09 | 2209 | 926148 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.76 | 19.0 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.295 | 0.952 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-A01
Sample ID: 241350009

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.952 | 9.52 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | RXC1 | 11/27/09 | 1536 | 926147 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 39.5 ug/L | 47.6 | 82.9 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 38.9 ug/L | 47.6 | 81.6 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 45.5 ug/L | 47.6 | 95.6 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-A01
Sample ID: 241350009

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 64.5 | ug/L | 95.2 | 67.7 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 35.7 | ug/L | 95.2 | 37.5 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 22.5 | ug/L | 95.2 | 23.6 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087939-A01
Sample ID: 241350010
Matrix: AQUEOUS
Collect Date: 24-NOV-09 14:00
Receive Date: 24-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Polypropylene Tubing 24 Hour
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | AGS1 12/01/09 | 2229 | 926148 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.72 | 18.9 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.292 | 0.943 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087939-A01
Sample ID: 241350010

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.943 | 9.43 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | RXC1 | 11/27/09 | 1536 | 926147 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 40.5 ug/L | 47.2 | 86.0 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 40.3 ug/L | 47.2 | 85.4 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 39.4 ug/L | 47.2 | 83.5 | (46%-130%) |

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Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087939-A01
Sample ID: 241350010

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 72.4 | ug/L | 94.3 | 76.7 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 41.0 | ug/L | 94.3 | 43.5 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 25.2 | ug/L | 94.3 | 26.7 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D02
Sample ID: 241350012
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Control Blank 7 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | JMB3 12/05/09 | 1319 | 929021 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.76 | 19.0 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.295 | 0.952 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D02
Sample ID: 241350012

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.952 | 9.52 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | JXC7 | 12/04/09 | 1357 | 929019 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 38.4 ug/L | 47.6 | 80.7 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 34.4 ug/L | 47.6 | 72.2 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 37.8 ug/L | 47.6 | 79.3 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D02
Sample ID: 241350012

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 68.1 | ug/L | 95.2 | 71.5 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 38.8 | ug/L | 95.2 | 40.8 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 23.4 | ug/L | 95.2 | 24.5 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-B01
Sample ID: 241350013
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Nylon Tubing 7 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | JMB3 12/05/09 | 1340 | 929021 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.76 | 19.0 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.295 | 0.952 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-B01
Sample ID: 241350013

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.952 | 9.52 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | JXC7 | 12/04/09 | 1357 | 929019 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 35.4 ug/L | 47.6 | 74.3 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 32.3 ug/L | 47.6 | 67.8 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 34.9 ug/L | 47.6 | 73.2 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-B01
Sample ID: 241350013

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 68.6 | ug/L | 95.2 | 72.1 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 36.1 | ug/L | 95.2 | 37.9 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 21.3 | ug/L | 95.2 | 22.4 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-B01
Sample ID: 241350014
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Tygon Tubing 7 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | JMB3 12/05/09 | 1401 | 929021 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.81 | 19.2 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.298 | 0.962 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |

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Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-B01
Sample ID: 241350014

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.962 | 9.62 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | JXC7 | 12/04/09 | 1357 | 929019 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 36.6 ug/L | 48.1 | 76.0 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 33.6 ug/L | 48.1 | 69.8 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 34.1 ug/L | 48.1 | 71.0 | (46%-130%) |

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Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-B01
Sample ID: 241350014

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 68.5 | ug/L | 96.2 | 71.3 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 37.7 | ug/L | 96.2 | 39.2 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 22.6 | ug/L | 96.2 | 23.5 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-B01
Sample ID: 241350015
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Teflon Tubing 7 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | JMB3 12/05/09 | 1422 | 929021 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.81 | 19.2 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.298 | 0.962 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |

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# Certificate of Analysis

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Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-B01
Sample ID: 241350015

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.192 | 0.962 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.962 | 9.62 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.288 | 0.962 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.92 | 9.62 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.88 | 9.62 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | JXC7 | 12/04/09 | 1357 | 929019 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 35.6 ug/L | 48.1 | 74.0 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 32.3 ug/L | 48.1 | 67.2 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 34.3 ug/L | 48.1 | 71.3 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-B01
Sample ID: 241350015

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 67.0 | ug/L | 96.2 | 69.6 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 42.0 | ug/L | 96.2 | 43.7 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 27.3 | ug/L | 96.2 | 28.3 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087939-B01
Sample ID: 241350016
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Polypropylene Tubing 7 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | JMB3 12/05/09 | 1443 | 929021 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.76 | 19.0 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.295 | 0.952 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087939-B01
Sample ID: 241350016

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.952 | 9.52 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | JXC7 | 12/04/09 | 1357 | 929019 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 35.7 ug/L | 47.6 | 75.0 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 32.8 ug/L | 47.6 | 68.9 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 34.5 ug/L | 47.6 | 72.4 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-B01
Sample ID: 241350017
Matrix: AQUEOUS
Collect Date: 30-NOV-09 14:30
Receive Date: 30-NOV-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: PVC Well Casing 7 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.91 | 9.57 | ug/L | 1 | JMB3 | 12/05/09 | 1505 | 929021 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 2,4-Dichlorophenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 2,4-Dimethylphenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 2,4-Dinitrophenol | U | ND | 4.78 | 19.1 | ug/L | 1 | | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 2-Chloronaphthalene | U | ND | 0.287 | 0.957 | ug/L | 1 | | | | | |
| 2-Chlorophenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | | |
| 2-Methylnaphthalene | U | ND | 0.287 | 0.957 | ug/L | 1 | | | | | |
| 2-Nitrophenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 4-Bromophenylphenylether | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 4-Chloroaniline | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| 4-Nitrophenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| Acenaphthene | U | ND | 0.297 | 0.957 | ug/L | 1 | | | | | |
| Acenaphthylene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Anthracene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Benzo(a)anthracene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Benzo(a)pyrene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Benzo(b)fluoranthene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Benzo(ghi)perylene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Benzo(k)fluoranthene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Butylbenzylphthalate | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| Carbazole | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Chrysene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Di-n-butylphthalate | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| Di-n-octylphthalate | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | | |
| Dibenzofuran | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |
| Diethylphthalate | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | | |

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-B01
Sample ID: 241350017

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.287 | 0.957 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.191 | 0.957 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.957 | 9.57 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.287 | 0.957 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.91 | 9.57 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.87 | 9.57 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | JXC7 | 12/04/09 | 1357 | 929019 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 34.2 ug/L | 47.8 | 71.5 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 30.4 ug/L | 47.8 | 63.5 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 35.8 ug/L | 47.8 | 74.8 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-B01
Sample ID: 241350017

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 69.5 | ug/L | 95.7 | 72.7 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 34.2 | ug/L | 95.7 | 35.8 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 20.9 | ug/L | 95.7 | 21.8 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D03
Sample ID: 241350018
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Control Blank 14 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | AMY 12/15/09 | 1443 | 932173 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.72 | 18.9 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.292 | 0.943 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D03
Sample ID: 241350018

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.943 | 9.43 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | TXA1 | 12/14/09 | 1832 | 932171 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 40.7 ug/L | 47.2 | 86.2 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 40.7 ug/L | 47.2 | 86.4 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 50.0 ug/L | 47.2 | 106 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-D03
Sample ID: 241350018

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 84.2 | ug/L | 94.3 | 89.2 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 42.1 | ug/L | 94.3 | 44.6 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 25.6 | ug/L | 94.3 | 27.1 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-C01
Sample ID: 241350019
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Nylon Tubing 14 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | AMY | 12/15/09 | 1506 | 932173 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4-Dichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4-Dimethylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4-Dinitrophenol | U | ND | 4.72 | 18.9 | ug/L | 1 | | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2-Chloronaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | | |
| 2-Chlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | | |
| 2-Methylnaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | | |
| 2-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Bromophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Chloroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| Acenaphthene | U | ND | 0.292 | 0.943 | ug/L | 1 | | | | | |
| Acenaphthylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(a)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(a)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(b)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(ghi)perylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(k)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Butylbenzylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| Carbazole | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Chrysene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Di-n-butylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| Di-n-octylphthalate | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Dibenzofuran | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| Diethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-C01
Sample ID: 241350019

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.943 | 9.43 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | TXA1 | 12/14/09 | 1832 | 932171 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 37.3 ug/L | 47.2 | 79.0 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 37.7 ug/L | 47.2 | 80.0 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 43.5 ug/L | 47.2 | 92.1 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087936-C01
Sample ID: 241350019

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 83.3 | ug/L | 94.3 | 88.2 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 37.9 | ug/L | 94.3 | 40.2 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 23.3 | ug/L | 94.3 | 24.7 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-C01
Sample ID: 241350020
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Tygon Tubing 14 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | AMY 12/15/09 | 1529 | 932173 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.76 | 19.0 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.295 | 0.952 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-C01
Sample ID: 241350020

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.190 | 0.952 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.952 | 9.52 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.286 | 0.952 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.90 | 9.52 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.86 | 9.52 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | TXA1 | 12/14/09 | 1832 | 932171 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 36.9 ug/L | 47.6 | 77.6 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 36.2 ug/L | 47.6 | 76.0 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 44.5 ug/L | 47.6 | 93.4 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087937-C01
Sample ID: 241350020

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 86.3 | ug/L | 95.2 | 90.6 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 37.8 | ug/L | 95.2 | 39.7 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 23.7 | ug/L | 95.2 | 24.9 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-C01
Sample ID: 241350021
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Teflon Tubing 14 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | AMY 12/15/09 | 1552 | 932173 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.72 | 18.9 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.292 | 0.943 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |

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Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-C01
Sample ID: 241350021

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.943 | 9.43 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | TXA1 | 12/14/09 | 1832 | 932171 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 35.3 ug/L | 47.2 | 74.9 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 36.4 ug/L | 47.2 | 77.1 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 41.0 ug/L | 47.2 | 87.0 | (46%-130%) |

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# Certificate of Analysis

Company : Sandia National Laboratories
Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087938-C01
Sample ID: 241350021

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 77.0 | ug/L | 94.3 | 81.6 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 36.9 | ug/L | 94.3 | 39.1 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 22.9 | ug/L | 94.3 | 24.3 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087939-C01
Sample ID: 241350022
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: Polypropylene Tubing 14 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | AMY 12/15/09 | 1615 | 932173 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dimethylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,4-Dinitrophenol | U | ND | 4.72 | 18.9 | ug/L | 1 | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Chloronaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Chlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| 2-Methylnaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| 2-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Bromophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chloroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| 4-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Acenaphthene | U | ND | 0.292 | 0.943 | ug/L | 1 | | | | |
| Acenaphthylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(a)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(b)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(ghi)perylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Benzo(k)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Butylbenzylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Carbazole | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Chrysene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Di-n-butylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Di-n-octylphthalate | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Dibenzofuran | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087939-C01 Project: SNLSGWater
Sample ID: 241350022 Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.943 | 9.43 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | TXA1 | 12/14/09 | 1832 | 932171 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 35.2 ug/L | 47.2 | 74.7 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 35.8 ug/L | 47.2 | 76.0 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 43.0 ug/L | 47.2 | 91.3 | (46%-130%) |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087939-C01
Sample ID: 241350022

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 79.8 | ug/L | 94.3 | 84.5 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 34.5 | ug/L | 94.3 | 36.6 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 21.6 | ug/L | 94.3 | 22.9 | | (15%-73%) | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-C01
Sample ID: 241350023
Matrix: AQUEOUS
Collect Date: 07-DEC-09 14:30
Receive Date: 07-DEC-09
Collector: Client

Project: SNLSGWater
Client ID: SNLS003

Client Desc.: PVC Well Casing 14 Day
Vol. Recv.:

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | AMY | 12/15/09 | 1637 | 932173 | 1 |
| 1,2-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 1,3-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 1,4-Dichlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4,5-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4,6-Trichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4-Dichlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4-Dimethylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,4-Dinitrophenol | U | ND | 4.72 | 18.9 | ug/L | 1 | | | | | |
| 2,4-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2,6-Dinitrotoluene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2-Chloronaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | | |
| 2-Chlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 2-Methyl-4,6-dinitrophenol | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | | |
| 2-Methylnaphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | | |
| 2-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 3,3'-Dichlorobenzidine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Bromophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Chloro-3-methylphenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Chloroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Chlorophenylphenylether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| 4-Nitrophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| Acenaphthene | U | ND | 0.292 | 0.943 | ug/L | 1 | | | | | |
| Acenaphthylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(a)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(a)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(b)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(ghi)perylene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Benzo(k)fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Butylbenzylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| Carbazole | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Chrysene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Di-n-butylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| Di-n-octylphthalate | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | | |
| Dibenzo(a,h)anthracene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | | |
| Dibenzofuran | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |
| Diethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | | |

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1515 Eubank SE
Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-C01
Sample ID: 241350023

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | AnalystDate | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| *3510/8270C TCL BNA Liquid "As Received"* | | | | | | | | | | |
| Dimethylphthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Diphenylamine | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Fluoranthene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Fluorene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Hexachlorobenzene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorobutadiene | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Hexachlorocyclopentadiene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Hexachloroethane | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Indeno(1,2,3-cd)pyrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Isophorone | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| N-Nitrosodipropylamine | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Naphthalene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| Nitrobenzene | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| Pentachlorophenol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| Phenanthrene | U | ND | 0.189 | 0.943 | ug/L | 1 | | | | |
| Phenol | U | ND | 0.943 | 9.43 | ug/L | 1 | | | | |
| Pyrene | U | ND | 0.283 | 0.943 | ug/L | 1 | | | | |
| bis(2-Chloroethoxy)methane | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroethyl) ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Chloroisopropyl)ether | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| bis(2-Ethylhexyl)phthalate | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| m,p-Cresols | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |
| m-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Cresol | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| o-Nitroaniline | U | ND | 1.89 | 9.43 | ug/L | 1 | | | | |
| p-Nitroaniline | U | ND | 2.83 | 9.43 | ug/L | 1 | | | | |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 3510C | 3510C BNA Liq. Prep-8270 Analysis | TXA1 | 12/14/09 | 1832 | 932171 |

**The following Analytical Methods were performed**

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | SW846 8270C | |

| Surrogate/Tracer recovery | Test | Result | Nominal | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| 2-Fluorobiphenyl | 3510/8270C TCL BNA Liquid "As Received" | 40.5 ug/L | 47.2 | 85.8 | (35%-100%) |
| Nitrobenzene-d5 | 3510/8270C TCL BNA Liquid "As Received" | 40.7 ug/L | 47.2 | 86.3 | (40%-112%) |
| p-Terphenyl-d14 | 3510/8270C TCL BNA Liquid "As Received" | 47.3 ug/L | 47.2 | 100 | (46%-130%) |

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Albuquerque, New Mexico 87123
Contact: Ms. Pamela M. Puissant
Project: **Level C, Groundwater Monitoring**

Report Date: December 30, 2009

Client Sample ID: 087940-C01
Sample ID: 241350023

Project: SNLSGWater
Client ID: SNLS003

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 83.4 | ug/L | 94.3 | 88.4 | | (39%-115%) | | |
| 2-Fluorophenol | | 3510/8270C TCL BNA Liquid "As Received" | | 41.5 | ug/L | 94.3 | 44.0 | | (25%-92%) | | |
| Phenol-d5 | | 3510/8270C TCL BNA Liquid "As Received" | | 25.6 | ug/L | 94.3 | 27.2 | | (15%-73%) | | |

