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Submittal of Mixed Waste Landfill Annual Long-Term Monitoring & Maintenance Report, April 2018-March 2019 for Sandia National Laboratories/New Mexico, EPA ID Number NM5890110518, June 2019

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**Sandia
National
Laboratories**

**MIXED WASTE LANDFILL
ANNUAL LONG-TERM MONITORING & MAINTENANCE REPORT
APRIL 2018 – MARCH 2019**

**SANDIA NATIONAL LABORATORIES, NEW MEXICO
LONG-TERM STEWARDSHIP**

JUNE 2019



**U.S. DEPARTMENT OF
ENERGY**



**United States Department of Energy
Sandia Field Office**

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.

**MIXED WASTE LANDFILL ANNUAL
LONG-TERM MONITORING & MAINTENANCE REPORT
APRIL 2018 – MARCH 2019**

Facility: Mixed Waste Landfill

Location: Sandia National Laboratories
Albuquerque, New Mexico

EPA ID No.: NM5890110518

Permit Basis: Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan,
submitted March 2012, effective January 8, 2014

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EXECUTIVE SUMMARY

The Mixed Waste Landfill (MWL) at Sandia National Laboratories, New Mexico (SNL/NM) is a solid waste management unit that underwent corrective action in accordance with Title 20, Chapter 4, Part 1 of the New Mexico Administrative Code (20.4.1.600 NMAC), incorporating Title 40, Code of Federal Regulations Part 264.101 (40 CFR 264.101); regulatory criteria found in the New Mexico Secretary of the Environment's Final Order *In the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill* Number (No.) HWB 04-11(M) (NMED May 2005); the Compliance Order on Consent (NMED April 2004); and the Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, Environmental Protection Agency (EPA) Identification No. NM5890110518 (NMED January 2015, with all approved modifications).

As of March 13, 2016, the February 2016 Final Order *In the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID No. NM5890110518, to Determine Corrective Action Complete with Controls at the Mixed Waste Landfill*, No. HWB 15-18 (P) (NMED February 2016) became effective, granting the Class 3 Permit Modification to reflect that the MWL is Corrective Action Complete with Controls. The MWL Long-Term Monitoring and Maintenance Plan (LTMMP) (SNL/NM March 2012), which became effective on January 8, 2014 (Blaine January 2014), defines all monitoring, inspection, maintenance/repair, and reporting requirements for the MWL. This sixth MWL Annual Long-Term Monitoring & Maintenance Report documents monitoring, inspection, maintenance, and repair activities conducted at the MWL during the April 1, 2018 through March 31, 2019 reporting period.

Sampling activities for this reporting period included two semiannual monitoring events each for groundwater, radon, and soil vapor. Annual soil-moisture monitoring was conducted in May 2018, annual tritium surface soil sampling was conducted in August 2018, and annual biota sampling (metals and radionuclides) was conducted in September 2018. All monitoring activities were conducted in accordance with LTMMP requirements and no monitoring results exceeded LTMMP trigger levels. All monitoring results were consistent with historical MWL monitoring data.

PCE has been detected twice in historical groundwater samples from monitoring well MWL-MW8 during the ten semiannual groundwater monitoring events conducted under the LTMMP since 2014 (April 2014 and April 2016 groundwater sample results). Although not required, an investigation was initiated during the reporting period to better understand the cause of the spurious detections. The best practice passive soil-vapor investigation of groundwater monitoring well MWL-MW8 confirms volatile organic compound soil vapor is diffusing into the well. Although the vapor concentrations measured inside the well are very low, they are the likely cause of the historical detections. The low frequency and concentrations of these detections are not consistent with contamination in the Regional Aquifer. Passive venting soil-vapor devices (i.e., BaroBalls™) were installed on all groundwater monitoring wells in February 2015 (SNL/NM June 2015) as a best practice to minimize the downward movement of soil vapor that enters the monitoring wells. Ongoing soil-vapor and groundwater monitoring will provide the empirical data necessary to monitor and evaluate the situation. Based upon both conservative fate and transport modeling (SNL/NM January 2019) and ongoing monitoring results, the volatile organic compounds soil-vapor plume does not pose a threat to groundwater.

Inspections of the MWL final cover system, storm-water diversion structures, compliance monitoring systems, and security fence were performed in accordance with LTMMMP requirements. Required maintenance and repairs were minor with their performance generally being conducted during inspections.

The Evapotranspirative (ET) Cover continues to meet successful revegetation criteria and is in good condition with even coverage of mature, native perennial grasses. Minor maintenance was performed during the reporting period as a best practice for ET Cover vegetation to promote the growth and health of the desired native grass species by reducing competition with weedy species for limited moisture and nutrients.

Regulatory activities during the reporting period included submittal of the first MWL Five-Year Report (SNL/NM January 2019), submittal of an updated reference document cited in the LTMMMP (Harrell January 2019), and the MWL Landfill Annual Long-Term Monitoring & Maintenance Report, April 2017-March 2018 (SNL/NM June 2018). There were no LTMMMP modifications during this reporting period.

All LTMMMP requirements have been met for the April 2018 through March 2019 reporting period. Based upon monitoring, inspection, and maintenance results, the ET Cover and monitoring systems are functioning as designed and site conditions remain protective of human health and the environment.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
LIST OF FIGURES	vii
LIST OF TABLES.....	ix
LIST OF ANNEXES	x
ACRONYMS AND ABBREVIATIONS	xi
 1.0 INTRODUCTION.....	 1-1
1.1 Purpose and Scope	1-4
1.2 Report Organization.....	1-4
 2.0 MONITORING AND INSPECTION REQUIREMENTS	 2-1
2.1 Monitoring Requirements	2-1
2.2 Inspection, Maintenance, and Repair Requirements	2-1
2.2.1 ET Cover	2-6
2.2.2 ET Cover Biology Inspection	2-6
2.2.3 ET Cover Surface and Physical Controls Inspection.....	2-10
2.2.4 Monitoring Networks and Sampling Equipment	2-10
 3.0 RADON MONITORING RESULTS.....	 3-1
3.1 Radon Sampling Field Activities	3-1
3.1.1 Radon Monitoring Detector Deployment and Collection.....	3-4
3.1.2 Field Quality Control	3-4
3.1.3 Waste Management	3-4
3.2 Laboratory Results.....	3-4
3.2.1 Environmental Sample Results.....	3-4
3.2.2 Field Quality Control Sample Results	3-5
3.2.3 Data Quality	3-5
3.2.4 Variances	3-5
3.3 Data Evaluation and Monitoring Trigger Level.....	3-5
 4.0 TRITIUM SURFACE SOIL MONITORING RESULTS	 4-1
4.1 Tritium Surface Soil Monitoring Field Activities.....	4-1
4.1.1 Field Quality Control	4-1
4.1.2 Waste Management	4-1
4.2 Laboratory Results.....	4-3

TABLE OF CONTENTS (Continued)

4.2.1	Environmental Sample Results.....	4-3
4.2.2	Field Quality Control Sample Results	4-3
4.2.3	Laboratory Quality Control and Data Quality	4-3
4.2.4	Variances	4-3
4.3	Data Evaluation and Monitoring Trigger Level.....	4-4
5.0	SOIL-VAPOR MONITORING RESULTS	5-1
5.1	Soil-Vapor Monitoring Field Activities	5-1
5.1.1	Well Purging.....	5-3
5.1.2	Field Quality Control	5-3
5.1.3	Waste Management	5-3
5.2	Laboratory Results and Trigger Level Evaluation	5-3
5.2.1	Environmental Sample Results.....	5-4
5.2.2	Field Quality Control Sample Results	5-6
5.2.3	Laboratory Quality Control and Data Quality	5-8
5.2.4	Variances	5-9
5.3	Historical Data Evaluation	5-9
6.0	SOIL-MOISTURE MONITORING RESULTS	6-1
6.1	Soil-Moisture Monitoring Field Activities	6-1
6.1.1	Field Quality Control	6-1
6.1.2	Waste Management	6-1
6.2	Monitoring Results	6-3
6.2.1	Variances	6-3
6.3	Data Evaluation and Monitoring Trigger Level.....	6-3
7.0	GROUNDWATER MONITORING RESULTS	7-1
7.1	Environmental Sampling Field Activities.....	7-1
7.1.1	Well Purging.....	7-1
7.1.2	Field Quality Control	7-3
7.1.3	Waste Management	7-4
7.2	Laboratory Results.....	7-4

TABLE OF CONTENTS (Continued)

7.2.1	Environmental Sample Results.....	7-4
7.2.2	Field Quality Control Sample Results	7-18
7.2.3	Laboratory Quality Control and Data Quality	7-19
7.2.4	Variances and Non-Conformances.....	7-20
7.3	Hydrogeologic Assessment.....	7-20
7.4	Monitoring Well MWL-MW8 Soil-Vapor Investigation	7-22
8.0	BIOTA MONITORING RESULTS	8-1
8.1	Biota Monitoring Field Activities	8-1
8.1.1	Field Quality Control.....	8-1
8.1.2	Waste Management	8-1
8.2	Laboratory Results.....	8-3
8.2.1	Environmental Sample Results.....	8-3
8.2.2	Field Quality Control Sample Results	8-3
8.2.3	Laboratory Quality Control Data Quality	8-7
8.2.4	Variances	8-8
8.3	Data Evaluation and Monitoring Trigger Level.....	8-8
9.0	INSPECTION, MAINTENANCE, AND REPAIR RESULTS.....	9-1
9.1	Final Cover System.....	9-1
9.1.1	Biology Inspection	9-1
9.1.2	ET Cover System/Surface Inspection	9-2
9.2	Storm-Water Diversion Structure Inspection	9-2
9.3	Soil-Vapor Monitoring Network Inspection.....	9-3
9.4	Soil-Moisture Monitoring Network Inspection	9-3
9.5	Groundwater Monitoring Well Network Inspection.....	9-3
9.6	Security Fence Inspection.....	9-3
9.7	ET Cover Maintenance and Supplemental Watering.....	9-4
10.0	REGULATORY ACTIVITIES	10-1
10.1	MWL Regulatory Submittals.....	10-1
10.2	MWL LTMMMP Modifications	10-1
11.0	SUMMARY AND CONCLUSIONS	11-1
11.1	Monitoring Activities	11-1
11.2	Inspections/Maintenance/Repairs Activities	11-2

TABLE OF CONTENTS (Concluded)

11.3	Regulatory Activities	11-3
11.4	Conclusions	11-3
12.0	REFERENCES.....	12-1

LIST OF FIGURES

Figure		Page
1-1	Location of the Mixed Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque	1-2
1-2	Location of the Mixed Waste Landfill within Technical Area III	1-3
2-1	Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover Layers	2-7
2-2	Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover and How it Works	2-8
2-3	Mixed Waste Landfill Engineered Storm-Water Drainage Swale	2-9
3-1	Mixed Waste Landfill Radon Detector Locations	3-2
4-1	Mixed Waste Landfill Tritium Surface Soil Sampling Locations	4-2
5-1	Mixed Waste Landfill Soil-Vapor Monitoring Well Locations	5-2
5-2	PCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports	5-13
5-3	PCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports	5-14
5-4	PCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports	5-15
5-5	PCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports	5-16
5-6	TCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports	5-17
5-7	TCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports	5-18
5-8	TCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports	5-19
5-9	TCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports	5-20

LIST OF FIGURES (Concluded)

Figure		Page
5-10	Total VOCs Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports.....	5-21
5-11	Total VOCs Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports.....	5-22
5-12	Total VOCs Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports.....	5-23
5-13	Total VOCs Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports.....	5-24
6-1	Mixed Waste Landfill Soil-Moisture Monitoring Locations.....	6-2
6-2	Mixed Waste Landfill MWL-VZ-1 Soil-Moisture Monitoring Results.....	6-4
6-3	Mixed Waste Landfill MWL-VZ-2 Soil-Moisture Monitoring Results.....	6-5
6-4	Mixed Waste Landfill MWL-VZ-3 Soil-Moisture Monitoring Results.....	6-6
7-1	Mixed Waste Landfill Groundwater Monitoring Well Locations.....	7-2
7-2	Nickel Concentrations vs. Time, Mixed Waste Landfill Groundwater Monitoring Wells.....	7-15
7-3	Uranium Concentrations vs. Time, Mixed Waste Landfill Groundwater Monitoring Wells.....	7-16
7-4	Gross Alpha Activity vs. Time, Mixed Waste Landfill Groundwater Monitoring Wells.....	7-17
7-5	Groundwater Level Elevations at Mixed Waste Landfill Groundwater Monitoring Wells.....	7-21
7-6	Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2018.....	7-23
7-7	Passive Volatile Organic Compound Sampler Deployment in Groundwater Monitoring Well MWL-MW8, April 24 – 27, 2018.....	7-25
8-1	Mixed Waste Landfill Biota Sampling Locations.....	8-2

LIST OF TABLES

Table		Page
2-1	Mixed Waste Landfill Monitoring Parameters, Frequencies, and Methods.....	2-2
2-2	Mixed Waste Landfill Inspection, Maintenance, and Repair Requirements.....	2-4
3-1	Summary of Radon Results, Mixed Waste Landfill Air Monitoring, Calendar Year 2018	3-3
4-1	Summary of Tritium Results (EPA Method 906.0), Mixed Waste Landfill Surface Soil Monitoring, August 2018	4-4
5-1	Summary of Detected VOCs (EPA Method TO-15), Mixed Waste Landfill Soil-Vapor Monitoring, April 2018	5-27
5-2	Summary of Detected VOCs (EPA Method TO-15), Mixed Waste Landfill Soil-Vapor Monitoring, October 2018	5-38
5-3	Summary of Duplicate Samples, Mixed Waste Landfill Soil-Vapor Monitoring, April and October 2018	5-7
5-4	Summary of Historical PCE Concentrations, Mixed Waste Landfill Soil-Vapor Monitoring.....	5-10
5-5	Summary of Historical TCE Concentrations, Mixed Waste Landfill Soil-Vapor Monitoring	5-11
5-6	Summary of Historical Total VOCs Concentrations, Mixed Waste Landfill Soil-Vapor Monitoring.....	5-12
7-1	Summary of Detected VOCs (EPA Method 8260B), Mixed Waste Landfill Groundwater Monitoring, April-May and October 2018.....	7-6
7-2	Summary of Method Detection Limits for VOCs (EPA Method 8260B), Mixed Waste Landfill Groundwater Monitoring, April-May and October 2018	7-7
7-3	Summary of Cadmium, Chromium, Nickel, and Uranium Results (EPA Method 6020), Mixed Waste Landfill Groundwater Monitoring, April-May and October 2018.....	7-8
7-4	Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results, Mixed Waste Landfill Groundwater Monitoring, April-May and October 2018	7-10

LIST OF TABLES (Concluded)

Table		Page
7-5	Summary of Field Water Quality Measurements, Mixed Waste Landfill Groundwater Monitoring, April-May and October 2018.....	7-13
7-6	Summary of Duplicate Sample Results, Mixed Waste Landfill Groundwater Monitoring, April-May and October 2018	7-18
7-7	Summary of Results for Passive Vapor Samplers, Monitoring Well MWL-MW8, April 24-27, 2018.....	7-26
8-1	Summary of Metals Results (EPA Method 6020/7470), Mixed Waste Landfill Biota Monitoring, September 2018	8-4
8-2	Summary of Gamma Spectroscopy Results (EPA Method 901.1), Mixed Waste Landfill Biota Monitoring, September 2018	8-6
8-3	Summary of Duplicate Sample Results, Mixed Waste Landfill Biota Monitoring, September 2018.....	8-7
9-1	Inspection Frequency and Dates Performed, Mixed Waste Landfill, April 2018 – March 2019 Reporting Period.....	9-2
10-1	Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan Document Submittal History	10-2

LIST OF ANNEXES

Annex

Annex A	Mixed Waste Landfill Radon Monitoring Forms and Reports January – December 2018
Annex B	Mixed Waste Landfill Surface Soil Tritium and Biota Monitoring Forms and Reports April 2018 – March 2019
Annex C	Mixed Waste Landfill Soil-Vapor Monitoring Forms and Reports April 2018 – March 2019
Annex D	Mixed Waste Landfill Soil-Moisture Monitoring Forms April 2018 – March 2019
Annex E	Mixed Waste Landfill Groundwater Monitoring Forms and Reports April 2018 – March 2019
Annex F	Mixed Waste Landfill Inspection Forms April 2018 – March 2019
Annex G	Mixed Waste Landfill Biology Report April 2018 – March 2019

ACRONYMS AND ABBREVIATIONS

ABCWUA	Albuquerque Bernalillo County Water Utility Authority
AGI	Amplified Geochemical Imaging LLC
AOP	Administrative Operating Procedure
AR/COC	Analysis Request/Chain-of-Custody
CFR	Code of Federal Regulations
CWL	Chemical Waste Landfill
CY	calendar year
DI	deionized water
DOE	U.S. Department of Energy
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ERFO	Environmental Resources Field Office
ET	evapotranspirative
eV	electron volts
FLUTE™	Flexible Liner Underground Technology, Ltd.™
FOP	Field Operating Procedure
ft bgs	feet below ground surface
GEL	GEL Laboratories LLC
gpm	gallons per minute
HWB	Hazardous Waste Bureau
KAFB	Kirtland Air Force Base
LTMM	Long-Term Monitoring & Maintenance
LTMMMP	Long-Term Monitoring and Maintenance Plan
MDA	minimum detectable activity
MDL	method detection limit
mg/L	milligrams per liter
MWL	Mixed Waste Landfill
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
No.	number
PCE	tetrachloroethene
pCi/L	picocuries per liter
Permit	RCRA Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518
PID	photoionization detector
PPE	personal protective equipment
ppbv	parts per billion by volume
ppmv	parts per million by volume
QC	quality control
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SME	subject matter expert
SNL/NM	Sandia National Laboratories, New Mexico
TA	Technical Area

TCE	trichloroethene
VOC	volatile organic compound

1.0 INTRODUCTION

Sandia National Laboratories, New Mexico (SNL/NM) is a multimission laboratory owned by the U.S. Department of Energy (DOE)/National Nuclear Security Administration. SNL/NM is managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc. SNL/NM is located within the boundaries of Kirtland Air Force Base (KAFB), southeast of the City of Albuquerque in Bernalillo County, New Mexico (Figure 1-1). The Mixed Waste Landfill (MWL) is located 4 miles south of SNL/NM central facilities and 5 miles southeast of Albuquerque International Sunport, in the north-central portion of Technical Area (TA)-III (Figure 1-2).

The MWL disposal area comprises 2.6 acres. From March 1959 to December 1988, the MWL accepted low-level radioactive waste, hazardous waste, and mixed waste from SNL/NM research facilities and off-site DOE and U.S. Department of Defense generators. More specific information regarding the MWL inventory and past disposal practices is presented in the MWL Phase 2 Resource Conservation and Recovery Act (RCRA) Facility Investigation Report (Peace et al. September 2002) and the extensive MWL Administrative Record.

All monitoring, inspection, and maintenance/repair requirements are defined in the MWL Long-Term Monitoring and Maintenance Plan (LTMMMP) (SNL/NM March 2012) and have been met for the April 1, 2018 through March 31, 2019 reporting period. This sixth MWL Annual Long-Term Monitoring & Maintenance (LTMM) Report documents all activities and results as required by Section 4.8.1 of the LTMMMP. Based upon monitoring, inspection, and maintenance results, the MWL Evapotranspirative (ET) Cover and all monitoring systems are functioning as designed, and site conditions remain protective of human health and the environment. No monitoring trigger levels were exceeded. Industrial land use is being maintained for the MWL consistent with LTMMMP requirements.

The MWL is a solid waste management unit that underwent corrective action in accordance with the following regulatory criteria:

- New Mexico Environment Department (NMED) Final Order *In the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill*, Number (No.) HWB 04-11(M) (NMED May 2005)
- Compliance Order on Consent (NMED April 2004)
- SNL/NM RCRA Permit
 - Module IV of RCRA Permit No. NM5890110518 (EPA August 1993)
 - Facility Operating Permit U.S. Environmental Protection Agency (EPA) Identification No. NM5890110518 (Permit) (NMED January 2015)
- New Mexico Administrative Code (NMAC), Title 20, Chapter 4, Part 1, Section 600 (20.4.1.600 NMAC) incorporating Title 40 of the Code of Federal Regulations (CFR), Part 264.101 (40 CFR 264.101)

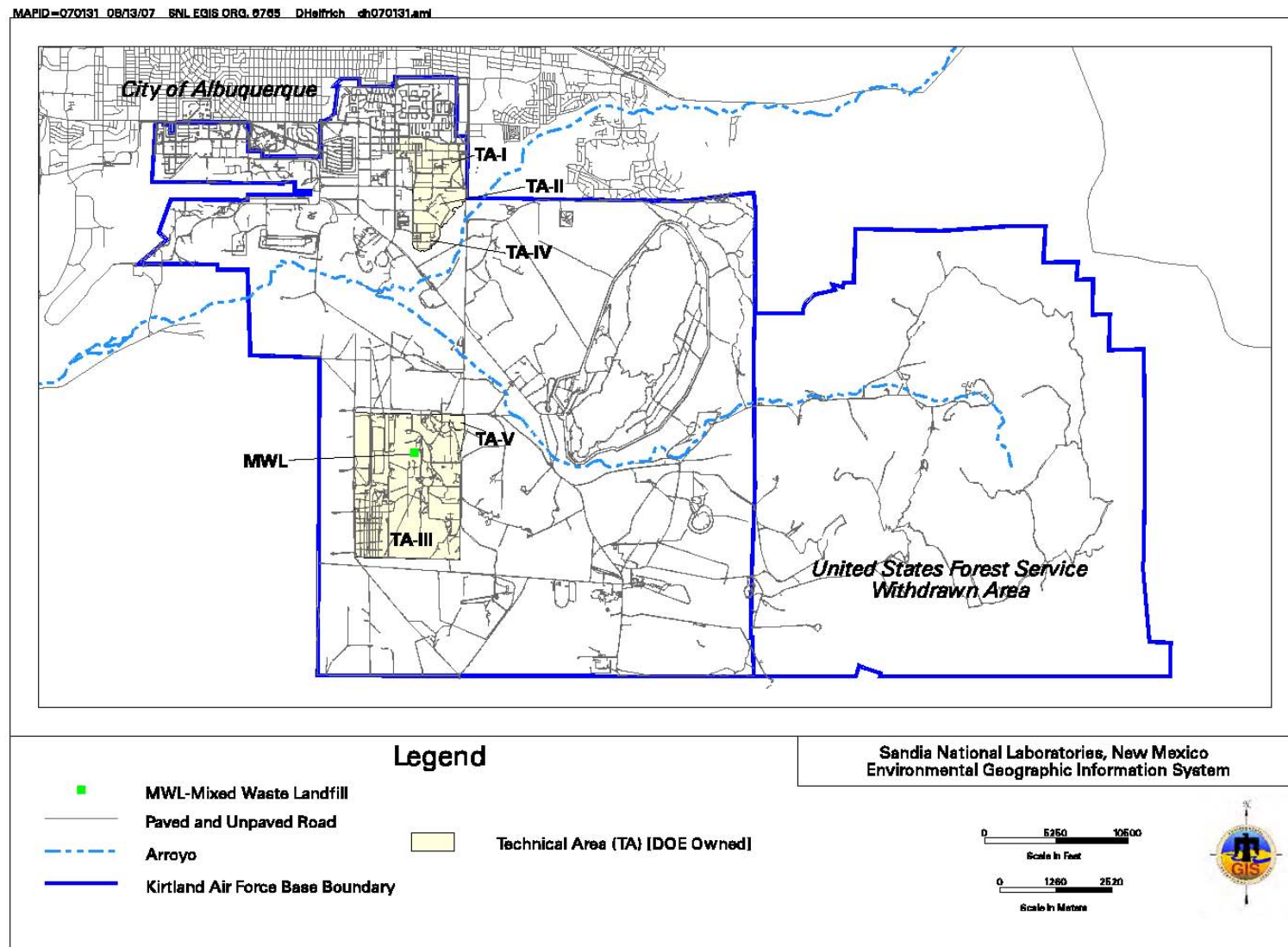


Figure 1-1
Location of the Mixed Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

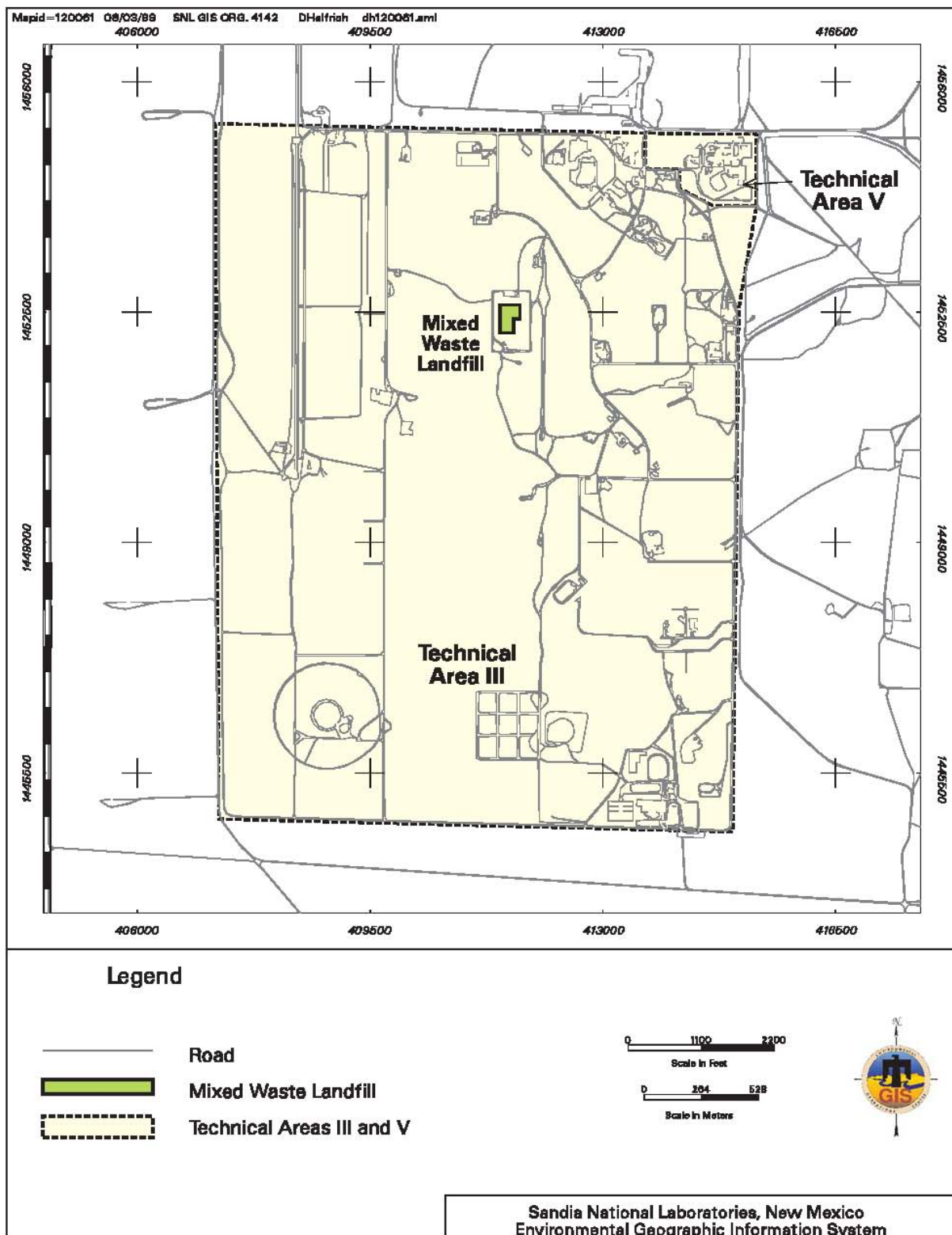


Figure 1-2
Location of the Mixed Waste Landfill within Technical Area III

On February 12, 2016, the NMED issued the Final Order *In the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID No. NM5890110518, to Determine Corrective Action Complete with Controls at the Mixed Waste Landfill*, No. HWB 15-18 (P) (NMED February 2016). As of March 13, 2016, the February 2016 Final Order became effective, granting the Class 3 Permit Modification to reflect that the MWL is Corrective Action Complete with Controls. All controls required for the MWL are defined in the LTMMMP that was approved by NMED on January 8, 2014 (Blaine January 2014) and is included in Attachment M of the Permit (Kieling February 2016). Long-term monitoring and maintenance is conducted in accordance with the Permit (NMED January 2015, with all approved modifications).

1.1 Purpose and Scope

The purpose and scope of this Annual LTMM Report is to document monitoring, inspection, maintenance, and repair activities conducted during the April 1, 2018 through March 31, 2019 annual reporting period as required by Section 4.8.1 of the LTMMMP.

1.2 Report Organization

This report is organized as follows:

- Chapter 1 presents background information, purpose and scope, and report organization.
- Chapter 2 presents LTMMMP monitoring and inspection requirements.
- Chapter 3 presents radon monitoring activities and results.
- Chapter 4 presents tritium surface soil monitoring activities and results.
- Chapter 5 presents vadose zone soil-vapor monitoring activities and results.
- Chapter 6 presents vadose zone soil-moisture monitoring activities and results.
- Chapter 7 presents groundwater monitoring activities and results.
- Chapter 8 presents biota monitoring activities and results.
- Chapter 9 presents inspection, maintenance, and repair activities and results.
- Chapter 10 summarizes regulatory activities.
- Chapter 11 presents a general summary and conclusions for the reporting period.
- Chapter 12 lists the references cited in this report.

Annexes to this report provide supporting information as follows:

- Annex A – Radon Monitoring Forms and Reports
- Annex B – Surface Soil Tritium and Biota Monitoring Forms and Reports
- Annex C – Soil-Vapor Monitoring Forms and Reports
- Annex D – Soil-Moisture Monitoring Forms
- Annex E – Groundwater Monitoring Forms and Reports
- Annex F – Inspection Forms
- Annex G – Biology Report

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2.0 MONITORING AND INSPECTION REQUIREMENTS

Monitoring, inspection, maintenance, and repair requirements are defined in Chapters 3 and 4 of the MWL LTMMP and are briefly summarized in this chapter. Monitoring requirements are described in Section 2.1 and resulting empirical data are evaluated to assess site conditions. Inspection requirements are described in Section 2.2 and include requirements to perform maintenance and/or repairs. These activities ensure the physical controls at the MWL are maintained, perform as designed, and provide the information needed to assess ET Cover performance and site conditions.

2.1 Monitoring Requirements

The primary objective of MWL monitoring activities is to ensure that the ET Cover and site conditions are protective of human health and the environment. Monitoring activities include sampling and analysis of air, surface soil, vadose zone, groundwater, and biota. The multi-media monitoring program is summarized in Table 2-1, which presents information for each monitoring activity including the sampling media, monitoring parameters, frequency, number of samples, locations, and monitoring methods.

The data quality objective (DQO) of all monitoring activities is to produce representative, accurate, defensible, and comparable analytical results to support the monitoring objective. The DQO is accomplished through implementation of standard operating procedures and analytical procedures/methods, including quality assurance measures, quality control (QC) samples, and data evaluation protocols.

Sampling and Analysis Plans (SAPs) for each monitoring activity are included in the LTMMP, Appendices C through G. Results for monitoring activities conducted at the MWL during the subject reporting period are presented in Chapters 3 through 8.

2.2 Inspection, Maintenance, and Repair Requirements

The primary objective of MWL inspection, maintenance, and repair activities is to ensure that the ET Cover, other physical controls at the site (e.g., surface-water diversion features and perimeter security fence), and the monitoring systems (groundwater and vadose zone networks) perform as designed.

Inspection parameters, specifications, frequency, and repair requirements are detailed in Chapter 4 of the LTMMP and summarized in Table 2-2. Repair work is initiated, as needed, based upon the results of the inspections and tracked to completion on the respective inspection forms. Long-term monitoring inspection checklists/forms are contained in the LTMMP, Annex I. Results of inspection activities conducted at the MWL in the subject reporting period are presented in Chapter 9. The following sections provide additional background information on the MWL ET Cover, inspections, and associated maintenance/repairs.

Table 2-1
Mixed Waste Landfill Monitoring Parameters, Frequencies, and Methods

Sampling Media	Monitoring Parameters ^a / Constituents of Concern	Monitoring Frequency ^a	Number of Samples Per Event	Monitoring Locations	Monitoring Method ^b	Comments
Air	Radon-222	Year 1 – Quarterly Year 2 – Quarterly Year 3 – Semiannual Year 4 – Semiannual Year 5 and subsequent years – Annual	17	10 detectors placed at corners and midpoints of perimeter fence 5 detectors placed on completed cover 2 detectors at background locations	Track-etch detectors (at breathing zone height); sampling and analysis per LTMMMP Appendix C	Samples are time-weighted average and will be collected over a 3-month period. The first quarterly monitoring period begins in January of each year.
Surface Soil	Tritium	Annual	4	One sample collected from each corner of the MWL ET Cover	Grab samples of soil collected; moisture extracted and analyzed for tritium using liquid scintillation per LTMMMP Appendix G	Samples collected from the MWL ground surface at the four corners of the ET Cover.
Vadose Zone	VOCs in soil vapor	Year 1 – Semiannual Year 2 – Semiannual Year 3 – Semiannual Year 4 and subsequent years – Annual	17	Samples collected from 2 single-port soil-vapor monitoring points installed through the ET Cover (MWL-SV01 and MWL-SV02) and 3 perimeter multi-port FLUTe™ wells (MWL-SV03, MWL-SV04, and MWL-SV05)	Sampling and analysis of soil vapor per LTMMMP Appendix D	MWL-SV01 and MWL-SV02 have a sampling port approximately 35 ft below the original ground surface. MWL-SV03, MWL-SV04, and MWL-SV05 have sampling ports at depths of approximately 50, 100, 200, 300, and 400 ft bgs.
Vadose Zone	Moisture content beneath the ET Cover	Year 1 – Semiannual Year 2 – Semiannual Year 3 and subsequent years – Annual	171	3 soil-moisture monitoring access tubes Measurements obtained at 1-ft increments from 4 ft to 25 ft bgs, then 5-ft increments to total depth of the access tube (200 linear ft)	Soil-moisture monitoring per LTMMMP Appendix E	Moisture content in vadose zone beneath the cover is measured using a neutron probe to evaluate moisture infiltration through the ET Cover.

Refer to footnotes at end of table.

Table 2-1 (Concluded)
Mixed Waste Landfill Monitoring Parameters, Frequencies, and Methods

Sampling Media	Monitoring Parameters ^a / Constituents of Concern	Monitoring Frequency ^a	Number of Samples Per Event	Monitoring Locations	Monitoring Method ^b	Comments
Groundwater	VOCs, metals ^c , tritium, radon, gamma-emitting radionuclides ^d , and gross alpha/beta activity	Semiannual	4	MWL compliance groundwater monitoring well network: MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9	Sampling and analysis of groundwater samples per LTMMMP Appendix F	Monitoring wells MWL-MW4, MWL-MW5, and MWL-MW6 retained for monitoring groundwater elevation only.
Biota – Surface Soil	Metals ^e and gamma-emitting radionuclides ^f	Annual	Up to 4 (2 each, if they exist)	Variable - ant hills and animal burrows on the MWL ET Cover located during ET Cover inspections, if present	Grab sampling and analysis of surface soil at animal burrow and/or ant hill features per LTMMMP Appendix G	If no features are identified, no samples will be collected.
Biota – Cover Vegetation	Gamma-emitting radionuclides (short list) in vegetation	Annual	Up to 2 if they exist	Variable - potentially deep-rooted vegetation overlying former disposal areas located during ET Cover inspections, if present	Grab sampling and analysis of vegetation, including the plant and root system per LTMMMP Appendix G	If no potentially deep-rooted plants are present, no samples will be collected.

Notes:

^aMonitoring parameters and frequency will be reevaluated every five years in the Five-Year Report.

^bSampling and Analysis Plans and sampling requirements are provided in appendices of the MWL LTMMMP (SNL/NM March 2012).

^cRequired metals analyses include cadmium, chromium, nickel, and uranium (SNL/NM March 2012).

^dRadionuclide results reported for groundwater include americium-241, cesium-137, and cobalt-60.

^eRequired metals analyses include RCRA metals plus copper, nickel, vanadium, zinc, cobalt, and beryllium (SNL/NM March 2012).

^fRadionuclide results reported for biota include cesium-137, cobalt-60, radium-226, thorium-232, uranium-235, and uranium-238.

bgs = Below ground surface.

ET = Evapotranspirative.

FLUTe™ = Flexible Liner Underground Technologies, Ltd.™

ft = Foot (feet).

LTMMMP = Long-Term Monitoring and Maintenance Plan.

MWL = Mixed Waste Landfill.

RCRA = Resource Conservation and Recovery Act.

VOC = Volatile organic compound.

Table 2-2
Mixed Waste Landfill Inspection, Maintenance, and Repair Requirements

MWL System to be Inspected	Inspection Frequency/ Performed by	Inspection Parameters	Maintenance Implementation	Maintenance/ Repair Frequency ^a
ET Cover Surface Biology Inspection (Cover vegetation and signs of animal activity)	Quarterly until vegetation is established, annually thereafter by a staff biologist ^b	Vegetation Inventory	Soil augmentations and/or reseeding	Within 60 days of discovery of needed repairs. Reseeding repairs may be delayed to await the appropriate growing season.
		Contiguous areas of no vegetation >200 ft ²	Revegetate barren areas that exceed prescribed limits	
		Animal intrusion burrows in excess of 4 inches in diameter	Repair cover system damage that exceeds prescribed limits	
ET Cover System (Surface)	Quarterly by a field technician	Settlement of cover surface in excess of 6 inches	Repair cover system damage that exceeds prescribed limits	Within 60 days of discovery of needed repairs. Reseeding repairs may be delayed to await the appropriate growing season.
		Erosion of cover soil in excess of 6 inches deep		
		Ponding of water on the ET Cover surface in excess of 100 ft ²		
		Animal intrusion burrows in excess of 4 inches in diameter		
		Contiguous areas of no vegetation >200 ft ^{2 c}	Revegetate barren areas that exceed prescribed limits ^c	Within 60 days of discovery of needed repairs.
ET Cover Surface-Water (Storm water) Drainage Features	Quarterly by a field technician	Channel or sidewall erosion in excess of 6 inches deep	Repair erosion that exceeds prescribed limits	Within 60 days of discovery of needed repairs.
		Accumulations of sediment in excess of 6 inches deep or debris that blocks more than 1/3 of the channel width	Remove sediment and debris accumulations that exceed prescribed limits	
Soil-Vapor Monitoring Wells, Soil-Moisture Monitoring Access Tubes, and Groundwater Monitoring Wells	Groundwater and Vadose Zone Network Components: Field technician to inspect at same frequency/time that monitoring occurs	Concrete pads, stanchions, and protective casings	Maintain, clean, repair, replace, re-label, as appropriate	Within 60 days of discovery of needed repairs.
		Well cover caps and Swagelok [®] (or equivalent) dust caps		
		Monitoring wells and soil-vapor sampling port labels		
		Locks		
		Sampling pumps and tubing		
		Neutron probe and cable system		

Refer to footnotes at end of table.

Table 2-2 (Concluded)
Mixed Waste Landfill Inspection, Maintenance, and Repair Requirements

MWL System to be Inspected	Inspection Frequency/ Performed by	Inspection Parameters	Maintenance Implementation	Maintenance/ Repair Frequency ^a
ET Cover Physical Controls	Quarterly by a field technician	Presence of windblown plants and debris	Remove windblown plants and debris	Within 60 days of discovery of needed repairs.
		Condition of fence wires, posts, gates, gate locks, warning signs, and survey monuments in the local area	Repair broken wire sections and posts, repair/oil gates, clean/replace locks, repair/replace warning signs, clear dirt/debris from monuments	

Notes:

^aMaintenance/repairs will be performed as necessary, based upon the results of inspections.

^bThe transition from quarterly to annual inspections by a staff biologist is based upon meeting successful revegetation criteria as determined by the staff biologist (SNL/NM March 2012).

^cBarren areas exceeding >200 ft² will not require corrective action after ET Cover vegetation is determined to have met successful revegetation criteria if they are the result of relatively short-term climate stresses (e.g., severe short-term drought), and the staff biologist determines they will naturally fill in over time. However, these areas will be noted and tracked during inspections and reviewed annually by the staff biologist to determine whether action is required based upon comparison to surrounding vegetation.

> = Greater than.

ET = Evapotranspirative.

ft² = Square feet.

MWL = Mixed Waste Landfill.

2.2.1 ET Cover

The ET Cover consists of four main layers: Compacted Subgrade, Biointrusion, Compacted Native Soil, and Topsoil Layers (Figure 2-1). A thin soil layer was placed on top of the Biointrusion Layer to fill void space and create an even surface upon which the Native Soil Layer was constructed. The Subgrade varies in thickness from 0 to 3.3 feet and the combined average thickness of the overlying ET Cover layers is 5.37 feet. The Topsoil layer was seeded with native grasses to mitigate surface erosion and promote evapotranspiration. The native grass species were selected based upon biological assessments of TA-III (Sullivan and Knight 1992; Peace et al. November 2004). As shown in Figure 2-1, the as-constructed thickness of the ET Cover layers exceeds as-designed thicknesses, resulting in a more protective ET Cover. A conceptual schematic profile of the ET Cover and how it works is provided in Figure 2-2.

The ET Cover surface slopes gently to the west (2 percent slope) and sheds surface-water runoff to the west and down the side slopes. An engineered drainage swale located immediately east, north, and south of the ET Cover diverts surface run-on from the east (upgradient) side of the ET Cover and run-off from the side slopes around the northern and southern ends of the ET Cover to the west (Figure 2-3). As documented in the June 2017 MWL Annual LTMM Report, from November 2016 through February 2017 the site access and perimeter road was improved. The surface of the road was raised, road ditches were installed on each side, and culverts were installed (SNL/NM June 2017a, Figure 9-1). These improvements provide additional site drainage control, intercepting surface water and channeling it away from the ET Cover area.

2.2.2 ET Cover Biology Inspection

Cover vegetation monitoring was accomplished in two phases. The first phase of quarterly inspections by the staff biologist focused on establishing native vegetation on the ET Cover such that successful revegetation criteria were met as defined in Section 4.1 of the LTMMMP. The August 2014 Biology Inspection was the last quarterly inspection conducted as part of the first phase. Completion of the first phase initiated transition to the second phase of annual inspections. The second phase annual inspections are performed near the end of the growing season (August–September) to determine the coverage of living plants. The staff biologist documents the flora coverage and signs of animal and insect activity during these annual inspections.

Damage to cover vegetation that exceeds the criteria listed in Section 4.2.2 of the LTMMMP is noted on the Biology Inspection Checklist/Form and appropriate maintenance/repairs must be completed within 60 days of the inspection. Reseeding repairs may be delayed until the appropriate time during the growing season (Table 2-2).

At the end of each reporting year, the staff biologist summarizes the results of the annual inspection, presents local climate trends, and makes recommendations in a summary Biology Report included in the Annual LTMM Report (Annex G). The annual *Biology Inspection Checklist/Form* is also included in the Annual LTMM Report (Annex F).

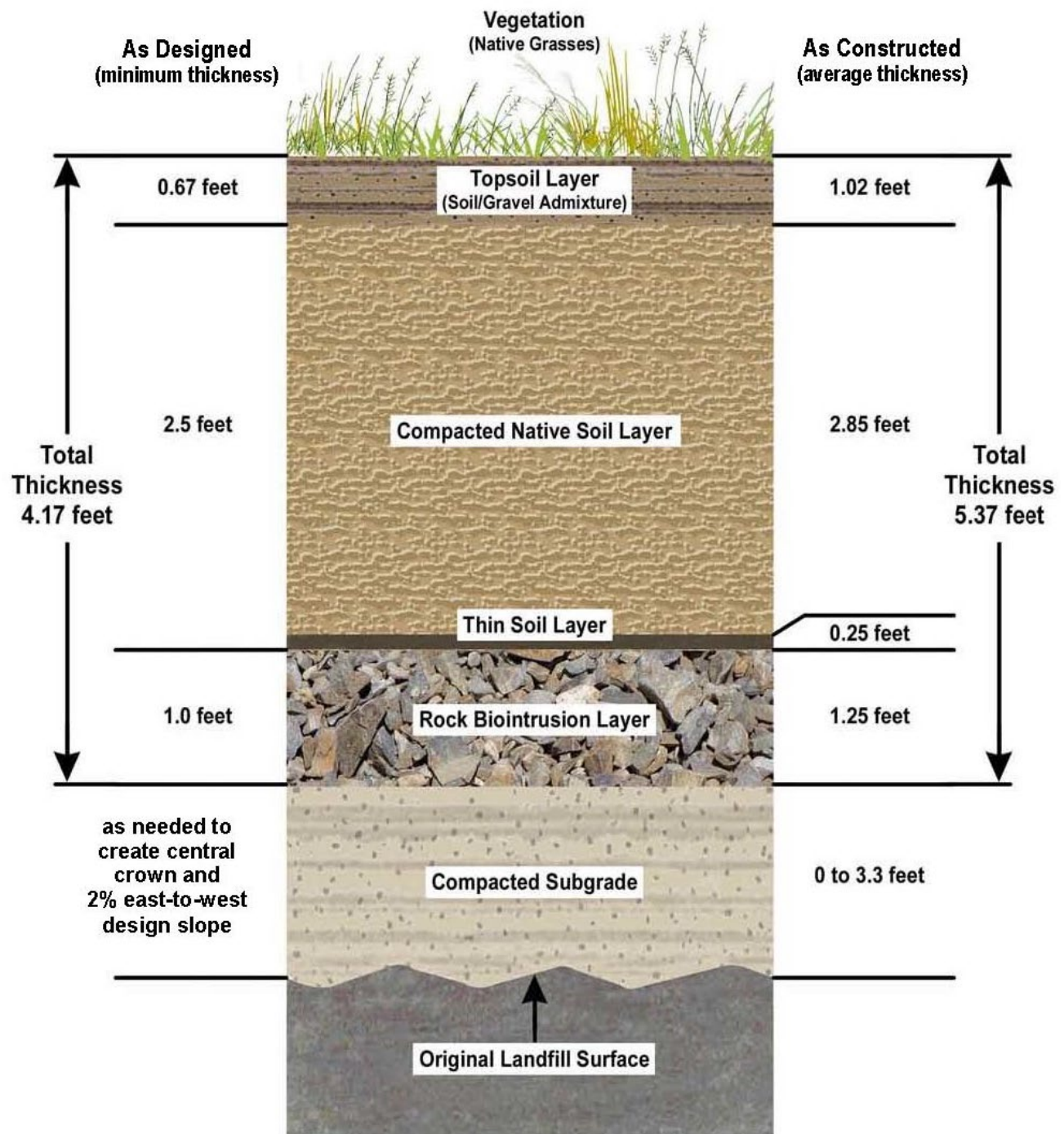


Figure 2-1
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover Layers

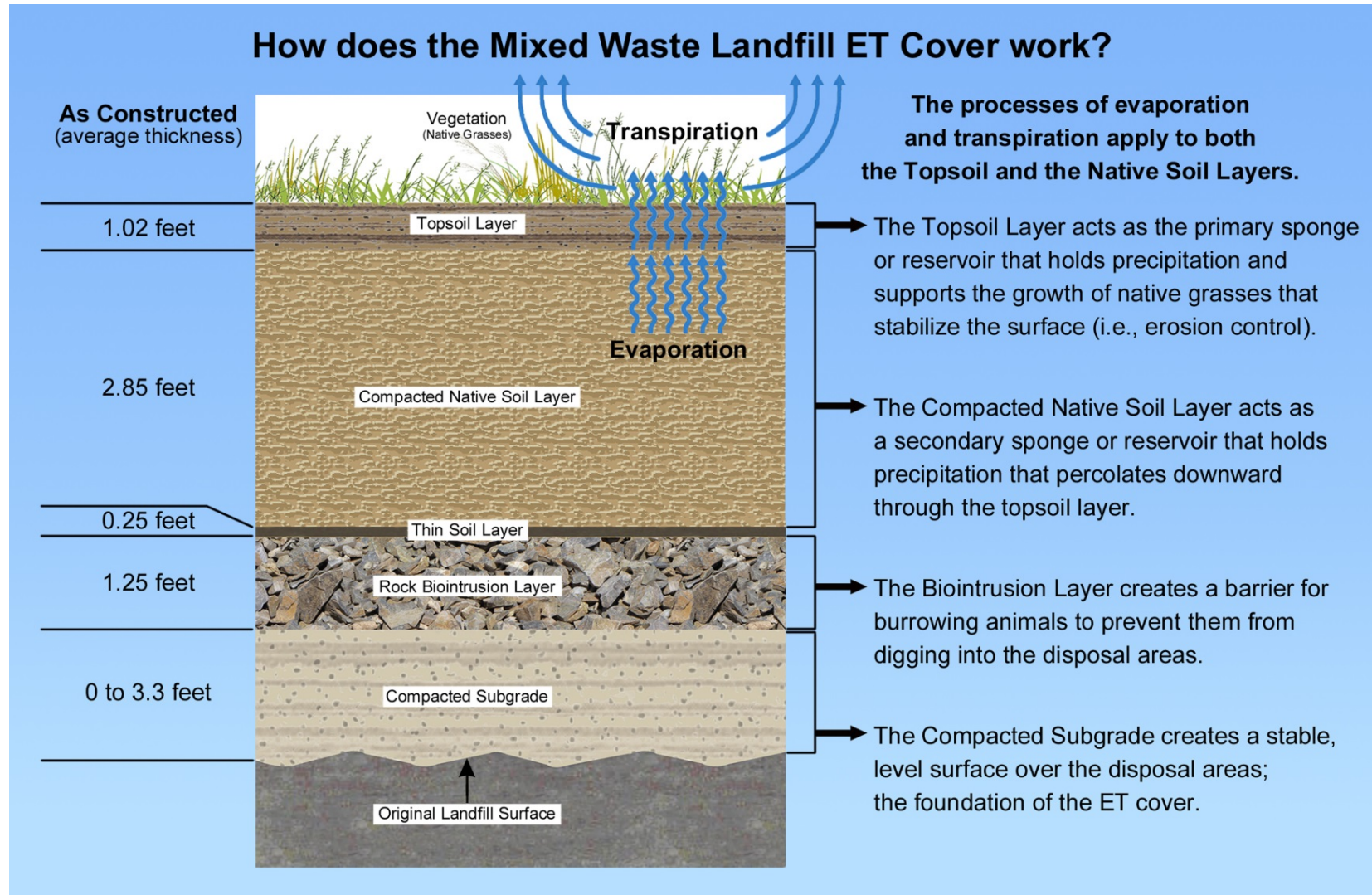


Figure 2-2
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover and How it Works

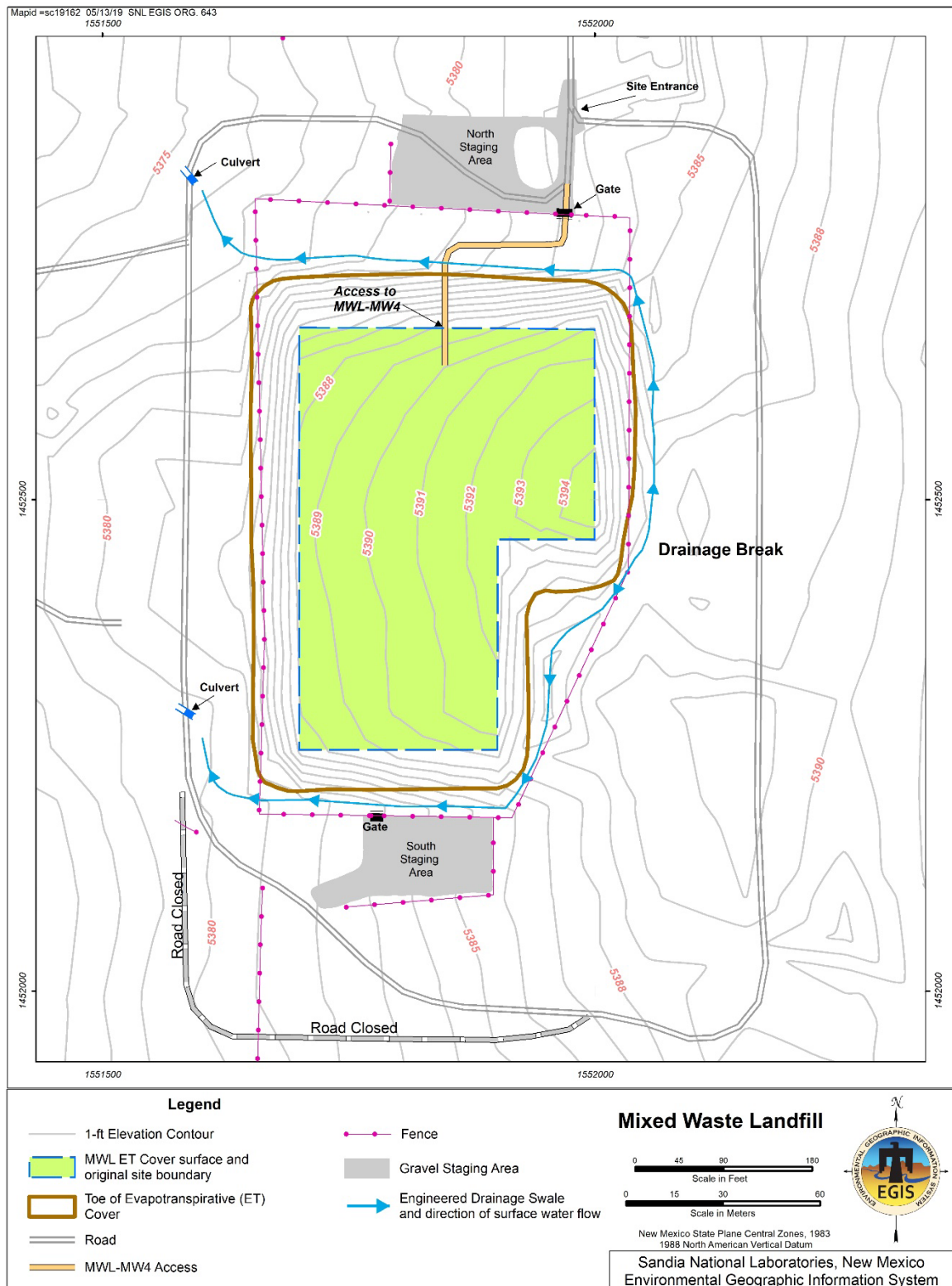


Figure 2-3
Mixed Waste Landfill Engineered Storm-Water Drainage Swale

2.2.3 ET Cover Surface and Physical Controls Inspection

The ET Cover surface, side slopes, and physical controls (i.e., storm-water drainage swale, security fence, locks, gates, signs, and survey monuments) are inspected by a field technician on a quarterly basis. Inspection parameters, specifications, frequency, and required maintenance/repair activities for the ET Cover are summarized in Table 2-2. Documentation of animal burrows in excess of 4 inches in diameter and contiguous areas lacking vegetation in excess of 200 square feet are noted on both the quarterly Cover Inspection and annual Biology Inspection Checklists/Forms. If inspection item specifications are exceeded, they will be noted on the *Cover Inspection Checklist/Form* and appropriate maintenance/repairs will be completed within 60 days of the inspection. Reseeding repairs may be delayed until the appropriate time during the growing season (Table 2-2).

2.2.4 Monitoring Networks and Sampling Equipment

Groundwater monitoring wells, soil-vapor monitoring wells, soil-moisture monitoring access tubes, and associated sampling/monitoring equipment are inspected during each monitoring event (i.e., they are inspected at the same frequency as the required monitoring). All inspection parameters, specifications, and required maintenance/repair activities are detailed in Table 2-2. The inspections and any associated maintenance and repair activities are documented on monitoring network-specific inspection checklists/forms. There is a separate inspection checklist/form for each of the three monitoring networks and associated sampling/monitoring equipment.

If conditions are observed that require maintenance, repair, or replacement they will be noted on the associated *Monitoring Network Inspection Checklist/Form* and appropriate actions will be completed within 60 days (Table 2-2).

3.0 RADON MONITORING RESULTS

This chapter presents radon monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with MWL LTMMP Section 3.2.1 and Appendix C (SNL/NM March 2012). The monitoring objective is to collect data to evaluate radon gas flux (i.e., movement of radon-222) to the atmosphere at the MWL. This monitoring provides an early warning detection system for changing conditions so that timely action can be taken, if necessary. The trigger level defined in LTMMP Section 5.2.1 applies only to results from the monitoring stations located along the perimeter security fence (locations RN1 through RN10).

Radon monitoring field activities are described in Section 3.1, analytical laboratory results and a discussion of data quality are presented in Section 3.2, and data evaluation requirements and a comparison of results to the trigger level are presented in Section 3.3. A summary of radon monitoring activities and results is provided in Section 11.1.

3.1 Radon Sampling Field Activities

Monitoring was conducted in calendar year (CY) 2018, fulfilling the LTMMP minimum requirement of annual monitoring. Radon monitoring presented for this April 1, 2018 through March 31, 2019 reporting period covers the CY 2018 period January 1, 2018 through December 31, 2018.

The radon air measurements were obtained using alpha-track radon gas detectors manufactured by Radonova (formerly Landauer® Nordic). Radtrak2® detectors were used for two six-month monitoring events during CY 2018. Radon sampling locations are designated as RN1 through RN17 and are shown in Figure 3-1. Locations RN1 through RN10 are located on the perimeter security fence and are the compliance locations to which the trigger level applies. Locations RN11 through RN15 are located on the ET Cover surface directly above pits and trenches with known sealed radium-226 sources. Radon is generated by the decay of radium-226, so results from these locations provide an early warning if sealed sources degrade. Locations RN16 and RN17 are background locations established away from the MWL, but in the general vicinity. Table 3-1 presents the detector type, dates of deployment and collection, location number, time-weighted average radon air concentrations in picocuries per liter (pCi/L) for each six-month period, and the CY 2018 range of radon air concentrations.

Radon monitoring results are reviewed and evaluated by an SNL/NM radiological subject matter expert (SME) and documented in a data evaluation memorandum. These reports are provided in Annex A and include the corresponding laboratory data sheets, Analysis Request/Chain-of-Custody forms (AR/COCs), and a map showing all monitoring locations. The results of CY 2018 radon monitoring are summarized in Section 3.2.1.

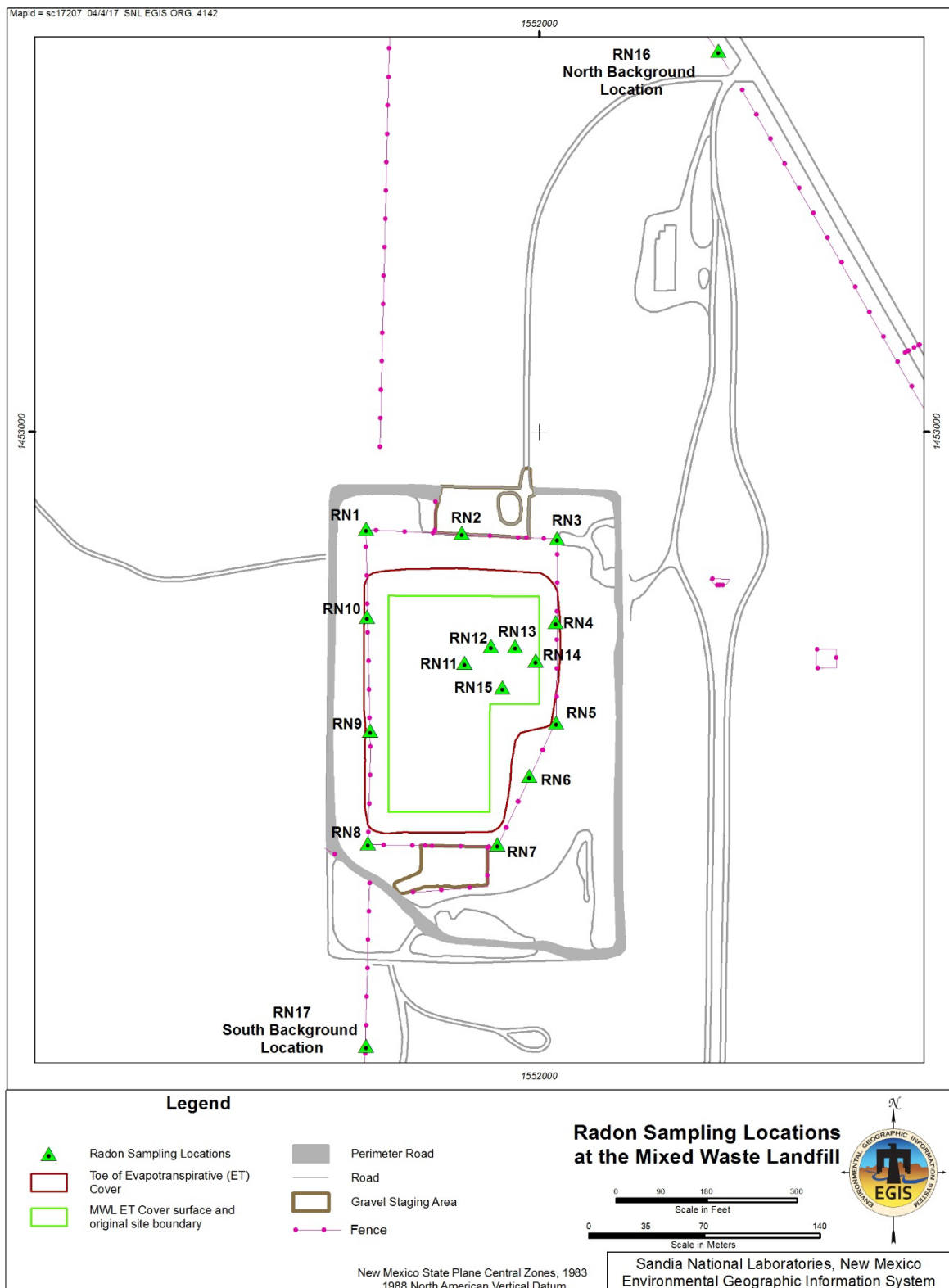


Figure 3-1
Mixed Waste Landfill Radon Detector Locations

Table 3-1
Summary of Radon Results
Mixed Waste Landfill Air Monitoring
Calendar Year 2018

Sample Location ^a	1 st Half CY 2018		2 nd Half CY 2018		CY 2018 Radon Air Concentration Range (pCi/L)	Trigger Level (pCi/L)
	Detector Deployment Date	Detector Collection Date	Detector Deployment Date	Detector Collection Date		
	1/2/2018	7/2/2018	7/2/2018	1/4/2019		
	Semiannual Time-Weighted Average Radon Air Concentration (pCi/L)					
RN1	<0.2 ^b		<0.2 ^b		<0.2	4
RN2	<0.2 ^b		<0.2 ^b		<0.2	4
RN3	<0.2 ^b		<0.2 ^b		<0.2	4
RN4	0.2		0.2		0.2	4
RN5	0.2		<0.2 ^b		<0.2 to 0.2	4
RN6	0.4		<0.2 ^b		<0.2 to 0.4	4
RN7	0.2		<0.2 ^b		<0.2 to 0.2	4
RN8	<0.2 ^b		<0.2 ^b		<0.2	4
RN9	0.2		<0.2 ^b		<0.2 to 0.2	4
RN10	0.2		<0.2 ^b		<0.2 to 0.2	4
RN11	<0.2 ^b		0.2		<0.2 to 0.2	NA
RN12	<0.2 ^b		<0.2 ^b		<0.2	NA
RN13	<0.2 ^b		<0.2 ^b		<0.2	NA
RN14	<0.2 ^b		<0.2 ^b		<0.2	NA
RN15	<0.2 ^b		<0.2 ^b		<0.2	NA
RN16	<0.2 ^b		<0.2 ^b		<0.2	NA
RN17	<0.2 ^b		0.2		<0.2 to 0.2	NA
RNTB	<0.2 ^b		<0.2 ^b		<0.2	NA

Notes:

^aBolded sample locations are the compliance locations where the trigger level applies.

^bNot detected, result is less than the minimum detectable activity.

CY = Calendar year.

NA = Not applicable.

pCi/L = Picocuries per liter.

RNTB = Trip blank.

3.1.1 Radon Monitoring Detector Deployment and Collection

The Radtrak2® radon detectors were deployed and collected on a semiannual schedule in CY 2018 at the 17 sampling locations, from January through June and July through December. During the months between deployment and collection, inspections were conducted to ensure the deployed detectors and associated protective housing were in good condition. All detectors were found in good condition during the monitoring period and at the times of collection. Minor maintenance to remove spider webs and maintain the protective housing at each monitoring location was performed at the time of the inspections. Deployment/collection and monthly inspection forms are included in Annex A.

3.1.2 Field Quality Control

Field QC measures associated with each monitoring period include two types of samples, one field control sample (trip blank) and two field background samples for each detector type deployed per monitoring period. The trip blank sample is used to confirm detectors were not contaminated during storage and shipment to the analytical laboratory. Two field background samples (RN16 and RN17) are collected at areas outside of the MWL, but within TA-III, to confirm natural radon activities in the vicinity of the MWL (Figure 3-1). The two field background sample results are compared to the sample detectors results from immediately above the disposal areas (RN11 through RN15) and around the perimeter (RN1 through RN10).

3.1.3 Waste Management

No waste is generated during radon monitoring field activities.

3.2 Laboratory Results

This section summarizes radon air monitoring results for CY 2018. The detectors were submitted to Radonova (formerly Landauer® Nordic) for analysis. Analytical laboratory reports, including the analytical method, dates of analyses, and contract verification reviews are filed in the SNL/NM Record Center.

3.2.1 Environmental Sample Results

The compiled quarterly monitoring results are presented in Table 3-1. The CY 2018 range of results for all detectors was <0.2 (i.e., not detected) to 0.4 pCi/L. The range for all background location results was <0.2 to 0.2 pCi/L. No sample locations exceeded the trigger level of 4 pCi/L and all results confirm low levels of radon consistent with natural background levels and historical results.

3.2.2 Field Quality Control Sample Results

A trip blank (designated as RNTB in Table 3-1) was submitted with the detectors collected at the end of each semiannual sampling period. The trip blank results confirmed there was no contamination during storage and shipment of detectors RN1 through RN17.

The two field background sample results (RN16 and RN17) for each semiannual period are compared to the semiannual sample results for detectors RN1 through RN15. These background sample results confirm radon activities in air at the MWL are equivalent to background conditions.

3.2.3 Data Quality

There were no data quality issues associated with the two semiannual monitoring periods. All data were acceptable and met the DQOs. The contract verification reviews for each monitoring period are included in Annex A.

3.2.4 Variances

There were no variances from the LTMMMP radon monitoring requirements.

3.3 Data Evaluation and Monitoring Trigger Level

The trigger level for radon in air is 4 pCi/L (time-weighted average), which applies to detectors RN1 through RN10 located on the perimeter fence. The trigger level of 4 pCi/L is the same as the EPA-recommended action level for radon in households. There was no exceedance of the 4 pCi/L trigger level at any of the radon sampling locations during CY 2018. These results confirm low levels of radon activity in air at the MWL consistent with natural background levels and historical results. There were no indications of releases of radon gas from the disposal areas.

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4.0 TRITIUM SURFACE SOIL MONITORING RESULTS

This chapter presents monitoring field activities and results for tritium in surface soil (i.e., sampling and analysis), analytical results, and data evaluation in accordance with MWL LTMMMP Section 3.3 and Appendix G (SNL/NM March 2012). The monitoring objective is to collect data to evaluate tritium flux (i.e., movement) to the atmosphere from soil moisture in surface soil at the MWL. This monitoring provides an early warning detection system for changing conditions so that timely action can be taken, if necessary. Results are compared to the trigger level defined in LTMMMP Section 5.2.2.1.

Tritium surface soil monitoring field activities are described in Section 4.1 and analytical laboratory results and a discussion of data quality are presented in Section 4.2. Data evaluation and a comparison of results to the trigger level are presented in Section 4.3. A summary of tritium surface soil monitoring activities and results is provided in Section 11.1.

4.1 Tritium Surface Soil Monitoring Field Activities

Surface soil samples were collected at the four ET Cover corner monitoring locations on August 9, 2018 fulfilling the annual monitoring requirement (Figure 4-1). Samples were collected during the New Mexico monsoon season to ensure adequate soil moisture for analysis. Monitoring results are reviewed and evaluated by an SNL/NM radiological SME. Annex B contains the data evaluation memorandum prepared by the radiological SME, data validation contract verification reviews, and AR/COC forms. The August 2018 results are presented in the following sections.

4.1.1 Field Quality Control

A field QC sample (duplicate soil sample) was collected as part of the August 9, 2018 tritium sampling event in accordance with the Tritium and Biota SAP (Appendix G, Table G-4.2-1 of the LTMMMP), which requires that one environmental and environmental duplicate sample pair be collected for every twenty environmental samples. The environmental-duplicate sample pair for the August 2018 sampling event was collected at the northwest corner of the ET Cover, tritium monitoring location MWL TS-2NW (Figure 4-1).

4.1.2 Waste Management

Waste generated during sampling activities included personal protective equipment (PPE) (i.e., gloves) and decontamination wipes and was managed in accordance with all applicable requirements. Process knowledge and sampling event analytical results were used to characterize the waste; based upon this information the waste was managed as solid waste.



Figure 4-1
Mixed Waste Landfill Tritium Surface Soil Sampling Locations

4.2 Laboratory Results

Soil samples and field QC samples were submitted to GEL Laboratories, LLC. (GEL) for analyses. Samples were analyzed by liquid scintillation analysis, in accordance with EPA Method 906.0. Tritium activity is measured in water extracted from the soil sample, so analytical results are sensitive to in-situ moisture content. Analytical results that are below the minimum detectable activity (MDA) are qualified with a “U” and are designated as below the detection level. Analytical laboratory reports, including certificates of analyses, analytical methods, sample results, dates of analyses, results of QC analyses, and data validation reports are filed in the SNL/NM Record Center.

4.2.1 Environmental Sample Results

Table 4-1 summarizes the tritium surface soil results for the August 2018 sampling event. Similar to previous years, tritium was not detected in all samples. Reported activities were all below the MDA. All samples had good soil-moisture content, ranging from 3.0 to 5.7 percent by mass, and the MDA ranged from 170 pCi/L (northeast ET Cover corner location, MWL TS-2NE) to 175 pCi/L (northwest ET Cover corner location, MWL TS-2NW). The results are consistent with the August 2017 results and historical results, which are characterized by low activity detections and non-detects. All results are below the trigger level of 20,000 pCi/L.

4.2.2 Field Quality Control Sample Results

The relative percent difference (RPD) between the environmental sample and corresponding duplicate results is calculated if both samples have results greater than the MDA. Tritium was not detected above the MDA in the environmental-duplicate sample pair; therefore, an RPD value was not calculated.

4.2.3 Laboratory Quality Control and Data Quality

Internal laboratory QC samples were analyzed concurrently with all environmental samples in accordance with laboratory procedures and EPA methods. These included laboratory control samples, method blanks, and matrix spike samples. The results were used to evaluate potential contamination associated with the laboratory analytical process and to determine the accuracy and precision of the analytical methods. All radiochemical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure (AOP) AOP 00-03, “Data Validation Procedure for Chemical and Radiochemical Data” (SNL/NM June 2017b).

Based upon data validation and review criteria, all tritium results were determined acceptable and met the DQOs. Reported QC sample results comply with analytical method and laboratory procedure requirements. Annex B includes data validation and contract verification reviews.

4.2.4 Variances

There were no variances from the LTMMMP tritium monitoring requirements.

Table 4-1
Summary of Tritium Results (EPA Method 906.0^a)
Mixed Waste Landfill Surface Soil Monitoring
August 2018

Sample Location	Result (pCi/L)	Percent Soil Moisture	MDA (pCi/L)	Laboratory Qualifier ^b	Validation Qualifier ^b	Trigger Level (pCi/L)
	August 2018					
MWL TS-2NW	26.6 ± 97.1	4.45	175	U	BD, FR3	20,000
MWL TS-2NW (Duplicate)	109 ± 104	4.30	170	U	BD, FR3	
MWL TS-2SW	62.9 ± 99.9	4.91	172	U	BD, FR3	
MWL TS-2SE	67.8 ± 101	3.02	172	U	BD, FR3	
MWL TS-2NE	122 ± 106	5.74	170	U	BD, FR3	

Notes:

^aU.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

^bLaboratory/Validation Qualifier

Laboratory Qualifier

U = Analyte activity is below the detection limit.

Validation Qualifier

BD = Result that is not statistically different from zero.

FR3 = Result is less than the MDA or less than the 2-sigma total propagated uncertainty.

EPA = U.S. Environmental Protection Agency.

MDA = Minimum detectable activity.

MWL = Mixed Waste Landfill.

pCi/L = Picocuries per liter.

4.3 Data Evaluation and Monitoring Trigger Level

The trigger level for tritium as measured in soil moisture from surface soil samples is 20,000 pCi/L, as specified in LTMMP Section 5.2.2.1 (SNL/NM March 2012). No August 2018 sample results exceeded the trigger level.

Tritium is the primary contaminant of concern and the most mobile radionuclide at the MWL. Surface soil sampling for tritium has been conducted at the MWL since August 1985 at various locations around the MWL perimeter. The tritium sampling being performed under the LTMMP is a continuation of this monitoring effort. The August 2018 results are consistent with historical data and reflect tritium activity at decreasing, very low levels that are close to or below the laboratory MDA. The results are consistent with the short half-life of tritium (12.30 years) and indicate no new releases from the disposal areas.

5.0 SOIL-VAPOR MONITORING RESULTS

This chapter presents soil-vapor monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with MWL LTMMMP Section 3.4.1 and Appendix D (SNL/NM March 2012). The soil-vapor monitoring objective is to provide spatial and temporal concentration data for volatile organic compounds (VOCs) in the soil vapor at various depths throughout the approximately 500-foot-thick vadose zone beneath the MWL (i.e., unsaturated soil and sediments above the Regional Aquifer). These monitoring data serve as an early warning detection system for the protection of groundwater so that timely action can be taken, if necessary. Results from the deepest sampling ports of the deepest soil-vapor wells are compared to trigger levels defined in LTMMMP Section 5.2.3.1.

Soil-vapor monitoring field activities are described in Section 5.1, analytical laboratory results and a discussion of data quality are presented in Section 5.2, and data evaluation and comparison of results to monitoring trigger levels are presented in Section 5.3. A summary of soil-vapor monitoring activities and results is provided in Section 11.1.

5.1 Soil-Vapor Monitoring Field Activities

MWL-SV01 and MWL-SV02 are single-sampling-port wells installed through the ET Cover; each has one sampling port at depths of 42.5 and 41.5 feet below ground surface (ft bgs), respectively. MWL-SV03, MWL-SV04, and MWL-SV05 are Flexible Liner Underground Technology, Ltd.TM (FLUTeTM) multi-sampling-port wells. Each has 5 sampling ports at depths of approximately 50, 100, 200, 300, and 400 ft bgs. These FLUTeTM multi-sampling port wells are installed around the ET Cover perimeter as shown in Figure 5-1.

Two soil-vapor monitoring events were conducted during the April 1, 2018 through March 31, 2019 reporting period fulfilling the LTMMMP semiannual monitoring requirement. Field forms and documentation that address calibration of equipment, well evacuation, purge volumes, and vacuum pressure readings for each sample container are provided in Annex C. The two soil-vapor monitoring events are described as follows.

- The first sampling event was conducted on April 25, 2018. Soil-vapor samples were collected from all monitoring well sampling ports. Duplicate samples were collected from two MWL-SV04 sampling ports (50 and 300 ft bgs ports).
- The second sampling event was conducted on October 30, 2018. Soil-vapor samples were collected from all monitoring well sampling ports. Duplicate samples were collected from two MWL-SV05 sampling ports (50 and 400 ft bgs ports).

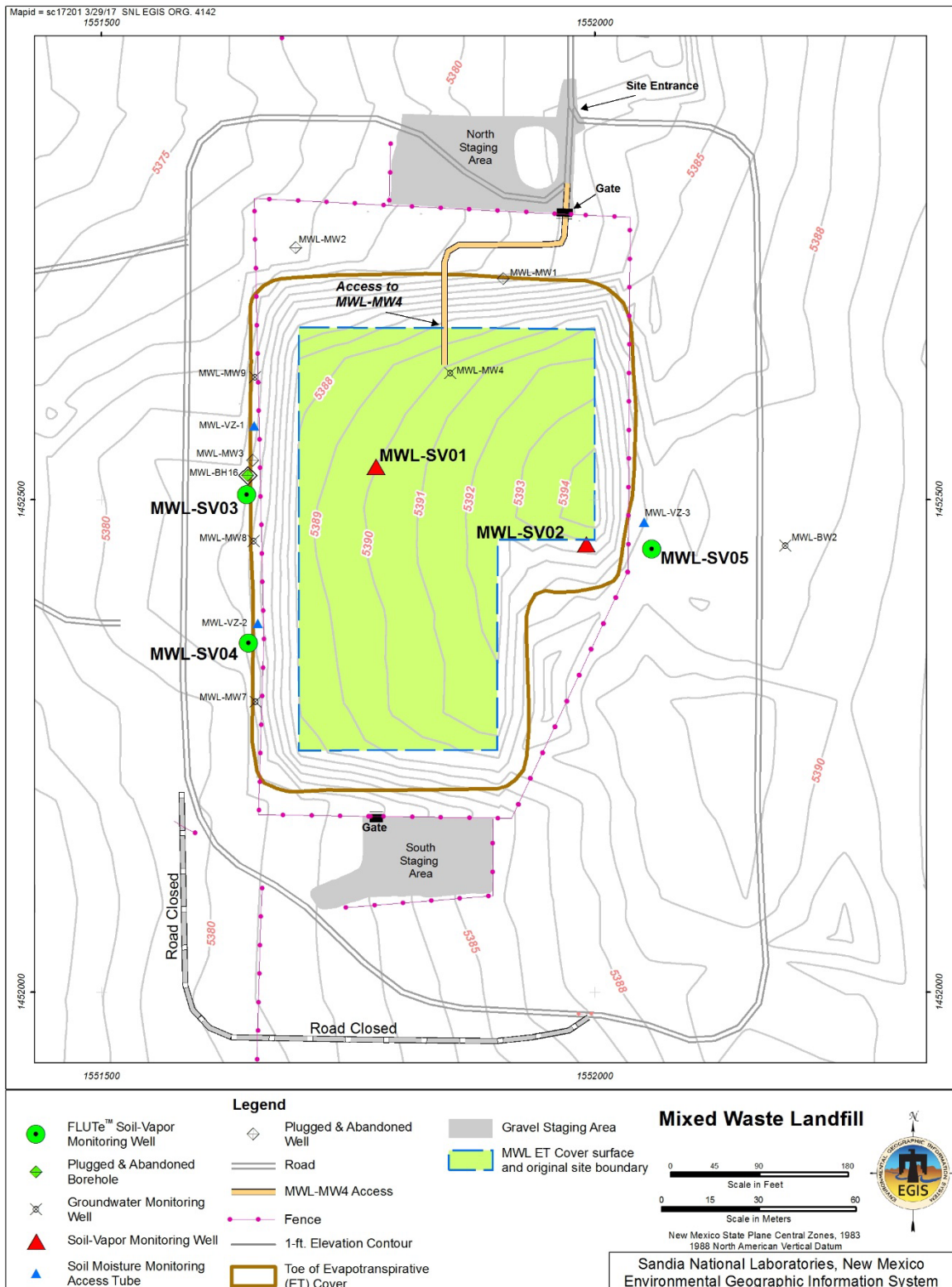


Figure 5-1
Mixed Waste Landfill Soil-Vapor Monitoring Well Locations

5.1.1 Well Purging

Purging removes stagnant air from each sampling port and associated sample tubing, and draws representative soil vapor from the soil/sediment pore space surrounding the sampling port in the subsurface. All wells were purged to remove a minimum of three tubing volumes of air, and until VOC levels stabilized (i.e., 3 photoionization detector [PID] measurements after purging 3 tubing volumes within plus or minus 10 percent), in accordance with procedures described in field operating procedure (FOP) FOP 08-22, "Soil-Vapor Monitoring" (SNL/NM October 2016) and LTMMP Appendix D. All wells were purged using a dedicated MWL vacuum pump. Real time continuous VOC screening was performed with a PID to determine stabilization during the purging process.

5.1.2 Field Quality Control

Field QC samples include duplicate samples (two per semiannual monitoring event) and field blank samples. Field QC samples were submitted for analysis with the environmental soil-vapor samples and analytical results are presented in Section 5.2.2 and Annex C. The environmental-duplicate sample pairs were collected simultaneously using a split-stream sampling manifold system (i.e., the duplicate samples were collected at the same time) to reduce variability caused by time and/or sampling mechanics.

Field blank samples were prepared in the field during sampling activities by collecting an ultra-pure grade nitrogen gas sample at each monitoring well. Results were used to assess whether contamination of the samples may have resulted from ambient field conditions and/or during shipment and analysis at the laboratory.

The field QC sampling protocol for the April and October 2018 sampling events included the collection of an environmental-duplicate sample pair from the sampling ports located at 50 ft bgs and 300 ft bgs at monitoring well MWL-SV04 in April (i.e., MWL-SV04-50 and MWL-SV04-300), and the sampling ports located at 50 ft bgs and 400 ft bgs at monitoring well MWL-SV05 in October (i.e., MWL-SV05-50 and MWL-SV05-400). A total of five QC field blank samples were submitted for analysis for each of the events. Field QC sample results are presented in Section 5.2.2.

5.1.3 Waste Management

A small volume of solid waste (e.g., PPE that does not come into contact with contaminants) was generated during the two soil-vapor monitoring events. This waste was combined with solid waste generated during groundwater monitoring activities and managed as non-hazardous solid waste as described in Section 7.1.3.

5.2 Laboratory Results and Trigger Level Evaluation

Environmental and field QC soil-vapor samples were submitted to TestAmerica Laboratories, Inc. for analyses. Samples were analyzed in accordance with EPA Method TO-15. Analytical laboratory reports, including certificates of analyses, analytical methods, method detection limits

(MDLs), reporting limits (RLs), dates of analyses, and data validation reports are filed in the SNL/NM Record Center.

As defined in the LTMMMP Section 5.2.3.1 (SNL/NM March 2012), trigger levels for VOCs in soil vapor are 20 parts per million by volume (ppmv) for tetrachloroethene (PCE), 20 ppmv for trichloroethene (TCE), and 25 ppmv for Total VOCs (i.e., the sum of validated detected VOC concentrations). The trigger levels apply only to samples collected from the deepest sampling port (i.e., 400 ft bgs port) in each of the three FLUTE™ multi-port soil-vapor monitoring wells (MWL-SV03, MWL-SV04, and MWL-SV05).

All VOC concentrations for the three deepest sampling ports are below the trigger levels. The PCE maximum concentration was 0.370 ppmv from the April MWL-SV03-400 environmental sample. The TCE maximum concentration was 0.270 ppmv from the April MWL-SV03-400 environmental sample. The maximum Total VOCs concentration was 0.77359 ppmv from the April MWL-SV03-400 environmental sample. All April and October 2018 VOC soil-vapor results are presented in Tables 5-1 and 5-2 at the end of this section.

5.2.1 Environmental Sample Results

This section summarizes soil-vapor monitoring results for the April 1, 2018 through March 31, 2019 reporting period. A summary of compounds detected in each semiannual event is provided below, and a summary of historical data (i.e., soil-vapor results collected since implementation of the LTMMMP in January 2014) is presented in Section 5.3.

First Sampling Event – April 25, 2018

A total of 21 compounds were detected above laboratory MDLs in April 2018 samples. All of these VOCs were also detected in the October samples except m,p-xylene.

Acetone	1,1-Dichloroethene
Benzene	cis-1,2-Dichloroethene
Bromodichloromethane	Methylene Chloride
2-Butanone	Tetrachloroethene
Carbon Disulfide	Toluene
Carbon Tetrachloride	1,1,2-Trichloro-1,2,2-trifluoroethane
Chloroform	1,1,1-Trichloroethane
Chloromethane	Trichloroethene
Dichlorodifluoromethane	Trichlorofluoromethane
1,2-Dichloro-1,1,2,2-tetrafluoroethane	m,p-Xylene
1,1-Dichloroethane	

PCE and TCE are the primary VOCs of concern, exhibit the highest concentrations, and were reported at low concentrations in all environmental samples from all sampling ports. PCE was detected at concentrations ranging from 0.028 ppmv (MWL-SV04-50, duplicate sample) to 0.370 ppmv (MWL-SV01-42.5 and MWL-SV03-400). TCE concentrations ranged from 0.033 (MWL-SV04-50, duplicate sample) to 0.270 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.14608 ppmv (MWL-SV04-50, duplicate sample) to 0.82938 ppmv (MWL-SV01-42.5). Other VOCs detected in all monitoring well sampling ports, generally at lower concentrations, include carbon tetrachloride; chloroform; dichlorodifluoromethane; 1,1-dichloroethane; 1,1-dichloroethene; cis-1,2-dichloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane; 1,1,1-trichloroethane; and trichlorofluoromethane. The two highest sample port VOC concentrations were both 0.370 ppmv PCE results from MWL-SV01-42.5 and MWL-SV03-400.

For the April 2018 results from the three deepest sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05, PCE concentrations ranged from 0.092 ppmv (MWL-SV05-400) to 0.370 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.087 ppmv (MWL-SV04-400) to 0.270 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.29875 ppmv (MWL-SV05-400) to 0.77359 ppmv (MWL-SV03-400).

Second Sampling Event – October 30, 2018

A total of 42 compounds were detected above laboratory MDLs in October 2018 samples. The higher number of compounds detected largely reflects very low concentration detections at one sampling port, MWL-SV04-100 (see Table 5-2 at the end of this section).

Acetone	trans-1,2-Dichloroethene
Benzene	1,2-Dichloropropane
Bromodichloromethane	cis-1,3-Dichloropropane
Bromoform	trans-1,3-Dichloropropane
2-Butanone	Ethyl benzene
Carbon Disulfide	4-Ethyltoluene
Carbon Tetrachloride	2-Hexanone
Chlorobenzene	Methylene Chloride
Chloroform	Styrene
Chloromethane	1,1,2,2-Tetrachloroethane
Dibromochloromethane	Tetrachloroethene
1,2-Dibromoethane	Toluene
1,2-Dichloro-1,1,2,2-tetrafluoroethane	1,1,2-Trichloro-1,2,2-trifluoroethane
1,2-Dichlorobenzene	1,1,1-Trichloroethane
1,3-Dichlorobenzene	1,1,2-Trichloroethane
1,4-Dichlorobenzene	Trichloroethene
Dichlorodifluoromethane	Trichlorofluoromethane
1,1-Dichloroethane	1,2,4-Trimethylbenzene
1,2-Dichloroethane	1,2,5-Trimethylbenzene
1,1-Dichloroethene	Vinyl Acetate
cis-1,2-Dichloroethene	Vinyl Chloride

PCE and TCE exhibited the highest concentrations and were reported in all environmental samples from all sampling ports. PCE was detected at concentrations ranging from 0.039 ppmv

(MWL-SV05-50) to 0.370 ppmv (MWL-SV01-42.5). TCE concentrations ranged from 0.049 ppmv (MWL-SV05-50, environmental sample) to 0.230 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.22375 ppmv (MWL-SV04-50) to 0.766173 ppmv (MWL-SV01-42.5). Other VOCs detected in all monitoring wells, generally at lower concentrations include carbon tetrachloride; chloroform; dichlorodifluoromethane; 1,1-dichloroethane; 1,1-dichloroethene; cis-1,2-dichloroethene; methylene chloride; 1,1,2-trichloro-1,2,2-trifluoroethane; 1,1,1-trichloroethane; and trichlorofluoromethane. The highest sample port VOC concentration was a PCE result of 0.370 ppmv from MWL-SV01-42.5.

For the October 2018 results from the three deepest sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05, PCE concentrations ranged from 0.080 ppmv (MWL-SV05-400 environmental duplicate) to 0.320 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.072 ppmv (MWL-SV04-400) to 0.230 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.27986 ppmv (MWL-SV05-400, environmental duplicate) to 0.67374 ppmv (MWL-SV03-400).

Tables 5-1 and 5-2 (provided at the end of this chapter) summarize detected VOCs results for the April 2018 and October 2018 sampling events, respectively.

5.2.2 Field Quality Control Sample Results

As described in Section 5.1.2, the field QC sampling protocol for the April and October 2018 sampling events included the collection and analysis of environmental-duplicate sample pairs and field blank samples. Field QC sample results met the sampling DQOs and validated the field sampling procedures and protocol. The analytical results for each field QC sample type are presented in this section.

Table 5-3 summarizes results of environmental-duplicate sample pair analyses and the calculated RPD values for the April and October 2018 sample pairs. An RPD was calculated when compounds were reported in both environmental and duplicate samples at concentrations greater than or equal to five times the laboratory RL. The environmental-duplicate sample pair results and QC field blank results are summarized below.

First Sampling Event – April 25, 2018

The two environmental-duplicate sample pairs collected during the April 2018 sampling event were analyzed for all analytical parameters. The calculated RPDs show good agreement for the environmental-duplicate sample pairs, ranging from less than 1 to 41, except for TCE and PCE in the MWL-SV04-50 pair, with RPDs of 50 and 76, respectively. An RPD of 50 or less demonstrates acceptable precision of the sampling and analytical processes consistent with soil-vapor monitoring protocol established at the SNL/NM Chemical Waste Landfill (CWL) (NMED October 2009 and subsequent revisions). The variation associated with the MWL-SV04-50 TCE and PCE results was not observed in the MWL-SV04-300 results (RPDs of 8 and 14, respectively) and is most likely related to natural variation associated with the low-concentration VOC soil-vapor plume. In both cases the duplicate sample results were lower than the environmental sample.

Table 5-3
Summary of Duplicate Samples
Mixed Waste Landfill Soil-Vapor Monitoring
April and October 2018

Well ID/Parameter	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a (%)
	(ppmv)		
April 2018 Environmental-Duplicate Sample Pair Results			
MWL-SV04-50			
Dichlorodifluoromethane	0.016	0.011	37
1,1-Dichloroethene	0.0064	0.0043	39
Tetrachloroethene	0.062	0.028	76
1,1,2-Trichloro-1,2,2-trifluoroethane	0.057	0.039	38
1,1,1-Trichloroethane	0.0071	0.0047	41
Trichloroethene	0.055	0.033	50
Trichlorofluoromethane	0.027	0.018	40
MWL-SV04-300			
Dichlorodifluoromethane	0.021	0.028	29
1,1-Dichloroethene	0.012	0.013	8
Tetrachloroethene	0.085	0.098	14
1,1,2-Trichloro-1,2,2-trifluoroethane	0.074	0.080	8
Trichloroethene	0.062	0.067	8
Trichlorofluoromethane	0.015	0.015	<1
October 2018 Environmental-Duplicate Sample Pair Results			
MWL-SV05-50			
Dichlorodifluoromethane	0.022	0.022	<1
1,1-Dichloroethane	0.0015	0.0015	<1
1,1-Dichloroethene	0.0095	0.0098	3
Tetrachloroethene	0.039	0.040	3
1,1,2-Trichloro-1,2,2-trifluoroethane	0.037	0.038	3
1,1,1-Trichloroethane	0.012	0.012	<1
Trichloroethene	0.049	0.051	4
Trichlorofluoromethane	0.11	0.11	<1
MWL-SV05-400			
Dichlorodifluoromethane	0.013	0.012	8
1,1-Dichloroethane	0.0016	0.0015	6
1,1-Dichloroethene	0.018	0.017	6
Tetrachloroethene	0.081	0.080	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.056	0.054	4
1,1,1-Trichloroethane	0.0017	0.0017	<1
Trichloroethene	0.077	0.075	3
Trichlorofluoromethane	0.034	0.034	<1

Notes:

^aRPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

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

where:

R₁ = Analysis result.
R₂ = Duplicate analysis result.

ID = Identification.

ppmv = Parts per million by volume basis.

A total of five field blank samples were submitted for analysis with the April 2018 environmental samples. VOCs detected in field blank samples at very low concentrations included acetone (2 samples), benzene (3 samples), methylene chloride (5 samples), PCE (3 samples), toluene (5 samples), and TCE (1 sample). VOCs detected in the field blank sample associated with only MWL-SV05 environmental samples included 2-butanone; chloromethane; dichlorodifluoromethane; 1,2-dichloroethane, ethylbenzene; 4-methyl-2-pentanone; styrene; trichlorofluoromethane; m,p-xylene; and o-xylene. No corrective action was required for PCE or TCE since these compounds were detected in associated environmental samples at concentrations greater than five times the field blank concentration. All other VOCs detected in the field blank samples were qualified as not detected during data validation for the corresponding environmental samples when these compounds were reported at concentrations less than the laboratory RL (i.e., results were very low concentrations).

Second Sampling Event – October 30, 2018

The two environmental-duplicate sample pairs collected during the October 2018 sampling event were analyzed for all analytical parameters. The calculated RPDs show good agreement for the environmental-duplicate sample pairs. The RPD values ranged from less than 1 to 8.

A total of five field blank samples were submitted for analysis with the October 2018 samples. VOCs detected in field blank samples at very low concentrations included acetone (2 samples), carbon disulfide (1 sample), PCE (2 samples), toluene (1 sample), m,p-xylene (1 sample), o-xylene (1 sample), and vinyl chloride (1 sample). No corrective action was required for carbon disulfide or PCE since these compounds were detected in associated environmental samples at concentrations greater than five times the field blank concentration. All other VOCs were qualified as not detected during data validation for the corresponding environmental samples when these compounds were reported at concentrations less than the laboratory RL (i.e., results were very low concentrations).

5.2.3 Laboratory Quality Control and Data Quality

Internal laboratory QC samples were analyzed concurrently with all environmental samples in accordance with laboratory procedures and EPA methods. These samples included laboratory control samples, method blanks, matrix spike and matrix spike duplicate samples, surrogate spikes samples, and replicate samples. The results were used to evaluate potential contamination associated with the laboratory analytical process and to determine the accuracy and precision of the analytical methods. There were no issues associated with laboratory QC samples for the April and October sampling events. All laboratory control sample results for both sampling events met the accuracy (i.e., percent recovery) requirement of 50 to 130 percent for detected compounds (Section 2.2 of LTMMMP Appendix D).

All chemical data were reviewed and qualified in accordance with SNL/NM AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM June 2017b). Based upon the data validation and review criteria, all April and October analytical data were determined acceptable and met the DQOs. Reported QC sample results comply with analytical method and laboratory procedure requirements. Data validation reviews, contract verification reviews, and certificates of analysis are provided in Annex C.

5.2.4 Variances

One variance from requirements in the LTMMMP was identified for the April and October 2018 soil-vapor monitoring activities. This variance is considered minor because it has no adverse impact on data quality. During the purging process, a PID with an 11.7 electron volts (eV) lamp was used instead of an 11.8 eV lamp as specified in Section 3.3 in Appendix D of the LTMMMP. 11.8 eV lamps are not currently available from the manufacturer or the distributors. Submittal of a permit modification request is anticipated in CY 2019 and will address this minor variance.

5.3 Historical Data Evaluation

Tables 5-4, 5-5, and 5-6 provide results for PCE, TCE, and Total VOCs, respectively. Each table presents results for the eight semiannual monitoring events conducted since implementation of the LTMMMP in 2014. Key points from the evaluation of the 2014 through 2018 soil-vapor monitoring results are summarized below.

- All individual VOC results for all monitoring well sampling ports are low concentrations, less than 0.600 ppmv.
- Concentrations throughout the 500-foot thick vadose zone are relatively consistent; shallow results do not vary considerably from deeper results.
- The soil-vapor monitoring results are consistent with an old source that has slowly dissipated throughout the vadose zone through diffusion.
- The distribution of concentrations in the vadose zone indicates the VOC soil-vapor plume is stable, with no evidence of new releases from the disposal area in the shallower sampling port results.
- 2014 through 2018 results for the shallow sampling ports closer to the disposal areas (i.e., sampling port depths ranging from 41.5 to 100 ft bgs at all five monitoring wells) reflect lower concentrations than were measured during the Phase 2 RCRA Facility Investigation in 1994 (Peace et al. September 2002) and 2008 VOC Soil-Vapor Investigation (SNL/NM August 2008), further supporting the absence of new releases from the disposal area.
- Results for the three deepest sampling ports of MWL-SV03 through MWL-SV05 (400 ft bgs) are stable and below the trigger levels.