# Quality Control Summary for VOC Analysis

## QC Summary

Report Date: December 11, 2009
Page 1 of 9

**Sandia National Laboratories**
**MS-0756, Org. 06765, Bldg. 823/Rm. 4276**
**1515 Eubank SE**
**Albuquerque, New Mexico**

**Contact:** **Ms. Pamela M. Puissant**

**Workorder:** **241350**

| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile-GC/MS** | | | | | | | | | | |
| Batch 928279 | | | | | | | | | | |
| QC1201984940 LCS | | | | | | | | | | |
| 1,1,1-Trichloroethane | 50.0 | | | 52.5 | ug/L | | 105 | (73%-132%) | RXM4 | 12/02/09 08:38 |
| 1,1,2,2-Tetrachloroethane | 50.0 | | | 52.6 | ug/L | | 105 | (71%-121%) | | |
| 1,1,2-Trichloroethane | 50.0 | | | 51.1 | ug/L | | 102 | (76%-120%) | | |
| 1,1-Dichloroethane | 50.0 | | | 50.2 | ug/L | | 100 | (75%-121%) | | |
| 1,1-Dichloroethylene | 50.0 | | | 50.2 | ug/L | | 100 | (70%-128%) | | |
| 1,2-Dichloroethane | 50.0 | | | 45.2 | ug/L | | 90.3 | (70%-123%) | | |
| 1,2-Dichloropropane | 50.0 | | | 52.8 | ug/L | | 106 | (75%-121%) | | |
| 2-Butanone | 250 | | | 190 | ug/L | | 75.8 | (31%-160%) | | |
| 2-Hexanone | 250 | | | 184 | ug/L | | 73.8 | (34%-162%) | | |
| 4-Methyl-2-pentanone | 250 | | | 229 | ug/L | | 91.8 | (68%-132%) | | |
| Acetone | 250 | | | 186 | ug/L | | 74.5 | (28%-157%) | | |
| Benzene | 50.0 | | | 53.9 | ug/L | | 108 | (72%-120%) | | |
| Bromodichloromethane | 50.0 | | | 51.5 | ug/L | | 103 | (77%-130%) | | |
| Bromoform | 50.0 | | | 56.3 | ug/L | | 113 | (77%-139%) | | |
| Bromomethane | 50.0 | | | 58.9 | ug/L | | 118 | (63%-131%) | | |
| Carbon disulfide | 250 | | | 314 | ug/L | | 126 | (63%-129%) | | |
| Carbon tetrachloride | 50.0 | | | 54.0 | ug/L | | 108 | (75%-139%) | | |
| Chlorobenzene | 50.0 | | | 53.9 | ug/L | | 108 | (76%-120%) | | |
| Chloroethane | 50.0 | | | 58.7 | ug/L | | 117 | (67%-126%) | | |
| Chloroform | 50.0 | | | 49.9 | ug/L | | 99.7 | (76%-121%) | | |
| Chloromethane | 50.0 | | | 50.0 | ug/L | | 99.9 | (52%-139%) | | |
| Dibromochloromethane | 50.0 | | | 53.5 | ug/L | | 107 | (82%-131%) | | |
| Ethylbenzene | 50.0 | | | 51.6 | ug/L | | 103 | (75%-120%) | | |
| Methylene chloride | 50.0 | | | 54.3 | ug/L | | 109 | (72%-131%) | | |
| Styrene | 50.0 | | | 54.8 | ug/L | | 110 | (76%-126%) | | |
| Tetrachloroethylene | 50.0 | | | 56.4 | ug/L | | 113 | (72%-126%) | | |
| Toluene | 50.0 | | | 52.7 | ug/L | | 105 | (74%-120%) | | |
| Trichloroethylene | 50.0 | | | 54.4 | ug/L | | 109 | (76%-123%) | | |
| Vinyl acetate | 250 | | | 307 | ug/L | | 123 | (61%-134%) | | |
| Vinyl chloride | 50.0 | | | 52.4 | ug/L | | 105 | (61%-131%) | | |
| Xylenes (total) | 150 | | | 164 | ug/L | | 109 | (75%-121%) | | |
| cis-1,2-Dichloroethylene | 50.0 | | | 55.5 | ug/L | | 111 | (77%-124%) | | |
| cis-1,3-Dichloropropylene | 50.0 | | | 54.3 | ug/L | | 109 | (79%-127%) | | |
| trans-1,2-Dichloroethylene | 50.0 | | | 56.9 | ug/L | | 114 | (71%-124%) | | |
| trans-1,3-Dichloropropylene | 50.0 | | | 50.4 | ug/L | | 101 | (81%-127%) | | |
| **1,2-Dichloroethane-d4 | 50.0 | | | 53.8 | ug/L | | 108 | (59%-130%) | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile-GC/MS** | | | | | | | | | | |
| Batch 928279 | | | | | | | | | | |
| **Bromofluorobenzene | 50.0 | | | 45.7 | ug/L | | 91.5 | (71%-126%) | | |
| **Toluene-d8 | 50.0 | | | 52.8 | ug/L | | 106 | (76%-129%) | RXM4 | 12/02/09 08:38 |
| QC1201984937 MB | | | | | | | | | | |
| 1,1,1-Trichloroethane | | | U | ND | ug/L | | | | | 12/02/09 09:40 |
| 1,1,2,2-Tetrachloroethane | | | U | ND | ug/L | | | | | |
| 1,1,2-Trichloroethane | | | U | ND | ug/L | | | | | |
| 1,1-Dichloroethane | | | U | ND | ug/L | | | | | |
| 1,1-Dichloroethylene | | | U | ND | ug/L | | | | | |
| 1,2-Dichloroethane | | | U | ND | ug/L | | | | | |
| 1,2-Dichloropropane | | | U | ND | ug/L | | | | | |
| 2-Butanone | | | U | ND | ug/L | | | | | |
| 2-Hexanone | | | U | ND | ug/L | | | | | |
| 4-Methyl-2-pentanone | | | U | ND | ug/L | | | | | |
| Acetone | | | U | ND | ug/L | | | | | |
| Benzene | | | U | ND | ug/L | | | | | |
| Bromodichloromethane | | | U | ND | ug/L | | | | | |
| Bromoform | | | U | ND | ug/L | | | | | |
| Bromomethane | | | U | ND | ug/L | | | | | |
| Carbon disulfide | | | U | ND | ug/L | | | | | |
| Carbon tetrachloride | | | U | ND | ug/L | | | | | |
| Chlorobenzene | | | U | ND | ug/L | | | | | |
| Chloroethane | | | U | ND | ug/L | | | | | |
| Chloroform | | | U | ND | ug/L | | | | | |
| Chloromethane | | | U | ND | ug/L | | | | | |
| Dibromochloromethane | | | U | ND | ug/L | | | | | |
| Ethylbenzene | | | U | ND | ug/L | | | | | |
| Methylene chloride | | | U | ND | ug/L | | | | | |
| Styrene | | | U | ND | ug/L | | | | | |
| Tetrachloroethylene | | | U | ND | ug/L | | | | | |
| Toluene | | | U | ND | ug/L | | | | | |
| Trichloroethylene | | | U | ND | ug/L | | | | | |
| Vinyl acetate | | | U | ND | ug/L | | | | | |
| Vinyl chloride | | | U | ND | ug/L | | | | | |
| Xylenes (total) | | | U | ND | ug/L | | | | | |
| cis-1,2-Dichloroethylene | | | U | ND | ug/L | | | | | |
| cis-1,3-Dichloropropylene | | | U | ND | ug/L | | | | | |
| trans-1,2-Dichloroethylene | | | U | ND | ug/L | | | | | |
| trans-1,3-Dichloropropylene | | | U | ND | ug/L | | | | | |
| **1,2-Dichloroethane-d4 | 50.0 | | | 50.4 | ug/L | | 101 | (59%-130%) | | |
| **Bromofluorobenzene | 50.0 | | | 46.1 | ug/L | | 92.3 | (71%-126%) | | |
| **Toluene-d8 | 50.0 | | | 53.2 | ug/L | | 106 | (76%-129%) | | |
| QC1201984938 241781001 PS | | | | | | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile-GC/MS** | | | | | | | | | | | |
| Batch 928279 | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 50.0 | U | ND | | 43.9 | ug/L | | 87.8 | (66%-132%) | | 12/03/09 11:46 |
| 1,1,2,2-Tetrachloroethane | 50.0 | U | ND | | 51.3 | ug/L | | 103 | (66%-128%) | RXM4 | |
| 1,1,2-Trichloroethane | 50.0 | U | ND | | 46.9 | ug/L | | 93.9 | (71%-125%) | | |
| 1,1-Dichloroethane | 50.0 | U | ND | | 45.0 | ug/L | | 90 | (69%-125%) | | |
| 1,1-Dichloroethylene | 50.0 | U | ND | | 42.9 | ug/L | | 85.8 | (61%-129%) | | |
| 1,2-Dichloroethane | 50.0 | U | ND | | 37.1 | ug/L | | 74.2 | (65%-129%) | | |
| 1,2-Dichloropropane | 50.0 | U | ND | | 49.8 | ug/L | | 99.5 | (71%-125%) | | |
| 2-Butanone | 250 | U | ND | | 125 | ug/L | | 50.1 | (11%-151%) | | |
| 2-Hexanone | 250 | U | ND | | 135 | ug/L | | 53.9 | (28%-143%) | | |
| 4-Methyl-2-pentanone | 250 | U | ND | | 206 | ug/L | | 82.5 | (64%-133%) | | |
| Acetone | 250 | U | ND | | 77.8 | ug/L | | 31.1 | (14%-150%) | | |
| Benzene | 50.0 | U | ND | | 49.6 | ug/L | | 99.2 | (66%-121%) | | |
| Bromodichloromethane | 50.0 | U | ND | | 43.4 | ug/L | | 86.8 | (72%-134%) | | |
| Bromoform | 50.0 | U | ND | | 50.6 | ug/L | | 101 | (72%-143%) | | |
| Bromomethane | 50.0 | U | ND | | 54.2 | ug/L | | 108 | (54%-136%) | | |
| Carbon disulfide | 250 | U | ND | | 281 | ug/L | | 112 | (57%-129%) | | |
| Carbon tetrachloride | 50.0 | U | ND | | 44.7 | ug/L | | 89.4 | (66%-138%) | | |
| Chlorobenzene | 50.0 | U | ND | | 48.5 | ug/L | | 97.1 | (69%-120%) | | |
| Chloroethane | 50.0 | U | ND | | 54.1 | ug/L | | 108 | (60%-129%) | | |
| Chloroform | 50.0 | U | ND | | 43.4 | ug/L | | 86.8 | (70%-126%) | | |
| Chloromethane | 50.0 | U | ND | | 42.8 | ug/L | | 85.6 | (47%-140%) | | |
| Dibromochloromethane | 50.0 | U | ND | | 47.7 | ug/L | | 95.5 | (76%-135%) | | |
| Ethylbenzene | 50.0 | U | ND | | 44.9 | ug/L | | 89.8 | (65%-123%) | | |
| Methylene chloride | 50.0 | U | ND | | 49.9 | ug/L | | 99.9 | (68%-134%) | | |
| Styrene | 50.0 | U | ND | | 50.3 | ug/L | | 101 | (66%-131%) | | |
| Tetrachloroethylene | 50.0 | U | ND | | 50.8 | ug/L | | 102 | (63%-126%) | | |
| Toluene | 50.0 | U | ND | | 47.6 | ug/L | | 95.3 | (65%-124%) | | |
| Trichloroethylene | 50.0 | U | ND | | 49.1 | ug/L | | 98.1 | (66%-127%) | | |
| Vinyl acetate | 250 | U | ND | | 304 | ug/L | | 122 | (41%-140%) | | |
| Vinyl chloride | 50.0 | U | ND | | 45.0 | ug/L | | 90 | (51%-134%) | | |
| Xylenes (total) | 150 | U | ND | | 147 | ug/L | | 97.7 | (65%-125%) | | |
| cis-1,2-Dichloroethylene | 50.0 | | | | 51.0 | ug/L | | 102 | (71%-128%) | | |
| cis-1,3-Dichloropropylene | 50.0 | U | ND | | 48.6 | ug/L | | 97.1 | (71%-129%) | | |
| trans-1,2-Dichloroethylene | 50.0 | U | ND | | 51.8 | ug/L | | 104 | (64%-126%) | | |
| trans-1,3-Dichloropropylene | 50.0 | U | ND | | 43.5 | ug/L | | 87.1 | (73%-130%) | | |
| **1,2-Dichloroethane-d4 | 50.0 | | 57.6 | | 47.5 | ug/L | | 94.9 | (59%-130%) | | |
| **Bromofluorobenzene | 50.0 | | 47.8 | | 45.2 | ug/L | | 90.4 | (71%-126%) | | |
| **Toluene-d8 | 50.0 | | 55.2 | | 52.9 | ug/L | | 106 | (76%-129%) | | |
| QC1201984939 241781001 PSD | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 50.0 | U | ND | | 43.3 | ug/L | 1.47 | 86.5 | (0%-20%) | | 12/03/09 12:16 |
| 1,1,2,2-Tetrachloroethane | 50.0 | U | ND | | 54.6 | ug/L | 6.25 | 109 | (0%-20%) | | |
| 1,1,2-Trichloroethane | 50.0 | U | ND | | 50.1 | ug/L | 6.56 | 100 | (0%-20%) | | |

# QC Summary

**Workorder:** 241350



| Parmname | NOM | | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile-GC/MS** | | | | | | | | | | | |
| Batch 928279 | | | | | | | | | | | |
| 1,1-Dichloroethane | 50.0 | U | ND | | 45.5 | ug/L | 1.16 | 91.1 | (0%-20%) | | |
| 1,1-Dichloroethylene | 50.0 | U | ND | | 42.9 | ug/L | 0.0441 | 85.8 | (0%-20%) | RXM4 | 12/03/09 12:16 |
| 1,2-Dichloroethane | 50.0 | U | ND | | 38.4 | ug/L | 3.45 | 76.8 | (0%-20%) | | |
| 1,2-Dichloropropane | 50.0 | U | ND | | 51.3 | ug/L | 3.01 | 103 | (0%-20%) | | |
| 2-Butanone | 250 | U | ND | | 130 | ug/L | 4.03 | 52.1 | (0%-20%) | | |
| 2-Hexanone | 250 | U | ND | | 141 | ug/L | 4.74 | 56.5 | (0%-20%) | | |
| 4-Methyl-2-pentanone | 250 | U | ND | | 223 | ug/L | 7.88 | 89.3 | (0%-20%) | | |
| Acetone | 250 | U | ND | | 78.4 | ug/L | 0.837 | 31.4 | (0%-20%) | | |
| Benzene | 50.0 | U | ND | | 52.3 | ug/L | 5.23 | 105 | (0%-20%) | | |
| Bromodichloromethane | 50.0 | U | ND | | 45.3 | ug/L | 4.24 | 90.6 | (0%-20%) | | |
| Bromoform | 50.0 | U | ND | | 53.4 | ug/L | 5.28 | 107 | (0%-20%) | | |
| Bromomethane | 50.0 | U | ND | | 55.6 | ug/L | 2.54 | 111 | (0%-20%) | | |
| Carbon disulfide | 250 | U | ND | | 289 | ug/L | 2.91 | 116 | (0%-20%) | | |
| Carbon tetrachloride | 50.0 | U | ND | | 45.2 | ug/L | 1.16 | 90.5 | (0%-20%) | | |
| Chlorobenzene | 50.0 | U | ND | | 52.0 | ug/L | 6.93 | 104 | (0%-20%) | | |
| Chloroethane | 50.0 | U | ND | | 55.5 | ug/L | 2.38 | 111 | (0%-20%) | | |
| Chloroform | 50.0 | U | ND | | 45.5 | ug/L | 4.73 | 91 | (0%-20%) | | |
| Chloromethane | 50.0 | U | ND | | 42.9 | ug/L | 0.223 | 85.8 | (0%-20%) | | |
| Dibromochloromethane | 50.0 | U | ND | | 50.8 | ug/L | 6.33 | 102 | (0%-20%) | | |
| Ethylbenzene | 50.0 | U | ND | | 46.8 | ug/L | 4.14 | 93.6 | (0%-20%) | | |
| Methylene chloride | 50.0 | U | ND | | 52.2 | ug/L | 4.53 | 104 | (0%-20%) | | |
| Styrene | 50.0 | U | ND | | 52.2 | ug/L | 3.68 | 104 | (0%-20%) | | |
| Tetrachloroethylene | 50.0 | U | ND | | 53.1 | ug/L | 4.56 | 106 | (0%-20%) | | |
| Toluene | 50.0 | U | ND | | 49.0 | ug/L | 2.74 | 97.9 | (0%-20%) | | |
| Trichloroethylene | 50.0 | U | ND | | 49.8 | ug/L | 1.51 | 99.6 | (0%-20%) | | |
| Vinyl acetate | 250 | U | ND | | 308 | ug/L | 1.03 | 123 | (0%-20%) | | |
| Vinyl chloride | 50.0 | U | ND | | 47.0 | ug/L | 4.31 | 94 | (0%-20%) | | |
| Xylenes (total) | 150 | U | ND | | 151 | ug/L | 2.99 | 101 | (0%-20%) | | |
| cis-1,2-Dichloroethylene | 50.0 | | | | 53.8 | ug/L | N/A | 108 | (0%-20%) | | |
| cis-1,3-Dichloropropylene | 50.0 | U | ND | | 50.9 | ug/L | 4.65 | 102 | (0%-20%) | | |
| trans-1,2-Dichloroethylene | 50.0 | U | ND | | 52.1 | ug/L | 0.707 | 104 | (0%-20%) | | |
| trans-1,3-Dichloropropylene | 50.0 | U | ND | | 45.9 | ug/L | 5.18 | 91.7 | (0%-20%) | | |
| **1,2-Dichloroethane-d4 | 50.0 | | 57.6 | | 47.4 | ug/L | | 94.9 | (59%-130%) | | |
| **Bromofluorobenzene | 50.0 | | 47.8 | | 45.0 | ug/L | | 90.1 | (71%-126%) | | |
| **Toluene-d8 | 50.0 | | 55.2 | | 52.7 | ug/L | | 105 | (76%-129%) | | |
| Batch 930872 | | | | | | | | | | | |
| QC1201991001 LCS | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 50.0 | | | | 43.3 | ug/L | | 86.6 | (73%-132%) | RXY1 | 12/09/09 08:39 |
| 1,1,2,2-Tetrachloroethane | 50.0 | | | | 47.8 | ug/L | | 95.6 | (71%-121%) | | |
| 1,1,2-Trichloroethane | 50.0 | | | | 46.5 | ug/L | | 93.1 | (76%-120%) | | |
| 1,1-Dichloroethane | 50.0 | | | | 46.8 | ug/L | | 93.5 | (75%-121%) | | |
| 1,1-Dichloroethylene | 50.0 | | | | 46.4 | ug/L | | 92.7 | (70%-128%) | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile-GC/MS** | | | | | | | | | | |
| Batch 930872 | | | | | | | | | | |
| 1,2-Dichloroethane | 50.0 | | | 46.7 | ug/L | | 93.4 | (70%-123%) | | |
| 1,2-Dichloropropane | 50.0 | | | 48.1 | ug/L | | 96.2 | (75%-121%) | RXY1 | 12/09/09 08:39 |
| 2-Butanone | 250 | | | 266 | ug/L | | 106 | (31%-160%) | | |
| 2-Hexanone | 250 | | | 239 | ug/L | | 95.8 | (34%-162%) | | |
| 4-Methyl-2-pentanone | 250 | | | 246 | ug/L | | 98.4 | (68%-132%) | | |
| Acetone | 250 | | | 276 | ug/L | | 110 | (28%-157%) | | |
| Benzene | 50.0 | | | 45.2 | ug/L | | 90.5 | (72%-120%) | | |
| Bromodichloromethane | 50.0 | | | 45.0 | ug/L | | 90 | (77%-130%) | | |
| Bromoform | 50.0 | | | 43.4 | ug/L | | 86.9 | (77%-139%) | | |
| Bromomethane | 50.0 | | | 52.1 | ug/L | | 104 | (63%-131%) | | |
| Carbon disulfide | 250 | | | 239 | ug/L | | 95.5 | (63%-129%) | | |
| Carbon tetrachloride | 50.0 | | | 45.3 | ug/L | | 90.5 | (75%-139%) | | |
| Chlorobenzene | 50.0 | | | 45.7 | ug/L | | 91.5 | (76%-120%) | | |
| Chloroethane | 50.0 | | | 50.8 | ug/L | | 102 | (67%-126%) | | |
| Chloroform | 50.0 | | | 45.0 | ug/L | | 89.9 | (76%-121%) | | |
| Chloromethane | 50.0 | | | 46.5 | ug/L | | 93 | (52%-139%) | | |
| Dibromochloromethane | 50.0 | | | 44.7 | ug/L | | 89.3 | (82%-131%) | | |
| Ethylbenzene | 50.0 | | | 43.9 | ug/L | | 87.8 | (75%-120%) | | |
| Methylene chloride | 50.0 | | | 41.7 | ug/L | | 83.4 | (72%-131%) | | |
| Styrene | 50.0 | | | 44.0 | ug/L | | 88.1 | (76%-126%) | | |
| Tetrachloroethylene | 50.0 | | | 45.0 | ug/L | | 90.1 | (72%-126%) | | |
| Toluene | 50.0 | | | 43.9 | ug/L | | 87.9 | (74%-120%) | | |
| Trichloroethylene | 50.0 | | | 46.3 | ug/L | | 92.6 | (76%-123%) | | |
| Vinyl acetate | 250 | | | 302 | ug/L | | 121 | (61%-134%) | | |
| Vinyl chloride | 50.0 | | | 50.2 | ug/L | | 100 | (61%-131%) | | |
| Xylenes (total) | 150 | | | 135 | ug/L | | 90.3 | (75%-121%) | | |
| cis-1,2-Dichloroethylene | 50.0 | | | 45.0 | ug/L | | 90 | (77%-124%) | | |
| cis-1,3-Dichloropropylene | 50.0 | | | 45.9 | ug/L | | 91.9 | (79%-127%) | | |
| trans-1,2-Dichloroethylene | 50.0 | | | 45.4 | ug/L | | 90.7 | (71%-124%) | | |
| trans-1,3-Dichloropropylene | 50.0 | | | 45.5 | ug/L | | 90.9 | (81%-127%) | | |
| **1,2-Dichloroethane-d4 | 50.0 | | | 47.3 | ug/L | | 94.7 | (59%-130%) | | |
| **Bromofluorobenzene | 50.0 | | | 41.5 | ug/L | | 83 | (71%-126%) | | |
| **Toluene-d8 | 50.0 | | | 45.3 | ug/L | | 90.6 | (76%-129%) | | |
| QC1201990998 MB | | | | | | | | | | |
| 1,1,1-Trichloroethane | | | U | ND | ug/L | | | | | 12/09/09 11:26 |
| 1,1,2,2-Tetrachloroethane | | | U | ND | ug/L | | | | | |
| 1,1,2-Trichloroethane | | | U | ND | ug/L | | | | | |
| 1,1-Dichloroethane | | | U | ND | ug/L | | | | | |
| 1,1-Dichloroethylene | | | U | ND | ug/L | | | | | |
| 1,2-Dichloroethane | | | U | ND | ug/L | | | | | |
| 1,2-Dichloropropane | | | U | ND | ug/L | | | | | |
| 2-Butanone | | | U | ND | ug/L | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile-GC/MS** | | | | | | | | | | | |
| Batch 930872 | | | | | | | | | | | |
| 2-Hexanone | | | | U | ND | ug/L | | | | | |
| 4-Methyl-2-pentanone | | | | U | ND | ug/L | | | | RXY1 | 12/09/09 11:26 |
| Acetone | | | | U | ND | ug/L | | | | | |
| Benzene | | | | U | ND | ug/L | | | | | |
| Bromodichloromethane | | | | U | ND | ug/L | | | | | |
| Bromoform | | | | U | ND | ug/L | | | | | |
| Bromomethane | | | | U | ND | ug/L | | | | | |
| Carbon disulfide | | | | U | ND | ug/L | | | | | |
| Carbon tetrachloride | | | | U | ND | ug/L | | | | | |
| Chlorobenzene | | | | U | ND | ug/L | | | | | |
| Chloroethane | | | | U | ND | ug/L | | | | | |
| Chloroform | | | | U | ND | ug/L | | | | | |
| Chloromethane | | | | U | ND | ug/L | | | | | |
| Dibromochloromethane | | | | U | ND | ug/L | | | | | |
| Ethylbenzene | | | | U | ND | ug/L | | | | | |
| Methylene chloride | | | | U | ND | ug/L | | | | | |
| Styrene | | | | U | ND | ug/L | | | | | |
| Tetrachloroethylene | | | | U | ND | ug/L | | | | | |
| Toluene | | | | U | ND | ug/L | | | | | |
| Trichloroethylene | | | | U | ND | ug/L | | | | | |
| Vinyl acetate | | | | U | ND | ug/L | | | | | |
| Vinyl chloride | | | | U | ND | ug/L | | | | | |
| Xylenes (total) | | | | U | ND | ug/L | | | | | |
| cis-1,2-Dichloroethylene | | | | U | ND | ug/L | | | | | |
| cis-1,3-Dichloropropylene | | | | U | ND | ug/L | | | | | |
| trans-1,2-Dichloroethylene | | | | U | ND | ug/L | | | | | |
| trans-1,3-Dichloropropylene | | | | U | ND | ug/L | | | | | |
| **1,2-Dichloroethane-d4 | 50.0 | | | | 47.5 | ug/L | | 94.9 | (59%-130%) | | |
| **Bromofluorobenzene | 50.0 | | | | 42.6 | ug/L | | 85.1 | (71%-126%) | | |
| **Toluene-d8 | 50.0 | | | | 44.8 | ug/L | | 89.6 | (76%-129%) | | |
| QC1201990999 241350021 PS | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 50.0 | U | ND | | 37.7 | ug/L | | 75.4 | (66%-132%) | | 12/09/09 14:40 |
| 1,1,2,2-Tetrachloroethane | 50.0 | U | ND | | 43.6 | ug/L | | 87.3 | (66%-128%) | | |
| 1,1,2-Trichloroethane | 50.0 | U | ND | | 42.7 | ug/L | | 85.4 | (71%-125%) | | |
| 1,1-Dichloroethane | 50.0 | U | ND | | 42.1 | ug/L | | 84.2 | (69%-125%) | | |
| 1,1-Dichloroethylene | 50.0 | U | ND | | 38.0 | ug/L | | 76 | (61%-129%) | | |
| 1,2-Dichloroethane | 50.0 | U | ND | | 43.4 | ug/L | | 86.8 | (65%-129%) | | |
| 1,2-Dichloropropane | 50.0 | U | ND | | 44.4 | ug/L | | 88.9 | (71%-125%) | | |
| 2-Butanone | 250 | U | ND | | 171 | ug/L | | 68.3 | (11%-151%) | | |
| 2-Hexanone | 250 | U | ND | | 157 | ug/L | | 62.7 | (28%-143%) | | |
| 4-Methyl-2-pentanone | 250 | U | ND | | 209 | ug/L | | 83.5 | (64%-133%) | | |
| Acetone | 250 | U | ND | | 114 | ug/L | | 45.8 | (14%-150%) | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile-GC/MS** | | | | | | | | | | | |
| Batch 930872 | | | | | | | | | | | |
| Benzene | 50.0 | U | ND | | 41.0 | ug/L | | 81.9 | (66%-121%) | | |
| Bromodichloromethane | 50.0 | U | ND | | 41.2 | ug/L | | 82.4 | (72%-134%) | RXY1 | 12/09/09 14:40 |
| Bromoform | 50.0 | U | ND | | 38.9 | ug/L | | 77.9 | (72%-143%) | | |
| Bromomethane | 50.0 | U | ND | | 46.5 | ug/L | | 93.1 | (54%-136%) | | |
| Carbon disulfide | 250 | U | ND | | 209 | ug/L | | 83.7 | (57%-129%) | | |
| Carbon tetrachloride | 50.0 | U | ND | | 38.1 | ug/L | | 76.2 | (66%-138%) | | |
| Chlorobenzene | 50.0 | U | ND | | 42.3 | ug/L | | 84.6 | (69%-120%) | | |
| Chloroethane | 50.0 | U | ND | | 43.1 | ug/L | | 86.3 | (60%-129%) | | |
| Chloroform | 50.0 | U | ND | | 41.4 | ug/L | | 82.7 | (70%-126%) | | |
| Chloromethane | 50.0 | U | ND | | 41.4 | ug/L | | 82.9 | (47%-140%) | | |
| Dibromochloromethane | 50.0 | U | ND | | 41.5 | ug/L | | 82.9 | (76%-135%) | | |
| Ethylbenzene | 50.0 | U | ND | | 39.7 | ug/L | | 79.4 | (65%-123%) | | |
| Methylene chloride | 50.0 | U | ND | | 38.6 | ug/L | | 77.2 | (68%-134%) | | |
| Styrene | 50.0 | U | ND | | 40.8 | ug/L | | 81.6 | (66%-131%) | | |
| Tetrachloroethylene | 50.0 | U | ND | | 38.8 | ug/L | | 77.6 | (63%-126%) | | |
| Toluene | 50.0 | U | ND | | 39.1 | ug/L | | 78.1 | (65%-124%) | | |
| Trichloroethylene | 50.0 | U | ND | | 40.4 | ug/L | | 80.8 | (66%-127%) | | |
| Vinyl acetate | 250 | U | ND | | 251 | ug/L | | 100 | (41%-140%) | | |
| Vinyl chloride | 50.0 | U | ND | | 44.0 | ug/L | | 88 | (51%-134%) | | |
| Xylenes (total) | 150 | U | ND | | 122 | ug/L | | 81.5 | (65%-125%) | | |
| cis-1,2-Dichloroethylene | 50.0 | U | ND | | 41.7 | ug/L | | 83.4 | (71%-128%) | | |
| cis-1,3-Dichloropropylene | 50.0 | U | ND | | 40.7 | ug/L | | 81.4 | (71%-129%) | | |
| trans-1,2-Dichloroethylene | 50.0 | U | ND | | 40.1 | ug/L | | 80.1 | (64%-126%) | | |
| trans-1,3-Dichloropropylene | 50.0 | U | ND | | 40.9 | ug/L | | 81.9 | (73%-130%) | | |
| **1,2-Dichloroethane-d4 | 50.0 | | 47.0 | | 45.3 | ug/L | | 90.6 | (59%-130%) | | |
| **Bromofluorobenzene | 50.0 | | 41.4 | | 41.2 | ug/L | | 82.4 | (71%-126%) | | |
| **Toluene-d8 | 50.0 | | 46.3 | | 46.1 | ug/L | | 92.2 | (76%-129%) | | |
| QC1201991000 241350021 PSD | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 50.0 | U | ND | | 44.6 | ug/L | 16.8 | 89.2 | (0%-20%) | | 12/09/09 15:08 |
| 1,1,2,2-Tetrachloroethane | 50.0 | U | ND | | 50.9 | ug/L | 15.5 | 102 | (0%-20%) | | |
| 1,1,2-Trichloroethane | 50.0 | U | ND | | 50.2 | ug/L | 16.1 | 100 | (0%-20%) | | |
| 1,1-Dichloroethane | 50.0 | U | ND | | 48.9 | ug/L | 14.9 | 97.8 | (0%-20%) | | |
| 1,1-Dichloroethylene | 50.0 | U | ND | | 45.0 | ug/L | 16.9 | 90 | (0%-20%) | | |
| 1,2-Dichloroethane | 50.0 | U | ND | | 50.3 | ug/L | 14.8 | 101 | (0%-20%) | | |
| 1,2-Dichloropropane | 50.0 | U | ND | | 51.4 | ug/L | 14.5 | 103 | (0%-20%) | | |
| 2-Butanone | 250 | U | ND | | 199 | ug/L | 15.3 | 79.6 | (0%-20%) | | |
| 2-Hexanone | 250 | U | ND | | 179 | ug/L | 13.2 | 71.6 | (0%-20%) | | |
| 4-Methyl-2-pentanone | 250 | U | ND | | 246 | ug/L | 16.5 | 98.5 | (0%-20%) | | |
| Acetone | 250 | U | ND | | 135 | ug/L | 16.7 | 54.2 | (0%-20%) | | |
| Benzene | 50.0 | U | ND | | 47.4 | ug/L | 14.6 | 94.8 | (0%-20%) | | |
| Bromodichloromethane | 50.0 | U | ND | | 48.9 | ug/L | 17.1 | 97.8 | (0%-20%) | | |
| Bromoform | 50.0 | U | ND | | 45.9 | ug/L | 16.4 | 91.8 | (0%-20%) | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile-GC/MS** | | | | | | | | | | | |
| Batch 930872 | | | | | | | | | | | |
| Bromomethane | 50.0 | U | ND | | 52.9 | ug/L | 12.8 | 106 | (0%-20%) | | |
| Carbon disulfide | 250 | U | ND | | 241 | ug/L | 14.2 | 96.5 | (0%-20%) | RXY1 | 12/09/09 15:08 |
| Carbon tetrachloride | 50.0 | U | ND | | 44.8 | ug/L | 16.1 | 89.5 | (0%-20%) | | |
| Chlorobenzene | 50.0 | U | ND | | 48.2 | ug/L | 13.1 | 96.4 | (0%-20%) | | |
| Chloroethane | 50.0 | U | ND | | 50.0 | ug/L | 14.8 | 100 | (0%-20%) | | |
| Chloroform | 50.0 | U | ND | | 48.0 | ug/L | 14.9 | 96 | (0%-20%) | | |
| Chloromethane | 50.0 | U | ND | | 48.8 | ug/L | 16.2 | 97.5 | (0%-20%) | | |
| Dibromochloromethane | 50.0 | U | ND | | 47.4 | ug/L | 13.4 | 94.8 | (0%-20%) | | |
| Ethylbenzene | 50.0 | U | ND | | 45.8 | ug/L | 14.2 | 91.5 | (0%-20%) | | |
| Methylene chloride | 50.0 | U | ND | | 45.4 | ug/L | 16.2 | 90.9 | (0%-20%) | | |
| Styrene | 50.0 | U | ND | | 45.7 | ug/L | 11.2 | 91.3 | (0%-20%) | | |
| Tetrachloroethylene | 50.0 | U | ND | | 44.0 | ug/L | 12.6 | 88 | (0%-20%) | | |
| Toluene | 50.0 | U | ND | | 45.2 | ug/L | 14.6 | 90.5 | (0%-20%) | | |
| Trichloroethylene | 50.0 | U | ND | | 47.5 | ug/L | 16.1 | 95 | (0%-20%) | | |
| Vinyl acetate | 250 | U | ND | | 287 | ug/L | 13.3 | 115 | (0%-20%) | | |
| Vinyl chloride | 50.0 | U | ND | | 51.2 | ug/L | 15.1 | 102 | (0%-20%) | | |
| Xylenes (total) | 150 | U | ND | | 139 | ug/L | 12.9 | 92.7 | (0%-20%) | | |
| cis-1,2-Dichloroethylene | 50.0 | U | ND | | 48.2 | ug/L | 14.5 | 96.4 | (0%-20%) | | |
| cis-1,3-Dichloropropylene | 50.0 | U | ND | | 47.8 | ug/L | 16.0 | 95.5 | (0%-20%) | | |
| trans-1,2-Dichloroethylene | 50.0 | U | ND | | 46.4 | ug/L | 14.6 | 92.8 | (0%-20%) | | |
| trans-1,3-Dichloropropylene | 50.0 | U | ND | | 47.8 | ug/L | 15.4 | 95.5 | (0%-20%) | | |
| **1,2-Dichloroethane-d4 | 50.0 | | 47.0 | | 53.2 | ug/L | | 106 | (59%-130%) | | |
| **Bromofluorobenzene | 50.0 | | 41.4 | | 47.7 | ug/L | | 95.4 | (71%-126%) | | |
| **Toluene-d8 | 50.0 | | 46.3 | | 53.1 | ug/L | | 106 | (76%-129%) | | |