PCE, TCE, and Total VOCs concentrations over time for all soil-vapor monitoring wells and ports are presented in Figures 5-2 through 5-13. The variation in PCE and TCE concentrations over the ten sampling events conducted from 2014 to 2018 is less than 0.100 ppmv for all sampling ports except MWL-SV01-42.5 (the maximum PCE variation was 0.260 ppmv between the September 2014 and October 2018 results). The 2014 through 2018 data sets are very similar indicating stable VOC concentrations throughout the 500-foot thick vadose zone. The variability shown in the data is expected given the vadose zone geology, which is laterally and vertically discontinuous, and comprised of interfingering, unconsolidated, alluvial-fan deposits ranging in grain size from clay to poorly sorted coarse gravels.

Table 5-4
Summary of Historical PCE Concentrations
Mixed Waste Landfill Soil-Vapor Monitoring

Well ID & Sample Port Depth ^a	September 2014 ^b (ppmv)	October 2014 ^b (ppmv)	April 2015 ^b (ppmv)	October 2015 ^b (ppmv)	April 2016 ^b (ppmv)	October 2016 ^b (ppmv)	May 2017 ^b (ppmv)	October 2017 ^b (ppmv)	April 2018 ^b (ppmv)	October 2018 ^b (ppmv)
MWL-SV01-42.5	0.560	0.400	0.460	0.470	0.410	0.450	0.300	0.420	0.370	0.370
MWL-SV02-41.5	0.086	0.067	0.075	0.068	0.068	0.070	0.071	0.072	0.059	0.059
MWL-SV03-50	0.140	0.120	0.150	0.110	0.170	0.140	0.100	0.140	0.130	0.130
MWL-SV03-100	0.210	0.230	0.240	0.220	0.240	0.240	0.160	0.220	0.210	0.170
MWL-SV03-200	0.300	0.320	0.310	0.290	0.270	0.270	0.210	0.260	0.240	0.210
MWL-SV03-300	0.290	0.320	0.290	0.370	0.310	0.300	0.220	0.280	0.270	0.200
MWL-SV03-400	0.390	0.400	0.420	0.450	0.430	0.440	0.390	0.310	0.370	0.320
MWL-SV04-50	0.072	0.076	0.076	0.074	0.078	0.077	0.052	0.063	0.062	0.060
MWL-SV04-100	0.130	0.120	0.120	0.120	0.130	0.130	0.089	0.110	0.110	0.120
MWL-SV04-200	0.180	0.180	0.170	0.150	0.180	0.150	0.110	0.130	0.120	0.120
MWL-SV04-300	0.110	0.130	0.110	0.120	0.130	0.130	0.095	0.120	0.098	0.110
MWL-SV04-400	0.110	0.140	0.120	0.140	0.150	0.130	0.100	0.110	0.120	0.120
MWL-SV05-50	0.052	0.048	0.055	0.040	0.060	0.045	0.044	0.021	0.045	0.040
MWL-SV05-100	0.092	0.096	0.100	0.077	0.099	0.095	0.089	0.070	0.085	0.075
MWL-SV05-200	0.140	0.170	0.150	0.120	0.170	0.140	0.140	0.100	0.130	0.120
MWL-SV05-300	0.090	0.120	0.097	0.110	0.100	0.110	0.110	0.091	0.098	0.091
MWL-SV05-400	0.100	0.110	0.080	0.120	0.110	0.110	0.100	0.092	0.092	0.081

Notes:

All concentrations are not rounded so they exactly match the reported concentrations in corresponding data tables.

^aPort depth is the last number in the Well ID and is in feet below ground surface.

^bIf a duplicate sample was collected, then maximum concentration of the environmental-duplicate sample pair is shown.

ID = Identification.

PCE = Tetrachloroethene.

ppmv = Parts per million by volume.

Table 5-5
Summary of Historical TCE Concentrations
Mixed Waste Landfill Soil-Vapor Monitoring

Well ID & Sample Port Depth ^a	September 2014 ^b (ppmv)	October 2014 ^b (ppmv)	April 2015 ^b (ppmv)	October 2015 ^b (ppmv)	April 2016 ^b (ppmv)	October 2016 ^b (ppmv)	May 2017 ^b (ppmv)	October 2017 ^b (ppmv)	April 2018 ^b (ppmv)	October 2018 ^b (ppmv)
MWL-SV01-42.5	0.110	0.090	0.099	0.110	0.091	0.100	0.071	0.086	0.081	0.070
MWL-SV02-41.5	0.075	0.058	0.067	0.065	0.063	0.065	0.070	0.067	0.056	0.050
MWL-SV03-50	0.100	0.082	0.097	0.080	0.140	0.110	0.098	0.120	0.110	0.100
MWL-SV03-100	0.190	0.190	0.200	0.200	0.210	0.210	0.130	0.180	0.190	0.150
MWL-SV03-200	0.300	0.300	0.290	0.310	0.250	0.270	0.250	0.230	0.240	0.190
MWL-SV03-300	0.190	0.210	0.170	0.260	0.200	0.220	0.200	0.210	0.190	0.140
MWL-SV03-400	0.290	0.280	0.260	0.350	0.300	0.320	0.250	0.230	0.270	0.230
MWL-SV04-50	0.061	0.059	0.060	0.066	0.070	0.067	0.054	0.058	0.055	0.051
MWL-SV04-100	0.130	0.120	0.120	0.130	0.140	0.150	0.120	0.120	0.110	0.110
MWL-SV04-200	0.210	0.210	0.190	0.200	0.220	0.200	0.180	0.170	0.170	0.140
MWL-SV04-300	0.076	0.091	0.064	0.093	0.081	0.097	0.087	0.094	0.067	0.076
MWL-SV04-400	0.075	0.096	0.060	0.097	0.070	0.091	0.085	0.081	0.087	0.072
MWL-SV05-50	0.067	0.061	0.064	0.052	0.074	0.058	0.049	0.042	0.055	0.051
MWL-SV05-100	0.140	0.130	0.130	0.120	0.130	0.130	0.110	0.100	0.110	0.099
MWL-SV05-200	0.200	0.240	0.210	0.200	0.210	0.200	0.190	0.150	0.190	0.170
MWL-SV05-300	0.100	0.130	0.082	0.120	0.096	0.120	0.120	0.120	0.110	0.120
MWL-SV05-400	0.094	0.100	0.066	0.120	0.089	0.100	0.087	0.097	0.089	0.077

Notes:

All concentrations are not rounded so they exactly match the reported concentrations in corresponding data tables.

^aPort depth is the last number in the Well ID and is in feet below ground surface.

^bIf a duplicate sample was collected, then maximum concentration of the environmental-duplicate sample pair is shown.

ID = Identification.

ppmv = Parts per million by volume.

TCE = Trichloroethene.

Table 5-6
Summary of Historical Total VOCs Concentrations
Mixed Waste Landfill Soil-Vapor Monitoring

Well ID & Sample Port Depth ^a	September 2014 ^b (ppmv)	October 2014 ^b (ppmv)	April 2015 ^b (ppmv)	October 2015 ^b (ppmv)	April 2016 ^b (ppmv)	October 2016 ^b (ppmv)	May 2017 ^b (ppmv)	October 2017 ^b (ppmv)	April 2018 ^b (ppmv)	October 2018 ^b (ppmv)
MWL-SV01-42.5	1.14010	1.00870	1.11670	1.03620	0.93510	0.97570	0.740723	0.89810	0.82938	0.766173
MWL-SV02-41.5	0.71822	0.67880	0.76470	0.69150	0.71030	0.70780	0.62944	0.67594	0.62856	0.58550
MWL-SV03-50	0.36957	0.31750	0.37076	0.30743	0.48016	0.42248	0.34860	0.42918	0.37492	0.37254
MWL-SV03-100	0.61151	0.63820	0.69490	0.74420	0.73270	0.73682	0.53366	0.62881	0.64167	0.51641
MWL-SV03-200	0.91906	0.94754	0.99016	0.93230	0.84151	0.87920	0.78555	0.78590	0.75426	0.63905
MWL-SV03-300	0.64917	0.67835	0.59506	0.83120	0.68678	0.74430	0.61278	0.71640	0.64246	0.51890
MWL-SV03-400	0.87270	0.81410	0.85950	0.95920	0.8798	0.89730	0.69654	0.62930	0.77359	0.67374
MWL-SV04-50	0.25949	0.26359	0.28424	0.28232	0.30064	0.29728	0.232861	0.25573	0.23944	0.22375
MWL-SV04-100	0.45631	0.42879	0.44346	0.46616	0.50930	0.53785	0.40932	0.43340	0.42102	0.40980
MWL-SV04-200	0.68361	0.66935	0.64340	0.63160	0.72689	0.66068	0.56579	0.56287	0.58006	0.52679
MWL-SV04-300	0.26624	0.32355	0.27345	0.34519	0.32831	0.37126	0.32319	0.35562	0.31116	0.30295
MWL-SV04-400	0.25031	0.3246	0.26702	0.35374	0.35148	0.38251	0.31282	0.32932	0.33570	0.31229
MWL-SV05-50	0.36547	0.31833	0.33990	0.30406	0.37770	0.35609	0.29951	0.26189	0.32248	0.28946
MWL-SV05-100	0.56578	0.54556	0.57169	0.53248	0.59430	0.61891	0.54760	0.51172	0.52584	0.47217
MWL-SV05-200	0.70237	0.82115	0.73680	0.65830	0.80567	0.73190	0.69410	0.57349	0.68820	0.60710
MWL-SV05-300	0.35628	0.42371	0.33576	0.44336	0.36421	0.46092	0.47695	0.44050	0.41957	0.40427
MWL-SV05-400	0.54096	0.39521	0.25075	0.45245	0.30765	0.40839	0.29962	0.29543	0.29875	0.30373

Notes:

All concentrations are not rounded so they exactly match the reported concentrations in corresponding data tables.

^aIf a duplicate sample was collected, then maximum concentration of the environmental-duplicate sample pair is shown.

^bPort depth is the last number in the Well ID and is in feet below ground surface.

ID = Identification.

ppmv = Parts per million by volume.

VOC = Volatile organic compound.

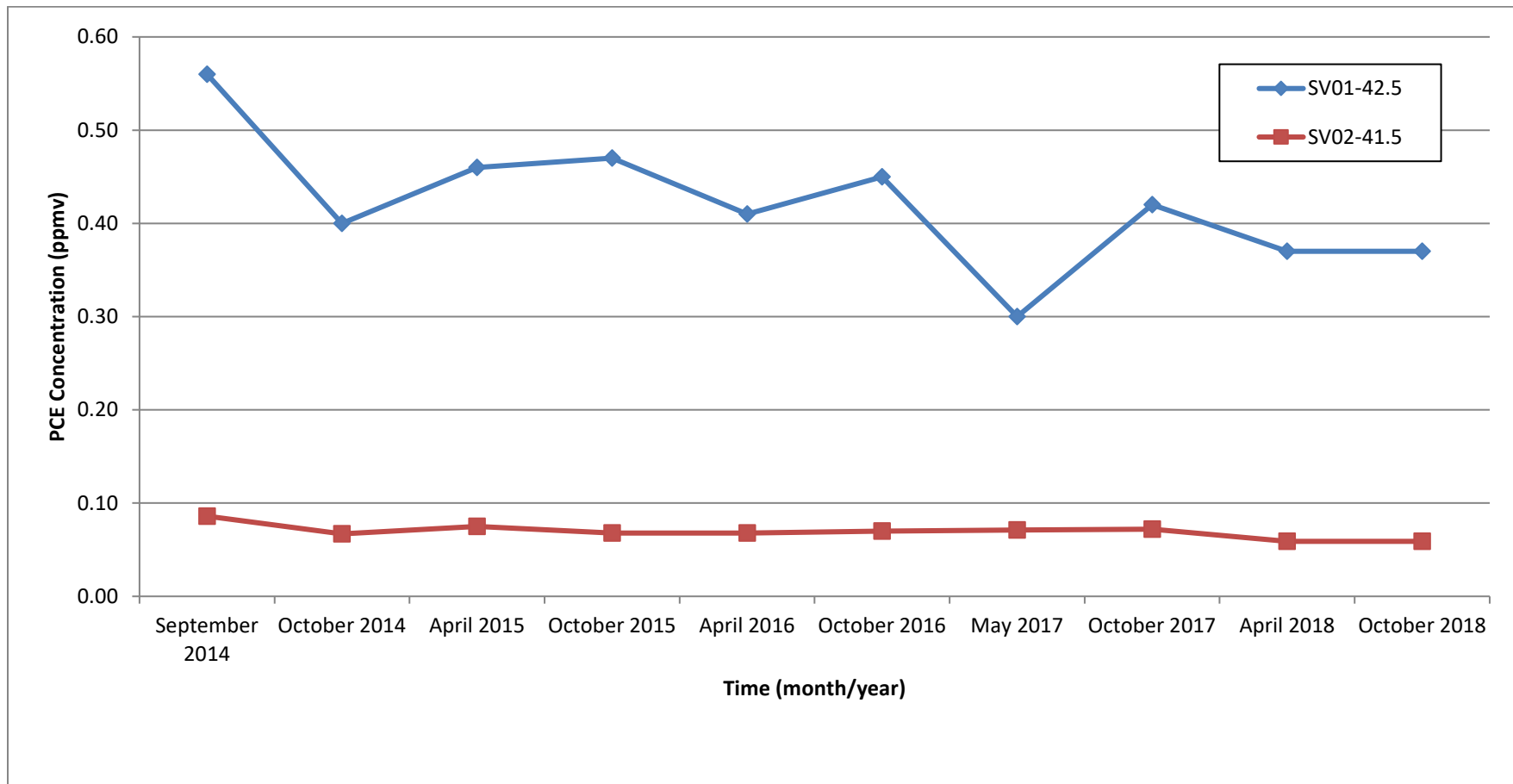


Figure 5-2
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

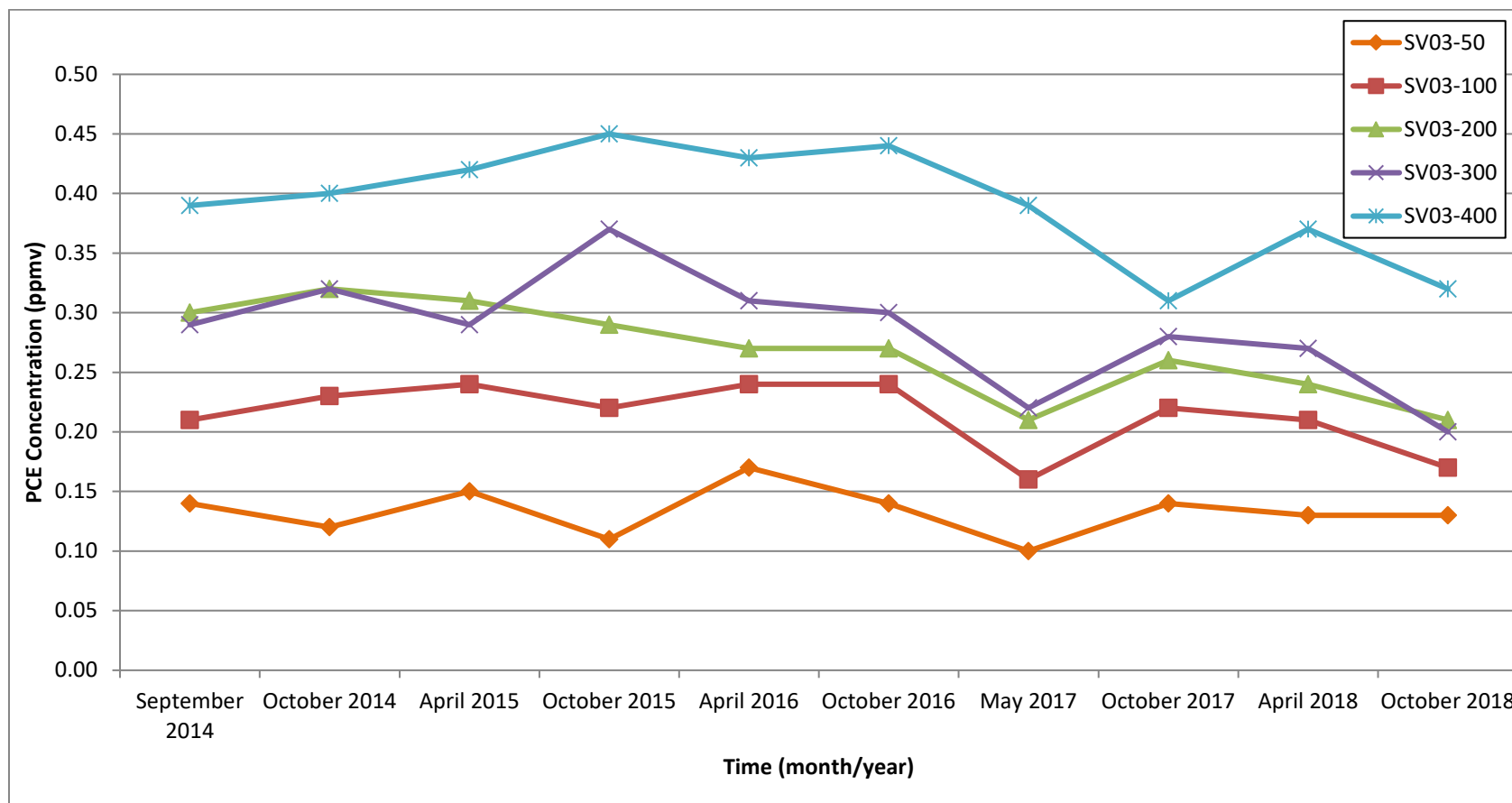


Figure 5-3
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

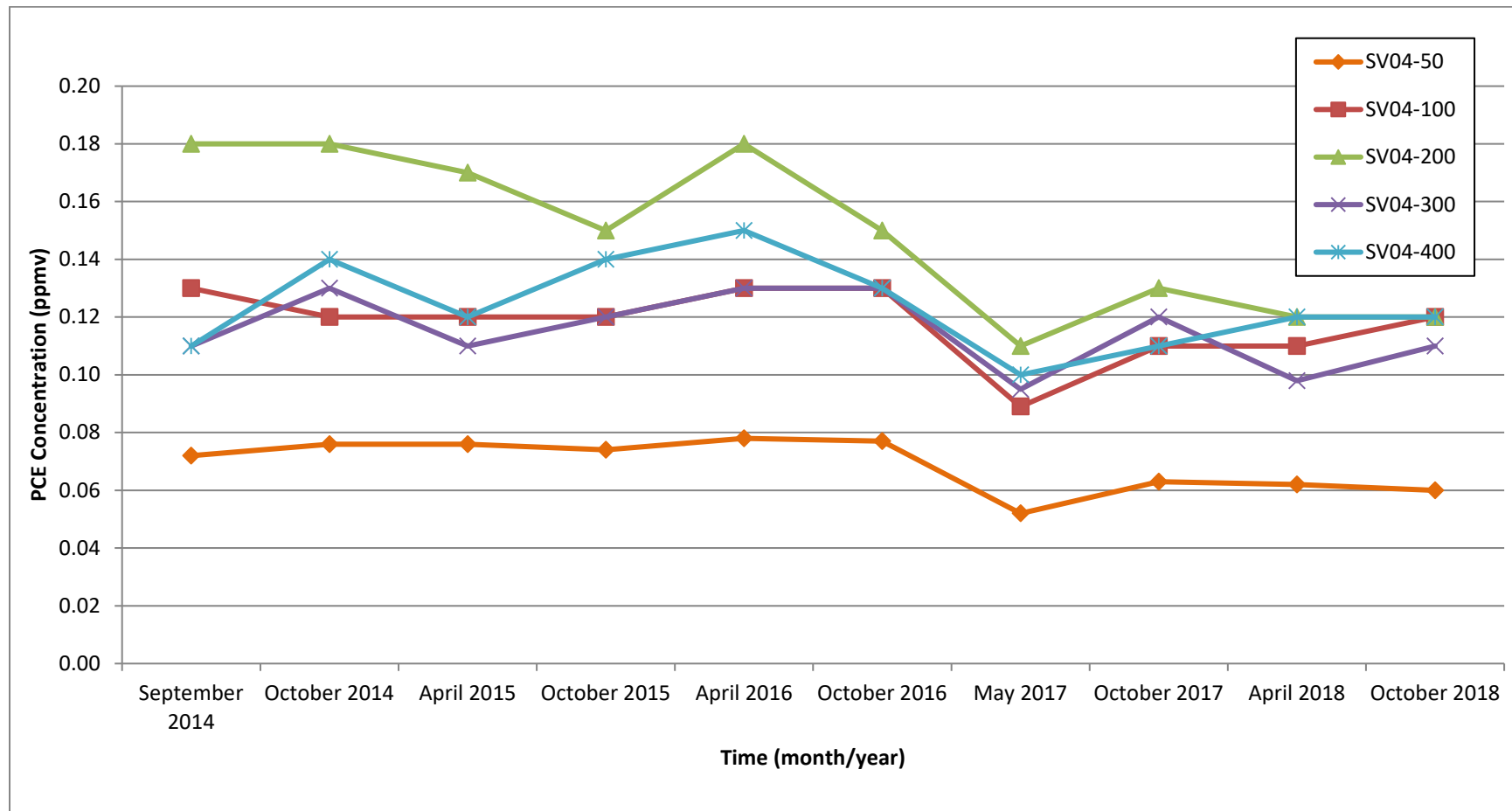


Figure 5-4
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

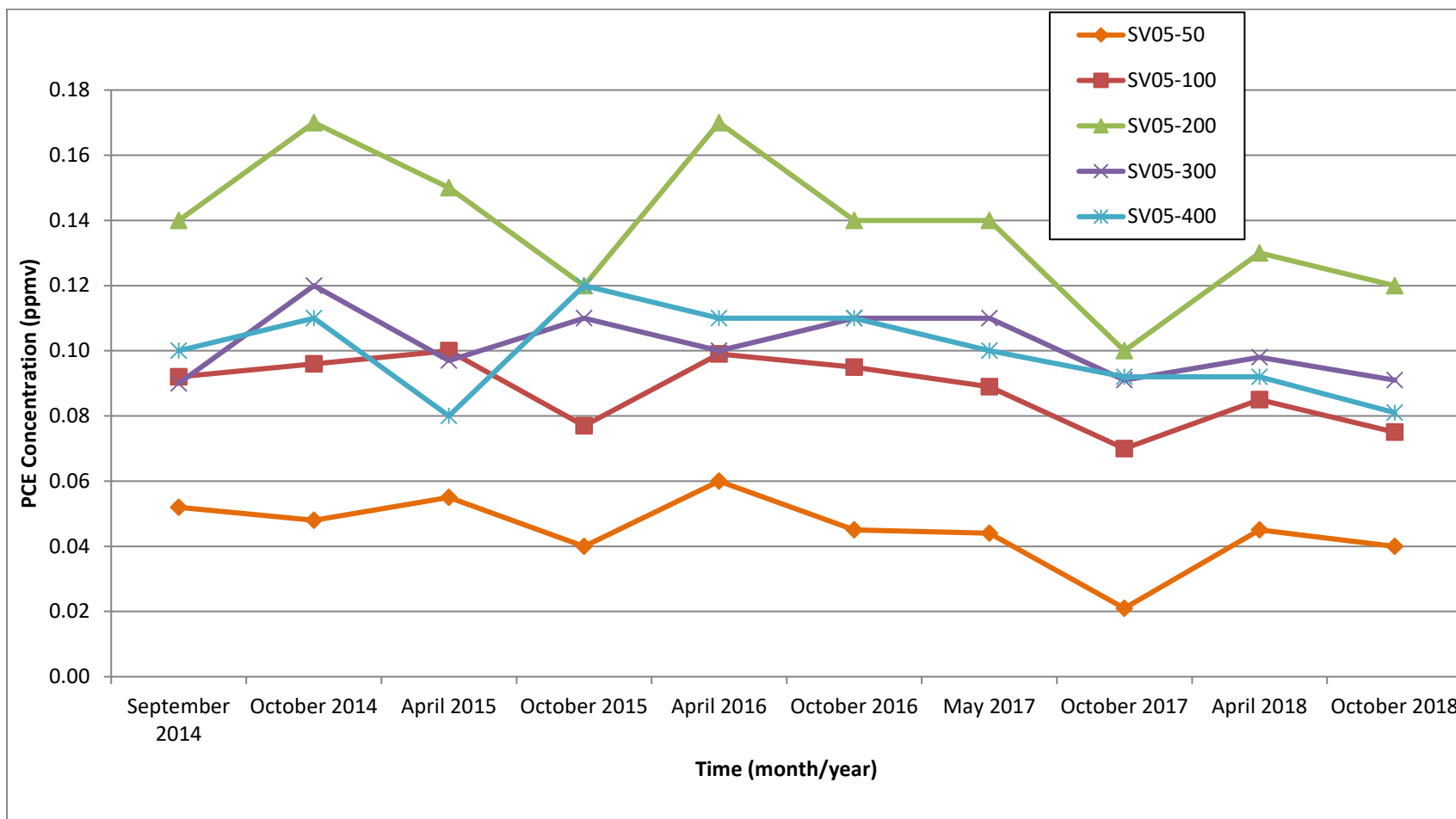


Figure 5-5
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

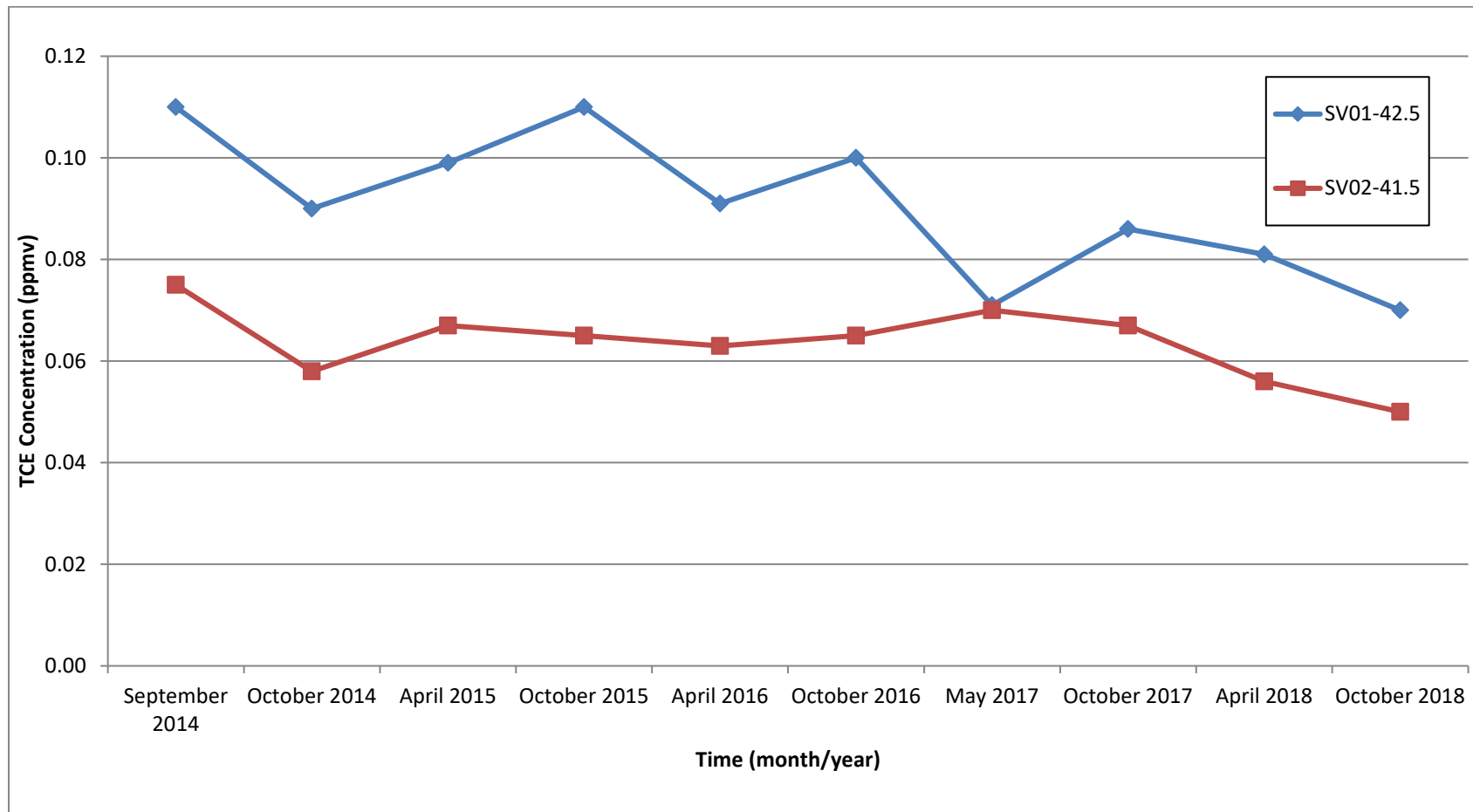


Figure 5-6
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

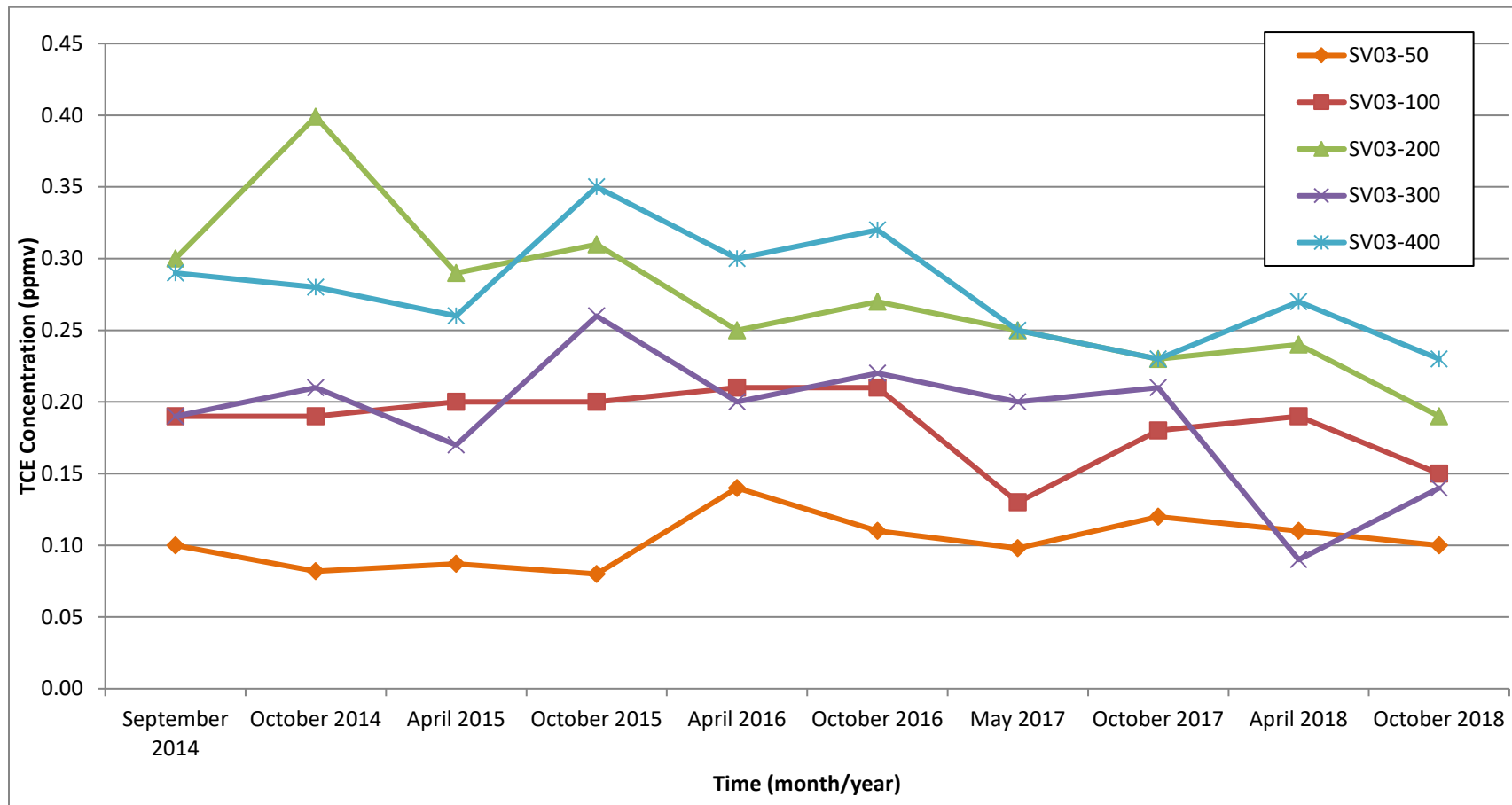


Figure 5-7
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

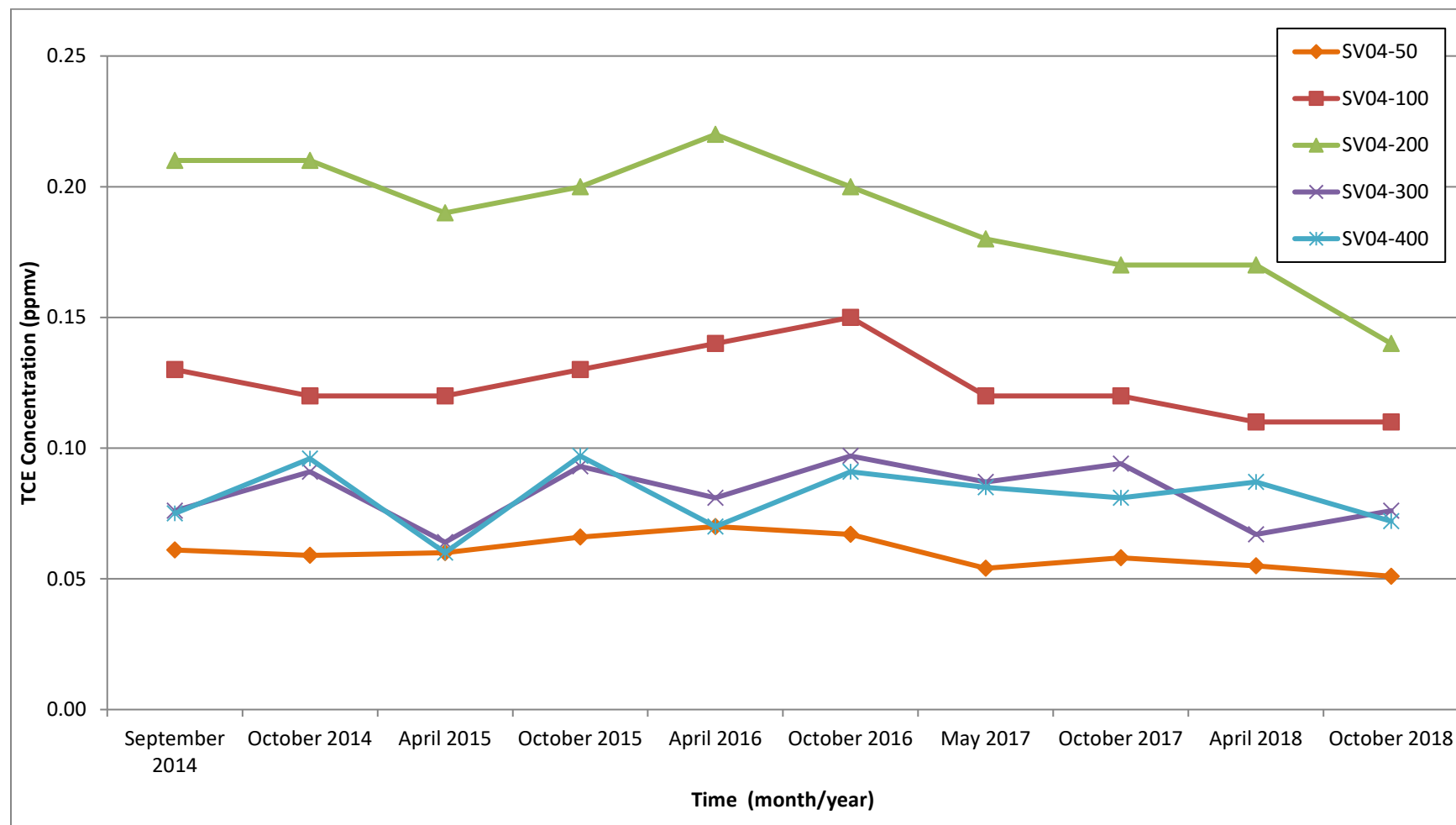


Figure 5-8
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

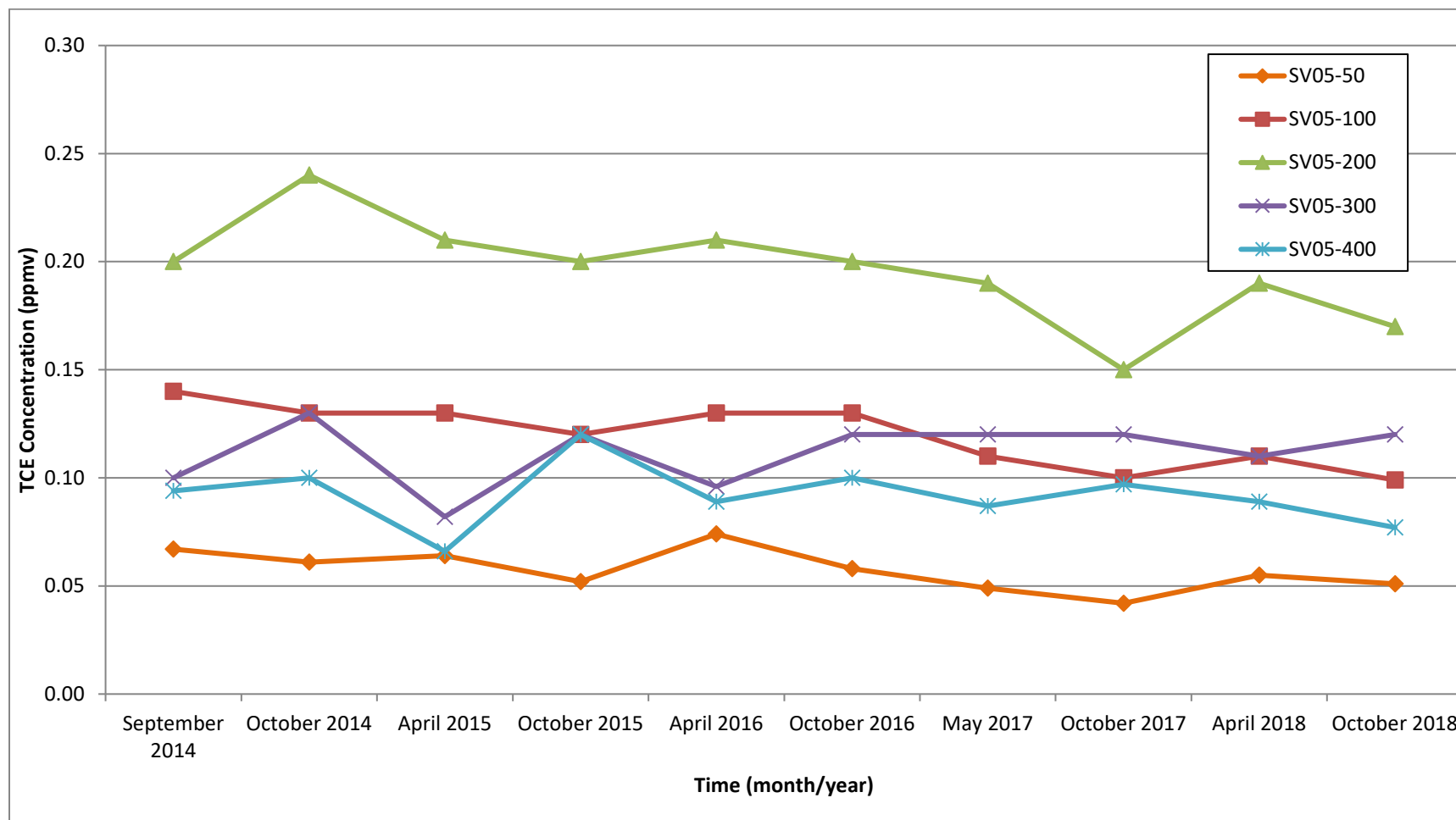


Figure 5-9
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

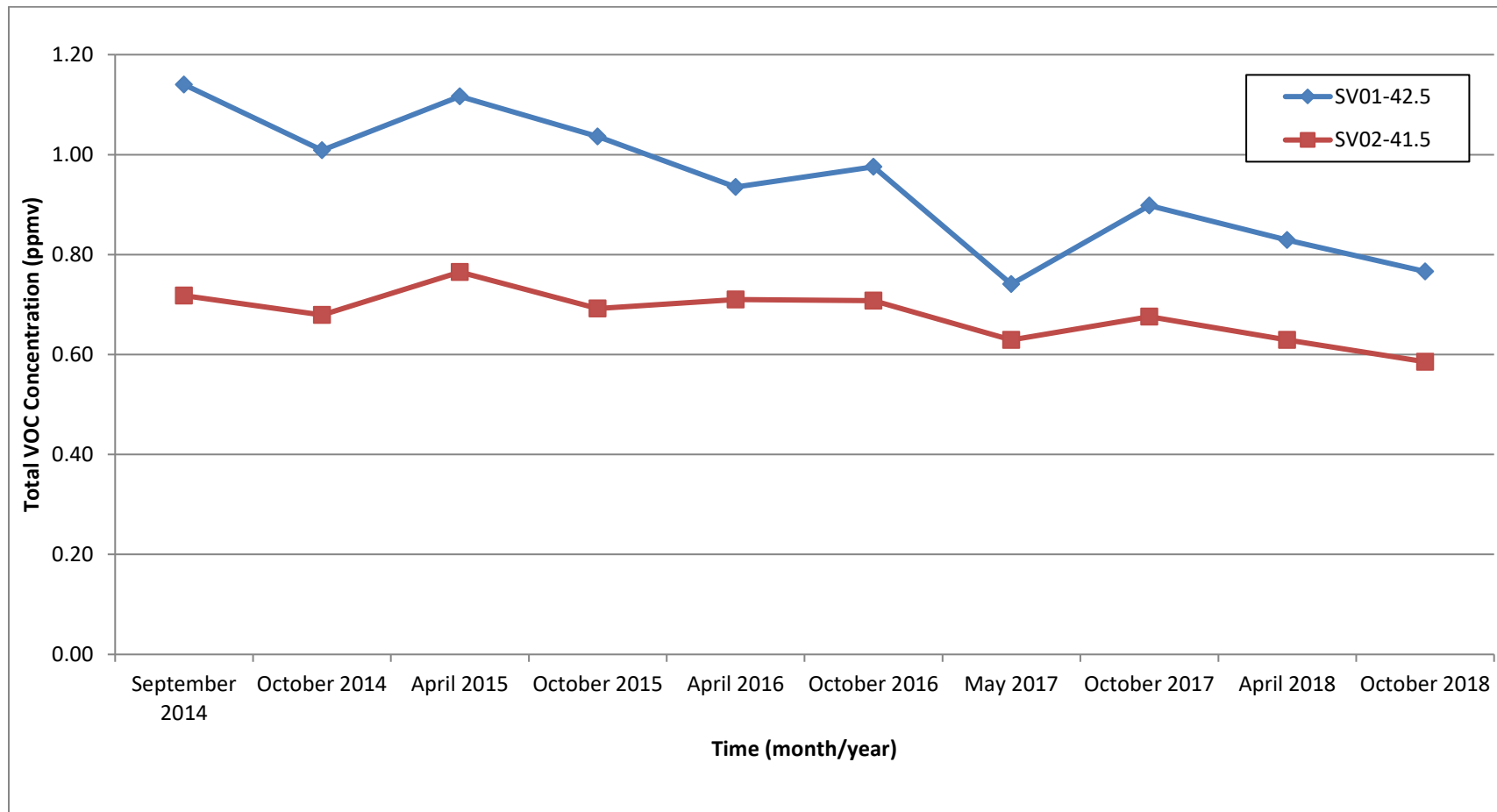


Figure 5-10
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

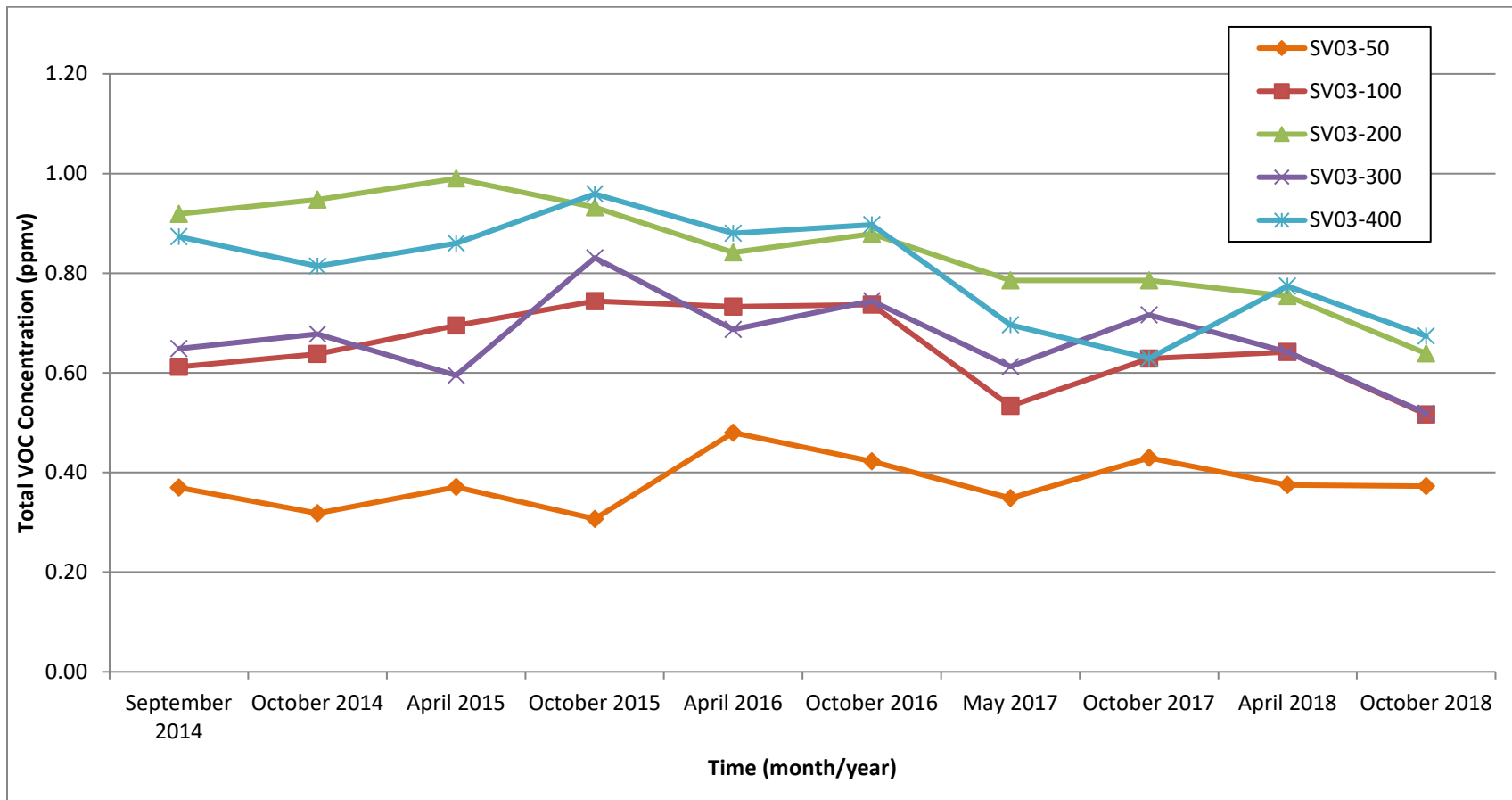


Figure 5-11
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

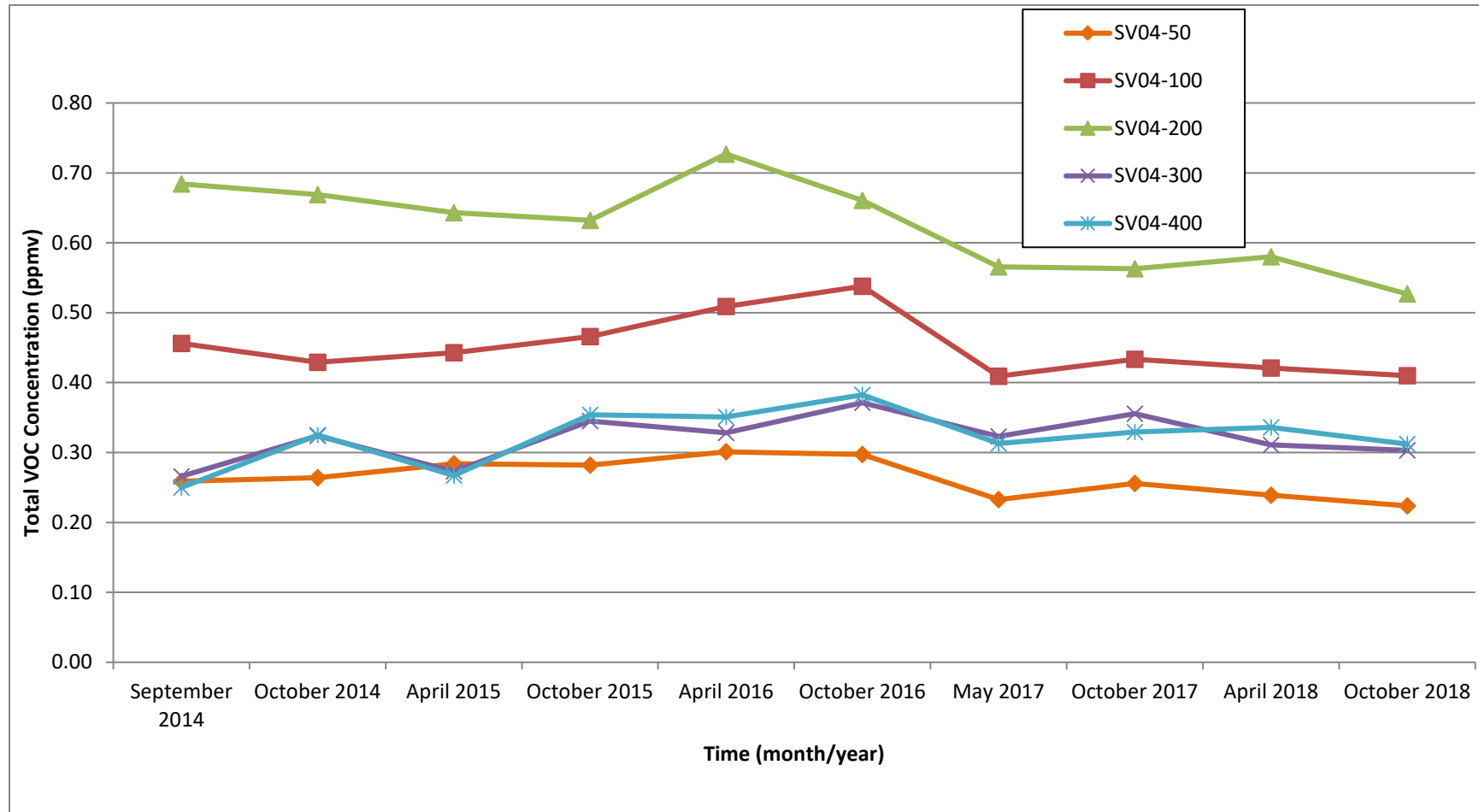


Figure 5-12
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

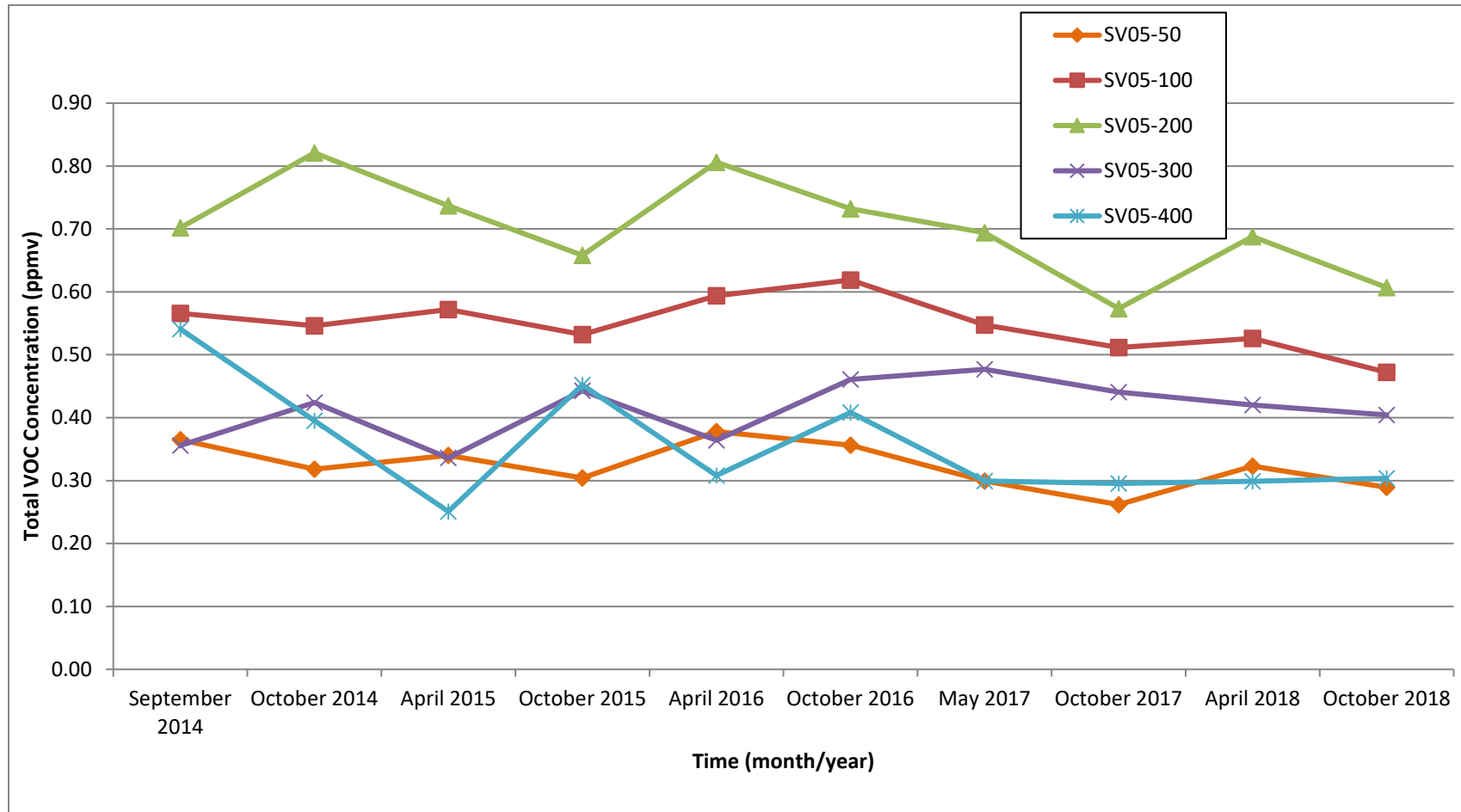


Figure 5-13
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

Table 5-1
Summary of Detected VOCs – April 2018

Table 5-2
Summary of Detected VOCs – October 2018

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Table 5-1
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV01-42.5 25-Apr-18	Acetone	0.0049	0.00045	0.013	J	--
	Bromodichloromethane	0.00058	0.00017	0.00076	J	--
	2-Butanone	0.0017	0.00050	0.0020	J	--
	Carbon disulfide	0.0013	0.00020	0.0020	J	0.002U
	Carbon tetrachloride	0.00030	0.00016	0.0020	J	--
	Chloroform	0.015	0.00024	0.00076	--	--
	Dichlorodifluoromethane	0.081	0.00037	0.0010	--	--
	1,1-Dichloroethane	0.0025	0.00018	0.00076	--	--
	1,1-Dichloroethene	0.0072	0.00033	0.0020	--	--
	cis-1,2-Dichloroethene	0.0012	0.00022	0.0010	--	--
	Methylene chloride	0.00044	0.00018	0.0010	B, J	0.001U
	Tetrachloroethene	0.37	0.00040	0.0031	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.070	0.00041	0.0010	--	--
	1,1,1-Trichloroethane	0.034	0.00016	0.00076	--	--
	Trichloroethene	0.081	0.00026	0.0010	--	--
	Trichlorofluoromethane	0.16	0.00049	0.0010	--	--
	Total Organics ^d	0.82938	NA	NA	NA	NA
MWL-SV02-41.5 25-Apr-18	Acetone	0.0075	0.00069	0.019	J	--
	2-Butanone	0.0048	0.00077	0.0031		--
	Carbon tetrachloride	0.00030	0.00025	0.0031	J	--
	Chloroform	0.0027	0.00037	0.0012	--	--
	1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00063	0.00060	0.0015	J	--
	Dichlorodifluoromethane	0.085	0.00056	0.0015	--	--
	1,1-Dichloroethane	0.0021	0.00028	0.0012	--	--
	1,1-Dichloroethene	0.0098	0.00050	0.0031	--	--
	cis-1,2-Dichloroethene	0.00073	0.00034	0.0015	J	--
	Methylene chloride	0.00053	0.00028	0.0015	B, J	0.0015U
	Tetrachloroethene	0.059	0.00020	0.0015	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.045	0.00063	0.0015	--	--
	1,1,1-Trichloroethane	0.065	0.00025	0.0012	--	--
	Trichloroethene	0.056	0.00041	0.0015	--	--
	Trichlorofluoromethane	0.29	0.00076	0.0015	--	--
	Total Organics ^d	0.62856	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-50 25-Apr-18	Acetone	0.0036	0.00037	0.010	J	0.01U
	Benzene	0.00037	0.00016	0.00083	J	--
	Carbon tetrachloride	0.00024	0.00013	0.0017	J	--
	Chloroform	0.0017	0.00020	0.00062	--	--
	Dichlorodifluoromethane	0.024	0.00030	0.00083	--	--
	1,1-Dichloroethane	0.0032	0.00015	0.00062	--	--
	1,1-Dichloroethene	0.011	0.00027	0.0017	--	--
	cis-1,2-Dichloroethene	0.0017	0.00018	0.00083	--	--
	Methylene chloride	0.00091	0.00015	0.00083	B	J+
	Tetrachloroethene	0.13	0.00011	0.00083	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.065	0.00034	0.00083	--	--
	1,1,1-Trichloroethane	0.0028	0.00013	0.00062	--	--
	Trichloroethene	0.11	0.00022	0.00083	--	--
	Trichlorofluoromethane	0.024	0.00041	0.00083	--	--
	Total Organics ^d	0.37492	NA	NA	NA	NA
MWL-SV03-100 25-Apr-18	Acetone	0.0025	0.00049	0.014	J	0.014U
	Carbon disulfide	0.00097	0.00021	0.0022	J	--
	Carbon tetrachloride	0.00040	0.00018	0.0022	J	--
	Chloroform	0.0025	0.00026	0.00083	--	--
	Chloromethane	0.00060	0.00054	0.0022	J	--
	Dichlorodifluoromethane	0.041	0.00040	0.0011	--	--
	1,1-Dichloroethane	0.0059	0.00020	0.00083	--	--
	1,1-Dichloroethene	0.022	0.00035	0.0022	--	--
	cis-1,2-Dichloroethene	0.0034	0.00024	0.0011	--	--
	Methylene chloride	0.0018	0.00020	0.0011	B	J+
	Tetrachloroethene	0.21	0.00014	0.0011	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.12	0.00045	0.0011	--	--
	1,1,1-Trichloroethane	0.0041	0.00018	0.00083	--	--
	Trichloroethene	0.19	0.00029	0.0011	--	--
	Trichlorofluoromethane	0.039	0.00054	0.0011	--	--
	Total Organics ^d	0.64167	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-200 25-Apr-18	Acetone	0.0040	0.00064	0.018	J	0.018U
	Benzene	0.00028	0.00028	0.0014	J	--
	Carbon tetrachloride	0.00048	0.00023	0.0029	J	--
	Chloroform	0.0024	0.00034	0.0011	--	--
	Dichlorodifluoromethane	0.049	0.00052	0.0014	--	--
	1,1-Dichloroethane	0.0077	0.00026	0.0011	--	--
	1,1-Dichloroethene	0.030	0.00046	0.0029	--	--
	cis-1,2-Dichloroethene	0.0045	0.00032	0.0014	--	--
	Methylene chloride	0.0032	0.00026	0.0014	B	J+
	Tetrachloroethene	0.24	0.00018	0.0014	--	--
	Toluene	0.00019	0.00018	0.0014	J	0.0014U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.14	0.00058	0.0014	--	--
	1,1,1-Trichloroethane	0.0027	0.00023	0.0011	--	--
	Trichloroethene	0.24	0.00038	0.0014	--	--
	Trichlorofluoromethane	0.034	0.00070	0.0014	--	--
MWL-SV03-300 25-Apr-18	Total Organics ^d	0.75426	NA	NA	NA	NA
	Acetone	0.0061	0.00062	0.018	J	0.018U
	Benzene	0.00030	0.00028	0.0014	J	--
	Carbon tetrachloride	0.00036	0.00022	0.0028	J	--
	Chloroform	0.0014	0.00033	0.0011	--	--
	Dichlorodifluoromethane	0.034	0.00051	0.0014	--	--
	1,1-Dichloroethane	0.0035	0.00025	0.0011	--	--
	1,1-Dichloroethene	0.022	0.00045	0.0028	--	--
	cis-1,2-Dichloroethene	0.0023	0.00031	0.0014	--	--
	Methylene chloride	0.0015	0.00025	0.0014	B	J+
	Tetrachloroethene	0.27	0.00018	0.0014	--	--
	Toluene	0.00030	0.00018	0.0014	J	0.0014U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.10	0.00057	0.0014	--	--
	1,1,1-Trichloroethane	0.0011	0.00023	0.0011	--	--
	Trichloroethene	0.19	0.00037	0.0014	--	--
	Trichlorofluoromethane	0.016	0.00069	0.0014	--	--
	Total Organics ^d	0.64246	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-400 25-Apr-18 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0059	0.0011	0.030	J	0.03U
	Carbon tetrachloride	0.00039	0.00038	0.0048	J	--
	Chloroform	0.0017	0.00057	0.0018	J	--
	Dichlorodifluoromethane	0.015	0.00086	0.0024	--	--
	1,1-Dichloroethane	0.0036	0.00043	0.0018	--	--
	1,1-Dichloroethene	0.022	0.00077	0.0048	--	--
	cis-1,2-Dichloroethene	0.0026	0.00053	0.0024	--	--
	Methylene chloride	0.0016	0.00043	0.0024	B, J	0.0024U
	Tetrachloroethene	0.37	0.00030	0.0024	--	--
	Toluene	0.00039	0.00030	0.0024	J	0.0024U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.070	0.00097	0.0024	--	--
	1,1,1-Trichloroethane	0.0013	0.00039	0.0018	J	--
	Trichloroethene	0.27	0.00063	0.0024	--	--
	Trichlorofluoromethane	0.0017	0.0012	0.0024	--	--
	Total Organics ^d	0.77359	NA	NA	NA	NA
MWL-SV04-50 25-Apr-18	Acetone	0.0031	0.00018	0.0050	J	--
	Benzene	0.00033	0.000079	0.00040	J	--
	2-Butanone	0.00056	0.00020	0.00080	J	--
	Carbon disulfide	0.0010	0.000078	0.00080	--	--
	Carbon tetrachloride	0.00023	0.000064	0.00080	J	--
	Chloroform	0.0019	0.000095	0.00030	--	--
	Dichlorodifluoromethane	0.016	0.00015	0.00040	--	--
	1,1-Dichloroethane	0.0013	0.000072	0.00030	--	--
	1,1-Dichloroethene	0.0064	0.00013	0.00080	--	--
	cis-1,2-Dichloroethene	0.00052	0.000089	0.00040	--	--
	Methylene chloride	0.00017	0.000072	0.00040	B, J	0.0004U
	Tetrachloroethene	0.062	0.000051	0.00040	--	--
	Toluene	0.000054	0.000051	0.00040	J	0.0004U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.057	0.00016	0.00040	--	--
	1,1,1-Trichloroethane	0.0071	0.000065	0.00030	--	--
	Trichloroethene	0.055	0.00011	0.00040	--	--
	Trichlorofluoromethane	0.027	0.00020	0.00040	--	--
	Total Organics ^d	0.23944	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-50 (Duplicate) 25-Apr-18	Acetone	0.0039	0.00018	0.0050	J	--
	Benzene	0.00025	0.000079	0.00040	J	--
	2-Butanone	0.00071	0.00020	0.00080	J	--
	Carbon tetrachloride	0.00015	0.000064	0.00080	J	--
	Chloroform	0.0013	0.000095	0.00030	--	--
	Chloromethane	0.00044	0.00020	0.00080	J	--
	Dichlorodifluoromethane	0.011	0.00015	0.00040	--	--
	1,1-Dichloroethane	0.00095	0.000072	0.00030	--	--
	1,1-Dichloroethene	0.0043	0.00013	0.00080	--	--
	cis-1,2-Dichloroethene	0.00038	0.000089	0.00040	J	--
	Methylene chloride	0.00023	0.000072	0.00040	J	0.0004U
	Tetrachloroethene	0.028	0.000051	0.00040	--	--
	Toluene	0.00023	0.000051	0.00040	J	0.0004U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.039	0.00016	0.00040	--	--
	1,1,1-Trichloroethane	0.0047	0.000065	0.00030	--	--
	Trichloroethene	0.033	0.00011	0.00040	--	--
	Trichlorofluoromethane	0.018	0.00020	0.00040	--	--
	Total Organics ^d	0.14608	NA	NA	NA	NA
MWL-SV04-100 25-Apr-18	Acetone	0.0025	0.00028	0.0078	J	--
	Benzene	0.00026	0.00012	0.00062	J	--
	Carbon tetrachloride	0.00036	0.00010	0.0012	J	--
	Chloroform	0.0021	0.00015	0.00047	--	--
	Dichlorodifluoromethane	0.032	0.00023	0.00062	--	--
	1,1-Dichloroethane	0.0031	0.00011	0.00047	--	--
	1,1-Dichloroethene	0.016	0.00020	0.0012	--	--
	cis-1,2-Dichloroethene	0.0016	0.00014	0.00062	--	--
	Methylene chloride	0.00051	0.00011	0.00062	J	0.00062U
	Tetrachloroethene	0.11	0.000080	0.00062	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.096	0.00025	0.00062	--	--
	1,1,1-Trichloroethane	0.0061	0.00010	0.00047	--	--
	Trichloroethene	0.11	0.00016	0.00062	--	--
	Trichlorofluoromethane	0.041	0.00031	0.00062	--	--
	Total Organics ^d	0.42102	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-200 25-Apr-18	Acetone	0.0050	0.00049	0.014	J	--
	Benzene	0.00032	0.00022	0.0011	J	--
	2-Butanone	0.00078	0.00055	0.0022	J	--
	Carbon disulfide	0.0013	0.00021	0.0022	J	--
	Carbon tetrachloride	0.00056	0.00018	0.0022	J	--
	Chloroform	0.0016	0.00026	0.00083	--	--
	Dichlorodifluoromethane	0.048	0.00040	0.0011	--	--
	1,1-Dichloroethane	0.0054	0.00020	0.00083	--	--
	1,1-Dichloroethene	0.031	0.00035	0.0022	--	--
	cis-1,2-Dichloroethene	0.0030	0.00024	0.0011	--	--
	Methylene chloride	0.0016	0.00020	0.0011	--	J+
	Tetrachloroethene	0.12	0.00014	0.0011	--	--
	Toluene	0.00097	0.00014	0.0011	J	0.0011U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.15	0.00045	0.0011	--	--
	1,1,1-Trichloroethane	0.0025	0.00018	0.00083	--	--
	Trichloroethene	0.17	0.00029	0.0011	--	--
	Trichlorofluoromethane	0.039	0.00054	0.0011	--	--
	Total Organics ^d	0.58006	NA	NA	NA	NA
MWL-SV04-300 25-Apr-18	Acetone	0.0061	0.00018	0.0050	--	--
	Benzene	0.00026	0.000079	0.00040	J	--
	2-Butanone	0.00083	0.00020	0.00080	--	--
	Carbon disulfide	0.0014	0.000078	0.00080	--	--
	Carbon tetrachloride	0.00029	0.000064	0.00080	J	--
	Chloroform	0.00051	0.000095	0.00030	--	--
	Dichlorodifluoromethane	0.021	0.00015	0.00040	--	--
	1,1-Dichloroethane	0.00087	0.000072	0.00030	--	--
	1,1-Dichloroethene	0.012	0.00013	0.00080	--	--
	cis-1,2-Dichloroethene	0.00047	0.000089	0.00040	--	--
	Methylene chloride	0.00039	0.000072	0.00040	J	0.0004U
	Tetrachloroethene	0.085	0.000051	0.00040	--	--
	Toluene	0.0014	0.000051	0.00040	--	J+
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.074	0.00016	0.00040	--	--
	1,1,1-Trichloroethane	0.00072	0.000065	0.00030	--	--
	Trichloroethene	0.062	0.00011	0.00040	--	--
	Trichlorofluoromethane	0.015	0.00020	0.00040	--	--
	m,p-Xylene	0.00011	0.00010	0.00080	J	--
	Total Organics ^d	0.28196	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-300 (Duplicate) 25-Apr-18	Acetone	0.0050	0.00050	0.014	J	--
	Benzene	0.00027	0.00022	0.0011	J	--
	2-Butanone	0.00092	0.00056	0.0022	J	--
	Carbon disulfide	0.0011	0.00022	0.0022	J	--
	Carbon tetrachloride	0.00029	0.00018	0.0022	J	--
	Chloroform	0.00050	0.00027	0.00084	J	--
	Dichlorodifluoromethane	0.028	0.00041	0.0011	--	--
	1,1-Dichloroethane	0.00091	0.00020	0.00084	--	--
	1,1-Dichloroethene	0.013	0.00036	0.0022	--	--
	cis-1,2-Dichloroethene	0.00048	0.00025	0.0011	J	--
	Methylene chloride	0.00039	0.00020	0.0011	J	0.0011U
	Tetrachloroethene	0.098	0.00014	0.0011	--	--
	Toluene	0.00032	0.00014	0.0011	J	0.0011U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.080	0.00046	0.0011	--	--
	1,1,1-Trichloroethane	0.00069	0.00018	0.00084	J	--
	Trichloroethene	0.067	0.00029	0.0011	--	--
	Trichlorofluoromethane	0.015	0.00055	0.0011	--	--
	Total Organics ^d	0.31116	NA	NA	NA	NA
MWL-SV04-400 25-Apr-18 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0050	0.00033	0.0092	J	--
	Benzene	0.00046	0.00014	0.00073	J	--
	2-Butanone	0.00059	0.00036	0.0015	J	--
	Carbon disulfide	0.0012	0.00014	0.0015	J	--
	Carbon tetrachloride	0.00024	0.00012	0.0015	J	--
	Chloroform	0.00067	0.00017	0.00055	--	--
	Dichlorodifluoromethane	0.021	0.00027	0.00073	--	--
	1,1-Dichloroethane	0.0014	0.00013	0.00055	--	--
	1,1-Dichloroethene	0.011	0.00024	0.0015	--	--
	cis-1,2-Dichloroethene	0.00084	0.00016	0.00073	--	--
	Methylene chloride	0.00040	0.00013	0.00073	J	0.00073U
	Tetrachloroethene	0.12	0.000093	0.00073	--	--
	Toluene	0.00011	0.000093	0.00073	J	0.00073U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.070	0.00030	0.00073	--	--
	1,1,1-Trichloroethane	0.0013	0.00012	0.00055	--	--
	Trichloroethene	0.087	0.00019	0.00073	--	--
	Trichlorofluoromethane	0.015	0.00036	0.00073	--	--
	Total Organics ^d	0.3357	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-50 25-Apr-18	Acetone	0.0060	0.00028	0.0080	J	0.008U
	Benzene	0.00020	0.00013	0.00064	J	0.00064U
	2-Butanone	0.00067	0.00032	0.0013	J	0.0013U
	Carbon disulfide	0.00051	0.00012	0.0013	J	--
	Carbon tetrachloride	0.00035	0.00010	0.0013	J	--
	Chloroform	0.0013	0.00015	0.00048	--	--
	Dichlorodifluoromethane	0.040	0.00023	0.00064	--	--
	1,1-Dichloroethane	0.0017	0.00012	0.00048	--	--
	1,1-Dichloroethene	0.010	0.00021	0.0013	--	--
	cis-1,2-Dichloroethene	0.00062	0.00014	0.00064	J	--
	Methylene chloride	0.00031	0.00012	0.00064	J	0.00064U
	Tetrachloroethene	0.045	0.000082	0.00064	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.044	0.00026	0.00064	--	--
	1,1,1-Trichloroethane	0.014	0.00010	0.00048	--	--
	Trichloroethene	0.055	0.00017	0.00064	--	--
	Trichlorofluoromethane	0.11	0.00031	0.00064	--	--
	Total Organics ^d	0.32248	NA	NA	NA	NA
MWL-SV05-100 25-Apr-18	Acetone	0.0031	0.00039	0.011	J	0.011U
	Benzene	0.00020	0.00017	0.00088	J	0.00088U
	Carbon disulfide	0.0012	0.00017	0.0018	J	--
	Carbon tetrachloride	0.00063	0.00014	0.0018	J	--
	Chloroform	0.0021	0.00021	0.00066	--	--
	Dichlorodifluoromethane	0.060	0.00032	0.00088	--	--
	1,1-Dichloroethane	0.0035	0.00016	0.00066	--	--
	1,1-Dichloroethene	0.022	0.00028	0.0018	--	--
	cis-1,2-Dichloroethene	0.0015	0.00019	0.00088	--	--
	Methylene chloride	0.00091	0.00016	0.00088	--	J+
	Tetrachloroethene	0.085	0.00011	0.00088	--	--
	Toluene	0.00015	0.00011	0.00088	J	0.00088U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.085	0.00036	0.00088	--	--
	1,1,1-Trichloroethane	0.014	0.00014	0.00066	--	--
	Trichloroethene	0.11	0.00023	0.00088	--	--
	Trichlorofluoromethane	0.14	0.00043	0.00088	--	--
	Total Organics ^d	0.52584	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-200 25-Apr-18	Acetone	0.0040	0.00038	0.011	J	0.011U
	Benzene	0.00027	0.00017	0.00086	J	0.00086U
	Carbon tetrachloride	0.0012	0.00014	0.0017	J	--
	Chloroform	0.0021	0.00020	0.00065	--	--
	Dichlorodifluoromethane	0.067	0.00031	0.00086	--	--
	1,1-Dichloroethane	0.0056	0.00015	0.00065	--	--
	1,1-Dichloroethene	0.042	0.00028	0.0017	--	--
	cis-1,2-Dichloroethene	0.0025	0.00019	0.00086	--	--
	Methylene chloride	0.0028	0.00015	0.00086	--	J+
	Tetrachloroethene	0.13	0.00011	0.00086	--	--
	Toluene	0.00018	0.00011	0.00086	J	0.00086U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.15	0.00035	0.00086	--	--
	1,1,1-Trichloroethane	0.0040	0.00014	0.00065	--	--
	Trichloroethene	0.19	0.00023	0.00086	--	--
	Trichlorofluoromethane	0.091	0.00042	0.00086	--	--
	Total Organics ^d	0.6882	NA	NA	NA	NA
MWL-SV05-300 25-Apr-18	Acetone	0.0043	0.00030	0.0085	J	0.0085U
	Benzene	0.00021	0.00013	0.00068	J	0.00068U
	Carbon disulfide	0.00080	0.00013	0.0014	J	--
	Carbon tetrachloride	0.00094	0.00011	0.0014	J	--
	Chloroform	0.00093	0.00016	0.00051	--	--
	Dichlorodifluoromethane	0.032	0.00025	0.00068	--	--
	1,1-Dichloroethane	0.0021	0.00012	0.00051	--	--
	1,1-Dichloroethene	0.028	0.00022	0.0014	--	--
	cis-1,2-Dichloroethene	0.0010	0.00015	0.00068	--	--
	Methylene chloride	0.0011	0.00012	0.00068	--	J+
	Tetrachloroethene	0.098	0.000087	0.00068	--	--
	Toluene	0.00014	0.000087	0.00068	J	0.00068U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.00028	0.00068	--	--
	1,1,1-Trichloroethane	0.0017	0.00011	0.00051	--	--
	Trichloroethene	0.11	0.00018	0.00068	--	--
	Trichlorofluoromethane	0.033	0.00033	0.00068	--	--
	Total Organics ^d	0.41957	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-400 25-Apr-18 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0054	0.00018	0.0050	--	J+
	Benzene	0.00034	0.000079	0.00040	J	0.0004U
	2-Butanone	0.00051	0.00020	0.00080	J	0.0008U
	Carbon disulfide	0.00022	0.000078	0.00080	J	--
	Carbon tetrachloride	0.00047	0.000064	0.00080	J	--
	Chloroform	0.00075	0.000095	0.00030	--	--
	Chloromethane	0.00028	0.00020	0.00080	J	0.0008U
	Dichlorodifluoromethane	0.015	0.00015	0.00040	--	--
	1,1-Dichloroethane	0.0015	0.000072	0.00030	--	--
	1,1-Dichloroethene	0.014	0.00013	0.00080	--	--
	cis-1,2-Dichloroethene	0.00076	0.000089	0.00040	--	--
	Methylene chloride	0.00075	0.000072	0.00040	--	J+
	Tetrachloroethene	0.092	0.000051	0.00040	--	--
	Toluene	0.0013	0.000051	0.00040	--	J+
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.052	0.00016	0.00040	--	--
	1,1,1-Trichloroethane	0.0016	0.000065	0.00030	--	--
	Trichloroethene	0.089	0.00011	0.00040	--	--
	Trichlorofluoromethane	0.024	0.00020	0.00040	--	--
	Total Organics ^d	0.29875	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Concluded)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Notes:

^aU.S. Environmental Protection Agency, 1999, "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15" Center for Environmental Research Information, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

^bResults, MDL, and RL are reported in parts per million by volume.

^cLaboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

B = Compound was found in blank and sample.

J = Result is greater than the MDL but less than the RL; the concentration is an approximate value.

Validation Qualifier

J+ = The associated value is an estimated quantity with a suspected positive bias.

U = The analyte was reported as a detection by the laboratory but was qualified during data validation as not detected. The associated numerical value is the revised sample quantitation limit in units of ppmv, in accordance with the data validation process.

^dTotal Organics or Total VOCs - Sum of validated detected organic analytes (i.e., results for analytes qualified during data validation as not detected not included in the total).

EPA = U.S. Environmental Protection Agency.

ID = Identification.

MDL = Method detection limit. The minimum concentration that can be measured and reported with 99 percent confidence that the analyte is present (i.e., greater than zero).

NA = Not applicable.

ppmv = Parts per million by volume.

RL = Reporting limit. Minimum concentration that can be reported with a statistically established degree of confidence.

VOC = Volatile organic compound.

Table 5-2
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV01-42.5 30-Oct-18	Acetone	0.0037	0.00018	0.005	J	--
	Benzene	0.000083	0.000079	0.0004	J	--
	Bromodichloromethane	0.00057	0.000066	0.0003	--	--
	2-Butanone	0.0012	0.0002	0.0008	--	--
	Carbon disulfide	0.0002	0.000078	0.0008	J	--
	Carbon tetrachloride	0.00029	0.000064	0.0008	J	--
	Chloroform	0.014	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.036	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0019	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.0058	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.001	0.000089	0.0004	--	--
	2-Hexanone	0.00016	0.000087	0.0004	J	--
	Methylene chloride	0.00016	0.000072	0.0004	J	--
	Tetrachloroethene	0.37	0.00046	0.0036	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.059	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.032	0.000065	0.0003	--	--
	1,1,2-Trichloroethane	0.00011	0.000067	0.0004	J	--
	Trichloroethene	0.070	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.17	0.0018	0.0036	--	--
	Total Organics ^d	0.766173	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV02-41.5 30-Oct-18	Acetone	0.0074	0.00045	0.013	J	--
	2-Butanone	0.0037	0.0005	0.002	--	--
	Carbon disulfide	0.0003	0.0002	0.002	J	--
	Carbon tetrachloride	0.00027	0.00016	0.002	J	--
	Chloroform	0.0024	0.00024	0.00076	--	--
	Dichlorodifluoromethane	0.058	0.00037	0.001	--	--
	1,1-Dichloroethane	0.0018	0.00018	0.00076	--	--
	1,1-Dichloroethene	0.0089	0.00033	0.002	--	--
	cis-1,2-Dichloroethene	0.00065	0.00023	0.001	J	--
	2-Hexanone	0.00028	0.00022	0.001	J	--
	Methylene chloride	0.0002	0.00018	0.001	J	--
	Tetrachloroethene	0.059	0.00013	0.001	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.039	0.00041	0.001	--	--
	1,1,1-Trichloroethane	0.058	0.00016	0.00076	--	--
	Trichloroethene	0.050	0.00027	0.001	--	--
	Trichlorofluoromethane	0.29	0.0015	0.003	--	--
	Vinyl acetate	0.0056	0.00037	0.002	--	N
	Total Organics ^d	0.5855	NA	NA	NA	NA
MWL-SV03-50 30-Oct-18	Acetone	0.0018	0.00029	0.0082	J	--
	Carbon disulfide	0.00019	0.00013	0.00065	J	--
	Carbon tetrachloride	0.00025	0.0001	0.0013	J	--
	Chloroform	0.0016	0.00015	0.00049	--	--
	Dichlorodifluoromethane	0.018	0.00024	0.00065	--	--
	1,1-Dichloroethane	0.0031	0.00012	0.00049	--	--
	1,1-Dichloroethene	0.012	0.00021	0.0013	--	--
	cis-1,2-Dichloroethene	0.0018	0.00015	0.00065	--	--
	Methylene chloride	0.0007	0.00012	0.00065	--	--
	Tetrachloroethene	0.13	0.000083	0.00065	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.072	0.00027	0.00065	--	--
	1,1,1-Trichloroethane	0.0031	0.00011	0.00049	--	--
	Trichloroethene	0.10	0.00017	0.00065	--	--
	Trichlorofluoromethane	0.028	0.00032	0.00065	--	--
	Total Organics ^d	0.37254	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-100 30-Oct-18	Acetone	0.0042	0.00044	0.012	J	--
	Carbon disulfide	0.00036	0.00019	0.002	J	--
	Carbon tetrachloride	0.00035	0.00016	0.002	J	--
	Chloroform	0.0021	0.00024	0.00075	--	--
	Dichlorodifluoromethane	0.028	0.00036	0.001	--	--
	1,1-Dichloroethane	0.0047	0.00018	0.00075	--	--
	1,1-Dichloroethene	0.018	0.00032	0.002	--	--
	cis-1,2-Dichloroethene	0.0029	0.00022	0.001	--	--
	Methylene chloride	0.0013	0.00018	0.001	--	--
	Tetrachloroethene	0.17	0.00013	0.001	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.096	0.00041	0.001	--	--
	1,1,1-Trichloroethane	0.0035	0.00016	0.00075	--	--
	Trichloroethene	0.15	0.00026	0.001	--	--
	Trichlorofluoromethane	0.035	0.00049	0.001	--	--
MWL-SV03-200 30-Oct-18	Total Organics ^d	0.51641	NA	NA	NA	NA
	Acetone	0.0095	0.00054	0.015	J	--
	Benzene	0.0018	0.00061	0.0024	J	--
	Carbon disulfide	0.0038	0.00024	0.0024	--	--
	Carbon tetrachloride	0.00043	0.0002	0.0024	J	--
	Chloroform	0.002	0.00029	0.00092	--	--
	Dichlorodifluoromethane	0.033	0.00044	0.0012	--	--
	1,1-Dichloroethane	0.0059	0.00022	0.00092	--	--
	1,1-Dichloroethene	0.024	0.00039	0.0024	--	--
	cis-1,2-Dichloroethene	0.0039	0.00027	0.0012	--	--
	Methylene chloride	0.0023	0.00022	0.0012	--	--
	Tetrachloroethene	0.21	0.00016	0.0012	--	--
	Toluene	0.00022	0.00016	0.0012	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.12	0.0005	0.0012	--	--
	1,1,1-Trichloroethane	0.0022	0.0002	0.00092	--	--
	Trichloroethene	0.19	0.00032	0.0012	--	--
	Trichlorofluoromethane	0.030	0.0006	0.0012	--	--
	Total Organics ^d	0.63905	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-300 30-Oct-18	Acetone	0.008	0.00043	0.012	J	--
	Benzene	0.00022	0.00019	0.00096	J	--
	2-Butanone	0.00075	0.00048	0.0019	J	--
	Carbon disulfide	0.0017	0.00019	0.0019	J	--
	Carbon tetrachloride	0.00037	0.00015	0.0019	J	--
	Chloroform	0.001	0.00023	0.00072	--	--
	Dichlorodifluoromethane	0.029	0.00035	0.00096	--	--
	1,1-Dichloroethane	0.0024	0.00017	0.00072	--	--
	1,1-Dichloroethene	0.018	0.00031	0.0019	--	--
	cis-1,2-Dichloroethene	0.0017	0.00021	0.00096	--	--
	Methylene chloride	0.0008	0.00017	0.00096	J	--
	Tetrachloroethene	0.20	0.00012	0.00096	--	--
	Toluene	0.00018	0.00012	0.00096	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.10	0.00039	0.00096	--	--
	1,1,1-Trichloroethane	0.00078	0.00016	0.00072	--	--
	Trichloroethene	0.14	0.00025	0.00096	--	--
	Trichlorofluoromethane	0.014	0.00047	0.00096	--	--
	Total Organic ^d	0.5189	NA	NA	NA	NA
MWL-SV03-400 30-Oct-18 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0095	0.00074	0.021	J	--
	2-Butanone	0.00087	0.00082	0.0033	J	--
	Carbon tetrachloride	0.00037	0.00026	0.0033	J	--
	Chloroform	0.0016	0.00039	0.0012	--	--
	Dichlorodifluoromethane	0.016	0.0006	0.0017	--	--
	1,1-Dichloroethane	0.0031	0.0003	0.0012	--	--
	1,1-Dichloroethene	0.017	0.00053	0.0033	--	--
	cis-1,2-Dichloroethene	0.0025	0.00037	0.0017	--	--
	Methylene chloride	0.0011	0.0003	0.0017	J	--
	Tetrachloroethene	0.32	0.00021	0.0017	--	--
	Toluene	0.0004	0.00021	0.0017	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.058	0.00067	0.0017	--	--
	1,1,1-Trichloroethane	0.0013	0.00027	0.0012	--	--
	Trichloroethene	0.23	0.00043	0.0017	--	--
	Trichlorofluoromethane	0.012	0.00081	0.0017	--	--
	Total Organics ^d	0.67374	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-50 30-Oct-18	Acetone	0.0027	0.00018	0.005	J	0.005U
	Benzene	0.00039	0.000079	0.0004	J	--
	Carbon tetrachloride	0.00026	0.000064	0.0008	J	--
	Chloroform	0.0017	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.011	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0013	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.0064	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.00059	0.000089	0.0004	--	--
	Methylene chloride	0.00011	0.000072	0.0004	J	--
	Tetrachloroethene	0.060	0.000051	0.0004	--	--
	Toluene	0.000056	0.000051	0.0004	J	0.0004U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.056	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.007	0.000065	0.0003	--	--
	Trichloroethene	0.051	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.028	0.0002	0.0004	--	--
	Total Organics ^d	0.22375	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-100 30-Oct-18	Acetone	0.0038	0.00018	0.005	J	0.005U
	Benzene	0.00041	0.000079	0.0004	--	--
	Bromodichloromethane	0.00024	0.000066	0.0003	J	--
	Bromoform	0.00021	0.00007	0.0004	J	--
	2-Butanone	0.00044	0.0002	0.0008	J	--
	Carbon disulfide	0.0036	0.000078	0.0008	--	--
	Carbon tetrachloride	0.00061	0.000064	0.0008	J	--
	Chlorobenzene	0.00021	0.000064	0.0003	J	--
	Chloroform	0.002	0.000095	0.0003	--	--
	Chloromethane	0.00027	0.0002	0.0008	J	--
	Dibromochloromethane	0.00024	0.000079	0.0004	J	--
	1,2-Dibromoethane	0.0002	0.000075	0.0008	J	--
	1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00018	0.00016	0.0004	J	--
	1,2-Dichlorobenzene	0.00018	0.00013	0.0004	J	--
	1,3-Dichlorobenzene	0.00019	0.00011	0.0004	J	--
	1,4-Dichlorobenzene	0.00019	0.00015	0.0004	J	--
	Dichlorodifluoromethane	0.017	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.003	0.000072	0.0003	--	--
	1,2-Dichloroethane	0.00023	0.000088	0.0008	J	--
	1,1-Dichloroethene	0.015	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.0018	0.000089	0.0004	--	--
	trans-1,2-Dichloroethene	0.00021	0.0001	0.0004	J	--
	cis-1,3-Dichloropropene	0.0002	0.0001	0.0004	J	--
	trans-1,3-Dichloropropene	0.00021	0.000088	0.0004	J	--
	Ethyl benzene	0.00023	0.000063	0.0004	J	--
	4-Ethyltoluene	0.0002	0.00019	0.0004	J	--
	2-Hexanone	0.00019	0.000087	0.0004	J	--
	Methylene chloride	0.00059	0.000072	0.0004	--	--
	Styrene	0.00018	0.000059	0.0004	J	--
	1,1,2,2-Tetrachloroethane	0.00019	0.000069	0.0004	J	--
	Tetrachloroethene	0.12	0.00015	0.0012	--	--
	Toluene	0.00026	0.000051	0.0004	J	0.0004U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.087	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.0053	0.000065	0.0003	--	--
	1,1,2-Trichloroethane	0.00022	0.000067	0.0004	J	--
	Trichloroethene	0.11	0.00032	0.0012	--	--
	Trichlorofluoromethane	0.038	0.0002	0.0004	--	--

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-100 (concluded) 30-Oct-18	1,2,4-Trimethylbenzene	0.00023	0.00016	0.0008	J	--
	1,3,5-Trimethylbenzene	0.00021	0.00013	0.0004	J	--
	Vinyl acetate	0.00023	0.00015	0.0008	J	--
	Vinyl chloride	0.00021	0.00012	0.0004	J	--
	m,p-Xylene	0.00045	0.0001	0.0008	J	0.0008U
	o-Xylene	0.00022	0.000054	0.0004	J	0.0004U
	Total Organics ^d	0.4098	NA	NA	NA	NA
MWL-SV04-200 30-Oct-18	Acetone	0.023	0.00043	0.012	--	--
	Benzene	0.0003	0.00019	0.00096	J	--
	2-Butanone	0.0015	0.00048	0.0019	J	--
	Carbon disulfide	0.022	0.00019	0.0019	--	--
	Carbon tetrachloride	0.00049	0.00015	0.0019	J	--
	Chloroform	0.0013	0.00023	0.00072	--	--
	Dichlorodifluoromethane	0.03	0.00035	0.00096	--	--
	1,1-Dichloroethane	0.0044	0.00017	0.00072	--	--
	1,1-Dichloroethene	0.026	0.00031	0.0019	--	--
	cis-1,2-Dichloroethene	0.0026	0.00021	0.00096	--	--
	Methylene chloride	0.0012	0.00017	0.00096	--	--
	Tetrachloroethene	0.12	0.00012	0.00096	--	--
	Toluene	0.00065	0.00012	0.00096	J	0.0004U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.12	0.00039	0.00096	--	--
	1,1,1-Trichloroethane	0.002	0.00016	0.00072	--	--
	Trichloroethene	0.14	0.00025	0.00096	--	--
	Trichlorofluoromethane	0.032	0.00047	0.00096	--	--
	m,p-Xylene	0.00042	0.00024	0.0019	J	0.0008U
	o-Xylene	0.00021	0.00013	0.00096	J	0.0004U
	Total Organics ^d	0.52679	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-300 30-Oct-18	Acetone	0.0039	0.00018	0.005	J	0.005U
	Benzene	0.0002	0.000079	0.0004	J	--
	Carbon tetrachloride	0.00032	0.000064	0.0008	J	--
	Chloroform	0.00053	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.013	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0011	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.013	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.00074	0.000089	0.0004	--	--
	Methylene chloride	0.00024	0.000072	0.0004	J	--
	Tetrachloroethene	0.11	0.00015	0.0012	--	--
	Toluene	0.00014	0.000051	0.0004	J	0.0004U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.073	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.00082	0.000065	0.0003	--	--
	Trichloroethene	0.076	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.014	0.0002	0.0004	--	--
	Total Organics ^d	0.30295	NA	NA	NA	NA
MWL-SV04-400 30-Oct-18 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0068	0.00018	0.005	--	--
	Benzene	0.00048	0.000079	0.0004	--	--
	2-Butanone	0.0006	0.0002	0.0008	J	--
	Carbon disulfide	0.011	0.000078	0.0008	--	--
	Carbon tetrachloride	0.00022	0.000064	0.0008	J	--
	Chloroform	0.00051	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.0099	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.001	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.010	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.00071	0.000089	0.0004	--	--
	Methylene chloride	0.00023	0.000072	0.0004	J	--
	Tetrachloroethene	0.12	0.00015	0.0012	--	--
	Toluene	0.0001	0.000051	0.0004	J	0.0004U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.064	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.00084	0.000065	0.0003	--	--
	Trichloroethene	0.072	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.014	0.0002	0.0004	--	--
	Total Organics ^d	0.31229	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-50 30-Oct-18	Acetone	0.0016	0.00018	0.005	J	0.005U
	Benzene	0.00014	0.000079	0.0004	J	--
	Carbon disulfide	0.000088	0.000078	0.0008	J	--
	Carbon tetrachloride	0.00031	0.000064	0.0008	J	--
	Chloroform	0.0012	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.022	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0015	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.0095	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.0006	0.000089	0.0004	--	--
	Methylene chloride	0.00022	0.000072	0.0004	J	--
	Tetrachloroethene	0.039	0.000051	0.0004	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.037	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.012	0.000065	0.0003	--	--
	Trichloroethene	0.049	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.11	0.00064	0.0013	--	--
	Vinyl chloride	0.00035	0.00012	0.0004	J	0.0004U
	Total Organics ^d	0.282558	NA	NA	NA	NA
MWL-SV05-50 (Duplicate) 30-Oct-18	Acetone	0.0044	0.00018	0.005	J	0.005U
	Benzene	0.00015	0.000079	0.0004	J	--
	2-Butanone	0.00031	0.0002	0.0008	J	--
	Carbon disulfide	0.0023	0.000078	0.0008	--	--
	Carbon tetrachloride	0.00034	0.000064	0.0008	J	--
	Chloroform	0.0012	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.022	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0015	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.0098	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.00063	0.000089	0.0004	--	--
	Methylene chloride	0.00023	0.000072	0.0004	J	--
	Tetrachloroethene	0.040	0.000051	0.0004	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.038	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.012	0.000065	0.0003	--	--
	Trichloroethene	0.051	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.11	0.0006	0.0012	--	--
	Total Organics ^d	0.28946	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-100 30-Oct-18	Acetone	0.0042	0.00018	0.005	J	0.005U
	Benzene	0.00018	0.000079	0.0004	J	--
	2-Butanone	0.00021	0.0002	0.0008	J	--
	Carbon tetrachloride	0.0006	0.000064	0.0008	J	--
	Chloroform	0.0019	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.035	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0031	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.021	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.0014	0.000089	0.0004	--	--
	Methylene chloride	0.00075	0.000072	0.0004	--	--
	Tetrachloroethene	0.075	0.000051	0.0004	--	--
	Toluene	0.00013	0.000051	0.0004	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.077	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.013	0.000065	0.0003	--	--
	Trichloroethene	0.099	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.14	0.00068	0.0014	--	--
	Vinyl acetate	0.0039	0.00015	0.0008	--	N
	Total Organics ^d	0.47217	NA	NA	NA	NA
MWL-SV05-200 30-Oct-18	Acetone	0.0051	0.00018	0.005	--	--
	Benzene	0.00024	0.000079	0.0004	J	--
	2-Butanone	0.00026	0.0002	0.0008	J	--
	Carbon disulfide	0.00012	0.000078	0.0008	J	--
	Carbon tetrachloride	0.001	0.000064	0.0008	--	--
	Chloroform	0.0019	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.035	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0047	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.037	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.0023	0.000089	0.0004	--	--
	1,2-Dichloropropane	0.00028	0.00024	0.0004	J	--
	Methylene chloride	0.0022	0.000072	0.0004	--	--
	Tetrachloroethene	0.12	0.00021	0.0016	--	--
	Toluene	0.0002	0.000051	0.0004	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.14	0.00066	0.0016	--	--
	1,1,1-Trichloroethane	0.0038	0.000065	0.0003	--	--
	Trichloroethene	0.17	0.00043	0.0016	--	--
	Trichlorofluoromethane	0.083	0.0002	0.0004	--	--
	Total Organics ^d	0.6071	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-300 30-Oct-18	Acetone	0.0072	0.00018	0.005	--	--
	Benzene	0.00023	0.000079	0.0004	J	--
	2-Butanone	0.00068	0.0002	0.0008	J	--
	Carbon disulfide	0.00032	0.000078	0.0008	J	--
	Carbon tetrachloride	0.00088	0.000064	0.0008	--	--
	Chloroform	0.00089	0.000095	0.0003	--	--
	Chloromethane	0.00021	0.0002	0.0008	J	--
	Dichlorodifluoromethane	0.019	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.002	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.025	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.001	0.000089	0.0004	--	--
	Methylene chloride	0.00091	0.000072	0.0004	--	--
	Tetrachloroethene	0.091	0.000051	0.0004	--	--
	Toluene	0.00015	0.000051	0.0004	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.10	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.0018	0.000065	0.0003	--	--
	Trichloroethene	0.12	0.00033	0.0012	--	--
	Trichlorofluoromethane	0.033	0.0002	0.0004	--	--
	Total Organics ^d	0.40427	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-400 30-Oct-18 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0063	0.00018	0.005	--	--
	Benzene	0.00051	0.000079	0.0004	--	--
	2-Butanone	0.00042	0.0002	0.0008	J	--
	Carbon disulfide	0.0098	0.000078	0.0008	--	--
	Carbon tetrachloride	0.00057	0.000064	0.0008	J	--
	Chloroform	0.00061	0.000095	0.0003	--	--
	Chloromethane	0.00022	0.0002	0.0008	J	--
	Dichlorodifluoromethane	0.013	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0016	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.018	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.00065	0.000089	0.0004	--	--
	Methylene chloride	0.00058	0.000072	0.0004	--	--
	Tetrachloroethene	0.081	0.000051	0.0004	--	--
	Toluene	0.0015	0.000051	0.0004	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.056	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.0017	0.000065	0.0003	--	--
	Trichloroethene	0.077	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.034	0.0002	0.0004	--	--
	Vinyl acetate	0.00027	0.00015	0.0008	J	--
	Total Organics ^d	0.30373	NA	NA	NA	NA
MWL-SV05-400 (Duplicate) 30-Oct-18 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0039	0.00018	0.005	J	0.005U
	Benzene	0.00043	0.000079	0.0004	--	--
	Carbon disulfide	0.00019	0.000078	0.0008	J	--
	Carbon tetrachloride	0.00059	0.000064	0.0008	J	--
	Chloroform	0.00061	0.000095	0.0003	--	--
	Dichlorodifluoromethane	0.012	0.00015	0.0004	--	--
	1,1-Dichloroethane	0.0015	0.000072	0.0003	--	--
	1,1-Dichloroethene	0.017	0.00013	0.0008	--	--
	cis-1,2-Dichloroethene	0.00063	0.000089	0.0004	--	--
	Methylene chloride	0.00054	0.000072	0.0004	--	--
	Tetrachloroethene	0.080	0.000051	0.0004	--	--
	Toluene	0.0014	0.000051	0.0004	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.054	0.00016	0.0004	--	--
	1,1,1-Trichloroethane	0.0017	0.000065	0.0003	--	--
	Trichloroethene	0.075	0.00011	0.0004	--	--
	Trichlorofluoromethane	0.034	0.0002	0.0004	--	--
	Total Organics ^d	0.27986	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Concluded)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Notes:

^aU.S. Environmental Protection Agency, 1999, "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15," Center for Environmental Research Information, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

^bResults, MDL, and RL are reported in parts per million by volume.

^cLaboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

J = Result is greater than the MDL but less than the RL; the concentration is an approximate value.

Validation Qualifier

U = The analyte was reported as a detection by the laboratory but was qualified during data validation as not detected. The associated numerical value is the revised sample quantitation limit in units of ppmv, in accordance with the data validation process.

N = Presumptive evidence of the presence of the material.

^dTotal Organics - Sum of validated detected organic analytes (i.e., results for analytes reported as detections by the laboratory but qualified during data validation as not detected are not included in the Total Organics value).

EPA = U.S. Environmental Protection Agency.

ID = Identification.

MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is present (i.e., greater than zero).

NA = Not applicable.

ppmv = Parts per million, by volume basis.

RL = Reporting limit. Minimum concentration that can be reported with a statistically established degree of confidence.

VOC = Volatile organic compound.

6.0 SOIL-MOISTURE MONITORING RESULTS

This chapter presents soil-moisture monitoring activities (i.e., data collection and evaluation) in accordance with MWL LTMMMP Section 3.4.2 and Appendix E (SNL/NM March 2012). The monitoring objective is to establish soil-moisture trends in the vadose zone beneath the MWL to evaluate ET Cover performance. The soil-moisture monitoring system functions as an early warning detection system for water percolation and infiltration through the ET Cover and disposal area so that timely action can be taken, if necessary. Results for the depth range of 8.7 to 86.6 ft bgs for each soil-moisture access tube are compared to the trigger level defined in LTMMMP Section 5.2.3.2.

Soil-moisture monitoring field activities and results are described in Sections 6.1 and 6.2, respectively. Data evaluation and comparison of results to the monitoring trigger level are presented in Section 6.3. A summary of soil-moisture monitoring activities and results is provided in Section 11.1.

6.1 Soil-Moisture Monitoring Field Activities

One annual soil-moisture monitoring event was conducted during the April 1, 2018 through March 31, 2019 reporting period fulfilling the LTMMMP annual monitoring requirement. The monitoring event was conducted on May 3, 2018. Figure 6-1 shows the soil-moisture monitoring locations MWL-VZ-1, MWL-VZ-2, and MWL-VZ-3, which are angled boreholes (60 degrees from the horizontal ground surface) that project beneath the MWL. Soil-moisture monitoring field forms and tables that compare soil-moisture content values to baseline values for the three access tubes are provided in Annex D.

Neutron count data collected in the field were correlated to percent soil-moisture content by volume as described in LTMMMP Section 3.4.2 and Appendix E (SNL/NM March 2012). Baseline for soil-moisture content was determined for each access tube prior to the ET Cover subgrade work in September 2006 by averaging data collected during ten monitoring events between May 27, 2004 and August 8, 2006.

6.1.1 Field Quality Control

The CPN 503DR neutron probe was operated in accordance with the field operating procedure and the manufacturer's operating manual. A standard count was taken the day of the monitoring event, prior to the moisture logging, to ensure the instrument was functioning properly and to confirm measurement accuracy. The results of the standard counts are provided on the MWL neutron logging data field form provided in Annex D.

6.1.2 Waste Management

No wastes were generated from soil-moisture monitoring activities.

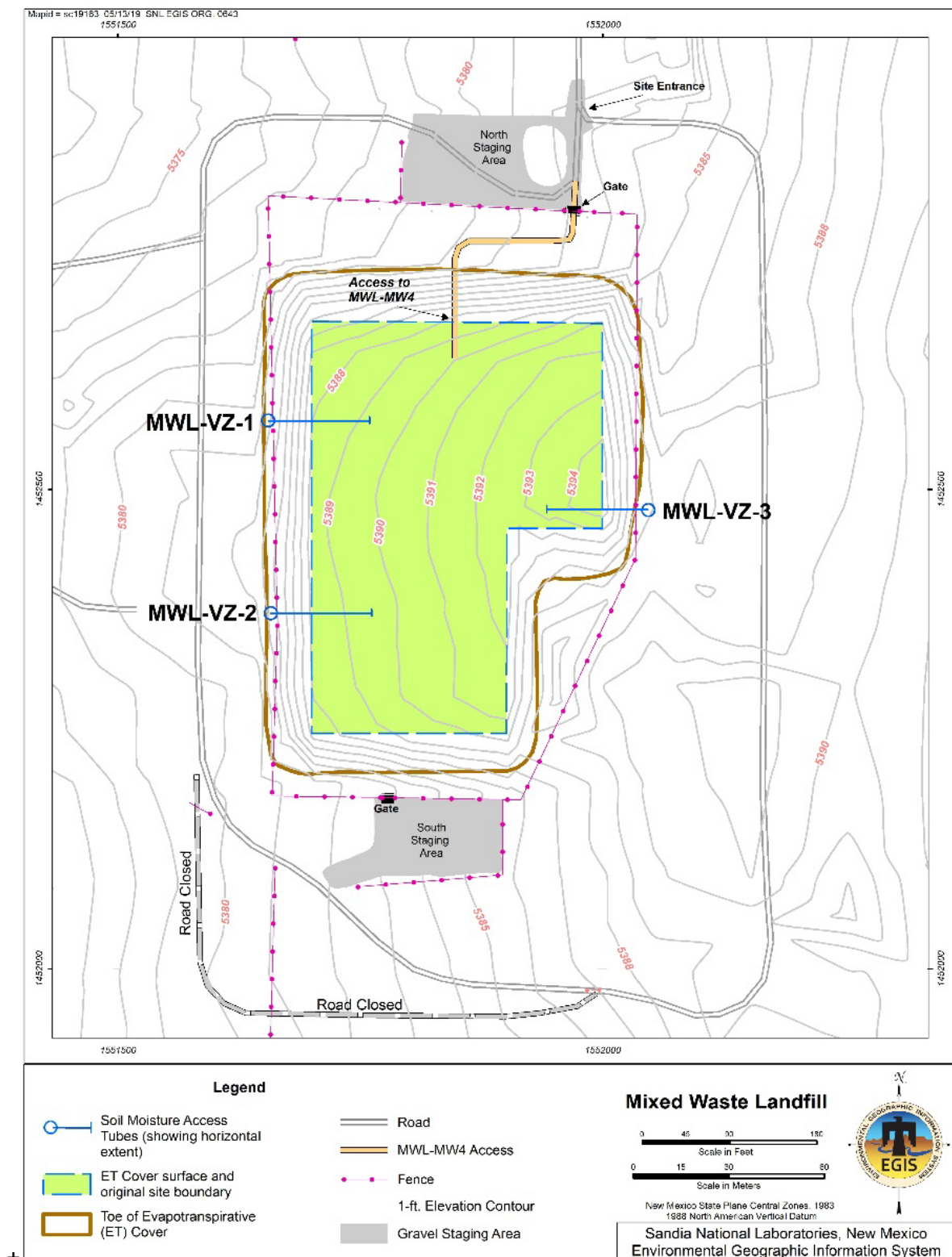


Figure 6-1
Mixed Waste Landfill Soil-Moisture Monitoring Locations

6.2 Monitoring Results

Soil-moisture monitoring data for this reporting period are presented in Figures 6-2, 6-3, and 6-4 for MWL-VZ-1, MWL-VZ-2, and MWL-VZ-3, respectively. The results for the May 3, 2018 annual monitoring event are plotted on these figures along with the baseline soil-moisture content and the trigger level for comparison. The May 2018 results track very closely with the established soil-moisture baseline for the three access tubes and indicate a dry vadose zone. All soil-moisture values were less than 10 percent, and most were less than 5 percent by volume.

6.2.1 Variances

There were no variances from the LTMMMP soil-moisture monitoring requirements.

6.3 Data Evaluation and Monitoring Trigger Level

Soil-moisture data collected during the reporting period were compared to the trigger level, which is 23 percent soil moisture by volume, and applies to the shallow depth range beneath the ET Cover of 8.7 to 86.6 ft bgs for each monitoring location as specified in LTMMMP Section 5.2.3.2 (SNL/NM March 2012). This comparison is shown graphically in Figures 6-2, 6-3, and 6-4.

During this reporting period, the soil-moisture content measurements for the shallow trigger level depth interval at MWL-VZ-1 ranged from 1.8 to 4.5 percent, compared to 1.7 to 5.6 percent baseline. At MWL-VZ-2 the soil-moisture content ranged from 2.1 to 4.7 percent, compared to 2.1 to 5.5 percent baseline. At MWL-VZ-3 the soil-moisture content ranged from 1.4 to 4.4 percent, compared to 1.8 to 4.5 percent baseline.

In summary, all values are below the 23 percent soil-moisture content by volume trigger level and track closely to baseline soil-moisture values, indicating the ET Cover is performing as designed.

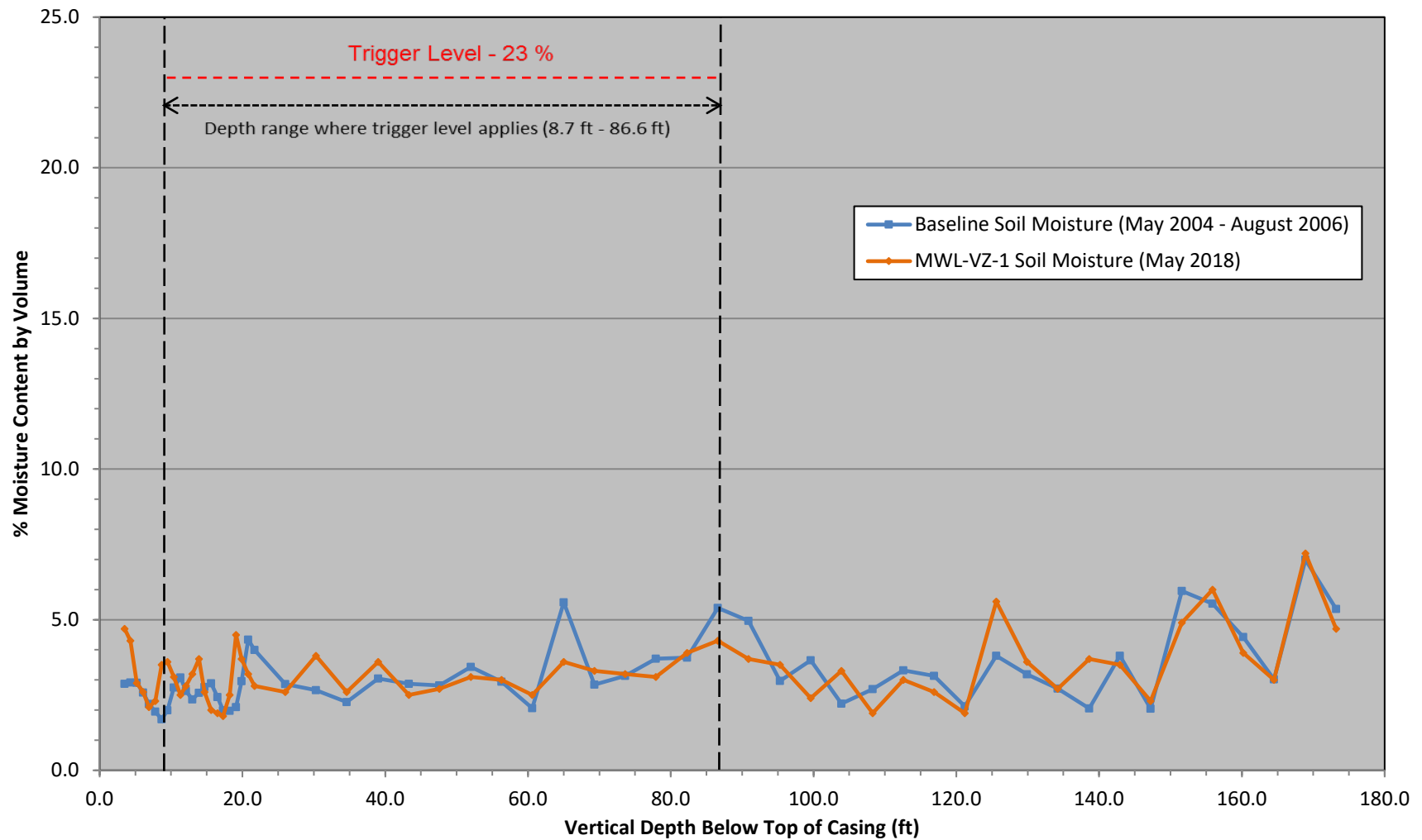


Figure 6-2
Mixed Waste Landfill MWL-VZ-1 Soil-Moisture Monitoring Results

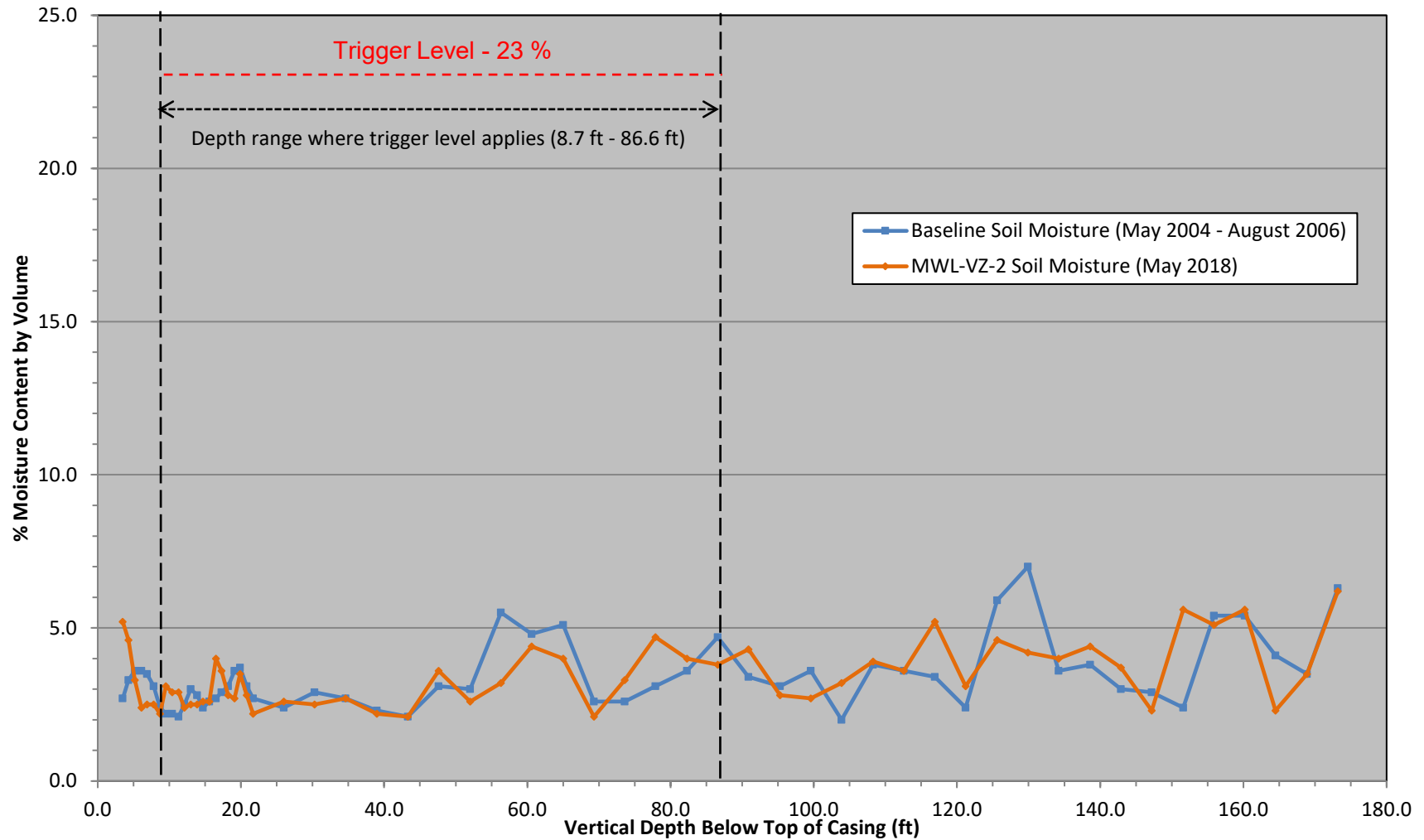


Figure 6-3
Mixed Waste Landfill MWL-VZ-2 Soil-Moisture Monitoring Results

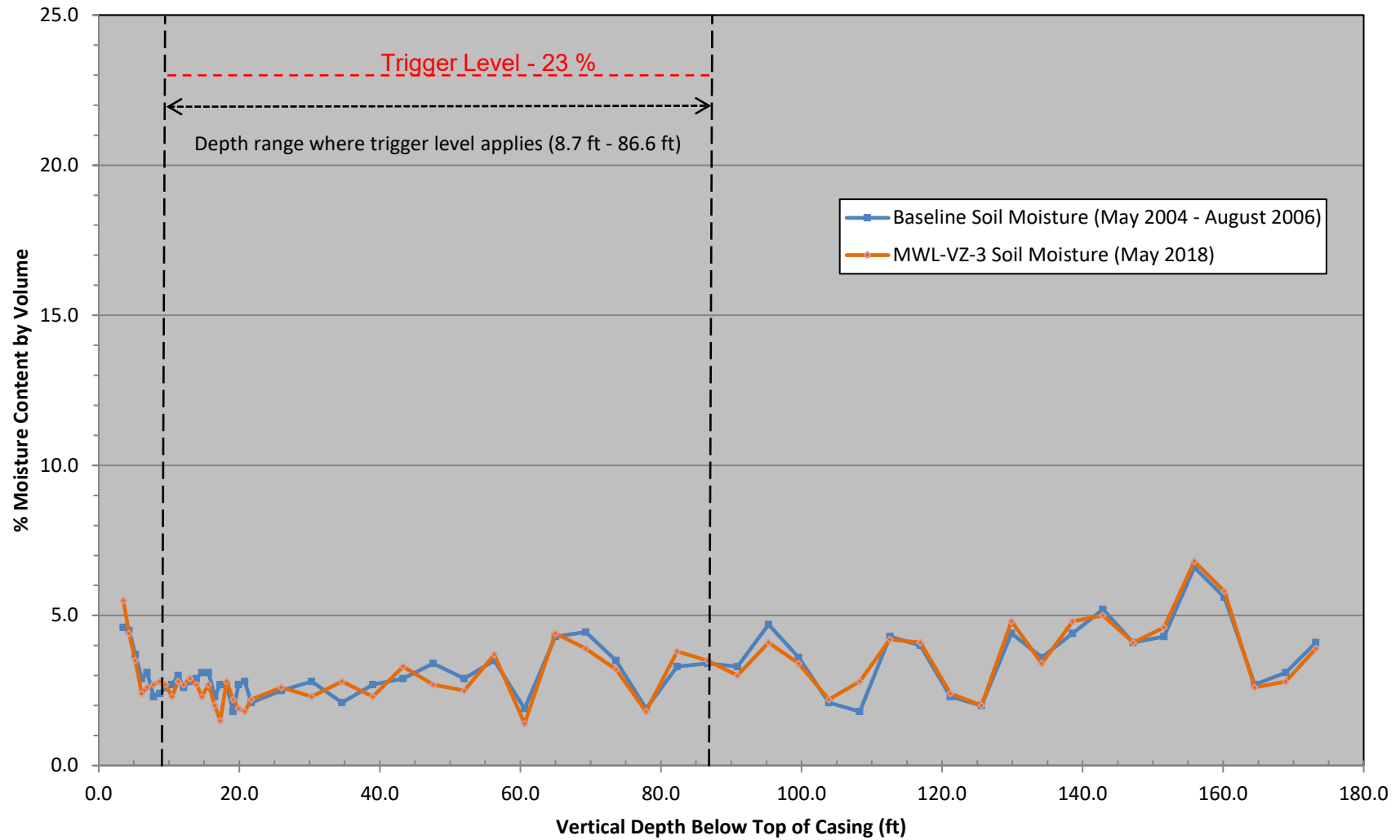


Figure 6-4
Mixed Waste Landfill MWL-VZ-3 Soil-Moisture Monitoring Results

7.0 GROUNDWATER MONITORING RESULTS

This chapter presents groundwater monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with MWL LTMMP Section 3.5 and Appendix F (SNL/NM March 2012). The monitoring objective is to obtain groundwater analytical results representative of the uppermost part of the aquifer beneath the MWL and compare them to the trigger levels defined in Table 5.2.4-1 of the LTMMP. Groundwater monitoring, combined with soil-vapor monitoring, functions as an early warning detection system for changing conditions so that timely action can be taken, if necessary.

Groundwater sampling field activities are described in Section 7.1, analytical laboratory results are presented and compared to trigger levels in Section 7.2, followed by a discussion of data quality. Hydrogeologic information on the Regional Aquifer is presented in Section 7.3. A summary of groundwater monitoring activities and results is provided in Section 11.1.

7.1 Environmental Sampling Field Activities

Two groundwater monitoring events were conducted during the April 1, 2018 through March 31, 2019 reporting period, fulfilling the LTMMP semiannual monitoring requirement. Groundwater samples were collected from monitoring wells MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9. Well locations are shown in Figure 7-1. The samples were analyzed for VOCs, metals (cadmium, chromium, nickel, and uranium), specific radionuclides, gross alpha and beta, tritium, and radon-222. Field forms and documentation that address calibration of equipment, well purging and water quality measurements, and equipment decontamination activities are provided in Annex E.

The first sampling event was conducted between April 26 and May 3, 2018. An environmental-duplicate sample pair was collected from MWL-BW2.

The second sampling event was conducted between October 23 and 29, 2018. An environmental-duplicate sample pair was collected from MWL-MW7.

7.1.1 Well Purging

Purging removes stagnant water from the well so that a representative environmental sample can be obtained. In accordance with LTMMP Appendix F, the minimum purge requirement is one saturated screen volume. Purging continued beyond the minimum purge volume until four stable field measurements for temperature, specific conductivity, potential of hydrogen (i.e., pH), and turbidity were obtained. Field measurements for water quality parameters were collected using an In-Situ Incorporated Aqua TROLL® 600 Multiparameter Water Quality Sonde and a HACH™ Model 2100Q portable turbidity meter. Additional water quality measurements included oxidation-reduction potential and dissolved oxygen.

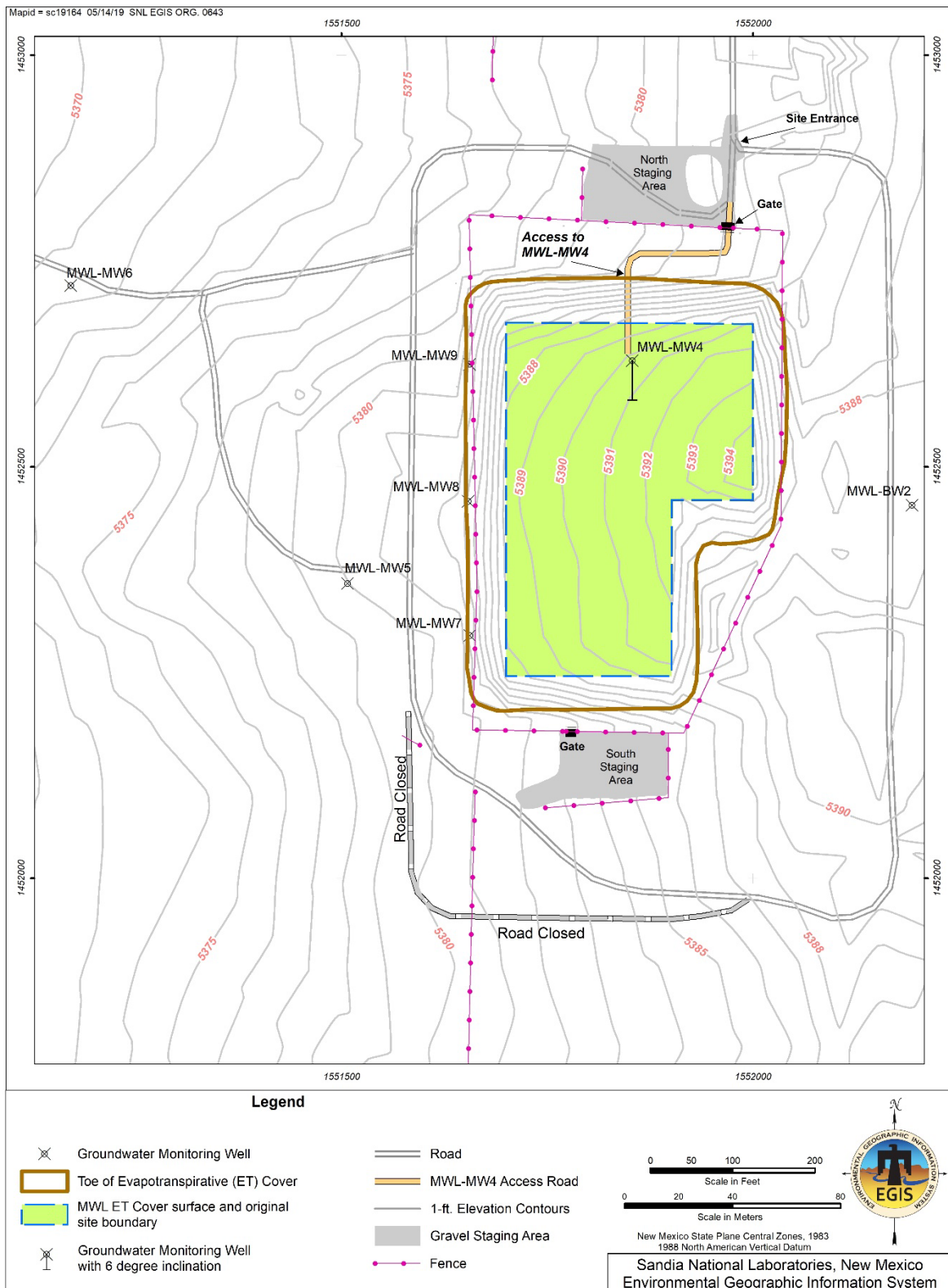


Figure 7-1
Mixed Waste Landfill Groundwater Monitoring Well Locations

A portable Bennett™ groundwater sampling system was used to collect environmental samples from all wells. Purge requirements were satisfied at all monitoring wells. In accordance with LTMMF Appendix F requirements designed to decrease the purging flow rate as low as possible for wells that potentially purge dry, the portable Bennett™ groundwater sampling system was equipped with a flow meter valve located along the discharge line and with small diameter tubing (1/4-inch inner diameter). The average flow rates ranged from 0.09 gallons per minute (gpm) at MWL-MW9 to 0.25 gpm at MWL-BW2 for the April-May 2018 sampling event. The average flow rates ranged from 0.08 gpm at MWL-MW9 to 0.35 gpm at MWL-BW2 for the October 2018 sampling event.

7.1.2 Field Quality Control

Field QC samples were collected as part of each sampling event and included duplicate, equipment blank, field blank, and trip blank samples. The sampling pump and tubing bundle used to collect environmental samples were decontaminated prior to sampling each monitoring well.

Duplicate samples were collected and analyzed to evaluate the overall precision and reproducibility of the sampling and analytical process. The duplicate samples were collected immediately after the original groundwater sample to reduce variability caused by time and/or sampling mechanics. Duplicate samples were analyzed for the same constituents as the groundwater samples.

Equipment blank (also referred to as rinsate blank) samples were collected after equipment decontamination to verify effectiveness of the decontamination process. Equipment blank samples consisted of deionized (DI) water that was pumped through the sampling system and analyzed for the same constituents as the groundwater samples.

Field blank samples were collected and analyzed for VOCs to detect any potential sample contamination resulting from ambient field conditions. The field blanks were prepared by pouring DI water into sample containers at the sample point (i.e., inside the sampling truck at each monitoring well) to simulate the transfer of environmental samples from the sampling system to the sample container. Additional field blank samples were collected at the Environmental Resources Field Office (ERFO) during the decontamination process to assess the DI water and ERFO ambient conditions.

Trip blank samples consist of laboratory reagent-grade water with hydrochloric acid preservative. They are prepared by the analytical laboratory and accompany the sample containers from the laboratory, through sampling activities, and are shipped back to the laboratory with the environmental samples. Trip blank samples were submitted with groundwater samples collected for analysis of VOCs to assess whether contamination of the samples occurred during sampling, transportation, analysis, and/or storage.

The field QC samples were submitted for analysis with the environmental samples. A brief explanation of the field QC sampling protocol for the April-May and October 2018 sampling events is provided below. Analytical results are presented in Section 7.2.

First Sampling Event – April 26-May 3, 2018

One duplicate sample was collected at MWL-BW2. One equipment blank sample was collected prior to sampling monitoring well MWL-BW2. Five field blank samples were collected; one at ERFO and four at the site (one at each monitoring well). Six trip blank samples were also submitted with groundwater samples for analysis of VOCs.

Second Sampling Event – October 23-29, 2018

One duplicate sample was collected at MWL-MW7. One equipment blank sample was collected prior to sampling MWL-MW7. Five field blank samples were collected; one at ERFO and four at the site (one at each monitoring well). Six trip blank samples were also submitted with groundwater samples for analysis of VOCs.

7.1.3 Waste Management

Purge and decontamination wastewater generated from sampling activities was collected in 55-gallon containers and stored at the ERFO waste accumulation area. All wastewater was managed as non-hazardous waste based upon historical sample results and process knowledge of monitoring well locations. All wastewater was discharged to the sanitary sewer in accordance with Albuquerque Bernalillo County Water Utility Authority (ABCWUA) requirements after characterization data were compared to discharge limits. Approximately 233 gallons of wastewater were generated during the April-May 2018 groundwater sampling event and approximately 231 gallons were generated during the October 2018 sampling event.

PPE and other solid waste generated during April-May and October 2018 monitoring activities were managed in accordance with all applicable requirements. Analytical data from the sampling event was used to supplement the waste management process. Based on historical data and sampling results from the two monitoring events, all solid waste was managed as non-hazardous solid waste.

7.2 Laboratory Results

Environmental and field QC samples were submitted to GEL for analyses. Samples were analyzed in accordance with applicable EPA analytical methods. For comparison, trigger levels are included in the analytical results tables in this report. Both analytical laboratory and data validation qualifiers are included in the groundwater data tables presented in this section. Analytical laboratory reports, including certificates of analyses, analytical methods, MDLs, practical quantitation limits, dates of analyses, results of QC analyses, and data validation reports are filed in the SNL/NM Record Center.

7.2.1 Environmental Sample Results

This section summarizes groundwater monitoring results for the reporting period. Groundwater monitoring results were compared to historical MWL groundwater monitoring results and LTMMMP trigger levels. All results were below applicable LTMMMP trigger levels defined in

Section 5.2.4 of the LTMMP (SNL/NM March 2012) and were comparable to historical MWL groundwater monitoring results.

Table 7-1 summarizes detected VOCs for the April-May and October 2018 sampling events. The MDLs for all VOCs are presented in Table 7-2. The 2018 results for cadmium, chromium, nickel, and uranium are provided in Table 7-3, and the radionuclide, gross alpha, gross beta, tritium, and radon-222 results are provided in Table 7-4. Table 7-5 summarizes field water quality measurements taken prior to environmental groundwater sample collection for both 2018 sampling events.

Radionuclide activity in groundwater samples is determined through specific radiological analyses as presented in Table 7-4. In addition, gross alpha and beta activities are measured to screen for indications of other radionuclides (i.e., radiological anomalies). Gross alpha activity values are corrected by subtracting naturally occurring uranium in accordance with 40 CFR 141. Uranium is measured independently in groundwater samples, and results are presented in Table 7-3.

Trigger levels provide early detection of potentially changing conditions that require additional testing and further investigation (SNL/NM March 2012). Groundwater radiological trigger levels for tritium (4 millirem per year), radon (1,000 pCi/L), gross alpha activity (15 pCi/L), and gross beta activity (4 millirem per year) are shown in Table 7-4. The units for the tritium and gross beta triggers relate to a dose rate and not a specific activity per volume (pCi/L) measurement. For tritium, the approximate equivalent activity is 20,000 pCi/L, assuming an onsite resident using the groundwater underlying the MWL as their primary drinking water source.

Gross alpha and beta results are used as a broad radiological screening tool to look for other potential radionuclides besides tritium, radon, and the radionuclides already addressed by gamma spectroscopy analysis (i.e., the radionuclides of concern). The screening analyses do not provide radionuclide-specific identification necessary to calculate a dose. If the gross alpha trigger is exceeded, additional radiological analysis may be required to identify the specific radionuclide(s) that are contributing to the gross alpha result. Gross beta results are compared to the extensive SNL/NM groundwater monitoring data set to determine if there are indications of radiological anomalies. In other words, the gross beta activity is compared to natural background beta activity. If there are indications of radiological anomalies, additional analysis may be required to identify the specific radionuclide that is causing the anomalous beta activity. Once the specific radionuclide is identified, the corresponding dose to a human receptor can be calculated and compared to the trigger of 4 millirem per year. Additional analysis based on elevated gross alpha or gross beta screening results would only be required if the results are not explained by the other radionuclide-specific results. In summary, the screening and evaluation process ensures that if radiological contamination is present, it will be detected, evaluated, and appropriate follow-up actions will be taken.

Table 7-1
Summary of Detected VOCs (EPA Method 8260B^a)
Mixed Waste Landfill Groundwater Monitoring
April-May and October 2018

Well ID	Analyte	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	Trigger Level (µg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
April-May 2018 Sampling Event							
MWL-BW2 30-Apr-2018	Toluene	0.310	0.300	1.00	3000	J	1.0U
MWL-BW2 30-Apr-2018 (duplicate)	Toluene	0.320	0.300	1.00	3000	J	1.0U
October 2018 Sampling Event							
MWL-MW7 25-Oct-18	Acetone	3.29	1.5	10.0	187.5	J	10UJ
MWL-MW7 (duplicate) 25-Oct-18	Acetone	2.36	1.5	10.0	187.5	J	10UJ
MWL-MW9 24-Oct-18	Acetone	3.00	1.5	10.0	187.5	J, N	10UJ

Notes:

^aU.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

^bLaboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

J = Estimated value, the analyte concentration is greater than the MDL but less than the PQL.

N = Results associated with a spike analysis that was outside control limits.

Validation Qualifier

J = The associated value is an estimated quantity.

U = The analyte was reported as a detection by the laboratory but was qualified during data validation as not detected. The associated numerical value is the revised sample quantitation limit in units of µg/L, in accordance with the data validation process.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

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

µg/L = Micrograms per liter.

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

VOC = Volatile organic compound.

Table 7-2
Summary of Method Detection Limits for VOCs (EPA Method 8260B^a)
Mixed Waste Landfill Groundwater Monitoring
April-May, and October 2018

Analyte	MDL (µg/L)
1,1,1-Trichloroethane	0.300
1,1,2,2-Tetrachloroethane	0.300
1,1,2-Trichloroethane	0.300
1,1-Dichloroethane	0.300
1,1-Dichloroethene	0.300
1,2-Dichloroethane	0.300
1,2-Dichloropropane	0.300
2-Butanone	1.50
2-Hexanone	1.50
4-methyl-,2-Pentanone	1.50
Acetone	1.50
Benzene	0.300
Bromodichloromethane	0.300
Bromoform	0.300
Bromomethane	0.300
Carbon disulfide	1.50
Carbon tetrachloride	0.300
Chlorobenzene	0.300
Chloroethane	0.300
Chloroform	0.300
Chloromethane	0.300
Dibromochloromethane	0.300
Dichlorodifluoromethane	0.300
Ethyl benzene	0.300
Methylene chloride	1.00
Styrene	0.300
Tetrachloroethene	0.300
Toluene	0.300
Trichloroethene	0.300
Vinyl acetate	1.50
Vinyl chloride	0.300
Xylene	0.300
cis-1,2-Dichloroethene	0.300
cis-1,3-Dichloropropene	0.300
trans-1,2-Dichloroethene	0.300
trans-1,3-Dichloropropene	0.300

Notes:

^aU.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit. The minimum concentration that can be measured and reported with 99 percent confidence that the analyte is greater than zero.

µg/L = Micrograms per liter.

VOC = Volatile organic compound.

Table 7-3
Summary of Cadmium, Chromium, Nickel, and Uranium Results (EPA Method 6020^a)
Mixed Waste Landfill Groundwater Monitoring
April-May and October 2018

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Trigger Level (mg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
April-May 2018 Sampling Event							
MWL-BW2 30-Apr-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00112	0.0006	0.002	0.050	B, J	0.002U
	Uranium	0.00663	0.000067	0.0002	0.015		
MWL-BW2 (duplicate) 30-Apr-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00298	0.0006	0.002	0.050	B	J+
	Uranium	0.00664	0.000067	0.0002	0.015		--
MWL-MW7 02-May-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00103	0.0006	0.002	0.050	B, J	0.002U
	Uranium	0.00744	0.000067	0.0002	0.015	--	--
MWL-MW8 03-May-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000866	0.0006	0.002	0.050	B, J	0.002U
	Uranium	0.00739	0.000067	0.0002	0.015	--	--
MWL-MW9 01-May-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00112	0.0006	0.002	0.050	B, J	0.002U
	Uranium	0.00894	0.000067	0.0002	0.015	--	--

Refer to notes at end of table.

Table 7-3 (Concluded)
Summary of Cadmium, Chromium, Nickel, and Uranium Results (EPA Method 6020^a)
Mixed Waste Landfill Groundwater Monitoring
April-May and October 2018

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Trigger Level (mg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
October 2018 Sampling Event							
MWL-BW2 23-Oct-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	ND	0.0006	0.002	0.050	U	--
	Uranium	0.00704	0.000067	0.0002	0.015	--	--
MWL-MW7 25-Oct-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	ND	0.0006	0.002	0.050	U	--
	Uranium	0.00775	0.000067	0.0002	0.015	--	--
MWL-MW7 (duplicate) 25-Oct-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	ND	0.0006	0.002	0.050	U	--
	Uranium	0.00835	0.000067	0.0002	0.015	--	--
MWL-MW8 29-Oct-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	ND	0.0006	0.002	0.050	U	--
	Uranium	0.00765	0.000067	0.0002	0.015	--	--
MWL-MW9 24-Oct-18	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	ND	0.0006	0.002	0.050	U	--
	Uranium	0.00923	0.000067	0.0002	0.015	--	--

Notes:

^aU.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

^bLaboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

B = The analyte was found in the blank above the effective MDL.

J = Estimated value, the analyte concentration is greater than the MDL but less than the PQL.

U = Analyte was not detected.

Validation Qualifier

J+ = Estimated value with a suspected high bias.

U = The analyte was reported as a detection by the laboratory but was qualified during data validation as not detected. The associated numerical value is the revised sample quantitation limit in units of mg/L, in accordance with the data validation process.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

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

mg/L = Milligrams per liter.

ND = Not detected (at MDL).

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

Table 7-4
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results
Mixed Waste Landfill Groundwater Monitoring
April-May and October 2018

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
April-May 2018 Sampling Event							
MWL-BW2 30-Apr-18	Americium-241	7.38 ± 14.2	22.5	NE	U	BD	EPA 901.1
	Cesium-137	1.25 ± 2.00	3.66	NE	U	BD	EPA 901.1
	Cobalt-60	0.170 ± 2.49	4.41	NE	U	BD	EPA 901.1
	Gross Alpha	8.56	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	4.95 ± 1.36	2.06	4 mrem/yr	--	J	EPA 900.0
	Tritium ^f	-41.1 ± 71.3	133	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	375 ± 92.3	50.3	1,000 pCi/L	--	--	SM7500-Rn B
MWL-BW2 (Duplicate) 30-Apr-18	Americium-241	3.68 ± 7.66	12.5	NE	U	BD	EPA 901.1
	Cesium-137	0.494 ± 3.19	4.22	NE	U	BD	EPA 901.1
	Cobalt-60	-1.65 ± 1.94	2.96	NE	U	BD	EPA 901.1
	Gross Alpha	5.20	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	6.53 ± 1.32	1.87	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-35.1 ± 72.6	135	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	387 ± 94.8	50.5	1,000 pCi/L	--	--	SM7500-Rn B
MWL-MW7 02-May-18	Americium-241	6.53 ± 8.65	14.0	NE	U	BD	EPA 901.1
	Cesium-137	-0.357 ± 1.73	3.00	NE	U	BD	EPA 901.1
	Cobalt-60	0.865 ± 1.62	3.12	NE	U	BD	EPA 901.1
	Gross Alpha	3.14	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	6.34 ± 1.25	1.80	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-50.9 ± 65.7	124	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	143 ± 40.7	35.6	1,000 pCi/L	--	--	SM7500-Rn B
MWL-MW8 03-May-18	Americium-241	-4.34 ± 9.13	14.2	NE	U	BD	EPA 901.1
	Cesium-137	2.55 ± 2.07	2.90	NE	U	BD	EPA 901.1
	Cobalt-60	-1.45 ± 2.00	3.14	NE	U	BD	EPA 901.1
	Gross Alpha	5.45	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	6.58 ± 1.25	1.75	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-44.9 ± 69.5	130	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	183 ± 55.1	49.1	1,000 pCi/L	--	--	SM7500-Rn B
MWL-MW9 01-May-18	Americium-241	5.57 ± 16.3	28.7	NE	U	BD	EPA 901.1
	Cesium-137	-0.739 ± 2.10	3.22	NE	U	BD	EPA 901.1
	Cobalt-60	-0.715 ± 2.05	3.49	NE	U	BD	EPA 901.1
	Gross Alpha	1.81	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	4.29 ± 2.77	4.18	4 mrem/yr	--	J	EPA 900.0
	Tritium ^f	-57.4 ± 70.5	134	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	409 ± 97.2	42.4	1,000 pCi/L	--	--	SM7500-RnB

Refer to notes at end of table.

Table 7-4 (Continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results
Mixed Waste Landfill Groundwater Monitoring
April-May and October 2018

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
October 2018 Sampling Event							
MWL-BW2 23-Oct-18	Americium-241	-3.9 ± 15.3	22.9	NE	U	BD	EPA 901.1
	Cesium-137	0.121 ± 2.1	3.7	NE	U	BD	EPA 901.1
	Cobalt-60	-1.16 ± 2.14	3.67	NE	U	BD	EPA 901.1
	Gross Alpha	11.48	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	4.49 ± 1.5	2.29	4 mrem/yr	--	J	EPA 900.0
	Tritium ^f	41.1 ± 78.9	135	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	323 ± 87.4	62.1	1,000 pCi/L	--	--	SM7500-Rn B
MWL-MW7 25-Oct-18	Americium-241	6.4 ± 9.59	14.4	NE	U	BD	EPA 901.1
	Cesium-137	0.851 ± 3.31	3.31	NE	U	BD	EPA 901.1
	Cobalt-60	0.871 ± 1.82	3.29	NE	U	BD	EPA 901.1
	Gross Alpha	5.61	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.19 ± 0.843	1.13	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-33 ± 75.8	140	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	115 ± 43.1	50.6	1,000 pCi/L	--	J	SM7500-Rn B
MWL-MW7 (Duplicate) 25-Oct-18	Americium-241	2.91 ± 5.67	8.76	NE	U	BD	EPA 901.1
	Cesium-137	-0.127 ± 1.51	2.58	NE	U	BD	EPA 901.1
	Cobalt-60	3.34 ± 2.38	3.34	NE	U	BD	EPA 901.1
	Gross Alpha	5.91	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	7.62 ± 0.972	1.26	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-35.9 ± 72.5	134	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	123 ± 44.4	50.7	1,000 pCi/L	--	J	SM7500-Rn B
MWL-MW8 29-Oct-18	Americium-241	-4.77 ± 13.7	13.7	NE	U	BD	EPA 901.1
	Cesium-137	-1.33 ± 2.19	2.19	NE	U	BD	EPA 901.1
	Cobalt-60	-0.398 ± 2.34	2.34	NE	U	BD	EPA 901.1
	Gross Alpha	3.63	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.91 ± 0.765	0.873	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	32.6 ± 70.1	121	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	145 ± 63.2	81.6	1,000 pCi/L	--	J	SM7500-Rn B

Refer to notes at end of table.

Table 7-4 (Concluded)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results
Mixed Waste Landfill Groundwater Monitoring
April-May and October 2018

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
October 2018 Sampling Event (Continued)							
MWL-MW9 24-Oct-18	Americium-241	3.86 ± 13.4	22.3	NE	U	BD	EPA 901.1
	Cesium-137	-1.29 ± 1.94	3.08	NE	U	BD	EPA 901.1
	Cobalt-60	0.494 ± 1.93	3.66	NE	U	BD	EPA 901.1
	Gross Alpha	6.32	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.77 ± 0.799	0.971	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-33.2 ± 73.6	135	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	497 ± 120	52	1,000 pCi/L	--	--	SM7500-Rn B

Notes:

^aGross alpha activity measurements were corrected by subtracting the total uranium activity from the total gross alpha result (Title 40 Code of Federal Regulations Parts 9, 141, and 142, Table I-4). Negative numbers indicate the sample count or result was less than the instrument background; result is below the minimum detectable activity.

^bMDA is the minimal detectable activity or minimum measured activity in a sample required to ensure 95 percent probability that the measured activity is accurately quantified above the critical level.

^cLaboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

NA = Not applicable.

U = Analyte was below detection limit.

Validation Qualifier

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.

J = Estimated value.

None = No data validation for corrected gross alpha activity.

^dAnalytical Methods EPA 900.0, EPA 901.1, and EPA 906.0 M:

- U.S. Environmental Protection Agency, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, Center for Environmental Research Information, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Analytical Method SM7500-Rn B:

- American Public Health Association, American Water Works Association, and Water Environment Federation, 1988, "Standard Methods for the Examination of Water and Wastewater," SM7500-Rn B Method, 22nd Edition, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation, Washington, D.C., 1988.

^eRefer to Section 7.2.1 for an explanation of the gross beta trigger level.

^fThe approximate equivalent activity for the 4 mrem/yr tritium trigger level is 20,000 pCi/L.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

mrem/yr = Millirem per year.

NA = Not applicable.

NE = Not established.

pCi/L = Picocuries per liter.

Table 7-5
Summary of Field Water Quality Measurements^a
Mixed Waste Landfill Groundwater Monitoring
April-May and October 2018

Well ID/ Sample Date	Temperature (°C)	SC (µmhos/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (% Sat)	DO (mg/L)
April-May 2018 Sampling Event							
MWL-BW2	21.21	738.7	162.7	7.38	3.07	29.9	2.20
MWL-MW7	19.40	587.1	203.6	7.60	0.25	84.8	6.34
MWL-MW8	18.77	570.8	178.9	7.49	0.28	35.8	2.71
MWL-MW9	21.83	744.1	53.5	7.65	0.71	15.8	1.13
October 2018 Sampling Event							
MWL-BW2	19.87	719.1	125.8	7.40	1.81	51.5	3.85
MWL-MW7	18.61	628.8	175.4	7.56	0.29	85.6	6.50
MWL-MW8	19.97	631.4	163.3	7.49	0.33	45.3	3.43
MWL-MW9	13.97	569.3	127.6	7.47	1.18	14.8	1.25

Notes:

^aField measurements collected prior to sampling.

°C = Degrees Celsius.

% Sat = Percent saturation.

DO = Dissolved oxygen.

ID = Identification.

mg/L = Milligrams per liter.

µmhos/cm = Micromhos per centimeter.

mV = Millivolts.

NTU = Nephelometric turbidity units.

ORP = Oxidation-reduction potential.

pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

SC = Specific Conductivity.

First Sampling Event – April 26-May 3, 2018

VOCs were not detected in the environmental samples above MDLs or sample quantitation limits established during data validation. Toluene detections in MWL-BW2 environmental and environmental duplicate samples were qualified as not detected during data validation due to associated equipment blank contamination.

Cadmium and chromium were not detected above the associated MDL. Nickel was reported at an estimated value of 0.00298 milligrams per liter (mg/L) in the MWL-BW2 environmental duplicate sample. Nickel results in all other environmental samples were qualified as not detected during data validation due to associated laboratory method blank contamination. Uranium was detected below LTMMMP trigger levels in all groundwater samples. Uranium concentrations ranged from 0.00663 mg/L at MWL-BW2 to 0.00894 mg/L at MWL-MW9. All metals results are consistent with historical MWL groundwater monitoring results and are below LTMMMP trigger levels.

MWL groundwater samples were screened for gamma-emitting radionuclides, gross alpha activity, gross beta activity, tritium, and radon-222. There were no detections of gamma-emitting radionuclides (as determined by gamma spectroscopy) or tritium (as determined by liquid scintillation counting). Negative results in Table 7-4 indicate the sample result was lower than the instrument background (i.e., below the instrument detection limit). Gross alpha activity was detected in all samples ranging from 1.81 pCi/L (MWL-MW9) to 8.56 pCi/L (MWL-BW2). Gross beta activity was detected in all samples ranging from 4.29 pCi/L (MWL-MW9) to 6.58 pCi/L

(MWL-MW8). Radon-222 was detected in all samples, with activities ranging from 143 pCi/L at MWL-MW7 to 409 pCi/L at MWL-MW9. All radiological results were reviewed by an SNL/NM radiological SME to screen for potential indications of radiological contamination; there were no indications of radiological anomalies in the groundwater sample results. Results are consistent with historical results and below LTMMMP trigger levels.

Second Sampling Event – October 23-29, 2018

VOCs were not detected in the environmental samples above MDLs or sample quantitation limits established during data validation. Acetone in MWL-MW7 and MWL-MW9 samples was qualified as not detected during data validation due to field blank and equipment blank results. Acetone was detected in all field blank and equipment blank samples at similar concentrations, and is a common laboratory contaminant.

Cadmium, chromium, and nickel were not detected above the associated MDLs. Uranium was detected in all groundwater samples with concentrations ranging from 0.00704 mg/L at MWL-BW2 to 0.00923 mg/L at MWL-MW9. All metals results are consistent with historical MWL groundwater monitoring results and are below LTMMMP trigger levels.

MWL groundwater samples were screened for gamma-emitting radionuclides, gross alpha activity, gross beta activity, tritium, and radon-222. There were no detections of gamma-emitting radionuclides (as determined by gamma spectroscopy) or tritium (as determined by liquid scintillation counting). Negative results in Table 7-4 indicate the sample result was lower than the instrument background (i.e., below the instrument detection limit). Gross alpha activity was detected in all samples ranging from 3.63 pCi/L (MWL-MW8) to 11.48 pCi/L (MWL-BW2). Gross beta activity was detected in all samples ranging from 4.49 pCi/L (MWL-BW2) to 7.62 pCi/L (MWL-MW7, duplicate sample). Radon-222 was detected in all samples, with activities ranging from 115 pCi/L at MWL-MW7 to 497 pCi/L at MWL-MW9. All radiological results were reviewed by an SNL/NM radiological SME to screen for potential indications of radiological contamination; there were no indications of radiological anomalies in the groundwater sample results. Results are consistent with historical results and below LTMMMP trigger levels.

Nickel and Uranium Concentration and Gross Alpha Activity Plots

Concentrations and activities over time of nickel, uranium, and gross alpha are presented in Figures 7-2 through 7-4, respectively for all groundwater monitoring events conducted since implementation of the LTMMMP in 2014. Trigger levels are not shown on these plots, as the respective trigger levels are higher than the maximum concentration or activity depicted on the vertical axis of these figures. For non-detect results, the MDL or MDA was used and for environmental-duplicate sample pairs, the highest result was used. Variation shown in these plots reflects natural background variation in the concentration of these constituents within the Regional Aquifer.

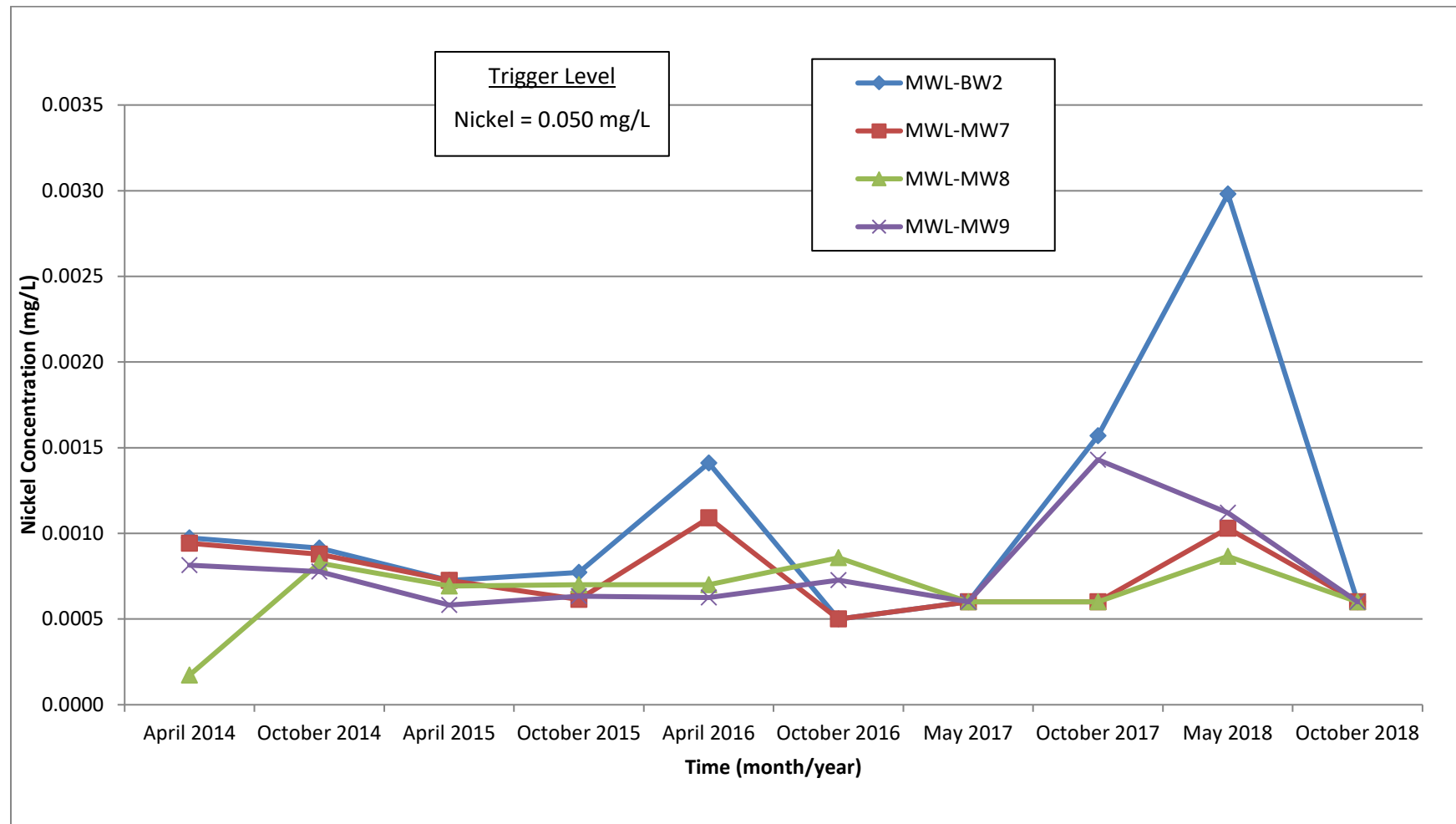


Figure 7-2
Nickel Concentrations vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

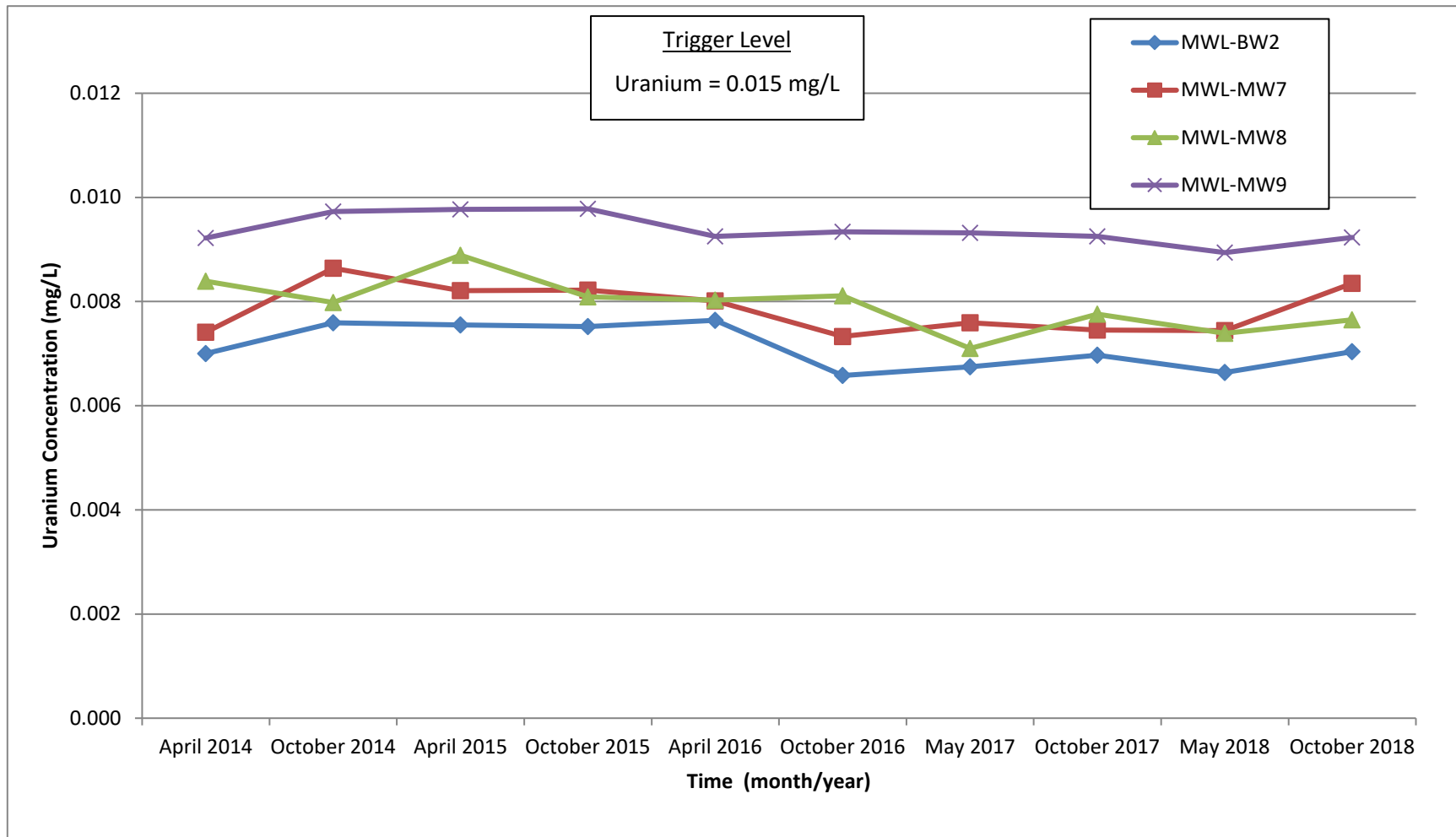


Figure 7-3
Uranium Concentrations vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

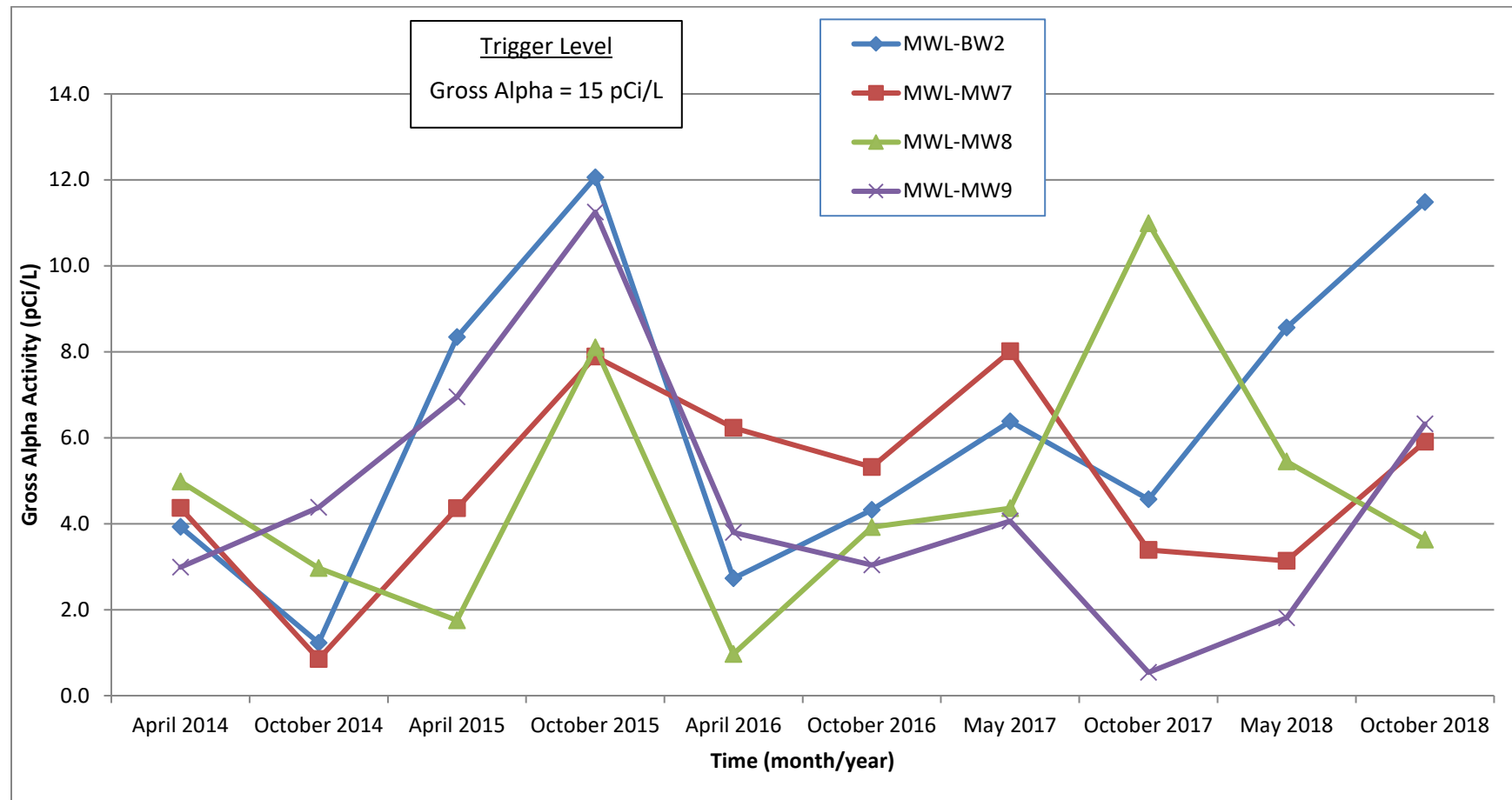


Figure 7-4
Gross Alpha Activity vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

7.2.2 Field Quality Control Sample Results

Field QC sample results met the sampling DQOs and validated the field sampling procedures and protocol. The analytical results for each field QC sample type are presented in this section.

Table 7-6 summarizes results of environmental-duplicate sample pair results and the calculated RPD values for the April-May and October 2018 data sets. RPDs were calculated for constituents that exceeded the MDL in the sample pairs. Only the metal uranium was detected above the associated MDLs in the two sample pairs. Calculated RPDs for uranium show good agreement (i.e., RPD values less than or equal to 35 for metals) for both sampling events, ranging from less than 1 to 7.

Table 7-6
Summary of Duplicate Sample Results
Mixed Waste Landfill Groundwater Monitoring
April-May and October 2018

Well ID/Parameter	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a (%)
April-May 2018 Sampling Event			
MWL-BW2			
Uranium (mg/L)	0.00663	0.00664	<1
October 2018 Sampling Event			
MWL-MW7			
Uranium (mg/L)	0.00775	0.00835	7

Notes:

^aRPD = Relative percent difference is calculated with the following equation and rounded to the nearest whole number.

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

where: R₁ = Environmental sample result.
R₂ = Duplicate sample result.

ID = Identification.
mg/L = Milligram(s) per liter.

A discussion of equipment, field, and trip blank results for the April-May and October 2018 sampling events is provided below.

First Sampling Event – April 26-May 3, 2018

The equipment blank sample for the April-May sampling event was analyzed for all constituents. Acetone and toluene were detected above laboratory MDLs. No corrective action was necessary for acetone, since this compound was not detected in the associated environmental samples. Toluene was detected in the equipment blank sample at a concentration greater than the associated environmental and environmental duplicate samples. As a result, toluene was qualified as not detected during data validation in the MWL-BW2 samples.

VOCs were not detected in the five field blank samples associated with the April-May 2018 sampling event.

No VOCs were detected in five of the six trip blank samples associated with the April-May 2018 sampling event. Toluene was detected in one trip blank sample, but no corrective action was necessary since toluene was not detected in the associated environmental sample.

Second Sampling Event – October 23-29, 2018

The equipment blank sample for the October 2018 sampling event was analyzed for all constituents. Acetone was detected above the laboratory MDL at a concentration comparable to the associated MWL-MW7 environmental and environmental duplicate samples. As a result, the MWL-MW7 acetone results were qualified as not detected during data validation.

Acetone was the only VOC reported in all five field blank samples at concentrations ranging from 1.76 µg/L to 2.63 µg/L. As a result, acetone was qualified as not detected during data validation in the MWL-MW7 samples (environmental and environmental duplicate) and the MWL-MW9 environmental sample since acetone was reported at similar concentrations.

No VOCs were detected above associated laboratory MDLs in the six trip blank samples associated with the October 2018 sampling event.

7.2.3 Laboratory Quality Control and Data Quality

Internal laboratory QC samples were analyzed concurrently with all environmental samples in accordance with laboratory procedures and EPA methods. These samples included laboratory control samples, method blanks, matrix spike and matrix spike duplicate samples, surrogate spike samples, and replicate samples. The results were used to evaluate potential contamination associated with the laboratory analytical process and to determine the accuracy and precision of the analytical methods. Reported laboratory QC sample results comply with analytical method and laboratory procedure requirements. Laboratory QC sample results that effected environmental sample results are discussed below.

First Sampling Event – April 26-May 3, 2018

All laboratory control sample results met the accuracy (i.e., percent recovery) requirement of 50 to 130 percent for VOCs and 75 to 125 percent for metals (Section 2.1 of LTMMP Appendix F).

Second Sampling Event – October 23-29, 2018

All laboratory control sample results met the accuracy (i.e., percent recovery) requirement of 50 to 130 percent for VOCs and 75 to 125 percent for metals (Section 2.1 of LTMMP Appendix F), except acetone and 2-butanone, which were recovered outside LTMMP limits. No corrective

action was necessary as the percent recovery for both compounds was within laboratory and EPA analytical method acceptance limits.

All chemical data were reviewed and qualified in accordance with SNL/NM AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM June 2017b). Based upon the data validation and review criteria, all analytical data were determined acceptable and met the DQOs. Data validation and contract verification reviews are provided in Annex E.

7.2.4 Variances and Non-Conformances

Variances and non-conformances are defined in the LTMMP Appendix F, Section 6 for groundwater monitoring. There were no variances or non-conformances from LTMMP requirements for groundwater monitoring during the April-May and October 2018 sampling events.

7.3 Hydrogeologic Assessment

A detailed conceptual site model is provided in the MWL Phase 2 RCRA Facility Investigation Report (Peace et al. September 2002) and the Mixed Waste Landfill Groundwater Report, 1990 through 2001 (Goering et al. December 2002). An update to the conceptual site model integrating the findings from the current groundwater monitoring well network installed in 2008 is presented in the Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2009 (SNL/NM June 2010).

The upper surface of the Regional Aquifer at the MWL is contained within the interfingering, unconsolidated, fine-grained alluvial-fan deposits of the Santa Fe Group. The more transmissive, coarser-grained Ancestral Rio Grande sediments underlie the fine-grained alluvial deposits beneath the MWL. The depth to water is approximately 500 ft bgs and groundwater flows generally westward, away from the Manzanita Mountains and towards the Rio Grande. Several water-supply wells operated by KAFB and the ABCWUA have profoundly modified the natural groundwater flow regime near the MWL by creating a trough in the water table in the western and northern portions of KAFB. As a result, water levels at the MWL have historically declined since monitoring began in 1990.

Figure 7-5 shows the rate of groundwater elevation decline at MWL groundwater monitoring wells for the time period 2000 through 2018. Since 2010, the rate of groundwater elevation decline in all wells has been relatively slow and constant. The rate of groundwater elevation decline in the upper screen interval of MWL-MW4 has stabilized since April 2010. The overall decline in MWL-BW2 since 2009 reflects a slightly higher rate of decline than observed in the other wells. Over the past four years the rate of decline has slowed, a trend that is most likely related to a relaxation in groundwater removal from the Regional Aquifer by the ABCWUA. Recharge from infiltration of direct precipitation at the MWL is negligible due to high evapotranspiration, low precipitation, the thick sequence of unsaturated Santa Fe Group deposits above the water table, and the presence of the MWL ET Cover. Groundwater recharge of the Regional Aquifer occurs by the infiltration of precipitation in the Manzanita Mountains located approximately 5 miles to the east.

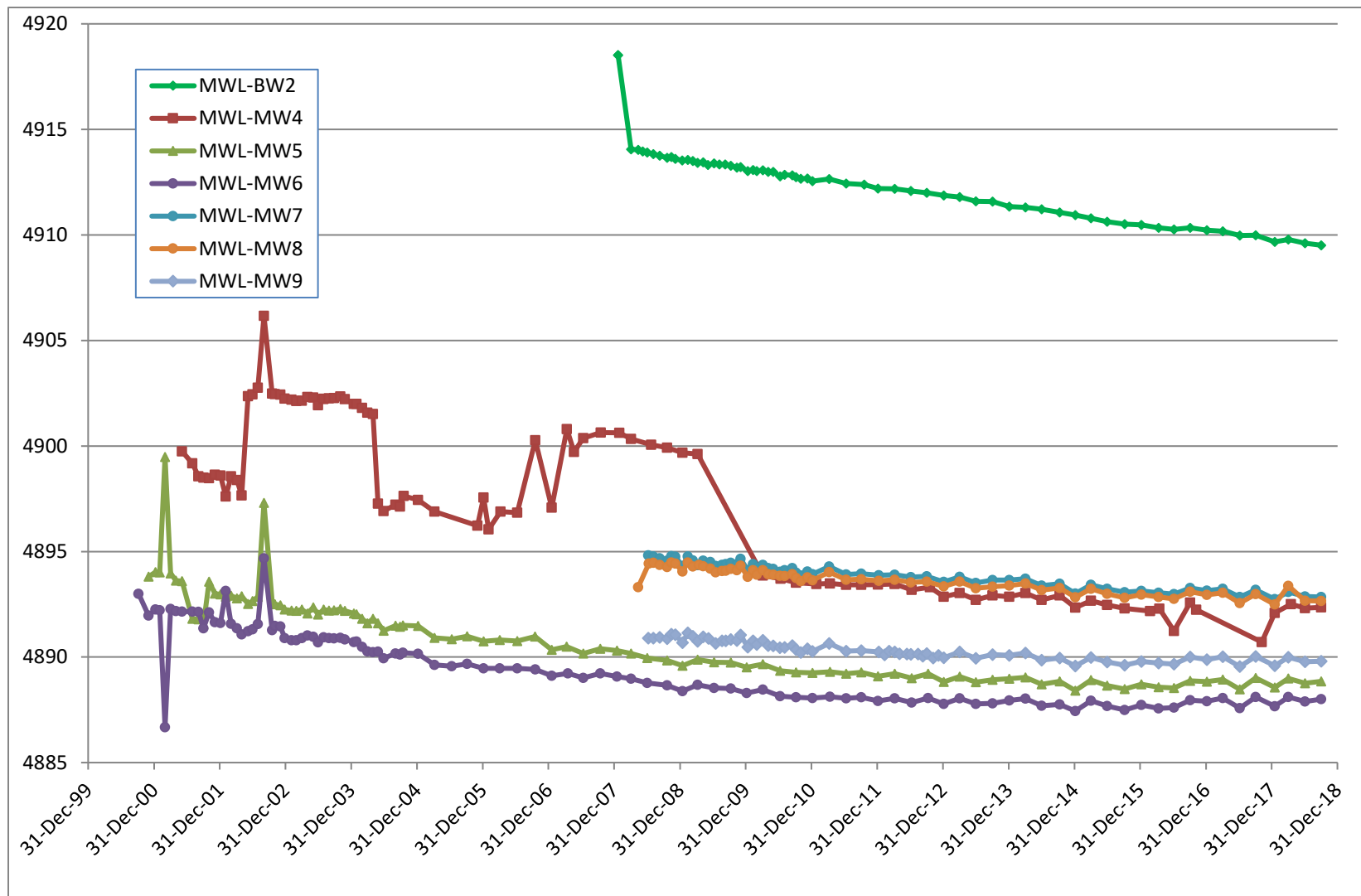


Figure 7-5
Groundwater Level Elevations at Mixed Waste Landfill Groundwater Monitoring Wells

Figure 7-6 shows the October 2018 potentiometric surface of the Regional Aquifer beneath the MWL. Based on the potentiometric contours, the hydraulic gradient is to the west-northwest. Measured orthogonally from the potentiometric surface contours, the horizontal gradient for October 2018 ranges from approximately 0.03 to 0.08 feet per foot. Groundwater velocities in the alluvial-fan sediments were calculated using the current potentiometric surface gradient, the average hydraulic conductivity obtained from slug testing of the four compliance monitoring wells, and an effective porosity of 25 percent. The calculated 2018 groundwater velocity remains consistent with previous years, and ranges from 0.02 to 0.06 feet per day; the average is 0.04 feet per day. These very low values and the general position of the groundwater elevation contours have not changed over the past five years, and are consistent with previous estimates for horizontal groundwater flow at the water table in the MWL vicinity.

7.4 Monitoring Well MWL-MW8 Soil-Vapor Investigation

Based upon fate and transport modeling and historical investigation and monitoring data, PCE is the primary MWL contaminant of concern that could impact groundwater. Updated fate and transport modeling for the VOC soil-vapor plume presented in Chapter 3 of the MWL Five-Year Report (SNL/NM January 2019) incorporates the monitoring results performed under the LTMMP that provide VOC soil-vapor concentration data for depths of 41.5 to 400 ft bgs. The simplistic one-dimensional model conservatively maximizes transport toward the groundwater and does not account for the natural protective capillary fringe barrier above the regional water table; the updated modeling results for PCE soil vapor indicate that impact to groundwater is unlikely. Conservative, protective trigger levels for PCE, TCE, and Total VOCs (i.e., total of all validated VOC results for an individual sample) were established in the LTMMP and apply to the 400 ft bgs sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05. All monitoring results for these soil-vapor sampling ports since their installation in 2014 are below the respective trigger levels.

PCE has been detected twice in groundwater samples from monitoring well MWL-MW8 during the ten semiannual groundwater monitoring events conducted under the LTMMP since 2014. The spurious detections (April 2014 and April 2016 samples) were below one part per billion, qualified as estimated values by the laboratory, and were an order of magnitude below the trigger level. Although not required based upon the low frequency of detections and concentrations detected, additional best practice actions and an investigation have been completed by SNL/NM personnel.

Based upon the VOC results from soil-vapor monitoring well MWL-SV03, located approximately 45 feet north of well MWL-MW8 (Figure 5-1), and extensive soil-vapor characterization and remediation experience at the nearby CWL, the most likely explanation for these spurious, low-concentration detections is PCE soil-vapor migration into the casing and/or screen interval of monitoring well MWL-MW8 from the surrounding vadose zone. As discussed in Chapter 5 and summarized in Table 5-4, PCE soil vapor has been measured at a depth of 400 ft bgs in MWL-SV03 at concentrations ranging from 0.310 (October 2017) to 0.450 ppmv (October 2015). If PCE soil vapor can diffuse into the well, it can directly contact and diffuse into groundwater within monitoring well MWL-MW8. For PCE soil vapor to impact groundwater outside the monitoring well, it is a much more difficult migration pathway. First, the PCE soil-vapor must diffuse into the stranded soil moisture of the capillary fringe located above the Regional Aquifer. Second, this soil moisture must move downward into the Regional Aquifer.

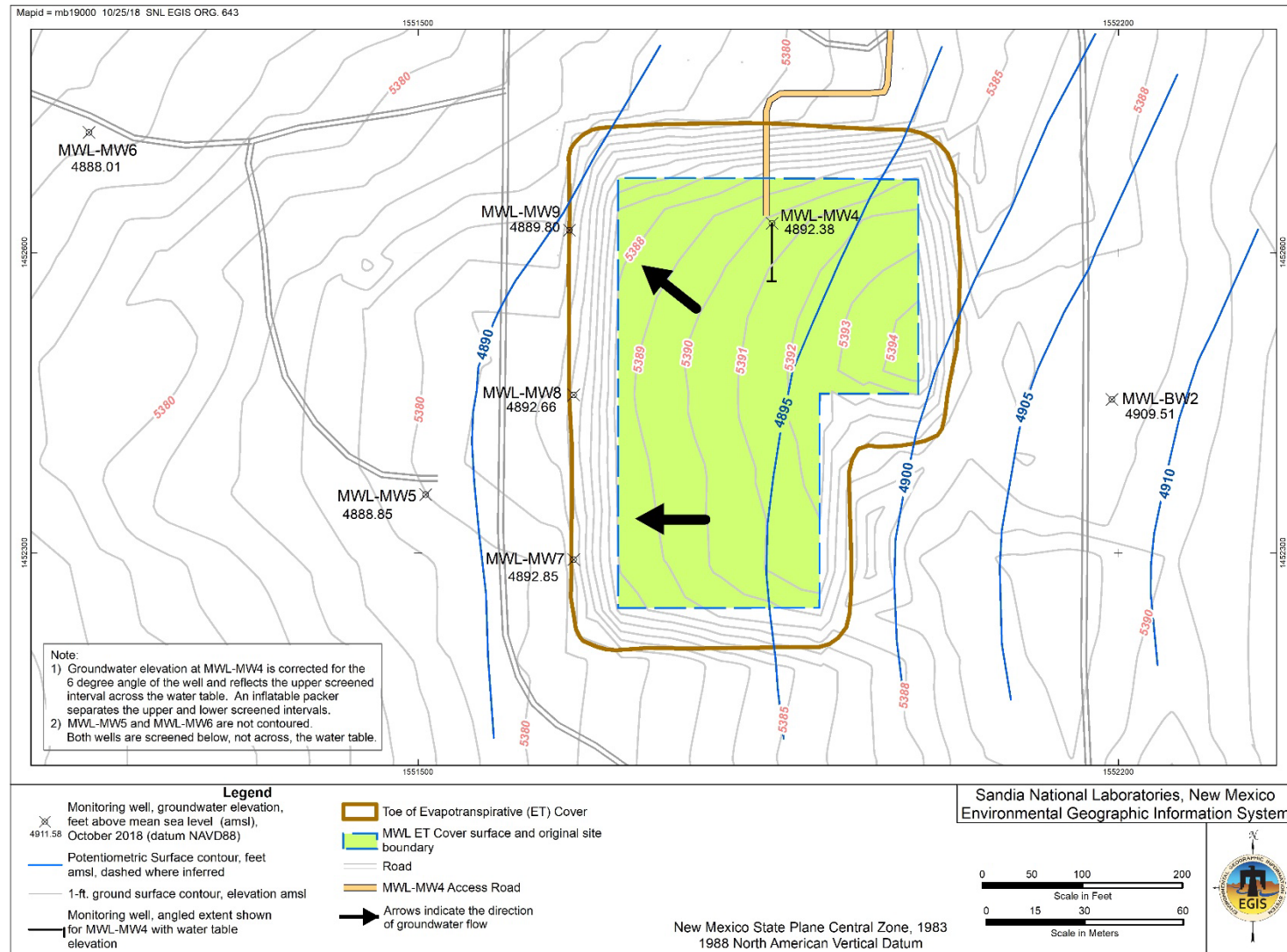


Figure 7-6
Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2018

Given the fact that the Regional Aquifer water table continues to decline beneath the MWL and is contained within mostly fine-grained alluvial sediments (i.e., silt-size sediments), similar to conditions at the CWL, the capillary fringe is expected to be relatively thick (i.e., many feet thick) and largely immobile. In other words, this zone of saturation is stranded or trapped by capillary forces and not able to move downward to the water table. As documented at the CWL (Annex E of the CWL Corrective Measures Study Report), the capillary fringe forms a significant barrier to the downward migration of PCE soil vapor (SNL/NM December 2004).

To better understand the possible cause of these spurious PCE detections and test this hypothesis, Amplified Geochemical Imaging LLC (AGI) Type 8 passive soil-vapor samplers were deployed at various depths above the water table in monitoring well MWL-MW8 from April 24 to 27, 2018. As shown in Figure 7-7, passive samplers were placed within the MWL-MW8 screen interval and casing corresponding to 1, 8, 15, 22, 41, 91, and 241 feet above the water table. QC samples included a duplicate sampler (at the 8 feet above water table location), a field blank sampler placed at the top of the well casing (i.e., at the surface), and a trip blank sampler that was shipped with the other samplers to the AGI laboratory to check for ambient contamination during shipment and analysis. The AGI samplers were deployed for just under 72 hours as recommended by AGI based upon assumed VOC concentrations in the well and VOC uptake rates determined by AGI for selected compounds. The exposed samplers were then shipped to the AGI analytical laboratory in Newark, Delaware for analysis following a modified EPA VOC Method 8260C. Results were reported in mass per sample (i.e., micrograms per sample) and converted to parts per billion by volume (ppbv) using site-specific atmospheric pressure and soil gas temperature estimates provided by SNL/NM personnel.

As shown in Table 7-7, results show detectable concentrations of PCE and TCE soil vapor inside the MWL-MW8 screen interval and well casing above the water table at the deployed sampling depths. The results for the field blank sample placed at the top of the well casing and the trip blank sample were both non-detections. PCE concentrations were very low, and ranged from 9.82 ppbv to 29.0 ppbv (i.e., 0.00982 to 0.0290 ppmv). TCE concentrations were similar but slightly lower, ranging from 9.28 to 21.7 ppbv, or 0.00928 to 0.0217 ppmv. The following information summarizes key findings from this investigation.

- PCE and TCE soil vapor is diffusing into the MWL-MW8 well casing and likely the screen interval above the water table.
- PCE and TCE concentrations are lowest just above the water table (i.e., depth of 491 feet below top of casing/1 foot above the water table), and generally increase to higher concentrations at sampling depths of 451 to 251 feet below top of casing (i.e., 41 to 241 feet above top of the water table).
- PCE maximum concentration in MWL-MW8 (0.0290 ppmv) is at the same approximate depth as the MWL-SV03 400 ft bgs sampling port located just 45 feet to the north, but approximately one order of magnitude lower than the MWL-SV03-400 PCE concentration from April 2018 (0.370 ppmv).
- Assuming equilibrium conditions between groundwater and air/soil vapor at the water table in MWL-MW8, a low-concentration PCE detection above the laboratory detection limit of 0.30 µg/L in groundwater would be expected with a PCE soil-vapor concentration of 0.033 ppmv.

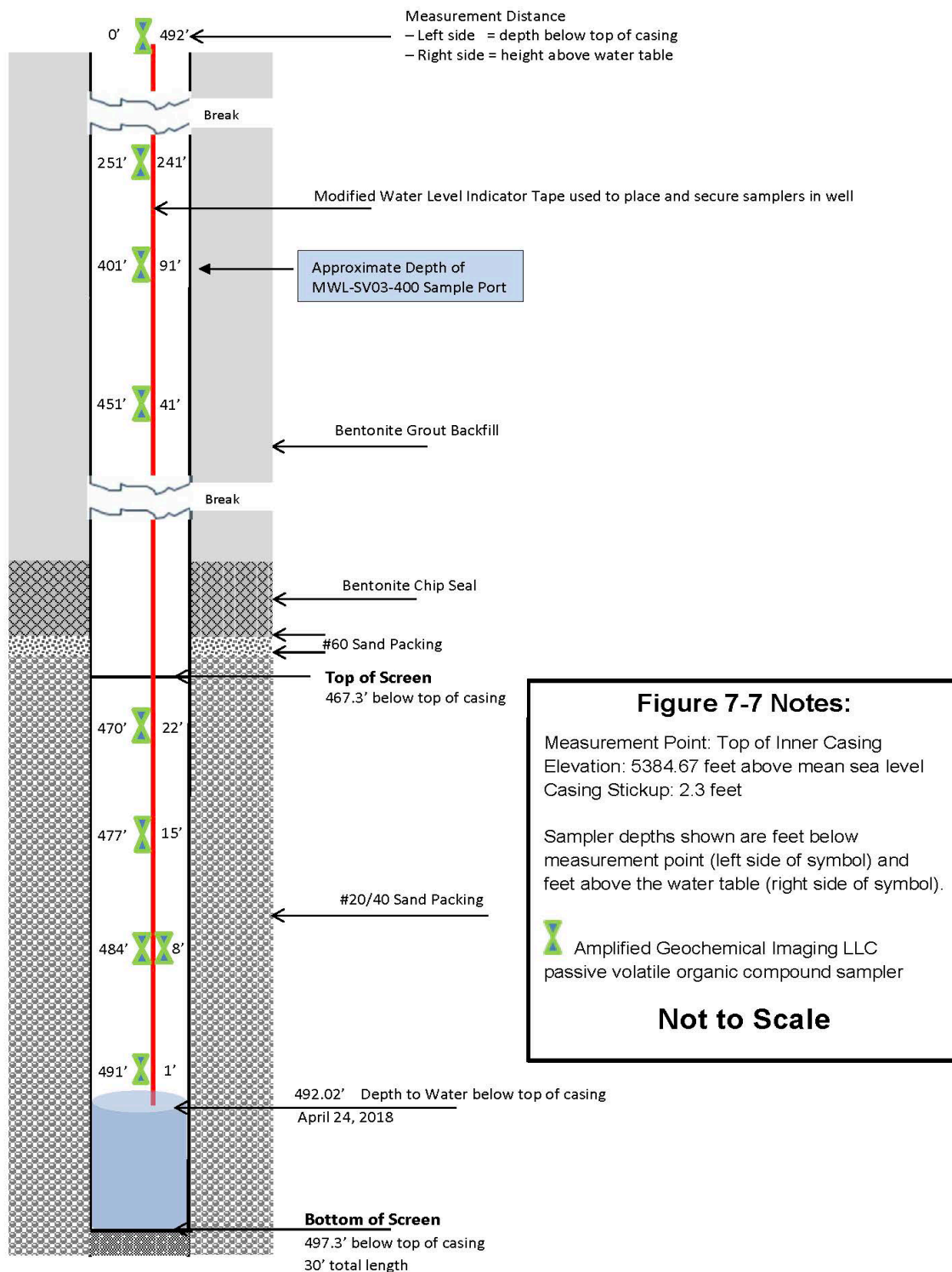


Figure 7-7
Passive Volatile Organic Compound Sampler Deployment in Groundwater Monitoring Well
MWL-MW8, April 24 – 27, 2018.

Table 7-7
Summary of Results for Passive Vapor Samplers
Monitoring Well MWL-MW8
April 24-27, 2018

Type	Feet Above Water Level	Feet Below Measurement Point ^a	Tetrachloroethene (PCE)		Trichloroethene (TCE)	
			µg/sample	ppbv ^b	µg/sample	ppbv ^b
Sampler Locations Above the MWL-MW8 Screen Interval in the Well Casing						
FB	492	0	<0.04	<0.08	<0.04	<0.49
SA	241	251	11.7	23.0	2.78	20.8
SA ^c	91 ^c	401 ^c	14.8	29.0	2.32	17.7
SA	41	451	12.3	24.2	2.92	21.7
Sampler Locations Within the MWL-MW8 Screen Interval						
SA	22	470	8.91	17.5	2.07	16.0
SA	15	477	6.66	13.1	1.30	10.6
FD	8	484	5.09	10.1	1.17	9.66
SA	8	484	5.25	10.4	1.18	9.77
SA	1	491	4.96	9.82	1.12	9.28
TB	NA	NA	<0.04	<0.08	<0.04	<0.49

^a Measurement point is top of inner well casing, with a stickup of 2.3 feet above ground surface. Measured depth to water was 492.02 feet below measurement point on April 24, 2018 prior to sampler deployment.

^b Volume concentrations calculated using site-specific pressure and temperature values of 0.82 atmospheres and 19 degrees Celsius.

^c Sample depth that corresponds to the 400 foot below ground surface sampling port of soil-vapor monitoring well MWL-SV03 located approximately 45 feet north of groundwater monitoring well MWL-MW8.

FB = Field blank sample.

FD = Field duplicate sample.

µg = Microgram.

NA = Not Applicable.

< = Less than (not detected at or above the value shown, which is the laboratory Limit of Detection).

ppbv = Parts per billion by volume.

SA = Sample.

TB = Trip blank sample.

The best practice passive soil-vapor investigation of groundwater monitoring well MWL-MW8 confirms that PCE and TCE soil vapor has diffused into the well above the water table. This information supports the hypothesis that the two estimated, very low-concentration PCE detections in April 2014 and April 2016 groundwater samples are most likely due to PCE soil-vapor diffusion into the well. Once in the well, the PCE and/or TCE soil vapor can diffuse directly into groundwater, with the well creating a bypass of the capillary fringe protective barrier that exists outside the well between the dry vadose zone and the Regional Aquifer water table. If the PCE soil-vapor plume were contaminating groundwater in the general vicinity of MWL-MW8, more consistent and frequent detections of PCE would be expected from MWL-MW8 groundwater samples.

Passive venting soil-vapor devices (i.e., BaroBalls™) were installed on groundwater monitoring wells in February 2015 (SNL/NM June 2015) as a best practice and are designed to minimize the downward movement of soil vapor that enters monitoring wells during periods of high atmospheric barometric pressure. Since the installation of the BaroBalls™, there has been only one detection of PCE (April 2016) in a MWL-MW8 groundwater sample. As PCE and TCE soil

vapor continues to diffuse into MWL-MW8, the passive venting devices help prevent the downward migration of this soil vapor towards the groundwater.

No additional actions are required based on the infrequent PCE groundwater detections; the very low, estimated concentrations that are below the PCE groundwater trigger level of 2.5 µg/L; and the results of this passive soil-vapor investigation. Additionally, the passive venting BaroBalls™ that were installed on all groundwater monitoring wells in February 2015 are performing effectively based upon semiannual inspections of the wells and passive venting devices, groundwater monitoring results, and the MWL-MW8 soil-vapor investigation results. Ongoing soil-vapor and groundwater monitoring will provide the empirical data necessary to monitor and evaluate the situation. Based upon both conservative fate and transport modeling (SNL/NM January 2019) and ongoing monitoring results, the VOC soil-vapor plume does not pose a threat to groundwater.

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8.0 BIOTA MONITORING RESULTS

This chapter presents biota monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with MWL LTMMMP Section 3.6 and Appendix F (SNL/NM March 2012). The monitoring objective is to provide data to evaluate biotic mobilization of contaminants (i.e., metals and radionuclides) from the subsurface to surface. Sampling of surface soil from animal burrows and ant hills, and potentially deep-rooted vegetation, is performed if these features are identified during the annual ET Cover Biology Inspection. Biota monitoring functions as an early warning detection system for biotic mobilization of contaminants to the surface so that timely action can be taken, if necessary. Results are compared to trigger levels and background levels defined in LTMMMP Section 5.2.2.2.

Biota monitoring field activities are described in Section 8.1, analytical laboratory results and a discussion of data quality are presented in Section 8.2, and data evaluation and a comparison of results to monitoring trigger levels are presented in Section 8.3. A summary of biota monitoring activities and results is provided in Section 11.1.

8.1 Biota Monitoring Field Activities

One biota sampling event was conducted during the April 1, 2018 through March 31, 2019 reporting period fulfilling the LTMMMP annual monitoring requirement. The biota sampling locations were identified during the annual ET Cover Biology Inspection performed on September 10, 2018. The sampling locations are shown in Figure 8-1 and consist of two ant hills (MWL AHSS-01-2018 and MWL AHSS-02-2018). There were no animal burrows or potentially deep-rooted plants identified on the ET Cover during the Biology Inspection. The two ant hill locations selected for surface soil sampling were the largest and most active of the ant hills on the ET Cover, and they provide good spatial coverage. Surface soil samples were collected at these locations on September 13, 2018 and analyzed for metals and gamma emitting radionuclides by gamma spectroscopy.

8.1.1 Field Quality Control

In accordance with the Tritium and Biota SAP (LTMMMP Appendix G, Table G-4.2-1), one field QC sample (duplicate sample) was collected at MWL AHSS-02-2018.

8.1.2 Waste Management

Waste generated during sampling activities included PPE (i.e., gloves), and decontamination wipes. Historical data and analytical results from the sampling event were used to characterize the waste; it was determined to be non-hazardous solid waste and was managed accordingly.