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the Decision Level
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- Z The percent difference is greater than 70%.
- d The 2:1 depletion requirement was not met for this sample
- h Prep holding time exceeded

# QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|---|

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

# Quality Control Summary for SVOC Analysis

## QC Summary

Report Date: December 30, 2009
Page 1 of 17

Sandia National Laboratories
MS-0756, Org. 06765, Bldg. 823/Rm. 4276
1515 Eubank SE
Albuquerque, New Mexico

**Contact:** Ms. Pamela M. Puissant

**Workorder:** 241350

| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 926148 | | | | | | | | | | |
| QC1201980198 LCS | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 50.0 | | | 32.6 | ug/L | | 65.3 | (40%-91%) | AGS1 | 12/01/09 19:25 |
| 1,2-Dichlorobenzene | 50.0 | | | 32.1 | ug/L | | 64.2 | (39%-91%) | | |
| 1,3-Dichlorobenzene | 50.0 | | | 30.8 | ug/L | | 61.6 | (38%-88%) | | |
| 1,4-Dichlorobenzene | 50.0 | | | 31.6 | ug/L | | 63.2 | (38%-88%) | | |
| 2,4,5-Trichlorophenol | 50.0 | | | 35.2 | ug/L | | 70.3 | (50%-111%) | | |
| 2,4,6-Trichlorophenol | 50.0 | | | 35.5 | ug/L | | 71 | (54%-111%) | | |
| 2,4-Dichlorophenol | 50.0 | | | 35.5 | ug/L | | 70.9 | (52%-105%) | | |
| 2,4-Dimethylphenol | 50.0 | | | 33.5 | ug/L | | 67 | (44%-100%) | | |
| 2,4-Dinitrophenol | 50.0 | | | 30.4 | ug/L | | 60.8 | (33%-118%) | | |
| 2,4-Dinitrotoluene | 50.0 | | | 38.4 | ug/L | | 76.8 | (55%-108%) | | |
| 2,6-Dinitrotoluene | 50.0 | | | 38.7 | ug/L | | 77.4 | (58%-104%) | | |
| 2-Chloronaphthalene | 50.0 | | | 33.5 | ug/L | | 67 | (46%-100%) | | |
| 2-Chlorophenol | 50.0 | | | 33.4 | ug/L | | 66.8 | (49%-96%) | | |
| 2-Methyl-4,6-dinitrophenol | 50.0 | | | 29.4 | ug/L | | 58.8 | (39%-124%) | | |
| 2-Methylnaphthalene | 50.0 | | | 35.1 | ug/L | | 70.2 | (42%-97%) | | |
| 2-Nitrophenol | 50.0 | | | 35.6 | ug/L | | 71.2 | (52%-104%) | | |
| 3,3'-Dichlorobenzidine | 50.0 | | | 33.2 | ug/L | | 66.3 | (41%-107%) | | |
| 4-Bromophenylphenylether | 50.0 | | | 43.5 | ug/L | | 87.1 | (56%-108%) | | |
| 4-Chloro-3-methylphenol | 50.0 | | | 36.5 | ug/L | | 73.1 | (55%-109%) | | |
| 4-Chloroaniline | 50.0 | | | 38.9 | ug/L | | 77.9 | (57%-145%) | | |
| 4-Chlorophenylphenylether | 50.0 | | | 38.7 | ug/L | | 77.5 | (57%-106%) | | |
| 4-Nitrophenol | 50.0 | | | 17.1 | ug/L | | 34.1 | (19%-56%) | | |
| Acenaphthene | 50.0 | | | 35.9 | ug/L | | 71.8 | (47%-101%) | | |
| Acenaphthylene | 50.0 | | | 37.7 | ug/L | | 75.5 | (58%-99%) | | |
| Anthracene | 50.0 | | | 39.2 | ug/L | | 78.3 | (55%-106%) | | |
| Benzo(a)anthracene | 50.0 | | | 39.3 | ug/L | | 78.6 | (56%-105%) | | |
| Benzo(a)pyrene | 50.0 | | | 40.7 | ug/L | | 81.5 | (58%-111%) | | |
| Benzo(b)fluoranthene | 50.0 | | | 40.8 | ug/L | | 81.6 | (53%-114%) | | |
| Benzo(ghi)perylene | 50.0 | | | 43.3 | ug/L | | 86.7 | (41%-125%) | | |
| Benzo(k)fluoranthene | 50.0 | | | 39.6 | ug/L | | 79.2 | (55%-116%) | | |
| Butylbenzylphthalate | 50.0 | | | 42.8 | ug/L | | 85.5 | (55%-122%) | | |
| Carbazole | 50.0 | | | 36.5 | ug/L | | 73.1 | (52%-124%) | | |
| Chrysene | 50.0 | | | 37.0 | ug/L | | 74.1 | (56%-105%) | | |
| Di-n-butylphthalate | 50.0 | | | 43.3 | ug/L | | 86.5 | (58%-119%) | | |
| Di-n-octylphthalate | 50.0 | | | 39.2 | ug/L | | 78.4 | (41%-136%) | | |
| Dibenzo(a,h)anthracene | 50.0 | | | 42.9 | ug/L | | 85.9 | (44%-126%) | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 926148 | | | | | | | | | | |
| Dibenzofuran | 50.0 | | | 42.7 | ug/L | | 85.5 | (54%-108%) | | |
| Diethylphthalate | 50.0 | | | 42.6 | ug/L | | 85.1 | (60%-112%) | AGS1 | 12/01/09 19:25 |
| Dimethylphthalate | 50.0 | | | 40.8 | ug/L | | 81.5 | (59%-107%) | | |
| Diphenylamine | 50.0 | | | 38.3 | ug/L | | 76.6 | (55%-113%) | | |
| Fluoranthene | 50.0 | | | 39.7 | ug/L | | 79.4 | (57%-114%) | | |
| Fluorene | 50.0 | | | 35.7 | ug/L | | 71.4 | (52%-106%) | | |
| Hexachlorobenzene | 50.0 | | | 36.3 | ug/L | | 72.7 | (53%-115%) | | |
| Hexachlorobutadiene | 50.0 | | | 28.5 | ug/L | | 57 | (33%-98%) | | |
| Hexachlorocyclopentadiene | 50.0 | | | 40.3 | ug/L | | 80.7 | (10%-128%) | | |
| Hexachloroethane | 50.0 | | | 29.1 | ug/L | | 58.2 | (35%-92%) | | |
| Indeno(1,2,3-cd)pyrene | 50.0 | | | 43.2 | ug/L | | 86.4 | (45%-124%) | | |
| Isophorone | 50.0 | | | 42.2 | ug/L | | 84.4 | (52%-113%) | | |
| N-Nitrosodipropylamine | 50.0 | | | 34.3 | ug/L | | 68.6 | (44%-118%) | | |
| Naphthalene | 50.0 | | | 35.1 | ug/L | | 70.1 | (40%-93%) | | |
| Nitrobenzene | 50.0 | | | 38.5 | ug/L | | 76.9 | (48%-112%) | | |
| Pentachlorophenol | 50.0 | | | 30.9 | ug/L | | 61.9 | (44%-121%) | | |
| Phenanthrene | 50.0 | | | 37.1 | ug/L | | 74.2 | (54%-105%) | | |
| Phenol | 50.0 | | | 14.0 | ug/L | | 28.1 | (21%-45%) | | |
| Pyrene | 50.0 | | | 38.7 | ug/L | | 77.4 | (49%-115%) | | |
| bis(2-Chloroethoxy)methane | 50.0 | | | 36.4 | ug/L | | 72.8 | (54%-107%) | | |
| bis(2-Chloroethyl) ether | 50.0 | | | 35.8 | ug/L | | 71.5 | (46%-106%) | | |
| bis(2-Chloroisopropyl)ether | 50.0 | | | 38.6 | ug/L | | 77.3 | (44%-115%) | | |
| bis(2-Ethylhexyl)phthalate | 50.0 | | | 40.5 | ug/L | | 80.9 | (55%-124%) | | |
| m,p-Cresols | 50.0 | | | 30.0 | ug/L | | 59.9 | (38%-96%) | | |
| m-Nitroaniline | 50.0 | | | 33.6 | ug/L | | 67.3 | (58%-125%) | | |
| o-Cresol | 50.0 | | | 30.2 | ug/L | | 60.5 | (41%-94%) | | |
| o-Nitroaniline | 50.0 | | | 34.6 | ug/L | | 69.2 | (50%-120%) | | |
| p-Nitroaniline | 50.0 | | | 32.3 | ug/L | | 64.7 | (48%-135%) | | |
| **2,4,6-Tribromophenol | 100 | | | 81.8 | ug/L | | 81.8 | (39%-115%) | | |
| **2-Fluorobiphenyl | 50.0 | | | 42.9 | ug/L | | 85.9 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 45.0 | ug/L | | 45 | (25%-92%) | | |
| **Nitrobenzene-d5 | 50.0 | | | 42.9 | ug/L | | 85.8 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 28.9 | ug/L | | 28.9 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 45.1 | ug/L | | 90.3 | (46%-130%) | | |
| QC1201981094 LCSD | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 50.0 | | | 36.8 | ug/L | 12.0 | 73.6 | (0%-20%) | | 12/01/09 19:45 |
| 1,2-Dichlorobenzene | 50.0 | | | 37.1 | ug/L | 14.4 | 74.2 | (0%-20%) | | |
| 1,3-Dichlorobenzene | 50.0 | | | 36.0 | ug/L | 15.6 | 72 | (0%-20%) | | |
| 1,4-Dichlorobenzene | 50.0 | | | 36.9 | ug/L | 15.4 | 73.8 | (0%-20%) | | |
| 2,4,5-Trichlorophenol | 50.0 | | | 39.6 | ug/L | 11.9 | 79.3 | (0%-20%) | | |
| 2,4,6-Trichlorophenol | 50.0 | | | 39.4 | ug/L | 10.3 | 78.7 | (0%-20%) | | |
| 2,4-Dichlorophenol | 50.0 | | | 39.5 | ug/L | 10.8 | 79 | (0%-20%) | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 926148 | | | | | | | | | | |
| 2,4-Dimethylphenol | 50.0 | | | 35.6 | ug/L | 6.16 | 71.3 | (0%-20%) | | |
| 2,4-Dinitrophenol | 50.0 | | | 36.8 | ug/L | 19.0 | 73.5 | (0%-20%) | AGS1 | 12/01/09 19:45 |
| 2,4-Dinitrotoluene | 50.0 | | | 43.4 | ug/L | 12.3 | 86.9 | (0%-20%) | | |
| 2,6-Dinitrotoluene | 50.0 | | | 43.3 | ug/L | 11.3 | 86.7 | (0%-20%) | | |
| 2-Chloronaphthalene | 50.0 | | | 37.3 | ug/L | 10.7 | 74.5 | (0%-20%) | | |
| 2-Chlorophenol | 50.0 | | | 37.5 | ug/L | 11.5 | 74.9 | (0%-20%) | | |
| 2-Methyl-4,6-dinitrophenol | 50.0 | | | 35.1 | ug/L | 17.5 | 70.2 | (0%-20%) | | |
| 2-Methylnaphthalene | 50.0 | | | 39.3 | ug/L | 11.4 | 78.6 | (0%-20%) | | |
| 2-Nitrophenol | 50.0 | | | 39.3 | ug/L | 9.81 | 78.5 | (0%-20%) | | |
| 3,3'-Dichlorobenzidine | 50.0 | | | 38.5 | ug/L | 15.0 | 77 | (0%-20%) | | |
| 4-Bromophenylphenylether | 50.0 | | | 47.0 | ug/L | 7.75 | 94.1 | (0%-20%) | | |
| 4-Chloro-3-methylphenol | 50.0 | | | 40.4 | ug/L | 10.1 | 80.8 | (0%-20%) | | |
| 4-Chloroaniline | 50.0 | | | 41.4 | ug/L | 6.07 | 82.8 | (0%-20%) | | |
| 4-Chlorophenylphenylether | 50.0 | | | 42.7 | ug/L | 9.73 | 85.4 | (0%-20%) | | |
| 4-Nitrophenol | 50.0 | | | 19.6 | ug/L | 13.7 | 39.2 | (0%-20%) | | |
| Acenaphthene | 50.0 | | | 39.8 | ug/L | 10.3 | 79.6 | (0%-20%) | | |
| Acenaphthylene | 50.0 | | | 41.7 | ug/L | 10.0 | 83.4 | (0%-20%) | | |
| Anthracene | 50.0 | | | 40.5 | ug/L | 3.42 | 81.1 | (0%-20%) | | |
| Benzo(a)anthracene | 50.0 | | | 42.9 | ug/L | 8.69 | 85.7 | (0%-20%) | | |
| Benzo(a)pyrene | 50.0 | | | 44.6 | ug/L | 9.10 | 89.2 | (0%-20%) | | |
| Benzo(b)fluoranthene | 50.0 | | | 41.7 | ug/L | 2.23 | 83.5 | (0%-20%) | | |
| Benzo(ghi)perylene | 50.0 | | | 52.5 | ug/L | 19.2 | 105 | (0%-20%) | | |
| Benzo(k)fluoranthene | 50.0 | | | 43.0 | ug/L | 8.16 | 86 | (0%-20%) | | |
| Butylbenzylphthalate | 50.0 | | | 43.1 | ug/L | 0.819 | 86.2 | (0%-20%) | | |
| Carbazole | 50.0 | | | 36.5 | ug/L | 0.0956 | 73 | (0%-20%) | | |
| Chrysene | 50.0 | | | 41.0 | ug/L | 10.2 | 82 | (0%-20%) | | |
| Di-n-butylphthalate | 50.0 | | | 47.3 | ug/L | 8.97 | 94.6 | (0%-20%) | | |
| Di-n-octylphthalate | 50.0 | | | 36.1 | ug/L | 8.28 | 72.2 | (0%-20%) | | |
| Dibenzo(a,h)anthracene | 50.0 | | | 52.5 | ug/L | 20.1* | 105 | (0%-20%) | | |
| Dibenzofuran | 50.0 | | | 47.0 | ug/L | 9.46 | 94 | (0%-20%) | | |