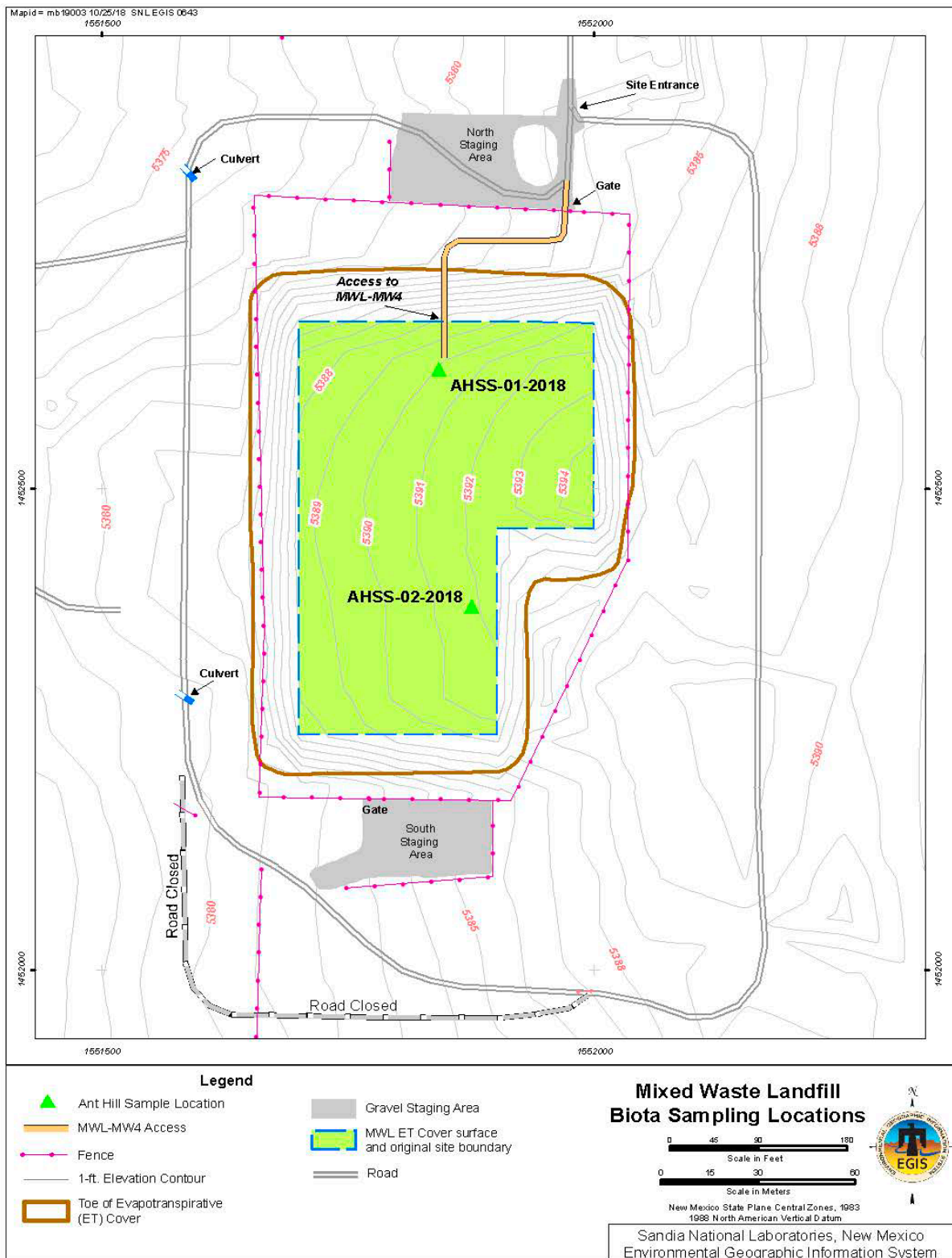


Figure 8-1
Mixed Waste Landfill Biota Sampling Locations

8.2 Laboratory Results

Biota surface soil samples were submitted to GEL for analyses. Samples were analyzed in accordance with applicable EPA analytical methods. Results that are below the MDL (metals) or MDA (gamma spectroscopy) are qualified with a “U” and are designated as not detected. Both laboratory and data validation qualifiers are included in the data tables presented in this section. Analytical laboratory reports, including certificates of analyses, analytical methods, MDAs and MDLs, sample results, dates of analyses, and results of QC analyses, are filed in the SNL/NM Record Center.

8.2.1 Environmental Sample Results

Table 8-1 summarizes metals results and Table 8-2 summarizes gamma spectroscopy results for the two ant hill surface soil sample locations. NMED-approved background concentrations and activities (Dinwiddie September 1997), and LTMMP trigger levels are included in Tables 8-1 and 8-2 for comparison.

All metals results were below trigger levels. All metals results were also below the respective NMED-approved background concentrations except for barium and selenium. The barium concentration in sample AHSS-02-2018 was slightly above the NMED-approved background concentration (130 mg/kg) at 166 mg/kg, but below the trigger level of 100,000 mg/kg. The selenium concentrations in sample AHSS-01-2018 and the environmental duplicate sample for AHSS-02-2018 were slightly above the NMED-approved background concentration (less than 1 mg/kg), at 1.15 mg/kg and 1.02 mg/kg, respectively, but below the trigger level of 5,680 mg/kg. The barium and selenium results likely reflect natural variation in background concentrations.

All gamma spectroscopy radionuclide activities were low, below the respective NMED-approved background activities. Eight of the 18 results were non-detects. One uranium-238 result was qualified as unusable during data validation due to the peak not meeting identification criteria. The gamma spectroscopy results were reviewed by an SNL/NM radiological SME to screen for potential indications of radiological contamination; there were no indications of radiological anomalies in the biota soil sample results.

8.2.2 Field Quality Control Sample Results

Table 8-3 summarizes results of the environmental-duplicate sample pair and the RPD values calculated for the September 2018 biota data set. An RPD was calculated when metals concentrations greater than the RL were reported in both the environmental and duplicate sample, and when radionuclides were reported in both the environmental and duplicate sample at activities greater than the MDA. Calculated RPDs for metals and radiological constituents show good agreement, ranging from <1 to 21, except for barium with an RPD of 38. As defined in Section 2.3, Appendix G of the LTMMP, an RPD of less than or equal to 35 is considered acceptable for metals results, but RPD values greater than 35 are expected due to natural variation in surface soil background concentrations. Based on the other RPD values, the greater value for barium is likely related to natural variability in the soil matrix and not indicative of an issue with data precision. Additional corrective action (e.g., resampling) is not required.

Table 8-1
Summary of Metals Results (EPA Method 6020/7470^a)
Mixed Waste Landfill Biota Monitoring
September 2018

Sample Location	Parameter	Result (mg/kg)	MDL (mg/kg)	Reporting Limit (mg/kg)	NMED Background ^b (mg/kg)	Trigger Level (mg/kg)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL AHSS-01-2018 13-Sep-18	Arsenic	2.44	0.311	0.919	5.6	17.7	--	
	Barium	116	0.0919	0.368	130	100,000	*B	J,MS1,RP2
	Beryllium	0.343	0.0184	0.0919	0.65	2,260	*	--
	Cadmium	0.0831	0.0184	0.184	<1	897	J	--
	Chromium	6.26	0.184	0.551	17.3	63.1	N	J,MS2
	Cobalt	2.37	0.0551	0.184	5.2	20,500	*	--
	Copper	6.73	0.0607	0.184	15.4	45,400	*	--
	Lead	4.76	0.0919	0.368	21.4	800	--	--
	Mercury	0.00491	0.00383	0.0114	<0.25	73.6	HJh	J-,H1,DL3
	Nickel	4.70	0.0919	0.368	11.5	22,500	--	--
	Selenium	1.15	0.331	0.919	<1	5,680	--	--
	Silver	ND	0.488	2.44	<1	5,680	U	--
	Vanadium	12.5	0.276	0.919	20.4	5,680	*N	J,MS2
	Zinc	20.2	0.735	1.84	62	100,000	*BN	J,MS1
MWL AHSS-02-2018 13-Sep-18	Arsenic	2.42	0.316	0.935	5.6	17.7	--	--
	Barium	166	0.0935	0.374	130	100,000	*B	J,MS1,RP2
	Beryllium	0.343	0.0187	0.0935	0.65	2,260	*	--
	Cadmium	0.0948	0.0187	0.187	<1	897	J	--
	Chromium	7.21	0.187	0.561	17.3	63.1	N	J,MS2
	Cobalt	2.66	0.0561	0.187	5.2	20,500	*	--
	Copper	4.92	0.0617	0.187	15.4	45,400	*	--
	Lead	6.42	0.0935	0.374	21.4	800	--	--
	Mercury	0.00467	0.0034	0.0102	<0.25	73.6	HJh	J-,H1,DL3
	Nickel	5.61	0.0935	0.374	11.5	22,500	--	--
	Selenium	0.920	0.336	0.935	<1	5,680	J	--
	Silver	ND	0.477	2.39	<1	5,680	U	--
	Vanadium	13.8	0.280	0.935	20.4	5,680	*N	J,MS2
	Zinc	20.5	0.748	1.87	62	100,000	*BN	J,MS1
MWL AHSS-02-2018 13-Sep-18 (Duplicate)	Arsenic	2.57	0.333	0.984	5.6	17.7	--	--
	Barium	113	0.0984	0.394	130	100,000	*B	J,MS1,RP2
	Beryllium	0.345	0.0197	0.0984	0.65	2,260	*	--
	Cadmium	0.0876	0.0197	0.197	<1	897	J	--
	Chromium	7.21	0.197	0.591	17.3	63.1	N	J,MS2
	Cobalt	2.74	0.0591	0.197	5.2	20,500	*	--
	Copper	5.33	0.065	0.197	15.4	45,400	*	--
	Lead	5.90	0.0984	0.394	21.4	800	--	--
	Mercury	0.00463	0.00398	0.0119	<0.25	73.6	HJh	J-,H1,DL3
	Nickel	5.76	0.0984	0.394	11.5	22,500	--	--
	Selenium	1.02	0.354	0.984	<1	5,680	--	--
	Silver	ND	0.0958	0.479	<1	5,680	U	--
	Vanadium	14.0	0.295	0.984	20.4	5,680	*N	J,MS2
	Zinc	19.9	0.787	1.97	62	100,000	*BN	J,MS1

Refer to notes at end of table.

Table 8-1 (Concluded)
Summary of Metals Results (EPA Method 6020/7470^a)
Mixed Waste Landfill Biota Monitoring
September 2018

Notes:

^aU.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

^bDinwiddie September 1997, Letter from R.S. Dinwiddie (NMED) to M.J. Zamorski (DOE), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB," dated September 24, 1997.

^cLaboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

- * = Recovery of 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.
- B = The analyte was found in the blank above the effective MDL.
- h = Prep holding time exceeded.
- H = Analytical holding time was exceeded.
- J = Estimated value, the analyte concentration is greater than the MDL but less than the Reporting Limit.
- N = Result associated with a spike analysis that was outside control limits.
- U = Result less than the MDL.

Validation Qualifier

- DL3 = Reporting limit verification percent recovery failed low for quality control for Low Level Continuing Calibration Verification for CRI analyses.
- H1 = Holding time exceeded for sample analysis.
- J = Estimated value.
- J- = The associated numerical value is an estimated quantity with a suspected negative bias.
- MS1 = Matrix spike not analyzed or applicable.
- MS2 = Matrix spike analyte(s) recovery failed high.
- RP2 = Replicate RPD failed.

- CRI = Reporting limit verification for Liquid Chromatography/Mass Spectrometry/Mass Spectrometry Method.
- DOE = U.S. Department of Energy.
- EPA = U.S. Environmental Protection Agency.
- MDL = Method detection limit.
- mg/kg = Milligram(s) per kilogram.
- ND = Not detected above the MDL.
- NMED = New Mexico Environment Department.
- PQL = Practical quantitation limit.
- RPD = Relative percent difference.
- SNL/KAFB = Sandia National Laboratories/Kirtland Air Force Base.

Table 8-2
Summary of Gamma Spectroscopy Results (EPA Method 901.1^a)
Mixed Waste Landfill Biota Monitoring
September 2018

Sample Location	Parameter	Result (pCi/g)	MDA (pCi/g)	NMED Background ^b (pCi/g)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL AHSS-01-2018 13-Sep-18	Cesium-137	0.0589 ± 0.0342	0.0344	1.5	--	J, FR7
	Cobalt-60	-0.00186 ± 0.0156	0.0285	NA	U	BD, FR3
	Radium-226	0.724 ± 0.096	0.0548	2.7	--	--
	Thorium-232 ^d	0.950 ± 0.101	0.0439	1.5	--	--
	Uranium-235	-0.0413 ± 0.0986	0.171	0.18	U	BD, FR3
	Uranium-238	1.02 ± 1.21	1.01	2.3	X	R, Z2
MWL AHSS-02-2018 13-Sep-18	Cesium-137	0.0602 ± 0.0308	0.0277	1.5	--	J, FR7
	Cobalt-60	0.00147 ± 0.0151	0.0275	NA	U	BD, FR3
	Radium-226	0.604 ± 0.0917	0.0471	2.7	--	--
	Thorium-232 ^d	0.954 ± 0.107	0.043	1.5	--	--
	Uranium-235	-0.031 ± 0.0971	0.163	0.18	U	BD, FR3
	Uranium-238	-0.0128 ± 0.853	1.47	2.3	U	BD, FR3
MWL AHSS-02-2018 13-Sep-18 (Duplicate)	Cesium-137	0.0749 ± 0.0257	0.0233	1.5	--	--
	Cobalt-60	0.0142 ± 0.0161	0.0285	NA	U	BD, FR3
	Radium-226	0.683 ± 0.0879	0.0406	2.7	--	--
	Thorium-232 ^d	0.875 ± 0.0934	0.0333	1.5	--	--
	Uranium-235	-0.0241 ± 0.0662	0.111	0.18	U	BD, FR3
	Uranium-238	0.092 ± 0.988	0.832	2.3	U	BD, FR3

Notes:

^aU.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

^bDinwiddie September 1997, Letter from R.S. Dinwiddie (NMED) to M.J. Zamorski (DOE), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB," dated September 24, 1997. Cobalt-60 is not naturally occurring; therefore, it does not have a listed background activity.

^cLaboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

U = Analyte is below detection limit.

X = Results are considered a false positive due to peak not meeting identification criteria.

Validation Qualifier

BD = Value is below the MDA or less than the 2-sigma uncertainty.

FR3 = Results is less than the MDA or less than 2-sigma the total propagated uncertainty.

FR7 = Results is less than or equal to the MDA and less than 3 times the MDA.

J = Estimated value, result was less than the MDA but less than three times the MDA.

R = The data are unusable (compound may or may not be present).

Z2 = Minimum peak criteria not met.

^dThorium-232 activity is quantified and reported using the daughter isotope Lead-212 results.

DOE = U.S. Department of Energy.

EPA = U.S. Environmental Protection Agency.

MDA = Minimum detectable activity.

NA = Not applicable.

NMED = New Mexico Environment Department.

pCi/g = Picocuries per gram.

SNL/KAFB = Sandia National Laboratories/Kirtland Air Force Base.

Table 8-3
Summary of Duplicate Sample Results
Mixed Waste Landfill Biota Monitoring
September 2018

Sample Location	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a (%)
MWL AHSS-02-2018 – Metals (mg/kg)			
Arsenic	2.42	2.57	6
Barium	166	113	38
Beryllium	0.343	0.345	<1
Cadmium	0.0948	0.0876	8
Chromium	7.21	7.21	0
Cobalt	2.66	2.74	6
Copper	4.92	5.33	8
Lead	6.42	5.90	8
Mercury	0.00467	0.00463	<1
Nickel	5.61	5.76	3
Vanadium	13.8	14.0	1
Zinc	20.5	19.9	3
MWL AHSS-02-2018 – Radionuclides (pCi/g)			
Cesium-137	0.0602	0.0749	21
Radium-226	0.604	0.683	12
Thorium-232	0.954	0.875	7

Notes:

^aRPD = Relative percent difference is calculated with the following equation and rounded to the nearest whole number.

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

where: R₁ = Environmental sample result.
R₂ = Duplicate sample result.

mg/kg = Milligram(s) per kilograms(s).
pCi/g = Picocuries per gram.

8.2.3 Laboratory Quality Control Data Quality

Internal laboratory QC samples were analyzed concurrently with all environmental samples in accordance with laboratory procedures and EPA analytical methods. These included laboratory control samples, method blanks, matrix spike, and matrix spike duplicate samples for the metals analyses. For the radiological analyses, method blank and laboratory control samples were analyzed with the environmental samples. The results were used to evaluate potential contamination associated with the laboratory analytical process and to determine the accuracy and precision of the analytical methods. All metals and gamma spectroscopy data were reviewed and qualified in accordance with SNL/NM AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM June 2017b). Data validation and contract verification reviews are provided in Annex B.

Minor issues were identified during data validation that resulted in the qualification of results; they are summarized below. All barium, chromium, vanadium, and zinc results were qualified during data validation as estimated values. This was due to either lack of matrix spike

information; high matrix spike recoveries; and/or issues with replicate RPDs. All mercury results were qualified during data validation as estimated values with a suspected negative bias due to the analytical hold time being exceeded. The analytical hold time for mercury was exceeded by the laboratory due to their misinterpretation of the analyses requested on the AR/COC. To prevent this in the future, follow up with the laboratory was completed and improvements were made to the software used to generate the AR/COC.

Based upon the data validation and review criteria, all analytical data were qualified as appropriate and determined acceptable and to meet the DQOs. Reported QC samples results comply with analytical method and laboratory procedure requirements.

8.2.4 Variances

There were no variances from the LTMMMP biota monitoring requirements.

8.3 Data Evaluation and Monitoring Trigger Level

Trigger levels for metals in biota surface soil samples are specified in the LTMMMP, Table 5.2.2-1 and included in Table 8-1. No surface soil metals results exceeded the trigger levels.

There are no trigger levels established for radionuclides. In accordance with the LTMMMP Section 5.2.2.2, the gamma spectroscopy results are compared with NMED-approved background activity levels (Dinwiddie September 1997), but the background activities are not considered trigger levels. All radionuclide results for biota surface soil samples were below the NMED-approved background activity levels. No deep-rooted vegetation was identified for sampling.

These results indicate contaminants from the disposal areas are not being mobilized to the surface by plant or animal activity.

9.0 INSPECTION, MAINTENANCE, AND REPAIR RESULTS

This chapter presents a summary of inspection, maintenance, and repair activities conducted in accordance with requirements in MWL LTMM Section 4.0 and Appendix I, MWL Long-Term Monitoring Inspection Checklists/Forms (SNL/NM March 2012). Inspection requirements are summarized in Table 2-2 of this Annual LTMM Report. Table 9-1 lists the date(s) each type of inspection was performed during the April 1, 2018 through March 31, 2019 reporting period. Inspection results are presented in the following sections and documented on the inspection forms/checklists listed in Table 9-1 and provided in Annex F. A summary of inspection activities and results is provided in Section 11.2.

9.1 Final Cover System

The final cover system includes the ET Cover vegetation and ET Cover surface (note the term ET Cover includes the side slopes). ET Cover vegetation is inspected annually by an SNL/NM staff biologist, documented on the Biology Inspection Form/Checklist for the MWL Cover, and summarized in Section 9.1.1. The ET Cover surface is inspected quarterly by a field technician, documented on the MWL Cover Inspection Checklist/Form, and summarized in Section 9.1.2. During the quarterly inspections the field technician also inspects the storm-water diversion structures, security fence, and survey monuments, which are summarized in Sections 9.2 and 9.6.

9.1.1 Biology Inspection

One ET Cover Biology Inspection was performed by the staff biologist on September 10, 2018 fulfilling the requirement for an annual Biology Inspection during the reporting period growing season (Table 9-1). The ET Cover vegetation continues to meet all LTMM criteria for successful revegetation. The approximate foliar coverage on the ET Cover was 48 percent, with 99 percent of this coverage composed of native vegetation. The foliar coverage is dominated by native grasses, with *Galleta* grass comprising approximately 40 percent of the total foliar coverage. There were no contiguous areas without vegetation exceeding 200 square feet in size and no plants capable of developing deep root systems were identified. Thirteen ant hills were observed evenly distributed on the side slopes and cover surface. No action or repairs were required based on the Biology Inspection. Overall, the ET Cover vegetation and surface is in good condition. Additional information is provided on the September 10, 2018 Biology Inspection Form/Checklist (Annex F) and in the Biology Report (Annex G). The Biology Report summarizes ET Cover background information, local climate trends, maintenance performed to support the vegetation, and recommendations for the ET Cover based on inspections performed during the reporting period. Although only the annual Biology Inspection is required, the staff biologist performed verification inspections to support the quarterly ET Cover surface inspections performed by a field technician (Section 9.1.2) during the reporting period as a best practice.

Table 9-1
Inspection Frequency and Dates Performed
Mixed Waste Landfill
April 2018 – March 2019 Reporting Period

Inspection Type	Frequency	Form/Checklist ^a	Date Performed
ET Cover Biology Inspection	Annual ^b	Biology Inspection Checklist/Form	September 10, 2018
ET Cover Surface Inspection	Quarterly	Cover Inspection Checklist/Form	June 12, 2018
			September 12, 2018
			December 6, 2018
			March 4, 2019
Storm-Water Diversion Structure Inspection ^c	Quarterly	Cover Inspection Checklist/Form	June 12, 2018
			September 12, 2018
			December 6, 2018
			March 4, 2019
Soil-Vapor Monitoring Network Inspection	Semiannual ^d	Soil-Vapor Monitoring Network Checklist/Form	April 25, 2018
Soil-Moisture Monitoring Network Inspection	Annual ^d	Soil-Moisture Monitoring Network Checklist/Form	October 30, 2018
Groundwater Monitoring Network Inspection	Semiannual ^d	Groundwater Monitoring Network Checklist/Form	April 12, 2018 & May 3, 2018 ^e
			April 30, 2018
Security Fence Inspection ^c	Quarterly	Cover Inspection Checklist/Form	October 23, 2018
			June 12, 2018
			September 12, 2018
			December 6, 2018
			March 4, 2019

Notes:

^aAll reporting period inspection forms are provided in Annex F.

^bTransition from quarterly to annual inspection frequency based upon meeting successful revegetation criteria as determined by the staff biologist during the August 14, 2014 growing season Biology Inspection.

^cThese inspections, conducted at the same time as the ET Cover Surface Inspection, include access controls (gates, locks, signs) and survey monuments, and are documented on the same inspection form.

^dMonitoring network inspections are performed at the same frequency and at the same time as the associated monitoring.

^eThe inspection began on April 12, 2018, but due to equipment issues, could not be completed until May 3, 2018.

ET = Evapotranspirative.

9.1.2 ET Cover System/Surface Inspection

Four ET Cover surface inspections were performed by a field technician during the reporting period fulfilling the LTMMP quarterly inspection requirement (Table 9-1). The quarterly inspections were supported by the staff biologist. There were no inspection items that required maintenance or repairs, although some minor best practice maintenance was performed as discussed in Section 9.7.

9.2 Storm-Water Diversion Structure Inspection

Storm-water diversion structure inspections were combined with the quarterly ET Cover System/Surface Inspections during the reporting period, fulfilling the LTMMP quarterly inspection requirement (Table 9-1). These inspections addressed the storm-water diversion swale on the north, east, and south sides of the ET Cover (just beyond the toe of the cover side

slopes, Figure 2-3), and were documented on the same Cover Inspection Checklist/Form. No inspection items required follow-up actions.

9.3 Soil-Vapor Monitoring Network Inspection

Two inspections of the soil-vapor monitoring network were performed as part of the semiannual soil-vapor monitoring events conducted during the reporting period, fulfilling the LTMMMP inspection requirement (Table 9-1). No inspection items required follow-up actions.

9.4 Soil-Moisture Monitoring Network Inspection

One inspection of the soil-moisture monitoring network was performed as part of the annual monitoring event conducted during the reporting period, fulfilling the LTMMMP inspection requirement (Table 9-1). The inspection began on April 12, 2018 at which time two of the cable connectors for the cable reel assembly were identified as faulty. The cable reel assembly was replaced, and the inspection and monitoring resumed on May 3, 2018 with no other inspection items requiring follow-up actions.

9.5 Groundwater Monitoring Well Network Inspection

Two inspections of the groundwater monitoring well network were performed as part of the semiannual monitoring events conducted during the reporting period, fulfilling the LTMMMP inspection requirement (Table 9-1). No inspection items required follow-up actions.

9.6 Security Fence Inspection

Perimeter security fence inspections were combined with the four quarterly ET Cover System/Surface Inspections during the reporting period, fulfilling the LTMMMP inspection requirement (Table 9-1). The inspections addressed the security fence, access controls (gates, locks, signs), and survey monuments, and were documented on the same Cover Inspection Checklist/Form. Results of the quarterly inspections are provided below.

June 12, 2018 Inspection

Accumulation of dead, dry windblown tumbleweeds were identified along the perimeter fence. The plant debris was removed by the field technicians at time of the inspection.

September 12, 2018 Inspection

Accumulation of dead, dry windblown tumbleweeds were identified along the perimeter fence. The plant debris was removed by the field technicians at time of the inspection.

December 6, 2018 Inspection

Accumulation of dead, dry windblown tumbleweeds were identified along the perimeter fence. The plant debris was removed by the field technicians at time of the inspection.

March 4, 2019 Inspection

A sign on the security fence was identified as not securely fastened. It was repaired by the field technicians at time of the inspection. Accumulation of dead, dry windblown tumbleweeds were identified along the perimeter fence. The plant debris was removed by the cover system landscaping/maintenance contractor as of April 4, 2019, within 60 days of the inspection.

9.7 ET Cover Maintenance and Supplemental Watering

Efforts completed since ET Cover construction in 2009 to establish self-sustaining, native grasses on the ET Cover have been successful. Supplemental watering was not conducted during this reporting period and only minimal ET Cover maintenance was needed as a best practice to support the establishment and long-term health of the native grasses.

Three routine weed control events were conducted during this reporting period as a best practice.

April 26-30, 2018

This event addressed clearing the perimeter fence of windblown tumbleweeds identified during the March 9, 2018 inspection (LTMMMP requirement based on the last inspection of the previous reporting period), and the removal of windblown tumbleweeds from the ET Cover, the perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Weed removal totaled approximately 7 cubic yards.

October 25-26, 2018

Live and dead weeds were removed from the ET Cover, the perimeter fence, the erosion control features, the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover), and an area northeast of the North Staging Area. Weed removal totaled approximately 16 cubic yards. Additional work included spot repair of minor erosion areas (i.e., areas did not exceed specifications that would require repair per Table 2-2 of the Annual LTMM Report) on the northwest slope of the ET Cover.

March 26 - April 4, 2019

This event addressed the requirement to clear the perimeter fence of windblown tumbleweeds as identified during the March 4, 2019 inspection, and the best practice removal of windblown tumbleweeds from the ET Cover, the erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Weed removal totaled approximately 76.5 cubic yards. Weed control activities also included the application of a sterilant to the North and South Staging Areas, and the application of a pre-emergent herbicide to the area between the north toe of the ET Cover and the north fence and the 3-foot area

outside the perimeter fence. Both the sterilant and pre-emergent herbicide are approved for use at SNL/NM, were applied selectively in accordance with the manufacturer's specifications, and do not carry a bee precaution rating according to the University of California Integrated Pest Management. They were applied to help control weed growth at the site and promote the health of the existing native grasses on the ET Cover and surrounding perimeter.

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10.0 REGULATORY ACTIVITIES

On January 8, 2014, the NMED approved the MWL LTMM (Blaine January 2014). All MWL regulatory submittals since approval and full implementation of the LTMM are summarized in Section 10.1, along with submittals that occurred during this April 1, 2018 through March 31, 2019 reporting period. There were no LTMM modification requests during the reporting period.

10.1 MWL Regulatory Submittals

Regulatory submittals during this reporting period include the fifth MWL Annual LTMM Report, April 2017 – March 2018 (SNL/NM June 2018), approved by NMED in July 2018 (Kieling July 2018). The first MWL Five-Year Report (SNL/NM January 2019) was submitted to the NMED and information related to this report was provided to the public at the DOE Semiannual Public Meeting held on April 11, 2019. There was also one submittal of an updated reference document cited in the LTMM SAPs (Harrell January 2019). This update was made to keep the SNL/NM Statement of Work for Analytical Laboratories current and to reflect ongoing modifications and improvements in analytical laboratory services used to support MWL monitoring activities. This submittal was within 30 days of the effective date for the updated Statement of Work.

MWL post-LTMM implementation regulatory submittals are summarized in Table 10-1, including submittals that occurred during this reporting period. A summary of regulatory submittals associated with full implementation of the LTMM is presented in the MWL Annual LTMM Report, April 2014 – March 2015 (SNL/NM June 2015).

10.2 MWL LTMM Modifications

There were no LTMM modification requests submitted to the NMED during the reporting period. However, a modification request is in progress and submittal to NMED is anticipated in CY 2019.

Table 10-1
Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan Document Submittal History

Date of Submittal ^a	LTMM Requirement	Description of Submittal
January 15, 2014	Section 3.4.1	Installation Work Plan for Three Soil-Vapor Monitoring Wells at the Mixed Waste Landfill <ul style="list-style-type: none"> Approved in February 2014
September, 2014	Section 3.4.1	Installation Report for Three Soil-Vapor Monitoring Wells at the Mixed Waste Landfill <ul style="list-style-type: none"> Approved in September 2014
March 6, 2014	Appendices C through G	Procedures, plans, and documents cited in the LTMM used by SNL/NM personnel for air, surface soil, soil vapor, soil moisture, biota, and groundwater monitoring.
June 18, 2014	Section 4.8.1	MWL Annual LTMM Report, January – March 2014 <ul style="list-style-type: none"> Approved in August 2014
July 9, 2014	Appendices C, D, F, and G	Updates to two documents used by SNL/NM personnel to validate analytical data from contract laboratories and conduct activities related to sampling MWL soil-vapor wells. Updates to the health and safety plan for groundwater monitoring at the MWL.
February 18, 2015	Appendix F	Updates to reference documents used by SNL/NM personnel to conduct groundwater monitoring activities at the MWL.
June 8, 2015	Section 4.8.1	MWL Annual LTMM Report, April 2014 – March 2015 <ul style="list-style-type: none"> Approved in October 2015
May 20, 2016	Appendices C, D, E, F, and G	Updates to three documents used by SNL/NM personnel to perform monitoring activities at the MWL.
June 23, 2016	Section 4.8.1	MWL Annual LTMM Report, April 2015 – March 2016 <ul style="list-style-type: none"> Approved in July 2016
November 9, 2016	Appendices C, D, F, and G	Updates to four documents used by SNL/NM personnel to perform monitoring activities at the MWL.
June 6, 2017	Section 4.8.1	MWL Annual LTMM Report, April 2016 – March 2017 <ul style="list-style-type: none"> Approved in April 2018
July 6, 2017	Appendices C, D, E, F, and G	Updates to one document used by SNL/NM personnel to validate analytical data from contract laboratories.
February 8, 2018	Appendix F	Updates to reference documents used by SNL/NM personnel to conduct groundwater monitoring activities at the MWL.
April 2018 through March 2019 Reporting Period Submittals		
June 7, 2018	Section 4.8.1	MWL Annual LTMM Report, April 2017 – March 2018 <ul style="list-style-type: none"> Approved in July 2018
December 14, 2019	Section 4.8.2	MWL Five-Year Report (first Five-Year Report)
January 15, 2019	Appendices D, F, and G	Update to the SNL/NM Statement of Work for Analytical Laboratories used for monitoring sample analysis.

Notes:

^aDate represents the date stamp on the DOE transmittal letter for the submittal.

DOE = U.S. Department of Energy.

LTMM = Long-Term Monitoring and Maintenance.

LTMMMP = Long-Term Monitoring and Maintenance Plan.

MWL = Mixed Waste Landfill.

SNL/NM = Sandia National Laboratories/New Mexico.

11.0 SUMMARY AND CONCLUSIONS

This chapter presents a summary of MWL LTMMP monitoring, inspection, and maintenance/repair activities performed during this reporting period, followed by conclusions based upon these activities and results.

11.1 Monitoring Activities

All monitoring activities for the April 1, 2018 through March 31, 2019 reporting period were completed in accordance with LTMMP requirements. The results for each monitoring activity are summarized as follows.

Radon Monitoring

The radon air monitoring minimum frequency is annual and was performed over two six-month periods covering CY 2018. The range of radon activity for all monitoring locations was <0.2 to 0.4 pCi/L, and the range for all background location results was <0.2 to 0.2 pCi/L. No sample locations exceeded the trigger level of 4 pCi/L and all results confirm low levels of radon consistent with natural background levels and historical results. There were no indications of releases of radon gas from the disposal areas.

Tritium Surface Soil Monitoring

The tritium surface soil monitoring frequency is annual. Soil samples were collected on August 9, 2018. Reported tritium activities were all non-detections below the MDA, consistent with historical data, and below the trigger level of 20,000 pCi/L. There were no indications of new releases of tritium from the disposal areas.

Soil-Vapor Monitoring

The vadose zone soil-vapor monitoring frequency is semiannual. A total of 21 VOCs were detected during the April-May 2018 sampling event and a total of 42 VOCs were detected during the October 2018 sampling event. The larger number of compounds detected in October reflects very low concentration detections at one sampling location (MWL-SV04-100). Results for PCE, TCE, and Total VOCs from the deepest sampling port of wells MWL-SV03, MWL-SV04, and MWL-SV05 (400 ft bgs) were below the 20 ppmv trigger level for PCE and TCE, and the 25 ppmv trigger level for Total VOCs. The maximum concentrations detected for PCE and TCE at the 400 ft bgs sampling ports were 0.370 ppmv and 0.270 ppmv, respectively at well MWL-SV03. The maximum concentration for Total VOCs at the 400 ft bgs sampling ports was 0.77359 ppmv at well MWL-SV03. Soil-vapor monitoring results indicate a relatively uniform distribution of low concentration VOCs throughout the 500-foot-thick vadose zone that are not a threat to groundwater. This distribution is consistent with an old source that has dissipated

throughout the vadose zone, and indicates the VOC soil-vapor plume is stable with no new releases from the disposal area.

Soil-Moisture Monitoring

The vadose zone soil-moisture monitoring frequency is annual. The trigger level for soil moisture applies to the shallow depth interval of 8.7 to 86.6 ft bgs at the three monitoring locations. The soil-moisture content by volume for this depth interval ranged from 1.4 to 4.7 percent, below the 23 percent soil-moisture content by volume trigger level. Soil-moisture monitoring results are consistent with baseline results established prior to ET Cover construction and indicate the ET Cover is performing as designed.

Groundwater Monitoring

The groundwater monitoring frequency is semiannual. No constituents were detected in groundwater at concentrations exceeding trigger levels and the results are consistent with background levels and historical MWL groundwater monitoring results. Soil-vapor and groundwater monitoring results indicate the Regional Aquifer beneath the MWL is protected.

The best practice passive soil-vapor investigation of groundwater monitoring well MWL-MW8 confirms that PCE and TCE soil vapor has diffused into the well above the water table. Based upon experience at the nearby CWL, VOC soil-vapor diffusion into the well is the most likely cause of the two spurious, low-concentration PCE detections (April 2014 and April 2016 groundwater sample results). The low frequency and concentrations of these detections are not consistent with contamination in the Regional Aquifer. Passive venting soil-vapor devices (i.e., BaroBalls™) were installed on all groundwater monitoring wells in February 2015 (SNL/NM June 2015) as a best practice and are designed to minimize the downward movement of soil vapor that enters the monitoring wells. Ongoing soil-vapor and groundwater monitoring will provide the empirical data necessary to monitor and evaluate the situation. Based upon both conservative fate and transport modeling (SNL/NM January 2019) and ongoing monitoring results, the VOC soil-vapor plume does not pose a threat to groundwater.

Biota Monitoring

Biota monitoring frequency is annual. All metals and radionuclide results were below or very close to respective NMED-approved background levels, and well below trigger levels.

11.2 Inspections/Maintenance/Repairs Activities

The annual ET Cover Biology Inspection was performed on September 10, 2018 during the reporting period growing season. The ET Cover continues to meet LTMMP successful revegetation criteria. Efforts completed since ET Cover construction in 2009 to establish self-sustaining, native grasses on the ET Cover have been successful. As a result, minimal maintenance and no repairs or supplemental watering were needed. The ET Cover vegetation is in good condition and no issues requiring maintenance or repairs were identified.

The ET Cover System/Surface Inspections were performed quarterly. Minor maintenance was performed during the inspections. Inspections of the engineered storm-water drainage swale, perimeter security fence and access controls (i.e., gates, locks, signs), and survey monuments were performed at the same time and frequency. No issues were identified requiring maintenance or repairs beyond that performed during the inspections, except for clearing the perimeter fence of windblown tumbleweeds after the March 4, 2019 inspection. The fence was cleared by the ET Cover maintenance contractor within 60 days of the inspection.

Inspections of the soil-vapor monitoring network, soil-moisture monitoring network, groundwater monitoring network, and associated sampling equipment were performed at required frequencies (i.e., concurrent with each monitoring event) and no issues requiring repairs or maintenance were identified. Routine equipment checks and preventive maintenance are performed by monitoring personnel as best practice throughout the monitoring process.

Three routine weed control events were conducted as a best practice during the reporting period. These events included removal of live and dead weeds from the ET Cover, and the removal of windblown tumbleweeds from the perimeter fence and drainage swale. Best practice maintenance also included the selective application of an approved sterilant and pre-emergent herbicide to perimeter areas to limit weed growth at the site and help promote the health of the desired native grass species by reducing competition with weedy species for limited moisture and nutrients.

11.3 Regulatory Activities

Regulatory activities during the April 1, 2018 through March 31, 2019 reporting period included submittal of the first MWL Five-Year Report (SNL/NM January 2019), an updated reference document cited in LTMMP SAPs (Harrell January 2019), and the fifth MWL Annual LTMM Report, April 2017 – March 2018 (SNL/NM June 2018) that was approved by NMED (Kielling July 2018). There were no LTMMP modification requests submitted to the NMED during the reporting period. A modification request is in progress and submittal to the NMED is anticipated in CY 2019.

11.4 Conclusions

All required LTMMP monitoring, inspection, and maintenance/repair activities for the April 1, 2018 through March 31, 2019 reporting period were performed and documented in this sixth Annual LTMM Report, which meets the requirements of the LTMMP, Section 4.8.1.

The monitoring and inspection results indicate the final remedy, which includes the ET Cover, monitoring systems, and related physical controls, is performing as designed. Institutional controls related to the MWL continue to be maintained. No monitoring trigger levels were exceeded. Based upon monitoring and inspection results, site conditions continue to be protective of human health and the environment.

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12.0 REFERENCES

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ANNEX A

**Mixed Waste Landfill
Radon Monitoring Forms and Reports**

January-December 2018

Data Evaluation Memos

Field Forms

Inspection Forms

Contract Verification Reviews

MIXED WASTE LANDFILL

RADON MONITORING

January-June 2018 Monitoring Period



Sandia National Laboratories

Operated for the United States Department of Energy
by National Technology and Engineering Solutions
of Sandia, LLC.

Albuquerque, New Mexico 87185-0651

date: July 26, 2018

to: Mike Mitchell (8888), Robert Ziock (8888), and Bonnie Little (8888)

from: Kelly Green (6281) kagreen@sandia.gov *Kelly Green*

subject: Review of MWL Radon Air Data – January through June 2018 Semiannual Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the January through June 2018 semiannual monitoring event. My review includes evaluation of the results and supporting documentation relative to the data quality objective (DQO) and monitoring objectives specified in the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (Appendix C, *Air Sampling and Analysis Plan for the Mixed Waste Landfill*). The DQO for this monitoring is to produce representative, accurate, defensible, and comparable analytical results to support the monitoring objective. Although radon monitoring at the MWL transitioned from a quarterly to semiannual frequency in calendar year (CY) 2016, a decision was made to return to quarterly monitoring for CY 2017 to investigate the lower results from the July through December 2016 monitoring period and to evaluate various detector types (e.g., RapiDOS[®] and Radtrak2[®]). After conducting the investigation in CY 2017, I recommended in my data evaluation memorandum dated February 14, 2018 to proceed with Radtrak2[®] detectors for 6-month semiannual monitoring durations in CY 2018 and beyond.

Radon air monitoring measurements during the January through June 2018 semiannual were obtained using the Radtrak2[®] detectors. The detectors were deployed at each monitoring location (Figure 1) on January 2, 2018 and were collected on July 2, 2018. The protective casing and mounting hardware were inspected during the collection effort and repairs were made if needed. The detectors remained in the field for approximately six months and were submitted to the analytical laboratory for analysis on Analysis Request/Chain of Custody (AR/COC) #618382. A trip blank detector (RNTB) was submitted with the detectors.

The results for this semiannual radon monitoring period and associated field documentation meet the LTMMP DQO and monitoring objectives. The results were consistent with the October through December 2017 and consistent with historical data. Results ranged from non-detects (<0.2 pCi/L) at locations RN1, RN2, RN3, RN8, RN11, RN12, RN13, RN14, RN15, and RN16 to 0.4 pCi/L at location RN6. The results included detections at 7 of the 17 locations, with a range of 0.2 to 0.4 pCi/L.

Review of MWL Radon-in-Air Data
1st Semiannual CY 2018 (January - June 2018)
July 26, 2018

The trigger level of 4 pCi/L was not exceeded by any of the individual sample results (note: the trigger level only applies to the results from the perimeter locations RN1 through RN10, Figure 1). All results indicate very low activities of radon in the air at the MWL, consistent with historical results and background radon activity. The results from this semiannual monitoring event will be presented in the next MWL Annual LTMM Report that will be submitted to NMED in June 2019 (reporting period is April 1, 2018 through March 31, 2019).

Attachments:

Analysis Request/Chain of Custody #618382

radonova Radon Monitoring Report (analytical laboratory results for Radtrak2[®] detectors)

Figure 1. Location of the Alpha Track Detectors at the MWL

SMO 2012-ARCO (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab												Page 1 of 2					
Batch No.												SMO Use		AR/COC		618382	
Project Name: MWL RADON MONITORIN			Date Samples Shipped: 7-5-18			SMO Authorization: [Signature]			<input type="checkbox"/> Waste Characterization								
Project/Task Manager: Robert Zlock			Carrier/Waybill No. 284578			SMO Contact Phone: Wendy Palencia/505-844-3132			<input type="checkbox"/> RMA								
Project/Task Number: 195122.10.11.08			Lab Contact: Steve Leslie/331-814-2211			Send Report to SMO: Stephanie Montaño/505.284.2553			<input type="checkbox"/> Released by COC No.			<input checked="" type="checkbox"/> 4° Celsius					
Service Order: CF378-18			Lab Destination: RADON														
			Contract No.: 1495047														
Tech Area:			Operational Site:														
Building:			Room:														
Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154																	
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID					
104181	001	RN1/ Radtrak2 996014-7	N/A	7/2/18 08:32	AF	N	0 NA	NONE	C	SA	RADON						
104182	001	RN2/ Radtrak2 185291-2	N/A	7/2/18 08:36	AF	N	0 NA	NONE	C	SA	RADON						
104183	001	RN3/ Radtrak2 265833-4	N/A	7/2/18 07:52	AF	N	0 NA	NONE	C	SA	RADON						
104184	001	RN4/ Radtrak2 995718-4	N/A	7/2/18 07:55	AF	N	0 NA	NONE	C	SA	RADON						
104185	001	RN5/ Radtrak2 119535-3	N/A	7/2/18 07:59	AF	N	0 NA	NONE	C	SA	RADON						
104186	001	RN6/ Radtrak2 283818-3	N/A	7/2/18 08:02	AF	N	0 NA	NONE	C	SA	RADON						
104187	001	RN7/ Radtrak2 652283-3	N/A	7/2/18 08:06	AF	N	0 NA	NONE	C	SA	RADON						
104188	001	RN8/ Radtrak2 786444-0	N/A	7/2/18 08:20	AF	N	0 NA	NONE	C	SA	RADON						
104189	001	RN9/ Radtrak2 770890-2	N/A	7/2/18 08:25	AF	N	0 NA	NONE	C	SA	RADON						
104190	001	RN10/ Radtrak2 698595-6	N/A	7/2/18 08:28	AF	N	0 NA	NONE	C	SA	RADON						
Last Chain: <input type="checkbox"/> Yes			Sample Tracking			SMO Use			Special Instructions/QC Requirements:			Conditions on Receipt					
Validation Req'd: <input checked="" type="checkbox"/> Yes			Date Entered:			EDD <input checked="" type="checkbox"/> Yes			Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day								
Background: <input type="checkbox"/> Yes			Entered by:			Negotiated TAT <input type="checkbox"/>			Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab								
Confirmatory: <input type="checkbox"/> Yes			QC Inits.:			Return Samples By:			Comments:								
Sample Team Members		Name	Signature	Init.	Company/Organization/Phone/Cell			Deployed: 1/2/18			Lab Use						
		Danielle Michel	[Signature]	DMM	SNL/00641/505-845-7706/505-219-7143												
Relinquished by [Signature]		Org. 0641	Date 7/5/18	Time 1055	Relinquished by [Signature]		Org.	Date	Time								
Received by [Signature]		Org. 0635	Date 7/2/18	Time 1055	Received by [Signature]		Org.	Date 07/12/18	Time								
Relinquished by [Signature]		Org. 0631	Date 7/5/18	Time 1359	Relinquished by [Signature]		Org.	Date	Time								
Received by [Signature]		Org.	Date 7/11/18	Time	Received by [Signature]		Org.	Date	Time								

*Prior confirmation with SMO required for 7 and 15 day TAT

Review of MWL Radon-in-Air Data
1st Semiannual CY 2018 (January - June 2018)
July 26, 2018

SMO 2012-ARCOC (4-2012)

**CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)**

AOP 95-16

Page 2 of 2

AR/COC 618382

[illegible]

US

Sida 1



ROBERT ZIOCK
United States

RADON MONITORING REPORT

Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER
4804488:1

REPORT PAGE 1

REPORT DATE
07/17/2018

PRINT DATE
07/17/2018

MEASUREMENT PERFORMED FOR
ROBERT ZIOCK

REPORT RECEIVER(S)
ROBERT ZIOCK

The analysis results are located on page 2 of this document.

Description of the measurement

The measurement was performed with a closed alpha-track detector (Radtrak2) following the quality guidance in EPA 402-R-95-012.

The detector(s) arrived to Radonova Laboratories AB 07/09/2018. They were measured 07/13/2018.

Property data and address

Building Id:

AR/COC 618382
AR/COC 618382

Type of building:
Building year:
HVAC:
Foundation type:
Purpose of test:

Measurement method: closed alpha-track detector

The radon measurement was performed with a closed alpha-track detector following the quality assurance guidance given in EPA 402-R-95-012. The detector container is manufactured from electrically conducting plastic. Through a small slit (filter), radon gas enters the detector. The track-detecting material (film) inside the detector is hit by alpha particles generated by the radon entering the container and the decay products formed from it. On the film, the alpha particles make small tracks which are enlarged through chemical etching and later counted in a microscope in order to determine the radon exposure. Radonova Laboratories AB (P.O. Box 6522, SE-751 28 Uppsala, Sweden) is accredited (no. 1489) by SWEDAC to conduct radon-gas measurements using the closed alpha-track detector method. The analysis equipment is checked daily and the detectors are calibrated at regular intervals. NRPP Licenses: 107831 AL, 107830 RT

Measured radon concentrations

For each detector, the measured value of the radon concentration is given. For each value an uncertainty associated with the measurement to a 95% confidence level is also given. For example a measurement result of 4.0 ± 0.5 pCi/l means that the radon concentration is most likely contained in the range 3.5–4.5 pCi/l. If the start or end date of the measurement has not been provided, the radon concentration cannot be calculated. In such cases, the total exposure in pCi*days/l will be reported. The reported measured values are related to the detectors as received by Radonova Laboratories AB. Detector deployment is not performed by Radonova Laboratories AB. Measurement information such as monitoring period (dates) and placement location is provided to Radonova Laboratories AB by the end user.

Radon measurements in Multifamily Buildings, Schools and Large Buildings

The United States Environmental Protection Agency (EPA) recommends remediation if the results of one long-term test or the average of two short-term tests conducted in an occupied room are 4.0 pCi/l or higher. The average yearly residential indoor radon level in the US is estimated to be around 1.3 pCi/l. Long-term tests are conducted for more than 90 days. Short-term tests are conducted between 2 and 90 days and should be performed under closed building conditions.

If an initial short-term test result is less than 4 pCi/l, a follow-up measurement is probably not needed.

If an initial short-term test result is between 4 pCi/l and 8 pCi/l, a long-term or a short-term follow-up measurement is recommended.

If an initial short-term test result is greater than 8 pCi/l, a short term follow-up measurement is recommended in order to get a fast result.

More information about radon measurements and mitigation can be found in the AARST and EPA publications:

- ANSI/AARST Protocol for Conducting Measurements of Radon and Radon-Decay Products in Schools and Large Buildings
- ANSI/AARST Protocol for Conducting Radon and Radon Decay Product Measurements in Multifamily Buildings.
- ANSI/AARST Radon Mitigation Standards for Schools and Large Buildings.
- ANSI/AARST Radon Mitigation Standards for Multifamily Buildings.
- EPA Radon Measurements in Schools, EPA 402-R-92-014, July 1993.

For more information about the interpretation of your test results or about other radon related issues we suggest contacting your state radon office.

Signature on the report

With the signature on the report, the person responsible for the radon analysis at Radonova Laboratories AB hereby certifies that the measurement procedures follows the guidance in accordance with EPA 402-R-95-012 and that the demands from SWEDAC are fulfilled.

DISCLAIMER – Radonova Inc. makes no warranty of any kind, express or implied, as to the use, operation or analysis of any Radonova Inc. monitor. Radonova Inc. specifically disclaims implied warranties of merchantability and fitness for a particular purpose. Radonova Inc. is not responsible for any damage, including consequential damages, to persons or property resulting from the use of the monitor or the resulting data.

RT002LN - VI-40 / 2017-06-22 / JO / LB



RADON MONITORING REPORT

Issued by an Accredited Laboratory



REPORT NUMBER
4804488:1

REPORT PAGE 2

REPORT DATE
07/17/2018

PRINT DATE
07/17/2018

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
996014-7	01/02/2018	07/02/2018	RN1			< 0.2	< 34
185291-2	01/02/2018	07/02/2018	RN2			< 0.2	< 34
265833-4	01/02/2018	07/02/2018	RN3			< 0.2	< 34
995718-4	01/02/2018	07/02/2018	RN4			0.2 ± 0.2	45 ± 20
119535-3	01/02/2018	07/02/2018	RN5			0.2 ± 0.2	41 ± 23
283818-3	01/02/2018	07/02/2018	RN6			0.4 ± 0.2	62 ± 23
652283-3	01/02/2018	07/02/2018	RN7			0.2 ± 0.2	35 ± 20
786444-0	01/02/2018	07/02/2018	RN8			< 0.2	< 34

RT0021LN - V1.40 / 2017-06-22 / JJO / LB

Comment to the results

Reported results are for detectors delivered with AR/COC # 618382

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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900 Oakmont Lane Suite 207, Westmont IL 60559
Telephone: 331.814.2200 E-mail: help@radonova.com

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RADON MONITORING REPORT

Issued by an Accredited Laboratory



REPORT NUMBER
4804488:1

REPORT PAGE 3

REPORT DATE
07/17/2018

PRINT DATE
07/17/2018

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
770890-2	01/02/2018	07/02/2018	RN9			0.2 ± 0.2	35 ± 23
698595-6	01/02/2018	07/02/2018	RN10			0.2 ± 0.2	41 ± 20
148217-3	01/02/2018	07/02/2018	RN11			< 0.2	< 34
445672-9	01/02/2018	07/02/2018	RN12			< 0.2	< 34
201698-8	01/02/2018	07/02/2018	RN13			< 0.2	< 34
219843-0	01/02/2018	07/02/2018	RN14			< 0.2	< 34
213188-6	01/02/2018	07/02/2018	RN15			< 0.2	< 34
176929-8	01/02/2018	07/02/2018	RN16			< 0.2	< 34

RT002LN -V/ 40 / 2017-06-22 / JJO / LB

Comment to the results

Reported results are for detectors delivered with AR/COC # 618382

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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RADON MONITORING REPORT

Issued by an Accredited Laboratory



REPORT NUMBER
4804488:1

REPORT PAGE 4

REPORT DATE
07/17/2018

PRINT DATE
07/17/2018

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
995116-1	01/02/2018	07/02/2018	RN17			0.2 ± 0.2	43 ± 20
252414-8	01/02/2018	07/02/2018	RNTB			< 0.2	< 34

RT002LN -V1.40 / 2017-06-22 / JJO / LB

Comment to the results

Reported results are for detectors delivered with AR/COC # 618382

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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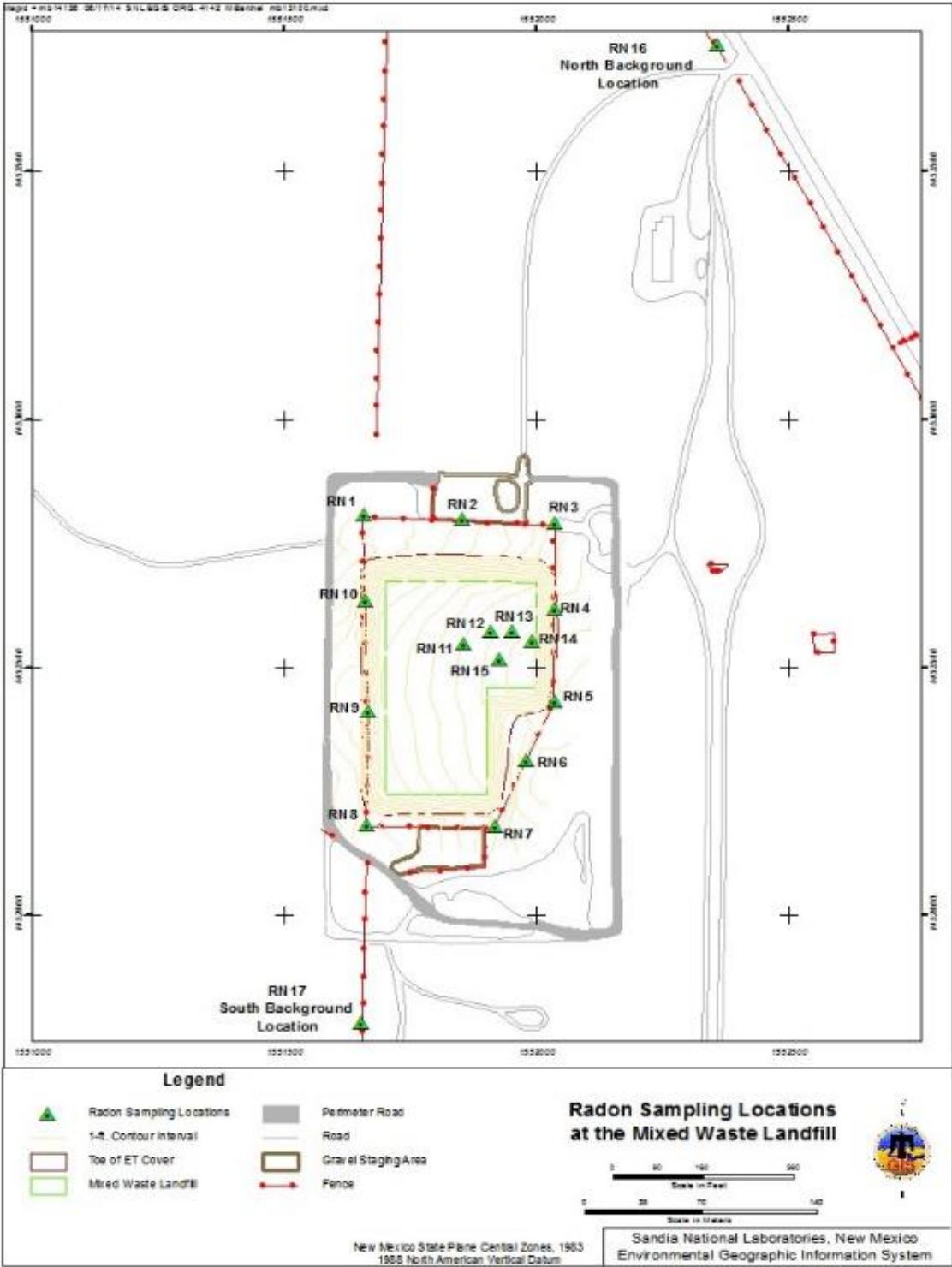


Figure 1. Location of Radon Detectors at the MWL

**Mixed Waste Landfill
Radon Detector Deployment / Collection Form**

Name: Danielle Michel Signature: Danielle Michel Activity (check all that apply):
☒ Deployment ☒ Collection
 Name: Mark Lyon Signature: Mark Lyon ☒ Deployment ☐ Collection
 ARCOG #: 618382 Detector Type: Radtrak 2

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
99604-2	104181	RN1	1/2/18	0956	7/2/18	0832	NONE
185291-2	104182	RN2		1000		0836	
265833-4	104183	RN3		0908		0752	
995718-4	104184	RN4		0914		0755	
119535-3	104185	RN5		0919		0759	
283818-3	104186	RN6		0923		0802	
652283-3	104187	RN7		0927		0806	
726444-0	104188	RN8		0940		0820	
770890-2	104189	RN9		0946		0825	
698595-6	104190	RN10		0951		0828	
148217-3	104191	RN11		1011		0840	
445672-9	104192	RN12		1015		0856	
201698-8	104193	RN13		1024		0853	
219943-0	104194	RN14		1028		0850	
213188-6	104195	RN15		1020		0846	
176929-8	104196	RN16		0900		0905	
995116-1	104197	RN17	✓	0932	✓	0813	
252414-8	104198	RNTB	✓	NA	✓	0920	✓

Additional Comments: _____

Original to: Mixed Waste Landfill Operating Record
 Copy to: SNL/NM Records Center

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Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL Radon Monitoring

Project/Task No. 195122_10.11.08

ARCOC No. 618382

Analytical Lab Radonova

SDG No. 4804488-1

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	N/A		
2.4	Matrix spike/matrix spike duplicate data provided	N/A		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	N/A		
2.7	Dilution factors provided and all dilution levels reported	N/A		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	N/A		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	N/A		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	N/A		
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	N/A		
	c) Matrix spike recovery data reported and met	N/A		
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data a) Method or reagent blank data reported and met for all samples	N/A		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	N/A		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	N/A		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) ICP interference check sample data provided	N/A		
	d) ICP serial dilution provided	N/A		
	e) Instrument run logs provided	N/A		
4.6	Radiochemistry and General Chemistry	N/A		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? ☐ Yes ☒ No

Based on the review, this data package is complete. ☒ Yes ☐ No

Reviewed by: Wendy Palencia Date: 07-17-2018 10:07:00

Closed by: Wendy Palencia Date: 07-17-2018 10:07:00

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Mark LyonSignature: Mark LyonDate of Inspection: 01/02/2018

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None
RN2	None
RN3	None
RN4	None
RN5	None
RN6	None
RN7	None
RN8	Replaced plexiglass hanger
RN9	None
RN10	None
RN11	None
RN12	None
RN13	None
RN14	None
RN15	Secondary plexiglass hanger will need replacing when put ^{back} in service
RN16	None
RN17	None

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Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Danielle MichelSignature: Danielle MichelDate of Inspection: 8/1/18

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	NONE
RN2	NONE
RN3	NONE
RN4	NONE
RN5	NONE
RN6	NONE
RN7	NONE
RN8	NONE
RN9	NONE
RN10	NONE
RN11	NONE
RN12	NONE
RN13	NONE
RN14	NONE
RN15	NONE
RN16	NONE
RN17	NONE

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: MARK LYONSignature: Mark LyonDate of Inspection: 03-01-2018

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None
RN2	None
RN3	None
RN4	None
RN5	None
RN6	None
RN7	None
RN8	None
RN9	None
RN10	None
RN11	None
RN12	None
RN13	None
RN14	None
RN15	None
RN16	None
RN17	None

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: MARK LYONSignature: Mark LyonDate of Inspection: 4/2/2018

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None
RN2	None
RN3	None
RN4	None
RN5	None
RN6	None
RN7	None
RN8	None
RN9	None
RN10	None
RN11	None
RN12	None
RN13	None
RN14	None
RN15	None
RN16	None
RN17	None

Original to: Mixed Waste Landfill Operating Record
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Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Danick MichelSignature: Danick MichelDate of Inspection: 5/2/18

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	NONE
RN2	NONE
RN3	NONE
RN4	NONE
RN5	NONE
RN6	NONE
RN7	NONE
RN8	NONE
RN9	NONE
RN10	NONE
RN11	NONE
RN12	NONE
RN13	NONE
RN14	NONE
RN15	NONE
RN16	NONE
RN17	NONE

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Robert ZickSignature: [Signature]Date of Inspection: June 1, 2018

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None
RN2	None
RN3	None
RN4	None
RN5	None
RN6	None
RN7	None
RN8	None
RN9	None
RN10	None
RN11	None
RN12	None
RN13	None
RN14	None
RN15	None
RN16	None
RN17	None

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center

MIXED WASTE LANDFILL

RADON MONITORING

July-December 2018 Monitoring Period



Sandia National Laboratories

Operated for the United States Department of Energy
by National Technology and Engineering Solutions
of Sandia, LLC.

Albuquerque, New Mexico 87185-0651

date: February 5, 2019

to: Mike Mitchell (8888), Robert Ziock (8888), and Bonnie Little (8888)

from: Kelly Green (6281) kagreen@sandia.gov *Kelly Green*

subject: Review of MWL Radon Air Data – July through December 2018 Semiannual Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the July through December 2018 semiannual monitoring event. My review includes evaluation of the results and supporting documentation relative to the data quality objective (DQO) and monitoring objectives specified in the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (Appendix C, *Air Sampling and Analysis Plan for the Mixed Waste Landfill*). The DQO for this monitoring is to produce representative, accurate, defensible, and comparable analytical results to support the monitoring objective.

Radon air monitoring measurements during the July through December 2018 semiannual period were obtained using the Radtrak2[®] detectors. The detectors were deployed at each monitoring location (Figure 1) on July 2, 2018 and were collected on January 4, 2019. The protective casing and mounting hardware were inspected during the collection effort and repairs were made if needed. The detectors remained in the field for approximately six months and were submitted to the analytical laboratory, RADONOVA, for analysis on Analysis Request/Chain of Custody (AR/COC) #618883. A trip blank detector (RNTB) was submitted with the detectors.

The results for this semiannual radon monitoring period and associated field documentation meet the LTMMMP DQO and monitoring objectives. The results were consistent with the January through June 2018 data and were all non-detects (less than 0.2 picoCuries per liter [pCi/L]), except for locations RN4, RN11, and RN17 (detections at 0.2 ± 0.1 pCi/L). These results indicate very low activities of radon in the air at the MWL, consistent with historical results and background radon activity. The trigger level of 4 pCi/L was not exceeded by any of the individual sample results (note: the trigger level only applies to the results from the perimeter locations RN1 through RN10, Figure 1).

Attachments:

Analysis Request/Chain of Custody #618883

RADONOVA Radon Monitoring Report (analytical laboratory results for Radtrak2[®] detectors)

Figure 1. Location of the Alpha Track Detectors at the MWL

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

4948648

Internal Lab

Page 1 of 2

Batch No.		SMO Use		AR/COG		618883							
Project Name: MWL RADON MONITORING		Date Samples Shipped: 1-07-19		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius							
Project/Task Manager: Robert Ziock		Carrier/Waybill No. 292228		SMO Contact Phone: Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154							
Project/Task Number: 195122.10.11.08		Lab Contact: Steve Leslie/331-814-2211		Send Report to SMO: Stephanie Montaño/505.284.2553									
Service Order: CF378-19		Lab Destination: RADON		Contract No.: 1495047									
Tech Area:		Operational Site:											
Building:		Room:											
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID	
105672	✓ 001	RN1/ Radtrak2 514648-5	N/A	1/4/19 1232	AF	N	0 NA	NONE	C	SA	RADON		
105673	✓ 001	RN2/ Radtrak2 420904-5	N/A	1/4/19 1237	AF	N	0 NA	NONE	C	SA	RADON		
105674	✓ 001	RN3/ Radtrak2 514501-6	N/A	1/4/19 1150	AF	N	0 NA	NONE	C	SA	RADON		
105675	✓ 001	RN4/ Radtrak2 517365-3	N/A	1/4/19 1155	AF	N	0 NA	NONE	C	SA	RADON		
105676	✓ 001	RN5/ Radtrak2 172139-8	N/A	1/4/19 1200	AF	N	0 NA	NONE	C	SA	RADON		
105677	✓ 001	RN6/ Radtrak2 639405-0	N/A	1/4/19 1203	AF	N	0 NA	NONE	C	SA	RADON		
105678	✓ 001	RN7/ Radtrak2 514607-1	N/A	1/4/19 1207	AF	N	0 NA	NONE	C	SA	RADON		
105679	✓ 001	RN8/ Radtrak2 418025-3	N/A	1/4/19 1219	AF	N	0 NA	NONE	C	SA	RADON		
105680	✓ 001	RN9/ Radtrak2 235948-7	N/A	1/4/19 1225	AF	N	0 NA	NONE	C	SA	RADON		
105681	✓ 001	RN10/ Radtrak2 603639-6	N/A	1/4/19 1228	AF	N	0 NA	NONE	C	SA	RADON		
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt			
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		Entered by:		EDD <input checked="" type="checkbox"/> Yes							
Background: <input type="checkbox"/> Yes		QC inits.:		Turnaround Time		<input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day							
Confirmatory: <input type="checkbox"/> Yes				Negotiated TAT		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab							
Sample Team Members		Name		Signature		Init.		Company/Organization/Phone/Cell		Sample Disposal		Return Samples By:	
		Danielle Michel		[Signature]		a		SNL/00641/505-845-7706/505-219-7143		Return to Client		Comments:	
		Mark Lyon		[Signature]		a		SNL/00631/505-284-3982		Disposal by Lab			
Relinquished by [Signature]		Org. 0054		Date 1/4/19		Time 1345		Relinquished by [Signature]		Org.		Date 1-8-19 Time 5pm	
Received by [Signature]		Org. 0042		Date 1-4-19		Time 1345		Received by [Signature]		Org.		Date 1-10-19 Time 1 pm	
Relinquished by [Signature]		Org. 00642		Date 1-7-19		Time 1030		Relinquished by [Signature]		Org.		Date Time	
Received by [Signature]		Org.		Date 1-8-19		Time 1200		Received by [Signature]		Org.		Date Time	

*Prior confirmation with SMO required for 7 and 15 day TAT

Review of MWL Radon-in-Air Data
2nd Semiannual CY 2018 (July - December 2018)
February 5, 2019

SMO 2012-ARCOG (4-2012)

**CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)**

AOP 95-16

Page 2 of 2

AR/COC 618883

[illegible]

US

Sida 1



NTESS
United States

RADON MONITORING REPORT

Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER
4948649:2

REPORT PAGE 1(4)

REPORT DATE
01/22/2019

PRINT DATE
01/22/2019

MEASUREMENT PERFORMED FOR
NTESS

REPORT RECEIVER(S)
NTESS

The analysis results are located on page 2 of this document.

Description of the measurement

The measurement was performed with a closed alpha-track detector (Radtrak2) following the quality guidance in EPA 402-R-95-012.

The detector(s) arrived to Radonova Laboratories AB 01/08/2019. They were measured 01/12/2019.

Property data and address

Building Id:

AR/COC 618883

AR/COC 618883

Type of building:

Building year:

HVAC:

Foundation type:

Purpose of test:

Measurement method: closed alpha-track detector

The radon measurement was performed with a closed alpha-track detector following the quality assurance guidance given in EPA 402-R-95-012.

The detector container is manufactured from electrically conducting plastic. Through a small slit (filter), radon gas enters the detector. The track-detecting material (film) inside the detector is hit by alpha particles generated by the radon entering the container and the decay products formed from it. On the film, the alpha particles make small tracks which are enlarged through chemical etching and later counted in a microscope in order to determine the radon exposure. Radonova Laboratories AB (P.O. Box 6522, SE-751 28 Uppsala, Sweden) is accredited (no. 1489) by SWEDAC to conduct radon-gas measurements using the closed alpha-track detector method. The analysis equipment is checked daily and the detectors are calibrated at regular intervals. NRPP Licenses: 107831 AL, 107830 RT

Measured radon concentrations

For each detector, the measured value of the radon concentration is given. For each value an uncertainty associated with the measurement to a 95% confidence level is also given. For example a measurement result of 4.0 ± 0.5 pCi/l means that the radon concentration is most likely contained in the range 3.5–4.5 pCi/l. If the start or end date of the measurement has not been provided, the radon concentration cannot be calculated. In such cases, the total exposure in pCi*days/l will be reported. The reported measured values are related to the detectors as received by Radonova Laboratories AB. Detector deployment is not performed by Radonova Laboratories AB. Measurement information such as monitoring period (dates) and placement location is provided to Radonova Laboratories AB by the end user.

Radon measurements in Multifamily Buildings, Schools and Large Buildings

The United States Environmental Protection Agency (EPA) recommends remediation if the results of one long-term test or the average of two short-term tests conducted in an occupied room are 4.0 pCi/l or higher. The average yearly residential indoor radon level in the US is estimated to be around 1.3 pCi/l. Long-term tests are conducted for more than 90 days. Short-term tests are conducted between 2 and 90 days and should be performed under closed building conditions.

If an initial short-term test result is less than 4 pCi/l, a follow-up measurement is probably not needed.

If an initial short-term test result is between 4 pCi/l and 8 pCi/l, a long-term or a short-term follow-up measurement is recommended.

If an initial short-term test result is greater than 8 pCi/l, a short term follow-up measurement is recommended in order to get a fast result.

More information about radon measurements and mitigation can be found in the AARST and EPA publications:

- ANSI/AARST Protocol for Conducting Measurements of Radon and Radon-Decay Products in Schools and Large Buildings
- ANSI/AARST Protocol for Conducting Radon and Radon Decay Product Measurements in Multifamily Buildings.
- ANSI/AARST Radon Mitigation Standards for Schools and Large Buildings.
- ANSI/AARST Radon Mitigation Standards for Multifamily Buildings.
- EPA Radon Measurements in Schools, EPA 402-R-92-014, July 1993.

For more information about the interpretation of your test results or about other radon related issues we suggest contacting your state radon office.

Signature on the report

With the signature on the report, the person responsible for the radon analysis at Radonova Laboratories AB hereby certifies that the measurement procedures follows the guidance in accordance with EPA 402-R-95-012 and that the demands from SWEDAC are fulfilled.

DISCLAIMER – Radonova Inc. makes no warranty of any kind, express or implied, as regard to the use, operation or analysis of any Radonova Inc. monitor. Radonova Inc. specifically disclaims implied warranties of merchantability and fitness for a particular purpose. Radonova Inc. is not responsible for any damage, including consequential damages, to persons or property resulting from the use of the monitor or the resulting data.

RT002UN - VI 40 / 2017-06-22, JJO / L.B

Review of MWL Radon-in-Air Data
2nd Semiannual CY 2018 (July - December 2018)
February 5, 2019



RADON MONITORING REPORT
Issued by an Accredited Laboratory



REPORT NUMBER
4948649-2

REPORT PAGE 2(4)

REPORT DATE
01/22/2019

PRINT DATE
01/22/2019

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
514648-5	01/02/2018	01/04/2019	RN1			< 0.2	< 69
420904-5	01/02/2018	01/04/2019	RN2			< 0.2	< 69
514501-6	01/02/2018	01/04/2019	RN3			< 0.2	< 69
517365-3	01/02/2018	01/04/2019	RN4			0.2 ± 0.1	70 ± 32
172139-8	01/02/2018	01/04/2019	RN5			< 0.2	< 69
639405-0	01/02/2018	01/04/2019	RN6			< 0.2	< 69
514607-1	01/02/2018	01/04/2019	RN7			< 0.2	< 69
418025-3	01/02/2018	01/04/2019	RN8			< 0.2	< 69

RT0021N-V1.40 / 2017-06-22 / JJO / LB

Comment to the results

This report replaces 4948649:1. Reason: Added detector 514612-1 (RN16)

Reported results are for detectors delivered with AR/COC # 618883

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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900 Oakmont Lane Suite 207, Westmont IL 60559
Telephone: 331.814.2200 E-mail: help@radonova.com

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Review of MWL Radon-in-Air Data
2nd Semiannual CY 2018 (July - December 2018)
February 5, 2019



RADON MONITORING REPORT
Issued by an Accredited Laboratory



REPORT NUMBER
4948649:2

REPORT PAGE 3(4)

REPORT DATE
01/22/2019

PRINT DATE
01/22/2019

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
235948-7	01/02/2018	01/04/2019	RN9			< 0.2	< 69
603639-6	01/02/2018	01/04/2019	RN10			< 0.2	< 69
454842-6	01/02/2018	01/04/2019	RN11			0.2 ± 0.1	74 ± 32
514658-4	01/02/2018	01/04/2019	RN12			< 0.2	< 69
517355-4	01/02/2018	01/04/2019	RN13			< 0.2	< 69
649823-2	01/02/2018	01/04/2019	RN14			< 0.2	< 69
423217-9	01/02/2018	01/04/2019	RN15			< 0.2	< 69
431275-7	01/02/2018	01/04/2019	RN17			0.2 ± 0.1	71 ± 27

RT002LN-V1.40 / 2017-06-22 / JO / LB

Comment to the results

This report replaces 4948649:1. Reason: Added detector 514612-1 (RN16)

Reported results are for detectors delivered with AR/COC # 618883

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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Review of MWL Radon-in-Air Data
2nd Semiannual CY 2018 (July - December 2018)
February 5, 2019



RADON MONITORING REPORT
Issued by an Accredited Laboratory



REPORT NUMBER
4948649:2

REPORT PAGE 4(4)

REPORT DATE
01/22/2019

PRINT DATE
01/22/2019

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
419031-0	01/02/2018	01/04/2019	RNTB			< 0.2	< 69
514612-1	01/02/2018	01/04/2019	RN16			< 0.2	< 69

RT002LN-VI.40 / 2017-06-23 / JJO / LB

Comment to the results

This report replaces 4948649:1. Reason: Added detector 514612-1 (RN16)

Reported results are for detectors delivered with AR/COC # 618883

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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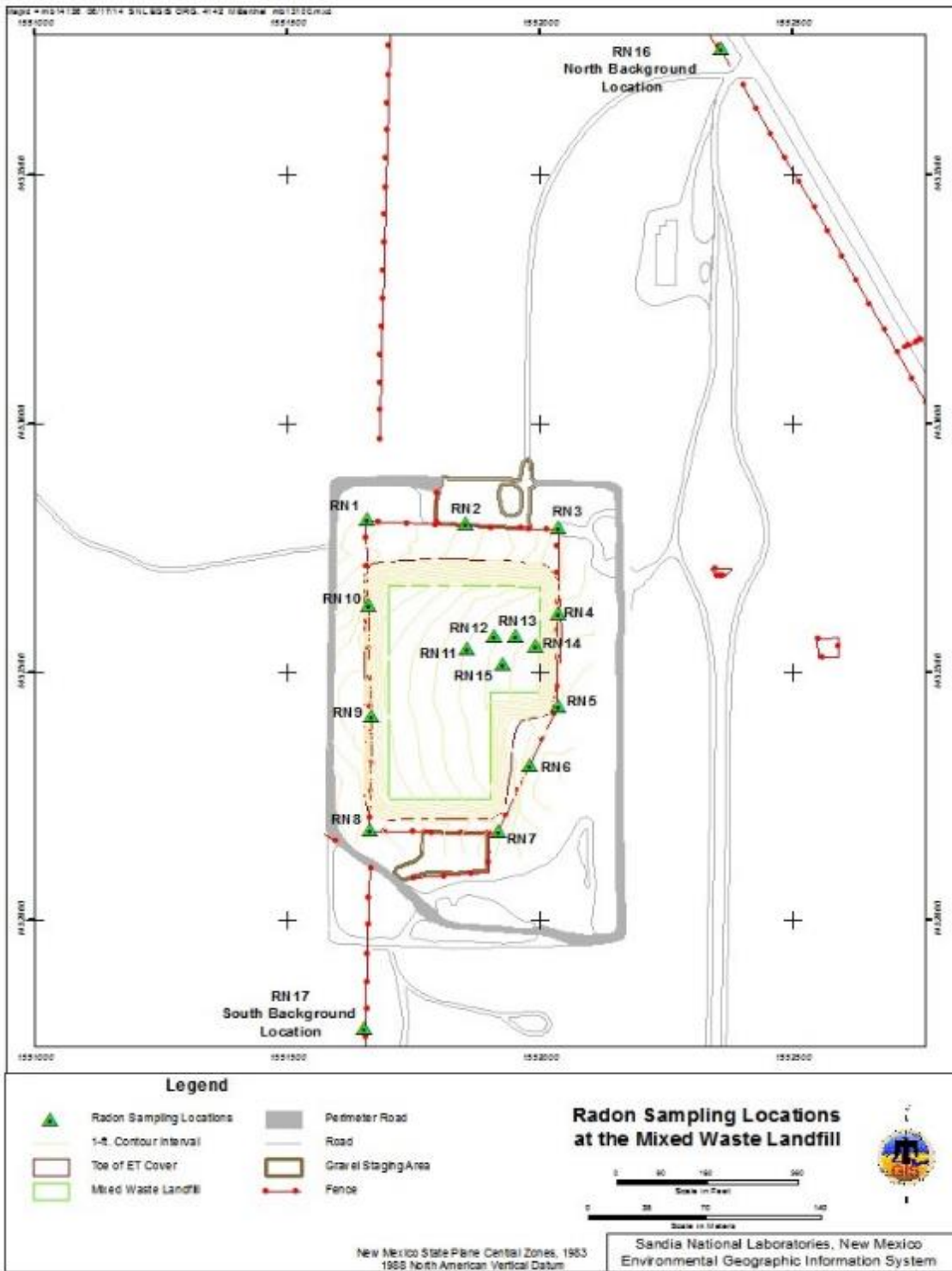


Figure 1. Location of Radon Detectors at the MWL

**Mixed Waste Landfill
Radon Detector Deployment / Collection Form**

Name: Danielle MichelSignature: 

Activity (check all that apply):

☒ Deployment ☒ Collection

Name: _____

Signature: _____

☐ Deployment ☐ Collection

Name: _____

Signature: _____

☐ Deployment ☐ Collection

Name: _____

Signature: _____

☐ Deployment ☐ CollectionARCOC #: 618883Detector Type: Radtrak2

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time
514648-5	105672	RN1	7/2/18	0832	1/4/19	1232
420904-5	105673	RN2		0836		1237
514501-6	105674	RN3		0752		1150
517365-3	105675	RN4		0755		1155
172139-8	105676	RN5		0759		1200
639405-0	105677	RN6		0802		1203
514607-1	105678	RN7		0806		1207
418025-3	105679	RN8		0820		1219
235948-7	105680	RN9		0825		1225
603639-6	105681	RN10		0828		1228
454842-6	105682	RN11		0842		1242
514658-4	105683	RN12		0856		1245
517366-4	105684	RN13		0853		1250
649823-2	105685	RN14		0850		1254 1252
423217-9	105686	RN15		0846		1258 1302
517409-9 514612-1	105687	RN16		0905		1305 1217
431275-7	105688	RN17	✓	0813	↓	1217
419031-0	105689	RNTB	NA	NA	↓	1320

NOTE: Comments regarding Sampling Locations are documented on LTS RDN-2012-002 MWL Radon Detector Collection Inspection Form and/or LTS RDN-2012-003 MWL Radon Monitoring Location Supplemental Inspection Form.

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

IMPORTANT NOTICE: A printed (and uncompleted) copy of this form may not be the form currently in effect. The official version is located on the 600 Controlled Documents home page. Once a form has been completed, this document becomes a record.

Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL RADON MONITORING

Project/Task No. 195122_10.11.08

ARCOC No. 618883

Analytical Lab RADONOVA

SDG No. 4648649-1

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	N/A		
2.4	Matrix spike/matrix spike duplicate data provided	N/A		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	N/A		
2.7	Dilution factors provided and all dilution levels reported	N/A		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	N/A		

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.14	All requested result and TIC (if requested) data provided	X		Initially the lab noted on the report that sample 105687-001 was not received. After following up with the lab, it was determined that the missing detector was received, but the detector number was incorrect on the ARCOC. The results for this detector are in the revised report.

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	N/A		
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	N/A		
	c) Matrix spike recovery data reported and met	N/A		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data a) Method or reagent blank data reported and met for all samples	N/A		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	N/A		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		

Line No.	Item	Yes	No	Comments
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) ICP interference check sample data provided	N/A		
	d) ICP serial dilution provided	N/A		
	e) Instrument run logs provided	N/A		
4.6	Radiochemistry and General Chemistry a) Instrument run logs provided	N/A		

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? ☐ Yes ☒ No

Based on the review, this data package is complete. ☒ Yes ☐ No

Reviewed by: Wendy Palencia Date: 01-22-2019 14:42:00

Closed by: Wendy Palencia Date: 01-22-2019 14:42:00

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Danielle MichelSignature: Danielle MichelDate of Inspection: 7/2/18

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	NONE
RN2	NONE
RN3	NONE
RN4	NONE
RN5	NONE
RN6	NONE
RN7	NONE
RN8	NONE
RN9	NONE
RN10	NONE
RN11	NONE
RN12	NONE
RN13	NONE
RN14	NONE
RN15	NONE
RN16	mounting bracket on detector S17409-9 broke. Replaced with the detector S17612-1 for July deployment
RN17	NONE

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: MARK LYONSignature: Mark LyonDate of Inspection: August 1, 2018

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None
RN2	None
RN3	None
RN4	None
RN5	None
RN6	None
RN7	None
RN8	None
RN9	None
RN10	None
RN11	None
RN12	None
RN13	None
RN14	None
RN15	None
RN16	None
RN17	None

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Robert Zock, Danielle MichelSignature: *[Handwritten Signature]*Date of Inspection: 9/4/2018

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None.
RN2	None.
RN3	None.
RN4	None.
RN5	None.
RN6	None.
RN7	None.
RN8	None.
RN9	None.
RN10	None.
RN11	None.
RN12	None.
RN13	None.
RN14	None.
RN15	None.
RN16	None.
RN17	None.

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Robert ZiockSignature: Date of Inspection: October 2, 2018

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None.
RN2	None.
RN3	None.
RN4	Spider web removed.
RN5	None.
RN6	None.
RN7	None.
RN8	None.
RN9	None.
RN10	None.
RN11	None.
RN12	None.
RN13	None.
RN14	None.
RN15	None.
RN16	None.
RN17	None.

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection Form

Name:

Robert Zick

Signature:

Robert Zick

Date of Inspection:

11/1/2018

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None.
RN2	None.
RN3	None.
RN4	Spider web removed.
RN5	None.
RN6	None.
RN7	None.
RN8	None.
RN9	None.
RN10	None.
RN11	None.
RN12	None.
RN13	None.
RN14	None.
RN15	None.
RN16	None.
RN17	None.

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Danielle Mickle, Robert Zock Signature: Danielle MickleDate of Inspection: 12/6/18

Inspection parameters: Identification labeling; mounting bracket and stainless steel clamp and post; radon detector; radon detector enclosure and internal attachment components.

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None.
RN2	None.
RN3	None.
RN4	None.
RN5	None.
RN6	None.
RN7	None.
RN8	None.
RN9	None.
RN10	None.
RN11	None.
RN12	None.
RN13	None.
RN14	None.
RN15	None.
RN16	None.
RN17	None.

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center

**Mixed Waste Landfill
Radon Detector Collection Inspection Form**

Name: Danille MichelSignature: [Signature]Collection Date: 11/4/19Detector Type: Radtrak 2Radon Monitoring Frequency: ☐ Quarterly ☒ Semiannually ☐ Annually

<i>Radon Monitoring Location Inspection Parameters</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Action Required at Location Numbers</i>
A. Monitoring location identification labeling.	YES	NO	
B. Radon detector condition.	YES	NO	
C. Radon detector enclosure securely fastened (mounting bracket and stainless steel clamp) to post (fence or free standing).	YES	NO	
D. Radon detector enclosure and internal attachment components.	YES	NO	
E. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	YES	NO	
<i>Radon Monitoring Detectors Inspection Parameters</i>			
F. Condition of radon detector at time of collection.	YES	NO	

**Mixed Waste Landfill
Radon Detector Collection Inspection Form**

Location	Action Required (Note any action required and date resolved, otherwise note "None")
RN1	None
RN2	None
RN3	None
RN4	None
RN5	None
RN6	None
RN7	None
RN8	None
RN9	None
RN10	None
RN11	None
RN12	None
RN13	None
RN14	None
RN15	None
RN16	None
RN17	None

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center

ANNEX B

**Mixed Waste Landfill
Surface Soil Tritium and Biota Monitoring Forms and Reports**

April 2018-March 2019

Data Evaluation Memo

Data Validation Reports

Contract Verification Reviews

Mixed Waste Landfill
Surface Soil Tritium Monitoring
August 2018 Sampling Event



date: February 5, 2019

to: Mike Mitchell (8888), Robert Ziock (8888), and Bonnie Little (631)

from: Kelly Green (6283)

subject: Review of Tritium-in-Soil Results for LTMMP Monitoring at the Mixed Waste Landfill

The purpose of this memo is to document my review of the surface soil tritium monitoring results for the August 9, 2018 sample event. My review includes evaluation of the results and supporting documentation relative to the data quality objective (DQO) and monitoring objectives specified in the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (Appendix G, *Tritium and Biota Sampling and Analysis Plan for the Mixed Waste Landfill*). All data was reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data." All data are determined as acceptable and reported quality control measures appear adequate.

Summary of Tritium Results (EPA Method 906.0^a)
Mixed Waste Landfill Surface Soil Monitoring
August 9, 2018

Sample Location	Result (pCi/L)	MDA (pCi/L)	Percent Soil Moisture	Laboratory Qualifier	Validation Qualifier	Trigger Level (pCi/L)
MWL TS-2NW	26.6 ± 97.1	175	4.45	U	BD, FR3	20,000
MWL TS-2NW (Duplicate)	109 ± 104	170	4.30	U	BD, FR3	
MWL TS-2SW	62.9 ± 99.9	172	4.91	U	BD, FR3	
MWL TS-2SE	67.8 ± 101	172	3.02	U	BD, FR3	
MWL TS-2NE	122 ± 106	170	5.74	U	BD, FR3	

Notes:

^aU.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition.

BD = Result is below the MDA.

EPA = U.S. Environmental Protection Agency.

FR3 = Result is < the MDA / MDL or < the 2-σ TPU (reason code).

MDA = Minimum detectable activity.

MDL = Method detection limit.

MWL = Mixed Waste Landfill.

pCi/L = Picocuries per liter.

TPU = Total Propagated Uncertainty.

U = Analyzed for but undetected.

The August 2018 results were all non-detections below the minimum detectable activity, which is consistent with the August 2017 monitoring results (MWL Annual LTMM Report, June 2018), historical MWL surface soil tritium results, and below the trigger level of 20,000 picocuries per liter.

cc: CFRC

Memorandum

Date: September 12, 2018

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL Surface Soil Monitoring
ARCO: 618904
SDG: 456906
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: RAD

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Five samples were prepared and analyzed with approved procedures using method GL-RAD-A-002 (tritium). Problems were identified with the data package that resulted in the qualification of data.

1. The sample results were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified BD,FR3**.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times.

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not a method requirement.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS met QC acceptance criteria.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits were met.

Other QC

A field duplicate pair was submitted with ARCO 618904. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 09/13/18



Sample Findings Summary



AR/COC: 618904

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
GL-RAD-A-002			
	105726-001/MWL TS-2NW	Tritium (10028-17-8)	BD, FR3
	105727-001/MWL TS-2SW	Tritium (10028-17-8)	BD, FR3
	105728-001/MWL TS-2SE	Tritium (10028-17-8)	BD, FR3
	105729-001/MWL TS-2NE	Tritium (10028-17-8)	BD, FR3
	105730-001/MWL TS-2NW	Tritium (10028-17-8)	BD, FR3

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOC#: 618904	Site/Project: MWL Surface Soil Monitoring	Validation Date: 09/12/2018
SDG #: 456906	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Soil	# of Samples: 5	CVR present: Yes
ARCOC(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input type="checkbox"/> Organic <input type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 08/09/2018.

Validated by: *L Thal*

Sandia Radiochemistry Worksheet

ARCOC #(s): 618904	SDG #:456906	Matrix: Soil
Laboratory Sample IDs:456906 – see below		
Method/Batch #s: ASTM D 2216 (Modified)/ GL-RAD-A-002 (Tritium):1791370 (dry weight prep)/1791717 Samples -001 through -005		

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDC	LCS %R	MS %R	MSD %R	MS/ MSD RER	Lab Rep. RER				
None													
Tracer/Carrier Recovery Outliers													
Sample ID	Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	
None													

Comments: HTs OK. Matrix QC on -001

Sample 456906003 (105728-001) was recounted to verify sample results. Recount is reported.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No.		SMO Use		AR/COC 618904	
Project Name: MWL SURFACE SOIL MON		Date Samples Shipped: 8/9/18		SMO Authorization:	
Project/Task Manager: Robert Ziock		Carrier/Waybill No. 286201		SMO Contact Phone: Mark Lyon/505-284-3982	
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Send Report to SMO: Stephanie Montaño/505.284.2553	
Service Order: CF426-18		Lab Destination: GEL		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Contract No.: 1303873				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 456906	
Tech Area:		Operational Site:			
Building:		Room:			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
105726	001	MWL TS-2NW	N/A	8/9/18 0833	SOIL	P	2x1-L	None	G	SA	TRITIUM (EPA 906)	001
105727	001	MWL TS-2SW	N/A	0826	SOIL	P	2x1-L	None	G	SA	TRITIUM (EPA 906)	002
105728	001	MWL TS-2SE	N/A	0820	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	003
105729	001	MWL TS-2NE	N/A	0812	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	004
105730	001	MWL TS-2NW	N/A	0833	SOIL	P	2x1 L	None	G	DU	TRITIUM (EPA 906)	005

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT <input type="checkbox"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
Confirmatory: <input type="checkbox"/> Yes		QC Inits.:		Return Samples By:		Comments:		

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
Sample Team Members	Danielle Michel			SNL/0641/505-845-7706
	Robert Ziock			SNL/8888/505-845-0485

Relinquished by:	Org. 8854	Date 8/9/18	Time 0950	Relinquished by:	Org.	Date	Time
Received by:	Org. 0631	Date 8/9/18	Time 0950	Received by:	Org.	Date	Time
Relinquished by:	Org. 0631	Date 8/9/18	Time 1145	Relinquished by:	Org.	Date	Time
Received by:	Org.	Date 8/16/18	Time 0800	Received by:	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL SURFACE SOIL

Project/Task No. 195122 / 10.11.08

ARCOC No. 618904

Analytical Lab GEL

SDG No. 456906

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	N/A		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	N/A		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	X		
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	N/A		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data a) Method or reagent blank data reported and met for all samples	X		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	N/A		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	N/A		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) ICP interference check sample data provided	N/A		
	d) ICP serial dilution provided	N/A		
	e) Instrument run logs provided	N/A		
4.6	Radiochemistry and General Chemistry	X		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? ☐ Yes ☒ No

Based on the review, this data package is complete. ☒ Yes ☐ No

Reviewed by: Mark L Lyon Date: 09-11-2018 10:51:00

Closed by: Mark L Lyon Date: 09-11-2018 10:51:00

Mixed Waste Landfill
Biota Monitoring
September 2018 Sampling Event

Memorandum-Revised

Date: November 12, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL Surface Soil Monitoring
ARCO: 618905
SDG: 459324 and 462405
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Three soil samples were prepared and analyzed with approved procedures using methods EPA 6020 (ICP-MS), EPA 6010B (ICP-AES) and EPA 7471A (CVAA-Hg). Data were reported for all required analytes. Problems were identified with the data package that resulted in the qualification of data.

ICP-MS:

1. The MS %Rs did not meet acceptance criteria for Zn and Ba and the parent sample results were >4X the spike amount. Therefore, the associated sample results will not be qualified for these failing recoveries. The associated sample results were detects and will be **qualified J,MS1** due to lack of matrix specific accuracy information.
2. The MS %Rs were >125% and the PS %Rs were ≤125% for V and Cr. The associated sample results were detects and will be **qualified J,MS2** due to the high MS and passing PS recoveries.
3. The replicate RPD was >35% and both the parent sample result and the replicate result were >5X the PQL for Ba. The associated sample results were detects and will be **qualified J,RP2**.

CVAA (Hg):

1. The samples were prepared and analyzed >1X but ≤2X past the method specified holding time. The associated sample results were detects < the PQL and will be **qualified J-,H1**.
2. The LLCCV recovery was <80% but ≥30%. The associated sample results were detects < the PQL and will be **qualified J-,DL3**.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved except as noted above in the Summary section.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria except as noted above in the Summary section and as follows. The LLCCV recovery was >120% for Zn. The associated sample results were detects >5X the PQL and will not be qualified.

Blanks

No target analytes were detected in the blanks except as follows. Zn was detected at \leq the PQL in the method blank. The associated sample results were detects > the PQL and >5X the method blank value and will not be qualified.

Ba was detected at > the PQL in the method blank. The associated sample results were detects > the PQL and >5X the method blank value and will not be qualified.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria except as noted above in the Summary section.

Laboratory Replicate

The replicate met all QC acceptance criteria except as noted above in the Summary section and as follows. The replicate RPD was >20% and both the parent sample result and the replicate result were >5X the PQL for Zn, V, Co and Cu. The replicate RPD was <35% and since the samples were soils, no data were qualified based on professional judgment.

The Be result for the original sample was <5X the PQL and the difference between the original and replicate result was > the PQL but \leq 2X the PQL. Since the samples were soils, no data will be qualified, based on professional judgment.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported and correctly adjusted for dilutions.

ICP-MS

The soil ICP-MS samples were diluted a standard 2X.

ICP Interference Check Sample (ICS A and AB)

Results of the ICP-MS ICS A and AB analyses were not evaluated for because the sample concentrations for Ca, Mg, Al and Fe were < those in the ICS solutions.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

A field duplicate pair was submitted with ARCOG 618905. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 11/12/18

Memorandum

Date: October 19, 2018

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL Surface Soil Monitoring
ARCOG: 618905
SDG: 459324
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: RAD

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Three soil samples were prepared and analyzed with approved procedures using method DOE HASL 300, 4.5.2.3/Ga-01-R (Gamma spec). Problems were identified with the data package that resulted in the qualification of data.

Gamma Spec:

1. The Ra-224 results for samples 459324001 and -005 and the Th-234 and U-238 results for sample -001 were rejected by the laboratory due to the peaks not meeting identification criteria and will be **qualified R,Z2**.
2. A Be-7 peak was not identified for sample -005. The associated result is considered non-detect at the MDA and will be **qualified BD,Z2**.
3. All sample results which were either < the associated 2-sigma TPU or < the associated MDA will be **qualified BD,FR3**.
4. All sample results which were > the MDA but $\leq 3X$ the MDA will be **qualified J,FR7**.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times.

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not a method requirement.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS was not a method requirement.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits were met.