| Diethylphthalate | 50.0 | | | 47.2 | ug/L | 10.3 | 94.4 | (0%-20%) | | |
| Dimethylphthalate | 50.0 | | | 45.1 | ug/L | 10.2 | 90.3 | (0%-20%) | | |
| Diphenylamine | 50.0 | | | 40.8 | ug/L | 6.21 | 81.5 | (0%-20%) | | |
| Fluoranthene | 50.0 | | | 44.5 | ug/L | 11.3 | 89 | (0%-20%) | | |
| Fluorene | 50.0 | | | 38.2 | ug/L | 6.92 | 76.5 | (0%-20%) | | |
| Hexachlorobenzene | 50.0 | | | 39.0 | ug/L | 7.10 | 78 | (0%-20%) | | |
| Hexachlorobutadiene | 50.0 | | | 32.5 | ug/L | 13.1 | 65 | (0%-20%) | | |
| Hexachlorocyclopentadiene | 50.0 | | | 47.5 | ug/L | 16.3 | 95 | (0%-20%) | | |
| Hexachloroethane | 50.0 | | | 34.4 | ug/L | 16.8 | 68.8 | (0%-20%) | | |
| Indeno(1,2,3-cd)pyrene | 50.0 | | | 52.3 | ug/L | 19.1 | 105 | (0%-20%) | | |
| Isophorone | 50.0 | | | 48.2 | ug/L | 13.2 | 96.4 | (0%-20%) | | |
| | | | | 40.3 | | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 926148 | | | | | | | | | | |
| N-Nitrosodipropylamine | 50.0 | | | | ug/L | 15.9 | 80.5 | (0%-20%) | | |
| Naphthalene | 50.0 | | | 39.3 | ug/L | 11.4 | 78.6 | (0%-20%) | AGS1 | 12/01/09 19:45 |
| Nitrobenzene | 50.0 | | | 43.3 | ug/L | 11.8 | 86.5 | (0%-20%) | | |
| Pentachlorophenol | 50.0 | | | 36.4 | ug/L | 16.1 | 72.7 | (0%-20%) | | |
| Phenanthrene | 50.0 | | | 42.5 | ug/L | 13.7 | 85.1 | (0%-20%) | | |
| Phenol | 50.0 | | | 15.8 | ug/L | 11.8 | 31.6 | (0%-20%) | | |
| Pyrene | 50.0 | | | 38.0 | ug/L | 1.77 | 76.1 | (0%-20%) | | |
| bis(2-Chloroethoxy)methane | 50.0 | | | 41.1 | ug/L | 12.3 | 82.3 | (0%-20%) | | |
| bis(2-Chloroethyl) ether | 50.0 | | | 40.9 | ug/L | 13.3 | 81.8 | (0%-20%) | | |
| bis(2-Chloroisopropyl)ether | 50.0 | | | 44.9 | ug/L | 14.9 | 89.7 | (0%-20%) | | |
| bis(2-Ethylhexyl)phthalate | 50.0 | | | 41.6 | ug/L | 2.66 | 83.1 | (0%-20%) | | |
| m,p-Cresols | 50.0 | | | 33.8 | ug/L | 12.1 | 67.6 | (0%-20%) | | |
| m-Nitroaniline | 50.0 | | | 36.4 | ug/L | 7.89 | 72.8 | (0%-20%) | | |
| o-Cresol | 50.0 | | | 34.1 | ug/L | 12.0 | 68.2 | (0%-20%) | | |
| o-Nitroaniline | 50.0 | | | 38.6 | ug/L | 11.0 | 77.3 | (0%-20%) | | |
| p-Nitroaniline | 50.0 | | | 36.6 | ug/L | 12.5 | 73.3 | (0%-20%) | | |
| **2,4,6-Tribromophenol | 100 | | | 91.6 | ug/L | | 91.6 | (39%-115%) | | |
| **2-Fluorobiphenyl | 50.0 | | | 47.6 | ug/L | | 95.2 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 49.6 | ug/L | | 49.6 | (25%-92%) | | |
| **Nitrobenzene-d5 | 50.0 | | | 48.0 | ug/L | | 96 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 32.1 | ug/L | | 32.1 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 44.1 | ug/L | | 88.2 | (46%-130%) | | |
| QC1201980195 MB | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | | | U | ND | ug/L | | | | | 12/01/09 19:04 |
| 1,2-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 1,3-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 1,4-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 2,4,5-Trichlorophenol | | | U | ND | ug/L | | | | | |
| 2,4,6-Trichlorophenol | | | U | ND | ug/L | | | | | |
| 2,4-Dichlorophenol | | | U | ND | ug/L | | | | | |
| 2,4-Dimethylphenol | | | U | ND | ug/L | | | | | |
| 2,4-Dinitrophenol | | | U | ND | ug/L | | | | | |
| 2,4-Dinitrotoluene | | | U | ND | ug/L | | | | | |
| 2,6-Dinitrotoluene | | | U | ND | ug/L | | | | | |
| 2-Chloronaphthalene | | | U | ND | ug/L | | | | | |
| 2-Chlorophenol | | | U | ND | ug/L | | | | | |
| 2-Methyl-4,6-dinitrophenol | | | U | ND | ug/L | | | | | |
| 2-Methylnaphthalene | | | U | ND | ug/L | | | | | |
| 2-Nitrophenol | | | U | ND | ug/L | | | | | |
| 3,3'-Dichlorobenzidine | | | U | ND | ug/L | | | | | |
| 4-Bromophenylphenylether | | | U | ND | ug/L | | | | | |
| 4-Chloro-3-methylphenol | | | U | ND | ug/L | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | | |
| Batch 926148 | | | | | | | | | | | |
| 4-Chloroaniline | | | U | ND | ug/L | | | | | | |
| 4-Chlorophenylphenylether | | | U | ND | ug/L | | | | AGS1 | 12/01/09 | 19:04 |
| 4-Nitrophenol | | | U | ND | ug/L | | | | | | |
| Acenaphthene | | | U | ND | ug/L | | | | | | |
| Acenaphthylene | | | U | ND | ug/L | | | | | | |
| Anthracene | | | U | ND | ug/L | | | | | | |
| Benzo(a)anthracene | | | U | ND | ug/L | | | | | | |
| Benzo(a)pyrene | | | U | ND | ug/L | | | | | | |
| Benzo(b)fluoranthene | | | U | ND | ug/L | | | | | | |
| Benzo(ghi)perylene | | | U | ND | ug/L | | | | | | |
| Benzo(k)fluoranthene | | | U | ND | ug/L | | | | | | |
| Butylbenzylphthalate | | | U | ND | ug/L | | | | | | |
| Carbazole | | | U | ND | ug/L | | | | | | |
| Chrysene | | | U | ND | ug/L | | | | | | |
| Di-n-butylphthalate | | | U | ND | ug/L | | | | | | |
| Di-n-octylphthalate | | | U | ND | ug/L | | | | | | |
| Dibenzo(a,h)anthracene | | | U | ND | ug/L | | | | | | |
| Dibenzofuran | | | U | ND | ug/L | | | | | | |
| Diethylphthalate | | | U | ND | ug/L | | | | | | |
| Dimethylphthalate | | | U | ND | ug/L | | | | | | |
| Diphenylamine | | | U | ND | ug/L | | | | | | |
| Fluoranthene | | | U | ND | ug/L | | | | | | |
| Fluorene | | | U | ND | ug/L | | | | | | |
| Hexachlorobenzene | | | U | ND | ug/L | | | | | | |
| Hexachlorobutadiene | | | U | ND | ug/L | | | | | | |
| Hexachlorocyclopentadiene | | | U | ND | ug/L | | | | | | |
| Hexachloroethane | | | U | ND | ug/L | | | | | | |
| Indeno(1,2,3-cd)pyrene | | | U | ND | ug/L | | | | | | |
| Isophorone | | | U | ND | ug/L | | | | | | |
| N-Nitrosodipropylamine | | | U | ND | ug/L | | | | | | |
| Naphthalene | | | U | ND | ug/L | | | | | | |
| Nitrobenzene | | | U | ND | ug/L | | | | | | |
| Pentachlorophenol | | | U | ND | ug/L | | | | | | |
| Phenanthrene | | | U | ND | ug/L | | | | | | |
| Phenol | | | U | ND | ug/L | | | | | | |
| Pyrene | | | U | ND | ug/L | | | | | | |
| bis(2-Chloroethoxy)methane | | | U | ND | ug/L | | | | | | |
| bis(2-Chloroethyl) ether | | | U | ND | ug/L | | | | | | |
| bis(2-Chloroisopropyl)ether | | | U | ND | ug/L | | | | | | |
| bis(2-Ethylhexyl)phthalate | | | U | ND | ug/L | | | | | | |
| m,p-Cresols | | | U | ND | ug/L | | | | | | |
| | | | U | ND | | | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 926148 | | | | | | | | | | |
| m-Nitroaniline | | | | | ug/L | | | | | |
| o-Cresol | | | U | ND | ug/L | | | | AGS1 | 12/01/09 19:04 |
| o-Nitroaniline | | | U | ND | ug/L | | | | | |
| p-Nitroaniline | | | U | ND | ug/L | | | | | |
| **2,4,6-Tribromophenol | 100 | | | 79.9 | ug/L | | 79.9 | (39%-115%) | | |
| **2-Fluorobiphenyl | 50.0 | | | 40.0 | ug/L | | 80 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 43.8 | ug/L | | 43.8 | (25%-92%) | | |
| **Nitrobenzene-d5 | 50.0 | | | 40.5 | ug/L | | 80.9 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 26.9 | ug/L | | 26.9 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 43.4 | ug/L | | 86.7 | (46%-130%) | | |
| Batch 929021 | | | | | | | | | | |
| QC1201986736 LCS | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 50.0 | | | 28.3 | ug/L | | 56.7 | (40%-91%) | JMB3 | 12/05/09 12:36 |
| 1,2-Dichlorobenzene | 50.0 | | | 29.8 | ug/L | | 59.5 | (39%-91%) | | |
| 1,3-Dichlorobenzene | 50.0 | | | 28.6 | ug/L | | 57.2 | (38%-88%) | | |
| 1,4-Dichlorobenzene | 50.0 | | | 30.1 | ug/L | | 60.3 | (38%-88%) | | |
| 2,4,5-Trichlorophenol | 50.0 | | | 35.2 | ug/L | | 70.4 | (50%-111%) | | |
| 2,4,6-Trichlorophenol | 50.0 | | | 37.2 | ug/L | | 74.5 | (54%-111%) | | |
| 2,4-Dichlorophenol | 50.0 | | | 31.3 | ug/L | | 62.5 | (52%-105%) | | |
| 2,4-Dimethylphenol | 50.0 | | | 26.8 | ug/L | | 53.7 | (44%-100%) | | |
| 2,4-Dinitrophenol | 50.0 | | | 50.7 | ug/L | | 101 | (33%-118%) | | |
| 2,4-Dinitrotoluene | 50.0 | | | 36.6 | ug/L | | 73.2 | (55%-108%) | | |
| 2,6-Dinitrotoluene | 50.0 | | | 36.2 | ug/L | | 72.4 | (58%-104%) | | |
| 2-Chloronaphthalene | 50.0 | | | 30.7 | ug/L | | 61.5 | (46%-100%) | | |
| 2-Chlorophenol | 50.0 | | | 31.5 | ug/L | | 62.9 | (49%-96%) | | |
| 2-Methyl-4,6-dinitrophenol | 50.0 | | | 40.2 | ug/L | | 80.4 | (39%-124%) | | |
| 2-Methylnaphthalene | 50.0 | | | 28.7 | ug/L | | 57.3 | (42%-97%) | | |
| 2-Nitrophenol | 50.0 | | | 30.2 | ug/L | | 60.4 | (52%-104%) | | |
| 3,3'-Dichlorobenzidine | 50.0 | | | 39.3 | ug/L | | 78.5 | (41%-107%) | | |
| 4-Bromophenylphenylether | 50.0 | | | 40.6 | ug/L | | 81.3 | (56%-108%) | | |
| 4-Chloro-3-methylphenol | 50.0 | | | 34.1 | ug/L | | 68.2 | (55%-109%) | | |
| 4-Chloroaniline | 50.0 | | | 36.3 | ug/L | | 72.6 | (57%-145%) | | |
| 4-Chlorophenylphenylether | 50.0 | | | 40.3 | ug/L | | 80.6 | (57%-106%) | | |
| 4-Nitrophenol | 50.0 | | | 17.1 | ug/L | | 34.2 | (19%-56%) | | |
| Acenaphthene | 50.0 | | | 36.5 | ug/L | | 73 | (47%-101%) | | |
| Acenaphthylene | 50.0 | | | 34.7 | ug/L | | 69.4 | (58%-99%) | | |
| Anthracene | 50.0 | | | 33.6 | ug/L | | 67.3 | (55%-106%) | | |
| Benzo(a)anthracene | 50.0 | | | 34.6 | ug/L | | 69.1 | (56%-105%) | | |
| Benzo(a)pyrene | 50.0 | | | 37.7 | ug/L | | 75.4 | (58%-111%) | | |
| Benzo(b)fluoranthene | 50.0 | | | 35.4 | ug/L | | 70.8 | (53%-114%) | | |
| Benzo(ghi)perylene | 50.0 | | | 45.2 | ug/L | | 90.3 | (41%-125%) | | |
| Benzo(k)fluoranthene | 50.0 | | | 37.2 | ug/L | | 74.3 | (55%-116%) | | |

# QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 929021 | | | | | | | | | | |
| Butylbenzylphthalate | 50.0 | | | 40.3 | ug/L | | 80.6 | (55%-122%) | | |
| Carbazole | 50.0 | | | 36.0 | ug/L | | 72 | (52%-124%) | JMB3 | 12/05/09 12:36 |
| Chrysene | 50.0 | | | 35.2 | ug/L | | 70.3 | (56%-105%) | | |
| Di-n-butylphthalate | 50.0 | | | 36.5 | ug/L | | 72.9 | (58%-119%) | | |
| Di-n-octylphthalate | 50.0 | | | 34.1 | ug/L | | 68.1 | (41%-136%) | | |
| Dibenzo(a,h)anthracene | 50.0 | | | 44.8 | ug/L | | 89.7 | (44%-126%) | | |
| Dibenzofuran | 50.0 | | | 39.5 | ug/L | | 78.9 | (54%-108%) | | |
| Diethylphthalate | 50.0 | | | 39.9 | ug/L | | 79.8 | (60%-112%) | | |
| Dimethylphthalate | 50.0 | | | 38.7 | ug/L | | 77.3 | (59%-107%) | | |
| Diphenylamine | 50.0 | | | 35.4 | ug/L | | 70.8 | (55%-113%) | | |
| Fluoranthene | 50.0 | | | 33.7 | ug/L | | 67.4 | (57%-114%) | | |
| Fluorene | 50.0 | | | 29.3 | ug/L | | 58.6 | (52%-106%) | | |
| Hexachlorobenzene | 50.0 | | | 33.6 | ug/L | | 67.2 | (53%-115%) | | |
| Hexachlorobutadiene | 50.0 | | | 22.3 | ug/L | | 44.5 | (33%-98%) | | |
| Hexachlorocyclopentadiene | 50.0 | | | 32.6 | ug/L | | 65.3 | (10%-128%) | | |
| Hexachloroethane | 50.0 | | | 27.1 | ug/L | | 54.3 | (35%-92%) | | |
| Indeno(1,2,3-cd)pyrene | 50.0 | | | 45.0 | ug/L | | 89.9 | (45%-124%) | | |
| Isophorone | 50.0 | | | 36.9 | ug/L | | 73.7 | (52%-113%) | | |
| N-Nitrosodipropylamine | 50.0 | | | 31.8 | ug/L | | 63.7 | (44%-118%) | | |
| Naphthalene | 50.0 | | | 28.6 | ug/L | | 57.2 | (40%-93%) | | |
| Nitrobenzene | 50.0 | | | 33.9 | ug/L | | 67.8 | (48%-112%) | | |
| Pentachlorophenol | 50.0 | | | 37.4 | ug/L | | 74.8 | (44%-121%) | | |
| Phenanthrene | 50.0 | | | 31.1 | ug/L | | 62.2 | (54%-105%) | | |
| Phenol | 50.0 | | | 13.1 | ug/L | | 26.1 | (21%-45%) | | |
| Pyrene | 50.0 | | | 33.9 | ug/L | | 67.8 | (49%-115%) | | |
| bis(2-Chloroethoxy)methane | 50.0 | | | 31.4 | ug/L | | 62.9 | (54%-107%) | | |
| bis(2-Chloroethyl) ether | 50.0 | | | 33.4 | ug/L | | 66.8 | (46%-106%) | | |
| bis(2-Chloroisopropyl)ether | 50.0 | | | 37.2 | ug/L | | 74.5 | (44%-115%) | | |
| bis(2-Ethylhexyl)phthalate | 50.0 | | | 37.6 | ug/L | | 75.1 | (55%-124%) | | |
| m,p-Cresols | 50.0 | | | 25.9 | ug/L | | 51.9 | (38%-96%) | | |
| m-Nitroaniline | 50.0 | | | 34.6 | ug/L | | 69.3 | (58%-125%) | | |
| o-Cresol | 50.0 | | | 27.9 | ug/L | | 55.7 | (41%-94%) | | |
| o-Nitroaniline | 50.0 | | | 33.9 | ug/L | | 67.7 | (50%-120%) | | |
| p-Nitroaniline | 50.0 | | | 38.7 | ug/L | | 77.4 | (48%-135%) | | |
| **2,4,6-Tribromophenol | 100 | | | 79.0 | ug/L | | 79 | (39%-115%) | | |
| **2-Fluorobiphenyl | 50.0 | | | 43.0 | ug/L | | 86.1 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 43.2 | ug/L | | 43.2 | (25%-92%) | | |
| **Nitrobenzene-d5 | 50.0 | | | 37.5 | ug/L | | 75 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 26.1 | ug/L | | 26.1 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 39.3 | ug/L | | 78.6 | (46%-130%) | | |
| QC1201986737 LCSD | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 50.0 | | | 30.4 | ug/L | 6.92 | 60.7 | (0%-20%) | | 12/05/09 12:58 |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 929021 | | | | | | | | | | |
| 1,2-Dichlorobenzene | 50.0 | | | 31.8 | ug/L | 6.50 | 63.5 | (0%-20%) | | |
| 1,3-Dichlorobenzene | 50.0 | | | 30.5 | ug/L | 6.31 | 60.9 | (0%-20%) | JMB3 | 12/05/09 12:58 |
| 1,4-Dichlorobenzene | 50.0 | | | 31.8 | ug/L | 5.31 | 63.6 | (0%-20%) | | |
| 2,4,5-Trichlorophenol | 50.0 | | | 37.2 | ug/L | 5.49 | 74.3 | (0%-20%) | | |
| 2,4,6-Trichlorophenol | 50.0 | | | 38.6 | ug/L | 3.49 | 77.1 | (0%-20%) | | |
| 2,4-Dichlorophenol | 50.0 | | | 33.9 | ug/L | 8.28 | 67.9 | (0%-20%) | | |
| 2,4-Dimethylphenol | 50.0 | | | 29.2 | ug/L | 8.32 | 58.4 | (0%-20%) | | |
| 2,4-Dinitrophenol | 50.0 | | | 56.6 | ug/L | 10.9 | 113 | (0%-20%) | | |
| 2,4-Dinitrotoluene | 50.0 | | | 39.0 | ug/L | 6.32 | 78 | (0%-20%) | | |
| 2,6-Dinitrotoluene | 50.0 | | | 39.0 | ug/L | 7.44 | 78 | (0%-20%) | | |
| 2-Chloronaphthalene | 50.0 | | | 32.5 | ug/L | 5.43 | 64.9 | (0%-20%) | | |
| 2-Chlorophenol | 50.0 | | | 34.2 | ug/L | 8.21 | 68.3 | (0%-20%) | | |
| 2-Methyl-4,6-dinitrophenol | 50.0 | | | 44.0 | ug/L | 9.04 | 88 | (0%-20%) | | |
| 2-Methylnaphthalene | 50.0 | | | 31.0 | ug/L | 7.76 | 62 | (0%-20%) | | |
| 2-Nitrophenol | 50.0 | | | 35.6 | ug/L | 16.2 | 71.1 | (0%-20%) | | |
| 3,3'-Dichlorobenzidine | 50.0 | | | 41.5 | ug/L | 5.49 | 83 | (0%-20%) | | |
| 4-Bromophenylphenylether | 50.0 | | | 42.4 | ug/L | 4.29 | 84.9 | (0%-20%) | | |
| 4-Chloro-3-methylphenol | 50.0 | | | 35.9 | ug/L | 5.21 | 71.9 | (0%-20%) | | |
| 4-Chloroaniline | 50.0 | | | 40.4 | ug/L | 10.6 | 80.8 | (0%-20%) | | |
| 4-Chlorophenylphenylether | 50.0 | | | 42.1 | ug/L | 4.30 | 84.1 | (0%-20%) | | |
| 4-Nitrophenol | 50.0 | | | 19.3 | ug/L | 12.4 | 38.7 | (0%-20%) | | |
| Acenaphthene | 50.0 | | | 37.9 | ug/L | 3.68 | 75.7 | (0%-20%) | | |
| Acenaphthylene | 50.0 | | | 35.8 | ug/L | 3.08 | 71.6 | (0%-20%) | | |
| Anthracene | 50.0 | | | 33.6 | ug/L | 0.257 | 67.1 | (0%-20%) | | |
| Benzo(a)anthracene | 50.0 | | | 35.0 | ug/L | 1.39 | 70.1 | (0%-20%) | | |
| Benzo(a)pyrene | 50.0 | | | 38.5 | ug/L | 2.24 | 77.1 | (0%-20%) | | |
| Benzo(b)fluoranthene | 50.0 | | | 37.2 | ug/L | 4.97 | 74.4 | (0%-20%) | | |
| Benzo(ghi)perylene | 50.0 | | | 45.4 | ug/L | 0.443 | 90.7 | (0%-20%) | | |
| Benzo(k)fluoranthene | 50.0 | | | 36.4 | ug/L | 2.09 | 72.8 | (0%-20%) | | |
| Butylbenzylphthalate | 50.0 | | | 40.7 | ug/L | 0.898 | 81.3 | (0%-20%) | | |
| Carbazole | 50.0 | | | 41.5 | ug/L | 14.2 | 83 | (0%-20%) | | |
| Chrysene | 50.0 | | | 37.2 | ug/L | 5.54 | 74.3 | (0%-20%) | | |
| Di-n-butylphthalate | 50.0 | | | 37.4 | ug/L | 2.49 | 74.8 | (0%-20%) | | |
| Di-n-octylphthalate | 50.0 | | | 33.9 | ug/L | 0.339 | 67.9 | (0%-20%) | | |
| Dibenzo(a,h)anthracene | 50.0 | | | 45.8 | ug/L | 2.17 | 91.6 | (0%-20%) | | |
| Dibenzofuran | 50.0 | | | 40.8 | ug/L | 3.31 | 81.6 | (0%-20%) | | |
| Diethylphthalate | 50.0 | | | 41.3 | ug/L | 3.44 | 82.6 | (0%-20%) | | |
| Dimethylphthalate | 50.0 | | | 40.5 | ug/L | 4.53 | 80.9 | (0%-20%) | | |
| Diphenylamine | 50.0 | | | 37.6 | ug/L | 6.00 | 75.2 | (0%-20%) | | |
| Fluoranthene | 50.0 | | | 35.3 | ug/L | 4.55 | 70.5 | (0%-20%) | | |
| Fluorene | 50.0 | | | 30.1 | ug/L | 2.65 | 60.2 | (0%-20%) | | |
| | | | | 34.2 | | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 929021 | | | | | | | | | | |
| Hexachlorobenzene | 50.0 | | | | ug/L | 1.64 | 68.3 | (0%-20%) | | |
| Hexachlorobutadiene | 50.0 | | | 25.1 | ug/L | 12.1 | 50.3 | (0%-20%) | JMB3 | 12/05/09 12:58 |
| Hexachlorocyclopentadiene | 50.0 | | | 38.9 | ug/L | 17.5 | 77.8 | (0%-20%) | | |
| Hexachloroethane | 50.0 | | | 29.2 | ug/L | 7.16 | 58.3 | (0%-20%) | | |
| Indeno(1,2,3-cd)pyrene | 50.0 | | | 45.4 | ug/L | 0.994 | 90.8 | (0%-20%) | | |
| Isophorone | 50.0 | | | 39.7 | ug/L | 7.42 | 79.4 | (0%-20%) | | |
| N-Nitrosodipropylamine | 50.0 | | | 33.7 | ug/L | 5.82 | 67.5 | (0%-20%) | | |
| Naphthalene | 50.0 | | | 30.5 | ug/L | 6.45 | 61 | (0%-20%) | | |
| Nitrobenzene | 50.0 | | | 37.2 | ug/L | 9.41 | 74.4 | (0%-20%) | | |
| Pentachlorophenol | 50.0 | | | 40.1 | ug/L | 6.91 | 80.1 | (0%-20%) | | |
| Phenanthrene | 50.0 | | | 33.5 | ug/L | 7.60 | 67.1 | (0%-20%) | | |
| Phenol | 50.0 | | | 14.3 | ug/L | 8.82 | 28.6 | (0%-20%) | | |
| Pyrene | 50.0 | | | 35.1 | ug/L | 3.52 | 70.2 | (0%-20%) | | |
| bis(2-Chloroethoxy)methane | 50.0 | | | 34.7 | ug/L | 9.81 | 69.3 | (0%-20%) | | |
| bis(2-Chloroethyl) ether | 50.0 | | | 36.6 | ug/L | 9.08 | 73.2 | (0%-20%) | | |
| bis(2-Chloroisopropyl)ether | 50.0 | | | 39.5 | ug/L | 5.93 | 79 | (0%-20%) | | |
| bis(2-Ethylhexyl)phthalate | 50.0 | | | 37.7 | ug/L | 0.432 | 75.4 | (0%-20%) | | |
| m,p-Cresols | 50.0 | | | 29.6 | ug/L | 13.4 | 59.3 | (0%-20%) | | |
| m-Nitroaniline | 50.0 | | | 40.3 | ug/L | 15.2 | 80.7 | (0%-20%) | | |
| o-Cresol | 50.0 | | | 30.6 | ug/L | 9.46 | 61.3 | (0%-20%) | | |
| o-Nitroaniline | 50.0 | | | 36.4 | ug/L | 7.19 | 72.8 | (0%-20%) | | |
| p-Nitroaniline | 50.0 | | | 44.5 | ug/L | 14.0 | 89.1 | (0%-20%) | | |
| **2,4,6-Tribromophenol | 100 | | | 80.6 | ug/L | | 80.6 | (39%-115%) | | |
| **2-Fluorobiphenyl | 50.0 | | | 44.4 | ug/L | | 88.8 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 46.0 | ug/L | | 46 | (25%-92%) | | |
| **Nitrobenzene-d5 | 50.0 | | | 40.8 | ug/L | | 81.6 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 28.1 | ug/L | | 28.1 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 40.1 | ug/L | | 80.2 | (46%-130%) | | |
| QC1201986735 MB | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | | | U | ND | ug/L | | | | | 12/05/09 12:15 |
| 1,2-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 1,3-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 1,4-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 2,4,5-Trichlorophenol | | | U | ND | ug/L | | | | | |
| 2,4,6-Trichlorophenol | | | U | ND | ug/L | | | | | |
| 2,4-Dichlorophenol | | | U | ND | ug/L | | | | | |
| 2,4-Dimethylphenol | | | U | ND | ug/L | | | | | |
| 2,4-Dinitrophenol | | | U | ND | ug/L | | | | | |
| 2,4-Dinitrotoluene | | | U | ND | ug/L | | | | | |
| 2,6-Dinitrotoluene | | | U | ND | ug/L | | | | | |
| 2-Chloronaphthalene | | | U | ND | ug/L | | | | | |
| 2-Chlorophenol | | | U | ND | ug/L | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | | |
| Batch 929021 | | | | | | | | | | | |
| 2-Methyl-4,6-dinitrophenol | | | U | ND | ug/L | | | | | | |
| 2-Methylnaphthalene | | | U | ND | ug/L | | | | JMB3 | 12/05/09 | 12:15 |
| 2-Nitrophenol | | | U | ND | ug/L | | | | | | |
| 3,3'-Dichlorobenzidine | | | U | ND | ug/L | | | | | | |
| 4-Bromophenylphenylether | | | U | ND | ug/L | | | | | | |
| 4-Chloro-3-methylphenol | | | U | ND | ug/L | | | | | | |
| 4-Chloroaniline | | | U | ND | ug/L | | | | | | |
| 4-Chlorophenylphenylether | | | U | ND | ug/L | | | | | | |
| 4-Nitrophenol | | | U | ND | ug/L | | | | | | |
| Acenaphthene | | | U | ND | ug/L | | | | | | |
| Acenaphthylene | | | U | ND | ug/L | | | | | | |
| Anthracene | | | U | ND | ug/L | | | | | | |
| Benzo(a)anthracene | | | U | ND | ug/L | | | | | | |
| Benzo(a)pyrene | | | U | ND | ug/L | | | | | | |
| Benzo(b)fluoranthene | | | U | ND | ug/L | | | | | | |
| Benzo(ghi)perylene | | | U | ND | ug/L | | | | | | |
| Benzo(k)fluoranthene | | | U | ND | ug/L | | | | | | |
| Butylbenzylphthalate | | | U | ND | ug/L | | | | | | |
| Carbazole | | | U | ND | ug/L | | | | | | |
| Chrysene | | | U | ND | ug/L | | | | | | |
| Di-n-butylphthalate | | | U | ND | ug/L | | | | | | |
| Di-n-octylphthalate | | | U | ND | ug/L | | | | | | |
| Dibenzo(a,h)anthracene | | | U | ND | ug/L | | | | | | |
| Dibenzofuran | | | U | ND | ug/L | | | | | | |
| Diethylphthalate | | | U | ND | ug/L | | | | | | |
| Dimethylphthalate | | | U | ND | ug/L | | | | | | |
| Diphenylamine | | | U | ND | ug/L | | | | | | |
| Fluoranthene | | | U | ND | ug/L | | | | | | |
| Fluorene | | | U | ND | ug/L | | | | | | |
| Hexachlorobenzene | | | U | ND | ug/L | | | | | | |
| Hexachlorobutadiene | | | U | ND | ug/L | | | | | | |
| Hexachlorocyclopentadiene | | | U | ND | ug/L | | | | | | |
| Hexachloroethane | | | U | ND | ug/L | | | | | | |
| Indeno(1,2,3-cd)pyrene | | | U | ND | ug/L | | | | | | |
| Isophorone | | | U | ND | ug/L | | | | | | |
| N-Nitrosodipropylamine | | | U | ND | ug/L | | | | | | |
| Naphthalene | | | U | ND | ug/L | | | | | | |
| Nitrobenzene | | | U | ND | ug/L | | | | | | |
| Pentachlorophenol | | | U | ND | ug/L | | | | | | |
| Phenanthrene | | | U | ND | ug/L | | | | | | |
| Phenol | | | U | ND | ug/L | | | | | | |
| | | | U | ND | | | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 929021 | | | | | | | | | | |
| Pyrene | | | | | ug/L | | | | | |
| bis(2-Chloroethoxy)methane | | | U | ND | ug/L | | | | JMB3 | 12/05/09 12:15 |
| bis(2-Chloroethyl) ether | | | U | ND | ug/L | | | | | |
| bis(2-Chloroisopropyl)ether | | | U | ND | ug/L | | | | | |
| bis(2-Ethylhexyl)phthalate | | | U | ND | ug/L | | | | | |
| m,p-Cresols | | | U | ND | ug/L | | | | | |
| m-Nitroaniline | | | U | ND | ug/L | | | | | |
| o-Cresol | | | U | ND | ug/L | | | | | |
| o-Nitroaniline | | | U | ND | ug/L | | | | | |
| p-Nitroaniline | | | U | ND | ug/L | | | | | |
| **2,4,6-Tribromophenol | 100 | | | 71.7 | ug/L | | 71.7 | (39%-115%) | | |
| **2-Fluorobiphenyl | 50.0 | | | 41.3 | ug/L | | 82.7 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 41.9 | ug/L | | 41.9 | (25%-92%) | | |
| **Nitrobenzene-d5 | 50.0 | | | 36.0 | ug/L | | 72 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 25.4 | ug/L | | 25.4 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 40.3 | ug/L | | 80.6 | (46%-130%) | | |
| Batch 932173 | | | | | | | | | | |
| QC1201993984 LCS | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 50.0 | | | 32.6 | ug/L | | 65.2 | (40%-91%) | AMY | 12/15/09 12:23 |
| 1,2-Dichlorobenzene | 50.0 | | | 31.0 | ug/L | | 61.9 | (39%-91%) | | |
| 1,3-Dichlorobenzene | 50.0 | | | 29.2 | ug/L | | 58.4 | (38%-88%) | | |
| 1,4-Dichlorobenzene | 50.0 | | | 29.5 | ug/L | | 59.1 | (38%-88%) | | |
| 2,4,5-Trichlorophenol | 50.0 | | | 46.8 | ug/L | | 93.5 | (50%-111%) | | |