Other QC

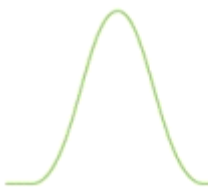
A field duplicate pair was submitted with ARCO 618905. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan

Level: I

Date: 10/19/18



Sample Findings Summary



AR/COC: 618905

Page 1 of 4

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE HASL 300, 4.5.2.3/Ga-			
	105731-001/MWL AHSS-01-2018	Americium-241 (14596-10-2)	BD, FR3
	105731-001/MWL AHSS-01-2018	Beryllium-7 (13966-02-4)	J, FR7
	105731-001/MWL AHSS-01-2018	Bismuth-212 (14913-49-6)	J, FR7
	105731-001/MWL AHSS-01-2018	Cesium-137 (10045-97-3)	J, FR7
	105731-001/MWL AHSS-01-2018	Cobalt-60 (10198-40-0)	BD, FR3
	105731-001/MWL AHSS-01-2018	Neptunium-237 (13994-20-2)	BD, FR3
	105731-001/MWL AHSS-01-2018	Radium-223 (15623-45-7)	BD, FR3
	105731-001/MWL AHSS-01-2018	Radium-224 (13233-32-4)	R, Z2
	105731-001/MWL AHSS-01-2018	Sodium-22 (13966-32-0)	BD, FR3
	105731-001/MWL AHSS-01-2018	Thorium-227 (15623-47-9)	BD, FR3
	105731-001/MWL AHSS-01-2018	Thorium-231 (14932-40-2)	BD, FR3
	105731-001/MWL AHSS-01-2018	Thorium-234 (15065-10-8)	R, Z2
	105731-001/MWL AHSS-01-2018	Uranium-235 (15117-96-1)	BD, FR3
	105731-001/MWL AHSS-01-2018	Uranium-238 (7440-61-1)	R, Z2
	105732-001/MWL AHSS-02-2018	Americium-241 (14596-10-2)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	105732-001/MWL AHSS-02-2018	Beryllium-7 (13966-02-4)	BD, FR3
	105732-001/MWL AHSS-02-2018	Bismuth-212 (14913-49-6)	J, FR7
	105732-001/MWL AHSS-02-2018	Cesium-137 (10045-97-3)	J, FR7
	105732-001/MWL AHSS-02-2018	Cobalt-60 (10198-40-0)	BD, FR3
	105732-001/MWL AHSS-02-2018	Neptunium-237 (13994-20-2)	BD, FR3
	105732-001/MWL AHSS-02-2018	Radium-223 (15623-45-7)	BD, FR3
	105732-001/MWL AHSS-02-2018	Sodium-22 (13966-32-0)	BD, FR3
	105732-001/MWL AHSS-02-2018	Thorium-227 (15623-47-9)	BD, FR3
	105732-001/MWL AHSS-02-2018	Thorium-231 (14932-40-2)	BD, FR3
	105732-001/MWL AHSS-02-2018	Thorium-234 (15065-10-8)	BD, FR3
	105732-001/MWL AHSS-02-2018	Uranium-235 (15117-96-1)	BD, FR3
	105732-001/MWL AHSS-02-2018	Uranium-238 (7440-61-1)	BD, FR3
	105733-001/MWL AHSS-02-2018	Americium-241 (14596-10-2)	BD, FR3
	105733-001/MWL AHSS-02-2018	Beryllium-7 (13966-02-4)	BD, Z2
	105733-001/MWL AHSS-02-2018	Cobalt-60 (10198-40-0)	BD, FR3
	105733-001/MWL AHSS-02-2018	Neptunium-237 (13994-20-2)	BD, FR3
	105733-001/MWL AHSS-02-2018	Radium-223 (15623-45-7)	BD, FR3
	105733-001/MWL AHSS-02-2018	Radium-224 (13233-32-4)	R, Z2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	105733-001/MWL AHSS-02-2018	Sodium-22 (13966-32-0)	BD, FR3
	105733-001/MWL AHSS-02-2018	Thorium-227 (15623-47-9)	BD, FR3
	105733-001/MWL AHSS-02-2018	Thorium-231 (14932-40-2)	BD, FR3
	105733-001/MWL AHSS-02-2018	Thorium-234 (15065-10-8)	BD, FR3
	105733-001/MWL AHSS-02-2018	Uranium-235 (15117-96-1)	BD, FR3
	105733-001/MWL AHSS-02-2018	Uranium-238 (7440-61-1)	BD, FR3
SW846 3050B/6020A			
	105731-002/MWL AHSS-01-2018	Barium (7440-39-3)	J, MS1,RP2
	105731-002/MWL AHSS-01-2018	Chromium (7440-47-3)	J, MS2
	105731-002/MWL AHSS-01-2018	Vanadium (7440-62-2)	J, MS2
	105731-002/MWL AHSS-01-2018	Zinc (7440-66-6)	J, MS1
	105732-002/MWL AHSS-02-2018	Barium (7440-39-3)	J, MS1,RP2
	105732-002/MWL AHSS-02-2018	Chromium (7440-47-3)	J, MS2
	105732-002/MWL AHSS-02-2018	Vanadium (7440-62-2)	J, MS2
	105732-002/MWL AHSS-02-2018	Zinc (7440-66-6)	J, MS1
	105733-002/MWL AHSS-02-2018	Barium (7440-39-3)	J, MS1,RP2
	105733-002/MWL AHSS-02-2018	Chromium (7440-47-3)	J, MS2
	105733-002/MWL AHSS-02-2018	Vanadium (7440-62-2)	J, MS2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	105733-002/MWL AHSS-02-2018	Zinc (7440-66-6)	J, MS1
SW846 7471A			
	105731-002/MWL AHSS-01-2018-Relog from 459324002	Mercury (7439-97-6)	J-, H1,DL3
	105732-002/MWL AHSS-02-2018-Relog from 459324004	Mercury (7439-97-6)	J-, H1,DL3
	105733-002/MWL AHSS-02-2018-Relog from 459324006	Mercury (7439-97-6)	J-, H1,DL3

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet Revised

ARCOC#: 618905	Site/Project: MWL Surface Soil Monitoring	Validation Date: 10/18/2018 and 11/12/2018
SDG #: 459324 and 462405	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Soil	# of Samples: 6	CVR present: Yes
ARCOC(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
105731-002	462405001	7471A	✓	09/13/2018	10/24/2018	10/25/2018	Yes	No
105732-002	462405002	7471A	✓	09/13/2018	10/24/2018	10/25/2018	Yes	No
105733-002	462405003	7471A	✓	09/13/2018	10/24/2018	10/25/2018	Yes	No

Comments: Collected: 09/13/2018.

The ARCOG for the attached report listed Metals, RCRA (SW846-6020/7470); Be, Co, Cu, Ni, V, Zn. Only Be, Co, Cu, Ni, V, And Zn were reported. The customer wanted the RCRA 8 metals PLUS the 6 listed. The lab had reportable data from the original workorder for all RCRA metals except Ag and Hg. The samples were relogged for Ag and Hg under workorder 462405. The Hg analysis was performed out of holding time. The revised metals results from the original workorder plus the metals from workorder 462405 are included in this revised data validation report.

Validated by:

L Thal

Sandia Inorganic Metals Worksheet Revised

ARCOG #(s): 618905	SDG #(s): 459324 and 462405	Matrix: Soils
Laboratory Sample IDs: 459324002, -004, -006 and 462405001, -002, -003		
Method/Batch #s: 3050B/6020A 1803105(pre)/1803108 3050B/6010B 1815728/1815729 7471A 1815286/1815287		

ICPMS Mass Cal: ☒ Pass ☐ Fail ☐ NA ICPMS Resolution: ☒ Pass ☐ Fail ☐ NA

Analyte (outliers)	Calibration						MB mg/kg	5X Blank mg/kg	LCS LCSD %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R	PS %R			
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
Zn	NA	✓	✓	✓	✓	✓	.963J	4.82	✓	130*	31.9	✓	NA	NA	125	NA			
V	NA	✓	✓	✓	✓	✓	✓	NA	✓	181	24.5	✓	NA	NA	✓	✓			
Be	NA	✓	✓	✓	✓	✓	✓	NA	✓	✓	Abs**	✓	NA	NA	✓	NA			
Co	NA	✓	✓	✓	✓	✓	✓	NA	✓	✓	22.2	✓	NA	NA	✓	NA			
Cu	NA	✓	✓	✓	✓	✓	✓	NA	✓	✓	20.9	✓	NA	NA	✓	NA			
Ba	NA	✓	✓	✓	✓	✓	.451	2.26	✓	-420*	45.1	✓	NA	NA	✓	NA			
Cr	NA	✓	✓	✓	✓	✓	✓	NA	✓	127	✓	✓	NA	NA	✓	✓			
Hg	NA	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	NA	NA	NA	73	NA			

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
None				None			

Comments: **ICPMS:** HTs OK. MS/PS/DUP/SD -002. *parent sample result >4X spike amount; ** sample results < 5X the PQL and the abs difference was > the PQL but ≤2X the PQL
 All samples diluted the standard 2X
 All sample results for Al, Mg, Ca and Fe < 100 000
ICP: HTs OK. MS/DUP/SD -001. Ag diluted 5x for samples -001 and -002 due to matrix interference
CVAA: HTs >1X but <2X. MS/DUP/SD -001

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A*

Page 1 of 1

Project Name: MWL SURFACE SOIL MON		Date Samples Shipped: <i>9/17/18</i>		SMO Authorization: <i>[Signature]</i>		AR/COC 618905	
Project/Task Manager: Robert Ziock		Carrier/Waybill No. <i>287911</i>		SMO Contact Phone: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Mark Lyon/505-284-3982			
Service Order: CF426-19		Lab Destination: GEL		Send Report to SMO: Stephanie Montaño/505.284.2553			
Contract No.: 1303873							
Tech Area:		Operational Site:		Bill to: Sandia National Laboratories (Accounts Payable),			
Building:		Room:		P.O. Box 5800, MS-0154			
				Albuquerque, NM 87185-0154 <i>459324</i>			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
105731	001	MWL AHSS-01-2018	N/A	<i>9/13/18 09:05</i>	SOIL	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	
105731	002	MWL AHSS-01-2018	N/A	<i>↓</i>	SOIL	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	
105732	001	MWL AHSS-02-2018	N/A	<i>09:15</i>	SOIL	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	
105732	002	MWL AHSS-02-2018	N/A	<i>↓</i>	SOIL	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	
105733	001	MWL AHSS-02-2018	N/A	<i>↓</i>	SOIL	P	250 ml	None	G	DU	GAMMA SPEC (EPA 901)	
105733	002	MWL AHSS-02-2018	N/A	<i>↓</i>	SOIL	P	250 ml	None	G	DU	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes				
Background: <input type="checkbox"/> Yes		Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day				
Confirmatory: <input type="checkbox"/> Yes		QC initials:		Negotiated TAT <input type="checkbox"/>				
Sample	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Lab Use
Team Members	Danielle Michel	<i>[Signature]</i>		SNL/8854/505-845-7706		Return Samples By:		
	Robert Ziock	<i>[Signature]</i>		SNL/8888/505-845-0485		Comments:		

Relinquished by <i>Danielle Michel</i>	Org. <i>8854</i>	Date <i>9/13/18</i>	Time <i>0945</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>9/13/18</i>	Time <i>0945</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>9/13/18</i>	Time <i>1105</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date <i>9/18/18</i>	Time <i>915</i>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL Surface Soil

Project/Task No. 195122 / 10.11.08

ARCOC No. 618905

Analytical Lab GEL

SDG No. 459324

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	N/A		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	X		
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	N/A		
	c) Matrix spike recovery data reported and met		X	105731-002 MS, EPA 6020 Vanadium
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples		X	105731-002 DUP, EPA 6020 Beryllium, Cobalt, Copper, Vanadium, Zinc
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data a) Method or reagent blank data reported and met for all samples	X		QC1204115094 MB contained Zinc less than the reporting limit. Field sample results for Zinc were "B" flagged.
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	N/A		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	N/A		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	X		
	a) Initial calibration provided			
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		
	e) Instrument run logs provided	X		
4.6	Radiochemistry and General Chemistry	X		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
105731-002 MS	EPA 6020 Vanadium	Matrix spike recovery of 181% exceeded the upper acceptance limit of 125%. The resulting post digestion spike recovery of 74.8% was less than the lower acceptance limit of 80%. Matrix interference and/or sample non-homogeneity is suspected. Vanadium concentrations reported in the field samples were qualified with the "N" flag.
105731-002 DUP	EPA 6020 Beryllium, Cobalt, Copper, Vanadium, Zinc	Precision RPD measures for lab duplicate showed Be (32.4), Co (22.2), Cu (20.9), V (24.5), and Zn (31.9) exceeding the 20 RPD advisory limit. Concentrations in the field samples were flagged with an asterisk, "**".

Were deficiencies unresolved? ☐ Yes ☒ No

Based on the review, this data package is complete. ☒ Yes ☐ No

Reviewed by: Mark L Lyon Date: 10-18-2018 08:07:00

Closed by: Mark L Lyon Date: 10-18-2018 08:07:00

ANNEX C

**Mixed Waste Landfill
Soil-Vapor Monitoring Forms and Reports**

April 2018-March 2019

Field Forms

Data Validation Reports

Contract Verification Reviews

Certificates of Analysis

FIELD SAMPLING FORMS

Mixed Waste Landfill

Long-Term Monitoring and Maintenance

Soil-Vapor Monitoring

Form Title	Corresponding Procedure
Health & Safety Meeting Form	PLA 05-09
SUMMA [®] Canister Log	FOP 08-22
Soil Vapor Sampling Form	FOP 08-22
Analysis Request and Chain of Custody*	LOP 94-03

*Completed AR/COC forms are provided in the Data Validation Section of this Annex.

FIELD SAMPLING FORMS
APRIL 2018 SOIL-VAPOR MONITORING

HEALTH & SAFETY MEETING FORMDept: 0641Facility: MWLDate: 04/25/18Time: 0755Activities: Soil Vapor Monitoring and sampling

(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: 50 °FWind Speed: 13 MPHHumidity: 54 %Wind Chill: 44 °FChemicals Used: ☒ None☐ Preservatives in sample bottles☐ Other: _____Hospital/Clinic: Sandia Medial Clinic Bldg. 831Phone: 911 on LAN; 844-0911 on mobile*Safety Topics Presented*

<input checked="" type="checkbox"/> Wear safety glasses	<input checked="" type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input checked="" type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input type="checkbox"/> Be aware of electrical hazards	<input type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle **YES** or **NO**. If answered **YES** explain.

Printed Name Robert Lynch

Printed Name Tim Jackson

Printed Name William Gibson

Printed Name CHRIS HOLLAND

Printed Name Cynthia Rivera

Printed Name Thomas Armijo

Attendees

Signature [Signature]

Signature [Signature]

Signature [Signature]

Signature [Signature]

Signature [Signature]

Signature [Signature]

Daniel O'Farrell

Notes

[Signature]

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cc/min)	Initial Canister Vacuum (in-Hg)	Ending Canister Vacuum (in-Hg)	Comments
MWL-SUDT-F3T	4/25/14	1009	8245	NA	NA	-24	-8	
MWL-SUDT-50		1013	NA	0.0	8.0	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1014		↓	↓	↓	↓	
		1014	3400085	NA	NA	-26	-8	100 samples fill
		↓	8031	NA	NA	-26	-8	
MWL-SUDT-100		1024	NA	0.0	8.0	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1026	↓	↓	↓	↓	↓	
		1027	34001323	NA	NA	-26	-8	
MWL-SUDT-200		1030	NA	0.0	8.0	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1032	↓	↓	↓	↓	↓	
		1034	34001564	NA	NA	-25	-8	
MWL-SUDT-300		1038	NA	0.0	8.0	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1040	↓	↓	↓	↓	↓	
		1042	34000140	NA	NA	-25	-8	
		1042	34000844	↓	↓	-25	-8	
MWL-SUDT-400		1045	NA	0.0	8.0	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1048	↓	↓	↓	↓	↓	
		1049	34000819	NA	NA	-25	-8	

Field Notes:

PID Background = 0.0 ppm

Elevation ~ 5400 ft asl

mini-RAE - PGM 7320

Safety Engineering On-Site

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (in-Hg)	Ending Canister Vacuum (in-Hg)	Comments
MWL-SV-FB 5	4/26/10	1112	7151	NA	NA	-24	-2	
MWL-SV-FB 5		1116	NA	0.0	8.0	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1117	↓	↓	↓	↓	↓	
		1118	34002073	NA	NA	-25	-2	
MWL-SV-FB 100		1121	NA	0.0	8.0	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1122	↓	↓	↓	↓	↓	
		1123	34000572	NA	NA	-25	-2	
MWL-SV-FB 200		1125	NA	0.0	8.0	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1127	↓	↓	↓	↓	↓	
		1128	34000151	NA	NA	-24	-4	
MWL-SV-FB 300		1132	NA	0.0	8.0	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1134	↓	↓	↓	↓	↓	
		1135	34000096	NA	NA	-26	-2	
MWL-SV-FB 400		1137	NA	0.0	8.0	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1139	↓	↓	↓	↓	↓	
		1141	34000609	NA	NA	-24	-2	
MWL-SV-FB 1ml		1145	8444	NA	NA	-25	-2	

Field Notes:

Background = 0,0 ppm
mini RAE-76m 7320

Elevation ~ 5400 ftms

Ambient Air sample collected

Soil Vapor Sampling Log Form

[illegible]

Field Notes:

PID Background = 0.0 ppm
 mini RAE - PGM 7320
 Elevation ~ 5400 fms/

[illegible]

PID Background = 0.0 ppm
Mini-RAE - PGM 7320
Elevation ~ 5400 ftmsl

SUMMARY SHEET FOR
APRIL 2018 SOIL-VAPOR SAMPLES

Sample Summary for Mixed Waste Landfill Soil-Vapor Monitoring
April 2018

Well ID	Sample Date	Sample ID / Port	SUMMA Number	ARCOC	Sample Number	Sample Type	Associated Field Blank (ARCOC #/Sample #)	Comments
Mixed Waste Landfill Soil Vapor Monitoring: Project Task Number 195122.10.11.08 / Service Order Number CF 01-18								
MWL-SV01	25-Apr-18	MWL-SV01-42.5	34001391	618733	105204	Environmental	618733 / 105203	
		MWL-SV-FB 1	34001153		105203	Field QC	n/a	Ultra Pure N2
MWL-SV02	25-Apr-18	MWL-SV02-41.5	34000829	618734	105206	Environmental	618734 / 105205	
		MWL-SV-FB 2	34000075		105205	Field QC	n/a	Ultra Pure N2
MWL-SV03	25-Apr-18	MWL-SV03-50	34001277	618735	105208	Environmental	618735 / 105207	
		MWL-SV03-100	34001374		105209	Environmental		
		MWL-SV03-200	34001672		105210	Environmental		
		MWL-SV03-300	8250		105211	Environmental		
		MWL-SV03-400	7758		105212	Environmental		
		MWL-SV-FB3	8206		105207	Field QC	n/a	Ultra Pure N2
MWL-SV04	25-Apr-18	MWL-SV04-50	34000085	618736	105214	Environmental	618736 / 105213	
		MWL-SV04-50	8031		105215	Duplicate		
		MWL-SV04-100	34001323		105216	Environmental		
		MWL-SV04-200	34001564		105217	Environmental		
		MWL-SV04-300	34000140		105218	Environmental		
		MWL-SV04-300	34000844		105219	Duplicate		
		MWL-SV04-400	34000819		105220	Environmental		
		MWL-SV-FB4	8245		105213	Field QC	n/a	Ultra Pure N2
MWL-SV05	25-Apr-18	MWL-SV05-50	34002073	618737	105222	Environmental	618737 / 105221	
		MWL-SV05-100	34000572		105223	Environmental		
		MWL-SV05-200	34000151		105224	Environmental		
		MWL-SV05-300	34000096		105225	Environmental		
		MWL-SV05-400	34000609		105226	Environmental		
		MWL-SV05-FB5	7151		105221	Field QC	n/a	Ultra Pure N2
		MWL-SV05-AM1	8444		105232	Field QC	n/a	Air

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES

MIXED WASTE LANDFILL

SOIL-VAPOR MONITORING

APRIL 2018

AR/COC NUMBERS 618733, 618734, 618735, 618736, 618737

Memorandum

Date: June 13, 2018

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL SVM
ARCOC: 618733, 618734, 618735, 618736 and 618737
SDG: 320-38760
Laboratory: TestAmerica Laboratories, Inc. -West Sacramento
Project/Task: 195122.10.11.08
Analysis: VOCs by method TO-15

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Twenty-five samples were prepared and analyzed with accepted procedures using method EPA TO-15 (Determination of VOCs in Air collected in specially prepared canisters and analyzed by GC-MS). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. Methylene chloride was detected at \leq the PQL in the MB associated with samples 38760-1 through -12. The associated result for samples -1 through -5 and -10 through -12 were detects \leq the PQL and will be **qualified U,B**; non-detect at their respective PQLs. The associated results for samples -6, -7 and -9 were detects $>$ the PQL but $\leq 10X$ the MB value and will be **qualified J+,B**. The associated result for sample -8 was a detect $>$ the PQL but and slightly $> 10X$ the MB value. Based on professional judgment it was **qualified J+,B**.
2. Carbon disulfide and methylene chloride were detected at \leq the PQL in FB1, sample -1 associated with sample -2. The associated sample results were detects \leq the PQL and will be **qualified 0.002U,B2 and 0.001U,B2** respectively, non-detect at their PQLs.
3. Methylene chloride was detected at \leq the PQL in FB2, sample -3, associated with sample -4. The methylene chloride result for sample -4 was a detect \leq the PQL and will be **qualified 0.0015U,B2**; non-detect at the PQL.
4. Acetone and methylene chloride were detected at \leq the PQL and toluene at $>$ the PQL in FB3, sample -5, associated with samples -6 through -10. The acetone results for all associated samples were detects \leq the PQL and will be **qualified U,B2**; non-detect at their respective PQLs. The methylene chloride result for sample -10 was a detect \leq the PQL and will be **qualified**

0.0024U,B2; non-detect at the PQL. The remaining associated sample results for methylene chloride were detects > the PQL but $\leq 10X$ the MB value and will be **qualified J+,B2**. The toluene results for samples -8 through -10 were detects \leq the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.

5. Methylene chloride was detected at \leq the PQL and toluene at > the PQL in FB4, sample -11, associated with samples -12 through -18. The methylene chloride result for sample -14 was a detect > the PQL but $\leq 10X$ the FB value and will be **qualified J+,B2**. The remaining associated sample results for methylene chloride were detects \leq the PQL and will be **qualified U,B2**; non-detect at their respective PQLs. The toluene results for all samples *except* samples -15 and -18 were detects \leq the PQL and will be **qualified U,B2**; non-detect at their respective PQLs. The toluene result for sample -15 was a detect > the PQL but $\leq 10X$ the MB value and will be **qualified J+,B2**.
6. Benzene and chloromethane were detected at \leq the PQL and acetone, 2-butanone, methylene chloride and toluene were detected at > the PQL in FB5, sample -19, associated with samples -20 through -24. The acetone results for all samples *except* sample -24; the benzene results for all samples; the 2-butanone results for samples -20 and -24; the chloromethane result for sample -24; the methylene chloride result for sample -20; and the toluene results for samples -21, -22 and -23 were detects \leq the PQL and will be **qualified U,B2**; non-detect at their respective PQLs. The acetone and toluene results for sample -24 and the methylene chloride results for samples -21, -22, -23 and -24 were detects > the PQL but $\leq 10X$ the MB values and will be **qualified J+,B2**.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks except as noted above in the Summary section and as follows. Benzene was detected at \leq the PQL, and toluene and trichloroethene at > the PQLs in FB1, sample -1, associated with sample -2. The toluene and benzene results for sample -2 were non-detect and will not be qualified. The trichloroethene result for sample -2 was a detect >5X the FB value and will not be qualified.

Benzene and tetrachloroethene were detected at \leq the PQL, and toluene at > the PQL in FB2, sample -3, associated with sample -4. The toluene and benzene results for sample -4 were non-detect and will not be qualified. The tetrachloroethene result for sample -4 was a detect >5X the FB value and will not be qualified.

Toluene was detected at > the PQL in FB3, sample -5, associated with samples -6 through -10. The toluene results for samples -6 and -7 were non-detect and will not be qualified.

Tetrachloroethene was detected at ≤ the PQL and toluene at > the PQL in FB4, sample -11, associated with samples -12 through -18. All associated sample results for tetrachloroethene were detects >5X the FB value and will not be qualified. The toluene result for sample -18 was non-detect and will not be qualified.

Chloromethane was detected at ≤ the PQL and 2-butanone and toluene were detected at > the PQL in FB5, sample -19, associated with samples -20 through -24. The chloromethane results for all samples *except* sample -24; the toluene result for sample -20 and the 2-butanone results for samples -21, -22 and -23 were non-detect and will not be qualified.

Dichlorodifluoromethane; 1,2-dichloroethane; 4-methyl-2-pentanone; styrene; tetrachloroethene and trichlorofluoromethane were detected at ≤ the PQL and ethylbenzene; m,p-xylene and o-xylene were detected at > the PQL in FB5, sample -19, associated with samples -20 through -24. The associated sample results were either non-detect or detects >5X the FB values and will not be qualified.

Surrogates

All surrogate acceptance criteria were met.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS/MSD was not performed.

Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

The LCS/LCSD met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported and correctly adjusted for dilutions. The samples were not diluted except as follows.

Sample -2 (7.86X for tetrachloroethene and 2.52X for all remaining target analytes); sample -4 (3.86X); sample -6 (2.07X); sample -7 (2.75X); sample -8 (3.58X); sample -9 (3.51X); sample -10 (5.96X); sample -14 (2.75X); sample -16 (2.8X); sample -17 (1.83X); sample -18 (1.56X); sample -20 (1.6X); sample -21 (2.19X); sample 22 (2.15X) and sample -23 (1.7X).

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Mass spectra acceptability were verified during data validation and met QC acceptance criteria. Sample results < the PQL with missing ions or poor ratios were qualified J by the laboratory and were not further qualified during data validation.

FBs were submitted, one with each ARCOC. Two field duplicate pairs were submitted with ARCOC 618736. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

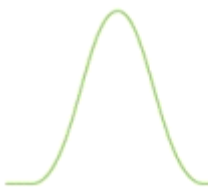
Sample -25 was submitted as an air blank canister. It was not associated with any field samples.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/14/18



Sample Findings Summary



AR/COC: 618733, 618734, 618735, 618736, 618737

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15			
	105203-001/MWL-SV-FB1	METHYLENE CHLORIDE (75-09-2)	0.0004U, B
	105204-001/MWL-SV01-42.5	CARBON DISULFIDE (75-15-0)	0.002U, B2
	105204-001/MWL-SV01-42.5	METHYLENE CHLORIDE (75-09-2)	0.001U, B,B2
	105205-001/MWL-SV-FB2	METHYLENE CHLORIDE (75-09-2)	0.0004U, B
	105206-001/MWL-SV02-41.5	METHYLENE CHLORIDE (75-09-2)	0.0015U, B,B2
	105207-001/MWL-SV-FB3	METHYLENE CHLORIDE (75-09-2)	0.0004U, B,B2
	105208-001/MWL-SV03-50	ACETONE (67-64-1)	0.01U, B2
	105208-001/MWL-SV03-50	METHYLENE CHLORIDE (75-09-2)	J+, B,B2
	105209-001/MWL-SV03-100	ACETONE (67-64-1)	0.014U, B2
	105209-001/MWL-SV03-100	METHYLENE CHLORIDE (75-09-2)	J+, B,B2
	105210-001/MWL-SV03-200	ACETONE (67-64-1)	0.018U, B2
	105210-001/MWL-SV03-200	METHYLENE CHLORIDE (75-09-2)	J+, B,B2
	105210-001/MWL-SV03-200	TOLUENE (108-88-3)	0.0014U, B2
	105211-001/MWL-SV03-300	ACETONE (67-64-1)	0.018U, B2
	105211-001/MWL-SV03-300	METHYLENE CHLORIDE (75-09-2)	J+, B,B2
	105211-001/MWL-SV03-300	TOLUENE (108-88-3)	0.0014U, B2
	105212-001/MWL-SV03-400	ACETONE (67-64-1)	0.03U, B2
	105212-001/MWL-SV03-400	METHYLENE CHLORIDE (75-09-2)	0.0024U, B,B2
	105212-001/MWL-SV03-400	TOLUENE (108-88-3)	0.0024U, B2
	105213-001/MWL-SV-FB4	METHYLENE CHLORIDE (75-09-2)	0.0004U, B
	105214-001/MWL-SV04-50	METHYLENE CHLORIDE (75-09-2)	0.0004U, B,B2
	105214-001/MWL-SV04-50	TOLUENE (108-88-3)	0.0004U, B2
	105215-001/MWL-SV04-50	METHYLENE CHLORIDE (75-09-2)	0.0004U, B2
	105215-001/MWL-SV04-50	TOLUENE (108-88-3)	0.0004U, B2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	105216-001/MWL-SV04-100	METHYLENE CHLORIDE (75-09-2)	0.00062U, B2
	105217-001/MWL-SV04-200	METHYLENE CHLORIDE (75-09-2)	J+, B2
	105217-001/MWL-SV04-200	TOLUENE (108-88-3)	0.0011U, B2
	105218-001/MWL-SV04-300	METHYLENE CHLORIDE (75-09-2)	0.0004U, B2
	105218-001/MWL-SV04-300	TOLUENE (108-88-3)	J+, B2
	105219-001/MWL-SV04-300	METHYLENE CHLORIDE (75-09-2)	0.0011U, B2
	105219-001/MWL-SV04-300	TOLUENE (108-88-3)	0.0011U, B2
	105220-001/MWL-SV04-400	METHYLENE CHLORIDE (75-09-2)	0.00073U, B2
	105220-001/MWL-SV04-400	TOLUENE (108-88-3)	0.00073U, B2
	105222-001/MWL-SV05-50	2-BUTANONE (MEK) (78-93-3)	0.0013U, B2
	105222-001/MWL-SV05-50	ACETONE (67-64-1)	0.008U, B2
	105222-001/MWL-SV05-50	BENZENE (71-43-2)	0.00064U, B2
	105222-001/MWL-SV05-50	METHYLENE CHLORIDE (75-09-2)	0.00064U, B2
	105223-001/MWL-SV05-100	ACETONE (67-64-1)	0.011U, B2
	105223-001/MWL-SV05-100	BENZENE (71-43-2)	0.00088U, B2
	105223-001/MWL-SV05-100	METHYLENE CHLORIDE (75-09-2)	J+, B2
	105223-001/MWL-SV05-100	TOLUENE (108-88-3)	0.00088U, B2
	105224-001/MWL-SV05-200	ACETONE (67-64-1)	0.011U, B2
	105224-001/MWL-SV05-200	BENZENE (71-43-2)	0.00086U, B2
	105224-001/MWL-SV05-200	METHYLENE CHLORIDE (75-09-2)	J+, B2
	105224-001/MWL-SV05-200	TOLUENE (108-88-3)	0.00086U, B2
	105225-001/MWL-SV05-300	ACETONE (67-64-1)	0.0085U, B2
	105225-001/MWL-SV05-300	BENZENE (71-43-2)	0.00068U, B2
	105225-001/MWL-SV05-300	METHYLENE CHLORIDE (75-09-2)	J+, B2
	105225-001/MWL-SV05-300	TOLUENE (108-88-3)	0.00068U, B2
	105226-001/MWL-SV05-400	2-BUTANONE (MEK) (78-93-3)	0.0008U, B2
	105226-001/MWL-SV05-400	ACETONE (67-64-1)	J+, B2
	105226-001/MWL-SV05-400	BENZENE (71-43-2)	0.0004U, B2
	105226-001/MWL-SV05-400	CHLOROMETHANE (74-87-3)	0.0008U, B2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	105226-001/MWL-SV05-400	METHYLENE CHLORIDE (75-09-2)	J+, B2
	105226-001/MWL-SV05-400	TOLUENE (108-88-3)	J+, B2

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOC#: 618733, 618734, 618735, 618736 and 618737	Site/Project: MWL SVM	Validation Date: 06/12/2018
SDG #:320-38760	Laboratory: TA Laboratories Inc. - West Sacramento, CA	Validator: Linda Thal
Matrix: Air	# of Samples: 25	CVR present: Yes
ARCOC(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
none			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
none								

Comments: Collected 04/25/2018

Validated by:

L. Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #:618733, 618734, 618735, 618736 and 618737	SDG: 320-38760	Matrix: Air
Laboratory Sample IDs: 320-38760-1 through -25		
Method/Batch #s: TO-15/223748 (samples -1 thru -12 incl -2 DL PCE); 224085 (samples -13 thru -25)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB1 -1	FB2 -3	FB3 -5	FB4 -11
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D									
223748 (samples -1 thru -12)													
Methylene chloride	NA	✓	✓	✓	.0000 881J	(.000 881)	✓	✓	✓	.00012J	.0001J	.00013J	.0001J
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	.00027J	✓
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.000079J	.000081J	✓	✓
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	.00019J	✓	.000093J
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00068	.00067	.0012	.00065
Carbon disulfide	NA	✓	✓	✓	✓	NA	✓	✓	✓	.0001J	✓	✓	✓
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00091	✓	✓	✓

Surrogate Recovery Outliers

Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	
none									

IS Outliers

FBZ		ChI-d5		1,4-DCB-d4							
Sample ID	Area	RT	Area	RT	Area	RT					
none											

Comments: HTs OK. LCS/LCSD (lab limits). RSDs and CCVs 30%
ATMS 6 05/11-12/2018 All avg RF

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #: 618733, 618734, 618735, 618736 and 618737	SDG: 320-38760	Matrix: Air
Laboratory Sample IDs: 320-38760-1 through -25		
Method/Batch #: TO-15/223748 (samples -1 thru -12 incl -2DL); 224085 (samples -13 thru -25)	Tuning (pass/fail):yes	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB5 -19	X5 (X10)	MWL- SVO5- AM1 -25		
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D										
224085 (samples -13 thru -25)														
2-Butanone (MEK)	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00086	(0.0086)	.00039J		
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.0086	(0.086)	.0041J		
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.000096J	0.00048	✓		
Methylene chloride	NA	✓	✓	✓	✓	NA	✓	✓	✓	.0018	(0.018)	.00018J		
Dichlorodifluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00029J	0.00145	.00062		
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00022J	0.0011	.00039J		
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.000083J	0.000415	.00049		
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	.00035J		
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.009	(0.09)	✓		
Chloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00032J	0.0016	.00068J		
1,2-Dichloroethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00011J	0.00055	✓		
Ethylbenzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00074	0.0037	✓		
4-Methyl-2-pentanone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00017J	0.00085	✓		
Styrene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.0002J	0.001	✓		
m,p-Xylene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.0029	0.0145	✓		
o-Xylene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00077	0.00385	✓		
1,1,2-Trichloro-1,1,1-trifluoroethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	.00045		
Surrogate Recovery Outliers														
Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R						
none														
IS Outliers														
	FBZ		Chl-d5		1,4-DCB-d4									
Sample ID	Area	RT	Area	RT	Area	RT								
none														

Comments: HTs OK. LCS/LCSD (lab limits)

ATMS 6 05/11-12/2018 All avg RF

Sample -025 is not associated with any field samples

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab


Page 1 of 1

Batch No.

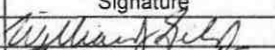

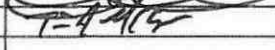
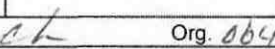
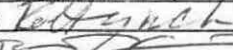

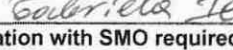

SMO Use

AR/COC

618734

Project Name: MWL GWM / SVM		Date Samples Shipped: 4-27-18		SMO Authorization: 		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 281584		SMO Contact Phone:		
Project/Task Number: 195122.10.11.08		Lab Contact: Lee Ann Heathcote/916-373-5600		Wendy Palencia/505-844-3132		
Service Order: CF01-18		Lab Destination: TAL-WS		Send Report to SMO: Michael Skelly/505-284-2483		
Tech Area:		Contract No.: 1636780				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154
Building:		Room:		Operational Site:		

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
105205	001	MWL-SV -FB 2	NA	4/25/18 12:00	UPN	S	6 L	None	G	FB	VOC (TO-15)	
105206	001	MWL-SV02-41.5	41.5	4/25/18 12:14	SG	S	6 L	None	G	SA	VOC (TO-15)	

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day			
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT <input type="checkbox"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			
Confirmatory: <input type="checkbox"/> Yes		QC initials:		Return Samples By:		Comments: Elevation and ambient pressure information on attached form. Elevation at ~ 5400 fmsl.			
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Lab Use			
	William Gibson		WG	SNL/00641/505-284-3307/505-239-7367					
	Robert Lynch		RL	SNL/00641/505-844-4013/505-250-7090					
	Christopher Hulliger		CH	AIS/00641/505-284-3309/505-382-0353					
	Tim Jackson		TJ	SNL/0631/505-284-2547/505-263-6639					
Relinquished by 		Org. 0641	Date 4-26-18	Time 10:10	Relinquished by		Org.	Date	Time
Received by 		Org. 0631	Date 4-26-18	Time 10:10	Received by		Org.	Date	Time
Relinquished by 		Org. 0631	Date 4-27-18	Time 08:01	Relinquished by		Org.	Date	Time
Received by 		Org. TA-SAC	Date 05-02-18	Time 12:10	Received by		Org.	Date	Time

05/25/20
03 Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab


Page 1 of 1

Batch No.

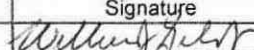
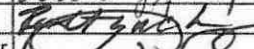


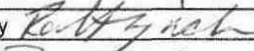

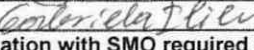
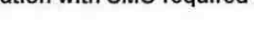
SMO Use

AR/COC

618735

Project Name: MWL GWM / SVM		Date Samples Shipped: 4-27-18		SMO Authorization: 		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 281584		SMO Contact Phone: Wendy Palencia/505-844-3132		
Project/Task Number: 195122.10.11.08		Lab Contact: Lee Ann Heathcote/916-373-5600		Send Report to SMO: Michael Skelly/505-284-2483		
Service Order: CF01-18		Lab Destination: TAL-WS				
Tech Area:		Contract No.: 1636780				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154
Building:		Room:		Operational Site:		

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
✓ 105207	001	MWL-SV-FB3	NA	4/25/18 08:40	UPN	S	6 L	None	G	FB	VOC (TO-15)	
✓ 105208	001	MWL-SV03-50	50	4/25/18 09:05	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105209	001	MWL-SV03-100	100	4/25/18 09:09	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105210	001	MWL-SV03-200	200	4/25/18 09:13	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105211	001	MWL-SV03-300	300	4/25/18 09:19	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105212	001	MWL-SV03-400	400	4/25/18 09:39	SG	S	6 L	None	G	SA	VOC (TO-15)	

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes				
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day				
Confirmatory: <input type="checkbox"/> Yes		QC inits.:				Negotiated TAT <input type="checkbox"/>				
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				Lab Use
	William Gibson		WG	SNL/00641/505-284-3307/505-239-7367		Return Samples By:				
	Robert Lynch		RL	SNL/00641/505-844-4013/505-250-7090		Comments: Elevation and ambient pressure information on attached forms. Elevation ~ 5400 fmsl				
	Christopher Hulliger		CH	AIS/00641/505-284-3309/505-382-0353						
	Tim Jackson		TJ	SNL/0631/505-284-2547/505-263-6639						
Relinquished by 		Org. 0641	Date 4-26-18	Time 10:10	Relinquished by		Org.	Date	Time	
Received by 		Org. 0631	Date 4-26-18	Time 10:10	Received by		Org.	Date	Time	
Relinquished by 		Org. 0631	Date 4-27-18	Time 09:30	Relinquished by		Org.	Date	Time	
Received by 		Org. 320	Date 05-02-18	Time 12:10	Received by		Org.	Date	Time	

Prior confirmation with SMO required for 7 and 15 day TAT

Page 1 of 1780

06/23/2018

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No.		SMO Use		AR/COC		618736						
Project Name: MWL GWM / SVM		Date Samples Shipped: 4-27-18		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 281584		SMO Contact Phone: Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154						
Project/Task Number: 195122.10.11.08		Lab Contact: Lee Ann Heathcote/916-373-5600		Send Report to SMO: Michael Skelly/505-284-2483								
Service Order: CF01-18		Lab Destination: TAL-WS		Contract No.: 1636780								
Tech Area:		Operational Site:										
Building:		Room:										
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
105213	001	MWL-SV-FB4	NA	4/25/18 10:09	UPN	S	6 L	None	G	FB	VOC (TO-15)	
105214	001	MWL-SV04-50	50	4/25/18 10:19	SG	S	6 L	None	G	SA	VOC (TO-15)	
105215	001	MWL-SV04-50	50	4/25/18 10:19	SG	S	6 L	None	G	DU	VOC (TO-15)	
105216	001	MWL-SV04-100	100	4/25/18 10:27	SG	S	6 L	None	G	SA	VOC (TO-15)	
105217	001	MWL-SV04-200	200	4/25/18 10:34	SG	S	6 L	None	G	SA	VOC (TO-15)	
105218	001	MWL-SV04-300	300	4/25/18 10:42	SG	S	6 L	None	G	SA	VOC (TO-15)	
105219	001	MWL-SV04-300	300	4/25/18 10:42	SG	S	6 L	None	G	DU	VOC (TO-15)	
105220	001	MWL-SV04-400	400	4/25/18 10:49	SG	S	6 L	None	G	SA	VOC (TO-15)	
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt		
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes						
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Confirmatory: <input type="checkbox"/> Yes		QC initials:				Negotiated TAT <input type="checkbox"/>						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab						
	William Gibson	[Signature]	WG	SNL/00641/505-284-3307/505-239-7367		Return Samples By:						
	Robert Lynch	[Signature]	RL	SNL/00641/505-844-4013/505-250-7090		Comments: Elevation and ambient pressure information on attached forms. Elevation ~ 5400 fmsl.						
	Christopher Hulliger	[Signature]	CH	AIS/00641/505-284-3309/505-382-0353								
	Tim Jackson	[Signature]	TJ	SNL/0631/505-284-2547/505-263-6639								
Relinquished by [Signature]		Org. 0641	Date 4-26-18	Time 10:10	Relinquished by		Org.	Date	Time			
Received by [Signature]		Org. 0631	Date 4-26-18	Time 10:10	Received by		Org.	Date	Time			
Relinquished by [Signature]		Org. 0631	Date 4-27-18	Time 08:30	Relinquished by		Org.	Date	Time			
Received by [Signature]		Org. 320	Date 5-02-18	Time 12:10	Received by		Org.	Date	Time			

Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No.		SMO Use		AR/COC 618737	
Project Name: MWL GWM / SVM		Date Samples Shipped: 4-27-18		SMO Authorization:	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No: 281584		SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08		Lab Contact: Lee Ann Heathcote/916-373-5600		Send Report to SMO: Michael Skelly/505-284-2483	
Service Order: CF01-18		Lab Destination: TAL-WS		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Contract No.: 1636780				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	
Tech Area:		Operational Site:			
Building:		Room:			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
✓ 105221	001	MWL-SV-FB5	NA	4/25/18 11:12	UPN	S	6 L	None	G	FB	VOC (TO-15)	
✓ 105222	001	MWL-SV05-50	50	4/25/18 11:18	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105223	001	MWL-SV05-100	100	4/25/18 11:23	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105224	001	MWL-SV05-200	200	4/25/18 11:28	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105225	001	MWL-SV05-300	300	4/25/18 11:35	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105226	001	MWL-SV05-400	400	4/25/18 11:41	SG	S	6 L	None	G	SA	VOC (TO-15)	
✓ 105232	001	MWL-SV05-AM1	NA	4/25/18 11:45	AIR	S	6 L	None	G	FB	VOC (TO-15)	

Last Chain: <input type="checkbox"/> Yes		Sample Tracking SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes		Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab	Lab Use
	William Gibson		WG	SNL/00641/505-284-3307/505-239-7367	Return Samples By: Comments: Elevation and ambient pressure information on attached forms. Elevation ~ 5400 fmsl.	
	Robert Lynch		RL	SNL/00641/505-844-4013/505-250-7090		
	Christopher Hulliger		CH	AIS/00641/505-284-3309/505-382-0353		
	Tim Jackson		TJ	SNL/0631/505-284-2547/505-263-6639		

Relinquished by	Org. 0641	Date 4-26-18	Time 11:10	Relinquished by	Org.	Date	Time
Received by	Org. 0631	Date 4-26-18	Time 10:10	Received by	Org.	Date	Time
Relinquished by	Org. 0631	Date 4-27-18	Time 08:00	Relinquished by	Org.	Date	Time
Received by	Org. 320	Date 5/02/18	Time 12:10	Received by	Org.	Date	Time

Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT VERIFICATION REVIEW FORMS

Mixed Waste Landfill Soil-Vapor Monitoring

April 2018

AR/COC Number	Sample Type
618733	Environmental*
618734	Environmental*
618735	Environmental*
618736	Environmental*
618737	Environmental*

* AR/COC forms are provided in the Data Validation Section of this Annex.

Contract Verification Form (CVR)

Project Leader Jackson

Project Name MWL SVM **Project/Task No.** 195122_10.11.08

ARCOC No. 618733, 618734, 618735, 618736 & 618737

Analytical Lab TAL-WS

SDG No. 320-38760-1

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		Reported as ppmv/v per customer request
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	X		
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data a) Method or reagent blank data reported and met for all samples		X	Methylene chloride detected in method blank for batch 223748
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Several compounds detected in all field blanks

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270)	X		
	a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		
	d) Internal standard performance data provided	X		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) ICP interference check sample data provided	N/A		
	d) ICP serial dilution provided	N/A		
	e) Instrument run logs provided	N/A		
4.6	Radiochemistry and General Chemistry	N/A		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? ☐ Yes ☒ No

Based on the review, this data package is complete. ☒ Yes ☐ No

Reviewed by: Wendy Palencia Date: 06-05-2018 10:29:00

Closed by: Wendy Palencia Date: 06-05-2018 10:29:00

CERTIFICATES OF ANALYSIS

Mixed Waste Landfill

April 2018 Soil-Vapor Samples

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105203-001/MWL-SV-FB1

Lab Sample ID: 320-38760-1

Date Collected: 04/25/18 12:07

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.0050	0.00018	ppm v/v			05/17/18 20:09	1
Benzene	0.000079	J	0.00040	0.000079	ppm v/v			05/17/18 20:09	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/17/18 20:09	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/17/18 20:09	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/17/18 20:09	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/17/18 20:09	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/17/18 20:09	1
Carbon disulfide	0.00010	J	0.00080	0.000078	ppm v/v			05/17/18 20:09	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/17/18 20:09	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/17/18 20:09	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/17/18 20:09	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/17/18 20:09	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/17/18 20:09	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/17/18 20:09	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/17/18 20:09	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/17/18 20:09	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/17/18 20:09	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/17/18 20:09	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/17/18 20:09	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			05/17/18 20:09	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/17/18 20:09	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/17/18 20:09	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/17/18 20:09	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/17/18 20:09	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/17/18 20:09	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/17/18 20:09	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/17/18 20:09	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/17/18 20:09	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/17/18 20:09	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/17/18 20:09	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/17/18 20:09	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/17/18 20:09	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/17/18 20:09	1
Methylene Chloride	0.00012	J B	0.00040	0.000072	ppm v/v			05/17/18 20:09	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/17/18 20:09	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/17/18 20:09	1
Tetrachloroethene	ND		0.00040	0.000051	ppm v/v			05/17/18 20:09	1
Toluene	0.00068		0.00040	0.000051	ppm v/v			05/17/18 20:09	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/17/18 20:09	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/17/18 20:09	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/17/18 20:09	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/17/18 20:09	1
Trichloroethene	0.00091		0.00040	0.00011	ppm v/v			05/17/18 20:09	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/17/18 20:09	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/17/18 20:09	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/17/18 20:09	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/17/18 20:09	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/17/18 20:09	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105203-001/MWL-SV-FB1

Lab Sample ID: 320-38760-1

Date Collected: 04/25/18 12:07

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/17/18 20:09	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/17/18 20:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130					05/17/18 20:09	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					05/17/18 20:09	1
Toluene-d8 (Surr)	102		70 - 130					05/17/18 20:09	1

Client Sample ID: 105204-001/MWL-SV01-42.5

Lab Sample ID: 320-38760-2

Date Collected: 04/25/18 12:31

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0049	J	0.013	0.00045	ppm v/v			05/17/18 21:04	2.52
Benzene	ND		0.0010	0.00020	ppm v/v			05/17/18 21:04	2.52
Benzyl chloride	ND		0.0020	0.00041	ppm v/v			05/17/18 21:04	2.52
Bromodichloromethane	0.00058	J	0.00076	0.00017	ppm v/v			05/17/18 21:04	2.52
Bromoform	ND		0.0010	0.00018	ppm v/v			05/17/18 21:04	2.52
Bromomethane	ND		0.0020	0.00084	ppm v/v			05/17/18 21:04	2.52
2-Butanone (MEK)	0.0017	J	0.0020	0.00050	ppm v/v			05/17/18 21:04	2.52
Carbon disulfide	0.0013	J	0.0020	0.00020	ppm v/v			05/17/18 21:04	2.52
Carbon tetrachloride	0.00030	J	0.0020	0.00016	ppm v/v			05/17/18 21:04	2.52
Chlorobenzene	ND		0.00076	0.00016	ppm v/v			05/17/18 21:04	2.52
Chloroethane	ND		0.0020	0.00078	ppm v/v			05/17/18 21:04	2.52
Chloroform	0.015		0.00076	0.00024	ppm v/v			05/17/18 21:04	2.52
Chloromethane	ND		0.0020	0.00050	ppm v/v			05/17/18 21:04	2.52
Dibromochloromethane	ND		0.0010	0.00020	ppm v/v			05/17/18 21:04	2.52
1,2-Dibromoethane (EDB)	ND		0.0020	0.00019	ppm v/v			05/17/18 21:04	2.52
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0010	0.00039	ppm v/v			05/17/18 21:04	2.52
1,2-Dichlorobenzene	ND		0.0010	0.00033	ppm v/v			05/17/18 21:04	2.52
1,3-Dichlorobenzene	ND		0.0010	0.00028	ppm v/v			05/17/18 21:04	2.52
1,4-Dichlorobenzene	ND		0.0010	0.00038	ppm v/v			05/17/18 21:04	2.52
Dichlorodifluoromethane	0.081		0.0010	0.00037	ppm v/v			05/17/18 21:04	2.52
1,1-Dichloroethane	0.0025		0.00076	0.00018	ppm v/v			05/17/18 21:04	2.52
1,2-Dichloroethane	ND		0.0020	0.00022	ppm v/v			05/17/18 21:04	2.52
1,1-Dichloroethene	0.0072		0.0020	0.00033	ppm v/v			05/17/18 21:04	2.52
cis-1,2-Dichloroethene	0.0012		0.0010	0.00022	ppm v/v			05/17/18 21:04	2.52
trans-1,2-Dichloroethene	ND		0.0010	0.00025	ppm v/v			05/17/18 21:04	2.52
1,2-Dichloropropane	ND		0.0010	0.00060	ppm v/v			05/17/18 21:04	2.52
cis-1,3-Dichloropropene	ND		0.0010	0.00026	ppm v/v			05/17/18 21:04	2.52
trans-1,3-Dichloropropene	ND		0.0010	0.00022	ppm v/v			05/17/18 21:04	2.52
Ethylbenzene	ND		0.0010	0.00016	ppm v/v			05/17/18 21:04	2.52
4-Ethyltoluene	ND		0.0010	0.00047	ppm v/v			05/17/18 21:04	2.52
Hexachlorobutadiene	ND		0.0050	0.0011	ppm v/v			05/17/18 21:04	2.52
2-Hexanone	ND		0.0010	0.00022	ppm v/v			05/17/18 21:04	2.52
4-Methyl-2-pentanone (MIBK)	ND		0.0010	0.00034	ppm v/v			05/17/18 21:04	2.52
Methylene Chloride	0.00044	J B	0.0010	0.00018	ppm v/v			05/17/18 21:04	2.52

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105204-001/MWL-SV01-42.5

Lab Sample ID: 320-38760-2

Date Collected: 04/25/18 12:31

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.0010	0.00015	ppm v/v			05/17/18 21:04	2.52
1,1,2,2-Tetrachloroethane	ND		0.0010	0.00017	ppm v/v			05/17/18 21:04	2.52
Toluene	ND		0.0010	0.00013	ppm v/v			05/17/18 21:04	2.52
1,1,2-Trichloro-1,2,2-trifluoroethane	0.070		0.0010	0.00041	ppm v/v			05/17/18 21:04	2.52
1,2,4-Trichlorobenzene	ND		0.0050	0.0011	ppm v/v			05/17/18 21:04	2.52
1,1,1-Trichloroethane	0.034		0.00076	0.00016	ppm v/v			05/17/18 21:04	2.52
1,1,2-Trichloroethane	ND		0.0010	0.00017	ppm v/v			05/17/18 21:04	2.52
Trichloroethene	0.081		0.0010	0.00026	ppm v/v			05/17/18 21:04	2.52
Trichlorofluoromethane	0.16		0.0010	0.00049	ppm v/v			05/17/18 21:04	2.52
1,2,4-Trimethylbenzene	ND		0.0020	0.00041	ppm v/v			05/17/18 21:04	2.52
1,3,5-Trimethylbenzene	ND		0.0010	0.00032	ppm v/v			05/17/18 21:04	2.52
Vinyl acetate	ND		0.0020	0.00037	ppm v/v			05/17/18 21:04	2.52
Vinyl chloride	ND		0.0010	0.00030	ppm v/v			05/17/18 21:04	2.52
m,p-Xylene	ND		0.0020	0.00025	ppm v/v			05/17/18 21:04	2.52
o-Xylene	ND		0.0010	0.00014	ppm v/v			05/17/18 21:04	2.52

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		70 - 130		05/17/18 21:04	2.52
1,2-Dichloroethane-d4 (Surr)	99		70 - 130		05/17/18 21:04	2.52
Toluene-d8 (Surr)	101		70 - 130		05/17/18 21:04	2.52

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.37		0.0031	0.00040	ppm v/v			05/18/18 07:16	7.86

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130		05/18/18 07:16	7.86
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		05/18/18 07:16	7.86
Toluene-d8 (Surr)	101		70 - 130		05/18/18 07:16	7.86

Client Sample ID: 105205-001/MWL-SV-FB2

Lab Sample ID: 320-38760-3

Date Collected: 04/25/18 12:00

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.0050	0.00018	ppm v/v			05/17/18 22:03	1
Benzene	0.000081	J	0.00040	0.000079	ppm v/v			05/17/18 22:03	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/17/18 22:03	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/17/18 22:03	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/17/18 22:03	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/17/18 22:03	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/17/18 22:03	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/17/18 22:03	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/17/18 22:03	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/17/18 22:03	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/17/18 22:03	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/17/18 22:03	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105205-001/MWL-SV-FB2

Lab Sample ID: 320-38760-3

Date Collected: 04/25/18 12:00

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/17/18 22:03	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/17/18 22:03	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/17/18 22:03	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/17/18 22:03	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/17/18 22:03	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/17/18 22:03	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/17/18 22:03	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			05/17/18 22:03	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/17/18 22:03	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/17/18 22:03	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/17/18 22:03	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/17/18 22:03	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/17/18 22:03	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/17/18 22:03	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/17/18 22:03	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/17/18 22:03	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/17/18 22:03	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/17/18 22:03	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/17/18 22:03	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/17/18 22:03	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/17/18 22:03	1
Methylene Chloride	0.00010	J B	0.00040	0.000072	ppm v/v			05/17/18 22:03	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/17/18 22:03	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/17/18 22:03	1
Tetrachloroethene	0.00019	J	0.00040	0.000051	ppm v/v			05/17/18 22:03	1
Toluene	0.00067		0.00040	0.000051	ppm v/v			05/17/18 22:03	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/17/18 22:03	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/17/18 22:03	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/17/18 22:03	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/17/18 22:03	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			05/17/18 22:03	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/17/18 22:03	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/17/18 22:03	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/17/18 22:03	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/17/18 22:03	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/17/18 22:03	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/17/18 22:03	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/17/18 22:03	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		05/17/18 22:03	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 130		05/17/18 22:03	1
Toluene-d8 (Surr)	100		70 - 130		05/17/18 22:03	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105206-001/MWL-SV02-41.5

Lab Sample ID: 320-38760-4

Date Collected: 04/25/18 12:14

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0075	J	0.019	0.00069	ppm v/v			05/17/18 22:56	3.86
Benzene	ND		0.0015	0.00030	ppm v/v			05/17/18 22:56	3.86
Benzyl chloride	ND		0.0031	0.00063	ppm v/v			05/17/18 22:56	3.86
Bromodichloromethane	ND		0.0012	0.00025	ppm v/v			05/17/18 22:56	3.86
Bromoform	ND		0.0015	0.00027	ppm v/v			05/17/18 22:56	3.86
Bromomethane	ND		0.0031	0.0013	ppm v/v			05/17/18 22:56	3.86
2-Butanone (MEK)	0.0048		0.0031	0.00077	ppm v/v			05/17/18 22:56	3.86
Carbon disulfide	ND		0.0031	0.00030	ppm v/v			05/17/18 22:56	3.86
Carbon tetrachloride	0.00030	J	0.0031	0.00025	ppm v/v			05/17/18 22:56	3.86
Chlorobenzene	ND		0.0012	0.00025	ppm v/v			05/17/18 22:56	3.86
Chloroethane	ND		0.0031	0.0012	ppm v/v			05/17/18 22:56	3.86
Chloroform	0.0027		0.0012	0.00037	ppm v/v			05/17/18 22:56	3.86
Chloromethane	ND		0.0031	0.00076	ppm v/v			05/17/18 22:56	3.86
Dibromochloromethane	ND		0.0015	0.00030	ppm v/v			05/17/18 22:56	3.86
1,2-Dibromoethane (EDB)	ND		0.0031	0.00029	ppm v/v			05/17/18 22:56	3.86
1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00063	J	0.0015	0.00060	ppm v/v			05/17/18 22:56	3.86
1,2-Dichlorobenzene	ND		0.0015	0.00050	ppm v/v			05/17/18 22:56	3.86
1,3-Dichlorobenzene	ND		0.0015	0.00042	ppm v/v			05/17/18 22:56	3.86
1,4-Dichlorobenzene	ND		0.0015	0.00058	ppm v/v			05/17/18 22:56	3.86
Dichlorodifluoromethane	0.085		0.0015	0.00056	ppm v/v			05/17/18 22:56	3.86
1,1-Dichloroethane	0.0021		0.0012	0.00028	ppm v/v			05/17/18 22:56	3.86
1,2-Dichloroethane	ND		0.0031	0.00034	ppm v/v			05/17/18 22:56	3.86
1,1-Dichloroethene	0.0098		0.0031	0.00050	ppm v/v			05/17/18 22:56	3.86
cis-1,2-Dichloroethene	0.00073	J	0.0015	0.00034	ppm v/v			05/17/18 22:56	3.86
trans-1,2-Dichloroethene	ND		0.0015	0.00039	ppm v/v			05/17/18 22:56	3.86
1,2-Dichloropropane	ND		0.0015	0.00093	ppm v/v			05/17/18 22:56	3.86
cis-1,3-Dichloropropene	ND		0.0015	0.00040	ppm v/v			05/17/18 22:56	3.86
trans-1,3-Dichloropropene	ND		0.0015	0.00034	ppm v/v			05/17/18 22:56	3.86
Ethylbenzene	ND		0.0015	0.00024	ppm v/v			05/17/18 22:56	3.86
4-Ethyltoluene	ND		0.0015	0.00072	ppm v/v			05/17/18 22:56	3.86
Hexachlorobutadiene	ND		0.0077	0.0017	ppm v/v			05/17/18 22:56	3.86
2-Hexanone	ND		0.0015	0.00034	ppm v/v			05/17/18 22:56	3.86
4-Methyl-2-pentanone (MIBK)	ND		0.0015	0.00052	ppm v/v			05/17/18 22:56	3.86
Methylene Chloride	0.00053	J B	0.0015	0.00028	ppm v/v			05/17/18 22:56	3.86
Styrene	ND		0.0015	0.00023	ppm v/v			05/17/18 22:56	3.86
1,1,2,2-Tetrachloroethane	ND		0.0015	0.00027	ppm v/v			05/17/18 22:56	3.86
Tetrachloroethene	0.059		0.0015	0.00020	ppm v/v			05/17/18 22:56	3.86
Toluene	ND		0.0015	0.00020	ppm v/v			05/17/18 22:56	3.86
1,1,2-Trichloro-1,2,2-trifluoroethane	0.045		0.0015	0.00063	ppm v/v			05/17/18 22:56	3.86
1,2,4-Trichlorobenzene	ND		0.0077	0.0017	ppm v/v			05/17/18 22:56	3.86
1,1,1-Trichloroethane	0.065		0.0012	0.00025	ppm v/v			05/17/18 22:56	3.86
1,1,2-Trichloroethane	ND		0.0015	0.00026	ppm v/v			05/17/18 22:56	3.86
Trichloroethene	0.056		0.0015	0.00041	ppm v/v			05/17/18 22:56	3.86
Trichlorofluoromethane	0.29		0.0015	0.00076	ppm v/v			05/17/18 22:56	3.86
1,2,4-Trimethylbenzene	ND		0.0031	0.00063	ppm v/v			05/17/18 22:56	3.86
1,3,5-Trimethylbenzene	ND		0.0015	0.00048	ppm v/v			05/17/18 22:56	3.86
Vinyl acetate	ND		0.0031	0.00056	ppm v/v			05/17/18 22:56	3.86

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105206-001/MWL-SV02-41.5

Lab Sample ID: 320-38760-4

Date Collected: 04/25/18 12:14

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Vinyl chloride	ND		0.0015	0.00046	ppm v/v			05/17/18 22:56	3.86
m,p-Xylene	ND		0.0031	0.00039	ppm v/v			05/17/18 22:56	3.86
o-Xylene	ND		0.0015	0.00021	ppm v/v			05/17/18 22:56	3.86
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/17/18 22:56	3.86
1,2-Dichloroethane-d4 (Surr)	99		70 - 130					05/17/18 22:56	3.86
Toluene-d8 (Surr)	101		70 - 130					05/17/18 22:56	3.86

Client Sample ID: 105207-001/MWL-SV-FB3

Lab Sample ID: 320-38760-5

Date Collected: 04/25/18 08:40

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.00027	J	0.0050	0.00018	ppm v/v			05/17/18 23:55	1
Benzene	ND		0.00040	0.000079	ppm v/v			05/17/18 23:55	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/17/18 23:55	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/17/18 23:55	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/17/18 23:55	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/17/18 23:55	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/17/18 23:55	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/17/18 23:55	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/17/18 23:55	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/17/18 23:55	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/17/18 23:55	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/17/18 23:55	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/17/18 23:55	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/17/18 23:55	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/17/18 23:55	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/17/18 23:55	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/17/18 23:55	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/17/18 23:55	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/17/18 23:55	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			05/17/18 23:55	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/17/18 23:55	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/17/18 23:55	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/17/18 23:55	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/17/18 23:55	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/17/18 23:55	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/17/18 23:55	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/17/18 23:55	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/17/18 23:55	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/17/18 23:55	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/17/18 23:55	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/17/18 23:55	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/17/18 23:55	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/17/18 23:55	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105207-001/MWL-SV-FB3

Lab Sample ID: 320-38760-5

Date Collected: 04/25/18 08:40

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methylene Chloride	0.00013	J B	0.00040	0.000072	ppm v/v			05/17/18 23:55	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/17/18 23:55	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/17/18 23:55	1
Tetrachloroethene	ND		0.00040	0.000051	ppm v/v			05/17/18 23:55	1
Toluene	0.0012		0.00040	0.000051	ppm v/v			05/17/18 23:55	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/17/18 23:55	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/17/18 23:55	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/17/18 23:55	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/17/18 23:55	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			05/17/18 23:55	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/17/18 23:55	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/17/18 23:55	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/17/18 23:55	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/17/18 23:55	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/17/18 23:55	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/17/18 23:55	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/17/18 23:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130					05/17/18 23:55	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					05/17/18 23:55	1
Toluene-d8 (Surr)	100		70 - 130					05/17/18 23:55	1

Client Sample ID: 105208-001/MWL-SV03-50

Lab Sample ID: 320-38760-6

Date Collected: 04/25/18 09:05

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0036	J	0.010	0.00037	ppm v/v			05/18/18 00:50	2.07
Benzene	0.00037	J	0.00083	0.00016	ppm v/v			05/18/18 00:50	2.07
Benzyl chloride	ND		0.0017	0.00034	ppm v/v			05/18/18 00:50	2.07
Bromodichloromethane	ND		0.00062	0.00014	ppm v/v			05/18/18 00:50	2.07
Bromoform	ND		0.00083	0.00014	ppm v/v			05/18/18 00:50	2.07
Bromomethane	ND		0.0017	0.00069	ppm v/v			05/18/18 00:50	2.07
2-Butanone (MEK)	ND		0.0017	0.00041	ppm v/v			05/18/18 00:50	2.07
Carbon disulfide	ND		0.0017	0.00016	ppm v/v			05/18/18 00:50	2.07
Carbon tetrachloride	0.00024	J	0.0017	0.00013	ppm v/v			05/18/18 00:50	2.07
Chlorobenzene	ND		0.00062	0.00013	ppm v/v			05/18/18 00:50	2.07
Chloroethane	ND		0.0017	0.00064	ppm v/v			05/18/18 00:50	2.07
Chloroform	0.0017		0.00062	0.00020	ppm v/v			05/18/18 00:50	2.07
Chloromethane	ND		0.0017	0.00041	ppm v/v			05/18/18 00:50	2.07
Dibromochloromethane	ND		0.00083	0.00016	ppm v/v			05/18/18 00:50	2.07
1,2-Dibromoethane (EDB)	ND		0.0017	0.00016	ppm v/v			05/18/18 00:50	2.07
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00083	0.00032	ppm v/v			05/18/18 00:50	2.07
1,2-Dichlorobenzene	ND		0.00083	0.00027	ppm v/v			05/18/18 00:50	2.07
1,3-Dichlorobenzene	ND		0.00083	0.00023	ppm v/v			05/18/18 00:50	2.07
1,4-Dichlorobenzene	ND		0.00083	0.00031	ppm v/v			05/18/18 00:50	2.07

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105208-001/MWL-SV03-50

Lab Sample ID: 320-38760-6

Date Collected: 04/25/18 09:05

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	0.024		0.00083	0.00030	ppm v/v			05/18/18 00:50	2.07
1,1-Dichloroethane	0.0032		0.00062	0.00015	ppm v/v			05/18/18 00:50	2.07
1,2-Dichloroethane	ND		0.0017	0.00018	ppm v/v			05/18/18 00:50	2.07
1,1-Dichloroethene	0.011		0.0017	0.00027	ppm v/v			05/18/18 00:50	2.07
cis-1,2-Dichloroethene	0.0017		0.00083	0.00018	ppm v/v			05/18/18 00:50	2.07
trans-1,2-Dichloroethene	ND		0.00083	0.00021	ppm v/v			05/18/18 00:50	2.07
1,2-Dichloropropane	ND		0.00083	0.00050	ppm v/v			05/18/18 00:50	2.07
cis-1,3-Dichloropropene	ND		0.00083	0.00022	ppm v/v			05/18/18 00:50	2.07
trans-1,3-Dichloropropene	ND		0.00083	0.00018	ppm v/v			05/18/18 00:50	2.07
Ethylbenzene	ND		0.00083	0.00013	ppm v/v			05/18/18 00:50	2.07
4-Ethyltoluene	ND		0.00083	0.00039	ppm v/v			05/18/18 00:50	2.07
Hexachlorobutadiene	ND		0.0041	0.00089	ppm v/v			05/18/18 00:50	2.07
2-Hexanone	ND		0.00083	0.00018	ppm v/v			05/18/18 00:50	2.07
4-Methyl-2-pentanone (MIBK)	ND		0.00083	0.00028	ppm v/v			05/18/18 00:50	2.07
Methylene Chloride	0.00091	B	0.00083	0.00015	ppm v/v			05/18/18 00:50	2.07
Styrene	ND		0.00083	0.00012	ppm v/v			05/18/18 00:50	2.07
1,1,2,2-Tetrachloroethane	ND		0.00083	0.00014	ppm v/v			05/18/18 00:50	2.07
Tetrachloroethene	0.13		0.00083	0.00011	ppm v/v			05/18/18 00:50	2.07
Toluene	ND		0.00083	0.00011	ppm v/v			05/18/18 00:50	2.07
1,1,2-Trichloro-1,2,2-trifluoroethane	0.065		0.00083	0.00034	ppm v/v			05/18/18 00:50	2.07
1,2,4-Trichlorobenzene	ND		0.0041	0.00090	ppm v/v			05/18/18 00:50	2.07
1,1,1-Trichloroethane	0.0028		0.00062	0.00013	ppm v/v			05/18/18 00:50	2.07
1,1,2-Trichloroethane	ND		0.00083	0.00014	ppm v/v			05/18/18 00:50	2.07
Trichloroethene	0.11		0.00083	0.00022	ppm v/v			05/18/18 00:50	2.07
Trichlorofluoromethane	0.024		0.00083	0.00041	ppm v/v			05/18/18 00:50	2.07
1,2,4-Trimethylbenzene	ND		0.0017	0.00034	ppm v/v			05/18/18 00:50	2.07
1,3,5-Trimethylbenzene	ND		0.00083	0.00026	ppm v/v			05/18/18 00:50	2.07
Vinyl acetate	ND		0.0017	0.00030	ppm v/v			05/18/18 00:50	2.07
Vinyl chloride	ND		0.00083	0.00025	ppm v/v			05/18/18 00:50	2.07
m,p-Xylene	ND		0.0017	0.00021	ppm v/v			05/18/18 00:50	2.07
o-Xylene	ND		0.00083	0.00011	ppm v/v			05/18/18 00:50	2.07
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/18/18 00:50	2.07
1,2-Dichloroethane-d4 (Surr)	99		70 - 130					05/18/18 00:50	2.07
Toluene-d8 (Surr)	100		70 - 130					05/18/18 00:50	2.07

Client Sample ID: 105209-001/MWL-SV03-100

Lab Sample ID: 320-38760-7

Date Collected: 04/25/18 09:09

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0025	J	0.014	0.00049	ppm v/v			05/18/18 01:46	2.75
Benzene	ND		0.0011	0.00022	ppm v/v			05/18/18 01:46	2.75
Benzyl chloride	ND		0.0022	0.00045	ppm v/v			05/18/18 01:46	2.75
Bromodichloromethane	ND		0.00083	0.00018	ppm v/v			05/18/18 01:46	2.75

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105209-001/MWL-SV03-100

Lab Sample ID: 320-38760-7

Date Collected: 04/25/18 09:09

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	ND		0.0011	0.00019	ppm v/v			05/18/18 01:46	2.75
Bromomethane	ND		0.0022	0.00092	ppm v/v			05/18/18 01:46	2.75
2-Butanone (MEK)	ND		0.0022	0.00055	ppm v/v			05/18/18 01:46	2.75
Carbon disulfide	0.00097	J	0.0022	0.00021	ppm v/v			05/18/18 01:46	2.75
Carbon tetrachloride	0.00040	J	0.0022	0.00018	ppm v/v			05/18/18 01:46	2.75
Chlorobenzene	ND		0.00083	0.00018	ppm v/v			05/18/18 01:46	2.75
Chloroethane	ND		0.0022	0.00085	ppm v/v			05/18/18 01:46	2.75
Chloroform	0.0025		0.00083	0.00026	ppm v/v			05/18/18 01:46	2.75
Chloromethane	0.00060	J	0.0022	0.00054	ppm v/v			05/18/18 01:46	2.75
Dibromochloromethane	ND		0.0011	0.00022	ppm v/v			05/18/18 01:46	2.75
1,2-Dibromoethane (EDB)	ND		0.0022	0.00021	ppm v/v			05/18/18 01:46	2.75
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0011	0.00043	ppm v/v			05/18/18 01:46	2.75
1,2-Dichlorobenzene	ND		0.0011	0.00036	ppm v/v			05/18/18 01:46	2.75
1,3-Dichlorobenzene	ND		0.0011	0.00030	ppm v/v			05/18/18 01:46	2.75
1,4-Dichlorobenzene	ND		0.0011	0.00041	ppm v/v			05/18/18 01:46	2.75
Dichlorodifluoromethane	0.041		0.0011	0.00040	ppm v/v			05/18/18 01:46	2.75
1,1-Dichloroethane	0.0059		0.00083	0.00020	ppm v/v			05/18/18 01:46	2.75
1,2-Dichloroethane	ND		0.0022	0.00024	ppm v/v			05/18/18 01:46	2.75
1,1-Dichloroethene	0.022		0.0022	0.00035	ppm v/v			05/18/18 01:46	2.75
cis-1,2-Dichloroethene	0.0034		0.0011	0.00024	ppm v/v			05/18/18 01:46	2.75
trans-1,2-Dichloroethene	ND		0.0011	0.00028	ppm v/v			05/18/18 01:46	2.75
1,2-Dichloropropane	ND		0.0011	0.00066	ppm v/v			05/18/18 01:46	2.75
cis-1,3-Dichloropropene	ND		0.0011	0.00029	ppm v/v			05/18/18 01:46	2.75
trans-1,3-Dichloropropene	ND		0.0011	0.00024	ppm v/v			05/18/18 01:46	2.75
Ethylbenzene	ND		0.0011	0.00017	ppm v/v			05/18/18 01:46	2.75
4-Ethyltoluene	ND		0.0011	0.00051	ppm v/v			05/18/18 01:46	2.75
Hexachlorobutadiene	ND		0.0055	0.0012	ppm v/v			05/18/18 01:46	2.75
2-Hexanone	ND		0.0011	0.00024	ppm v/v			05/18/18 01:46	2.75
4-Methyl-2-pentanone (MIBK)	ND		0.0011	0.00037	ppm v/v			05/18/18 01:46	2.75
Methylene Chloride	0.0018	B	0.0011	0.00020	ppm v/v			05/18/18 01:46	2.75
Styrene	ND		0.0011	0.00016	ppm v/v			05/18/18 01:46	2.75
1,1,2,2-Tetrachloroethane	ND		0.0011	0.00019	ppm v/v			05/18/18 01:46	2.75
Tetrachloroethene	0.21		0.0011	0.00014	ppm v/v			05/18/18 01:46	2.75
Toluene	ND		0.0011	0.00014	ppm v/v			05/18/18 01:46	2.75
1,1,2-Trichloro-1,2,2-trifluoroethane	0.12		0.0011	0.00045	ppm v/v			05/18/18 01:46	2.75
1,2,4-Trichlorobenzene	ND		0.0055	0.0012	ppm v/v			05/18/18 01:46	2.75
1,1,1-Trichloroethane	0.0041		0.00083	0.00018	ppm v/v			05/18/18 01:46	2.75
1,1,2-Trichloroethane	ND		0.0011	0.00018	ppm v/v			05/18/18 01:46	2.75
Trichloroethene	0.19		0.0011	0.00029	ppm v/v			05/18/18 01:46	2.75
Trichlorofluoromethane	0.039		0.0011	0.00054	ppm v/v			05/18/18 01:46	2.75
1,2,4-Trimethylbenzene	ND		0.0022	0.00045	ppm v/v			05/18/18 01:46	2.75
1,3,5-Trimethylbenzene	ND		0.0011	0.00034	ppm v/v			05/18/18 01:46	2.75
Vinyl acetate	ND		0.0022	0.00040	ppm v/v			05/18/18 01:46	2.75
Vinyl chloride	ND		0.0011	0.00033	ppm v/v			05/18/18 01:46	2.75
m,p-Xylene	ND		0.0022	0.00028	ppm v/v			05/18/18 01:46	2.75
o-Xylene	ND		0.0011	0.00015	ppm v/v			05/18/18 01:46	2.75

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105209-001/MWL-SV03-100

Lab Sample ID: 320-38760-7

Date Collected: 04/25/18 09:09

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		05/18/18 01:46	2.75
1,2-Dichloroethane-d4 (Surr)	100		70 - 130		05/18/18 01:46	2.75
Toluene-d8 (Surr)	101		70 - 130		05/18/18 01:46	2.75

Client Sample ID: 105210-001/MWL-SV03-200

Lab Sample ID: 320-38760-8

Date Collected: 04/25/18 09:13

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0040	J	0.018	0.00064	ppm v/v			05/18/18 02:39	3.58
Benzene	0.00028	J	0.0014	0.00028	ppm v/v			05/18/18 02:39	3.58
Benzyl chloride	ND		0.0029	0.00058	ppm v/v			05/18/18 02:39	3.58
Bromodichloromethane	ND		0.0011	0.00024	ppm v/v			05/18/18 02:39	3.58
Bromoform	ND		0.0014	0.00025	ppm v/v			05/18/18 02:39	3.58
Bromomethane	ND		0.0029	0.0012	ppm v/v			05/18/18 02:39	3.58
2-Butanone (MEK)	ND		0.0029	0.00071	ppm v/v			05/18/18 02:39	3.58
Carbon disulfide	ND		0.0029	0.00028	ppm v/v			05/18/18 02:39	3.58
Carbon tetrachloride	0.00048	J	0.0029	0.00023	ppm v/v			05/18/18 02:39	3.58
Chlorobenzene	ND		0.0011	0.00023	ppm v/v			05/18/18 02:39	3.58
Chloroethane	ND		0.0029	0.0011	ppm v/v			05/18/18 02:39	3.58
Chloroform	0.0024		0.0011	0.00034	ppm v/v			05/18/18 02:39	3.58
Chloromethane	ND		0.0029	0.00071	ppm v/v			05/18/18 02:39	3.58
Dibromochloromethane	ND		0.0014	0.00028	ppm v/v			05/18/18 02:39	3.58
1,2-Dibromoethane (EDB)	ND		0.0029	0.00027	ppm v/v			05/18/18 02:39	3.58
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00055	ppm v/v			05/18/18 02:39	3.58
1,2-Dichlorobenzene	ND		0.0014	0.00047	ppm v/v			05/18/18 02:39	3.58
1,3-Dichlorobenzene	ND		0.0014	0.00039	ppm v/v			05/18/18 02:39	3.58
1,4-Dichlorobenzene	ND		0.0014	0.00053	ppm v/v			05/18/18 02:39	3.58
Dichlorodifluoromethane	0.049		0.0014	0.00052	ppm v/v			05/18/18 02:39	3.58
1,1-Dichloroethane	0.0077		0.0011	0.00026	ppm v/v			05/18/18 02:39	3.58
1,2-Dichloroethane	ND		0.0029	0.00032	ppm v/v			05/18/18 02:39	3.58
1,1-Dichloroethene	0.030		0.0029	0.00046	ppm v/v			05/18/18 02:39	3.58
cis-1,2-Dichloroethene	0.0045		0.0014	0.00032	ppm v/v			05/18/18 02:39	3.58
trans-1,2-Dichloroethene	ND		0.0014	0.00036	ppm v/v			05/18/18 02:39	3.58
1,2-Dichloropropane	ND		0.0014	0.00086	ppm v/v			05/18/18 02:39	3.58
cis-1,3-Dichloropropene	ND		0.0014	0.00037	ppm v/v			05/18/18 02:39	3.58
trans-1,3-Dichloropropene	ND		0.0014	0.00032	ppm v/v			05/18/18 02:39	3.58
Ethylbenzene	ND		0.0014	0.00023	ppm v/v			05/18/18 02:39	3.58
4-Ethyltoluene	ND		0.0014	0.00067	ppm v/v			05/18/18 02:39	3.58
Hexachlorobutadiene	ND		0.0072	0.0015	ppm v/v			05/18/18 02:39	3.58
2-Hexanone	ND		0.0014	0.00031	ppm v/v			05/18/18 02:39	3.58
4-Methyl-2-pentanone (MIBK)	ND		0.0014	0.00048	ppm v/v			05/18/18 02:39	3.58
Methylene Chloride	0.0032	B	0.0014	0.00026	ppm v/v			05/18/18 02:39	3.58
Styrene	ND		0.0014	0.00021	ppm v/v			05/18/18 02:39	3.58
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00025	ppm v/v			05/18/18 02:39	3.58
Tetrachloroethene	0.24		0.0014	0.00018	ppm v/v			05/18/18 02:39	3.58
Toluene	0.00019	J	0.0014	0.00018	ppm v/v			05/18/18 02:39	3.58

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105210-001/MWL-SV03-200

Lab Sample ID: 320-38760-8

Date Collected: 04/25/18 09:13

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	0.14		0.0014	0.00058	ppm v/v			05/18/18 02:39	3.58
1,2,4-Trichlorobenzene	ND		0.0072	0.0016	ppm v/v			05/18/18 02:39	3.58
1,1,1-Trichloroethane	0.0027		0.0011	0.00023	ppm v/v			05/18/18 02:39	3.58
1,1,2-Trichloroethane	ND		0.0014	0.00024	ppm v/v			05/18/18 02:39	3.58
Trichloroethene	0.24		0.0014	0.00038	ppm v/v			05/18/18 02:39	3.58
Trichlorofluoromethane	0.034		0.0014	0.00070	ppm v/v			05/18/18 02:39	3.58
1,2,4-Trimethylbenzene	ND		0.0029	0.00058	ppm v/v			05/18/18 02:39	3.58
1,3,5-Trimethylbenzene	ND		0.0014	0.00045	ppm v/v			05/18/18 02:39	3.58
Vinyl acetate	ND		0.0029	0.00052	ppm v/v			05/18/18 02:39	3.58
Vinyl chloride	ND		0.0014	0.00043	ppm v/v			05/18/18 02:39	3.58
m,p-Xylene	ND		0.0029	0.00036	ppm v/v			05/18/18 02:39	3.58
o-Xylene	ND		0.0014	0.00019	ppm v/v			05/18/18 02:39	3.58
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/18/18 02:39	3.58
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					05/18/18 02:39	3.58
Toluene-d8 (Surr)	101		70 - 130					05/18/18 02:39	3.58

Client Sample ID: 105211-001/MWL-SV03-300

Lab Sample ID: 320-38760-9

Date Collected: 04/25/18 09:19

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0061	J	0.018	0.00062	ppm v/v			05/18/18 03:33	3.51
Benzene	0.00030	J	0.0014	0.00028	ppm v/v			05/18/18 03:33	3.51
Benzyl chloride	ND		0.0028	0.00057	ppm v/v			05/18/18 03:33	3.51
Bromodichloromethane	ND		0.0011	0.00023	ppm v/v			05/18/18 03:33	3.51
Bromoform	ND		0.0014	0.00025	ppm v/v			05/18/18 03:33	3.51
Bromomethane	ND		0.0028	0.0012	ppm v/v			05/18/18 03:33	3.51
2-Butanone (MEK)	ND		0.0028	0.00070	ppm v/v			05/18/18 03:33	3.51
Carbon disulfide	ND		0.0028	0.00027	ppm v/v			05/18/18 03:33	3.51
Carbon tetrachloride	0.00036	J	0.0028	0.00022	ppm v/v			05/18/18 03:33	3.51
Chlorobenzene	ND		0.0011	0.00022	ppm v/v			05/18/18 03:33	3.51
Chloroethane	ND		0.0028	0.0011	ppm v/v			05/18/18 03:33	3.51
Chloroform	0.0014		0.0011	0.00033	ppm v/v			05/18/18 03:33	3.51
Chloromethane	ND		0.0028	0.00069	ppm v/v			05/18/18 03:33	3.51
Dibromochloromethane	ND		0.0014	0.00028	ppm v/v			05/18/18 03:33	3.51
1,2-Dibromoethane (EDB)	ND		0.0028	0.00026	ppm v/v			05/18/18 03:33	3.51
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00054	ppm v/v			05/18/18 03:33	3.51
1,2-Dichlorobenzene	ND		0.0014	0.00046	ppm v/v			05/18/18 03:33	3.51
1,3-Dichlorobenzene	ND		0.0014	0.00039	ppm v/v			05/18/18 03:33	3.51
1,4-Dichlorobenzene	ND		0.0014	0.00052	ppm v/v			05/18/18 03:33	3.51
Dichlorodifluoromethane	0.034		0.0014	0.00051	ppm v/v			05/18/18 03:33	3.51
1,1-Dichloroethane	0.0035		0.0011	0.00025	ppm v/v			05/18/18 03:33	3.51
1,2-Dichloroethane	ND		0.0028	0.00031	ppm v/v			05/18/18 03:33	3.51
1,1-Dichloroethene	0.022		0.0028	0.00045	ppm v/v			05/18/18 03:33	3.51

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105211-001/MWL-SV03-300

Lab Sample ID: 320-38760-9

Date Collected: 04/25/18 09:19

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	0.0023		0.0014	0.00031	ppm v/v			05/18/18 03:33	3.51
trans-1,2-Dichloroethene	ND		0.0014	0.00035	ppm v/v			05/18/18 03:33	3.51
1,2-Dichloropropane	ND		0.0014	0.00084	ppm v/v			05/18/18 03:33	3.51
cis-1,3-Dichloropropene	ND		0.0014	0.00037	ppm v/v			05/18/18 03:33	3.51
trans-1,3-Dichloropropene	ND		0.0014	0.00031	ppm v/v			05/18/18 03:33	3.51
Ethylbenzene	ND		0.0014	0.00022	ppm v/v			05/18/18 03:33	3.51
4-Ethyltoluene	ND		0.0014	0.00066	ppm v/v			05/18/18 03:33	3.51
Hexachlorobutadiene	ND		0.0070	0.0015	ppm v/v			05/18/18 03:33	3.51
2-Hexanone	ND		0.0014	0.00031	ppm v/v			05/18/18 03:33	3.51
4-Methyl-2-pentanone (MIBK)	ND		0.0014	0.00047	ppm v/v			05/18/18 03:33	3.51
Methylene Chloride	0.0015	B	0.0014	0.00025	ppm v/v			05/18/18 03:33	3.51
Styrene	ND		0.0014	0.00021	ppm v/v			05/18/18 03:33	3.51
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00024	ppm v/v			05/18/18 03:33	3.51
Tetrachloroethene	0.27		0.0014	0.00018	ppm v/v			05/18/18 03:33	3.51
Toluene	0.00030	J	0.0014	0.00018	ppm v/v			05/18/18 03:33	3.51
1,1,2-Trichloro-1,2,2-trifluoroethane	0.10		0.0014	0.00057	ppm v/v			05/18/18 03:33	3.51
1,2,4-Trichlorobenzene	ND		0.0070	0.0015	ppm v/v			05/18/18 03:33	3.51
1,1,1-Trichloroethane	0.0011		0.0011	0.00023	ppm v/v			05/18/18 03:33	3.51
1,1,2-Trichloroethane	ND		0.0014	0.00024	ppm v/v			05/18/18 03:33	3.51
Trichloroethene	0.19		0.0014	0.00037	ppm v/v			05/18/18 03:33	3.51
Trichlorofluoromethane	0.016		0.0014	0.00069	ppm v/v			05/18/18 03:33	3.51
1,2,4-Trimethylbenzene	ND		0.0028	0.00057	ppm v/v			05/18/18 03:33	3.51
1,3,5-Trimethylbenzene	ND		0.0014	0.00044	ppm v/v			05/18/18 03:33	3.51
Vinyl acetate	ND		0.0028	0.00051	ppm v/v			05/18/18 03:33	3.51
Vinyl chloride	ND		0.0014	0.00042	ppm v/v			05/18/18 03:33	3.51
m,p-Xylene	ND		0.0028	0.00035	ppm v/v			05/18/18 03:33	3.51
o-Xylene	ND		0.0014	0.00019	ppm v/v			05/18/18 03:33	3.51
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130					05/18/18 03:33	3.51
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					05/18/18 03:33	3.51
Toluene-d8 (Surr)	100		70 - 130					05/18/18 03:33	3.51

Client Sample ID: 105212-001/MWL-SV03-400

Lab Sample ID: 320-38760-10

Date Collected: 04/25/18 09:39

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0059	J	0.030	0.0011	ppm v/v			05/18/18 04:26	5.96
Benzene	ND		0.0024	0.00047	ppm v/v			05/18/18 04:26	5.96
Benzyl chloride	ND		0.0048	0.00097	ppm v/v			05/18/18 04:26	5.96
Bromodichloromethane	ND		0.0018	0.00039	ppm v/v			05/18/18 04:26	5.96
Bromoform	ND		0.0024	0.00042	ppm v/v			05/18/18 04:26	5.96
Bromomethane	ND		0.0048	0.0020	ppm v/v			05/18/18 04:26	5.96
2-Butanone (MEK)	ND		0.0048	0.0012	ppm v/v			05/18/18 04:26	5.96
Carbon disulfide	ND		0.0048	0.00046	ppm v/v			05/18/18 04:26	5.96

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105212-001/MWL-SV03-400

Lab Sample ID: 320-38760-10

Date Collected: 04/25/18 09:39

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	0.00039	J	0.0048	0.00038	ppm v/v			05/18/18 04:26	5.96
Chlorobenzene	ND		0.0018	0.00038	ppm v/v			05/18/18 04:26	5.96
Chloroethane	ND		0.0048	0.0018	ppm v/v			05/18/18 04:26	5.96
Chloroform	0.0017	J	0.0018	0.00057	ppm v/v			05/18/18 04:26	5.96
Chloromethane	ND		0.0048	0.0012	ppm v/v			05/18/18 04:26	5.96
Dibromochloromethane	ND		0.0024	0.00047	ppm v/v			05/18/18 04:26	5.96
1,2-Dibromoethane (EDB)	ND		0.0048	0.00045	ppm v/v			05/18/18 04:26	5.96
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0024	0.00092	ppm v/v			05/18/18 04:26	5.96
1,2-Dichlorobenzene	ND		0.0024	0.00077	ppm v/v			05/18/18 04:26	5.96
1,3-Dichlorobenzene	ND		0.0024	0.00066	ppm v/v			05/18/18 04:26	5.96
1,4-Dichlorobenzene	ND		0.0024	0.00089	ppm v/v			05/18/18 04:26	5.96
Dichlorodifluoromethane	0.015		0.0024	0.00086	ppm v/v			05/18/18 04:26	5.96
1,1-Dichloroethane	0.0036		0.0018	0.00043	ppm v/v			05/18/18 04:26	5.96
1,2-Dichloroethane	ND		0.0048	0.00052	ppm v/v			05/18/18 04:26	5.96
1,1-Dichloroethene	0.022		0.0048	0.00077	ppm v/v			05/18/18 04:26	5.96
cis-1,2-Dichloroethene	0.0026		0.0024	0.00053	ppm v/v			05/18/18 04:26	5.96
trans-1,2-Dichloroethene	ND		0.0024	0.00060	ppm v/v			05/18/18 04:26	5.96
1,2-Dichloropropane	ND		0.0024	0.0014	ppm v/v			05/18/18 04:26	5.96
cis-1,3-Dichloropropene	ND		0.0024	0.00062	ppm v/v			05/18/18 04:26	5.96
trans-1,3-Dichloropropene	ND		0.0024	0.00052	ppm v/v			05/18/18 04:26	5.96
Ethylbenzene	ND		0.0024	0.00038	ppm v/v			05/18/18 04:26	5.96
4-Ethyltoluene	ND		0.0024	0.0011	ppm v/v			05/18/18 04:26	5.96
Hexachlorobutadiene	ND		0.012	0.0026	ppm v/v			05/18/18 04:26	5.96
2-Hexanone	ND		0.0024	0.00052	ppm v/v			05/18/18 04:26	5.96
4-Methyl-2-pentanone (MIBK)	ND		0.0024	0.00080	ppm v/v			05/18/18 04:26	5.96
Methylene Chloride	0.0016	J B	0.0024	0.00043	ppm v/v			05/18/18 04:26	5.96
Styrene	ND		0.0024	0.00035	ppm v/v			05/18/18 04:26	5.96
1,1,2,2-Tetrachloroethane	ND		0.0024	0.00041	ppm v/v			05/18/18 04:26	5.96
Tetrachloroethene	0.37		0.0024	0.00030	ppm v/v			05/18/18 04:26	5.96
Toluene	0.00039	J	0.0024	0.00030	ppm v/v			05/18/18 04:26	5.96
1,1,2-Trichloro-1,2,2-trifluoroethane	0.070		0.0024	0.00097	ppm v/v			05/18/18 04:26	5.96
1,2,4-Trichlorobenzene	ND		0.012	0.0026	ppm v/v			05/18/18 04:26	5.96
1,1,1-Trichloroethane	0.0013	J	0.0018	0.00039	ppm v/v			05/18/18 04:26	5.96
1,1,2-Trichloroethane	ND		0.0024	0.00040	ppm v/v			05/18/18 04:26	5.96
Trichloroethene	0.27		0.0024	0.00063	ppm v/v			05/18/18 04:26	5.96
Trichlorofluoromethane	0.017		0.0024	0.0012	ppm v/v			05/18/18 04:26	5.96
1,2,4-Trimethylbenzene	ND		0.0048	0.00097	ppm v/v			05/18/18 04:26	5.96
1,3,5-Trimethylbenzene	ND		0.0024	0.00075	ppm v/v			05/18/18 04:26	5.96
Vinyl acetate	ND		0.0048	0.00086	ppm v/v			05/18/18 04:26	5.96
Vinyl chloride	ND		0.0024	0.00072	ppm v/v			05/18/18 04:26	5.96
m,p-Xylene	ND		0.0048	0.00060	ppm v/v			05/18/18 04:26	5.96
o-Xylene	ND		0.0024	0.00032	ppm v/v			05/18/18 04:26	5.96
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130					05/18/18 04:26	5.96
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					05/18/18 04:26	5.96
Toluene-d8 (Surr)	101		70 - 130					05/18/18 04:26	5.96

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105213-001/MWL-SV-FB4

Lab Sample ID: 320-38760-11

Date Collected: 04/25/18 10:09

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.0050	0.00018	ppm v/v			05/18/18 05:25	1
Benzene	ND		0.00040	0.000079	ppm v/v			05/18/18 05:25	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/18/18 05:25	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/18/18 05:25	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/18/18 05:25	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/18/18 05:25	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/18/18 05:25	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/18/18 05:25	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/18/18 05:25	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/18/18 05:25	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/18/18 05:25	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/18/18 05:25	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/18/18 05:25	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/18/18 05:25	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/18/18 05:25	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/18/18 05:25	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/18/18 05:25	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/18/18 05:25	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/18/18 05:25	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			05/18/18 05:25	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/18/18 05:25	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/18/18 05:25	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/18/18 05:25	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/18/18 05:25	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/18/18 05:25	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/18/18 05:25	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/18/18 05:25	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/18/18 05:25	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/18/18 05:25	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/18/18 05:25	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/18/18 05:25	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/18/18 05:25	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/18/18 05:25	1
Methylene Chloride	0.00010	J B	0.00040	0.000072	ppm v/v			05/18/18 05:25	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/18/18 05:25	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/18/18 05:25	1
Tetrachloroethene	0.000093	J	0.00040	0.000051	ppm v/v			05/18/18 05:25	1
Toluene	0.00065		0.00040	0.000051	ppm v/v			05/18/18 05:25	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/18/18 05:25	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/18/18 05:25	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/18/18 05:25	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/18/18 05:25	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			05/18/18 05:25	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/18/18 05:25	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/18/18 05:25	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/18/18 05:25	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/18/18 05:25	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/18/18 05:25	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105213-001/MWL-SV-FB4

Lab Sample ID: 320-38760-11

Date Collected: 04/25/18 10:09

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/18/18 05:25	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/18/18 05:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130					05/18/18 05:25	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					05/18/18 05:25	1
Toluene-d8 (Surr)	100		70 - 130					05/18/18 05:25	1

Client Sample ID: 105214-001/MWL-SV04-50

Lab Sample ID: 320-38760-12

Date Collected: 04/25/18 10:19

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0031	J	0.0050	0.00018	ppm v/v			05/18/18 06:23	1
Benzene	0.00033	J	0.00040	0.000079	ppm v/v			05/18/18 06:23	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/18/18 06:23	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/18/18 06:23	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/18/18 06:23	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/18/18 06:23	1
2-Butanone (MEK)	0.00056	J	0.00080	0.00020	ppm v/v			05/18/18 06:23	1
Carbon disulfide	0.0010		0.00080	0.000078	ppm v/v			05/18/18 06:23	1
Carbon tetrachloride	0.00023	J	0.00080	0.000064	ppm v/v			05/18/18 06:23	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/18/18 06:23	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/18/18 06:23	1
Chloroform	0.0019		0.00030	0.000095	ppm v/v			05/18/18 06:23	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/18/18 06:23	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/18/18 06:23	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/18/18 06:23	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/18/18 06:23	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/18/18 06:23	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/18/18 06:23	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/18/18 06:23	1
Dichlorodifluoromethane	0.016		0.00040	0.00015	ppm v/v			05/18/18 06:23	1
1,1-Dichloroethane	0.0013		0.00030	0.000072	ppm v/v			05/18/18 06:23	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/18/18 06:23	1
1,1-Dichloroethene	0.0064		0.00080	0.00013	ppm v/v			05/18/18 06:23	1
cis-1,2-Dichloroethene	0.00052		0.00040	0.000089	ppm v/v			05/18/18 06:23	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/18/18 06:23	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/18/18 06:23	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/18/18 06:23	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/18/18 06:23	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/18/18 06:23	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/18/18 06:23	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/18/18 06:23	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/18/18 06:23	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/18/18 06:23	1
Methylene Chloride	0.00017	J B	0.00040	0.000072	ppm v/v			05/18/18 06:23	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105214-001/MWL-SV04-50

Lab Sample ID: 320-38760-12

Date Collected: 04/25/18 10:19

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.00040	0.000059	ppm v/v			05/18/18 06:23	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/18/18 06:23	1
Tetrachloroethene	0.062		0.00040	0.000051	ppm v/v			05/18/18 06:23	1
Toluene	0.000054	J	0.00040	0.000051	ppm v/v			05/18/18 06:23	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.057		0.00040	0.00016	ppm v/v			05/18/18 06:23	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/18/18 06:23	1
1,1,1-Trichloroethane	0.0071		0.00030	0.000065	ppm v/v			05/18/18 06:23	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/18/18 06:23	1
Trichloroethene	0.055		0.00040	0.00011	ppm v/v			05/18/18 06:23	1
Trichlorofluoromethane	0.027		0.00040	0.00020	ppm v/v			05/18/18 06:23	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/18/18 06:23	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/18/18 06:23	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/18/18 06:23	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/18/18 06:23	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/18/18 06:23	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/18/18 06:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130					05/18/18 06:23	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					05/18/18 06:23	1
Toluene-d8 (Surr)	102		70 - 130					05/18/18 06:23	1

Client Sample ID: 105215-001/MWL-SV04-50

Lab Sample ID: 320-38760-13

Date Collected: 04/25/18 10:19

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0039	J	0.0050	0.00018	ppm v/v			05/18/18 18:51	1
Benzene	0.00025	J	0.00040	0.000079	ppm v/v			05/18/18 18:51	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/18/18 18:51	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/18/18 18:51	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/18/18 18:51	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/18/18 18:51	1
2-Butanone (MEK)	0.00071	J	0.00080	0.00020	ppm v/v			05/18/18 18:51	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/18/18 18:51	1
Carbon tetrachloride	0.00015	J	0.00080	0.000064	ppm v/v			05/18/18 18:51	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/18/18 18:51	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/18/18 18:51	1
Chloroform	0.0013		0.00030	0.000095	ppm v/v			05/18/18 18:51	1
Chloromethane	0.00044	J	0.00080	0.00020	ppm v/v			05/18/18 18:51	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/18/18 18:51	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/18/18 18:51	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/18/18 18:51	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/18/18 18:51	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/18/18 18:51	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/18/18 18:51	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105215-001/MWL-SV04-50

Lab Sample ID: 320-38760-13

Date Collected: 04/25/18 10:19

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	0.011		0.00040	0.00015	ppm v/v			05/18/18 18:51	1
1,1-Dichloroethane	0.00095		0.00030	0.000072	ppm v/v			05/18/18 18:51	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/18/18 18:51	1
1,1-Dichloroethene	0.0043		0.00080	0.00013	ppm v/v			05/18/18 18:51	1
cis-1,2-Dichloroethene	0.00038	J	0.00040	0.000089	ppm v/v			05/18/18 18:51	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/18/18 18:51	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/18/18 18:51	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/18/18 18:51	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/18/18 18:51	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/18/18 18:51	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/18/18 18:51	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/18/18 18:51	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/18/18 18:51	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/18/18 18:51	1
Methylene Chloride	0.00023	J	0.00040	0.000072	ppm v/v			05/18/18 18:51	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/18/18 18:51	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/18/18 18:51	1
Tetrachloroethene	0.028		0.00040	0.000051	ppm v/v			05/18/18 18:51	1
Toluene	0.00023	J	0.00040	0.000051	ppm v/v			05/18/18 18:51	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.039		0.00040	0.00016	ppm v/v			05/18/18 18:51	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/18/18 18:51	1
1,1,1-Trichloroethane	0.0047		0.00030	0.000065	ppm v/v			05/18/18 18:51	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/18/18 18:51	1
Trichloroethene	0.033		0.00040	0.00011	ppm v/v			05/18/18 18:51	1
Trichlorofluoromethane	0.018		0.00040	0.00020	ppm v/v			05/18/18 18:51	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/18/18 18:51	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/18/18 18:51	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/18/18 18:51	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/18/18 18:51	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/18/18 18:51	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/18/18 18:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	105		70 - 130					05/18/18 18:51	1
1,2-Dichloroethane-d4 (Surr)	98		70 - 130					05/18/18 18:51	1
Toluene-d8 (Surr)	101		70 - 130					05/18/18 18:51	1

Client Sample ID: 105217-001/MWL-SV04-200

Lab Sample ID: 320-38760-14

Date Collected: 04/25/18 10:34

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	J	0.014	0.00049	ppm v/v			05/18/18 19:46	2.75
Benzene	0.00032	J	0.0011	0.00022	ppm v/v			05/18/18 19:46	2.75
Benzyl chloride	ND		0.0022	0.00045	ppm v/v			05/18/18 19:46	2.75
Bromodichloromethane	ND		0.00083	0.00018	ppm v/v			05/18/18 19:46	2.75

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105217-001/MWL-SV04-200

Lab Sample ID: 320-38760-14

Date Collected: 04/25/18 10:34

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	ND		0.0011	0.00019	ppm v/v			05/18/18 19:46	2.75
Bromomethane	ND		0.0022	0.00092	ppm v/v			05/18/18 19:46	2.75
2-Butanone (MEK)	0.00078	J	0.0022	0.00055	ppm v/v			05/18/18 19:46	2.75
Carbon disulfide	0.0013	J	0.0022	0.00021	ppm v/v			05/18/18 19:46	2.75
Carbon tetrachloride	0.00056	J	0.0022	0.00018	ppm v/v			05/18/18 19:46	2.75
Chlorobenzene	ND		0.00083	0.00018	ppm v/v			05/18/18 19:46	2.75
Chloroethane	ND		0.0022	0.00085	ppm v/v			05/18/18 19:46	2.75
Chloroform	0.0016		0.00083	0.00026	ppm v/v			05/18/18 19:46	2.75
Chloromethane	ND		0.0022	0.00054	ppm v/v			05/18/18 19:46	2.75
Dibromochloromethane	ND		0.0011	0.00022	ppm v/v			05/18/18 19:46	2.75
1,2-Dibromoethane (EDB)	ND		0.0022	0.00021	ppm v/v			05/18/18 19:46	2.75
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0011	0.00043	ppm v/v			05/18/18 19:46	2.75
1,2-Dichlorobenzene	ND		0.0011	0.00036	ppm v/v			05/18/18 19:46	2.75
1,3-Dichlorobenzene	ND		0.0011	0.00030	ppm v/v			05/18/18 19:46	2.75
1,4-Dichlorobenzene	ND		0.0011	0.00041	ppm v/v			05/18/18 19:46	2.75
Dichlorodifluoromethane	0.048		0.0011	0.00040	ppm v/v			05/18/18 19:46	2.75
1,1-Dichloroethane	0.0054		0.00083	0.00020	ppm v/v			05/18/18 19:46	2.75
1,2-Dichloroethane	ND		0.0022	0.00024	ppm v/v			05/18/18 19:46	2.75
1,1-Dichloroethene	0.031		0.0022	0.00035	ppm v/v			05/18/18 19:46	2.75
cis-1,2-Dichloroethene	0.0030		0.0011	0.00024	ppm v/v			05/18/18 19:46	2.75
trans-1,2-Dichloroethene	ND		0.0011	0.00028	ppm v/v			05/18/18 19:46	2.75
1,2-Dichloropropane	ND		0.0011	0.00066	ppm v/v			05/18/18 19:46	2.75
cis-1,3-Dichloropropene	ND		0.0011	0.00029	ppm v/v			05/18/18 19:46	2.75
trans-1,3-Dichloropropene	ND		0.0011	0.00024	ppm v/v			05/18/18 19:46	2.75
Ethylbenzene	ND		0.0011	0.00017	ppm v/v			05/18/18 19:46	2.75
4-Ethyltoluene	ND		0.0011	0.00051	ppm v/v			05/18/18 19:46	2.75
Hexachlorobutadiene	ND		0.0055	0.0012	ppm v/v			05/18/18 19:46	2.75
2-Hexanone	ND		0.0011	0.00024	ppm v/v			05/18/18 19:46	2.75
4-Methyl-2-pentanone (MIBK)	ND		0.0011	0.00037	ppm v/v			05/18/18 19:46	2.75
Methylene Chloride	0.0016		0.0011	0.00020	ppm v/v			05/18/18 19:46	2.75
Styrene	ND		0.0011	0.00016	ppm v/v			05/18/18 19:46	2.75
1,1,2,2-Tetrachloroethane	ND		0.0011	0.00019	ppm v/v			05/18/18 19:46	2.75
Tetrachloroethene	0.12		0.0011	0.00014	ppm v/v			05/18/18 19:46	2.75
Toluene	0.00097	J	0.0011	0.00014	ppm v/v			05/18/18 19:46	2.75
1,1,2-Trichloro-1,2,2-trifluoroethane	0.15		0.0011	0.00045	ppm v/v			05/18/18 19:46	2.75
1,2,4-Trichlorobenzene	ND		0.0055	0.0012	ppm v/v			05/18/18 19:46	2.75
1,1,1-Trichloroethane	0.0025		0.00083	0.00018	ppm v/v			05/18/18 19:46	2.75
1,1,2-Trichloroethane	ND		0.0011	0.00018	ppm v/v			05/18/18 19:46	2.75
Trichloroethene	0.17		0.0011	0.00029	ppm v/v			05/18/18 19:46	2.75
Trichlorofluoromethane	0.039		0.0011	0.00054	ppm v/v			05/18/18 19:46	2.75
1,2,4-Trimethylbenzene	ND		0.0022	0.00045	ppm v/v			05/18/18 19:46	2.75
1,3,5-Trimethylbenzene	ND		0.0011	0.00034	ppm v/v			05/18/18 19:46	2.75
Vinyl acetate	ND		0.0022	0.00040	ppm v/v			05/18/18 19:46	2.75
Vinyl chloride	ND		0.0011	0.00033	ppm v/v			05/18/18 19:46	2.75
m,p-Xylene	ND		0.0022	0.00028	ppm v/v			05/18/18 19:46	2.75
o-Xylene	ND		0.0011	0.00015	ppm v/v			05/18/18 19:46	2.75

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105217-001/MWL-SV04-200

Lab Sample ID: 320-38760-14

Date Collected: 04/25/18 10:34

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		70 - 130		05/18/18 19:46	2.75
1,2-Dichloroethane-d4 (Surr)	98		70 - 130		05/18/18 19:46	2.75
Toluene-d8 (Surr)	102		70 - 130		05/18/18 19:46	2.75

Client Sample ID: 105218-001/MWL-SV04-300

Lab Sample ID: 320-38760-15

Date Collected: 04/25/18 10:42

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0061		0.0050	0.00018	ppm v/v			05/18/18 20:45	1
Benzene	0.00026	J	0.00040	0.000079	ppm v/v			05/18/18 20:45	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/18/18 20:45	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/18/18 20:45	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/18/18 20:45	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/18/18 20:45	1
2-Butanone (MEK)	0.00083		0.00080	0.00020	ppm v/v			05/18/18 20:45	1
Carbon disulfide	0.0014		0.00080	0.000078	ppm v/v			05/18/18 20:45	1
Carbon tetrachloride	0.00029	J	0.00080	0.000064	ppm v/v			05/18/18 20:45	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/18/18 20:45	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/18/18 20:45	1
Chloroform	0.00051		0.00030	0.000095	ppm v/v			05/18/18 20:45	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/18/18 20:45	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/18/18 20:45	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/18/18 20:45	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/18/18 20:45	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/18/18 20:45	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/18/18 20:45	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/18/18 20:45	1
Dichlorodifluoromethane	0.021		0.00040	0.00015	ppm v/v			05/18/18 20:45	1
1,1-Dichloroethane	0.00087		0.00030	0.000072	ppm v/v			05/18/18 20:45	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/18/18 20:45	1
1,1-Dichloroethene	0.012		0.00080	0.00013	ppm v/v			05/18/18 20:45	1
cis-1,2-Dichloroethene	0.00047		0.00040	0.000089	ppm v/v			05/18/18 20:45	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/18/18 20:45	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/18/18 20:45	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/18/18 20:45	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/18/18 20:45	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/18/18 20:45	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/18/18 20:45	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/18/18 20:45	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/18/18 20:45	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/18/18 20:45	1
Methylene Chloride	0.00039	J	0.00040	0.000072	ppm v/v			05/18/18 20:45	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/18/18 20:45	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/18/18 20:45	1
Tetrachloroethene	0.085		0.00040	0.000051	ppm v/v			05/18/18 20:45	1
Toluene	0.0014		0.00040	0.000051	ppm v/v			05/18/18 20:45	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105218-001/MWL-SV04-300

Lab Sample ID: 320-38760-15

Date Collected: 04/25/18 10:42

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	0.074		0.00040	0.00016	ppm v/v			05/18/18 20:45	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/18/18 20:45	1
1,1,1-Trichloroethane	0.00072		0.00030	0.000065	ppm v/v			05/18/18 20:45	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/18/18 20:45	1
Trichloroethene	0.062		0.00040	0.00011	ppm v/v			05/18/18 20:45	1
Trichlorofluoromethane	0.015		0.00040	0.00020	ppm v/v			05/18/18 20:45	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/18/18 20:45	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/18/18 20:45	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/18/18 20:45	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/18/18 20:45	1
m,p-Xylene	0.00011	J	0.00080	0.00010	ppm v/v			05/18/18 20:45	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/18/18 20:45	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	105		70 - 130					05/18/18 20:45	1
1,2-Dichloroethane-d4 (Surr)	98		70 - 130					05/18/18 20:45	1
Toluene-d8 (Surr)	101		70 - 130					05/18/18 20:45	1

Client Sample ID: 105219-001/MWL-SV04-300

Lab Sample ID: 320-38760-16

Date Collected: 04/25/18 10:42

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	J	0.014	0.00050	ppm v/v			05/18/18 21:40	2.8
Benzene	0.00027	J	0.0011	0.00022	ppm v/v			05/18/18 21:40	2.8
Benzyl chloride	ND		0.0022	0.00046	ppm v/v			05/18/18 21:40	2.8
Bromodichloromethane	ND		0.00084	0.00018	ppm v/v			05/18/18 21:40	2.8
Bromoform	ND		0.0011	0.00020	ppm v/v			05/18/18 21:40	2.8
Bromomethane	ND		0.0022	0.00094	ppm v/v			05/18/18 21:40	2.8
2-Butanone (MEK)	0.00092	J	0.0022	0.00056	ppm v/v			05/18/18 21:40	2.8
Carbon disulfide	0.0011	J	0.0022	0.00022	ppm v/v			05/18/18 21:40	2.8
Carbon tetrachloride	0.00029	J	0.0022	0.00018	ppm v/v			05/18/18 21:40	2.8
Chlorobenzene	ND		0.00084	0.00018	ppm v/v			05/18/18 21:40	2.8
Chloroethane	ND		0.0022	0.00086	ppm v/v			05/18/18 21:40	2.8
Chloroform	0.00050	J	0.00084	0.00027	ppm v/v			05/18/18 21:40	2.8
Chloromethane	ND		0.0022	0.00055	ppm v/v			05/18/18 21:40	2.8
Dibromochloromethane	ND		0.0011	0.00022	ppm v/v			05/18/18 21:40	2.8
1,2-Dibromoethane (EDB)	ND		0.0022	0.00021	ppm v/v			05/18/18 21:40	2.8
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0011	0.00043	ppm v/v			05/18/18 21:40	2.8
1,2-Dichlorobenzene	ND		0.0011	0.00036	ppm v/v			05/18/18 21:40	2.8
1,3-Dichlorobenzene	ND		0.0011	0.00031	ppm v/v			05/18/18 21:40	2.8
1,4-Dichlorobenzene	ND		0.0011	0.00042	ppm v/v			05/18/18 21:40	2.8
Dichlorodifluoromethane	0.028		0.0011	0.00041	ppm v/v			05/18/18 21:40	2.8
1,1-Dichloroethane	0.00091		0.00084	0.00020	ppm v/v			05/18/18 21:40	2.8
1,2-Dichloroethane	ND		0.0022	0.00025	ppm v/v			05/18/18 21:40	2.8
1,1-Dichloroethene	0.013		0.0022	0.00036	ppm v/v			05/18/18 21:40	2.8

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105219-001/MWL-SV04-300

Lab Sample ID: 320-38760-16

Date Collected: 04/25/18 10:42

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	0.00048	J	0.0011	0.00025	ppm v/v			05/18/18 21:40	2.8
trans-1,2-Dichloroethene	ND		0.0011	0.00028	ppm v/v			05/18/18 21:40	2.8
1,2-Dichloropropane	ND		0.0011	0.00067	ppm v/v			05/18/18 21:40	2.8
cis-1,3-Dichloropropene	ND		0.0011	0.00029	ppm v/v			05/18/18 21:40	2.8
trans-1,3-Dichloropropene	ND		0.0011	0.00025	ppm v/v			05/18/18 21:40	2.8
Ethylbenzene	ND		0.0011	0.00018	ppm v/v			05/18/18 21:40	2.8
4-Ethyltoluene	ND		0.0011	0.00052	ppm v/v			05/18/18 21:40	2.8
Hexachlorobutadiene	ND		0.0056	0.0012	ppm v/v			05/18/18 21:40	2.8
2-Hexanone	ND		0.0011	0.00024	ppm v/v			05/18/18 21:40	2.8
4-Methyl-2-pentanone (MIBK)	ND		0.0011	0.00038	ppm v/v			05/18/18 21:40	2.8
Methylene Chloride	0.00039	J	0.0011	0.00020	ppm v/v			05/18/18 21:40	2.8
Styrene	ND		0.0011	0.00017	ppm v/v			05/18/18 21:40	2.8
1,1,2,2-Tetrachloroethane	ND		0.0011	0.00019	ppm v/v			05/18/18 21:40	2.8
Tetrachloroethene	0.098		0.0011	0.00014	ppm v/v			05/18/18 21:40	2.8
Toluene	0.00032	J	0.0011	0.00014	ppm v/v			05/18/18 21:40	2.8
1,1,2-Trichloro-1,2,2-trifluoroethane	0.080		0.0011	0.00046	ppm v/v			05/18/18 21:40	2.8
1,2,4-Trichlorobenzene	ND		0.0056	0.0012	ppm v/v			05/18/18 21:40	2.8
1,1,1-Trichloroethane	0.00069	J	0.00084	0.00018	ppm v/v			05/18/18 21:40	2.8
1,1,2-Trichloroethane	ND		0.0011	0.00019	ppm v/v			05/18/18 21:40	2.8
Trichloroethene	0.067		0.0011	0.00029	ppm v/v			05/18/18 21:40	2.8
Trichlorofluoromethane	0.015		0.0011	0.00055	ppm v/v			05/18/18 21:40	2.8
1,2,4-Trimethylbenzene	ND		0.0022	0.00045	ppm v/v			05/18/18 21:40	2.8
1,3,5-Trimethylbenzene	ND		0.0011	0.00035	ppm v/v			05/18/18 21:40	2.8
Vinyl acetate	ND		0.0022	0.00041	ppm v/v			05/18/18 21:40	2.8
Vinyl chloride	ND		0.0011	0.00034	ppm v/v			05/18/18 21:40	2.8
m,p-Xylene	ND		0.0022	0.00028	ppm v/v			05/18/18 21:40	2.8
o-Xylene	ND		0.0011	0.00015	ppm v/v			05/18/18 21:40	2.8
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130					05/18/18 21:40	2.8
1,2-Dichloroethane-d4 (Surr)	99		70 - 130					05/18/18 21:40	2.8
Toluene-d8 (Surr)	102		70 - 130					05/18/18 21:40	2.8

Client Sample ID: 105220-001/MWL-SV04-400

Lab Sample ID: 320-38760-17

Date Collected: 04/25/18 10:49

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	J	0.0092	0.00033	ppm v/v			05/18/18 22:36	1.83
Benzene	0.00046	J	0.00073	0.00014	ppm v/v			05/18/18 22:36	1.83
Benzyl chloride	ND		0.0015	0.00030	ppm v/v			05/18/18 22:36	1.83
Bromodichloromethane	ND		0.00055	0.00012	ppm v/v			05/18/18 22:36	1.83
Bromoform	ND		0.00073	0.00013	ppm v/v			05/18/18 22:36	1.83
Bromomethane	ND		0.0015	0.00061	ppm v/v			05/18/18 22:36	1.83
2-Butanone (MEK)	0.00059	J	0.0015	0.00036	ppm v/v			05/18/18 22:36	1.83
Carbon disulfide	0.0012	J	0.0015	0.00014	ppm v/v			05/18/18 22:36	1.83

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105220-001/MWL-SV04-400

Lab Sample ID: 320-38760-17

Date Collected: 04/25/18 10:49

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	0.00024	J	0.0015	0.00012	ppm v/v			05/18/18 22:36	1.83
Chlorobenzene	ND		0.00055	0.00012	ppm v/v			05/18/18 22:36	1.83
Chloroethane	ND		0.0015	0.00056	ppm v/v			05/18/18 22:36	1.83
Chloroform	0.00067		0.00055	0.00017	ppm v/v			05/18/18 22:36	1.83
Chloromethane	ND		0.0015	0.00036	ppm v/v			05/18/18 22:36	1.83
Dibromochloromethane	ND		0.00073	0.00014	ppm v/v			05/18/18 22:36	1.83
1,2-Dibromoethane (EDB)	ND		0.0015	0.00014	ppm v/v			05/18/18 22:36	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00073	0.00028	ppm v/v			05/18/18 22:36	1.83
1,2-Dichlorobenzene	ND		0.00073	0.00024	ppm v/v			05/18/18 22:36	1.83
1,3-Dichlorobenzene	ND		0.00073	0.00020	ppm v/v			05/18/18 22:36	1.83
1,4-Dichlorobenzene	ND		0.00073	0.00027	ppm v/v			05/18/18 22:36	1.83
Dichlorodifluoromethane	0.021		0.00073	0.00027	ppm v/v			05/18/18 22:36	1.83
1,1-Dichloroethane	0.0014		0.00055	0.00013	ppm v/v			05/18/18 22:36	1.83
1,2-Dichloroethane	ND		0.0015	0.00016	ppm v/v			05/18/18 22:36	1.83
1,1-Dichloroethene	0.011		0.0015	0.00024	ppm v/v			05/18/18 22:36	1.83
cis-1,2-Dichloroethene	0.00084		0.00073	0.00016	ppm v/v			05/18/18 22:36	1.83
trans-1,2-Dichloroethene	ND		0.00073	0.00018	ppm v/v			05/18/18 22:36	1.83
1,2-Dichloropropane	ND		0.00073	0.00044	ppm v/v			05/18/18 22:36	1.83
cis-1,3-Dichloropropene	ND		0.00073	0.00019	ppm v/v			05/18/18 22:36	1.83
trans-1,3-Dichloropropene	ND		0.00073	0.00016	ppm v/v			05/18/18 22:36	1.83
Ethylbenzene	ND		0.00073	0.00012	ppm v/v			05/18/18 22:36	1.83
4-Ethyltoluene	ND		0.00073	0.00034	ppm v/v			05/18/18 22:36	1.83
Hexachlorobutadiene	ND		0.0037	0.00079	ppm v/v			05/18/18 22:36	1.83
2-Hexanone	ND		0.00073	0.00016	ppm v/v			05/18/18 22:36	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.00073	0.00025	ppm v/v			05/18/18 22:36	1.83
Methylene Chloride	0.00040	J	0.00073	0.00013	ppm v/v			05/18/18 22:36	1.83
Styrene	ND		0.00073	0.00011	ppm v/v			05/18/18 22:36	1.83
1,1,2,2-Tetrachloroethane	ND		0.00073	0.00013	ppm v/v			05/18/18 22:36	1.83
Tetrachloroethene	0.12		0.00073	0.000093	ppm v/v			05/18/18 22:36	1.83
Toluene	0.00011	J	0.00073	0.000093	ppm v/v			05/18/18 22:36	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	0.070		0.00073	0.00030	ppm v/v			05/18/18 22:36	1.83
1,2,4-Trichlorobenzene	ND		0.0037	0.00079	ppm v/v			05/18/18 22:36	1.83
1,1,1-Trichloroethane	0.0013		0.00055	0.00012	ppm v/v			05/18/18 22:36	1.83
1,1,2-Trichloroethane	ND		0.00073	0.00012	ppm v/v			05/18/18 22:36	1.83
Trichloroethene	0.087		0.00073	0.00019	ppm v/v			05/18/18 22:36	1.83
Trichlorofluoromethane	0.015		0.00073	0.00036	ppm v/v			05/18/18 22:36	1.83
1,2,4-Trimethylbenzene	ND		0.0015	0.00030	ppm v/v			05/18/18 22:36	1.83
1,3,5-Trimethylbenzene	ND		0.00073	0.00023	ppm v/v			05/18/18 22:36	1.83
Vinyl acetate	ND		0.0015	0.00027	ppm v/v			05/18/18 22:36	1.83
Vinyl chloride	ND		0.00073	0.00022	ppm v/v			05/18/18 22:36	1.83
m,p-Xylene	ND		0.0015	0.00018	ppm v/v			05/18/18 22:36	1.83
o-Xylene	ND		0.00073	0.000099	ppm v/v			05/18/18 22:36	1.83
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130					05/18/18 22:36	1.83
1,2-Dichloroethane-d4 (Surr)	99		70 - 130					05/18/18 22:36	1.83
Toluene-d8 (Surr)	101		70 - 130					05/18/18 22:36	1.83

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105216-001/MWL-SV04-100

Lab Sample ID: 320-38760-18

Date Collected: 04/25/18 10:27

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0025	J	0.0078	0.00028	ppm v/v			05/18/18 23:32	1.56
Benzene	0.00026	J	0.00062	0.00012	ppm v/v			05/18/18 23:32	1.56
Benzyl chloride	ND		0.0012	0.00025	ppm v/v			05/18/18 23:32	1.56
Bromodichloromethane	ND		0.00047	0.00010	ppm v/v			05/18/18 23:32	1.56
Bromoform	ND		0.00062	0.00011	ppm v/v			05/18/18 23:32	1.56
Bromomethane	ND		0.0012	0.00052	ppm v/v			05/18/18 23:32	1.56
2-Butanone (MEK)	ND		0.0012	0.00031	ppm v/v			05/18/18 23:32	1.56
Carbon disulfide	ND		0.0012	0.00012	ppm v/v			05/18/18 23:32	1.56
Carbon tetrachloride	0.00036	J	0.0012	0.00010	ppm v/v			05/18/18 23:32	1.56
Chlorobenzene	ND		0.00047	0.00010	ppm v/v			05/18/18 23:32	1.56
Chloroethane	ND		0.0012	0.00048	ppm v/v			05/18/18 23:32	1.56
Chloroform	0.0021		0.00047	0.00015	ppm v/v			05/18/18 23:32	1.56
Chloromethane	ND		0.0012	0.00031	ppm v/v			05/18/18 23:32	1.56
Dibromochloromethane	ND		0.00062	0.00012	ppm v/v			05/18/18 23:32	1.56
1,2-Dibromoethane (EDB)	ND		0.0012	0.00012	ppm v/v			05/18/18 23:32	1.56
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00062	0.00024	ppm v/v			05/18/18 23:32	1.56
1,2-Dichlorobenzene	ND		0.00062	0.00020	ppm v/v			05/18/18 23:32	1.56
1,3-Dichlorobenzene	ND		0.00062	0.00017	ppm v/v			05/18/18 23:32	1.56
1,4-Dichlorobenzene	ND		0.00062	0.00023	ppm v/v			05/18/18 23:32	1.56
Dichlorodifluoromethane	0.032		0.00062	0.00023	ppm v/v			05/18/18 23:32	1.56
1,1-Dichloroethane	0.0031		0.00047	0.00011	ppm v/v			05/18/18 23:32	1.56
1,2-Dichloroethane	ND		0.0012	0.00014	ppm v/v			05/18/18 23:32	1.56
1,1-Dichloroethene	0.016		0.0012	0.00020	ppm v/v			05/18/18 23:32	1.56
cis-1,2-Dichloroethene	0.0016		0.00062	0.00014	ppm v/v			05/18/18 23:32	1.56
trans-1,2-Dichloroethene	ND		0.00062	0.00016	ppm v/v			05/18/18 23:32	1.56
1,2-Dichloropropane	ND		0.00062	0.00037	ppm v/v			05/18/18 23:32	1.56
cis-1,3-Dichloropropene	ND		0.00062	0.00016	ppm v/v			05/18/18 23:32	1.56
trans-1,3-Dichloropropene	ND		0.00062	0.00014	ppm v/v			05/18/18 23:32	1.56
Ethylbenzene	ND		0.00062	0.000098	ppm v/v			05/18/18 23:32	1.56
4-Ethyltoluene	ND		0.00062	0.00029	ppm v/v			05/18/18 23:32	1.56
Hexachlorobutadiene	ND		0.0031	0.00067	ppm v/v			05/18/18 23:32	1.56
2-Hexanone	ND		0.00062	0.00014	ppm v/v			05/18/18 23:32	1.56
4-Methyl-2-pentanone (MIBK)	ND		0.00062	0.00021	ppm v/v			05/18/18 23:32	1.56
Methylene Chloride	0.00051	J	0.00062	0.00011	ppm v/v			05/18/18 23:32	1.56
Styrene	ND		0.00062	0.000092	ppm v/v			05/18/18 23:32	1.56
1,1,2,2-Tetrachloroethane	ND		0.00062	0.00011	ppm v/v			05/18/18 23:32	1.56
Tetrachloroethene	0.11		0.00062	0.000080	ppm v/v			05/18/18 23:32	1.56
Toluene	ND		0.00062	0.000080	ppm v/v			05/18/18 23:32	1.56
1,1,2-Trichloro-1,2,2-trifluoroethane	0.096		0.00062	0.00025	ppm v/v			05/18/18 23:32	1.56
1,2,4-Trichlorobenzene	ND		0.0031	0.00068	ppm v/v			05/18/18 23:32	1.56
1,1,1-Trichloroethane	0.0061		0.00047	0.00010	ppm v/v			05/18/18 23:32	1.56
1,1,2-Trichloroethane	ND		0.00062	0.00010	ppm v/v			05/18/18 23:32	1.56
Trichloroethene	0.11		0.00062	0.00016	ppm v/v			05/18/18 23:32	1.56
Trichlorofluoromethane	0.041		0.00062	0.00031	ppm v/v			05/18/18 23:32	1.56
1,2,4-Trimethylbenzene	ND		0.0012	0.00025	ppm v/v			05/18/18 23:32	1.56
1,3,5-Trimethylbenzene	ND		0.00062	0.00020	ppm v/v			05/18/18 23:32	1.56
Vinyl acetate	ND		0.0012	0.00023	ppm v/v			05/18/18 23:32	1.56
Vinyl chloride	ND		0.00062	0.00019	ppm v/v			05/18/18 23:32	1.56

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105216-001/MWL-SV04-100

Lab Sample ID: 320-38760-18

Date Collected: 04/25/18 10:27

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.0012	0.00016	ppm v/v			05/18/18 23:32	1.56
o-Xylene	ND		0.00062	0.000084	ppm v/v			05/18/18 23:32	1.56
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130					05/18/18 23:32	1.56
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					05/18/18 23:32	1.56
Toluene-d8 (Surr)	102		70 - 130					05/18/18 23:32	1.56

Client Sample ID: 105221-001/MWL-SV-FB5

Lab Sample ID: 320-38760-19

Date Collected: 04/25/18 11:12

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0086		0.0050	0.00018	ppm v/v			05/19/18 00:28	1
Benzene	0.000096	J	0.00040	0.000079	ppm v/v			05/19/18 00:28	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/19/18 00:28	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/19/18 00:28	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/19/18 00:28	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/19/18 00:28	1
2-Butanone (MEK)	0.00086		0.00080	0.00020	ppm v/v			05/19/18 00:28	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/19/18 00:28	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/19/18 00:28	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/19/18 00:28	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/19/18 00:28	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/19/18 00:28	1
Chloromethane	0.00032	J	0.00080	0.00020	ppm v/v			05/19/18 00:28	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/19/18 00:28	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/19/18 00:28	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/19/18 00:28	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/19/18 00:28	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/19/18 00:28	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/19/18 00:28	1
Dichlorodifluoromethane	0.00029	J	0.00040	0.00015	ppm v/v			05/19/18 00:28	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/19/18 00:28	1
1,2-Dichloroethane	0.00011	J	0.00080	0.000088	ppm v/v			05/19/18 00:28	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/19/18 00:28	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/19/18 00:28	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/19/18 00:28	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/19/18 00:28	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/19/18 00:28	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/19/18 00:28	1
Ethylbenzene	0.00074		0.00040	0.000063	ppm v/v			05/19/18 00:28	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/19/18 00:28	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/19/18 00:28	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/19/18 00:28	1
4-Methyl-2-pentanone (MIBK)	0.00017	J	0.00040	0.00014	ppm v/v			05/19/18 00:28	1
Methylene Chloride	0.0018		0.00040	0.000072	ppm v/v			05/19/18 00:28	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105221-001/MWL-SV-FB5

Lab Sample ID: 320-38760-19

Date Collected: 04/25/18 11:12

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	0.00020	J	0.00040	0.000059	ppm v/v			05/19/18 00:28	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/19/18 00:28	1
Tetrachloroethene	0.000083	J	0.00040	0.000051	ppm v/v			05/19/18 00:28	1
Toluene	0.0090		0.00040	0.000051	ppm v/v			05/19/18 00:28	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/19/18 00:28	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/19/18 00:28	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/19/18 00:28	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/19/18 00:28	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			05/19/18 00:28	1
Trichlorofluoromethane	0.00022	J	0.00040	0.00020	ppm v/v			05/19/18 00:28	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/19/18 00:28	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/19/18 00:28	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/19/18 00:28	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/19/18 00:28	1
m,p-Xylene	0.0029		0.00080	0.00010	ppm v/v			05/19/18 00:28	1
o-Xylene	0.00077		0.00040	0.000054	ppm v/v			05/19/18 00:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		70 - 130					05/19/18 00:28	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					05/19/18 00:28	1
Toluene-d8 (Surr)	100		70 - 130					05/19/18 00:28	1

Client Sample ID: 105222-001/MWL-SV05-50

Lab Sample ID: 320-38760-20

Date Collected: 04/25/18 11:18

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0060	J	0.0080	0.00028	ppm v/v			05/19/18 01:24	1.6
Benzene	0.00020	J	0.00064	0.00013	ppm v/v			05/19/18 01:24	1.6
Benzyl chloride	ND		0.0013	0.00026	ppm v/v			05/19/18 01:24	1.6
Bromodichloromethane	ND		0.00048	0.00011	ppm v/v			05/19/18 01:24	1.6
Bromoform	ND		0.00064	0.00011	ppm v/v			05/19/18 01:24	1.6
Bromomethane	ND		0.0013	0.00054	ppm v/v			05/19/18 01:24	1.6
2-Butanone (MEK)	0.00067	J	0.0013	0.00032	ppm v/v			05/19/18 01:24	1.6
Carbon disulfide	0.00051	J	0.0013	0.00012	ppm v/v			05/19/18 01:24	1.6
Carbon tetrachloride	0.00035	J	0.0013	0.00010	ppm v/v			05/19/18 01:24	1.6
Chlorobenzene	ND		0.00048	0.00010	ppm v/v			05/19/18 01:24	1.6
Chloroethane	ND		0.0013	0.00049	ppm v/v			05/19/18 01:24	1.6
Chloroform	0.0013		0.00048	0.00015	ppm v/v			05/19/18 01:24	1.6
Chloromethane	ND		0.0013	0.00032	ppm v/v			05/19/18 01:24	1.6
Dibromochloromethane	ND		0.00064	0.00013	ppm v/v			05/19/18 01:24	1.6
1,2-Dibromoethane (EDB)	ND		0.0013	0.00012	ppm v/v			05/19/18 01:24	1.6
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00064	0.00025	ppm v/v			05/19/18 01:24	1.6
1,2-Dichlorobenzene	ND		0.00064	0.00021	ppm v/v			05/19/18 01:24	1.6
1,3-Dichlorobenzene	ND		0.00064	0.00018	ppm v/v			05/19/18 01:24	1.6
1,4-Dichlorobenzene	ND		0.00064	0.00024	ppm v/v			05/19/18 01:24	1.6
Dichlorodifluoromethane	0.040		0.00064	0.00023	ppm v/v			05/19/18 01:24	1.6

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105222-001/MWL-SV05-50

Lab Sample ID: 320-38760-20

Date Collected: 04/25/18 11:18

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	0.0017		0.00048	0.00012	ppm v/v			05/19/18 01:24	1.6
1,2-Dichloroethane	ND		0.0013	0.00014	ppm v/v			05/19/18 01:24	1.6
1,1-Dichloroethene	0.010		0.0013	0.00021	ppm v/v			05/19/18 01:24	1.6
cis-1,2-Dichloroethene	0.00062	J	0.00064	0.00014	ppm v/v			05/19/18 01:24	1.6
trans-1,2-Dichloroethene	ND		0.00064	0.00016	ppm v/v			05/19/18 01:24	1.6
1,2-Dichloropropane	ND		0.00064	0.00038	ppm v/v			05/19/18 01:24	1.6
cis-1,3-Dichloropropene	ND		0.00064	0.00017	ppm v/v			05/19/18 01:24	1.6
trans-1,3-Dichloropropene	ND		0.00064	0.00014	ppm v/v			05/19/18 01:24	1.6
Ethylbenzene	ND		0.00064	0.00010	ppm v/v			05/19/18 01:24	1.6
4-Ethyltoluene	ND		0.00064	0.00030	ppm v/v			05/19/18 01:24	1.6
Hexachlorobutadiene	ND		0.0032	0.00069	ppm v/v			05/19/18 01:24	1.6
2-Hexanone	ND		0.00064	0.00014	ppm v/v			05/19/18 01:24	1.6
4-Methyl-2-pentanone (MIBK)	ND		0.00064	0.00022	ppm v/v			05/19/18 01:24	1.6
Methylene Chloride	0.00031	J	0.00064	0.00012	ppm v/v			05/19/18 01:24	1.6
Styrene	ND		0.00064	0.000094	ppm v/v			05/19/18 01:24	1.6
1,1,2,2-Tetrachloroethane	ND		0.00064	0.00011	ppm v/v			05/19/18 01:24	1.6
Tetrachloroethene	0.045		0.00064	0.000082	ppm v/v			05/19/18 01:24	1.6
Toluene	ND		0.00064	0.000082	ppm v/v			05/19/18 01:24	1.6
1,1,2-Trichloro-1,2,2-trifluoroethane	0.044		0.00064	0.00026	ppm v/v			05/19/18 01:24	1.6
1,2,4-Trichlorobenzene	ND		0.0032	0.00069	ppm v/v			05/19/18 01:24	1.6
1,1,1-Trichloroethane	0.014		0.00048	0.00010	ppm v/v			05/19/18 01:24	1.6
1,1,2-Trichloroethane	ND		0.00064	0.00011	ppm v/v			05/19/18 01:24	1.6
Trichloroethene	0.055		0.00064	0.00017	ppm v/v			05/19/18 01:24	1.6
Trichlorofluoromethane	0.11		0.00064	0.00031	ppm v/v			05/19/18 01:24	1.6
1,2,4-Trimethylbenzene	ND		0.0013	0.00026	ppm v/v			05/19/18 01:24	1.6
1,3,5-Trimethylbenzene	ND		0.00064	0.00020	ppm v/v			05/19/18 01:24	1.6
Vinyl acetate	ND		0.0013	0.00023	ppm v/v			05/19/18 01:24	1.6
Vinyl chloride	ND		0.00064	0.00019	ppm v/v			05/19/18 01:24	1.6
m,p-Xylene	ND		0.0013	0.00016	ppm v/v			05/19/18 01:24	1.6
o-Xylene	ND		0.00064	0.000086	ppm v/v			05/19/18 01:24	1.6
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130					05/19/18 01:24	1.6
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					05/19/18 01:24	1.6
Toluene-d8 (Surr)	101		70 - 130					05/19/18 01:24	1.6

Client Sample ID: 105223-001/MWL-SV05-100

Lab Sample ID: 320-38760-21

Date Collected: 04/25/18 11:23

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0031	J	0.011	0.00039	ppm v/v			05/19/18 02:19	2.19
Benzene	0.00020	J	0.00088	0.00017	ppm v/v			05/19/18 02:19	2.19
Benzyl chloride	ND		0.0018	0.00036	ppm v/v			05/19/18 02:19	2.19
Bromodichloromethane	ND		0.00066	0.00014	ppm v/v			05/19/18 02:19	2.19
Bromoform	ND		0.00088	0.00015	ppm v/v			05/19/18 02:19	2.19

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105223-001/MWL-SV05-100

Lab Sample ID: 320-38760-21

Date Collected: 04/25/18 11:23

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromomethane	ND		0.0018	0.00073	ppm v/v			05/19/18 02:19	2.19
2-Butanone (MEK)	ND		0.0018	0.00044	ppm v/v			05/19/18 02:19	2.19
Carbon disulfide	0.0012	J	0.0018	0.00017	ppm v/v			05/19/18 02:19	2.19
Carbon tetrachloride	0.00063	J	0.0018	0.00014	ppm v/v			05/19/18 02:19	2.19
Chlorobenzene	ND		0.00066	0.00014	ppm v/v			05/19/18 02:19	2.19
Chloroethane	ND		0.0018	0.00067	ppm v/v			05/19/18 02:19	2.19
Chloroform	0.0021		0.00066	0.00021	ppm v/v			05/19/18 02:19	2.19
Chloromethane	ND		0.0018	0.00043	ppm v/v			05/19/18 02:19	2.19
Dibromochloromethane	ND		0.00088	0.00017	ppm v/v			05/19/18 02:19	2.19
1,2-Dibromoethane (EDB)	ND		0.0018	0.00016	ppm v/v			05/19/18 02:19	2.19
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00088	0.00034	ppm v/v			05/19/18 02:19	2.19
1,2-Dichlorobenzene	ND		0.00088	0.00028	ppm v/v			05/19/18 02:19	2.19
1,3-Dichlorobenzene	ND		0.00088	0.00024	ppm v/v			05/19/18 02:19	2.19
1,4-Dichlorobenzene	ND		0.00088	0.00033	ppm v/v			05/19/18 02:19	2.19
Dichlorodifluoromethane	0.060		0.00088	0.00032	ppm v/v			05/19/18 02:19	2.19
1,1-Dichloroethane	0.0035		0.00066	0.00016	ppm v/v			05/19/18 02:19	2.19
1,2-Dichloroethane	ND		0.0018	0.00019	ppm v/v			05/19/18 02:19	2.19
1,1-Dichloroethene	0.022		0.0018	0.00028	ppm v/v			05/19/18 02:19	2.19
cis-1,2-Dichloroethene	0.0015		0.00088	0.00019	ppm v/v			05/19/18 02:19	2.19
trans-1,2-Dichloroethene	ND		0.00088	0.00022	ppm v/v			05/19/18 02:19	2.19
1,2-Dichloropropane	ND		0.00088	0.00053	ppm v/v			05/19/18 02:19	2.19
cis-1,3-Dichloropropene	ND		0.00088	0.00023	ppm v/v			05/19/18 02:19	2.19
trans-1,3-Dichloropropene	ND		0.00088	0.00019	ppm v/v			05/19/18 02:19	2.19
Ethylbenzene	ND		0.00088	0.00014	ppm v/v			05/19/18 02:19	2.19
4-Ethyltoluene	ND		0.00088	0.00041	ppm v/v			05/19/18 02:19	2.19
Hexachlorobutadiene	ND		0.0044	0.00095	ppm v/v			05/19/18 02:19	2.19
2-Hexanone	ND		0.00088	0.00019	ppm v/v			05/19/18 02:19	2.19
4-Methyl-2-pentanone (MIBK)	ND		0.00088	0.00030	ppm v/v			05/19/18 02:19	2.19
Methylene Chloride	0.00091		0.00088	0.00016	ppm v/v			05/19/18 02:19	2.19
Styrene	ND		0.00088	0.00013	ppm v/v			05/19/18 02:19	2.19
1,1,2,2-Tetrachloroethane	ND		0.00088	0.00015	ppm v/v			05/19/18 02:19	2.19
Tetrachloroethene	0.085		0.00088	0.00011	ppm v/v			05/19/18 02:19	2.19
Toluene	0.00015	J	0.00088	0.00011	ppm v/v			05/19/18 02:19	2.19
1,1,2-Trichloro-1,2,2-trifluoroethane	0.085		0.00088	0.00036	ppm v/v			05/19/18 02:19	2.19
1,2,4-Trichlorobenzene	ND		0.0044	0.00095	ppm v/v			05/19/18 02:19	2.19
1,1,1-Trichloroethane	0.014		0.00066	0.00014	ppm v/v			05/19/18 02:19	2.19
1,1,2-Trichloroethane	ND		0.00088	0.00015	ppm v/v			05/19/18 02:19	2.19
Trichloroethene	0.11		0.00088	0.00023	ppm v/v			05/19/18 02:19	2.19
Trichlorofluoromethane	0.14		0.00088	0.00043	ppm v/v			05/19/18 02:19	2.19
1,2,4-Trimethylbenzene	ND		0.0018	0.00035	ppm v/v			05/19/18 02:19	2.19
1,3,5-Trimethylbenzene	ND		0.00088	0.00027	ppm v/v			05/19/18 02:19	2.19
Vinyl acetate	ND		0.0018	0.00032	ppm v/v			05/19/18 02:19	2.19
Vinyl chloride	ND		0.00088	0.00026	ppm v/v			05/19/18 02:19	2.19
m,p-Xylene	ND		0.0018	0.00022	ppm v/v			05/19/18 02:19	2.19
o-Xylene	ND		0.00088	0.00012	ppm v/v			05/19/18 02:19	2.19

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130		05/19/18 02:19	2.19

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105223-001/MWL-SV05-100

Lab Sample ID: 320-38760-21

Date Collected: 04/25/18 11:23

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	100		70 - 130		05/19/18 02:19	2.19
Toluene-d8 (Surr)	101		70 - 130		05/19/18 02:19	2.19

Client Sample ID: 105224-001/MWL-SV05-200

Lab Sample ID: 320-38760-22

Date Collected: 04/25/18 11:28

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0040	J	0.011	0.00038	ppm v/v			05/19/18 03:14	2.15
Benzene	0.00027	J	0.00086	0.00017	ppm v/v			05/19/18 03:14	2.15
Benzyl chloride	ND		0.0017	0.00035	ppm v/v			05/19/18 03:14	2.15
Bromodichloromethane	ND		0.00065	0.00014	ppm v/v			05/19/18 03:14	2.15
Bromoform	ND		0.00086	0.00015	ppm v/v			05/19/18 03:14	2.15
Bromomethane	ND		0.0017	0.00072	ppm v/v			05/19/18 03:14	2.15
2-Butanone (MEK)	ND		0.0017	0.00043	ppm v/v			05/19/18 03:14	2.15
Carbon disulfide	ND		0.0017	0.00017	ppm v/v			05/19/18 03:14	2.15
Carbon tetrachloride	0.0012	J	0.0017	0.00014	ppm v/v			05/19/18 03:14	2.15
Chlorobenzene	ND		0.00065	0.00014	ppm v/v			05/19/18 03:14	2.15
Chloroethane	ND		0.0017	0.00066	ppm v/v			05/19/18 03:14	2.15
Chloroform	0.0021		0.00065	0.00020	ppm v/v			05/19/18 03:14	2.15
Chloromethane	ND		0.0017	0.00042	ppm v/v			05/19/18 03:14	2.15
Dibromochloromethane	ND		0.00086	0.00017	ppm v/v			05/19/18 03:14	2.15
1,2-Dibromoethane (EDB)	ND		0.0017	0.00016	ppm v/v			05/19/18 03:14	2.15
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00086	0.00033	ppm v/v			05/19/18 03:14	2.15
1,2-Dichlorobenzene	ND		0.00086	0.00028	ppm v/v			05/19/18 03:14	2.15
1,3-Dichlorobenzene	ND		0.00086	0.00024	ppm v/v			05/19/18 03:14	2.15
1,4-Dichlorobenzene	ND		0.00086	0.00032	ppm v/v			05/19/18 03:14	2.15
Dichlorodifluoromethane	0.067		0.00086	0.00031	ppm v/v			05/19/18 03:14	2.15
1,1-Dichloroethane	0.0056		0.00065	0.00015	ppm v/v			05/19/18 03:14	2.15
1,2-Dichloroethane	ND		0.0017	0.00019	ppm v/v			05/19/18 03:14	2.15
1,1-Dichloroethene	0.042		0.0017	0.00028	ppm v/v			05/19/18 03:14	2.15
cis-1,2-Dichloroethene	0.0025		0.00086	0.00019	ppm v/v			05/19/18 03:14	2.15
trans-1,2-Dichloroethene	ND		0.00086	0.00022	ppm v/v			05/19/18 03:14	2.15
1,2-Dichloropropane	ND		0.00086	0.00052	ppm v/v			05/19/18 03:14	2.15
cis-1,3-Dichloropropene	ND		0.00086	0.00022	ppm v/v			05/19/18 03:14	2.15
trans-1,3-Dichloropropene	ND		0.00086	0.00019	ppm v/v			05/19/18 03:14	2.15
Ethylbenzene	ND		0.00086	0.00014	ppm v/v			05/19/18 03:14	2.15
4-Ethyltoluene	ND		0.00086	0.00040	ppm v/v			05/19/18 03:14	2.15
Hexachlorobutadiene	ND		0.0043	0.00093	ppm v/v			05/19/18 03:14	2.15
2-Hexanone	ND		0.00086	0.00019	ppm v/v			05/19/18 03:14	2.15
4-Methyl-2-pentanone (MIBK)	ND		0.00086	0.00029	ppm v/v			05/19/18 03:14	2.15
Methylene Chloride	0.0028		0.00086	0.00015	ppm v/v			05/19/18 03:14	2.15
Styrene	ND		0.00086	0.00013	ppm v/v			05/19/18 03:14	2.15
1,1,2,2-Tetrachloroethane	ND		0.00086	0.00015	ppm v/v			05/19/18 03:14	2.15
Tetrachloroethene	0.13		0.00086	0.00011	ppm v/v			05/19/18 03:14	2.15
Toluene	0.00018	J	0.00086	0.00011	ppm v/v			05/19/18 03:14	2.15

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105224-001/MWL-SV05-200

Lab Sample ID: 320-38760-22

Date Collected: 04/25/18 11:28

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	0.15		0.00086	0.00035	ppm v/v			05/19/18 03:14	2.15
1,2,4-Trichlorobenzene	ND		0.0043	0.00093	ppm v/v			05/19/18 03:14	2.15
1,1,1-Trichloroethane	0.0040		0.00065	0.00014	ppm v/v			05/19/18 03:14	2.15
1,1,2-Trichloroethane	ND		0.00086	0.00014	ppm v/v			05/19/18 03:14	2.15
Trichloroethene	0.19		0.00086	0.00023	ppm v/v			05/19/18 03:14	2.15
Trichlorofluoromethane	0.091		0.00086	0.00042	ppm v/v			05/19/18 03:14	2.15
1,2,4-Trimethylbenzene	ND		0.0017	0.00035	ppm v/v			05/19/18 03:14	2.15
1,3,5-Trimethylbenzene	ND		0.00086	0.00027	ppm v/v			05/19/18 03:14	2.15
Vinyl acetate	ND		0.0017	0.00031	ppm v/v			05/19/18 03:14	2.15
Vinyl chloride	ND		0.00086	0.00026	ppm v/v			05/19/18 03:14	2.15
m,p-Xylene	ND		0.0017	0.00022	ppm v/v			05/19/18 03:14	2.15
o-Xylene	ND		0.00086	0.00012	ppm v/v			05/19/18 03:14	2.15
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130					05/19/18 03:14	2.15
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					05/19/18 03:14	2.15
Toluene-d8 (Surr)	100		70 - 130					05/19/18 03:14	2.15

Client Sample ID: 105225-001/MWL-SV05-300

Lab Sample ID: 320-38760-23

Date Collected: 04/25/18 11:35

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0043	J	0.0085	0.00030	ppm v/v			05/19/18 04:10	1.7
Benzene	0.00021	J	0.00068	0.00013	ppm v/v			05/19/18 04:10	1.7
Benzyl chloride	ND		0.0014	0.00028	ppm v/v			05/19/18 04:10	1.7
Bromodichloromethane	ND		0.00051	0.00011	ppm v/v			05/19/18 04:10	1.7
Bromoform	ND		0.00068	0.00012	ppm v/v			05/19/18 04:10	1.7
Bromomethane	ND		0.0014	0.00057	ppm v/v			05/19/18 04:10	1.7
2-Butanone (MEK)	ND		0.0014	0.00034	ppm v/v			05/19/18 04:10	1.7
Carbon disulfide	0.00080	J	0.0014	0.00013	ppm v/v			05/19/18 04:10	1.7
Carbon tetrachloride	0.00094	J	0.0014	0.00011	ppm v/v			05/19/18 04:10	1.7
Chlorobenzene	ND		0.00051	0.00011	ppm v/v			05/19/18 04:10	1.7
Chloroethane	ND		0.0014	0.00052	ppm v/v			05/19/18 04:10	1.7
Chloroform	0.00093		0.00051	0.00016	ppm v/v			05/19/18 04:10	1.7
Chloromethane	ND		0.0014	0.00033	ppm v/v			05/19/18 04:10	1.7
Dibromochloromethane	ND		0.00068	0.00013	ppm v/v			05/19/18 04:10	1.7
1,2-Dibromoethane (EDB)	ND		0.0014	0.00013	ppm v/v			05/19/18 04:10	1.7
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00068	0.00026	ppm v/v			05/19/18 04:10	1.7
1,2-Dichlorobenzene	ND		0.00068	0.00022	ppm v/v			05/19/18 04:10	1.7
1,3-Dichlorobenzene	ND		0.00068	0.00019	ppm v/v			05/19/18 04:10	1.7
1,4-Dichlorobenzene	ND		0.00068	0.00025	ppm v/v			05/19/18 04:10	1.7
Dichlorodifluoromethane	0.032		0.00068	0.00025	ppm v/v			05/19/18 04:10	1.7
1,1-Dichloroethane	0.0021		0.00051	0.00012	ppm v/v			05/19/18 04:10	1.7
1,2-Dichloroethane	ND		0.0014	0.00015	ppm v/v			05/19/18 04:10	1.7
1,1-Dichloroethene	0.028		0.0014	0.00022	ppm v/v			05/19/18 04:10	1.7

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105225-001/MWL-SV05-300

Lab Sample ID: 320-38760-23

Date Collected: 04/25/18 11:35

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	0.0010		0.00068	0.00015	ppm v/v			05/19/18 04:10	1.7
trans-1,2-Dichloroethene	ND		0.00068	0.00017	ppm v/v			05/19/18 04:10	1.7
1,2-Dichloropropane	ND		0.00068	0.00041	ppm v/v			05/19/18 04:10	1.7
cis-1,3-Dichloropropene	ND		0.00068	0.00018	ppm v/v			05/19/18 04:10	1.7
trans-1,3-Dichloropropene	ND		0.00068	0.00015	ppm v/v			05/19/18 04:10	1.7
Ethylbenzene	ND		0.00068	0.00011	ppm v/v			05/19/18 04:10	1.7
4-Ethyltoluene	ND		0.00068	0.00032	ppm v/v			05/19/18 04:10	1.7
Hexachlorobutadiene	ND		0.0034	0.00073	ppm v/v			05/19/18 04:10	1.7
2-Hexanone	ND		0.00068	0.00015	ppm v/v			05/19/18 04:10	1.7
4-Methyl-2-pentanone (MIBK)	ND		0.00068	0.00023	ppm v/v			05/19/18 04:10	1.7
Methylene Chloride	0.0011		0.00068	0.00012	ppm v/v			05/19/18 04:10	1.7
Styrene	ND		0.00068	0.00010	ppm v/v			05/19/18 04:10	1.7
1,1,2,2-Tetrachloroethane	ND		0.00068	0.00012	ppm v/v			05/19/18 04:10	1.7
Tetrachloroethene	0.098		0.00068	0.000087	ppm v/v			05/19/18 04:10	1.7
Toluene	0.00014	J	0.00068	0.000087	ppm v/v			05/19/18 04:10	1.7
1,1,2-Trichloro-1,2,2-trifluoroethane	0.11		0.00068	0.00028	ppm v/v			05/19/18 04:10	1.7
1,2,4-Trichlorobenzene	ND		0.0034	0.00074	ppm v/v			05/19/18 04:10	1.7
1,1,1-Trichloroethane	0.0017		0.00051	0.00011	ppm v/v			05/19/18 04:10	1.7
1,1,2-Trichloroethane	ND		0.00068	0.00011	ppm v/v			05/19/18 04:10	1.7
Trichloroethene	0.11		0.00068	0.00018	ppm v/v			05/19/18 04:10	1.7
Trichlorofluoromethane	0.033		0.00068	0.00033	ppm v/v			05/19/18 04:10	1.7
1,2,4-Trimethylbenzene	ND		0.0014	0.00028	ppm v/v			05/19/18 04:10	1.7
1,3,5-Trimethylbenzene	ND		0.00068	0.00021	ppm v/v			05/19/18 04:10	1.7
Vinyl acetate	ND		0.0014	0.00025	ppm v/v			05/19/18 04:10	1.7
Vinyl chloride	ND		0.00068	0.00020	ppm v/v			05/19/18 04:10	1.7
m,p-Xylene	ND		0.0014	0.00017	ppm v/v			05/19/18 04:10	1.7
o-Xylene	ND		0.00068	0.000092	ppm v/v			05/19/18 04:10	1.7
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/19/18 04:10	1.7
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					05/19/18 04:10	1.7
Toluene-d8 (Surr)	101		70 - 130					05/19/18 04:10	1.7

Client Sample ID: 105226-001/MWL-SV05-400

Lab Sample ID: 320-38760-24

Date Collected: 04/25/18 11:41

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0054		0.0050	0.00018	ppm v/v			05/19/18 05:08	1
Benzene	0.00034	J	0.00040	0.000079	ppm v/v			05/19/18 05:08	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/19/18 05:08	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/19/18 05:08	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/19/18 05:08	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/19/18 05:08	1
2-Butanone (MEK)	0.00051	J	0.00080	0.00020	ppm v/v			05/19/18 05:08	1
Carbon disulfide	0.00022	J	0.00080	0.000078	ppm v/v			05/19/18 05:08	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-38760-1

Client Sample ID: 105226-001/MWL-SV05-400

Lab Sample ID: 320-38760-24

Date Collected: 04/25/18 11:41

Matrix: Air

Date Received: 05/02/18 12:10

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	0.00047	J	0.00080	0.000064	ppm v/v			05/19/18 05:08	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/19/18 05:08	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/19/18 05:08	1
Chloroform	0.00075		0.00030	0.000095	ppm v/v			05/19/18 05:08	1
Chloromethane	0.00028	J	0.00080	0.00020	ppm v/v			05/19/18 05:08	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/19/18 05:08	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/19/18 05:08	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/19/18 05:08	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/19/18 05:08	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/19/18 05:08	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/19/18 05:08	1
Dichlorodifluoromethane	0.015		0.00040	0.00015	ppm v/v			05/19/18 05:08	1
1,1-Dichloroethane	0.0015		0.00030	0.000072	ppm v/v			05/19/18 05:08	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/19/18 05:08	1
1,1-Dichloroethene	0.014		0.00080	0.00013	ppm v/v			05/19/18 05:08	1
cis-1,2-Dichloroethene	0.00076		0.00040	0.000089	ppm v/v			05/19/18 05:08	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/19/18 05:08	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/19/18 05:08	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/19/18 05:08	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/19/18 05:08	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/19/18 05:08	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/19/18 05:08	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/19/18 05:08	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/19/18 05:08	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/19/18 05:08	1
Methylene Chloride	0.00075		0.00040	0.000072	ppm v/v			05/19/18 05:08	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/19/18 05:08	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/19/18 05:08	1
Tetrachloroethene	0.092		0.00040	0.000051	ppm v/v			05/19/18 05:08	1
Toluene	0.0013		0.00040	0.000051	ppm v/v			05/19/18 05:08	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.052		0.00040	0.00016	ppm v/v			05/19/18 05:08	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/19/18 05:08	1
1,1,1-Trichloroethane	0.0016		0.00030	0.000065	ppm v/v			05/19/18 05:08	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/19/18 05:08	1
Trichloroethene	0.089		0.00040	0.00011	ppm v/v			05/19/18 05:08	1
Trichlorofluoromethane	0.024		0.00040	0.00020	ppm v/v			05/19/18 05:08	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/19/18 05:08	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/19/18 05:08	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/19/18 05:08	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/19/18 05:08	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/19/18 05:08	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/19/18 05:08	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/19/18 05:08	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 130					05/19/18 05:08	1
Toluene-d8 (Surr)	101		70 - 130					05/19/18 05:08	1

TestAmerica Sacramento

FIELD SAMPLING FORMS
OCTOBER 2018 SOIL-VAPOR MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 8888 Facility: MWL Date: 10/30/18 Time: 0800

Activities: Soil Vapor Monitoring and Sampling

(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: 58 °F Wind Speed: 3 MPH Humidity: 50 % Wind Chill: 58 °F

Chemicals Used: ☐ None ☒ Preservatives in sample bottles

☐ Other: _____

Hospital/Clinic: Sandia Medial Clinic Bldg. 831

Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Tim Jackson
Printed Name

Robert Lynch
Printed Name

William Gibson
Printed Name

Printed Name

Printed Name

Printed Name

Printed Name

Attendees

T. Jackson
Signature

Robert Lynch
Signature

William Gibson
Signature

Signature

Signature

Signature

Signature

Notes

Soil Vapor Sampling Log Form

[illegible]

Field Notes:

Field Notes:
Elevation @ ~ 5200 ft asl
PID = 0.1 ppm
ARCOL = 619265

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (ft ³)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-SV03-FB	10/30/16	1011	3400211	NA	NA	-24	-8	OB split
MWL-SV03-50		1015	NA	0.1	17	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1015	↓	↓	↓	↓	↓	
		1017	34002029	NA	NA	-25	-8	
MWL-SV03-100		1018	NA	0.1	15	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1018	↓	↓	↓	↓	↓	
		1020	34000192	NA	NA	-25	-8	
MWL-SV03-200		1021	NA	0.1	17	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1022	↓	↓	↓	↓	↓	
		1023	34001303	NA	NA	-25	-8	
MWL-SV03-300		1024	NA	0.1	14	NA	NA	OB split
↓		↓	↓	↓	↓	↓	↓	
		1026	↓	↓	↓	↓	↓	
		1033	3400211	NA	NA	-25	-2	
MWL-SV03-400		1039	NA 10130118	0.1	16	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1040	↓	↓	↓	↓	↓	
		1055	34000153	NA	NA	-25	-8	OB split

Field Notes:

Elevation at ~5200 fms /
PID Background = 0.1 ppm

MWL-SV03-300 - A canister
#34002111 received w/ 19 PSI

ARCOC = 619264

slow sample fill @ 300' port, 400' port

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MAL-5004-F3	10/30/12	932	34000178	NA	NA	-24	-8	OB split
MAL-5004-50		935	NA	0.0	16	NA	NA	
		↓	↓	↓	↓	↓	↓	
		936	↓	↓	↓	↓	↓	
		939	34001802	NA	NA	-24	-8	
MAL-5004-100		940	NA	0.1	15	NA	NA	
		↓	↓	↓	↓	↓	↓	
		940	↓	↓	↓	↓	↓	
		942	34000008	NA	NA	-24	-8	
MAL-5004-200		943	NA	0.1	16	NA	NA	
		↓	↓	↓	↓	↓	↓	
		944	↓	↓	↓	↓	↓	
		947	34000889	NA	NA	-24	-8	
MAL-5004-300		948	NA	0.1	17	NA	NA	
		↓	↓	↓	↓	↓	↓	
		949	↓	↓	↓	↓	↓	
		951	34000091	NA	NA	-25	-8	OB split
MAL-5004-0400		950	NA	0.1	17	NA	NA	
		↓	↓	↓	↓	↓	↓	
		959	↓	↓	↓	↓	↓	
		1000	34000209	NA	NA	-25	-8	OB split

Field Notes:

Elevation @ ~ 5200 fams/

PID = 0.1 ppm

ARLOC 619263

10m sample fill @ 50' post, 200' post,

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L3)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-SV05-F13	10/30/10	845	34000494	NA	NA	-24	-8	OB split
MWL-SV05-50		851	NA	0	10	NA	NA	
		↓	↓	↓	↓	↓	↓	
		854	8019	NA	NA	-24	-8	SA
		↓	34002040	↓	↓	-24	-8	Duplicate
MWL-SV05-100		855	NA	0	10	NA	NA	
		↓	↓	↓	↓	↓	↓	
		856	↓	↓	↓	↓	↓	
		857	34002022	NA	NA	-24	-8	
MWL-SV05-200		858	NA	0	15	NA	NA	
		↓	↓	↓	↓	↓	↓	
		859	↓	↓	↓	↓	↓	
		900	34001443	NA	NA	-24	-8	
MWL-SV05-300		901	NA	0	10	NA	NA	
		↓	↓	↓	↓	↓	↓	
		902	↓	↓	↓	↓	↓	
		904	7530	NA	NA	-24	-8	OB split
MWL-SV05-400		908	NA	0.1	17	NA	NA	
		↓	↓	↓	↓	↓	↓	
		909	↓	↓	↓	↓	↓	
		911	34001462	NA	NA	-24	-8	SA
		↓	34001120	↓	↓	-24	-8	Duplicate

Field Notes:

Elevation at ~ 5200 ft AMSL.

PID Background = 0.9 ppm

ARCOG: 619262

slow sample fill @ 50' pit

**SUMMARY SHEET FOR
OCTOBER 2018 SOIL-VAPOR SAMPLES**

Sample Summary for Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

Well ID	Sample Date	Sample ID / Port	SUMMA Number	ARCOC	Sample Number	Sample Type	Associated Field Blank (ARCOC #/Sample #)	Comments
Mixed Waste Landfill Soil Vapor Monitoring: Project Task Number 195122.10.11.08 / Service Order Number CF 01-19								
MWL-SV01	30-Oct-18	MWL-SV01-42.5	9097	619266	106641	Environmental	619266 / 106640	
		MWL-SV-FB 5	8296		106640	Field QC	n/a	Ultra Pure N2
MWL-SV02	30-Oct-18	MWL-SV02-41.5	34001255	619265	106639	Environmental	619265 / 106638	
		MWL-SV-FB 4	34000797		106638	Field QC	n/a	Ultra Pure N2
MWL-SV03	30-Oct-18	MWL-SV03-50	34002029	619264	106633	Environmental	619264 / 106632	
		MWL-SV03-100	34000198		106634	Environmental		
		MWL-SV03-200	34001303		106635	Environmental		
		MWL-SV03-300	34002111		106636	Environmental		
		MWL-SV03-400	34000153		106637	Environmental		
		MWL-SV-FB 3	34001211		106632	Field QC	n/a	Ultra Pure N2
MWL-SV04	30-Oct-18	MWL-SV04-50	34001802	619263	106627	Environmental	619263 / 106626	
		MWL-SV04-100	34000008		106628	Environmental		
		MWL-SV04-200	34000889		106629	Environmental		
		MWL-SV04-300	34000091		106630	Environmental		
		MWL-SV04-400	34000209		106631	Environmental		
		MWL-SV-FB 2	34000148		106626	Field QC	n/a	Ultra Pure N2
MWL-SV05	30-Oct-18	MWL-SV05-50	8019	619262	106619	Environmental	619262 / 106618	
		MWL-SV05-50	34002040		106620	Duplicate		
		MWL-SV05-100	34002022		106621	Environmental		
		MWL-SV05-200	34001443		106622	Environmental		
		MWL-SV05-300	7530		106623	Environmental		
		MWL-SV05-400	34001462		106624	Environmental		
		MWL-SV05-400	34001128		106625	Duplicate		
		MWL-SV-FB 1	34000494		106618	Field QC	n/a	Ultra Pure N2

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES

MIXED WASTE LANDFILL

SOIL-VAPOR MONITORING

OCTOBER 2018

AR/COC NUMBERS 619262, 619263, 619264, 619265, 619266

Memorandum

Date: December 11, 2018

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMMP
ARCOC: 619262, 619263, 619264, 619265 and 619266
SDG: 320-45032
Laboratory: TestAmerica Laboratories, Inc. -West Sacramento
Project/Task: 195122.10.11.08
Analysis: VOCs by method TO-15

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Twenty-four samples were prepared and analyzed with accepted procedures using method EPA TO-15 (Determination of VOCs in Air collected in specially prepared canisters and analyzed by GC-MS). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. Acetone and vinyl chloride were detected at \leq the PQL in FB 1, sample 320-45032-1 associated with samples -2 through -8. The acetone results for samples -2, -3, -4 and -8 were detects \leq the PQL and will be **qualified 0.005U,B2**, non-detect at the PQL. The vinyl chloride result for sample -2 was a detect \leq the PQL and will be **qualified 0.0004U,B2**, non-detect at the PQL.
2. Acetone; toluene; m,p-xylene and o-xylene were detected at \leq the PQL in FB 2, sample -9 associated with samples -10 through -14. The acetone results for samples -10, -11 and -13 were detects \leq the PQL and will be **qualified 0.005U,B2**, non-detect at the PQL. The toluene results for all associated samples were detects \leq the PQL and will be **qualified 0.0004U,B2**, non-detect at the PQL. The m,p-xylene results for samples -11 and -12 were detects \leq the PQL and will be **qualified 0.0008U,B2**, non-detect at the PQL. The o-xylene results for samples -11 and -12 were detects \leq the PQL and will be **qualified 0.0004U,B2**, non-detect at the PQL.
3. The vinyl acetate results for samples -4 and -22 were $>$ the PQL but since the mass spectra were inconclusive, the results will be **qualified N,Z1**.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria with the following exception. The initial calibration intercept was positive and > the MDL for 4-methyl-2-pentanone. The associated sample results were non-detect and will not be qualified.

Blanks

No target analytes were detected in the blanks except as noted above in the Summary section and as follows.

Acetone and vinyl chloride were detected at \leq the PQL in FB 1, sample -1 associated with samples -2 through -8. The acetone results for samples -5, -6 and -7 were detects > the PQL and >10X the FB value and will not be qualified. The vinyl chloride results for samples -3 through -8 were non-detect and will not be qualified.

Acetone; carbon disulfide; tetrachloroethene; toluene; m,p-xylene and o-xylene were detected at \leq the PQL in FB 2, sample -9 associated with samples -10 through -14. The acetone results for samples -12 and -14 were detects > the PQL and >10X the FB value and will not be qualified. The m,p-xylene and o-xylene results for samples -10, -13 and -14 were non-detect and will not be qualified. The associated sample results for carbon disulfide and tetrachloroethene were either non-detect or detects >5X the FB values and will not be qualified.

Tetrachloroethene was detected at \leq the PQL in FB 4, sample -21 associated with sample -22. The associated sample result was a detect > the PQL and > 5X the FB value and will not be qualified.

It should be noted that, according to the case narrative, the canister certification batches indicated that trace amounts of acetone, ethylbenzene, methylene chloride and xylenes were present in the canisters.

Surrogates

All surrogate acceptance criteria were met.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS/MSD was not performed.

Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

The LCS/LCSD met all QC acceptance criteria for accuracy and precision.

Detection Limits/Dilutions

All detection limits were properly reported and correctly adjusted for dilutions performed due to high amounts of target analytes present in the samples.

The following samples were diluted for all target analytes: Sample -12 (2.41X); -16 (1.63X); -17 (2.49X); -18 (3.05X); -19 (2.4X) and -20 (4.14X).

Sample -22 was diluted 7.43X for trichlorofluoromethane and 2.53X for all remaining target analytes.

Samples -2, -3 and -4 were diluted 3.24X, 3.05X and 3.47X respectively for trichlorofluoromethane.

Sample -5 was diluted 4.07X for tetrachloroethene, trichloroethene and 1,1,2-trichloro-1,2,2-trifluoroethane.

Sample -6 was diluted 3.12X for trichloroethene.

Sample -11 was diluted 3.0X for tetrachloroethene and trichloroethene.

Sample -13 was diluted 3.01X for tetrachloroethene.

Sample -14 was diluted 2.98X for tetrachloroethene.

Sample -24 was diluted 9.09X for tetrachloroethene and trichlorofluoromethane.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Mass spectra acceptability were verified during data validation and met QC acceptance criteria except as noted above in the Summary section. Sample results < the PQL with missing ions or poor ratios were qualified J by the laboratory and were not further qualified during data validation.

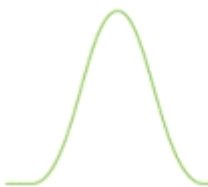
FBs were submitted with each ARCOC. Two field duplicate pairs were submitted with ARCOC 619262. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan

Level: I

Date: 12/12/18



Sample Findings Summary



AR/COC: 619262, 619263, 619264, 619265, 619266

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15			
	106619-001/MWL-SV05-50	ACETONE (67-64-1)	0.005U, B2
	106619-001/MWL-SV05-50	VINYL CHLORIDE (75-01-4)	0.0004U, B2
	106620-001/MWL-SV05-50	ACETONE (67-64-1)	0.005U, B2
	106621-001/MWL-SV05-100	ACETONE (67-64-1)	0.005U, B2
	106621-001/MWL-SV05-100	VINYL ACETATE (108-05-4)	N, Z1
	106625-001/MWL-SV05-400	ACETONE (67-64-1)	0.005U, B2
	106627-001/MWL-SV04-50	ACETONE (67-64-1)	0.005U, B2
	106627-001/MWL-SV04-50	TOLUENE (108-88-3)	0.0004U, B2
	106628-001/MWL-SV04-100	ACETONE (67-64-1)	0.005U, B2
	106628-001/MWL-SV04-100	M,P-XYLENE (179601-23-1)	0.0008U, B2
	106628-001/MWL-SV04-100	O-XYLENE (95-47-6)	0.0004U, B2
	106628-001/MWL-SV04-100	TOLUENE (108-88-3)	0.0004U, B2
	106629-001/MWL-SV04-200	M,P-XYLENE (179601-23-1)	0.0008U, B2
	106629-001/MWL-SV04-200	O-XYLENE (95-47-6)	0.0004U, B2
	106629-001/MWL-SV04-200	TOLUENE (108-88-3)	0.0004U, B2
	106630-001/MWL-SV04-300	ACETONE (67-64-1)	0.005U, B2
	106630-001/MWL-SV04-300	TOLUENE (108-88-3)	0.0004U, B2
	106631-001/MWL-SV04-400	TOLUENE (108-88-3)	0.0004U, B2
	106639-001/MWL-SV02-41.5	VINYL ACETATE (108-05-4)	N, Z1

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOC#: 619262, 619263, 619264, 619265 and 619266	Site/Project: MWL LTMMP	Validation Date: 12/06/2018
SDG #:320-45032	Laboratory: TA Laboratories Inc. - West Sacramento, CA	Validator: Linda Thal
Matrix: Air	# of Samples: 24	CVR present: Yes
ARCOC(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
none			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
none								

Comments: Collected 10/30/2018

Validated by:

L Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCO #s: 619262, 619263, 619264, 619265 and 619266	SDG: 320-45032	Matrix: Air
Laboratory Sample IDs: 320-45032-1 through -24		
Method/Batch #s: TO-15/259036 (samples -8 thru -21); 259283 (samples -1 thru -7, -22, -23, -24; -11DL, -13DL, -14DL); 259475 (samples -2DL, -3DL, -4DL, -5DL, -6DL -22DL, -24DL)	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB 2 -9	FB 3 -15	FB 4 -21	X5
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D									
259036 (samples -8 thru -21)													
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00048J	✓	✓	NA
Carbon disulfide	NA	✓	✓	✓	✓	NA	✓	✓	✓	.000096J	✓	✓	NA
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00014J	✓	.000094J	.00047
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.000064J	✓	✓	NA
m,p-Xylene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00017J	✓	✓	NA
o-Xylene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.000076J	✓	✓	NA
4-Methyl-2-pentanone	+0.00015	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	NA
Surrogate Recovery Outliers													
Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R					
none													
IS Outliers													
	FBZ		Chl-d5		1,4-DCB-d4								
Sample ID	Area	RT	Area	RT	Area	RT							
none													

Comments: HTs OK. LCS/LCSD (lab limits). RSDs and CCVs 30%. ATMS 9 ICAL 10/09/2018. Linear: 4-Methyl-2-pentanone
 Samples missing ions that were "J" Qualified by the lab were not further qualified during DV
 Canister certification batches indicated trace amounts of Acetone, Ethylbenzene, Methylene chloride, and Xylenes were present.

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #:619262, 619263, 619264, 619265 and 619266	SDG: 320-45032	Matrix: Air
Laboratory Sample IDs: 320-45032-1 through -24		
Method/Batch #: TO-15/259036 (samples -8 thru -21); 259283 (samples -1 thru -7, -22, -23, -24; -11DL, -13DL, -14DL); 259475 (samples -2DL, -3DL, -4DL, -5DL, -6DL -22DL, -24DL)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB 1 -1	X5 (X10)	FB 5 -23	X5			
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D												
259283 (samples -1 thru -7, -22, -23, -24; -11DL, -13DL, -14DL)																
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00047J	(.0047)	✓	NA			
Vinyl chloride	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00036J	.0018	✓	NA			
4-Methyl-2-pentanone	+0.00015	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	✓	NA			
259475 (samples -2DL, -3DL, -4DL, -5DL, -6DL -22DL, -24DL)																
none																
Surrogate Recovery Outliers																
Sample ID	1,2-DCA-d4 %R		Toluene-d8 %R		BFB %R			Sample ID		1,2-DCA-d4 %R		Toluene-d8 %R		BFB %R		
none																
IS Outliers																
	FBZ		Chl-d5			1,4-DCB-d4										
Sample ID	Area	RT	Area		RT	Area		RT								
none																

Comments: HTs OK. LCS/LCSD (lab limits). RSDs and CCVs 30%. ATMS 9 ICAL 10/09/2018.

Samples missing ions that were "J" Qualified by the lab were not further qualified during DV

Canister certification batches indicated trace amounts of Acetone, Ethylbenzene, Methylene chloride, and Xylenes were present.

Sample -4 (1X) and sample -22 (2.53X) – Vinyl acetate reported as detect > PQL; inconclusive evidence to support this "N"

Samples diluted for all target analytes:

-12 (2.41X); -16 (1.63X); -17 (2.49X); -18 (3.05X); -19(2.4X) -20 (4.14X); -22 (2.53X and -22DL 7.43X for Trichlorofluoromethane)

Samples diluted for some target analytes:

- 2DL 3.24X Trichlorofluoromethane
- 3DL 3.05X Trichlorofluoromethane
- 4DL 3.47X Trichlorofluoromethane
- 5DL 4.07X PCE, TCE, 1,1,2-Trichloro-1,2,2-trifluoroethane
- 6DL 3.12X TCE
- 11DL 3.0X PCE, TCE
- 13DL 3.01X PCE
- 14DL 2.98X PCE
- 24DL 9.09X PCE and Trichlorofluoromethane

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY



320-45032 Chain of Custody

Page 1 of 1

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC 619262

Project Name: MWL LTMMF
 Project/Task Manager: Timmie Jackson
 Project/Task Number: 195122.10.11.08
 Service Order: CF01-19

Date Samples Shipped: *11-1-18*
 Carrier/Waybill No.: *289956*
 Lab Contact: Lee Ann Heathcote/916-373-5600
 Lab Destination: TAL-WS
 Contract No.: 1636780

SMO Authorization: *Timmie Jackson*
 SMO Contact Phone: *916-373-5600*
 Wendy Palencia/505-844-3132
 Send Report to SMO:
 Stephanie Montaño/505-284-2553

☐ Waste Characterization
☐ RMA
☐ Released by COC No. ☒ 4° Celsius

Bill to: Sandia National Laboratories (Accounts Payable),
 P.O. Box 5800, MS-0154
 Albuquerque, NM 87185-0154

Tech Area:

Building: Room: Operational Site:

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
106618	001	MWL-SV-FB 1	NA	10/30/18 08:45	UPN	S	6 L	None	G	FB	VOC (TO-15)	
106619	001	MWL-SV05-50	50	10/30/18 08:54	SG	S	6 L	None	G	SA	VOC (TO-15)	
106620	001	MWL-SV05-50	50	10/30/18 08:54	SG	S	6 L	None	G	DU	VOC (TO-15)	
106621	001	MWL-SV05-100	100	10/30/18 08:57	SG	S	6 L	None	G	SA	VOC (TO-15)	
106622	001	MWL-SV05-200	200	10/30/18 09:00	SG	S	6 L	None	G	SA	VOC (TO-15)	
106623	001	MWL-SV05-300	300	10/30/18 09:04	SG	S	6 L	None	G	SA	VOC (TO-15)	
106624	001	MWL-SV05-400	400	10/30/18 09:11	SG	S	6 L	None	G	SA	VOC (TO-15)	
106625	001	MWL-SV05-400	400	10/30/18 09:11	SG	S	6 L	None	G	DU	VOC (TO-15)	

Last Chain: ☐ Yes

Sample Tracking

SMO Use

Special Instructions/QC Requirements:

Conditions on

Validation Req'd: ☒ Yes

Date Entered:

EDD ☒ Yes

Receipt

Background: ☐ Yes

Entered by:

Turnaround Time ☐ 7-Day* ☐ 15-Day* ☒ 30-DayConfirmatory: ☐ Yes

QC inits.:

Negotiated TAT ☐

Sample Team Members

Name

Signature

Init.

Company/Organization/Phone/Cell

Sample Disposal ☐ Return to Client ☒ Disposal by Lab

William Gibson

*William Gibson**WJG*

SNL/08888/505-239-7367/505-239-7367

Return Samples By:

Robert Lynch

*Robert Lynch**RL*

SNL/08888/505-844-4013/505-250-7090

Comments: Elevation and ambient pressure information on attached forms.

Tim Jackson

*Tim Jackson**TJ*

SNL/08888/505-284-2547/505-263-6639

Lab Use

Relinquished by *Timmie Jackson*Org. *88888*Date *10/30/18*Time *1350*

Relinquished by

Org.

Date

Time

Received by *Timmie Jackson*Org. *00042*Date *10-30-18*Time *1350*

Received by

Org.

Date

Time

Relinquished by *Emily James*Org. *00042*Date *11-1-18*Time *1059*

Relinquished by

Org.

Date

Time

Received by *Emily James*Org. *TA-SAC*Date *11/8/18*Time *9:15*

Received by

Org.

Date

Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No.		SMO Use		AR/COC		619263						
Project Name: MWL LTMMF		Date Samples Shipped: 11-1-18		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 289956		SMO Contact Phone: Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154						
Project/Task Number: 195122.10.11.08		Lab Contact: Lee Ann Heathcote/916-373-5600		Send Report to SMO: Stephanie Montaño/505-284-2553								
Service Order: CF01-19		Lab Destination: TAL-WS		Contract No.: 1636780								
Tech Area:		Operational Site:										
Building:		Room:										
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
106626	001	MWL-SV-FB 2	NA	10/30/18 09:32	UPN	S	6 L	None	G	FB	VOC (TO-15)	
106627	001	MWL-SV04-50	50	10/30/18 09:39	SG	S	6 L	None	G	SA	VOC (TO-15)	
106628	001	MWL-SV04-100	100	10/30/18 09:42	SG	S	6 L	None	G	SA	VOC (TO-15)	
106629	001	MWL-SV04-200	200	10/30/18 09:47	SG	S	6 L	None	G	SA	VOC (TO-15)	
106630	001	MWL-SV04-300	300	10/30/18 09:51	SG	S	6 L	None	G	SA	VOC (TO-15)	
106631	001	MWL-SV04-400	400	10/30/18 10:00	SG	S	6 L	None	G	SA	VOC (TO-15)	
<div> <div> Last Chain: <input type="checkbox"/> Yes Validation Req'd: <input checked="" type="checkbox"/> Yes Background: <input type="checkbox"/> Yes Confirmatory: <input type="checkbox"/> Yes </div> <div> Sample Tracking Date Entered: Entered by: QC initials: </div> <div> SMO Use Date Entered: Entered by: QC initials: </div> <div> Special Instructions/QC Requirements: EDD <input checked="" type="checkbox"/> Yes Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day Negotiated TAT <input type="checkbox"/> Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab Return Samples By: </div> <div> Conditions on Receipt </div> </div>												
<div> <div> Sample Team Members Name Signature Init Company/Organization/Phone/Cell William Gibson [Signature] [Init] SNL/08888/505-239-7367/505-239-7367 Robert Lynch [Signature] [Init] SNL/08888/505-844-4013/505-250-7090 Tim Jackson [Signature] [Init] SNL/08888/505-284-2547/505-263-6639 </div> <div> Comments: Elevation and ambient pressure information on attached forms. </div> </div>												
<div> <div> Relinquished by [Signature] Org. 08888 Date 10/30/18 Time 1350 Received by [Signature] Org. 00642 Date 10-30-18 Time 1350 Relinquished by [Signature] Org. 00472 Date 11-1-18 Time 1059 Received by [Signature] Org. TA-SAC Date 11/8/18 Time 9:15 </div> <div> Relinquished by Org. Date Time Received by Org. Date Time Relinquished by Org. Date Time Received by Org. Date Time </div> </div>												

*Prior confirmation with SMO required for 7 and 15 day TAT

Page 1613 of 1617

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No.		SMO Use		AR/COC		619264						
Project Name: MWL LTMMF		Date Samples Shipped: 11-1-18		SMO Authorization: T-1-18		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No.						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 289956		SMO Contact Phone: Wendy Palencia/505-844-3132		<input checked="" type="checkbox"/> 4° Celsius						
Project/Task Number: 195122.10.11.08		Lab Contact: Lee Ann Heathcote/916-373-5600		Send Report to SMO: Stephanie Montaño/505-284-2553		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154						
Service Order: CF01-19		Lab Destination: TAL-WS		Contract No.: 1636780								
Tech Area:		Operational Site:										
Building:		Room:										
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
106632	001	MWL-SV-FB 3	NA	10/30/18 10:11	UPN	S	6 L	None	G	FB	VOC (TO-15)	
106633	001	MWL-SV03-50	50	10/30/18 10:17	SG	S	6 L	None	G	SA	VOC (TO-15)	
106634	001	MWL-SV03-100	100	10/30/18 10:20	SG	S	6 L	None	G	SA	VOC (TO-15)	
106635	001	MWL-SV03-200	200	10/30/18 10:23	SG	S	6 L	None	G	SA	VOC (TO-15)	
106636	001	MWL-SV03-300	300	10/30/18 10:33	SG	S	6 L	None	G	SA	VOC (TO-15)	
106637	001	MWL-SV03-400	400	10/30/18 10:55	SG	S	6 L	None	G	SA	VOC (TO-15)	
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt		
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes						
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Confirmatory: <input type="checkbox"/> Yes		QC initials:				Negotiated TAT <input type="checkbox"/>						
Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab						
	William Gibson	<i>William Gibson</i>	WG	SNL/08888/505-239-7367/505-239-7367		Return Samples By:						
	Robert Lynch	<i>Robert Lynch</i>	RL	SNL/08888/505-844-4013/505-250-7090		Comments: Elevation and ambient pressure information on attached forms.						
	Tim Jackson	<i>Tim Jackson</i>	TJ	SNL/08888/505-284-2547/505-263-6639								
Relinquished by: T-1-18		Org. 8000	Date 10/30/18	Time 1350	Relinquished by:		Org.	Date	Time			
Received by: T-1-18		Org. 00542	Date 10/30/18	Time 1350	Received by:		Org.	Date	Time			
Relinquished by: T-1-18		Org. 00642	Date 11/1/18	Time 1059	Relinquished by:		Org.	Date	Time			
Received by: Emily James		Org. TA-SAC	Date 11/8/18	Time 9:15	Received by:		Org.	Date	Time			

*Prior confirmation with SMO required for 7 and 15 day TAT

Page 1614 of 1617

Page 1 of 1

AR/COC	619265
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Relinquished by T. J. King	Org. 8880	Date 10/30/18	Time 1350	Relinquished by	Org.	Date	Time
Received by T. J. King	Org. 00542	Date 10-30-18	Time 1350	Received by	Org.	Date	Time
Relinquished by T. J. King	Org. 00642	Date 11-1-18	Time 1059	Relinquished by	Org.	Date	Time
Received by Emily James	Org. TA-SAC	Date 11/8/18	Time 9:15	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT VERIFICATION REVIEW FORMS
Mixed Waste Landfill Soil-Vapor Monitoring
October 2018

AR/COC Number	Sample Type
619262	Environmental*
619263	Environmental*
619264	Environmental*
619265	Environmental*
619266	Environmental*

* AR/COC forms are provided in the Data Validation Section of this Annex.