| 2,4,6-Trichlorophenol | 50.0 | | | 45.1 | ug/L | | 90.2 | (54%-111%) | | |
| 2,4-Dichlorophenol | 50.0 | | | 38.3 | ug/L | | 76.7 | (52%-105%) | | |
| 2,4-Dimethylphenol | 50.0 | | | 38.8 | ug/L | | 77.5 | (44%-100%) | | |
| 2,4-Dinitrophenol | 50.0 | | | 35.8 | ug/L | | 71.6 | (33%-118%) | | |
| 2,4-Dinitrotoluene | 50.0 | | | 37.3 | ug/L | | 74.7 | (55%-108%) | | |
| 2,6-Dinitrotoluene | 50.0 | | | 37.9 | ug/L | | 75.9 | (58%-104%) | | |
| 2-Chloronaphthalene | 50.0 | | | 34.2 | ug/L | | 68.5 | (46%-100%) | | |
| 2-Chlorophenol | 50.0 | | | 35.9 | ug/L | | 71.8 | (49%-96%) | | |
| 2-Methyl-4,6-dinitrophenol | 50.0 | | | 34.8 | ug/L | | 69.5 | (39%-124%) | | |
| 2-Methylnaphthalene | 50.0 | | | 34.8 | ug/L | | 69.6 | (42%-97%) | | |
| 2-Nitrophenol | 50.0 | | | 37.7 | ug/L | | 75.3 | (52%-104%) | | |
| 3,3'-Dichlorobenzidine | 50.0 | | | 39.8 | ug/L | | 79.7 | (41%-107%) | | |
| 4-Bromophenylphenylether | 50.0 | | | 48.7 | ug/L | | 97.4 | (56%-108%) | | |
| 4-Chloro-3-methylphenol | 50.0 | | | 41.3 | ug/L | | 82.6 | (55%-109%) | | |
| 4-Chloroaniline | 50.0 | | | 42.0 | ug/L | | 84 | (57%-145%) | | |
| 4-Chlorophenylphenylether | 50.0 | | | 43.2 | ug/L | | 86.5 | (57%-106%) | | |
| 4-Nitrophenol | 50.0 | | | 15.6 | ug/L | | 31.2 | (19%-56%) | | |
| Acenaphthene | 50.0 | | | 38.3 | ug/L | | 76.6 | (47%-101%) | | |
| Acenaphthylene | 50.0 | | | 39.8 | ug/L | | 79.6 | (58%-99%) | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 932173 | | | | | | | | | | |
| Anthracene | 50.0 | | | 39.3 | ug/L | | 78.6 | (55%-106%) | | |
| Benzo(a)anthracene | 50.0 | | | 40.5 | ug/L | | 81.1 | (56%-105%) | AMY | 12/15/09 12:23 |
| Benzo(a)pyrene | 50.0 | | | 42.3 | ug/L | | 84.5 | (58%-111%) | | |
| Benzo(b)fluoranthene | 50.0 | | | 41.3 | ug/L | | 82.5 | (53%-114%) | | |
| Benzo(ghi)perylene | 50.0 | | | 33.2 | ug/L | | 66.5 | (41%-125%) | | |
| Benzo(k)fluoranthene | 50.0 | | | 47.3 | ug/L | | 94.6 | (55%-116%) | | |
| Butylbenzylphthalate | 50.0 | | | 48.5 | ug/L | | 97 | (55%-122%) | | |
| Carbazole | 50.0 | | | 38.3 | ug/L | | 76.6 | (52%-124%) | | |
| Chrysene | 50.0 | | | 41.7 | ug/L | | 83.4 | (56%-105%) | | |
| Di-n-butylphthalate | 50.0 | | | 48.4 | ug/L | | 96.9 | (58%-119%) | | |
| Di-n-octylphthalate | 50.0 | | | 49.6 | ug/L | | 99.2 | (41%-136%) | | |
| Dibenzo(a,h)anthracene | 50.0 | | | 33.3 | ug/L | | 66.5 | (44%-126%) | | |
| Dibenzofuran | 50.0 | | | 47.0 | ug/L | | 93.9 | (54%-108%) | | |
| Diethylphthalate | 50.0 | | | 46.7 | ug/L | | 93.4 | (60%-112%) | | |
| Dimethylphthalate | 50.0 | | | 43.2 | ug/L | | 86.3 | (59%-107%) | | |
| Diphenylamine | 50.0 | | | 41.2 | ug/L | | 82.4 | (55%-113%) | | |
| Fluoranthene | 50.0 | | | 43.7 | ug/L | | 87.5 | (57%-114%) | | |
| Fluorene | 50.0 | | | 39.4 | ug/L | | 78.8 | (52%-106%) | | |
| Hexachlorobenzene | 50.0 | | | 44.1 | ug/L | | 88.2 | (53%-115%) | | |
| Hexachlorobutadiene | 50.0 | | | 32.5 | ug/L | | 65.1 | (33%-98%) | | |
| Hexachlorocyclopentadiene | 50.0 | | | 42.1 | ug/L | | 84.2 | (10%-128%) | | |
| Hexachloroethane | 50.0 | | | 29.3 | ug/L | | 58.5 | (35%-92%) | | |
| Indeno(1,2,3-cd)pyrene | 50.0 | | | 33.0 | ug/L | | 66 | (45%-124%) | | |
| Isophorone | 50.0 | | | 47.5 | ug/L | | 95.1 | (52%-113%) | | |
| N-Nitrosodipropylamine | 50.0 | | | 38.6 | ug/L | | 77.2 | (44%-118%) | | |
| Naphthalene | 50.0 | | | 34.3 | ug/L | | 68.6 | (40%-93%) | | |
| Nitrobenzene | 50.0 | | | 43.8 | ug/L | | 87.6 | (48%-112%) | | |
| Pentachlorophenol | 50.0 | | | 43.6 | ug/L | | 87.2 | (44%-121%) | | |
| Phenanthrene | 50.0 | | | 39.4 | ug/L | | 78.7 | (54%-105%) | | |
| Phenol | 50.0 | | | 16.5 | ug/L | | 33 | (21%-45%) | | |
| Pyrene | 50.0 | | | 45.5 | ug/L | | 90.9 | (49%-115%) | | |
| bis(2-Chloroethoxy)methane | 50.0 | | | 40.7 | ug/L | | 81.5 | (54%-107%) | | |
| bis(2-Chloroethyl) ether | 50.0 | | | 39.7 | ug/L | | 79.5 | (46%-106%) | | |
| bis(2-Chloroisopropyl)ether | 50.0 | | | 38.1 | ug/L | | 76.1 | (44%-115%) | | |
| bis(2-Ethylhexyl)phthalate | 50.0 | | | 44.3 | ug/L | | 88.5 | (55%-124%) | | |
| m,p-Cresols | 50.0 | | | 33.2 | ug/L | | 66.3 | (38%-96%) | | |
| m-Nitroaniline | 50.0 | | | 36.4 | ug/L | | 72.8 | (58%-125%) | | |
| o-Cresol | 50.0 | | | 35.3 | ug/L | | 70.6 | (41%-94%) | | |
| o-Nitroaniline | 50.0 | | | 39.8 | ug/L | | 79.5 | (50%-120%) | | |
| p-Nitroaniline | 50.0 | | | 33.5 | ug/L | | 67 | (48%-135%) | | |
| **2,4,6-Tribromophenol | 100 | | | 104 | ug/L | | 104 | (39%-115%) | | |
| | | | | 46.2 | | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 932173 | | | | | | | | | | |
| **2-Fluorobiphenyl | 50.0 | | | | ug/L | | 92.3 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 51.0 | ug/L | | 51 | (25%-92%) | AMY | 12/15/09 12:23 |
| **Nitrobenzene-d5 | 50.0 | | | 44.8 | ug/L | | 89.6 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 32.3 | ug/L | | 32.3 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 52.6 | ug/L | | 105 | (46%-130%) | | |
| QC1201993992 LCSD | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 50.0 | | | 32.9 | ug/L | 0.888 | 65.8 | (0%-20%) | | 12/15/09 12:47 |
| 1,2-Dichlorobenzene | 50.0 | | | 31.7 | ug/L | 2.21 | 63.3 | (0%-20%) | | |
| 1,3-Dichlorobenzene | 50.0 | | | 29.7 | ug/L | 1.55 | 59.3 | (0%-20%) | | |
| 1,4-Dichlorobenzene | 50.0 | | | 30.1 | ug/L | 1.91 | 60.2 | (0%-20%) | | |
| 2,4,5-Trichlorophenol | 50.0 | | | 49.3 | ug/L | 5.19 | 98.5 | (0%-20%) | | |
| 2,4,6-Trichlorophenol | 50.0 | | | 46.6 | ug/L | 3.19 | 93.2 | (0%-20%) | | |
| 2,4-Dichlorophenol | 50.0 | | | 39.7 | ug/L | 3.58 | 79.5 | (0%-20%) | | |
| 2,4-Dimethylphenol | 50.0 | | | 40.1 | ug/L | 3.46 | 80.3 | (0%-20%) | | |
| 2,4-Dinitrophenol | 50.0 | | | 40.8 | ug/L | 13.1 | 81.6 | (0%-20%) | | |
| 2,4-Dinitrotoluene | 50.0 | | | 39.5 | ug/L | 5.63 | 79 | (0%-20%) | | |
| 2,6-Dinitrotoluene | 50.0 | | | 40.1 | ug/L | 5.63 | 80.3 | (0%-20%) | | |
| 2-Chloronaphthalene | 50.0 | | | 34.6 | ug/L | 1.05 | 69.2 | (0%-20%) | | |
| 2-Chlorophenol | 50.0 | | | 36.3 | ug/L | 1.06 | 72.5 | (0%-20%) | | |
| 2-Methyl-4,6-dinitrophenol | 50.0 | | | 38.2 | ug/L | 9.41 | 76.4 | (0%-20%) | | |
| 2-Methylnaphthalene | 50.0 | | | 35.2 | ug/L | 1.16 | 70.5 | (0%-20%) | | |
| 2-Nitrophenol | 50.0 | | | 38.6 | ug/L | 2.42 | 77.1 | (0%-20%) | | |
| 3,3'-Dichlorobenzidine | 50.0 | | | 38.8 | ug/L | 2.73 | 77.5 | (0%-20%) | | |
| 4-Bromophenylphenylether | 50.0 | | | 49.4 | ug/L | 1.38 | 98.8 | (0%-20%) | | |
| 4-Chloro-3-methylphenol | 50.0 | | | 42.3 | ug/L | 2.46 | 84.6 | (0%-20%) | | |
| 4-Chloroaniline | 50.0 | | | 43.3 | ug/L | 3.00 | 86.6 | (0%-20%) | | |
| 4-Chlorophenylphenylether | 50.0 | | | 44.2 | ug/L | 2.27 | 88.4 | (0%-20%) | | |
| 4-Nitrophenol | 50.0 | | | 16.8 | ug/L | 7.84 | 33.7 | (0%-20%) | | |
| Acenaphthene | 50.0 | | | 38.8 | ug/L | 1.27 | 77.6 | (0%-20%) | | |
| Acenaphthylene | 50.0 | | | 40.4 | ug/L | 1.46 | 80.8 | (0%-20%) | | |
| Anthracene | 50.0 | | | 40.8 | ug/L | 3.84 | 81.7 | (0%-20%) | | |
| Benzo(a)anthracene | 50.0 | | | 41.8 | ug/L | 3.09 | 83.6 | (0%-20%) | | |
| Benzo(a)pyrene | 50.0 | | | 44.9 | ug/L | 6.05 | 89.8 | (0%-20%) | | |
| Benzo(b)fluoranthene | 50.0 | | | 42.6 | ug/L | 3.20 | 85.2 | (0%-20%) | | |
| Benzo(ghi)perylene | 50.0 | | | 33.8 | ug/L | 1.55 | 67.5 | (0%-20%) | | |
| Benzo(k)fluoranthene | 50.0 | | | 50.4 | ug/L | 6.30 | 101 | (0%-20%) | | |
| Butylbenzylphthalate | 50.0 | | | 48.8 | ug/L | 0.697 | 97.7 | (0%-20%) | | |
| Carbazole | 50.0 | | | 38.8 | ug/L | 1.21 | 77.5 | (0%-20%) | | |
| Chrysene | 50.0 | | | 44.1 | ug/L | 5.47 | 88.1 | (0%-20%) | | |
| Di-n-butylphthalate | 50.0 | | | 48.5 | ug/L | 0.166 | 97 | (0%-20%) | | |
| Di-n-octylphthalate | 50.0 | | | 51.1 | ug/L | 3.05 | 102 | (0%-20%) | | |
| Dibenzo(a,h)anthracene | 50.0 | | | 34.5 | ug/L | 3.59 | 69 | (0%-20%) | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 932173 | | | | | | | | | | |
| Dibenzofuran | 50.0 | | | 48.1 | ug/L | 2.46 | 96.3 | (0%-20%) | | |
| Diethylphthalate | 50.0 | | | 49.1 | ug/L | 4.91 | 98.1 | (0%-20%) | AMY | 12/15/09 12:47 |
| Dimethylphthalate | 50.0 | | | 45.2 | ug/L | 4.56 | 90.4 | (0%-20%) | | |
| Diphenylamine | 50.0 | | | 42.0 | ug/L | 1.86 | 84 | (0%-20%) | | |
| Fluoranthene | 50.0 | | | 45.2 | ug/L | 3.21 | 90.3 | (0%-20%) | | |
| Fluorene | 50.0 | | | 40.8 | ug/L | 3.48 | 81.6 | (0%-20%) | | |
| Hexachlorobenzene | 50.0 | | | 44.3 | ug/L | 0.393 | 88.6 | (0%-20%) | | |
| Hexachlorobutadiene | 50.0 | | | 33.4 | ug/L | 2.62 | 66.8 | (0%-20%) | | |
| Hexachlorocyclopentadiene | 50.0 | | | 44.4 | ug/L | 5.18 | 88.7 | (0%-20%) | | |
| Hexachloroethane | 50.0 | | | 30.3 | ug/L | 3.51 | 60.6 | (0%-20%) | | |
| Indeno(1,2,3-cd)pyrene | 50.0 | | | 34.4 | ug/L | 4.17 | 68.8 | (0%-20%) | | |
| Isophorone | 50.0 | | | 48.6 | ug/L | 2.18 | 97.2 | (0%-20%) | | |
| N-Nitrosodipropylamine | 50.0 | | | 39.6 | ug/L | 2.68 | 79.3 | (0%-20%) | | |
| Naphthalene | 50.0 | | | 34.7 | ug/L | 1.00 | 69.3 | (0%-20%) | | |
| Nitrobenzene | 50.0 | | | 44.2 | ug/L | 0.891 | 88.4 | (0%-20%) | | |
| Pentachlorophenol | 50.0 | | | 46.0 | ug/L | 5.45 | 92 | (0%-20%) | | |
| Phenanthrene | 50.0 | | | 40.9 | ug/L | 3.82 | 81.8 | (0%-20%) | | |
| Phenol | 50.0 | | | 16.6 | ug/L | 0.530 | 33.2 | (0%-20%) | | |
| Pyrene | 50.0 | | | 47.6 | ug/L | 4.66 | 95.3 | (0%-20%) | | |
| bis(2-Chloroethoxy)methane | 50.0 | | | 41.8 | ug/L | 2.48 | 83.5 | (0%-20%) | | |
| bis(2-Chloroethyl) ether | 50.0 | | | 40.6 | ug/L | 2.15 | 81.2 | (0%-20%) | | |
| bis(2-Chloroisopropyl)ether | 50.0 | | | 38.6 | ug/L | 1.48 | 77.3 | (0%-20%) | | |
| bis(2-Ethylhexyl)phthalate | 50.0 | | | 44.0 | ug/L | 0.548 | 88.1 | (0%-20%) | | |
| m,p-Cresols | 50.0 | | | 33.2 | ug/L | 0.0564 | 66.3 | (0%-20%) | | |
| m-Nitroaniline | 50.0 | | | 39.7 | ug/L | 8.65 | 79.4 | (0%-20%) | | |
| o-Cresol | 50.0 | | | 34.5 | ug/L | 2.16 | 69.1 | (0%-20%) | | |
| o-Nitroaniline | 50.0 | | | 42.0 | ug/L | 5.54 | 84.1 | (0%-20%) | | |
| p-Nitroaniline | 50.0 | | | 36.5 | ug/L | 8.71 | 73.1 | (0%-20%) | | |
| **2,4,6-Tribromophenol | 100 | | | 107 | ug/L | | 107 | (39%-115%) | | |
| **2-Fluorobiphenyl | 50.0 | | | 46.6 | ug/L | | 93.3 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 51.2 | ug/L | | 51.2 | (25%-92%) | | |
| **Nitrobenzene-d5 | 50.0 | | | 45.6 | ug/L | | 91.1 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 32.3 | ug/L | | 32.3 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 53.7 | ug/L | | 107 | (46%-130%) | | |
| QC1201993983 MB | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | | | U | ND | ug/L | | | | | 12/15/09 12:00 |
| 1,2-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 1,3-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 1,4-Dichlorobenzene | | | U | ND | ug/L | | | | | |
| 2,4,5-Trichlorophenol | | | U | ND | ug/L | | | | | |
| 2,4,6-Trichlorophenol | | | U | ND | ug/L | | | | | |
| 2,4-Dichlorophenol | | | U | ND | ug/L | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | | |
| Batch 932173 | | | | | | | | | | | |
| 2,4-Dimethylphenol | | | U | ND | ug/L | | | | | | |
| 2,4-Dinitrophenol | | | U | ND | ug/L | | | | AMY | 12/15/09 | 12:00 |
| 2,4-Dinitrotoluene | | | U | ND | ug/L | | | | | | |
| 2,6-Dinitrotoluene | | | U | ND | ug/L | | | | | | |
| 2-Chloronaphthalene | | | U | ND | ug/L | | | | | | |
| 2-Chlorophenol | | | U | ND | ug/L | | | | | | |
| 2-Methyl-4,6-dinitrophenol | | | U | ND | ug/L | | | | | | |
| 2-Methylnaphthalene | | | U | ND | ug/L | | | | | | |
| 2-Nitrophenol | | | U | ND | ug/L | | | | | | |
| 3,3'-Dichlorobenzidine | | | U | ND | ug/L | | | | | | |
| 4-Bromophenylphenylether | | | U | ND | ug/L | | | | | | |
| 4-Chloro-3-methylphenol | | | U | ND | ug/L | | | | | | |
| 4-Chloroaniline | | | U | ND | ug/L | | | | | | |
| 4-Chlorophenylphenylether | | | U | ND | ug/L | | | | | | |
| 4-Nitrophenol | | | U | ND | ug/L | | | | | | |
| Acenaphthene | | | U | ND | ug/L | | | | | | |
| Acenaphthylene | | | U | ND | ug/L | | | | | | |
| Anthracene | | | U | ND | ug/L | | | | | | |
| Benzo(a)anthracene | | | U | ND | ug/L | | | | | | |
| Benzo(a)pyrene | | | U | ND | ug/L | | | | | | |
| Benzo(b)fluoranthene | | | U | ND | ug/L | | | | | | |
| Benzo(ghi)perylene | | | U | ND | ug/L | | | | | | |
| Benzo(k)fluoranthene | | | U | ND | ug/L | | | | | | |
| Butylbenzylphthalate | | | U | ND | ug/L | | | | | | |
| Carbazole | | | U | ND | ug/L | | | | | | |
| Chrysene | | | U | ND | ug/L | | | | | | |
| Di-n-butylphthalate | | | U | ND | ug/L | | | | | | |
| Di-n-octylphthalate | | | U | ND | ug/L | | | | | | |
| Dibenzo(a,h)anthracene | | | U | ND | ug/L | | | | | | |
| Dibenzofuran | | | U | ND | ug/L | | | | | | |
| Diethylphthalate | | | U | ND | ug/L | | | | | | |
| Dimethylphthalate | | | U | ND | ug/L | | | | | | |
| Diphenylamine | | | U | ND | ug/L | | | | | | |
| Fluoranthene | | | U | ND | ug/L | | | | | | |
| Fluorene | | | U | ND | ug/L | | | | | | |
| Hexachlorobenzene | | | U | ND | ug/L | | | | | | |
| Hexachlorobutadiene | | | U | ND | ug/L | | | | | | |
| Hexachlorocyclopentadiene | | | U | ND | ug/L | | | | | | |
| Hexachloroethane | | | U | ND | ug/L | | | | | | |
| Indeno(1,2,3-cd)pyrene | | | U | ND | ug/L | | | | | | |
| Isophorone | | | U | ND | ug/L | | | | | | |
| | | | U | ND | | | | | | | |

## QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile-GC/MS** | | | | | | | | | | |
| Batch 932173 | | | | | | | | | | |
| N-Nitrosodipropylamine | | | | | ug/L | | | | | |
| Naphthalene | | | U | ND | ug/L | | | | AMY | 12/15/09 12:00 |
| Nitrobenzene | | | U | ND | ug/L | | | | | |
| Pentachlorophenol | | | U | ND | ug/L | | | | | |
| Phenanthrene | | | U | ND | ug/L | | | | | |
| Phenol | | | U | ND | ug/L | | | | | |
| Pyrene | | | U | ND | ug/L | | | | | |
| bis(2-Chloroethoxy)methane | | | U | ND | ug/L | | | | | |
| bis(2-Chloroethyl) ether | | | U | ND | ug/L | | | | | |
| bis(2-Chloroisopropyl)ether | | | U | ND | ug/L | | | | | |
| bis(2-Ethylhexyl)phthalate | | | U | ND | ug/L | | | | | |
| m,p-Cresols | | | U | ND | ug/L | | | | | |
| m-Nitroaniline | | | U | ND | ug/L | | | | | |
| o-Cresol | | | U | ND | ug/L | | | | | |
| o-Nitroaniline | | | U | ND | ug/L | | | | | |
| p-Nitroaniline | | | U | ND | ug/L | | | | | |
| **2,4,6-Tribromophenol | 100 | | | 106 | ug/L | | 106 | (39%-115%) | | |
| **2-Fluorobiphenyl | 50.0 | | | 47.8 | ug/L | | 95.6 | (35%-100%) | | |
| **2-Fluorophenol | 100 | | | 58.0 | ug/L | | 58 | (25%-92%) | | |
| **Nitrobenzene-d5 | 50.0 | | | 50.5 | ug/L | | 101 | (40%-112%) | | |
| **Phenol-d5 | 100 | | | 39.9 | ug/L | | 39.9 | (15%-73%) | | |
| **p-Terphenyl-d14 | 50.0 | | | 57.1 | ug/L | | 114 | (46%-130%) | | |

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the Decision Level
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- Z The percent difference is greater than 70%.
- d The 2:1 depletion requirement was not met for this sample
- h Prep holding time exceeded

# QC Summary

**Workorder:** 241350



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|---|

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.