Contract Verification Form (CVR)

Project Leader Jackson

Project Name MWL LTMMP **Project/Task No.** 195122_10.11.08

ARCOC No. 619262, 619263, 619264, 619265 & 619266

Analytical Lab TAL-WS

SDG No. 320-45032-1

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	N/A		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	X		
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	N/A		
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data a) Method or reagent blank data reported and met for all samples	X		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone and vinyl chloride detected in MWL-SV-FB 1. Acetone, carbon disulfide, tetrachloroethene, toluene, m,p-xylene and o-xylene detected in MWL-SV-FB 2. Tetrachloroethene detected in MWL-SV-FB 4.
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		

Line No.	Item	Yes	No	Comments
	c) Continuing calibration provided	X		
	d) Internal standard performance data provided	X		
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668)	N/A		
	a) 12-hour tune check provided			
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			

Line No.	Item	Yes	No	Comments
	b) Continuing calibration provided	N/A		
	c) CRI provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	N/A		
	a) Initial calibration provided			
	b) Continuing calibration provided	N/A		
	c) ICP interference check sample data provided	N/A		
	d) ICP serial dilution provided	N/A		
	e) Instrument run logs provided	N/A		
4.6	Radiochemistry and General Chemistry	N/A		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		

Line No.	Item	Yes	No	If no, explain
5.3	Verification or reanalysis requested from lab	N/A		

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? ☐ Yes ☒ No

Based on the review, this data package is complete. ☒ Yes ☐ No

Reviewed by: Wendy Palencia Date: 12-05-2018 10:27:00

Closed by: Wendy Palencia Date: 12-05-2018 10:27:00

CERTIFICATES OF ANALYSIS

Mixed Waste Landfill

October 2018 Soil-Vapor Samples

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106618-001/MWL-SV-FB 1

Lab Sample ID: 320-45032-1

Date Collected: 10/30/18 08:45

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.00047	J	0.0050	0.00018	ppm v/v			11/14/18 23:07	1
Benzene	ND		0.00040	0.000079	ppm v/v			11/14/18 23:07	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 23:07	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/14/18 23:07	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/14/18 23:07	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 23:07	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/14/18 23:07	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			11/14/18 23:07	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			11/14/18 23:07	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/14/18 23:07	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 23:07	1
Chloroform	ND		0.00030	0.000095	ppm v/v			11/14/18 23:07	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/14/18 23:07	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/14/18 23:07	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/14/18 23:07	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 23:07	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 23:07	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/14/18 23:07	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/14/18 23:07	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			11/14/18 23:07	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			11/14/18 23:07	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/14/18 23:07	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			11/14/18 23:07	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			11/14/18 23:07	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/14/18 23:07	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 23:07	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/14/18 23:07	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/14/18 23:07	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/14/18 23:07	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/14/18 23:07	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 23:07	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/14/18 23:07	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 23:07	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			11/14/18 23:07	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/14/18 23:07	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/14/18 23:07	1
Tetrachloroethene	ND		0.00040	0.000051	ppm v/v			11/14/18 23:07	1
Toluene	ND		0.00040	0.000051	ppm v/v			11/14/18 23:07	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 23:07	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 23:07	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			11/14/18 23:07	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/14/18 23:07	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			11/14/18 23:07	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			11/14/18 23:07	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/14/18 23:07	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 23:07	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/14/18 23:07	1
Vinyl chloride	0.00036	J	0.00040	0.00012	ppm v/v			11/14/18 23:07	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106618-001/MWL-SV-FB 1

Lab Sample ID: 320-45032-1

Date Collected: 10/30/18 08:45

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/14/18 23:07	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/14/18 23:07	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					11/14/18 23:07	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					11/14/18 23:07	1
Toluene-d8 (Surr)	96		70 - 130					11/14/18 23:07	1

Client Sample ID: 106619-001/MWL-SV05-50

Lab Sample ID: 320-45032-2

Date Collected: 10/30/18 08:54

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0016	J	0.0050	0.00018	ppm v/v			11/15/18 00:11	1
Benzene	0.00014	J	0.00040	0.000079	ppm v/v			11/15/18 00:11	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/15/18 00:11	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/15/18 00:11	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/15/18 00:11	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/15/18 00:11	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/15/18 00:11	1
Carbon disulfide	0.000088	J	0.00080	0.000078	ppm v/v			11/15/18 00:11	1
Carbon tetrachloride	0.00031	J	0.00080	0.000064	ppm v/v			11/15/18 00:11	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/15/18 00:11	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/15/18 00:11	1
Chloroform	0.0012		0.00030	0.000095	ppm v/v			11/15/18 00:11	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/15/18 00:11	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/15/18 00:11	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/15/18 00:11	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 00:11	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 00:11	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/15/18 00:11	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/15/18 00:11	1
Dichlorodifluoromethane	0.022		0.00040	0.00015	ppm v/v			11/15/18 00:11	1
1,1-Dichloroethane	0.0015		0.00030	0.000072	ppm v/v			11/15/18 00:11	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/15/18 00:11	1
1,1-Dichloroethene	0.0095		0.00080	0.00013	ppm v/v			11/15/18 00:11	1
cis-1,2-Dichloroethene	0.00060		0.00040	0.000089	ppm v/v			11/15/18 00:11	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/15/18 00:11	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/15/18 00:11	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/15/18 00:11	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/15/18 00:11	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/15/18 00:11	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/15/18 00:11	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/15/18 00:11	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/15/18 00:11	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/15/18 00:11	1
Methylene Chloride	0.00022	J	0.00040	0.000072	ppm v/v			11/15/18 00:11	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106619-001/MWL-SV05-50

Lab Sample ID: 320-45032-2

Date Collected: 10/30/18 08:54

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.00040	0.000059	ppm v/v			11/15/18 00:11	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/15/18 00:11	1
Tetrachloroethene	0.039		0.00040	0.000051	ppm v/v			11/15/18 00:11	1
Toluene	ND		0.00040	0.000051	ppm v/v			11/15/18 00:11	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.037		0.00040	0.00016	ppm v/v			11/15/18 00:11	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/15/18 00:11	1
1,1,1-Trichloroethane	0.012		0.00030	0.000065	ppm v/v			11/15/18 00:11	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/15/18 00:11	1
Trichloroethene	0.049		0.00040	0.00011	ppm v/v			11/15/18 00:11	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/15/18 00:11	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 00:11	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/15/18 00:11	1
Vinyl chloride	0.00035	J	0.00040	0.00012	ppm v/v			11/15/18 00:11	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/15/18 00:11	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/15/18 00:11	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		11/15/18 00:11	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 130		11/15/18 00:11	1
Toluene-d8 (Surr)	98		70 - 130		11/15/18 00:11	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	0.11		0.0013	0.00064	ppm v/v			11/15/18 19:37	3.24

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130		11/15/18 19:37	3.24
1,2-Dichloroethane-d4 (Surr)	102		70 - 130		11/15/18 19:37	3.24
Toluene-d8 (Surr)	96		70 - 130		11/15/18 19:37	3.24

Client Sample ID: 106620-001/MWL-SV05-50

Lab Sample ID: 320-45032-3

Date Collected: 10/30/18 08:54

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0044	J	0.0050	0.00018	ppm v/v			11/15/18 01:14	1
Benzene	0.00015	J	0.00040	0.000079	ppm v/v			11/15/18 01:14	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/15/18 01:14	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/15/18 01:14	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/15/18 01:14	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/15/18 01:14	1
2-Butanone (MEK)	0.00031	J	0.00080	0.00020	ppm v/v			11/15/18 01:14	1
Carbon disulfide	0.0023		0.00080	0.000078	ppm v/v			11/15/18 01:14	1
Carbon tetrachloride	0.00034	J	0.00080	0.000064	ppm v/v			11/15/18 01:14	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/15/18 01:14	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/15/18 01:14	1
Chloroform	0.0012		0.00030	0.000095	ppm v/v			11/15/18 01:14	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106620-001/MWL-SV05-50

Lab Sample ID: 320-45032-3

Date Collected: 10/30/18 08:54

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/15/18 01:14	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/15/18 01:14	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/15/18 01:14	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 01:14	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 01:14	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/15/18 01:14	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/15/18 01:14	1
Dichlorodifluoromethane	0.022		0.00040	0.00015	ppm v/v			11/15/18 01:14	1
1,1-Dichloroethane	0.0015		0.00030	0.000072	ppm v/v			11/15/18 01:14	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/15/18 01:14	1
1,1-Dichloroethene	0.0098		0.00080	0.00013	ppm v/v			11/15/18 01:14	1
cis-1,2-Dichloroethene	0.00063		0.00040	0.000089	ppm v/v			11/15/18 01:14	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/15/18 01:14	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/15/18 01:14	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/15/18 01:14	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/15/18 01:14	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/15/18 01:14	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/15/18 01:14	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/15/18 01:14	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/15/18 01:14	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/15/18 01:14	1
Methylene Chloride	0.00023	J	0.00040	0.000072	ppm v/v			11/15/18 01:14	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/15/18 01:14	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/15/18 01:14	1
Tetrachloroethene	0.040		0.00040	0.000051	ppm v/v			11/15/18 01:14	1
Toluene	ND		0.00040	0.000051	ppm v/v			11/15/18 01:14	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.038		0.00040	0.00016	ppm v/v			11/15/18 01:14	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/15/18 01:14	1
1,1,1-Trichloroethane	0.012		0.00030	0.000065	ppm v/v			11/15/18 01:14	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/15/18 01:14	1
Trichloroethene	0.051		0.00040	0.00011	ppm v/v			11/15/18 01:14	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/15/18 01:14	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 01:14	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/15/18 01:14	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/15/18 01:14	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/15/18 01:14	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/15/18 01:14	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130		11/15/18 01:14	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		11/15/18 01:14	1
Toluene-d8 (Surr)	100		70 - 130		11/15/18 01:14	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	0.11		0.0012	0.00060	ppm v/v			11/15/18 20:32	3.05

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106620-001/MWL-SV05-50

Date Collected: 10/30/18 08:54

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Lab Sample ID: 320-45032-3

Matrix: Air

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		11/15/18 20:32	3.05
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		11/15/18 20:32	3.05
Toluene-d8 (Surr)	95		70 - 130		11/15/18 20:32	3.05

Client Sample ID: 106621-001/MWL-SV05-100

Date Collected: 10/30/18 08:57

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Lab Sample ID: 320-45032-4

Matrix: Air

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0042	J	0.0050	0.00018	ppm v/v			11/15/18 02:17	1
Benzene	0.00018	J	0.00040	0.000079	ppm v/v			11/15/18 02:17	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/15/18 02:17	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/15/18 02:17	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/15/18 02:17	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/15/18 02:17	1
2-Butanone (MEK)	0.00021	J	0.00080	0.00020	ppm v/v			11/15/18 02:17	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			11/15/18 02:17	1
Carbon tetrachloride	0.00060	J	0.00080	0.000064	ppm v/v			11/15/18 02:17	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/15/18 02:17	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/15/18 02:17	1
Chloroform	0.0019		0.00030	0.000095	ppm v/v			11/15/18 02:17	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/15/18 02:17	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/15/18 02:17	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/15/18 02:17	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 02:17	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 02:17	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/15/18 02:17	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/15/18 02:17	1
Dichlorodifluoromethane	0.035		0.00040	0.00015	ppm v/v			11/15/18 02:17	1
1,1-Dichloroethane	0.0031		0.00030	0.000072	ppm v/v			11/15/18 02:17	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/15/18 02:17	1
1,1-Dichloroethene	0.021		0.00080	0.00013	ppm v/v			11/15/18 02:17	1
cis-1,2-Dichloroethene	0.0014		0.00040	0.000089	ppm v/v			11/15/18 02:17	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/15/18 02:17	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/15/18 02:17	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/15/18 02:17	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/15/18 02:17	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/15/18 02:17	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/15/18 02:17	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/15/18 02:17	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/15/18 02:17	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/15/18 02:17	1
Methylene Chloride	0.00075		0.00040	0.000072	ppm v/v			11/15/18 02:17	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/15/18 02:17	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/15/18 02:17	1
Tetrachloroethene	0.075		0.00040	0.000051	ppm v/v			11/15/18 02:17	1
Toluene	0.00013	J	0.00040	0.000051	ppm v/v			11/15/18 02:17	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106621-001/MWL-SV05-100

Lab Sample ID: 320-45032-4

Date Collected: 10/30/18 08:57

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	0.077		0.00040	0.00016	ppm v/v			11/15/18 02:17	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/15/18 02:17	1
1,1,1-Trichloroethane	0.013		0.00030	0.000065	ppm v/v			11/15/18 02:17	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/15/18 02:17	1
Trichloroethene	0.099		0.00040	0.00011	ppm v/v			11/15/18 02:17	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/15/18 02:17	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 02:17	1
Vinyl acetate	0.0039		0.00080	0.00015	ppm v/v			11/15/18 02:17	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/15/18 02:17	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/15/18 02:17	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/15/18 02:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					11/15/18 02:17	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/15/18 02:17	1
Toluene-d8 (Surr)	97		70 - 130					11/15/18 02:17	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	0.14		0.0014	0.00068	ppm v/v			11/15/18 21:27	3.47
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		70 - 130					11/15/18 21:27	3.47
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/15/18 21:27	3.47
Toluene-d8 (Surr)	95		70 - 130					11/15/18 21:27	3.47

Client Sample ID: 106622-001/MWL-SV05-200

Lab Sample ID: 320-45032-5

Date Collected: 10/30/18 09:00

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0051		0.0050	0.00018	ppm v/v			11/15/18 03:19	1
Benzene	0.00024	J	0.00040	0.000079	ppm v/v			11/15/18 03:19	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/15/18 03:19	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/15/18 03:19	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/15/18 03:19	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/15/18 03:19	1
2-Butanone (MEK)	0.00026	J	0.00080	0.00020	ppm v/v			11/15/18 03:19	1
Carbon disulfide	0.00012	J	0.00080	0.000078	ppm v/v			11/15/18 03:19	1
Carbon tetrachloride	0.0010		0.00080	0.000064	ppm v/v			11/15/18 03:19	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/15/18 03:19	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/15/18 03:19	1
Chloroform	0.0019		0.00030	0.000095	ppm v/v			11/15/18 03:19	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/15/18 03:19	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/15/18 03:19	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/15/18 03:19	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 03:19	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106622-001/MWL-SV05-200

Lab Sample ID: 320-45032-5

Date Collected: 10/30/18 09:00

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 03:19	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/15/18 03:19	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/15/18 03:19	1
Dichlorodifluoromethane	0.035		0.00040	0.00015	ppm v/v			11/15/18 03:19	1
1,1-Dichloroethane	0.0047		0.00030	0.000072	ppm v/v			11/15/18 03:19	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/15/18 03:19	1
1,1-Dichloroethene	0.037		0.00080	0.00013	ppm v/v			11/15/18 03:19	1
cis-1,2-Dichloroethene	0.0023		0.00040	0.000089	ppm v/v			11/15/18 03:19	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/15/18 03:19	1
1,2-Dichloropropane	0.00028	J	0.00040	0.00024	ppm v/v			11/15/18 03:19	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/15/18 03:19	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/15/18 03:19	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/15/18 03:19	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/15/18 03:19	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/15/18 03:19	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/15/18 03:19	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/15/18 03:19	1
Methylene Chloride	0.0022		0.00040	0.000072	ppm v/v			11/15/18 03:19	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/15/18 03:19	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/15/18 03:19	1
Toluene	0.00020	J	0.00040	0.000051	ppm v/v			11/15/18 03:19	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/15/18 03:19	1
1,1,1-Trichloroethane	0.0038		0.00030	0.000065	ppm v/v			11/15/18 03:19	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/15/18 03:19	1
Trichlorofluoromethane	0.083		0.00040	0.00020	ppm v/v			11/15/18 03:19	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/15/18 03:19	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 03:19	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/15/18 03:19	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/15/18 03:19	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/15/18 03:19	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/15/18 03:19	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130		11/15/18 03:19	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 130		11/15/18 03:19	1
Toluene-d8 (Surr)	100		70 - 130		11/15/18 03:19	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.12		0.0016	0.00021	ppm v/v			11/15/18 22:21	4.07
1,1,2-Trichloro-1,2,2-trifluoroethane	0.14		0.0016	0.00066	ppm v/v			11/15/18 22:21	4.07
Trichloroethene	0.17		0.0016	0.00043	ppm v/v			11/15/18 22:21	4.07

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		70 - 130		11/15/18 22:21	4.07
1,2-Dichloroethane-d4 (Surr)	106		70 - 130		11/15/18 22:21	4.07
Toluene-d8 (Surr)	96		70 - 130		11/15/18 22:21	4.07

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106623-001/MWL-SV05-300

Lab Sample ID: 320-45032-6

Date Collected: 10/30/18 09:04

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0072		0.0050	0.00018	ppm v/v			11/15/18 04:23	1
Benzene	0.00023	J	0.00040	0.000079	ppm v/v			11/15/18 04:23	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/15/18 04:23	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/15/18 04:23	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/15/18 04:23	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/15/18 04:23	1
2-Butanone (MEK)	0.00068	J	0.00080	0.00020	ppm v/v			11/15/18 04:23	1
Carbon disulfide	0.00032	J	0.00080	0.000078	ppm v/v			11/15/18 04:23	1
Carbon tetrachloride	0.00088		0.00080	0.000064	ppm v/v			11/15/18 04:23	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/15/18 04:23	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/15/18 04:23	1
Chloroform	0.00089		0.00030	0.000095	ppm v/v			11/15/18 04:23	1
Chloromethane	0.00021	J	0.00080	0.00020	ppm v/v			11/15/18 04:23	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/15/18 04:23	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/15/18 04:23	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 04:23	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 04:23	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/15/18 04:23	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/15/18 04:23	1
Dichlorodifluoromethane	0.019		0.00040	0.00015	ppm v/v			11/15/18 04:23	1
1,1-Dichloroethane	0.0020		0.00030	0.000072	ppm v/v			11/15/18 04:23	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/15/18 04:23	1
1,1-Dichloroethene	0.025		0.00080	0.00013	ppm v/v			11/15/18 04:23	1
cis-1,2-Dichloroethene	0.0010		0.00040	0.000089	ppm v/v			11/15/18 04:23	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/15/18 04:23	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/15/18 04:23	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/15/18 04:23	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/15/18 04:23	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/15/18 04:23	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/15/18 04:23	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/15/18 04:23	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/15/18 04:23	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/15/18 04:23	1
Methylene Chloride	0.00091		0.00040	0.000072	ppm v/v			11/15/18 04:23	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/15/18 04:23	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/15/18 04:23	1
Tetrachloroethene	0.091		0.00040	0.000051	ppm v/v			11/15/18 04:23	1
Toluene	0.00015	J	0.00040	0.000051	ppm v/v			11/15/18 04:23	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.10		0.00040	0.00016	ppm v/v			11/15/18 04:23	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/15/18 04:23	1
1,1,1-Trichloroethane	0.0018		0.00030	0.000065	ppm v/v			11/15/18 04:23	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/15/18 04:23	1
Trichlorofluoromethane	0.033		0.00040	0.00020	ppm v/v			11/15/18 04:23	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/15/18 04:23	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 04:23	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/15/18 04:23	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/15/18 04:23	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/15/18 04:23	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106623-001/MWL-SV05-300

Lab Sample ID: 320-45032-6

Date Collected: 10/30/18 09:04

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/15/18 04:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130					11/15/18 04:23	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/15/18 04:23	1
Toluene-d8 (Surr)	100		70 - 130					11/15/18 04:23	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	0.12		0.0012	0.00033	ppm v/v			11/15/18 23:16	3.12
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		70 - 130					11/15/18 23:16	3.12
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					11/15/18 23:16	3.12
Toluene-d8 (Surr)	97		70 - 130					11/15/18 23:16	3.12

Client Sample ID: 106624-001/MWL-SV05-400

Lab Sample ID: 320-45032-7

Date Collected: 10/30/18 09:11

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0063		0.0050	0.00018	ppm v/v			11/15/18 05:27	1
Benzene	0.00051		0.00040	0.000079	ppm v/v			11/15/18 05:27	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/15/18 05:27	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/15/18 05:27	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/15/18 05:27	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/15/18 05:27	1
2-Butanone (MEK)	0.00042	J	0.00080	0.00020	ppm v/v			11/15/18 05:27	1
Carbon disulfide	0.0098		0.00080	0.000078	ppm v/v			11/15/18 05:27	1
Carbon tetrachloride	0.00057	J	0.00080	0.000064	ppm v/v			11/15/18 05:27	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/15/18 05:27	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/15/18 05:27	1
Chloroform	0.00061		0.00030	0.000095	ppm v/v			11/15/18 05:27	1
Chloromethane	0.00022	J	0.00080	0.00020	ppm v/v			11/15/18 05:27	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/15/18 05:27	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/15/18 05:27	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 05:27	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 05:27	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/15/18 05:27	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/15/18 05:27	1
Dichlorodifluoromethane	0.013		0.00040	0.00015	ppm v/v			11/15/18 05:27	1
1,1-Dichloroethane	0.0016		0.00030	0.000072	ppm v/v			11/15/18 05:27	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/15/18 05:27	1
1,1-Dichloroethene	0.018		0.00080	0.00013	ppm v/v			11/15/18 05:27	1
cis-1,2-Dichloroethene	0.00065		0.00040	0.000089	ppm v/v			11/15/18 05:27	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/15/18 05:27	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/15/18 05:27	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106624-001/MWL-SV05-400

Lab Sample ID: 320-45032-7

Date Collected: 10/30/18 09:11

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/15/18 05:27	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/15/18 05:27	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/15/18 05:27	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/15/18 05:27	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/15/18 05:27	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/15/18 05:27	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/15/18 05:27	1
Methylene Chloride	0.00058		0.00040	0.000072	ppm v/v			11/15/18 05:27	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/15/18 05:27	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/15/18 05:27	1
Tetrachloroethene	0.081		0.00040	0.000051	ppm v/v			11/15/18 05:27	1
Toluene	0.0015		0.00040	0.000051	ppm v/v			11/15/18 05:27	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.056		0.00040	0.00016	ppm v/v			11/15/18 05:27	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/15/18 05:27	1
1,1,1-Trichloroethane	0.0017		0.00030	0.000065	ppm v/v			11/15/18 05:27	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/15/18 05:27	1
Trichloroethene	0.077		0.00040	0.00011	ppm v/v			11/15/18 05:27	1
Trichlorofluoromethane	0.034		0.00040	0.00020	ppm v/v			11/15/18 05:27	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/15/18 05:27	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 05:27	1
Vinyl acetate	0.00027	J	0.00080	0.00015	ppm v/v			11/15/18 05:27	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/15/18 05:27	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/15/18 05:27	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/15/18 05:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130					11/15/18 05:27	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 130					11/15/18 05:27	1
Toluene-d8 (Surr)	101		70 - 130					11/15/18 05:27	1

Client Sample ID: 106625-001/MWL-SV05-400

Lab Sample ID: 320-45032-8

Date Collected: 10/30/18 09:11

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0039	J	0.0050	0.00018	ppm v/v			11/14/18 01:55	1
Benzene	0.00043		0.00040	0.000079	ppm v/v			11/14/18 01:55	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 01:55	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/14/18 01:55	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/14/18 01:55	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 01:55	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/14/18 01:55	1
Carbon disulfide	0.00019	J	0.00080	0.000078	ppm v/v			11/14/18 01:55	1
Carbon tetrachloride	0.00059	J	0.00080	0.000064	ppm v/v			11/14/18 01:55	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/14/18 01:55	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 01:55	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106625-001/MWL-SV05-400

Lab Sample ID: 320-45032-8

Date Collected: 10/30/18 09:11

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroform	0.00061		0.00030	0.000095	ppm v/v			11/14/18 01:55	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/14/18 01:55	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/14/18 01:55	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/14/18 01:55	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 01:55	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 01:55	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/14/18 01:55	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/14/18 01:55	1
Dichlorodifluoromethane	0.012		0.00040	0.00015	ppm v/v			11/14/18 01:55	1
1,1-Dichloroethane	0.0015		0.00030	0.000072	ppm v/v			11/14/18 01:55	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/14/18 01:55	1
1,1-Dichloroethene	0.017		0.00080	0.00013	ppm v/v			11/14/18 01:55	1
cis-1,2-Dichloroethene	0.00063		0.00040	0.000089	ppm v/v			11/14/18 01:55	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/14/18 01:55	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 01:55	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/14/18 01:55	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/14/18 01:55	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/14/18 01:55	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/14/18 01:55	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 01:55	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/14/18 01:55	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 01:55	1
Methylene Chloride	0.00054		0.00040	0.000072	ppm v/v			11/14/18 01:55	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/14/18 01:55	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/14/18 01:55	1
Tetrachloroethene	0.080		0.00040	0.000051	ppm v/v			11/14/18 01:55	1
Toluene	0.0014		0.00040	0.000051	ppm v/v			11/14/18 01:55	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.054		0.00040	0.00016	ppm v/v			11/14/18 01:55	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 01:55	1
1,1,1-Trichloroethane	0.0017		0.00030	0.000065	ppm v/v			11/14/18 01:55	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/14/18 01:55	1
Trichloroethene	0.075		0.00040	0.00011	ppm v/v			11/14/18 01:55	1
Trichlorofluoromethane	0.034		0.00040	0.00020	ppm v/v			11/14/18 01:55	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/14/18 01:55	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 01:55	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/14/18 01:55	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/14/18 01:55	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/14/18 01:55	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/14/18 01:55	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		11/14/18 01:55	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		11/14/18 01:55	1
Toluene-d8 (Surr)	99		70 - 130		11/14/18 01:55	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106626-001/MWL-SV-FB 2

Lab Sample ID: 320-45032-9

Date Collected: 10/30/18 09:32

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.00048	J	0.0050	0.00018	ppm v/v			11/14/18 02:58	1
Benzene	ND		0.00040	0.000079	ppm v/v			11/14/18 02:58	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 02:58	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/14/18 02:58	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/14/18 02:58	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 02:58	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/14/18 02:58	1
Carbon disulfide	0.000096	J	0.00080	0.000078	ppm v/v			11/14/18 02:58	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			11/14/18 02:58	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/14/18 02:58	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 02:58	1
Chloroform	ND		0.00030	0.000095	ppm v/v			11/14/18 02:58	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/14/18 02:58	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/14/18 02:58	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/14/18 02:58	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 02:58	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 02:58	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/14/18 02:58	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/14/18 02:58	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			11/14/18 02:58	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			11/14/18 02:58	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/14/18 02:58	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			11/14/18 02:58	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			11/14/18 02:58	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/14/18 02:58	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 02:58	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/14/18 02:58	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/14/18 02:58	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/14/18 02:58	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/14/18 02:58	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 02:58	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/14/18 02:58	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 02:58	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			11/14/18 02:58	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/14/18 02:58	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/14/18 02:58	1
Tetrachloroethene	0.00014	J	0.00040	0.000051	ppm v/v			11/14/18 02:58	1
Toluene	0.000064	J	0.00040	0.000051	ppm v/v			11/14/18 02:58	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 02:58	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 02:58	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			11/14/18 02:58	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/14/18 02:58	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			11/14/18 02:58	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			11/14/18 02:58	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/14/18 02:58	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 02:58	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/14/18 02:58	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/14/18 02:58	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106626-001/MWL-SV-FB 2

Lab Sample ID: 320-45032-9

Date Collected: 10/30/18 09:32

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	0.00017	J	0.00080	0.00010	ppm v/v			11/14/18 02:58	1
o-Xylene	0.000076	J	0.00040	0.000054	ppm v/v			11/14/18 02:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					11/14/18 02:58	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					11/14/18 02:58	1
Toluene-d8 (Surr)	99		70 - 130					11/14/18 02:58	1

Client Sample ID: 106627-001/MWL-SV04-50

Lab Sample ID: 320-45032-10

Date Collected: 10/30/18 09:39

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0027	J	0.0050	0.00018	ppm v/v			11/14/18 04:01	1
Benzene	0.00039	J	0.00040	0.000079	ppm v/v			11/14/18 04:01	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 04:01	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/14/18 04:01	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/14/18 04:01	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 04:01	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/14/18 04:01	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			11/14/18 04:01	1
Carbon tetrachloride	0.00026	J	0.00080	0.000064	ppm v/v			11/14/18 04:01	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/14/18 04:01	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 04:01	1
Chloroform	0.0017		0.00030	0.000095	ppm v/v			11/14/18 04:01	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/14/18 04:01	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/14/18 04:01	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/14/18 04:01	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 04:01	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 04:01	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/14/18 04:01	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/14/18 04:01	1
Dichlorodifluoromethane	0.011		0.00040	0.00015	ppm v/v			11/14/18 04:01	1
1,1-Dichloroethane	0.0013		0.00030	0.000072	ppm v/v			11/14/18 04:01	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/14/18 04:01	1
1,1-Dichloroethene	0.0064		0.00080	0.00013	ppm v/v			11/14/18 04:01	1
cis-1,2-Dichloroethene	0.00059		0.00040	0.000089	ppm v/v			11/14/18 04:01	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/14/18 04:01	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 04:01	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/14/18 04:01	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/14/18 04:01	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/14/18 04:01	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/14/18 04:01	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 04:01	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/14/18 04:01	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 04:01	1
Methylene Chloride	0.00011	J	0.00040	0.000072	ppm v/v			11/14/18 04:01	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106627-001/MWL-SV04-50

Lab Sample ID: 320-45032-10

Date Collected: 10/30/18 09:39

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.00040	0.000059	ppm v/v			11/14/18 04:01	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/14/18 04:01	1
Tetrachloroethene	0.060		0.00040	0.000051	ppm v/v			11/14/18 04:01	1
Toluene	0.000056	J	0.00040	0.000051	ppm v/v			11/14/18 04:01	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.056		0.00040	0.00016	ppm v/v			11/14/18 04:01	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 04:01	1
1,1,1-Trichloroethane	0.0070		0.00030	0.000065	ppm v/v			11/14/18 04:01	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/14/18 04:01	1
Trichloroethene	0.051		0.00040	0.00011	ppm v/v			11/14/18 04:01	1
Trichlorofluoromethane	0.028		0.00040	0.00020	ppm v/v			11/14/18 04:01	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/14/18 04:01	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 04:01	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/14/18 04:01	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/14/18 04:01	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/14/18 04:01	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/14/18 04:01	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130					11/14/18 04:01	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 130					11/14/18 04:01	1
Toluene-d8 (Surr)	97		70 - 130					11/14/18 04:01	1

Client Sample ID: 106628-001/MWL-SV04-100

Lab Sample ID: 320-45032-11

Date Collected: 10/30/18 09:42

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0038	J	0.0050	0.00018	ppm v/v			11/14/18 05:04	1
Benzene	0.00041		0.00040	0.000079	ppm v/v			11/14/18 05:04	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 05:04	1
Bromodichloromethane	0.00024	J	0.00030	0.000066	ppm v/v			11/14/18 05:04	1
Bromoform	0.00021	J	0.00040	0.000070	ppm v/v			11/14/18 05:04	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 05:04	1
2-Butanone (MEK)	0.00044	J	0.00080	0.00020	ppm v/v			11/14/18 05:04	1
Carbon disulfide	0.0036		0.00080	0.000078	ppm v/v			11/14/18 05:04	1
Carbon tetrachloride	0.00061	J	0.00080	0.000064	ppm v/v			11/14/18 05:04	1
Chlorobenzene	0.00021	J	0.00030	0.000064	ppm v/v			11/14/18 05:04	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 05:04	1
Chloroform	0.0020		0.00030	0.000095	ppm v/v			11/14/18 05:04	1
Chloromethane	0.00027	J	0.00080	0.00020	ppm v/v			11/14/18 05:04	1
Dibromochloromethane	0.00024	J	0.00040	0.000079	ppm v/v			11/14/18 05:04	1
1,2-Dibromoethane (EDB)	0.00020	J	0.00080	0.000075	ppm v/v			11/14/18 05:04	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00018	J	0.00040	0.00016	ppm v/v			11/14/18 05:04	1
1,2-Dichlorobenzene	0.00018	J	0.00040	0.00013	ppm v/v			11/14/18 05:04	1
1,3-Dichlorobenzene	0.00019	J	0.00040	0.00011	ppm v/v			11/14/18 05:04	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106628-001/MWL-SV04-100

Lab Sample ID: 320-45032-11

Date Collected: 10/30/18 09:42

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.00019	J	0.00040	0.00015	ppm v/v			11/14/18 05:04	1
Dichlorodifluoromethane	0.017		0.00040	0.00015	ppm v/v			11/14/18 05:04	1
1,1-Dichloroethane	0.0030		0.00030	0.000072	ppm v/v			11/14/18 05:04	1
1,2-Dichloroethane	0.00023	J	0.00080	0.000088	ppm v/v			11/14/18 05:04	1
1,1-Dichloroethene	0.015		0.00080	0.00013	ppm v/v			11/14/18 05:04	1
cis-1,2-Dichloroethene	0.0018		0.00040	0.000089	ppm v/v			11/14/18 05:04	1
trans-1,2-Dichloroethene	0.00021	J	0.00040	0.00010	ppm v/v			11/14/18 05:04	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 05:04	1
cis-1,3-Dichloropropene	0.00020	J	0.00040	0.00010	ppm v/v			11/14/18 05:04	1
trans-1,3-Dichloropropene	0.00021	J	0.00040	0.000088	ppm v/v			11/14/18 05:04	1
Ethylbenzene	0.00023	J	0.00040	0.000063	ppm v/v			11/14/18 05:04	1
4-Ethyltoluene	0.00020	J	0.00040	0.00019	ppm v/v			11/14/18 05:04	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 05:04	1
2-Hexanone	0.00019	J	0.00040	0.000087	ppm v/v			11/14/18 05:04	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 05:04	1
Methylene Chloride	0.00059		0.00040	0.000072	ppm v/v			11/14/18 05:04	1
Styrene	0.00018	J	0.00040	0.000059	ppm v/v			11/14/18 05:04	1
1,1,2,2-Tetrachloroethane	0.00019	J	0.00040	0.000069	ppm v/v			11/14/18 05:04	1
Toluene	0.00026	J	0.00040	0.000051	ppm v/v			11/14/18 05:04	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.087		0.00040	0.00016	ppm v/v			11/14/18 05:04	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 05:04	1
1,1,1-Trichloroethane	0.0053		0.00030	0.000065	ppm v/v			11/14/18 05:04	1
1,1,2-Trichloroethane	0.00022	J	0.00040	0.000067	ppm v/v			11/14/18 05:04	1
Trichlorofluoromethane	0.038		0.00040	0.00020	ppm v/v			11/14/18 05:04	1
1,2,4-Trimethylbenzene	0.00023	J	0.00080	0.00016	ppm v/v			11/14/18 05:04	1
1,3,5-Trimethylbenzene	0.00021	J	0.00040	0.00013	ppm v/v			11/14/18 05:04	1
Vinyl acetate	0.00023	J	0.00080	0.00015	ppm v/v			11/14/18 05:04	1
Vinyl chloride	0.00021	J	0.00040	0.00012	ppm v/v			11/14/18 05:04	1
m,p-Xylene	0.00045	J	0.00080	0.00010	ppm v/v			11/14/18 05:04	1
o-Xylene	0.00022	J	0.00040	0.000054	ppm v/v			11/14/18 05:04	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		11/14/18 05:04	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		11/14/18 05:04	1
Toluene-d8 (Surr)	99		70 - 130		11/14/18 05:04	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.12		0.0012	0.00015	ppm v/v			11/15/18 09:26	3
Trichloroethene	0.11		0.0012	0.00032	ppm v/v			11/15/18 09:26	3

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130		11/15/18 09:26	3
1,2-Dichloroethane-d4 (Surr)	108		70 - 130		11/15/18 09:26	3
Toluene-d8 (Surr)	96		70 - 130		11/15/18 09:26	3

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106629-001/MWL-SV04-200

Lab Sample ID: 320-45032-12

Date Collected: 10/30/18 09:47

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.023		0.012	0.00043	ppm v/v			11/14/18 06:00	2.41
Benzene	0.00030	J	0.00096	0.00019	ppm v/v			11/14/18 06:00	2.41
Benzyl chloride	ND		0.0019	0.00039	ppm v/v			11/14/18 06:00	2.41
Bromodichloromethane	ND		0.00072	0.00016	ppm v/v			11/14/18 06:00	2.41
Bromoform	ND		0.00096	0.00017	ppm v/v			11/14/18 06:00	2.41
Bromomethane	ND		0.0019	0.00081	ppm v/v			11/14/18 06:00	2.41
2-Butanone (MEK)	0.0015	J	0.0019	0.00048	ppm v/v			11/14/18 06:00	2.41
Carbon disulfide	0.022		0.0019	0.00019	ppm v/v			11/14/18 06:00	2.41
Carbon tetrachloride	0.00049	J	0.0019	0.00015	ppm v/v			11/14/18 06:00	2.41
Chlorobenzene	ND		0.00072	0.00015	ppm v/v			11/14/18 06:00	2.41
Chloroethane	ND		0.0019	0.00074	ppm v/v			11/14/18 06:00	2.41
Chloroform	0.0013		0.00072	0.00023	ppm v/v			11/14/18 06:00	2.41
Chloromethane	ND		0.0019	0.00047	ppm v/v			11/14/18 06:00	2.41
Dibromochloromethane	ND		0.00096	0.00019	ppm v/v			11/14/18 06:00	2.41
1,2-Dibromoethane (EDB)	ND		0.0019	0.00018	ppm v/v			11/14/18 06:00	2.41
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00096	0.00037	ppm v/v			11/14/18 06:00	2.41
1,2-Dichlorobenzene	ND		0.00096	0.00031	ppm v/v			11/14/18 06:00	2.41
1,3-Dichlorobenzene	ND		0.00096	0.00027	ppm v/v			11/14/18 06:00	2.41
1,4-Dichlorobenzene	ND		0.00096	0.00036	ppm v/v			11/14/18 06:00	2.41
Dichlorodifluoromethane	0.030		0.00096	0.00035	ppm v/v			11/14/18 06:00	2.41
1,1-Dichloroethane	0.0044		0.00072	0.00017	ppm v/v			11/14/18 06:00	2.41
1,2-Dichloroethane	ND		0.0019	0.00021	ppm v/v			11/14/18 06:00	2.41
1,1-Dichloroethene	0.026		0.0019	0.00031	ppm v/v			11/14/18 06:00	2.41
cis-1,2-Dichloroethene	0.0026		0.00096	0.00021	ppm v/v			11/14/18 06:00	2.41
trans-1,2-Dichloroethene	ND		0.00096	0.00024	ppm v/v			11/14/18 06:00	2.41
1,2-Dichloropropane	ND		0.00096	0.00058	ppm v/v			11/14/18 06:00	2.41
cis-1,3-Dichloropropene	ND		0.00096	0.00025	ppm v/v			11/14/18 06:00	2.41
trans-1,3-Dichloropropene	ND		0.00096	0.00021	ppm v/v			11/14/18 06:00	2.41
Ethylbenzene	ND		0.00096	0.00015	ppm v/v			11/14/18 06:00	2.41
4-Ethyltoluene	ND		0.00096	0.00045	ppm v/v			11/14/18 06:00	2.41
Hexachlorobutadiene	ND		0.0048	0.0010	ppm v/v			11/14/18 06:00	2.41
2-Hexanone	ND		0.00096	0.00021	ppm v/v			11/14/18 06:00	2.41
4-Methyl-2-pentanone (MIBK)	ND		0.00096	0.00033	ppm v/v			11/14/18 06:00	2.41
Methylene Chloride	0.0012		0.00096	0.00017	ppm v/v			11/14/18 06:00	2.41
Styrene	ND		0.00096	0.00014	ppm v/v			11/14/18 06:00	2.41
1,1,2,2-Tetrachloroethane	ND		0.00096	0.00017	ppm v/v			11/14/18 06:00	2.41
Tetrachloroethene	0.12		0.00096	0.00012	ppm v/v			11/14/18 06:00	2.41
Toluene	0.00065	J	0.00096	0.00012	ppm v/v			11/14/18 06:00	2.41
1,1,2-Trichloro-1,2,2-trifluoroethane	0.12		0.00096	0.00039	ppm v/v			11/14/18 06:00	2.41
1,2,4-Trichlorobenzene	ND		0.0048	0.0010	ppm v/v			11/14/18 06:00	2.41
1,1,1-Trichloroethane	0.0020		0.00072	0.00016	ppm v/v			11/14/18 06:00	2.41
1,1,2-Trichloroethane	ND		0.00096	0.00016	ppm v/v			11/14/18 06:00	2.41
Trichloroethene	0.14		0.00096	0.00025	ppm v/v			11/14/18 06:00	2.41
Trichlorofluoromethane	0.032		0.00096	0.00047	ppm v/v			11/14/18 06:00	2.41
1,2,4-Trimethylbenzene	ND		0.0019	0.00039	ppm v/v			11/14/18 06:00	2.41
1,3,5-Trimethylbenzene	ND		0.00096	0.00030	ppm v/v			11/14/18 06:00	2.41
Vinyl acetate	ND		0.0019	0.00035	ppm v/v			11/14/18 06:00	2.41
Vinyl chloride	ND		0.00096	0.00029	ppm v/v			11/14/18 06:00	2.41

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106629-001/MWL-SV04-200

Lab Sample ID: 320-45032-12

Date Collected: 10/30/18 09:47

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	0.00042	J	0.0019	0.00024	ppm v/v			11/14/18 06:00	2.41
o-Xylene	0.00021	J	0.00096	0.00013	ppm v/v			11/14/18 06:00	2.41
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130					11/14/18 06:00	2.41
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/14/18 06:00	2.41
Toluene-d8 (Surr)	97		70 - 130					11/14/18 06:00	2.41

Client Sample ID: 106630-001/MWL-SV04-300

Lab Sample ID: 320-45032-13

Date Collected: 10/30/18 09:51

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0039	J	0.0050	0.00018	ppm v/v			11/14/18 07:04	1
Benzene	0.00020	J	0.00040	0.000079	ppm v/v			11/14/18 07:04	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 07:04	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/14/18 07:04	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/14/18 07:04	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 07:04	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/14/18 07:04	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			11/14/18 07:04	1
Carbon tetrachloride	0.00032	J	0.00080	0.000064	ppm v/v			11/14/18 07:04	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/14/18 07:04	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 07:04	1
Chloroform	0.00053		0.00030	0.000095	ppm v/v			11/14/18 07:04	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/14/18 07:04	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/14/18 07:04	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/14/18 07:04	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 07:04	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 07:04	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/14/18 07:04	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/14/18 07:04	1
Dichlorodifluoromethane	0.013		0.00040	0.00015	ppm v/v			11/14/18 07:04	1
1,1-Dichloroethane	0.0011		0.00030	0.000072	ppm v/v			11/14/18 07:04	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/14/18 07:04	1
1,1-Dichloroethene	0.013		0.00080	0.00013	ppm v/v			11/14/18 07:04	1
cis-1,2-Dichloroethene	0.00074		0.00040	0.000089	ppm v/v			11/14/18 07:04	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/14/18 07:04	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 07:04	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/14/18 07:04	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/14/18 07:04	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/14/18 07:04	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/14/18 07:04	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 07:04	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/14/18 07:04	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 07:04	1
Methylene Chloride	0.00024	J	0.00040	0.000072	ppm v/v			11/14/18 07:04	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106630-001/MWL-SV04-300

Lab Sample ID: 320-45032-13

Date Collected: 10/30/18 09:51

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.00040	0.000059	ppm v/v			11/14/18 07:04	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/14/18 07:04	1
Toluene	0.00014	J	0.00040	0.000051	ppm v/v			11/14/18 07:04	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.073		0.00040	0.00016	ppm v/v			11/14/18 07:04	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 07:04	1
1,1,1-Trichloroethane	0.00082		0.00030	0.000065	ppm v/v			11/14/18 07:04	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/14/18 07:04	1
Trichloroethene	0.076		0.00040	0.00011	ppm v/v			11/14/18 07:04	1
Trichlorofluoromethane	0.014		0.00040	0.00020	ppm v/v			11/14/18 07:04	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/14/18 07:04	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 07:04	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/14/18 07:04	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/14/18 07:04	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/14/18 07:04	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/14/18 07:04	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130		11/14/18 07:04	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		11/14/18 07:04	1
Toluene-d8 (Surr)	102		70 - 130		11/14/18 07:04	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.11		0.0012	0.00015	ppm v/v			11/15/18 10:21	3.01

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130		11/15/18 10:21	3.01
1,2-Dichloroethane-d4 (Surr)	107		70 - 130		11/15/18 10:21	3.01
Toluene-d8 (Surr)	97		70 - 130		11/15/18 10:21	3.01

Client Sample ID: 106631-001/MWL-SV04-400

Lab Sample ID: 320-45032-14

Date Collected: 10/30/18 10:00

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0068		0.0050	0.00018	ppm v/v			11/14/18 08:07	1
Benzene	0.00048		0.00040	0.000079	ppm v/v			11/14/18 08:07	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 08:07	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/14/18 08:07	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/14/18 08:07	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 08:07	1
2-Butanone (MEK)	0.00060	J	0.00080	0.00020	ppm v/v			11/14/18 08:07	1
Carbon disulfide	0.011		0.00080	0.000078	ppm v/v			11/14/18 08:07	1
Carbon tetrachloride	0.00022	J	0.00080	0.000064	ppm v/v			11/14/18 08:07	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/14/18 08:07	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 08:07	1
Chloroform	0.00051		0.00030	0.000095	ppm v/v			11/14/18 08:07	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106631-001/MWL-SV04-400

Lab Sample ID: 320-45032-14

Date Collected: 10/30/18 10:00

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/14/18 08:07	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/14/18 08:07	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/14/18 08:07	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 08:07	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 08:07	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/14/18 08:07	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/14/18 08:07	1
Dichlorodifluoromethane	0.0099		0.00040	0.00015	ppm v/v			11/14/18 08:07	1
1,1-Dichloroethane	0.0010		0.00030	0.000072	ppm v/v			11/14/18 08:07	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/14/18 08:07	1
1,1-Dichloroethene	0.010		0.00080	0.00013	ppm v/v			11/14/18 08:07	1
cis-1,2-Dichloroethene	0.00071		0.00040	0.000089	ppm v/v			11/14/18 08:07	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/14/18 08:07	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 08:07	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/14/18 08:07	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/14/18 08:07	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/14/18 08:07	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/14/18 08:07	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 08:07	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/14/18 08:07	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 08:07	1
Methylene Chloride	0.00023	J	0.00040	0.000072	ppm v/v			11/14/18 08:07	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/14/18 08:07	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/14/18 08:07	1
Toluene	0.00010	J	0.00040	0.000051	ppm v/v			11/14/18 08:07	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.064		0.00040	0.00016	ppm v/v			11/14/18 08:07	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 08:07	1
1,1,1-Trichloroethane	0.00084		0.00030	0.000065	ppm v/v			11/14/18 08:07	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/14/18 08:07	1
Trichloroethene	0.072		0.00040	0.00011	ppm v/v			11/14/18 08:07	1
Trichlorofluoromethane	0.014		0.00040	0.00020	ppm v/v			11/14/18 08:07	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/14/18 08:07	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 08:07	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/14/18 08:07	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/14/18 08:07	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/14/18 08:07	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/14/18 08:07	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130		11/14/18 08:07	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		11/14/18 08:07	1
Toluene-d8 (Surr)	101		70 - 130		11/14/18 08:07	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.12		0.0012	0.00015	ppm v/v			11/15/18 11:17	2.98

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106631-001/MWL-SV04-400

Lab Sample ID: 320-45032-14

Date Collected: 10/30/18 10:00

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		11/15/18 11:17	2.98
1,2-Dichloroethane-d4 (Surr)	107		70 - 130		11/15/18 11:17	2.98
Toluene-d8 (Surr)	99		70 - 130		11/15/18 11:17	2.98

Client Sample ID: 106632-001/MWL-SV-FB 3

Lab Sample ID: 320-45032-15

Date Collected: 10/30/18 10:11

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.0050	0.00018	ppm v/v			11/14/18 09:11	1
Benzene	ND		0.00040	0.000079	ppm v/v			11/14/18 09:11	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 09:11	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/14/18 09:11	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/14/18 09:11	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 09:11	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/14/18 09:11	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			11/14/18 09:11	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			11/14/18 09:11	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/14/18 09:11	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 09:11	1
Chloroform	ND		0.00030	0.000095	ppm v/v			11/14/18 09:11	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/14/18 09:11	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/14/18 09:11	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/14/18 09:11	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 09:11	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 09:11	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/14/18 09:11	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/14/18 09:11	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			11/14/18 09:11	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			11/14/18 09:11	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/14/18 09:11	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			11/14/18 09:11	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			11/14/18 09:11	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/14/18 09:11	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 09:11	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/14/18 09:11	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/14/18 09:11	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/14/18 09:11	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/14/18 09:11	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 09:11	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/14/18 09:11	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 09:11	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			11/14/18 09:11	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/14/18 09:11	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/14/18 09:11	1
Tetrachloroethene	ND		0.00040	0.000051	ppm v/v			11/14/18 09:11	1
Toluene	ND		0.00040	0.000051	ppm v/v			11/14/18 09:11	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106632-001/MWL-SV-FB 3

Lab Sample ID: 320-45032-15

Date Collected: 10/30/18 10:11

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 09:11	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 09:11	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			11/14/18 09:11	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/14/18 09:11	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			11/14/18 09:11	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			11/14/18 09:11	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/14/18 09:11	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 09:11	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/14/18 09:11	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/14/18 09:11	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/14/18 09:11	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/14/18 09:11	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130					11/14/18 09:11	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 130					11/14/18 09:11	1
Toluene-d8 (Surr)	99		70 - 130					11/14/18 09:11	1

Client Sample ID: 106633-001/MWL-SV03-50

Lab Sample ID: 320-45032-16

Date Collected: 10/30/18 10:17

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0018	J	0.0082	0.00029	ppm v/v			11/14/18 10:10	1.63
Benzene	0.00019	J	0.00065	0.00013	ppm v/v			11/14/18 10:10	1.63
Benzyl chloride	ND		0.0013	0.00027	ppm v/v			11/14/18 10:10	1.63
Bromodichloromethane	ND		0.00049	0.00011	ppm v/v			11/14/18 10:10	1.63
Bromoform	ND		0.00065	0.00011	ppm v/v			11/14/18 10:10	1.63
Bromomethane	ND		0.0013	0.00055	ppm v/v			11/14/18 10:10	1.63
2-Butanone (MEK)	ND		0.0013	0.00032	ppm v/v			11/14/18 10:10	1.63
Carbon disulfide	ND		0.0013	0.00013	ppm v/v			11/14/18 10:10	1.63
Carbon tetrachloride	0.00025	J	0.0013	0.00010	ppm v/v			11/14/18 10:10	1.63
Chlorobenzene	ND		0.00049	0.00010	ppm v/v			11/14/18 10:10	1.63
Chloroethane	ND		0.0013	0.00050	ppm v/v			11/14/18 10:10	1.63
Chloroform	0.0016		0.00049	0.00015	ppm v/v			11/14/18 10:10	1.63
Chloromethane	ND		0.0013	0.00032	ppm v/v			11/14/18 10:10	1.63
Dibromochloromethane	ND		0.00065	0.00013	ppm v/v			11/14/18 10:10	1.63
1,2-Dibromoethane (EDB)	ND		0.0013	0.00012	ppm v/v			11/14/18 10:10	1.63
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00065	0.00025	ppm v/v			11/14/18 10:10	1.63
1,2-Dichlorobenzene	ND		0.00065	0.00021	ppm v/v			11/14/18 10:10	1.63
1,3-Dichlorobenzene	ND		0.00065	0.00018	ppm v/v			11/14/18 10:10	1.63
1,4-Dichlorobenzene	ND		0.00065	0.00024	ppm v/v			11/14/18 10:10	1.63
Dichlorodifluoromethane	0.018		0.00065	0.00024	ppm v/v			11/14/18 10:10	1.63
1,1-Dichloroethane	0.0031		0.00049	0.00012	ppm v/v			11/14/18 10:10	1.63
1,2-Dichloroethane	ND		0.0013	0.00014	ppm v/v			11/14/18 10:10	1.63
1,1-Dichloroethene	0.012		0.0013	0.00021	ppm v/v			11/14/18 10:10	1.63
cis-1,2-Dichloroethene	0.0018		0.00065	0.00015	ppm v/v			11/14/18 10:10	1.63

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106633-001/MWL-SV03-50

Lab Sample ID: 320-45032-16

Date Collected: 10/30/18 10:17

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
trans-1,2-Dichloroethene	ND		0.00065	0.00016	ppm v/v			11/14/18 10:10	1.63
1,2-Dichloropropane	ND		0.00065	0.00039	ppm v/v			11/14/18 10:10	1.63
cis-1,3-Dichloropropene	ND		0.00065	0.00017	ppm v/v			11/14/18 10:10	1.63
trans-1,3-Dichloropropene	ND		0.00065	0.00014	ppm v/v			11/14/18 10:10	1.63
Ethylbenzene	ND		0.00065	0.00010	ppm v/v			11/14/18 10:10	1.63
4-Ethyltoluene	ND		0.00065	0.00030	ppm v/v			11/14/18 10:10	1.63
Hexachlorobutadiene	ND		0.0033	0.00070	ppm v/v			11/14/18 10:10	1.63
2-Hexanone	ND		0.00065	0.00014	ppm v/v			11/14/18 10:10	1.63
4-Methyl-2-pentanone (MIBK)	ND		0.00065	0.00022	ppm v/v			11/14/18 10:10	1.63
Methylene Chloride	0.00070		0.00065	0.00012	ppm v/v			11/14/18 10:10	1.63
Styrene	ND		0.00065	0.000096	ppm v/v			11/14/18 10:10	1.63
1,1,2,2-Tetrachloroethane	ND		0.00065	0.00011	ppm v/v			11/14/18 10:10	1.63
Tetrachloroethene	0.13		0.00065	0.000083	ppm v/v			11/14/18 10:10	1.63
Toluene	ND		0.00065	0.000083	ppm v/v			11/14/18 10:10	1.63
1,1,2-Trichloro-1,2,2-trifluoroethane	0.072		0.00065	0.00027	ppm v/v			11/14/18 10:10	1.63
1,2,4-Trichlorobenzene	ND		0.0033	0.00071	ppm v/v			11/14/18 10:10	1.63
1,1,1-Trichloroethane	0.0031		0.00049	0.00011	ppm v/v			11/14/18 10:10	1.63
1,1,2-Trichloroethane	ND		0.00065	0.00011	ppm v/v			11/14/18 10:10	1.63
Trichloroethene	0.10		0.00065	0.00017	ppm v/v			11/14/18 10:10	1.63
Trichlorofluoromethane	0.028		0.00065	0.00032	ppm v/v			11/14/18 10:10	1.63
1,2,4-Trimethylbenzene	ND		0.0013	0.00026	ppm v/v			11/14/18 10:10	1.63
1,3,5-Trimethylbenzene	ND		0.00065	0.00020	ppm v/v			11/14/18 10:10	1.63
Vinyl acetate	ND		0.0013	0.00024	ppm v/v			11/14/18 10:10	1.63
Vinyl chloride	ND		0.00065	0.00020	ppm v/v			11/14/18 10:10	1.63
m,p-Xylene	ND		0.0013	0.00016	ppm v/v			11/14/18 10:10	1.63
o-Xylene	ND		0.00065	0.000088	ppm v/v			11/14/18 10:10	1.63
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130					11/14/18 10:10	1.63
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/14/18 10:10	1.63
Toluene-d8 (Surr)	99		70 - 130					11/14/18 10:10	1.63

Client Sample ID: 106634-001/MWL-SV03-100

Lab Sample ID: 320-45032-17

Date Collected: 10/30/18 10:20

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0042	J	0.012	0.00044	ppm v/v			11/14/18 11:06	2.49
Benzene	ND		0.0010	0.00020	ppm v/v			11/14/18 11:06	2.49
Benzyl chloride	ND		0.0020	0.00041	ppm v/v			11/14/18 11:06	2.49
Bromodichloromethane	ND		0.00075	0.00016	ppm v/v			11/14/18 11:06	2.49
Bromoform	ND		0.0010	0.00017	ppm v/v			11/14/18 11:06	2.49
Bromomethane	ND		0.0020	0.00083	ppm v/v			11/14/18 11:06	2.49
2-Butanone (MEK)	ND		0.0020	0.00050	ppm v/v			11/14/18 11:06	2.49
Carbon disulfide	0.00036	J	0.0020	0.00019	ppm v/v			11/14/18 11:06	2.49
Carbon tetrachloride	0.00035	J	0.0020	0.00016	ppm v/v			11/14/18 11:06	2.49

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106634-001/MWL-SV03-100

Lab Sample ID: 320-45032-17

Date Collected: 10/30/18 10:20

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlorobenzene	ND		0.00075	0.00016	ppm v/v			11/14/18 11:06	2.49
Chloroethane	ND		0.0020	0.00077	ppm v/v			11/14/18 11:06	2.49
Chloroform	0.0021		0.00075	0.00024	ppm v/v			11/14/18 11:06	2.49
Chloromethane	ND		0.0020	0.00049	ppm v/v			11/14/18 11:06	2.49
Dibromochloromethane	ND		0.0010	0.00020	ppm v/v			11/14/18 11:06	2.49
1,2-Dibromoethane (EDB)	ND		0.0020	0.00019	ppm v/v			11/14/18 11:06	2.49
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0010	0.00039	ppm v/v			11/14/18 11:06	2.49
1,2-Dichlorobenzene	ND		0.0010	0.00032	ppm v/v			11/14/18 11:06	2.49
1,3-Dichlorobenzene	ND		0.0010	0.00027	ppm v/v			11/14/18 11:06	2.49
1,4-Dichlorobenzene	ND		0.0010	0.00037	ppm v/v			11/14/18 11:06	2.49
Dichlorodifluoromethane	0.028		0.0010	0.00036	ppm v/v			11/14/18 11:06	2.49
1,1-Dichloroethane	0.0047		0.00075	0.00018	ppm v/v			11/14/18 11:06	2.49
1,2-Dichloroethane	ND		0.0020	0.00022	ppm v/v			11/14/18 11:06	2.49
1,1-Dichloroethene	0.018		0.0020	0.00032	ppm v/v			11/14/18 11:06	2.49
cis-1,2-Dichloroethene	0.0029		0.0010	0.00022	ppm v/v			11/14/18 11:06	2.49
trans-1,2-Dichloroethene	ND		0.0010	0.00025	ppm v/v			11/14/18 11:06	2.49
1,2-Dichloropropane	ND		0.0010	0.00060	ppm v/v			11/14/18 11:06	2.49
cis-1,3-Dichloropropene	ND		0.0010	0.00026	ppm v/v			11/14/18 11:06	2.49
trans-1,3-Dichloropropene	ND		0.0010	0.00022	ppm v/v			11/14/18 11:06	2.49
Ethylbenzene	ND		0.0010	0.00016	ppm v/v			11/14/18 11:06	2.49
4-Ethyltoluene	ND		0.0010	0.00047	ppm v/v			11/14/18 11:06	2.49
Hexachlorobutadiene	ND		0.0050	0.0011	ppm v/v			11/14/18 11:06	2.49
2-Hexanone	ND		0.0010	0.00022	ppm v/v			11/14/18 11:06	2.49
4-Methyl-2-pentanone (MIBK)	ND		0.0010	0.00034	ppm v/v			11/14/18 11:06	2.49
Methylene Chloride	0.0013		0.0010	0.00018	ppm v/v			11/14/18 11:06	2.49
Styrene	ND		0.0010	0.00015	ppm v/v			11/14/18 11:06	2.49
1,1,2,2-Tetrachloroethane	ND		0.0010	0.00017	ppm v/v			11/14/18 11:06	2.49
Tetrachloroethene	0.17		0.0010	0.00013	ppm v/v			11/14/18 11:06	2.49
Toluene	ND		0.0010	0.00013	ppm v/v			11/14/18 11:06	2.49
1,1,2-Trichloro-1,2,2-trifluoroethane	0.096		0.0010	0.00041	ppm v/v			11/14/18 11:06	2.49
1,2,4-Trichlorobenzene	ND		0.0050	0.0011	ppm v/v			11/14/18 11:06	2.49
1,1,1-Trichloroethane	0.0035		0.00075	0.00016	ppm v/v			11/14/18 11:06	2.49
1,1,2-Trichloroethane	ND		0.0010	0.00017	ppm v/v			11/14/18 11:06	2.49
Trichloroethene	0.15		0.0010	0.00026	ppm v/v			11/14/18 11:06	2.49
Trichlorofluoromethane	0.035		0.0010	0.00049	ppm v/v			11/14/18 11:06	2.49
1,2,4-Trimethylbenzene	ND		0.0020	0.00040	ppm v/v			11/14/18 11:06	2.49
1,3,5-Trimethylbenzene	ND		0.0010	0.00031	ppm v/v			11/14/18 11:06	2.49
Vinyl acetate	ND		0.0020	0.00036	ppm v/v			11/14/18 11:06	2.49
Vinyl chloride	ND		0.0010	0.00030	ppm v/v			11/14/18 11:06	2.49
m,p-Xylene	ND		0.0020	0.00025	ppm v/v			11/14/18 11:06	2.49
o-Xylene	ND		0.0010	0.00013	ppm v/v			11/14/18 11:06	2.49
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					11/14/18 11:06	2.49
1,2-Dichloroethane-d4 (Surr)	104		70 - 130					11/14/18 11:06	2.49
Toluene-d8 (Surr)	99		70 - 130					11/14/18 11:06	2.49

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106635-001/MWL-SV03-200

Lab Sample ID: 320-45032-18

Date Collected: 10/30/18 10:23

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0095	J	0.015	0.00054	ppm v/v			11/14/18 12:02	3.05
Benzene	ND		0.0012	0.00024	ppm v/v			11/14/18 12:02	3.05
Benzyl chloride	ND		0.0024	0.00050	ppm v/v			11/14/18 12:02	3.05
Bromodichloromethane	ND		0.00092	0.00020	ppm v/v			11/14/18 12:02	3.05
Bromoform	ND		0.0012	0.00021	ppm v/v			11/14/18 12:02	3.05
Bromomethane	ND		0.0024	0.0010	ppm v/v			11/14/18 12:02	3.05
2-Butanone (MEK)	0.0018	J	0.0024	0.00061	ppm v/v			11/14/18 12:02	3.05
Carbon disulfide	0.0038		0.0024	0.00024	ppm v/v			11/14/18 12:02	3.05
Carbon tetrachloride	0.00043	J	0.0024	0.00020	ppm v/v			11/14/18 12:02	3.05
Chlorobenzene	ND		0.00092	0.00020	ppm v/v			11/14/18 12:02	3.05
Chloroethane	ND		0.0024	0.00094	ppm v/v			11/14/18 12:02	3.05
Chloroform	0.0020		0.00092	0.00029	ppm v/v			11/14/18 12:02	3.05
Chloromethane	ND		0.0024	0.00060	ppm v/v			11/14/18 12:02	3.05
Dibromochloromethane	ND		0.0012	0.00024	ppm v/v			11/14/18 12:02	3.05
1,2-Dibromoethane (EDB)	ND		0.0024	0.00023	ppm v/v			11/14/18 12:02	3.05
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0012	0.00047	ppm v/v			11/14/18 12:02	3.05
1,2-Dichlorobenzene	ND		0.0012	0.00040	ppm v/v			11/14/18 12:02	3.05
1,3-Dichlorobenzene	ND		0.0012	0.00034	ppm v/v			11/14/18 12:02	3.05
1,4-Dichlorobenzene	ND		0.0012	0.00045	ppm v/v			11/14/18 12:02	3.05
Dichlorodifluoromethane	0.033		0.0012	0.00044	ppm v/v			11/14/18 12:02	3.05
1,1-Dichloroethane	0.0059		0.00092	0.00022	ppm v/v			11/14/18 12:02	3.05
1,2-Dichloroethane	ND		0.0024	0.00027	ppm v/v			11/14/18 12:02	3.05
1,1-Dichloroethene	0.024		0.0024	0.00039	ppm v/v			11/14/18 12:02	3.05
cis-1,2-Dichloroethene	0.0039		0.0012	0.00027	ppm v/v			11/14/18 12:02	3.05
trans-1,2-Dichloroethene	ND		0.0012	0.00031	ppm v/v			11/14/18 12:02	3.05
1,2-Dichloropropane	ND		0.0012	0.00073	ppm v/v			11/14/18 12:02	3.05
cis-1,3-Dichloropropene	ND		0.0012	0.00032	ppm v/v			11/14/18 12:02	3.05
trans-1,3-Dichloropropene	ND		0.0012	0.00027	ppm v/v			11/14/18 12:02	3.05
Ethylbenzene	ND		0.0012	0.00019	ppm v/v			11/14/18 12:02	3.05
4-Ethyltoluene	ND		0.0012	0.00057	ppm v/v			11/14/18 12:02	3.05
Hexachlorobutadiene	ND		0.0061	0.0013	ppm v/v			11/14/18 12:02	3.05
2-Hexanone	ND		0.0012	0.00027	ppm v/v			11/14/18 12:02	3.05
4-Methyl-2-pentanone (MIBK)	ND		0.0012	0.00041	ppm v/v			11/14/18 12:02	3.05
Methylene Chloride	0.0023		0.0012	0.00022	ppm v/v			11/14/18 12:02	3.05
Styrene	ND		0.0012	0.00018	ppm v/v			11/14/18 12:02	3.05
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00021	ppm v/v			11/14/18 12:02	3.05
Tetrachloroethene	0.21		0.0012	0.00016	ppm v/v			11/14/18 12:02	3.05
Toluene	0.00022	J	0.0012	0.00016	ppm v/v			11/14/18 12:02	3.05
1,1,2-Trichloro-1,2,2-trifluoroethane	0.12		0.0012	0.00050	ppm v/v			11/14/18 12:02	3.05
1,2,4-Trichlorobenzene	ND		0.0061	0.0013	ppm v/v			11/14/18 12:02	3.05
1,1,1-Trichloroethane	0.0022		0.00092	0.00020	ppm v/v			11/14/18 12:02	3.05
1,1,2-Trichloroethane	ND		0.0012	0.00020	ppm v/v			11/14/18 12:02	3.05
Trichloroethene	0.19		0.0012	0.00032	ppm v/v			11/14/18 12:02	3.05
Trichlorofluoromethane	0.030		0.0012	0.00060	ppm v/v			11/14/18 12:02	3.05
1,2,4-Trimethylbenzene	ND		0.0024	0.00049	ppm v/v			11/14/18 12:02	3.05
1,3,5-Trimethylbenzene	ND		0.0012	0.00038	ppm v/v			11/14/18 12:02	3.05
Vinyl acetate	ND		0.0024	0.00044	ppm v/v			11/14/18 12:02	3.05
Vinyl chloride	ND		0.0012	0.00037	ppm v/v			11/14/18 12:02	3.05

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106635-001/MWL-SV03-200

Lab Sample ID: 320-45032-18

Date Collected: 10/30/18 10:23

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.0024	0.00031	ppm v/v			11/14/18 12:02	3.05
o-Xylene	ND		0.0012	0.00016	ppm v/v			11/14/18 12:02	3.05
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130					11/14/18 12:02	3.05
1,2-Dichloroethane-d4 (Surr)	104		70 - 130					11/14/18 12:02	3.05
Toluene-d8 (Surr)	101		70 - 130					11/14/18 12:02	3.05

Client Sample ID: 106636-001/MWL-SV03-300

Lab Sample ID: 320-45032-19

Date Collected: 10/30/18 10:33

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0080	J	0.012	0.00043	ppm v/v			11/14/18 12:58	2.4
Benzene	0.00022	J	0.00096	0.00019	ppm v/v			11/14/18 12:58	2.4
Benzyl chloride	ND		0.0019	0.00039	ppm v/v			11/14/18 12:58	2.4
Bromodichloromethane	ND		0.00072	0.00016	ppm v/v			11/14/18 12:58	2.4
Bromoform	ND		0.00096	0.00017	ppm v/v			11/14/18 12:58	2.4
Bromomethane	ND		0.0019	0.00080	ppm v/v			11/14/18 12:58	2.4
2-Butanone (MEK)	0.00075	J	0.0019	0.00048	ppm v/v			11/14/18 12:58	2.4
Carbon disulfide	0.0017	J	0.0019	0.00019	ppm v/v			11/14/18 12:58	2.4
Carbon tetrachloride	0.00037	J	0.0019	0.00015	ppm v/v			11/14/18 12:58	2.4
Chlorobenzene	ND		0.00072	0.00015	ppm v/v			11/14/18 12:58	2.4
Chloroethane	ND		0.0019	0.00074	ppm v/v			11/14/18 12:58	2.4
Chloroform	0.0010		0.00072	0.00023	ppm v/v			11/14/18 12:58	2.4
Chloromethane	ND		0.0019	0.00047	ppm v/v			11/14/18 12:58	2.4
Dibromochloromethane	ND		0.00096	0.00019	ppm v/v			11/14/18 12:58	2.4
1,2-Dibromoethane (EDB)	ND		0.0019	0.00018	ppm v/v			11/14/18 12:58	2.4
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00096	0.00037	ppm v/v			11/14/18 12:58	2.4
1,2-Dichlorobenzene	ND		0.00096	0.00031	ppm v/v			11/14/18 12:58	2.4
1,3-Dichlorobenzene	ND		0.00096	0.00026	ppm v/v			11/14/18 12:58	2.4
1,4-Dichlorobenzene	ND		0.00096	0.00036	ppm v/v			11/14/18 12:58	2.4
Dichlorodifluoromethane	0.029		0.00096	0.00035	ppm v/v			11/14/18 12:58	2.4
1,1-Dichloroethane	0.0024		0.00072	0.00017	ppm v/v			11/14/18 12:58	2.4
1,2-Dichloroethane	ND		0.0019	0.00021	ppm v/v			11/14/18 12:58	2.4
1,1-Dichloroethene	0.018		0.0019	0.00031	ppm v/v			11/14/18 12:58	2.4
cis-1,2-Dichloroethene	0.0017		0.00096	0.00021	ppm v/v			11/14/18 12:58	2.4
trans-1,2-Dichloroethene	ND		0.00096	0.00024	ppm v/v			11/14/18 12:58	2.4
1,2-Dichloropropane	ND		0.00096	0.00058	ppm v/v			11/14/18 12:58	2.4
cis-1,3-Dichloropropene	ND		0.00096	0.00025	ppm v/v			11/14/18 12:58	2.4
trans-1,3-Dichloropropene	ND		0.00096	0.00021	ppm v/v			11/14/18 12:58	2.4
Ethylbenzene	ND		0.00096	0.00015	ppm v/v			11/14/18 12:58	2.4
4-Ethyltoluene	ND		0.00096	0.00045	ppm v/v			11/14/18 12:58	2.4
Hexachlorobutadiene	ND		0.0048	0.0010	ppm v/v			11/14/18 12:58	2.4
2-Hexanone	ND		0.00096	0.00021	ppm v/v			11/14/18 12:58	2.4
4-Methyl-2-pentanone (MIBK)	ND		0.00096	0.00032	ppm v/v			11/14/18 12:58	2.4
Methylene Chloride	0.00080	J	0.00096	0.00017	ppm v/v			11/14/18 12:58	2.4

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106636-001/MWL-SV03-300

Lab Sample ID: 320-45032-19

Date Collected: 10/30/18 10:33

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.00096	0.00014	ppm v/v			11/14/18 12:58	2.4
1,1,2,2-Tetrachloroethane	ND		0.00096	0.00017	ppm v/v			11/14/18 12:58	2.4
Tetrachloroethene	0.20		0.00096	0.00012	ppm v/v			11/14/18 12:58	2.4
Toluene	0.00018	J	0.00096	0.00012	ppm v/v			11/14/18 12:58	2.4
1,1,2-Trichloro-1,2,2-trifluoroethane	0.10		0.00096	0.00039	ppm v/v			11/14/18 12:58	2.4
1,2,4-Trichlorobenzene	ND		0.0048	0.0010	ppm v/v			11/14/18 12:58	2.4
1,1,1-Trichloroethane	0.00078		0.00072	0.00016	ppm v/v			11/14/18 12:58	2.4
1,1,2-Trichloroethane	ND		0.00096	0.00016	ppm v/v			11/14/18 12:58	2.4
Trichloroethene	0.14		0.00096	0.00025	ppm v/v			11/14/18 12:58	2.4
Trichlorofluoromethane	0.014		0.00096	0.00047	ppm v/v			11/14/18 12:58	2.4
1,2,4-Trimethylbenzene	ND		0.0019	0.00039	ppm v/v			11/14/18 12:58	2.4
1,3,5-Trimethylbenzene	ND		0.00096	0.00030	ppm v/v			11/14/18 12:58	2.4
Vinyl acetate	ND		0.0019	0.00035	ppm v/v			11/14/18 12:58	2.4
Vinyl chloride	ND		0.00096	0.00029	ppm v/v			11/14/18 12:58	2.4
m,p-Xylene	ND		0.0019	0.00024	ppm v/v			11/14/18 12:58	2.4
o-Xylene	ND		0.00096	0.00013	ppm v/v			11/14/18 12:58	2.4
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					11/14/18 12:58	2.4
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					11/14/18 12:58	2.4
Toluene-d8 (Surr)	99		70 - 130					11/14/18 12:58	2.4

Client Sample ID: 106637-001/MWL-SV03-400

Lab Sample ID: 320-45032-20

Date Collected: 10/30/18 10:55

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0095	J	0.021	0.00074	ppm v/v			11/14/18 13:52	4.14
Benzene	ND		0.0017	0.00033	ppm v/v			11/14/18 13:52	4.14
Benzyl chloride	ND		0.0033	0.00067	ppm v/v			11/14/18 13:52	4.14
Bromodichloromethane	ND		0.0012	0.00027	ppm v/v			11/14/18 13:52	4.14
Bromoform	ND		0.0017	0.00029	ppm v/v			11/14/18 13:52	4.14
Bromomethane	ND		0.0033	0.0014	ppm v/v			11/14/18 13:52	4.14
2-Butanone (MEK)	0.00087	J	0.0033	0.00082	ppm v/v			11/14/18 13:52	4.14
Carbon disulfide	ND		0.0033	0.00032	ppm v/v			11/14/18 13:52	4.14
Carbon tetrachloride	0.00037	J	0.0033	0.00026	ppm v/v			11/14/18 13:52	4.14
Chlorobenzene	ND		0.0012	0.00026	ppm v/v			11/14/18 13:52	4.14
Chloroethane	ND		0.0033	0.0013	ppm v/v			11/14/18 13:52	4.14
Chloroform	0.0016		0.0012	0.00039	ppm v/v			11/14/18 13:52	4.14
Chloromethane	ND		0.0033	0.00082	ppm v/v			11/14/18 13:52	4.14
Dibromochloromethane	ND		0.0017	0.00033	ppm v/v			11/14/18 13:52	4.14
1,2-Dibromoethane (EDB)	ND		0.0033	0.00031	ppm v/v			11/14/18 13:52	4.14
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0017	0.00064	ppm v/v			11/14/18 13:52	4.14
1,2-Dichlorobenzene	ND		0.0017	0.00054	ppm v/v			11/14/18 13:52	4.14
1,3-Dichlorobenzene	ND		0.0017	0.00046	ppm v/v			11/14/18 13:52	4.14
1,4-Dichlorobenzene	ND		0.0017	0.00062	ppm v/v			11/14/18 13:52	4.14

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106637-001/MWL-SV03-400

Lab Sample ID: 320-45032-20

Date Collected: 10/30/18 10:55

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	0.016		0.0017	0.00060	ppm v/v			11/14/18 13:52	4.14
1,1-Dichloroethane	0.0031		0.0012	0.00030	ppm v/v			11/14/18 13:52	4.14
1,2-Dichloroethane	ND		0.0033	0.00036	ppm v/v			11/14/18 13:52	4.14
1,1-Dichloroethene	0.017		0.0033	0.00053	ppm v/v			11/14/18 13:52	4.14
cis-1,2-Dichloroethene	0.0025		0.0017	0.00037	ppm v/v			11/14/18 13:52	4.14
trans-1,2-Dichloroethene	ND		0.0017	0.00041	ppm v/v			11/14/18 13:52	4.14
1,2-Dichloropropane	ND		0.0017	0.00099	ppm v/v			11/14/18 13:52	4.14
cis-1,3-Dichloropropene	ND		0.0017	0.00043	ppm v/v			11/14/18 13:52	4.14
trans-1,3-Dichloropropene	ND		0.0017	0.00036	ppm v/v			11/14/18 13:52	4.14
Ethylbenzene	ND		0.0017	0.00026	ppm v/v			11/14/18 13:52	4.14
4-Ethyltoluene	ND		0.0017	0.00077	ppm v/v			11/14/18 13:52	4.14
Hexachlorobutadiene	ND		0.0083	0.0018	ppm v/v			11/14/18 13:52	4.14
2-Hexanone	ND		0.0017	0.00036	ppm v/v			11/14/18 13:52	4.14
4-Methyl-2-pentanone (MIBK)	ND		0.0017	0.00056	ppm v/v			11/14/18 13:52	4.14
Methylene Chloride	0.0011	J	0.0017	0.00030	ppm v/v			11/14/18 13:52	4.14
Styrene	ND		0.0017	0.00024	ppm v/v			11/14/18 13:52	4.14
1,1,2,2-Tetrachloroethane	ND		0.0017	0.00029	ppm v/v			11/14/18 13:52	4.14
Tetrachloroethene	0.32		0.0017	0.00021	ppm v/v			11/14/18 13:52	4.14
Toluene	0.00040	J	0.0017	0.00021	ppm v/v			11/14/18 13:52	4.14
1,1,2-Trichloro-1,2,2-trifluoroethane	0.058		0.0017	0.00067	ppm v/v			11/14/18 13:52	4.14
1,2,4-Trichlorobenzene	ND		0.0083	0.0018	ppm v/v			11/14/18 13:52	4.14
1,1,1-Trichloroethane	0.0013		0.0012	0.00027	ppm v/v			11/14/18 13:52	4.14
1,1,2-Trichloroethane	ND		0.0017	0.00028	ppm v/v			11/14/18 13:52	4.14
Trichloroethene	0.23		0.0017	0.00043	ppm v/v			11/14/18 13:52	4.14
Trichlorofluoromethane	0.012		0.0017	0.00081	ppm v/v			11/14/18 13:52	4.14
1,2,4-Trimethylbenzene	ND		0.0033	0.00067	ppm v/v			11/14/18 13:52	4.14
1,3,5-Trimethylbenzene	ND		0.0017	0.00052	ppm v/v			11/14/18 13:52	4.14
Vinyl acetate	ND		0.0033	0.00060	ppm v/v			11/14/18 13:52	4.14
Vinyl chloride	ND		0.0017	0.00050	ppm v/v			11/14/18 13:52	4.14
m,p-Xylene	ND		0.0033	0.00041	ppm v/v			11/14/18 13:52	4.14
o-Xylene	ND		0.0017	0.00022	ppm v/v			11/14/18 13:52	4.14
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130					11/14/18 13:52	4.14
1,2-Dichloroethane-d4 (Surr)	102		70 - 130					11/14/18 13:52	4.14
Toluene-d8 (Surr)	98		70 - 130					11/14/18 13:52	4.14

Client Sample ID: 106638-001/MWL-SV-FB 4

Lab Sample ID: 320-45032-21

Date Collected: 10/30/18 10:46

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.0050	0.00018	ppm v/v			11/14/18 14:56	1
Benzene	ND		0.00040	0.000079	ppm v/v			11/14/18 14:56	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/14/18 14:56	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/14/18 14:56	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106638-001/MWL-SV-FB 4

Lab Sample ID: 320-45032-21

Date Collected: 10/30/18 10:46

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	ND		0.00040	0.000070	ppm v/v			11/14/18 14:56	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/14/18 14:56	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/14/18 14:56	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			11/14/18 14:56	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			11/14/18 14:56	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/14/18 14:56	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/14/18 14:56	1
Chloroform	ND		0.00030	0.000095	ppm v/v			11/14/18 14:56	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/14/18 14:56	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/14/18 14:56	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/14/18 14:56	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 14:56	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 14:56	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/14/18 14:56	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/14/18 14:56	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			11/14/18 14:56	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			11/14/18 14:56	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/14/18 14:56	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			11/14/18 14:56	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			11/14/18 14:56	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/14/18 14:56	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/14/18 14:56	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/14/18 14:56	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/14/18 14:56	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/14/18 14:56	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/14/18 14:56	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/14/18 14:56	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/14/18 14:56	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/14/18 14:56	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			11/14/18 14:56	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/14/18 14:56	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/14/18 14:56	1
Tetrachloroethene	0.000094	J	0.00040	0.000051	ppm v/v			11/14/18 14:56	1
Toluene	ND		0.00040	0.000051	ppm v/v			11/14/18 14:56	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			11/14/18 14:56	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/14/18 14:56	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			11/14/18 14:56	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/14/18 14:56	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			11/14/18 14:56	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			11/14/18 14:56	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/14/18 14:56	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/14/18 14:56	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/14/18 14:56	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/14/18 14:56	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/14/18 14:56	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/14/18 14:56	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		11/14/18 14:56	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106638-001/MWL-SV-FB 4

Lab Sample ID: 320-45032-21

Date Collected: 10/30/18 10:46

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	102		70 - 130		11/14/18 14:56	1
Toluene-d8 (Surr)	101		70 - 130		11/14/18 14:56	1

Client Sample ID: 106639-001/MWL-SV02-41.5

Lab Sample ID: 320-45032-22

Date Collected: 10/30/18 11:37

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0074	J	0.013	0.00045	ppm v/v			11/15/18 06:23	2.53
Benzene	ND		0.0010	0.00020	ppm v/v			11/15/18 06:23	2.53
Benzyl chloride	ND		0.0020	0.00041	ppm v/v			11/15/18 06:23	2.53
Bromodichloromethane	ND		0.00076	0.00017	ppm v/v			11/15/18 06:23	2.53
Bromoform	ND		0.0010	0.00018	ppm v/v			11/15/18 06:23	2.53
Bromomethane	ND		0.0020	0.00085	ppm v/v			11/15/18 06:23	2.53
2-Butanone (MEK)	0.0037		0.0020	0.00050	ppm v/v			11/15/18 06:23	2.53
Carbon disulfide	0.00030	J	0.0020	0.00020	ppm v/v			11/15/18 06:23	2.53
Carbon tetrachloride	0.00027	J	0.0020	0.00016	ppm v/v			11/15/18 06:23	2.53
Chlorobenzene	ND		0.00076	0.00016	ppm v/v			11/15/18 06:23	2.53
Chloroethane	ND		0.0020	0.00078	ppm v/v			11/15/18 06:23	2.53
Chloroform	0.0024		0.00076	0.00024	ppm v/v			11/15/18 06:23	2.53
Chloromethane	ND		0.0020	0.00050	ppm v/v			11/15/18 06:23	2.53
Dibromochloromethane	ND		0.0010	0.00020	ppm v/v			11/15/18 06:23	2.53
1,2-Dibromoethane (EDB)	ND		0.0020	0.00019	ppm v/v			11/15/18 06:23	2.53
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0010	0.00039	ppm v/v			11/15/18 06:23	2.53
1,2-Dichlorobenzene	ND		0.0010	0.00033	ppm v/v			11/15/18 06:23	2.53
1,3-Dichlorobenzene	ND		0.0010	0.00028	ppm v/v			11/15/18 06:23	2.53
1,4-Dichlorobenzene	ND		0.0010	0.00038	ppm v/v			11/15/18 06:23	2.53
Dichlorodifluoromethane	0.058		0.0010	0.00037	ppm v/v			11/15/18 06:23	2.53
1,1-Dichloroethane	0.0018		0.00076	0.00018	ppm v/v			11/15/18 06:23	2.53
1,2-Dichloroethane	ND		0.0020	0.00022	ppm v/v			11/15/18 06:23	2.53
1,1-Dichloroethene	0.0089		0.0020	0.00033	ppm v/v			11/15/18 06:23	2.53
cis-1,2-Dichloroethene	0.00065	J	0.0010	0.00023	ppm v/v			11/15/18 06:23	2.53
trans-1,2-Dichloroethene	ND		0.0010	0.00025	ppm v/v			11/15/18 06:23	2.53
1,2-Dichloropropane	ND		0.0010	0.00061	ppm v/v			11/15/18 06:23	2.53
cis-1,3-Dichloropropene	ND		0.0010	0.00026	ppm v/v			11/15/18 06:23	2.53
trans-1,3-Dichloropropene	ND		0.0010	0.00022	ppm v/v			11/15/18 06:23	2.53
Ethylbenzene	ND		0.0010	0.00016	ppm v/v			11/15/18 06:23	2.53
4-Ethyltoluene	ND		0.0010	0.00047	ppm v/v			11/15/18 06:23	2.53
Hexachlorobutadiene	ND		0.0051	0.0011	ppm v/v			11/15/18 06:23	2.53
2-Hexanone	0.00028	J	0.0010	0.00022	ppm v/v			11/15/18 06:23	2.53
4-Methyl-2-pentanone (MIBK)	ND		0.0010	0.00034	ppm v/v			11/15/18 06:23	2.53
Methylene Chloride	0.00020	J	0.0010	0.00018	ppm v/v			11/15/18 06:23	2.53
Styrene	ND		0.0010	0.00015	ppm v/v			11/15/18 06:23	2.53
1,1,2,2-Tetrachloroethane	ND		0.0010	0.00017	ppm v/v			11/15/18 06:23	2.53
Tetrachloroethene	0.059		0.0010	0.00013	ppm v/v			11/15/18 06:23	2.53
Toluene	ND		0.0010	0.00013	ppm v/v			11/15/18 06:23	2.53

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106639-001/MWL-SV02-41.5

Lab Sample ID: 320-45032-22

Date Collected: 10/30/18 11:37

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	0.039		0.0010	0.00041	ppm v/v			11/15/18 06:23	2.53
1,2,4-Trichlorobenzene	ND		0.0051	0.0011	ppm v/v			11/15/18 06:23	2.53
1,1,1-Trichloroethane	0.058		0.00076	0.00016	ppm v/v			11/15/18 06:23	2.53
1,1,2-Trichloroethane	ND		0.0010	0.00017	ppm v/v			11/15/18 06:23	2.53
Trichloroethene	0.050		0.0010	0.00027	ppm v/v			11/15/18 06:23	2.53
1,2,4-Trimethylbenzene	ND		0.0020	0.00041	ppm v/v			11/15/18 06:23	2.53
1,3,5-Trimethylbenzene	ND		0.0010	0.00032	ppm v/v			11/15/18 06:23	2.53
Vinyl acetate	0.0056		0.0020	0.00037	ppm v/v			11/15/18 06:23	2.53
Vinyl chloride	ND		0.0010	0.00030	ppm v/v			11/15/18 06:23	2.53
m,p-Xylene	ND		0.0020	0.00025	ppm v/v			11/15/18 06:23	2.53
o-Xylene	ND		0.0010	0.00014	ppm v/v			11/15/18 06:23	2.53

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		11/15/18 06:23	2.53
1,2-Dichloroethane-d4 (Surr)	102		70 - 130		11/15/18 06:23	2.53
Toluene-d8 (Surr)	98		70 - 130		11/15/18 06:23	2.53

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	0.29		0.0030	0.0015	ppm v/v			11/16/18 00:09	7.43

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		70 - 130		11/16/18 00:09	7.43
1,2-Dichloroethane-d4 (Surr)	107		70 - 130		11/16/18 00:09	7.43
Toluene-d8 (Surr)	96		70 - 130		11/16/18 00:09	7.43

Client Sample ID: 106640-001/MWL-SV-FB 5

Lab Sample ID: 320-45032-23

Date Collected: 10/30/18 10:44

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.0050	0.00018	ppm v/v			11/15/18 07:27	1
Benzene	ND		0.00040	0.000079	ppm v/v			11/15/18 07:27	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/15/18 07:27	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			11/15/18 07:27	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/15/18 07:27	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/15/18 07:27	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			11/15/18 07:27	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			11/15/18 07:27	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			11/15/18 07:27	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/15/18 07:27	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/15/18 07:27	1
Chloroform	ND		0.00030	0.000095	ppm v/v			11/15/18 07:27	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/15/18 07:27	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/15/18 07:27	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/15/18 07:27	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 07:27	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106640-001/MWL-SV-FB 5

Lab Sample ID: 320-45032-23

Date Collected: 10/30/18 10:44

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 07:27	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/15/18 07:27	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/15/18 07:27	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			11/15/18 07:27	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			11/15/18 07:27	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/15/18 07:27	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			11/15/18 07:27	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			11/15/18 07:27	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/15/18 07:27	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/15/18 07:27	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/15/18 07:27	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/15/18 07:27	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/15/18 07:27	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/15/18 07:27	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/15/18 07:27	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			11/15/18 07:27	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/15/18 07:27	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			11/15/18 07:27	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/15/18 07:27	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/15/18 07:27	1
Tetrachloroethene	ND		0.00040	0.000051	ppm v/v			11/15/18 07:27	1
Toluene	ND		0.00040	0.000051	ppm v/v			11/15/18 07:27	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 07:27	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/15/18 07:27	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			11/15/18 07:27	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			11/15/18 07:27	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			11/15/18 07:27	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			11/15/18 07:27	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/15/18 07:27	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 07:27	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/15/18 07:27	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/15/18 07:27	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/15/18 07:27	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/15/18 07:27	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130		11/15/18 07:27	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		11/15/18 07:27	1
Toluene-d8 (Surr)	87		70 - 130		11/15/18 07:27	1

Client Sample ID: 106641-001/MWL-SV01-42.5

Lab Sample ID: 320-45032-24

Date Collected: 10/30/18 11:27

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0037	J	0.0050	0.00018	ppm v/v			11/15/18 08:30	1
Benzene	0.000083	J	0.00040	0.000079	ppm v/v			11/15/18 08:30	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106641-001/MWL-SV01-42.5

Lab Sample ID: 320-45032-24

Date Collected: 10/30/18 11:27

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			11/15/18 08:30	1
Bromodichloromethane	0.00057		0.00030	0.000066	ppm v/v			11/15/18 08:30	1
Bromoform	ND		0.00040	0.000070	ppm v/v			11/15/18 08:30	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			11/15/18 08:30	1
2-Butanone (MEK)	0.0012		0.00080	0.00020	ppm v/v			11/15/18 08:30	1
Carbon disulfide	0.00020	J	0.00080	0.000078	ppm v/v			11/15/18 08:30	1
Carbon tetrachloride	0.00029	J	0.00080	0.000064	ppm v/v			11/15/18 08:30	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			11/15/18 08:30	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			11/15/18 08:30	1
Chloroform	0.014		0.00030	0.000095	ppm v/v			11/15/18 08:30	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			11/15/18 08:30	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			11/15/18 08:30	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			11/15/18 08:30	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			11/15/18 08:30	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 08:30	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			11/15/18 08:30	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			11/15/18 08:30	1
Dichlorodifluoromethane	0.036		0.00040	0.00015	ppm v/v			11/15/18 08:30	1
1,1-Dichloroethane	0.0019		0.00030	0.000072	ppm v/v			11/15/18 08:30	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			11/15/18 08:30	1
1,1-Dichloroethene	0.0058		0.00080	0.00013	ppm v/v			11/15/18 08:30	1
cis-1,2-Dichloroethene	0.0010		0.00040	0.000089	ppm v/v			11/15/18 08:30	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			11/15/18 08:30	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			11/15/18 08:30	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			11/15/18 08:30	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			11/15/18 08:30	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			11/15/18 08:30	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			11/15/18 08:30	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			11/15/18 08:30	1
2-Hexanone	0.00016	J	0.00040	0.000087	ppm v/v			11/15/18 08:30	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			11/15/18 08:30	1
Methylene Chloride	0.00016	J	0.00040	0.000072	ppm v/v			11/15/18 08:30	1
Styrene	ND		0.00040	0.000059	ppm v/v			11/15/18 08:30	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			11/15/18 08:30	1
Toluene	ND		0.00040	0.000051	ppm v/v			11/15/18 08:30	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.059		0.00040	0.00016	ppm v/v			11/15/18 08:30	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			11/15/18 08:30	1
1,1,1-Trichloroethane	0.032		0.00030	0.000065	ppm v/v			11/15/18 08:30	1
1,1,2-Trichloroethane	0.00011	J	0.00040	0.000067	ppm v/v			11/15/18 08:30	1
Trichloroethene	0.070		0.00040	0.00011	ppm v/v			11/15/18 08:30	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			11/15/18 08:30	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			11/15/18 08:30	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			11/15/18 08:30	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			11/15/18 08:30	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			11/15/18 08:30	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			11/15/18 08:30	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-45032-1

Client Sample ID: 106641-001/MWL-SV01-42.5

Lab Sample ID: 320-45032-24

Date Collected: 10/30/18 11:27

Matrix: Air

Date Received: 11/08/18 09:15

Sample Container: Summa Canister 6L

<i>Surrogate</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
4-Bromofluorobenzene (Surr)	102		70 - 130		11/15/18 08:30	1
1,2-Dichloroethane-d4 (Surr)	109		70 - 130		11/15/18 08:30	1
Toluene-d8 (Surr)	97		70 - 130		11/15/18 08:30	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.37		0.0036	0.00046	ppm v/v	—		11/16/18 01:01	9.09
Trichlorofluoromethane	0.17		0.0036	0.0018	ppm v/v			11/16/18 01:01	9.09
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	109		70 - 130					11/16/18 01:01	9.09
1,2-Dichloroethane-d4 (Surr)	106		70 - 130					11/16/18 01:01	9.09
Toluene-d8 (Surr)	93		70 - 130					11/16/18 01:01	9.09

ANNEX D

**Mixed Waste Landfill
Soil-Moisture Monitoring Forms**

April 2018-March 2019

Field Forms and Tables

HEALTH & SAFETY MEETING FORM

 Dept: OG-41 Facility: MWL Date: 5/3/18 Time: 0800

 Activities: soil moisture monitoring
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

 Temp: 50 °F Wind Speed: 5 MPH Humidity: 39 % Wind Chill: NA °F

 Chemicals Used: ☒ None ☐ Preservatives in sample bottles

☐ Other: _____

Hospital/Clinic: Sandia Medial Clinic Bldg. 831

Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input type="checkbox"/> Wear safety glasses	<input checked="" type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input type="checkbox"/> Wear latex or nitrile gloves	<input checked="" type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe <u>NA</u>	<input checked="" type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or NO. If answered YES explain.

Danielle Michel
 Printed Name
Robert Zick
 Printed Name

 Printed Name

 Printed Name

 Printed Name

 Printed Name

Attendees

Danielle Michel
 Signature
Robert Zick
 Signature

 Signature

 Signature

 Signature

 Signature

Notes

Mixed Waste Landfill Neutron Logging Data Field Form

Name: <i>Robert Zick</i>	Standard Count: <i>6617</i>	Chi: <i>0.75</i>
Name: <i>Danielle Michel</i>	Previous Count: <i>6581</i>	Count Time: 30 seconds
Notes:		

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Winch Counter Reading (ft)	VZ-3 Counts (E Side)	VZ-2 Counts (SW Corner)	VZ-1 Counts (NW Corner)
			Date/Time <i>5/3/18 - 0830</i>	Date/Time <i>5/3/18 0930</i>	Date/Time <i>5/3/18 1030</i>
0.0	0	0	<i>985</i>	<i>1613</i>	<i>1441</i>
0.9	1	9999	<i>2455</i>	<i>2670</i>	<i>2663</i>
1.7	2	9998	<i>3882</i>	<i>2962</i>	<i>2786</i>
2.6	3	9997	<i>3492</i>	<i>2880</i>	<i>2461</i>
3.5	4	9996	<i>2837</i>	<i>2692</i>	<i>2532</i>
4.3	5	9995	<i>2400</i>	<i>2489</i>	<i>2357</i>
5.2	6	9994	<i>2067</i>	<i>2019</i>	<i>1857</i>
6.1	7	9993	<i>1687</i>	<i>1684</i>	<i>1747</i>
6.9	8	9992	<i>1732</i>	<i>1719</i>	<i>1556</i>
7.8	9	9991	<i>1772</i>	<i>1706</i>	<i>1637</i>
8.7	10	9990	<i>1828</i>	<i>1599</i>	<i>2078</i>
9.5	11	9989	<i>1797</i>	<i>1921</i>	<i>2109</i>
10.4	12	9988	<i>1625</i>	<i>1847</i>	<i>1944</i>
11.3	13	9987	<i>1814</i>	<i>1838</i>	<i>1696</i>
12.1	14	9986	<i>1775</i>	<i>1676</i>	<i>1832</i>
13.0	15	9985	<i>1842</i>	<i>1692</i>	<i>1950</i>
13.9	16	9984	<i>1767</i>	<i>1701</i>	<i>2153</i>
14.7	17	9983	<i>1630</i>	<i>1754</i>	<i>1754</i>
15.6	18	9982	<i>1781</i>	<i>1759</i>	<i>1521</i>
16.5	19	9981	<i>1526</i>	<i>2266</i>	<i>1498</i>
17.3	20	9980	<i>1345</i>	<i>2096</i>	<i>1462</i>
18.2	21	9979	<i>1820</i>	<i>1827</i>	<i>1704</i>
19.1	22	9978	<i>1590</i>	<i>1789</i>	<i>2452</i>
19.9	23	9977	<i>1493</i>	<i>2069</i>	<i>2159</i>
20.8	24	9976	<i>1450</i>	<i>1808</i>	<i>1958</i>
21.7	25	9975	<i>1600</i>	<i>1582</i>	<i>1811</i>

Mixed Waste Landfill Neutron Logging Data Field Form

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Winch Counter Reading (ft)	VZ-3 Counts (E Side)	VZ-2 Counts (SW Corner)	VZ-1 Counts (NW Corner)
26.0	30	9970	1726	1732	1752
30.3	35	9965	1640	1693	2175
34.6	40	9960	1800	1797	1726
39.0	45	9955	1632	1599	2106
43.3	50	9950	1986	1572	1690
47.6	55	9945	1795	2117	1763
52.0	60	9940	1716	1753	1929
56.3	65	9935	2133	1972	1898
60.6	70	9930	1303	2420	1701
65.0	75	9925	2409	2247	2132
69.3	80	9920	2241	1540	1986
73.6	85	9915	1968	1994	1950
77.9	90	9910	1437	2525	1922
82.3	95	9905	2200	2272	2218
86.6	100	9900	2068	2194	2361
90.9	105	9895	1890	2376	2133
95.3	110	9890	2303	1824	2085
99.6	115	9885	2050	1792	1673
103.9	120	9880	1587	1947	1992
108.3	125	9875	1819	2242	1488
112.6	130	9870	2352	2100	1898
116.9	135	9865	2310	2710	1728
121.2	140	9860	1679	1945	1474
125.6	145	9855	1504	2480	2865
129.9	150	9850	2553	2321	2105
134.2	155	9845	2031	2263	1784
138.6	160	9840	2564	2406	2140
142.9	165	9835	2625	2135	2086
147.2	170	9830	2318	1620	1631
151.6	175	9825	2470	2864	2605
155.9	180	9820	3290	2658	2988
160.2	185	9815	2923	2856	2219
164.5	190	9810	1742	1640	1883
168.9	195	9805	1800	2065	3465
173.2	200	9800	2213	3074	2510

MIXED WASTE LANDFILL
SOIL MOISTURE MONITORING

Soil Moisture Monitoring Results Tables

Table D-1
VZ-1 Soil-Moisture Monitoring Results
May 2018

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period	Baseline Average (2004-2006)	Difference between Baseline Average & May 2018	Soil Moisture Trigger Level (% content by volume)
		May 2018			
		Soil Moisture (% content by volume)			
3.5	4	4.7	2.9	1.8	NA
4.3	5	4.3	2.9	1.4	NA
5.2	6	2.9	2.9	0.0	NA
6.1	7	2.6	2.6	0.0	NA
6.9	8	2.1	2.2	-0.1	NA
7.8	9	2.3	1.9	0.4	NA
8.7	10	3.5	1.7	1.8	23
9.5	11	3.6	2.0	1.6	23
10.4	12	3.1	2.7	0.4	23
11.3	13	2.5	3.1	-0.6	23
12.1	14	2.8	2.6	0.2	23
13.0	15	3.2	2.4	0.8	23
13.9	16	3.7	2.6	1.1	23
14.7	17	2.6	2.8	-0.2	23
15.6	18	2.0	2.9	-0.9	23
16.5	19	1.9	2.4	-0.5	23
17.3	20	1.8	2.0	-0.2	23
18.2	21	2.5	2.0	0.5	23
19.1	22	4.5	2.1	2.4	23
19.9	23	3.7	3.0	0.7	23
20.8	24	3.2	4.3	-1.1	23
21.7	25	2.8	4.0	-1.2	23
26.0	30	2.6	2.9	-0.3	23
30.3	35	3.8	2.7	1.1	23
34.6	40	2.6	2.3	0.3	23
39.0	45	3.6	3.0	0.6	23
43.3	50	2.5	2.9	-0.4	23
47.6	55	2.7	2.8	-0.1	23
52.0	60	3.1	3.4	-0.3	23
56.3	65	3.0	2.9	0.1	23
60.6	70	2.5	2.1	0.4	23
65.0	75	3.6	5.6	-2.0	23
69.3	80	3.3	2.8	0.5	23
73.6	85	3.2	3.1	0.1	23

Table D-1 (concluded)
VZ-1 Soil-Moisture Monitoring Results
May 2018

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period	Baseline Average (2004-2006)	Difference between Baseline Average & May 2018	Soil Moisture Trigger Level (% content by volume)
		May 2018			
		Soil Moisture (% content by volume)			
77.9	90	3.1	3.7	-0.6	23
82.3	95	3.9	3.7	0.2	23
86.6	100	4.3	5.4	-1.1	23
90.9	105	3.7	5.0	-1.3	NA
95.3	110	3.5	3.0	0.5	NA
99.6	115	2.4	3.6	-1.2	NA
103.9	120	3.3	2.2	1.1	NA
108.3	125	1.9	2.7	-0.8	NA
112.6	130	3.0	3.3	-0.3	NA
116.9	135	2.6	3.1	-0.5	NA
121.2	140	1.9	2.1	-0.2	NA
125.6	145	5.6	3.8	1.8	NA
129.9	150	3.6	3.2	0.4	NA
134.2	155	2.7	2.7	0.0	NA
138.6	160	3.7	2.1	1.6	NA
142.9	165	3.5	3.8	-0.3	NA
147.2	170	2.3	2.0	0.3	NA
151.6	175	4.9	6.0	-1.1	NA
155.9	180	6.0	5.5	0.5	NA
160.2	185	3.9	4.4	-0.5	NA
164.5	190	3.0	3.0	0.0	NA
168.9	195	7.2	7.0	0.2	NA
173.2	200	4.7	5.4	-0.7	NA
	Average	3.3	3.2		

Note: Shaded area represents depths where 23-percent soil moisture trigger applies.

NA = Not applicable

Table D-2
VZ-2 Soil-Moisture Monitoring Results
May 2018

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period	Baseline Average (2004-2006)	Difference between Baseline Average & May 2018	Soil Moisture Trigger Level (% content by volume)
		May 2018			
		Soil Moisture (% content by volume)			
3.5	4	5.2	2.7	2.5	NA
4.3	5	4.6	3.3	1.3	NA
5.2	6	3.3	3.6	-0.3	NA
6.1	7	2.4	3.6	-1.2	NA
6.9	8	2.5	3.5	-1.0	NA
7.8	9	2.5	3.1	-0.6	NA
8.7	10	2.2	2.4	-0.2	23
9.5	11	3.1	2.2	0.9	23
10.4	12	2.9	2.2	0.7	23
11.3	13	2.9	2.1	0.8	23
12.1	14	2.4	2.5	-0.1	23
13.0	15	2.5	3.0	-0.5	23
13.9	16	2.5	2.8	-0.3	23
14.7	17	2.6	2.4	0.2	23
15.6	18	2.6	2.6	0.0	23
16.5	19	4.0	2.7	1.3	23
17.3	20	3.6	2.9	0.7	23
18.2	21	2.8	3.1	-0.3	23
19.1	22	2.7	3.6	-0.9	23
19.9	23	3.5	3.7	-0.2	23
20.8	24	2.8	3.1	-0.3	23
21.7	25	2.2	2.7	-0.5	23
26.0	30	2.6	2.4	0.2	23
30.3	35	2.5	2.9	-0.4	23
34.6	40	2.7	2.7	0.0	23
39.0	45	2.2	2.3	-0.1	23
43.3	50	2.1	2.1	0.0	23
47.6	55	3.6	3.1	0.5	23
52.0	60	2.6	3.0	-0.4	23
56.3	65	3.2	5.5	-2.3	23
60.6	70	4.4	4.8	-0.4	23
65.0	75	4.0	5.1	-1.1	23
69.3	80	2.1	2.6	-0.5	23
73.6	85	3.3	2.6	0.7	23

Table D-2 (concluded)
VZ-2 Soil-Moisture Monitoring Results
May 2018

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period	Baseline Average (2004-2006)	Difference between Baseline Average & May 2018	Soil Moisture Trigger Level (% content by volume)
		May 2018			
		Soil Moisture (% content by volume)			
77.9	90	4.7	3.1	1.6	23
82.3	95	4.0	3.6	0.4	23
86.6	100	3.8	4.7	-0.9	23
90.9	105	4.3	3.4	0.9	NA
95.3	110	2.8	3.1	-0.3	NA
99.6	115	2.7	3.6	-0.9	NA
103.9	120	3.2	2.0	1.2	NA
108.3	125	3.9	3.8	0.1	NA
112.6	130	3.6	3.6	0.0	NA
116.9	135	5.2	3.4	1.8	NA
121.2	140	3.1	2.4	0.7	NA
125.6	145	4.6	5.9	-1.3	NA
129.9	150	4.2	7.0	-2.8	NA
134.2	155	4.0	3.6	0.4	NA
138.6	160	4.4	3.8	0.6	NA
142.9	165	3.7	3.0	0.7	NA
147.2	170	2.3	2.9	-0.6	NA
151.6	175	5.6	2.4	3.2	NA
155.9	180	5.1	5.4	-0.3	NA
160.2	185	5.6	5.4	0.2	NA
164.5	190	2.3	4.1	-1.8	NA
168.9	195	3.5	3.5	0.0	NA
173.2	200	6.2	6.3	-0.1	NA
	Average	3.4	3.4		

Note: Shaded area represents depths where 23-percent soil moisture trigger applies.

NA = Not applicable

Table D-3
VZ-3 Soil-Moisture Monitoring Results
May 2018

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period	Baseline Average (2004-2006)	Difference between Baseline Average & May 2018	Soil Moisture Trigger Level (% content by volume)
		May 2018			
		Soil Moisture (% content by volume)			
3.5	4	5.5	4.6	0.9	NA
4.3	5	4.4	4.5	-0.1	NA
5.2	6	3.5	3.7	-0.2	NA
6.1	7	2.4	2.9	-0.5	NA
6.9	8	2.6	3.1	-0.5	NA
7.8	9	2.7	2.3	0.4	NA
8.7	10	2.8	2.4	0.4	23
9.5	11	2.7	2.6	0.1	23
10.4	12	2.3	2.7	-0.4	23
11.3	13	2.8	3.0	-0.2	23
12.1	14	2.7	2.6	0.1	23
13.0	15	2.9	2.8	0.1	23
13.9	16	2.7	2.9	-0.2	23
14.7	17	2.3	3.1	-0.8	23
15.6	18	2.7	3.1	-0.4	23
16.5	19	2.0	2.3	-0.3	23
17.3	20	1.5	2.7	-1.2	23
18.2	21	2.8	2.7	0.1	23
19.1	22	2.2	1.8	0.4	23
19.9	23	1.9	2.7	-0.8	23
20.8	24	1.8	2.8	-1.0	23
21.7	25	2.2	2.1	0.1	23
26.0	30	2.6	2.5	0.1	23
30.3	35	2.3	2.8	-0.5	23
34.6	40	2.8	2.1	0.7	23
39.0	45	2.3	2.7	-0.4	23
43.3	50	3.3	2.9	0.4	23
47.6	55	2.7	3.4	-0.7	23
52.0	60	2.5	2.9	-0.4	23
56.3	65	3.7	3.5	0.2	23
60.6	70	1.4	1.9	-0.5	23
65.0	75	4.4	4.3	0.1	23
69.3	80	3.9	4.5	-0.6	23
73.6	85	3.2	3.5	-0.3	23

Table D-3 (concluded)
VZ-3 Soil-Moisture Monitoring Results
May 2018

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period	Baseline Average (2004-2006)	Difference between Baseline Average & May 2018	Soil Moisture Trigger Level (% content by volume)
		May 2018			
		Soil Moisture (% content by volume)			
77.9	90	1.8	1.9	-0.1	23
82.3	95	3.8	3.3	0.5	23
86.6	100	3.5	3.4	0.1	23
90.9	105	3.0	3.3	-0.3	NA
95.3	110	4.1	4.7	-0.6	NA
99.6	115	3.4	3.6	-0.2	NA
103.9	120	2.2	2.1	0.1	NA
108.3	125	2.8	1.8	1.0	NA
112.6	130	4.2	4.3	-0.1	NA
116.9	135	4.1	4.0	0.1	NA
121.2	140	2.4	2.3	0.1	NA
125.6	145	2.0	2.0	0.0	NA
129.9	150	4.8	4.4	0.4	NA
134.2	155	3.4	3.6	-0.2	NA
138.6	160	4.8	4.4	0.4	NA
142.9	165	5.0	5.2	-0.2	NA
147.2	170	4.1	4.1	0.0	NA
151.6	175	4.6	4.3	0.3	NA
155.9	180	6.8	6.6	0.2	NA
160.2	185	5.8	5.6	0.2	NA
164.5	190	2.6	2.7	-0.1	NA
168.9	195	2.8	3.1	-0.3	NA
173.2	200	3.9	4.1	-0.2	NA
	Average	3.2	3.2		

Note: Shaded area represents depths where 23-percent soil moisture trigger applies.

NA = Not applicable

ANNEX E

**Mixed Waste Landfill
Groundwater Monitoring Forms and Reports**

April 2018-March 2019

Field Forms

Data Validation Reports

Contract Verification Reviews

FIELD SAMPLING FORMS

MWL LONG-TERM MONITORING AND MAINTENANCE

GROUNDWATER MONITORING

Form Title	Corresponding Procedure
Health & Safety Meeting Form	PLA 05-09
Groundwater Sample Collection Field Equipment Check Log	FOP 05-02
Portable Pump and Tubing/Water Level Indicator Decontamination Log Form	FOP 05-03
Field Measurement Log For Groundwater Sample Collection	FOP 05-01
Analysis Request and Chain of Custody*	LOP 94-03

*Completed AR/COC forms are provided in the Data Validation Section of this Annex.

FIELD SAMPLING FORMS
APRIL-MAY 2018 GROUNDWATER MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 0641

Facility: 9925

Date: 04/26/18

Time: 0820

Activities: Deconing Pump

(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: _____ °F

Wind Speed: _____ MPH

Humidity: 0%

Wind Chill: °F

Chemicals Used: ☐ None ☒ Preservatives in sample bottles

☐ Other: _____

Hospital/Clinic: Sandia Medial Clinic Bldg. 831

Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

Safety Topics Reviewed		
<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):
Does anyone have any weight restrictions on lifting? Circle YES or NO . If answered YES explain.		

Robert T Lynch
Printed Name

CHRIS HULLIGER
Printed Name


Printed Name _____

Printed Name _____

Printed Name _____

Printed Name _____

Attendees

Signature 

Signature _____

Signature _____

Signature _____

Signature _____

Signature _____

Notes

Notes

Inside 9925 Hi-Bay

HEALTH & SAFETY MEETING FORMDept: 0641Facility: MWL-BW 2Date: 4/30/18Time: 0815Activities: Groundwater Monitoring and Sampling

(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: 60 °FWind Speed: 9 MPHHumidity: 14 %Wind Chill: 68 °FChemicals Used: ☐ None ☒ Preservatives in sample bottles☐ Other: _____Hospital/Clinic: Sandia Medial Clinic Bldg. 831Phone: 911 on LAN; 844-0911 on mobile*Safety Topics Presented*

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Printed Name Robert Lynch

Printed Name William Gibson

Printed Name CHRIS HOLLIER

Printed Name _____

Printed Name _____

Printed Name _____

Attendees

Signature [Signature]

Signature [Signature]

Signature [Signature]

Signature _____

Signature _____

Signature _____

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: MWL-MW 9 Date: 05/01/18 Time: 0811

Activities: Groundwater Monitoring and Sampling

(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: 67 °F Wind Speed: 16 MPH Humidity: 16 % Wind Chill: 67 °F

Chemicals Used: ☐ None ☒ Preservatives in sample bottles ☐ Other: _____

Hospital/Clinic: Sandia Medial Clinic Bldg. 831

Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert J Lynch
Printed Name

Chris Humber
Printed Name

William Gibson
Printed Name

Printed Name

Printed Name

Printed Name

Attendees

Ralph Snel
Signature

[Signature]
Signature

William J. Gibson
Signature

Signature

Signature

Signature

Notes

HEALTH & SAFETY MEETING FORM 1Dept: 0641Facility: MWL-MW 7Date: ⁰⁵24/02/18Time: 0814Activities: Groundwater Monitoring and SamplingPL 25/02/18

(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: 59 °FWind Speed: 8 MPHHumidity: 33 %Wind Chill: 57 °FChemicals Used: ☐ None ☒ Preservatives in sample bottles☐ Other: _____Hospital/Clinic: Sandia Medial Clinic Bldg. 831Phone: 911 on LAN; 844-0911 on mobile*Safety Topics Presented*

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle **YES** or **NO**. If answered **YES** explain.Robert Lynch

Printed Name

Chris Hutter

Printed Name

William Gibson

Printed Name

Printed Name

Printed Name

Printed Name

Attendees

Signature Robert LynchSignature Chris HutterSignature William Gibson

Signature

Signature

Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641Facility: MWL-MW 8Date: ⁰⁵04/03/18Time: 0816Activities: Groundwater Monitoring and Sampling

(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: 54 °FWind Speed: 8 MPHHumidity: 38 %Wind Chill: 51 °FChemicals Used: ☐ None ☒ Preservatives in sample bottles☐ Other: _____Hospital/Clinic: Sandia Medial Clinic Bldg. 831Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert Lynch
Printed Name

CHRIS HULLNER
Printed Name

William Gibson
Printed Name

Printed Name

Printed Name

Printed Name

Attendees

Robert Lynch
Signature

Chris Hullner
Signature

William Gibson
Signature

Signature

Signature

Signature

Notes

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL		
Well I.D.: MWL-BW 2	Date: 04/30/18	
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 496'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol (L gal)	Temp (°C)	SC (μS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
481.32	0835	Start							
483.88	0902	5	19.57	704.7	139.9	7.37	0.52	18.9	1.41
484.68	0921	10	19.81	698.4	128.6	7.37	0.80	15.9	1.17
485.21	0940	15	19.97	709.2	134.7	7.37	0.73	14.8	1.09
485.64	1000	20	20.44	722.8	136.4	7.36	0.39	13.4	0.98
486.16	1020	25	20.91	732.6	138.9	7.36	0.62	15.1	1.10
486.36	1028	27	21.25	737.7	146.8	7.35	0.97	21.8	1.58
486.62	1037	29	21.31	739.4	152.0	7.35	0.99	20.7	1.49
486.85	1045	31	20.99	733.3	153.7	7.35	1.37	22.9	1.66
486.98	1049	32	20.99	738.8	157.0	7.36	1.82	26.5	1.92
487.05	1054	33	21.13	736.5	161.0	7.36	2.20	26.9	1.94
487.09	1058	34	21.20	741.0	161.0	7.37	3.27	27.8	2.00
487.11	1103	35	21.21	738.7	162.7	7.38	3.07	29.9	2.20
	1104	Sampling							

Comments: ~1.5 gals purged from tubing 0843

FB Lot # 009

Project Name: MWL	
Well I.D.: MWL-MW 9	Date: 05/01/18
Method: Portable pump <input checked="" type="checkbox"/> Dedicated pump <input type="checkbox"/> Pump depth: 497'	

[illegible]

F13 Lot # 080

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

21 05/02/18

Project Name: MWL		05
Well I.D.: MWL-MW 7	Date: 05/02/18	
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 496'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol (L/gal)	Temp (°C)	SC (μS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
490.35	0829	Start							
491.48	0856	2	17.62	561.2	174.3	7.64	0.33	84.8	6.57
491.57	0905	3	17.85	565.5	174.4	7.64	0.41	85.1	6.56
491.70	0913	4	18.38	574.3	180.2	7.62	0.51	84.5	6.44
491.78	0921	5	18.35	573.4	182.4	7.62	0.40	84.1	6.42
491.84	0928	6	18.51	575.9	187.0	7.61	0.32	84.2	6.40
491.86	0935	7	18.95	582.4	190.7	7.61	0.35	84.8	6.39
491.89	0943	8	19.28	588.9	192.1	7.60	0.28	85.2	6.37
491.90	0950	9	19.49	589.4	199.3	7.60	0.25	85.4	6.36
491.90	0958	10	19.44	587.9	201.1	7.60	0.34	85.2	6.35
491.89	1005	11	19.46	588.5	205.5	7.60	0.20	85.1	6.34
491.89	1013	12	19.40	587.1	203.6	7.60	0.25	84.8	6.34
	1014	Sampling							

Comments: ~1.5 gals purged from tubing 0843

00

FB Lot # 079

PL 05/03/18

05

PURGE MEASUREMENTS

[illegible]

Comments: ~1.5 gals purged from tubing 084/2

FB Lot # 025

GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL						
Calibrations done by: C. Hulliger				Date: 4/30/18		
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (S/N):						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0547	4.00	21.3	7.01	21.4	10.01
2. Time:	1303	4.00	21.8	7.02	21.6	10.03
3. Time:						
4. Time:						
Standard lot no.:	7GF1144		8GA687		6GF797	
Expiration date:	JUNE/19		JAN/20		JUN/18	
SC Calibration/Check						
Reference Value: 1309@21c			Standard Lot No.: 7GG624			
	Value	Temp	Expiration Date: JUL/18			
1. Time:	0554	1315	21.3			
2. Time:	1314	1325	21.9			
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GA564			
	Value	Temp	Expiration Date: OCT/18			
1. Time:	0556	220	21.1			
2. Time:	1316	221	22.0			
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0543	94.0	24.4			
2. Time:	1229	94.7	24.4			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: C. Hulliger			Date: 4/30/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time <i>0558</i>	<i>10</i>	<i>20.1</i>	<i>101</i>	<i>799</i>
2. Time <i>1314</i>	<i>10.1</i>	<i>20.1</i>	<i>102</i>	<i>801</i>
3. Time				
4. Time				
Comments:				

GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG**Page 1 of 2**

SNL/NM Project Name: MWL						
Calibrations done by: C. Hulliger				Date: 5/1/18		
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 506777						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: 0543	4.00	21.3	7.01	21.4	10.01	21.1
2. Time: 1324	4.00	22.7	7.00	22.6	10.00	22.7
3. Time:						
4. Time:						
Standard lot no.:	7GF1144		8GA687		6GF797	
Expiration date:	JUNE/19		JAN/20		JUN/18	
SC Calibration/Check						
Reference Value: 1309@21c			Standard Lot No.: 7GG624			
	Value	Temp	Expiration Date: JUL/18			
1. Time: 0549	1307	21.1				
2. Time: 1340	1350	22.6				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GA564			
	Value	Temp	Expiration Date: OCT/18			
1. Time: 0551	220	20.9				
2. Time: 1343	219	22.6				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: 0540	97.1		24.4			
2. Time: 1321	98.0		24.4			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: C. Hulliger			Date: 5/1/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time 0554	10.2	20	101	801
2. Time 1352	10.1	19.9	100	799
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL						
Calibrations done by: C. Hulliger				Date: 5/2/18		
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (S/N):						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0538	4.00	22.4	7.00	22.5	10.00
2. Time:	1239	4.00	22.2	7.01	22.1	10.02
3. Time:						
4. Time:						
Standard lot no.:	7GF1144		8GA687		6GF797	
Expiration date:	JUNE/19		JAN/20		JUN/18	
SC Calibration/Check						
Reference Value: 1309@21c			Standard Lot No.: 7GG624			
	Value	Temp	Expiration Date: JUL/18			
1. Time:	0543	1330	22.4			
2. Time:	1256	1341	22.5			
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GA564			
	Value	Temp	Expiration Date: OCT/18			
1. Time:	0544	220	22.3			
2. Time:	1258	219	22.4			
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0535	96.4	24.4			
2. Time:	1236	96.3	24.4			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: C. Hulliger			Date: 5/2/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time <i>0546</i>	<i>10</i>	<i>19.9</i>	<i>101</i>	<i>796</i>
2. Time <i>1300</i>	<i>10.1</i>	<i>20</i>	<i>100</i>	<i>799</i>
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL						
Calibrations done by: C. Hulliger				Date: 5/3/18		
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571017						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: 0541	4.00	20.2	7.01	20.1	10.01	20.2
2. Time: 1305	4.00	19.7	7.00	19.8	10.02	19.9
3. Time:						
4. Time:						
Standard lot no.:	7GF1144		8GA687		6GF797	
Expiration date:	JUNE/19		JAN/20		JUN/18	
SC Calibration/Check						
Reference Value: 1309@21c			Standard Lot No.: 7GG624			
	Value	Temp	Expiration Date: JUL/18			
1. Time: 0547	1285	20.2				
2. Time: 1316	1273	19.9				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GA564			
	Value	Temp	Expiration Date: OCT/18			
1. Time: 0548	220	20.3				
2. Time: 1317	220	19.9				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: 0538	95.6	24.5				
2. Time: 1300	97.4	24.5				
3. Time:						
4. Time:						



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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2



SNL/NM Project Name: MWL				
Calibration done by: C. Hulliger			Date: 5/3/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time 0550	10	20.1	100	801
2. Time 1319	10.1	20.	100	799
3. Time				
4. Time				
Comments:				

**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>MWL-GWM</u>	Monitoring Well ID #: <u>Prior to MWL-BW2</u>	Date: <u>04/26/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>NA</u>	
<u>Personnel Performing Decontamination:</u>		
Robert Lynch Print Name: _____		 Initial: _____
Chris Hulliger Print Name: _____		 Initial: _____
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>NA</u>
List of Decontamination Materials		
Deionized Water Source: <u>Bldg. 1090</u> Lot Number: <u>075, 005, 073, 008, 014, 093, 069, 084</u> <u>077, 078, 090, 079</u>	HNO₃ Grade: <u>Reagent</u> UN #: <u>2031</u> Manufacturer: <u>ACROS</u> Lot Number: <u>A0385545</u>	


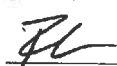
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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>MWL-GWM</u>	Monitoring Well ID #: <u>MWL-BW2</u>	Date: <u>04/30/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>62089</u>	
<u>Personnel Performing Decontamination:</u>		
William Gibson Print Name: _____		 Initial: _____
Robert Lynch Print Name: _____		 Initial: _____
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>Culligan</u>	Grade: <u>Reagent</u>	
Lot Number: <u>03/29/18</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0385545</u>	

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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>MWL-GWM</u>	Monitoring Well ID #: <u>MWL-MW9</u>	Date: <u>05/01/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>62089</u>	
<u>Personnel Performing Decontamination:</u> Chris Hulliger Print Name: _____ Robert Lynch Print Name: _____ <div style="text-align: right;"> Initial: _____  Initial: _____</div>		
Condition of Equipment Pump: <u>Excellent</u> Tubing Bundle: <u>Excellent</u> Water Level Indicator: <u>Good</u>		
List of Decontamination Materials		
Deionized Water Source: <u>Culligan</u> Lot Number: <u>03/29/18</u>	HNO₃ Grade: <u>Reagent</u> UN #: <u>2031</u> Manufacturer: <u>ACROS</u> Lot Number: <u>A0385545</u>	


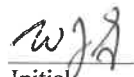
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Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form

Project Name: <u>MWL-GWM</u>	Monitoring Well ID #: <u>MWL-MW7</u>	Date: <u>05/02/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>62089</u>	
<u>Personnel Performing Decontamination:</u>		
Chris Hulliger Print Name:	<u>CH</u> Initial:	
William Gibson Print Name:	<u>WG</u> Initial:	
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>Culligan</u>	Grade: <u>Reagent</u>	
Lot Number: <u>03/29/18</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0385545</u>	

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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>MWL-GWM</u>	Monitoring Well ID #: <u>MWL-MW8</u>	Date: <u>05/03/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>62089</u>	
<u>Personnel Performing Decontamination:</u>		
Robert lynch Print Name: _____		 Initial: _____
William Gibson Print Name: _____		 Initial: _____
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>Culligan</u>	Grade: <u>Reagent</u>	
Lot Number: <u>03/29/18</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0385545</u>	

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SUMMARY SHEET FOR
APRIL-MAY 2018 GROUNDWATER SAMPLES

Sample Summary for Mixed Waste Landfill Groundwater Monitoring
April-May 2018

<i>Well ID</i>	<i>Sample Date</i>	<i>ARCOC</i>	<i>Sample Number</i>	<i>Sample Type</i>	<i>Associated Equipment Blank (ARCOC #/Sample #)</i>	<i>Associated Trip Blank (ARCOC #/ Sample #)</i>	<i>Associated Field Blank (ARCOC #/ Sample #)</i>	<i>Comments</i>
GEL Analytical Data: Project Task # 195122.10.11.08, Service Order # CF01-18								
MWL-BW2	30-Apr-18	618724	105180	Environmental	618722 / 105160	618724 / 105182	618724 / 105179	
MWL-BW2	30-Apr-18	618724	105181	Duplicate	618722 / 105160	618724 / 105182	618724 / 105179	
MWL-MW7	2-May-18	618726	105174	Environmental	n/a	618726 / 105175	618726 / 105173	
MWL-MW8	3-May-18	618727	105177	Environmental	n/a	618727 / 105178	618727 / 105176	
MWL-MW9	1-May-18	618725	105184	Environmental	n/a	618725 / 105185	618725 / 105183	
MWL EB-1	26-Apr-18	618722	105160	Equipment Blank	n/a	618722 / 105161	n/a	Equipment blank sample prior to MWL-BW2.
MWL DIW	26-Apr-18	618723	105164	DIW QC	n/a	618723 / 105165	n/a	DIW - source water for EB-1
MWL FB-1	30-Apr-18	618724	105179	Field Blank	n/a	618724 / 105182	n/a	at MWL-BW2
MWL FB-2	1-May-18	618725	105183	Field Blank	n/a	618725 / 105185	n/a	at MWL-MW9
MWL FB-3	2-May-18	618726	105173	Field Blank	n/a	618726 / 105175	n/a	at MWL-MW7
MWL FB-4	3-May-18	618727	105176	Field Blank	n/a	618727 / 105178	n/a	at MWL-MW8

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES
GROUNDWATER MONITORING
APRIL-MAY 2018

AR/COC NUMBERS 618724, 618725, 618726, 618727

Memorandum

Date: June 12, 2018
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL GWM
ARCOC: 618724, 618725, 618726 and 618727
SDG: 449067
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Thirteen samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was negative with an absolute value $>$ the MDL but $\leq 3X$ the MDL for methylene chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. Toluene was detected at \leq the PQL in EB-1, sample 448956008 submitted in another SDG and associated with samples 449067002 and -008 from this SDG. The associated sample results were detects \leq the PQL and will be **qualified 1.0U,B2**, non-detect at the PQL.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows. The initial calibration intercepts were > the MDL and positive for cis-1,3-dichloropropylene and trans-1,3-dichloropropylene. The associated sample results were non-detect and will not be qualified.

The ICV %D was >20% but ≤40% with negative bias for acetone. All associated sample results were non-detect and since no other calibration infractions occurred, will not be qualified.

The CCV %Ds were >20% and positive for 1,1,1-trichloroethane and carbon tetrachloride. The associated sample results were non-detect and will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as noted above in the Summary section and as follows. Acetone was detected at ≤ the PQL in EB-1, sample 448956008 submitted in another SDG and associated with samples 449067002 and -008 from this SDG. The associated sample results were non-detect and will not be qualified.

Toluene was detected at ≤ the PQL in FB-2, sample -015 associated with sample -016. The associated sample result was non-detect and will not be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Mass spectra were verified during data validation.

Four TBs and four FBs were submitted, one TB and one FB for each ARCOC. EB-1 was submitted with ARCOC 618722, analyzed in another SDG and associated with the field samples on ARCOC 618724 submitted with this SDG. A field duplicate pair was submitted with ARCOC 618724. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/12/18

Memorandum

Date: June 12, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL GWM
ARCOC: 618724, 618725, 618726 and 618727
SDG: 449067
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Five samples were prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. Problems were identified with the data package that resulted in the qualification of data.

1. Ni was detected at \leq the PQL in the MB. The associated result for sample 449067009 was $>$ the PQL but $\leq 5X$ the MB value and will be **qualified J+,B**. The remaining associated sample results were \leq the PQL and will be **qualified 0.002U,B**, non-detect at the PQL.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks except as noted above in the Summary section.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the sample concentrations of Ca, Mg, Al and Fe were < those in the ICS solution.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

EB-1 was submitted with ARCOG 618722, analyzed in another SDG and associated with the field samples on ARCOG 618724 submitted with this SDG. A field duplicate pair was submitted with ARCOG 618724. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 06/12/18

Memorandum

Date: June 12, 2018
To: File
From: Linda Thal
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL GWM
ARCOC: 618724, 618725, 618726 and 618727
SDG: 449067
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: RAD

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Five samples were prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec – short list), EPA 900.0 (gross alpha/beta), SM 7500 Rn B (Radon-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

Gammaspec and Tritium:

1. All sample results which were either < the associated 2-sigma TPU or < the associated MDA will be **qualified BD,FR3**.

Gammaspec and Gross Alpha/Beta:

1. All sample results that were > the MDA but $\leq 3X$ the MDA will be **qualified J,FR7**.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times.

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met all QC acceptance criteria.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD)

All LCS and/or LCSD recoveries met QC acceptance criteria.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits were met.

Other QC

EB-1 was submitted with ARCO 618722, analyzed in another SDG and associated with the field samples on ARCO 618724 submitted with this SDG. A field duplicate pair was submitted with ARCO 618724. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/12/18

CONTRACT VERIFICATION REVIEW FORMS
Mixed Waste Landfill Groundwater Monitoring
April-May 2018

AR/COC Number	Sample Type
618724	Environmental*
618725	Environmental*
618726	Environmental*
618727	Environmental*

* AR/COC forms are provided in the Data Validation Section of this Annex.

Contract Verification Form (CVR)

Project Leader Jackson

Project Name MWL GWM

Project/Task No. 195122_10.11.08

ARCOC No. 618724, 618725, 618726 & 618727

Analytical Lab GEL

SDG No. 449067

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain
		Yes	No	
1.1	All items on ARCOG complete - data entry clerk initialed and dated	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		One vial each for samples 105182-001 and 105175-001 and two vials for sample 105178-001 were received with headspace

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		
2.6	QC batch numbers provided	X		
2.7	Dilution factors provided and all dilution levels reported	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1	Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2	Quantitation limit met for all samples	X		
3.3	Accuracy a) Laboratory control sample accuracy reported and met for all samples	X		
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
	c) Matrix spike recovery data reported and met	X		
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data a) Method or reagent blank data reported and met for all samples		X	Nickel detected in method blank (QC1204023418)

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Toluene detected in MWL FB-2
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270) a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	X		
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		

Line No.	Item	Yes	No	Comments
	c) CRI provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
4.5	Inorganics (metals)	X		
	a) Initial calibration provided			
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		
	e) Instrument run logs provided	X		
4.6	Radiochemistry and General Chemistry	X		
	a) Instrument run logs provided			

5.0 Data Anomaly Report

Line No.	Item	Yes	No	If no, explain
5.1	DAR completed for monitoring and surveillance sample data	N/A		
5.2	Problems or outliers noted	N/A		
5.3	Verification or reanalysis requested from lab	N/A		

Line No.	Item	Yes	No	If no, explain
----------	------	-----	----	----------------

6.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies has been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
---------------------	----------	-------------------------------

Were deficiencies unresolved? ☐ Yes ☒ No

Based on the review, this data package is complete. ☒ Yes ☐ No

Reviewed by: Wendy Palencia Date: 06-05-2018 08:18:00

Closed by: Wendy Palencia Date: 06-05-2018 08:18:00

FIELD SAMPLING FORMS
OCTOBER 2018 GROUNDWATER MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 08888 Facility: ERFO Date: 10-22-18 Time: 0951Activities: Pre Decon MWL Pump & Tubing
(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: 58 °F Wind Speed: 6 MPH Humidity: 63 % Wind Chill: NA °FChemicals Used: ☐ None ☐ Preservatives in sample bottles☒ Other: Decon solutions

Hospital/Clinic: Sandia Medial Clinic Bldg. 831

Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input checked="" type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input checked="" type="checkbox"/> Use safe lifting practices	<input checked="" type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or ☒ NO. If answered YES explain.

William Gibson
Printed Name

CHRIS HULLIER
Printed Name

Printed Name

Printed Name

Printed Name

Printed Name

Printed Name

Attendees

William Gibson
Signature

[Signature]
Signature

Signature

Signature

Signature

Signature

Notes

HEALTH & SAFETY MEETING FORM

 Dept: 08888 Facility: MWL Date: 10-23-18 Time: 0813

 Activities: Purge & Sample Groundwater
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

 Temp: 52 °F Wind Speed: 7-9 MPH Humidity: 91 % Wind Chill: 49 °F

 Chemicals Used: ☐ None ☒ Preservatives in sample bottles ☐ Other: _____

Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input checked="" type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input checked="" type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

 Does anyone have any weight restrictions on lifting? Circle YES or ☒ NO. If answered YES explain.

Attendees

William Gibson
 Printed Name

CHRIS HULLIER
 Printed Name

 Printed Name

 Printed Name

 Printed Name

 Printed Name

William Gibson
 Signature

[Signature]
 Signature

 Signature

 Signature

 Signature

 Signature

Notes

HEALTH & SAFETY MEETING FORMDept: 08888 Facility: MWL Date: 10-24-18 Time: 0800Activities: Purge and Sample groundwater
(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

Temp: 50 °F Wind Speed: 10-12 MPH Humidity: 100 % Wind Chill: 46 °FChemicals Used: ☐ None ☒ Preservatives in sample bottles ☐ Other: _____

Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input checked="" type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input checked="" type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

William Gibson
Printed Name

CHRIS HOLLITER
Printed Name

Printed Name

Printed Name

Printed Name

Printed Name

Attendees

William Gibson
Signature

Chris Holliter
Signature

Signature

Signature

Signature

Signature

Notes

HEALTH & SAFETY MEETING FORM
 Dept: 08888 Facility: MWL Date: 10-25-18 Time: 0742

 Activities: Purge and Sample groundwater
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

 Temp: 41 °F Wind Speed: 4-5 MPH Humidity: 100 % Wind Chill: 38 °F

 Chemicals Used: ☐ None ☒ Preservatives in sample bottles ☐ Other: _____

Hospital/Clinic: Sandia Medial Clinic Bldg. 831 Phone: 911 on LAN; 844-0911 on mobile

Safety Topics Presented

<input checked="" type="checkbox"/> Wear safety glasses	<input checked="" type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input checked="" type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or ☒ NO. If answered YES explain.

William Gibson
 Printed Name

CHRIS HUNTER
 Printed Name

 Printed Name

 Printed Name

 Printed Name

 Printed Name

 Printed Name

Attendees

Chris Hunter
 Signature

 Signature

 Signature

 Signature

 Signature

 Signature

Notes

HEALTH & SAFETY MEETING FORM
 Dept: 8888 Facility: MWL-MW-8 Date: 10/29/18 Time: 0808
Activities: Groundwater Monitoring and Sampling

(Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:

 Temp: 50 °F Wind Speed: 2 MPH Humidity: 24 % Wind Chill: 50 °F

 Chemicals Used: ☐ None ☒ Preservatives in sample bottles ☐ Other: _____
Hospital/Clinic: Sandia Medial Clinic Bldg. 831Phone: 911 on LAN; 844-0911 on mobile*Safety Topics Presented*

<input checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input checked="" type="checkbox"/> Wear safety boots	<input checked="" type="checkbox"/> Wear latex or nitrile gloves	<input type="checkbox"/> No eating or drinking onsite
<input type="checkbox"/> Wear hearing protection	<input type="checkbox"/> Use safe lifting practices	<input type="checkbox"/> Set up eye wash
<input checked="" type="checkbox"/> Be aware of biohazards (snakes, spiders, etc.)	<input checked="" type="checkbox"/> Be aware of slips, trips, and falls. Keep work area clean and use a step stool when necessary	<input checked="" type="checkbox"/> Wear communication device (radio, cell phone, EOC alert enabled pager)
<input checked="" type="checkbox"/> Be aware of electrical hazards	<input checked="" type="checkbox"/> Be aware of pinch points	<input type="checkbox"/> Avoid spilling leachate (hose connections)
<input checked="" type="checkbox"/> Be aware of pressure hazards	<input type="checkbox"/> Notify RCT when using neutron probe	<input type="checkbox"/> Practice ALARA
<input checked="" type="checkbox"/> Be aware of environmental conditions (heat/cold stress). Dress accordingly. Wear sunscreen if necessary. Stay hydrated.	<input type="checkbox"/> Other (list):	<input type="checkbox"/> Other (list):

Does anyone have any weight restrictions on lifting? Circle YES or **NO**. If answered YES explain.

Robert Lynch
Printed Name

Chris Humber
Printed Name

William Gibson
Printed Name

Printed Name

Printed Name

Printed Name

Attendees

[Signature]
Signature

[Signature]
Signature

[Signature]
Signature

Signature

Signature

Signature

Notes

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL-LTMMP		
Well I.D.: MWL-BW2	Date: 10-23-18	
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 496'

PURGE MEASUREMENTS

[illegible]

Comments: purge 4.00 gal. ~~0839~~ 0850 WJA 10-23-18

FB-1 \rightarrow 1090 DIW \Rightarrow 017

Project Name: MWL-LT MMP		
Well I.D.: MWL-MW7	Date: 10/25/18	
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 496'

[illegible]

Comments: ~ 2.00 gal 0817 Temp → used shade structure and cooling towels begin at 5-gallons
FB-3 → 1090 DIW #003

Project Name: MWL		
Well I.D.: MWL-MW-8	Date: 10/29/18	
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 497'

[illegible]

FB (1090) #023

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL-LTMMMP		
Well I.D.: MWL-MW9 WJA 10-24-18	Date: 10-24-18	
Method: Portable pump ^x	Dedicated pump	Pump depth: 496' 497'

PURGE MEASUREMENTS

[illegible]

Comments: Purge ~~4.00~~ ^{2.00} gal. *WJH* 10-24-13 0836

QC/DIW, EB-1, EB-2 1090 DIW # 082

GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL			Used Tablet			
Calibrations done by: C. Hulliger			Date: 10/23/18			
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 506777						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0528	3.98	21.7	7.01	21.7	9.98
2. Time:	1259	3.98	20.8	7.03	20.5	10.02
3. Time:						
4. Time:						
Standard lot no.:	8GG386		8GG097		8GH470	
Expiration date:	JUL/20		JUL/20		AUG/20	
SC Calibration/Check						
Reference Value: 1360@23c			Standard Lot No.: 8GF676			
	Value	Temp	Expiration Date: JUN/19			
1. Time:	0533	1311				
2. Time:	1310	1298				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GG1100			
	Value	Temp	Expiration Date: APR/19			
1. Time:	0535	220				
2. Time:	1313	219				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0525	98.4	24.4			
2. Time:	1257	98.5	24.4			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: C. Hulliger			Date: 10/23/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time 0537	10.1	20.1	100	802
2. Time 1315	10.0	19.9	101	801
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL			Used Tablet			
Calibrations done by: C. Hulliger			Date: 10/24/18			
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 506777						
Other (S/N):						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0525	3.99	21.2	7.01	21.3	10.00
2. Time:	1214	4.00	19.8	7.02	19.2	10.02
3. Time:						
4. Time:						
Standard lot no.:	8GG386		8GG097		8GH470	
Expiration date:	JUL/20		JUL/20		AUG/20	
SC Calibration/Check						
Reference Value: 1360@23c			Standard Lot No.: 8GF676			
	Value	Temp	Expiration Date: JUN/19			
1. Time:	0531	1313				
2. Time:	1229	1283				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GG1100			
	Value	Temp	Expiration Date: APR/19			
1. Time:	0533	220				
2. Time:	1231	220				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0523	98.3	24.4			
2. Time:	1210	98.1	24.4			
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: C. Hulliger			Date: 10/24/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time <i>0535</i>	<i>10.2</i>	<i>20</i>	<i>99.8</i>	<i>800</i>
2. Time <i>1233</i>	<i>10.2</i>	<i>20.1</i>	<i>99.9</i>	<i>802</i>
3. Time				
4. Time				
Comments:				

GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL			Used Tablet			
Calibrations done by: C. Hulliger			Date: 10/25/18			
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 506777						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: 0528	3.98	20.8	7.02	21.0	10.01	20.7
2. Time: 1314	3.98	20.5	7.02	20.4	10.01	20.5
3. Time:						
4. Time:						
Standard lot no.:	8GG386		8GG097		8GH470	
Expiration date:	JUL/20		JUL/20		AUG/20	
SC Calibration/Check						
Reference Value: 1360@23c			Standard Lot No.: 8GF676			
	Value	Temp	Expiration Date: JUN/19			
1. Time: 0539	1287	20.6				
2. Time: 1328	1297	20.6				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GG1100			
	Value	Temp	Expiration Date: APR/19			
1. Time: 0541	221	20.4				
2. Time: 1331	220	20.7				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: 0526	98.0	24.4				
2. Time: 1312	98.1	24.4				
3. Time:						
4. Time:						

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: C. Hulliger			Date: 10/25/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time 0543	10	20.2	101	801
2. Time 1334	10.2	20.1	100	796
3. Time				
4. Time				
Comments:				

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL			Used Tablet			
Calibrations done by: C. Hulliger			Date: 10/29/18			
Make & Model: IN-SITU Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 506777						
Other (S/N): _____						
pH Calibration/Check						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0531	3.99	20.7	7.02	20.8	10.01
2. Time:	1229	3.99	21.4	7.03	21.5	10.01
3. Time:						
4. Time:						
Standard lot no.:	8GG386		8GG097		8GH470	
Expiration date:	JUL/20		JUL/20		AUG/20	
SC Calibration/Check						
Reference Value: 1360@23c			Standard Lot No.: 8GF676			
	Value	Temp	Expiration Date: JUN/19			
1. Time:	0539	1301				
2. Time:	1243	1321				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 8GG1100			
	Value	Temp	Expiration Date: APR/19			
1. Time:	0541	220				
2. Time:	1248	219				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0529	98.2	24.4			
2. Time:	1223	97.8	24.4			
3. Time:						
4. Time:						



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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: C. Hulliger			Date: 10/29/18	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A8012	A8015	A8010	A8015
1. Time 0542	9.99	20.1	100	801
2. Time 1250	9.98	20.1	101	802
3. Time				
4. Time				
Comments:				

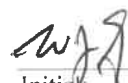
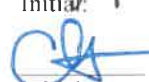
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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>MWL</u>	Monitoring Well ID #: <u>Pre-Decon</u>	Date: <u>10-22-17</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>NA</u>	
<u>Personnel Performing Decontamination:</u>		
Chris Hulliger Print Name:	 Initial:	
William Gibson Print Name:	 Initial:	
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>NA</u>
List of Decontamination Materials		
Deionized Water Source: <u>1090</u> Lot Number: <u>090,078,010,082,090,081,079,068,096,092</u>	HNO₃ Grade: <u>Reagent</u> UN #: <u>2031</u> Manufacturer: <u>ACROS</u> Lot Number: <u>A0385545</u>	


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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>MWL-LTMMP</u>	Monitoring Well ID #: <u>MWL-BW2</u>	Date: <u>10/23/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>210272</u>	
<u>Personnel Performing Decontamination:</u>		
William Gibson Print Name: _____		 Initial: _____
Chris Hulliger Print Name: _____		 Initial: _____
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>1090</u>	Grade: <u>Reagent</u>	
Lot Number: <u>071,015,025,088,020,001,084,080,004,083</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0385545</u>	



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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>MWL-LTMMP</u>	Monitoring Well ID #: <u>MWL-MW9</u>	Date: <u>10-24-17</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>210272</u>	
<u>Personnel Performing Decontamination:</u>		
William Gibson Print Name: _____		 Initial: _____
Chris Hulliger Print Name: _____		
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>NA</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>1090</u>	Grade: <u>Reagent</u>	
Lot Number: <u>017,084,087,011,086,080,012,067,013,016,094,082</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0385545</u>	


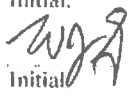
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**Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form**

Project Name: <u>MWL-LTMMP</u>	Monitoring Well ID #: <u>MWL-MW7</u>	Date: <u>10/25/18</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: <u>1806-814</u>	Water Level Indicator ID #: <u>210272</u>	
<u>Personnel Performing Decontamination:</u>		
William Gibson Print Name:		 Initial:
Chris Hulliger Print Name:		 Initial:
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>
List of Decontamination Materials		
Deonized Water	HNO₃	
Source: <u>1090</u>	Grade: <u>Reagent</u>	
Lot Number: <u>022,091,005,019,073,081,094,087,066,083</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0385545</u>	

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Portable Pump and Tubing / Water Level Indicator
Decontamination Log Form

Project Name: MWL-LTMMP	Monitoring Well ID #: MWL-MW8	Date: 10/29/18
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
Pump and Tubing Bundle ID #: 1806-814	Water Level Indicator ID #: 210272	
Personnel Performing Decontamination:		
Robert Lynch Print Name:		
William Gibson Print Name:		
 Initial:		
 Initial:		
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Good
List of Decontamination Materials		
Deionized Water Source: 1090 DIW Lot Number: 023,003,085,001,004,079,089,088,017,020	HNO₃ Grade: Reagent UN #: 2031 Manufacturer: ACROS Lot Number: A0385545	

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**SUMMARY SHEET FOR
OCTOBER 2018 GROUNDWATER SAMPLES**

Sample Summary for Mixed Waste Landfill Groundwater Monitoring
October 2018

Well ID	Sample Location ID	Sample Date	ARCOC	Sample Number	Sample Type	Associated Equipment Blank (ARCOC #/Sample #)	Associated Trip Blank (ARCOC # / Sample #)	Associated Field Blank (ARCOC # / Sample #)	Comments
GEL Analytical Data: Project Task # 195122.10.11.08, Service Order # CF01-19									
MWL-BW2	SA-1	23-Oct-18	619228	106554	Environmental	n/a	619228 / 106555	619228 / 106553	
MWL-MW7	SA-3	25-Oct-18	619232	106564	Environmental	619231 / 106561	619232 / 106566	619232 / 106563	
MWL-MW7	SA-4	25-Oct-18	619232	106565	Duplicate	619231 / 106561	619232 / 106566	619232 / 106563	
MWL-MW8	SA-6	29-Oct-18	619233	106568	Environmental	n/a	619233 / 106569	619233 / 106567	
MWL-MW9	SA-8	24-Oct-18	619230	106559	Environmental	n/a	619230 / 106560	619230 / 106558	
MWL EB	SA-11	24-Oct-18	619231	106561	Equipment Blank	n/a	619231 / 106562	n/a	Equipment blank sample prior to MWL-MW7.
MWL DIW	SA-10	24-Oct-18	619229	106556	DIW QC	n/a	619229 / 106557	n/a	DIW - source water for EB.
MWL-FB	SA-2	23-Oct-18	619228	106553	Field Blank	n/a	619228 / 106555	n/a	at MWL-BW2
MWL-FB	SA-5	25-Oct-18	619232	106563	Field Blank	n/a	619232 / 106566	n/a	at MWL-MW7
MWL-FB	SA-7	29-Oct-18	619233	106567	Field Blank	n/a	619233 / 106569	n/a	at MWL-MW8
MWL-FB	SA-9	24-Oct-18	619230	106558	Field Blank	n/a	619230 / 106560	n/a	at MWL-MW9

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES
GROUNDWATER MONITORING
OCTOBER 2018

AR/COC NUMBERS 619228

Memorandum

Date: November 29, 2018
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619228
SDG: 462467
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Three samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was negative with an absolute value $>$ the MDL but $\leq 3X$ the MDL for methylene chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for acetone. The associated result for sample 462467001 was a detect and will be **qualified J,I3**.
3. The MSD recovery was $<$ acceptance criteria but $\geq 20\%$ acetone. The acetone result for sample -001 was a detect and will be **qualified J-,MS3**. The remaining associated sample results were non-detect and will be **qualified UJ,MS3**.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for acetone. The associated result for samples -002 and -008 were non-detect and since no other calibration infractions occurred, will not be qualified.

The initial calibration %RSDs were $>15\%$ but $\leq 40\%$ and the ICV %D was $>20\%$ with positive bias for 2-butanone and 2-hexanone. The associated sample results were non-detect and since a positive ICV is not considered another infraction, will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as follows. Acetone was detected at \leq the PQL in sample -001, a FB associated with sample -002. The associated sample result was non-detect and will not be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met except as noted above in the Summary section.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

A TB and a FB were submitted with ARCO 619228 and were associated with the sample on the same ARCO.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 11/30/18

Memorandum

Date: November 29, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619228
SDG: 462467
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

One sample was prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the sample concentrations of Al, Ca, Mg and Fe were < those in the ICS A and AB solutions.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 11/30/18

Memorandum

Date: November 29, 2018

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619228
SDG: 462467
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: RAD

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

One sample was prepared and analyzed with approved procedures using methods SM 7500 Rn B (Rn-222), EPA 901.1 (gamma spec - short list); EPA 900.0 (gross alpha/beta) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

Gamma Spec and Tritium:

1. The sample results were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified BD,FR3**.

Gross Alpha/Beta:

1. The gross beta sample result was > the MDA but $\leq 3X$ the MDA and will be **qualified J,FR7**.

Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not a method requirement.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

The sample was not diluted. All required detection limits were met.

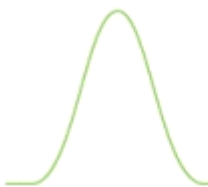
Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 11/30/18



Sample Findings Summary



AR/COC: 619228

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	106554-004/SA-1	BETA (12587-47-2)	J, FR7
EPA 901.1			
	106554-003/SA-1	Americium-241 (14596-10-2)	BD, FR3
	106554-003/SA-1	Cesium-137 (10045-97-3)	BD, FR3
	106554-003/SA-1	Cobalt-60 (10198-40-0)	BD, FR3
	106554-003/SA-1	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	106554-005/SA-1	Tritium (10028-17-8)	BD, FR3
SW846 8260B DOE-AL			
	106553-001/SA-2	Acetone (67-64-1)	J-, I3,MS3
	106553-001/SA-2	Methylene chloride (75-09-2)	UJ, I5
	106554-001/SA-1	Acetone (67-64-1)	UJ, MS3
	106554-001/SA-1	Methylene chloride (75-09-2)	UJ, I5
	106555-001/MWL-TB 1	Acetone (67-64-1)	UJ, MS3
	106555-001/MWL-TB 1	Methylene chloride (75-09-2)	UJ, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOG#: 619228	Site/Project: MWL LTMMP	Validation Date: 11/29/2018
SDG #: 462467	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 8	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 10/23/2018.

All three vials for sample 462467008(106555-001) were received with headspace.

Validated by:

L Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 619228	SDG: 462467	Matrix: Aqueous
Laboratory Sample IDs: 462467001, -002, -008		
Method/Batch #s: 8260B 1818784	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	SA-2 FB -001	X5 (X10)	TB 1 -008	
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
Acetone	NA	✓	20	✓	✓	NA	✓	✓	32	✓	1.76J	(17.6)	✓	
Methylene chloride	-2.4	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	
2-Butanone	NA	✓	16	(+26)	✓	NA	✓	✓	✓	✓	✓	NA	✓	
2-Hexanone	NA	✓	19	(+23)	✓	NA	✓	✓	✓	✓	✓	NA	✓	

Surrogate Recovery Outliers

Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	
None									

IS Outliers

FBZ		Chl-d5		1,4-DCB-d4							
Sample ID	Area	RT	Area	RT	Area	RT					
None											

Comments: HTs OK. MS/MSD -002
ICAL: VOA4.I 10/14/2018 Linear: MeCl₂

Sandia Inorganic Metals Worksheet

ARCOG #(s): 619228	SDG #(s): 462467	Matrix: Aqueous
Laboratory Sample IDs: 462467003		
Method/Batch #s: 3005A/6020 :1815475(prepare)/1815476		

ICPMS Mass Cal: ☒ Pass ☐ Fail ☐ NA ICPMS Resolution: ☒ Pass ☐ Fail ☐ NA

Analyte (outliers)	Calibration						MB mg/L	5X Blank mg/L	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R				
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
None																			

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
None				None			

Comments: HT OK. MS/DUP/SD -003.
Sample results for Ca, Mg, Al and Fe < ICSA

Revised 7/2015

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>N/A</i>		SMO Use		AR/COC 619228																																																																																																																																					
Project Name: MWL LTMMMP		Date Samples Shipped: <i>10/23/18</i>		SMO Authorization: <i>[Signature]</i>																																																																																																																																					
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>289288</i>		SMO Contact Phone: <i>gmo</i>																																																																																																																																					
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132																																																																																																																																					
Service Order: CF01-19		Lab Destination: GEL		Send Report to SMO:																																																																																																																																					
		Contract No.: 1303873		Stephanie Montaño/505-284-2553																																																																																																																																					
Tech Area:				<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius																																																																																																																																					
Building:		Room:		Operational Site:																																																																																																																																					
				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>462467</i>																																																																																																																																					
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID																																																																																																																													
106553	001	SA-2	NA	10/23/18 10:27	DIW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	<i>001</i>																																																																																																																													
106554	001	SA-1	496	10/23/18 10:27	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	<i>002</i>																																																																																																																													
106554	002	SA-1	496	10/23/18 10:30	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	<i>003</i>																																																																																																																													
106554	003	SA-1	496	10/23/18 10:31	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>004</i>																																																																																																																													
106554	004	SA-1	496	10/23/18 10:32	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>005</i>																																																																																																																													
106554	005	SA-1	496	10/23/18 10:33	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>006</i>																																																																																																																													
106554	006	SA-1	496	10/23/18 10:28	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>007</i>																																																																																																																													
106555	001	MWL-TB 1	NA	10/23/18 10:27	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	<i>008</i>																																																																																																																													
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*Prior confirmation with SMO required for 7 and 15 day TAT

SMO 2012-ARCO (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Page 1 of 1

Batch No. <i>N/A</i>		SMO Use		AR/COC 619228																																																																																																																																									
Project Name: MWL LTMMMP	Date Samples Shipped: <i>10/23/18</i>	SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization																																																																																																																																									
Project/Task Manager: Timmie Jackson	Carrier/Waybill No: <i>289288</i>	SMO Contact Phone: <i>940</i>		<input type="checkbox"/> RMA																																																																																																																																									
Project/Task Number: 195122.10.11.08	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132		<input type="checkbox"/> Released by COC No.																																																																																																																																									
Service Order: CF01-19	Lab Destination: GEL	Send Report to SMO:		<input checked="" type="checkbox"/> 4° Celsius																																																																																																																																									
	Contract No: 1303873	Stephanie Montaño/505-284-2553		Bill to: Sandia National Laboratories (Accounts Payable)																																																																																																																																									
Tech Area:				P.O. Box 5800, MS-0154																																																																																																																																									
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Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID																																																																																																																																	
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AR/COC NUMBERS 619229, 619230

Memorandum

Date: November 30, 2018
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619229 and 619230
SDG: 462605
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Five samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was negative with an absolute value $>$ the MDL but $\leq 3X$ the MDL for methylene chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for acetone. The associated result for samples 462605001, -008 and -009 were detects and will be **qualified J,I3**.
3. Acetone was detected at \leq the PQL in sample -008, a FB associated with sample -009. The associated sample result was a detect \leq the PQL and will be **qualified 10U,B2**, non-detect at the PQL.
4. The MSD recovery was $<$ acceptance criteria but $\geq 20\%$ acetone. The acetone result for samples -001, -008 and -009 were detects and will be **qualified J-,MS3**. The remaining associated sample results were non-detect and will be **qualified UJ,MS3**.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for acetone. The associated results for samples -007 and -015 were non-detect and since no other calibration infractions occurred, will not be qualified.

The initial calibration %RSDs were $>15\%$ but $\leq 40\%$ and the ICV %D was $>20\%$ with positive bias for 2-butanone and 2-hexanone. The associated sample results were non-detect and since a positive ICV is not considered another infraction, will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as noted above in the Summary section and as follows. Acetone was detected at \leq the PQL in sample -001, a DIW QC sample. No field sample results should be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met except as noted above in the Summary section. It should be noted that the MS/MSD was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Mass spectra were verified during data validation.

Two TBs were submitted, one for each ARCOC. A FB was submitted with 619230 and was associated with the sample on the same ARCOC. A DIW QC sample was submitted with ARCOC 619229 and was the source water for the EB submitted with ARCOC 619231 analyzed in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 11/30/18

Memorandum

Date: November 30, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619229 and 619230
SDG: 462605
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Two samples were prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the sample concentrations of Al, Ca, Mg and Fe were < those in the ICS A and AB solutions.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

A DIW QC sample was submitted with ARCOG 619229 and was the source water for the EB submitted with ARCOG 619231 analyzed in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 11/30/18

Memorandum

Date: November 30, 2018

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619229 and 619230
SDG: 462605
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: RAD

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Two samples were prepared and analyzed with approved procedures using methods SM 7500 Rn B (Rn-222), EPA 901.1 (gamma spec - short list); EPA 900.0 (gross alpha/beta) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

All analyses:

1. The sample results that were either < the associated 2-sigma TPU or < the associated MDA will be **qualified BD,FR3**.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not a method requirement.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS analysis for tritium was performed on an SNL sample of similar matrix from another SDG. No data should be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met. It should be noted that the replicate analyses for all target analytes *except* gross alpha/beta were performed on SNL samples of similar matrix from another SDG. No data should be qualified.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits were met.

Other QC

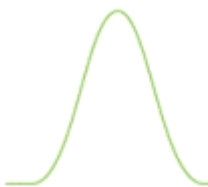
A DIW QC sample was submitted with ARCO 619229 and was the source water for the EB submitted with ARCO 619231 analyzed in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 11/30/18



Sample Findings Summary



AR/COC: 619229, 619230

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	106556-004/SA-10	ALPHA (12587-46-1)	BD, FR3
	106556-004/SA-10	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	106556-003/SA-10	Americium-241 (14596-10-2)	BD, FR3
	106556-003/SA-10	Cesium-137 (10045-97-3)	BD, FR3
	106556-003/SA-10	Cobalt-60 (10198-40-0)	BD, FR3
	106556-003/SA-10	Potassium-40 (13966-00-2)	BD, FR3
	106559-003/SA-8	Americium-241 (14596-10-2)	BD, FR3
	106559-003/SA-8	Cesium-137 (10045-97-3)	BD, FR3
	106559-003/SA-8	Cobalt-60 (10198-40-0)	BD, FR3
	106559-003/SA-8	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	106556-005/SA-10	Tritium (10028-17-8)	BD, FR3
	106559-005/SA-8	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	106556-006/SA-10	Radon-222 (14859-67-7)	BD, FR3
SW846 8260B DOE-AL			
	106556-001/SA-10	Acetone (67-64-1)	J-, I3,MS3
	106556-001/SA-10	Methylene chloride (75-09-2)	UJ, I5
	106557-001/MWL-TB 2	Acetone (67-64-1)	UJ, MS3
	106557-001/MWL-TB 2	Methylene chloride (75-09-2)	UJ, I5
	106558-001/SA-9	Acetone (67-64-1)	J-, I3,MS3
	106558-001/SA-9	Methylene chloride (75-09-2)	UJ, I5
	106559-001/SA-8	Acetone (67-64-1)	10UJ, I3,B2,MS3
	106559-001/SA-8	Methylene chloride (75-09-2)	UJ, I5

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	106560-001/MWL-TB 3	Acetone (67-64-1)	UJ, MS3
	106560-001/MWL-TB 3	Methylene chloride (75-09-2)	UJ, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOG#: 619229 and 619230	Site/Project: MWL LTMMP	Validation Date: 11/30/2018
SDG #: 462605	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 15	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 10/24/2018.

ARCOG's state TBs were received with bubbles.

Sample 106558-001 not identified as a FB on the ARCOG.

The sample on ARCOG 619229 is a DIW QC source for the EB on ARCOG 619231

Validated by:

L. Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 619229 and 619230	SDG: 462605	Matrix: Aqueous
Laboratory Sample IDs: 462605001, -007, -008, -009, -015		
Method/Batch #s: 8260B 1818784	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	SA-9 FB -008	DIW QC -001	TB 2 -007	TB 3 -015
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
Acetone	NA	✓	20	✓	✓	NA	✓	✓	32	✓	2.63J	1.94J	✓	✓
Methylene chloride	-2.4	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	✓
2-Butanone	NA	✓	16	(+26)	✓	NA	✓	✓	✓	✓	✓	NA	✓	✓
2-Hexanone	NA	✓	19	(+23)	✓	NA	✓	✓	✓	✓	✓	NA	✓	✓

Surrogate Recovery Outliers

Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	
None									

IS Outliers

FBZ		Chl-d5		1,4-DCB-d4							
Sample ID	Area	RT	Area	RT	Area	RT					
None											

Comments: HTs OK. MS/MSD on SNL sample from SDG 462467
ICAL: VOA4.I 10/14/2018 Linear: MeCl₂

Sandia Inorganic Metals Worksheet

ARCOG #(s): 619229 and 619230	SDG #(s): 462605	Matrix: Aqueous
Laboratory Sample IDs: 462605002, -010		
Method/Batch #s: 3005A/6020 :1815950(prepare)/1815951		

ICPMS Mass Cal: ☒ Pass ☐ Fail ☐ NA ICPMS Resolution: ☒ Pass ☐ Fail ☐ NA

Analyte (outliers)	Calibration						MB mg/L	5X Blank mg/L	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R	DIW QC			
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
None																			

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
None				None			

Comments: HT OK. MS/DUP/SD -010.
Sample results for Ca, Mg, Al and Fe < ICSA

Sandia Radiochemistry Worksheet

ARCO# (s): 619229 and 619230	SDG #:462605	Matrix: Aqueous
Laboratory Sample IDs:462605 – see below		
Method/Batch #: EPA 901.1 (gammascpec)/1816865 Samples -003, -011		
Method/Batch #: EPA 900.0/SW846 9310 (gross A/B)/1816822 Samples -004, -012		
Method/Batch #: SM 7500 Rn B (Rn-222)/1815929 Samples -006, -014		
Method/Batch #: EPA 906.0 Modified (Tritium)/1818426 Samples -005, -013		

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDC	LCS %R	MS %R	MSD %R	MS/ MSD RER	Lab Rep. RER	DIW QC			
None													
Tracer/Carrier Recovery Outliers													
Sample ID	Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	
None													

Comments: HTs OK. Matrix QC this SDG for gross A/B; Matrix QC on SNL sample from SDG 462467 for rest

Gross A/B: Parent and dup sample 150ml, MS/MSD 50ml –no data qualified.

Tritium: Sample/DUP 50ml, MS 25ml - no data qualified.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <u>NA</u>		SMO Use		AR/COC 619229								
Project Name: MWL LTMMMP		Date Samples Shipped: <u>10/24/18</u>		SMO Authorization: <u>[Signature]</u>								
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <u>289299</u>		SMO Contact Phone: <u>Wendy Palencia/505-844-3132</u>								
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Send Report to SMO: <u>Stephanie Montaño/505-284-2553</u>								
Service Order: CF01-19		Lab Destination: GEL		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius								
Contract No.: 1303873		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <u>462005</u>										
Tech Area:		Operational Site:										
Building:		Room:										
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓ 106556	001	SA-10	NA	10/24/18 09:35	DIW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	<u>001</u>
✓ 106556	002	SA-10	NA	10/24/18 09:37	DIW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	<u>002</u>
✓ 106556	003	SA-10	NA	10/24/18 09:38	DIW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<u>003</u>
✓ 106556	004	SA-10	NA	10/24/18 09:39	DIW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<u>004</u>
✓ 106556	005	SA-10	NA	10/24/18 09:40	DIW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<u>005</u>
✓ 106556	006	SA-10	NA	10/24/18 09:36	DIW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<u>006</u>
✓ 106557	001	MWL-TB 2	NA	10/24/18 09:35	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	<u>007</u>
Last Chain: <input type="checkbox"/> Yes			Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes			Date Entered:		EDD		<input checked="" type="checkbox"/> Yes					
Background: <input type="checkbox"/> Yes			Entered by:		Turnaround Time		<input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day					
Confirmatory: <input type="checkbox"/> Yes			QC inits.:		Negotiated TAT		<input type="checkbox"/>					
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal				Return Samples By: Comments: Received trip blanks from lab for VOC-LTMMMP with bubbles		
	William Gibson	<u>[Signature]</u>	<u>WJ</u>	SNL/08888/505-239-7367/505-239-7367		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab						
	Christopher Hulliger	<u>[Signature]</u>	<u>CH</u>	AIS/08888/505-284-3309/505-382-0353								
Relinquished by <u>[Signature]</u>			Org. <u>8888</u>	Date <u>10/24/18</u>	Time <u>1150</u>	Relinquished by			Org.	Date	Time	
Received by <u>[Signature]</u>			Org. <u>00642</u>	Date <u>10/24/18</u>	Time <u>1150</u>	Received by			Org.	Date	Time	
Relinquished by <u>[Signature]</u>			Org. <u>00642</u>	Date <u>10/24/18</u>	Time <u>1300</u>	Relinquished by			Org.	Date	Time	
Received by <u>[Signature]</u>			Org.	Date <u>10/25/18</u>	Time <u>750</u>	Received by			Org.	Date	Time	

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <u>N/A</u>		SMO Use		AR/COC		619230	
Project Name: <u>MWL LTMMMP</u>		Date Samples Shipped: <u>10/24/18</u>		SMO Authorization: <u>[Signature]</u>		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Project/Task Manager: <u>Timmie Jackson</u>		Carrier/Waybill No. <u>289299</u>		SMO Contact Phone: <u>Wendy Palencia/505-844-3132</u>			
Project/Task Number: <u>195122.10.11.08</u>		Lab Contact: <u>Edie Kent/843-769-7385</u>		Send Report to SMO: <u>Stephanie Montaño/505-284-2553</u>			
Service Order: <u>CF01-19</u>		Lab Destination: <u>GEL</u>					
Contract No.: <u>1303873</u>		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <u>402605</u>					
Tech Area:		Operational Site:					
Building:		Room:					

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
106558	001	SA-9	NA	10/24/18 10:41	DIW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	008
106559	001	SA-8	497	10/24/18 10:41	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	009
106559	002	SA-8	497	10/24/18 10:44	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	010
106559	003	SA-8	497	10/24/18 10:45	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	011
106559	004	SA-8	497	10/24/18 10:46	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	012
106559	005	SA-8	497	10/24/18 10:47	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	013
106559	006	SA-8	497	10/24/18 10:43	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	014
106560	001	MWL-TB 3	NA	10/24/18 10:41	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	015

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT <input type="checkbox"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Return Samples By:		Comments: Received trip blanks from lab for VOC-LTMMMP with bubbles		

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cell
	William Gibson	<u>[Signature]</u>	<u>WG</u>	SNL/08888/505-239-7367/505-239-7367
	Christopher Hulliger	<u>[Signature]</u>	<u>CH</u>	AIS/08888/505-284-3309/505-382-0353

Relinquished by <u>[Signature]</u>	Org. <u>8888</u>	Date <u>10/24/18</u>	Time <u>1150</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>00642</u>	Date <u>10/24/18</u>	Time <u>1150</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>00642</u>	Date <u>10/24/18</u>	Time <u>1300</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org.	Date <u>10-25-18</u>	Time <u>250</u>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

AR/COC NUMBERS 619231, 619232

Memorandum

Date: December 3, 2018

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 619231 and 619232
SDG: 462681
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Six samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was negative with an absolute value $>$ the MDL but $\leq 3X$ the MDL for methylene chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for acetone. The associated results for samples 462681001, -008, -009 and -015 were detects and will be **qualified J,I3**.
3. Acetone was detected at \leq the PQL in sample -001, an EB associated with samples -008, -009 and -015. The associated sample results were detects \leq the PQL and will be **qualified 10U,B2**, non-detect at the PQL.
4. For samples -001 and -007, the associated MSD recovery was $<$ acceptance criteria but $\geq 20\%$ acetone. The acetone result for sample -001 was a detect and will be **qualified J-,MS3**. The acetone result for sample -007 was non-detect and will be **qualified UJ,MS3**.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for acetone. The associated results for samples -007 and -021 were non-detect and since no other calibration infractions occurred, will not be qualified.

The initial calibration %RSDs were $>15\%$ but $\leq 40\%$ and the ICV %D was $>20\%$ with positive bias for 2-butanone and 2-hexanone. The associated sample results were non-detect and since a positive ICV is not considered another infraction, will not be qualified.

For the CCV associated with samples -008, -009, -015 and -021, the %D was $>20\%$ with positive bias for chloromethane. The associated sample results were non-detect and will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as noted above in the Summary section and as follows. Acetone was detected at \leq the PQL in sample 462605001, a DIW QC sample submitted in another SDG, which was the source water for the EB. No field sample results will be qualified.

Acetone was detected at \leq the PQL in sample -008, a FB associated with samples -009 and -015. The FB result was qualified non-detect due to EB contamination and no field sample results will be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met except as noted above in the Summary section. It should be noted that the MS/MSD analyses associated with samples -001 and -007 were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Mass spectra were verified during data validation.

Two TBs were submitted, one for each ARCOC. A FB was submitted with 619232 and was associated with the samples on the same ARCOC. An EB was submitted with ARCOC 619231 and was associated with the samples on ARCOC 619232. A DIW QC sample was submitted with ARCOC 619229, analyzed in another SDG, and was the source water for the EB submitted with ARCOC 619231. A field duplicate pair was submitted with ARCOC 619232. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/03/18

Memorandum

Date: December 3, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619231 and 619232
SDG: 462681
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Three samples were prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the sample concentrations of Al, Ca, Mg and Fe were < those in the ICS A and AB solutions.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

An EB was submitted with ARCO 619231 and was associated with the samples on ARCO 619232. A DIW QC sample was submitted with ARCO 619229, analyzed in another SDG, and was the source water for the EB submitted with ARCO 619231. A field duplicate pair was submitted with ARCO 619232. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/03/18

Memorandum

Date: December 3, 2018

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619231 and 619232
SDG: 462681
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: RAD

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Three samples were prepared and analyzed with approved procedures using methods SM 7500 Rn B (Rn-222), EPA 901.1 (gamma spec - short list); EPA 900.0 (gross alpha/beta) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

Gamma Spec:

1. The K-40 results for samples 462681011 and -017 were rejected by the laboratory due to the peaks not meeting identification criteria and will be **qualified R,Z2**.

All analyses:

1. The sample results that were either < the associated 2-sigma TPU or < the associated MDA will be **qualified BD,FR3**.

Radon-222:

1. The results for samples -014 and -020 were > the MDA but $\leq 3X$ the MDA and will be **qualified J,FR7**.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not a method requirement.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS and/or MSD analyses for tritium and gross alpha/beta were performed on SNL samples of similar matrix from other SDGs. No data will be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met. It should be noted that the replicate analyses for all target analytes *except* Rn-222 were performed on SNL samples of similar matrix from other SDGs. No data will be qualified.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits were met.

Other QC

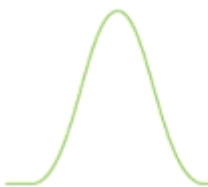
An EB was submitted with ARCOG 619231 and was associated with the samples on ARCOG 619232. A DIW QC sample was submitted with ARCOG 619229, analyzed in another SDG, and was the source water for the EB submitted with ARCOG 619231. A field duplicate pair was submitted with ARCOG 619232. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/03/18



Sample Findings Summary



AR/COC: 619231, 619232

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	106561-004/SA-11	ALPHA (12587-46-1)	BD, FR3
	106561-004/SA-11	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	106561-003/SA-11	Americium-241 (14596-10-2)	BD, FR3
	106561-003/SA-11	Cesium-137 (10045-97-3)	BD, FR3
	106561-003/SA-11	Cobalt-60 (10198-40-0)	BD, FR3
	106561-003/SA-11	Potassium-40 (13966-00-2)	BD, FR3
	106564-003/SA-3	Americium-241 (14596-10-2)	BD, FR3
	106564-003/SA-3	Cesium-137 (10045-97-3)	BD, FR3
	106564-003/SA-3	Cobalt-60 (10198-40-0)	BD, FR3
	106564-003/SA-3	Potassium-40 (13966-00-2)	R, Z2
	106565-003/SA-4	Americium-241 (14596-10-2)	BD, FR3
	106565-003/SA-4	Cesium-137 (10045-97-3)	BD, FR3
	106565-003/SA-4	Cobalt-60 (10198-40-0)	BD, FR3
	106565-003/SA-4	Potassium-40 (13966-00-2)	R, Z2
EPA 906.0 Modified			
	106561-005/SA-11	Tritium (10028-17-8)	BD, FR3
	106564-005/SA-3	Tritium (10028-17-8)	BD, FR3
	106565-005/SA-4	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	106561-006/SA-11	Radon-222 (14859-67-7)	BD, FR3
	106564-006/SA-3	Radon-222 (14859-67-7)	J, FR7
	106565-006/SA-4	Radon-222 (14859-67-7)	J, FR7
SW846 8260B DOE-AL			
	106561-001/SA-11	Acetone (67-64-1)	J-, I3,MS3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	106561-001/SA-11	Methylene chloride (75-09-2)	UJ, I5
	106562-001/MWL TB 4	Acetone (67-64-1)	UJ, MS3
	106562-001/MWL TB 4	Methylene chloride (75-09-2)	UJ, I5
	106563-001/SA-5	Acetone (67-64-1)	10UJ, I3,B2
	106563-001/SA-5	Methylene chloride (75-09-2)	UJ, I5
	106564-001/SA-3	Acetone (67-64-1)	10UJ, I3,B2
	106564-001/SA-3	Methylene chloride (75-09-2)	UJ, I5
	106565-001/SA-4	Acetone (67-64-1)	10UJ, I3,B2
	106565-001/SA-4	Methylene chloride (75-09-2)	UJ, I5
	106566-001/MWL-TB 5	Methylene chloride (75-09-2)	UJ, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOG#: 619231 and 619232	Site/Project: MWL LTMMP	Validation Date: 11/30/2018
SDG #: 462681	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 21	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 10/24 and 10/25/2018.

ARCOGs state TBs were received with bubbles.

Sample 106563-001 not identified as a FB on the ARCOG.

The sample on ARCOG 619229 submitted in SDG 462605 is a DIW QC source for the EB on ARCOG 619231

Validated by:

L Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 619231 and 619232	SDG: 462681	Matrix: Aqueous
Laboratory Sample IDs: 462681001, -007, -008, -009, -015, -021		
Method/Batch #s: 8260B ¹ 1818784 and ² 1819685	Tuning (pass/fail):pass	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	TB 4 -007	SA-10 DIW QC 462605 -001	SA-11 EB -001	X10
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
¹ 1818784 -001, -007								462467002						
Acetone	NA	✓	20	✓	✓	NA	✓	✓	32	✓	✓	1.94J	2.21J	(22.1)
Methylene chloride	-2.4	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
2-Butanone	NA	✓	16	(+26)	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
2-Hexanone	NA	✓	19	(+23)	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
											SA-5 FB -008	X10	TB 5 -021	
² 1819685 -008, -009, -015, -021								-009						
Acetone	NA	✓	20	³ -25	✓	NA	✓	✓	✓	✓	2.25	(22.5)	✓	
Methylene chloride	-2.4	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	
2-Butanone	NA	✓	16	(+26)/ ³ -21	✓	NA	✓	✓	✓	✓	✓	NA	✓	
2-Hexanone	NA	✓	19	(+23)	✓	NA	✓	✓	✓	✓	✓	NA	✓	
4-Methyl-2-pentanone	NA	✓	✓	³ -23	✓	NA	✓	✓	✓	✓	✓	NA	✓	
1,1,2,2-Tetrachloroethane	NA	✓	✓	³ -21	✓	NA	✓	✓	✓	✓	✓	NA	✓	
Chloromethane	NA	✓	✓	+22	✓	NA	✓	✓	✓	✓	✓	NA	✓	
Surrogate Recovery Outliers														
Sample ID	1,2-DCA-d4 %R		Toluene-d8 %R		BFB %R		Sample ID		1,2-DCA-d4 %R		Toluene-d8 %R		BFB %R	
None														
IS Outliers														
	FBZ		Chl-d5		1,4-DCB-d4									
Sample ID	Area	RT	Area	RT	Area	RT								
None														

Comments: HTs OK. ¹MS/MSD on SNL sample from SDG 462467 and ²-009. ³associated with the MS/MSD only
ICAL: VOA4.I 10/14/2018 Linear: MeCl₂

Sandia Inorganic Metals Worksheet

ARCOG #(s): 619231 and 619232	SDG #(s): 462681	Matrix: Aqueous
Laboratory Sample IDs: 462681002, -010, -016		
Method/Batch #s: 3005A/6020 :1816369(prepare)/1816370		

ICPMS Mass Cal: ☒ Pass ☐ Fail ☐ NA ICPMS Resolution: ☒ Pass ☐ Fail ☐ NA

Analyte (outliers)	Calibration						MB mg/L	5X Blank mg/L	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R	SA-10 DIW QC 462605 -002	SA-11 EB -002		
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
None																			

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
None				None			

Comments: HT OK. MS/DUP/SD -010.
Sample results for Ca, Mg, Al and Fe < ICSA

Sandia Radiochemistry Worksheet

ARCOC #(s): 619231 and 619232	SDG #:462681	Matrix: Aqueous
Laboratory Sample IDs:462681 – see below		
Method/Batch #s: EPA 901.1 (gammasepec)/1816865 Samples -003, -011, -017		
Method/Batch #s: EPA 900.0/SW846 9310 (gross A/B)/1816822 Samples -004, -012, -018		
Method/Batch #s: SM 7500 Rn B (Rn-222)/1816322 Samples -006, -014, -020		
Method/Batch #s: EPA 906.0 Modified (Tritium)/1818426 Samples -005, -013, -019		

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDC	LCS %R	MS %R	MSD %R	MS/ MSD RER	Lab Rep. RER	SA-10 DIW QC	SA-11 EB		
None													
Tracer/Carrier Recovery Outliers													
Sample ID	Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	
None													

Comments: HTs OK. Matrix QC on SNL samples from other SDGs for all except Rn-222 -014

GS: Samples -011 and -017 – Results considered a false positive for K-40 due to the peak not meeting identification criteria.

Gross A/B: Parent and dup sample 150ml, MS/MSD 50ml –no data qualified.

Tritium: Sample/DUP 50ml, MS 25ml - no data qualified.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>1/A</i>		SMO Use <i>10/25/18</i> <i>289622</i>		AR/COC 619231	
Project Name: MWL LTMMMP		Date Samples Shipped: <i>10/25/18</i>		SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No.		SMO Contact Phone: <i>[Signature]</i>	
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132	
Service Order: CF01-19		Lab Destination: GEL		Send Report to SMO:	
		Contract No.: 1303873		Stephanie Montaño/505-284-2553	
Tech Area:				<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Building:		Room:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>402081</i>	
Operational Site:					

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
106561	001	SA-11	NA	10/24/18 13:01	DIW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	<i>001</i>
106561	002	SA-11	NA	10/24/18 13:02	DIW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	<i>002</i>
106561	003	SA-11	NA	10/24/18 13:03	DIW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>003</i>
106561	004	SA-11	NA	10/24/18 13:04	DIW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>004</i>
106561	005	SA-11	NA	10/24/18 13:05	DIW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>005</i>
106561	006	SA-11	NA	10/24/18 13:06	DIW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>006</i>
106562	001	MWL TB 4	NA	10/24/18 13:01	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	<i>007</i>

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD		<input checked="" type="checkbox"/> Yes			
Background: <input type="checkbox"/> Yes		Entered by:		Turnaround Time		<input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day			
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Negotiated TAT		<input type="checkbox"/>			
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal		Return Samples By: Comments: Received trip blanks from lab for VOC LTMMMP with bubble.	
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/08888/505-239-7367/505-239-7367		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			
	Christopher Hulliger	<i>[Signature]</i>	<i>CH</i>	SNL/08888/505-284-3309/505-382-0353					
Relinquished by <i>[Signature]</i>		Org. <i>8888</i>	Date <i>10/25/18</i>	Time <i>1130</i>	Relinquished by		Org.	Date	Time
Received by <i>[Signature]</i>		Org. <i>00642</i>	Date <i>10/25/18</i>	Time <i>1130</i>	Received by		Org.	Date	Time
Relinquished by <i>[Signature]</i>		Org. <i>00642</i>	Date <i>10/25/18</i>	Time <i>1235</i>	Relinquished by		Org.	Date	Time
Received by <i>[Signature]</i>		Org.	Date <i>10/24/18</i>	Time <i>0850</i>	Received by		Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 2

Batch No.		SMO Use		AR/COC		619232	
Project Name: MWL LTMMMP		Date Samples Shipped: 10/25/18		SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 289622		SMO Contact Phone: <i>[Signature]</i>			
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132			
Service Order: CF01-19		Lab Destination: GEL		Send Report to SMO:			
		Contract No.: 1303873		Stephanie Montaño/505-284-2553		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 462681	
Tech Area:							
Building:		Room:		Operational Site:			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
106563	001	SA-5	NA	10/25/18 10:09	DIW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	008
106564	001	SA-3	496	10/25/18 10:09	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	009
106564	002	SA-3	496	10/25/18 10:12	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	010
106564	003	SA-3	496	10/25/18 10:13	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	011
106564	004	SA-3	496	10/25/18 10:14	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	012
106564	005	SA-3	496	10/25/18 10:16	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	013
106564	006	SA-3	496	10/25/18 10:11	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	014
106565	001	SA-4	496	10/25/18 10:09	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	015
106565	002	SA-4	496	10/25/18 10:12	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	016
106565	003	SA-4	496	10/25/18 10:13	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	017

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes		QC inits.:				Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Lab Use
	William Gibson	<i>[Signature]</i>	WJG	SNL/08888/505-239-7367/505-239-7367		Return Samples By:		
	Christopher Hulliger	<i>[Signature]</i>	CH	AIS/08888/505-284-3309/505-382-0353		Comments: Received trip blanks from lab for VOC-LTMMMP with bubbles		

Relinquished by <i>[Signature]</i>	Org. 8888	Date 10/25/18	Time 1135	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. 00642	Date 10/25/18	Time 1135	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. 00642	Date 10/25/18	Time 1235	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date 10/26/18	Time 0950	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

Revised Memorandum

Date: December 12, 2018

To: File

From: Linda Thal and Mary Donivan (gamma spec reanalysis only)

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619231 and 619232
SDG: 462681 and 465725
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: RAD

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Three samples were prepared and analyzed with approved procedures using methods SM 7500 Rn B (Rn-222), EPA 901.1 (gamma spec - short list); EPA 900.0 (gross alpha/beta) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

Gamma Spec:

1. The K-40 results for samples 462681011 and -017 were rejected by the laboratory due to the peaks not meeting identification criteria and will be **qualified R,Z2**.
2. Samples 462681011 (106564-003) and 462681017 (106565-003) were relogged and reanalyzed for gamma spec only as samples 465725001 (106564-R03) and 465725002 (106565-R03) because the original results for K-40 did not meet identification criteria. The reanalysis did not confirm the original results and the original sample results will be **qualified R,X1** based on professional judgment and per client request.
3. No peaks were identified for Co-60 in sample 465725002. The result should be considered a non-detect at the calculated MDA and will be **qualified BD,Z2**.

All analyses:

1. The sample results that were either < the associated 2-sigma TPU or < the associated MDA will be **qualified BD,FR3**.

Radon-222:

1. The results for samples -014 and -020 were $>$ the MDA but $\leq 3X$ the MDA and will be **qualified J,FR7**.

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations $>$ the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not a method requirement.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS and/or MSD analyses for tritium and gross alpha/beta were performed on SNL samples of similar matrix from other SDGs. No data will be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met. It should be noted that the replicate analyses for all target analytes *except* Rn-222 and the gamma spec reanalysis were performed on SNL samples of similar matrix from other SDGs. No data will be qualified.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits were met.

Other QC

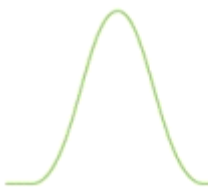
An EB was submitted with ARCOG 619231 and was associated with the samples on ARCOG 619232. A DIW QC sample was submitted with ARCOG 619229, analyzed in another SDG, and was the source water for the EB submitted with ARCOG 619231. A field duplicate pair was submitted with ARCOG

619232. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/03/18

Reviewed by: Linda Thal **Level:** I **Date:** 12/12/18



Sample Findings Summary



AR/COC: 619231, 619232

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	106561-004/SA-11	ALPHA (12587-46-1)	BD, FR3
	106561-004/SA-11	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	106561-003/SA-11	Americium-241 (14596-10-2)	BD, FR3
	106561-003/SA-11	Cesium-137 (10045-97-3)	BD, FR3
	106561-003/SA-11	Cobalt-60 (10198-40-0)	BD, FR3
	106561-003/SA-11	Potassium-40 (13966-00-2)	BD, FR3
	106564-003/SA-3	Americium-241 (14596-10-2)	BD, FR3
	106564-003/SA-3	Cesium-137 (10045-97-3)	BD, FR3
	106564-003/SA-3	Cobalt-60 (10198-40-0)	BD, FR3
	106564-003/SA-3	Potassium-40 (13966-00-2)	R, X1
	106564-R03/SA-3-Relog from 462681011	Americium-241 (14596-10-2)	BD, FR3
	106564-R03/SA-3-Relog from 462681011	Cesium-137 (10045-97-3)	BD, FR3
	106564-R03/SA-3-Relog from 462681011	Cobalt-60 (10198-40-0)	BD, FR3
	106564-R03/SA-3-Relog from 462681011	Potassium-40 (13966-00-2)	BD, FR3
	106565-003/SA-4	Americium-241 (14596-10-2)	BD, FR3
	106565-003/SA-4	Cesium-137 (10045-97-3)	BD, FR3
	106565-003/SA-4	Cobalt-60 (10198-40-0)	BD, FR3
	106565-003/SA-4	Potassium-40 (13966-00-2)	R, X1
	106565-R03/SA-4-Relog from 462681017	Americium-241 (14596-10-2)	BD, FR3
	106565-R03/SA-4-Relog from 462681017	Cesium-137 (10045-97-3)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	106565-R03/SA-4-Relog from 462681017	Cobalt-60 (10198-40-0)	BD, Z2
	106565-R03/SA-4-Relog from 462681017	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	106561-005/SA-11	Tritium (10028-17-8)	BD, FR3
	106564-005/SA-3	Tritium (10028-17-8)	BD, FR3
	106565-005/SA-4	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	106561-006/SA-11	Radon-222 (14859-67-7)	BD, FR3
	106564-006/SA-3	Radon-222 (14859-67-7)	J, FR7
	106565-006/SA-4	Radon-222 (14859-67-7)	J, FR7
SW846 8260B DOE-AL			
	106561-001/SA-11	Acetone (67-64-1)	J-, I3,MS3
	106561-001/SA-11	Methylene chloride (75-09-2)	UJ, I5
	106562-001/MWL TB 4	Acetone (67-64-1)	UJ, MS3
	106562-001/MWL TB 4	Methylene chloride (75-09-2)	UJ, I5
	106563-001/SA-5	Acetone (67-64-1)	10UJ, I3,B2
	106563-001/SA-5	Methylene chloride (75-09-2)	UJ, I5
	106564-001/SA-3	Acetone (67-64-1)	10UJ, I3,B2
	106564-001/SA-3	Methylene chloride (75-09-2)	UJ, I5
	106565-001/SA-4	Acetone (67-64-1)	10UJ, I3,B2
	106565-001/SA-4	Methylene chloride (75-09-2)	UJ, I5
	106566-001/MWL-TB 5	Methylene chloride (75-09-2)	UJ, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOG#: 619231 and 619232	Site/Project: MWL LTMMP	Validation Date: 11/30/2018 and 12/12/2018*
SDG #: 462681 and 465725*	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal and Mary Donovan*
Matrix: Aqueous	# of Samples: 21	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 10/24 and 10/25/2018.

ARCOG(s) state TBs were received with bubbles.

Sample 106563-001 not identified as a FB on the ARCOG.

The sample on ARCOG 619229 submitted in SDG 462605 is a DIW QC source for the EB on ARCOG 619231

*Samples 462681011 (106564-003) and 462681017 (106565-003) were relogged and reanalyzed for gamma spec only as samples 465725001 (106564-R03) and 465725002 (106565-R03) per client request

Validated by:

L. Thal

Mary A. Donovan

Sandia Radiochemistry Worksheet

ARCOC #(s): 619231 and 619232	SDG #:462681 and 465725	Matrix: Aqueous
Laboratory Sample IDs:462681 and 465725 – see below		
Method/Batch #s: EPA 901.1 (gammascpec)/1816865 Samples 462681003, -011, -017 1827128 Samples 465725001, -002		
Method/Batch #s: EPA 900.0/SW846 9310 (gross A/B)/1816822 Samples 462681004, -012, -018		
Method/Batch #s: SM 7500 Rn B (Rn-222)/1816322 Samples 462681006, -014, -020		
Method/Batch #s: EPA 906.0 Modified (Tritium)/1818426 Samples 462681005, -013, -019		

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDC	LCS %R	MS %R	MSD %R	MS/ MSD RER	Lab Rep. RER	SA-10 DIW QC	SA-11 EB		
None													
Tracer/Carrier Recovery Outliers													
Sample ID	Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	
None													

Comments: HTs OK. Matrix QC on SNL samples from other SDGs for all except Rn-222 -014 and GS reanalysis 465725001

GS: Samples 462681011 and -017 – Results considered a false positive for K-40 due to the peak not meeting identification criteria.

No peaks were identified for Co-60 in sample 465725002. The result should be considered a non-detect at the calculated MDA.

Gross A/B: Parent and dup sample 150ml, MS/MSD 50ml –no data qualified.

Tritium: Sample/DUP 50ml, MS 25ml - no data qualified.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 2

Batch No.

SMO Use

AR/COC 619232

Project Name: MWL LTMMMP	Date Samples Shipped: 10/25/18	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. 289622	SMO Contact Phone: <i>[Signature]</i>	<input type="checkbox"/> RMA
Project/Task Number: 195122.10.11.08	Lab Contact: Edie Ken/843-769-7385	Wendy Palencia/505-844-3132	<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Service Order: CF01-19	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505-284-2553	
	Contract No.: 1303873		

Tech Area:

Building:

Room:

Operational Site:

 Bill to: Sandia National Laboratories (Accounts Payable),
 P.O. Box 5800, MS-0154
 Albuquerque, NM 87185-0154
 465 725
 402681

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
106563	001	SA-5	NA	10/25/18 10:09	DIW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	008
106564	001	SA-3	496	10/25/18 10:09	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	009
106564	002	SA-3	496	10/25/18 10:12	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	010
106564	003	SA-3	496	10/25/18 10:13	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	011
106564	004	SA-3	496	10/25/18 10:14	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	012
106564	005	SA-3	496	10/25/18 10:16	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	013
106564	006	SA-3	496	10/25/18 10:11	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	014
106565	001	SA-4	496	10/25/18 10:09	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	015
106565	002	SA-4	496	10/25/18 10:12	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	016
106565	003	SA-4	496	10/25/18 10:13	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	017

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes			
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day			
Confirmatory: <input type="checkbox"/> Yes		QC initials:				Negotiated TAT <input type="checkbox"/>			
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Lab Use	
	William Gibson	<i>[Signature]</i>	WJG	SNL/08888/505-239-7367/505-239-7367		Return Samples By:			
	Christopher Hulliger	<i>[Signature]</i>	CH	AIS/08888/505-284-3309/505-382-0353		Comments: Received trip blanks from lab for VOC-LTMMMP with bubbles			
Relinquished by <i>[Signature]</i>		Org. 8888	Date 10/25/18	Time 1135	Relinquished by		Org.	Date	Time
Received by <i>[Signature]</i>		Org. 00642	Date 10/25/18	Time 1135	Received by		Org.	Date	Time
Relinquished by <i>[Signature]</i>		Org. 00642	Date 10/25/18	Time 1235	Relinquished by		Org.	Date	Time
Received by <i>[Signature]</i>		Org.	Date 10/26/18	Time 0950	Received by		Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

AOP 95-16

[illegible]

AR/COC NUMBER 619233

Memorandum

Date: December 3, 2018

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 619233
SDG: 462870
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: VOCs

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

Three samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was negative with an absolute value $>$ the MDL but $\leq 3X$ the MDL for methylene chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for acetone. The associated result for sample 462870001 was a detect and will be **qualified J,I3**.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding time and were properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows. The initial calibration %RSD was >15% but ≤40% for acetone. The associated results for samples -002 and -008 were non-detect and since no other calibration infractions occurred, will not be qualified.

The initial calibration %RSDs were >15% but ≤40% and the ICV %D was >20% with positive bias for 2-butanone and 2-hexanone. The associated sample results were non-detect and since a positive ICV is not considered another infraction, will not be qualified.

The CCV %D was >20% with positive bias for chloromethane. The associated sample results were non-detect and will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as follows. Acetone was detected at ≤ the PQL in sample -001, a FB associated with sample -002. The associated sample result was non-detect and will not be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met. It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

Mass spectra were verified during data validation.

A TB and a FB were submitted with ARCO 619233 and were associated with the sample on the same ARCO.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/03/18

Memorandum

Date: December 3, 2018
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 619233
SDG: 462870
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: Metals

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

One sample was prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the sample concentrations of Al, Ca, Mg and Fe were < those in the ICS A and AB solutions.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/03/18

Memorandum

Date: December 3, 2018

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 619233
SDG: 462870
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: RAD

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM SMO Procedure AOP 00-03 Rev 5.

Summary

One sample was prepared and analyzed with approved procedures using methods SM 7500 Rn B (Rn-222), EPA 901.1 (gamma spec - short list); EPA 900.0 (gross alpha/beta) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

Gamma Spec and Tritium:

1. The sample results were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified BD,FR3**.

Radon-222:

1. The result for sample 462870007 was > the MDA but $\leq 3X$ the MDA and will be **qualified J,FR7**.

Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not a method requirement.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

The sample was not diluted. All required detection limits were met.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/03/18



Sample Findings Summary



AR/COC: 619233

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	106568-003/SA-6	Americium-241 (14596-10-2)	BD, FR3
	106568-003/SA-6	Cesium-137 (10045-97-3)	BD, FR3
	106568-003/SA-6	Cobalt-60 (10198-40-0)	BD, FR3
	106568-003/SA-6	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	106568-005/SA-6	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	106568-006/SA-6	Radon-222 (14859-67-7)	J, FR7
SW846 8260B DOE-AL			
	106567-001/SA-7	Acetone (67-64-1)	J, I3
	106567-001/SA-7	Methylene chloride (75-09-2)	UJ, I5
	106568-001/SA-6	Methylene chloride (75-09-2)	UJ, I5
	106569-001/MWL-TB 6	Methylene chloride (75-09-2)	UJ, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

Sandia Data Validation Summary Worksheet

ARCOG#: 619233	Site/Project: MWL LTMMP	Validation Date: 12/03/2018
SDG #: 462870	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 8	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

Requested Analyses Not Reported			
Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers								
Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Collected: 10/29/2018.
ARCOG state TB was received with bubbles.

Validated by:

L Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 619233	SDG: 462870	Matrix: Aqueous
Laboratory Sample IDs: 462870001, -002, -008		
Method/Batch #s: 8260B 1819685	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	SA-7 FB -001	X10	TB 6 -008	
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
Acetone	NA	✓	20	¹ -25	✓	NA	✓	✓	✓	✓	2.1J	21	✓	
Methylene chloride	-2.4	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	
2-Butanone	NA	✓	16	(+26)/ ¹ -21	✓	NA	✓	✓	✓	✓	✓	NA	✓	
2-Hexanone	NA	✓	19	(+23)	✓	NA	✓	✓	✓	✓	✓	NA	✓	
4-Methyl-2-pentanone	NA	✓	✓	¹ -23	✓	NA	✓	✓	✓	✓	✓	NA	✓	
1,1,2,2-Tetrachloroethane	NA	✓	✓	¹ -21	✓	NA	✓	✓	✓	✓	✓	NA	✓	
Chloromethane	NA	✓	✓	+22	✓	NA	✓	✓	✓	✓	✓	NA	✓	

Surrogate Recovery Outliers

Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R	
None									

IS Outliers

	FBZ		Chl-d5		1,4-DCB-d4							
Sample ID	Area	RT	Area	RT	Area	RT						
None												

Comments: HTs OK. MS/MSD on SNL sample from SDG 462681; ¹MS/MSD only
ICAL: VOA4.I 10/14/2018 Linear: MeCl₂

Sandia Inorganic Metals Worksheet

ARCOG #(s): 619233	SDG #(s): 462870	Matrix: Aqueous
Laboratory Sample IDs: 462870003		
Method/Batch #s: 3005A/6020 :1818716(prepare)/1818717		

ICPMS Mass Cal: ☒ Pass ☐ Fail ☐ NA ICPMS Resolution: ☒ Pass ☐ Fail ☐ NA

Analyte (outliers)	Calibration						MB mg/L	5X Blank mg/L	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R				
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
None																			

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
None				None			

Comments: HT OK. MS/DUP/SD -003.
Sample results for Ca, Mg, Al and Fe < ICSA

Sandia Radiochemistry Worksheet

ARCOC #(s): 619233	SDG #:462870	Matrix: Aqueous
Laboratory Sample IDs:462870 – see below		
Method/Batch #s: EPA 901.1 (gammascpec)/1820753 Sample -004		
Method/Batch #s: EPA 900.0/SW846 9310 (gross A/B)/1821050 Sample -005		
Method/Batch #s: SM 7500 Rn B (Rn-222)/1818360 Sample -007		
Method/Batch #s: EPA 906.0 Modified (Tritium)/1820133 Sample -006		

[illegible][illegible]

Comments: HTs OK. Matrix QC on this SDG for all

Gross A/B: Parent and dup sample 200ml, MS/MSD 50ml –no data qualified.

Tritium: Sample/DUP 50ml, MS 25ml - no data qualified.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. 44

SMO Use

AR/COC **619233**

Project Name: MWL LTMMMP	Date Samples Shipped: <u>10/29/18</u>	SMO Authorization: <u>[Signature]</u>	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <u>289688</u>	SMO Contact Phone: <u>[Signature]</u>	<input type="checkbox"/> RMA
Project/Task Number: 195122.10.11.08	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Service Order: CF01-19	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505-284-2553	
	Contract No.: 1303873		

Tech Area:	Building:	Room:	Operational Site:

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
✓ 106567	001	SA-7	NA	10/29/18 10:04	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	001
✓ 106568	001	SA-6	497	10/29/18 10:04	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	002
✓ 106568	002	SA-6	497	10/29/18 10:06	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	003
✓ 106568	003	SA-6	497	10/29/18 10:08	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
✓ 106568	004	SA-6	497	10/29/18 10:10	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
✓ 106568	005	SA-6	497	10/29/18 10:12	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	006
✓ 106568	006	SA-6	497	10/29/18 10:14	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	007
✓ 106569	001	MWL-TB 6	NA	10/29/18 10:04	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	008

Last Chain: <input checked="" type="checkbox"/> Yes	Sample Tracking	SMO Use	Special Instructions/QC Requirements:	Conditions on Receipt															
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:		EDD <input checked="" type="checkbox"/> Yes																
Background: <input type="checkbox"/> Yes	Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day																
Confirmatory: <input type="checkbox"/> Yes	QC initials:		Negotiated TAT <input type="checkbox"/>																
Sample Team Members <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Name</th> <th>Signature</th> <th>Init.</th> <th>Company/Organization/Phone/Cell</th> </tr> <tr> <td>William Gibson</td> <td><u>[Signature]</u></td> <td>WJG</td> <td>SNL/08888/505-239-7367/505-239-7367</td> </tr> <tr> <td>Robert Lynch</td> <td><u>[Signature]</u></td> <td>RL</td> <td>SNL/08888/505-844-4013/505-250-7090</td> </tr> <tr> <td>Christopher Hulliger</td> <td><u>[Signature]</u></td> <td>CH</td> <td>SNL/08888/505-284-3309/505-382-0353</td> </tr> </table>	Name	Signature	Init.		Company/Organization/Phone/Cell	William Gibson	<u>[Signature]</u>	WJG	SNL/08888/505-239-7367/505-239-7367	Robert Lynch	<u>[Signature]</u>	RL	SNL/08888/505-844-4013/505-250-7090	Christopher Hulliger	<u>[Signature]</u>	CH	SNL/08888/505-284-3309/505-382-0353	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab	Return Samples By:
	Name	Signature	Init.	Company/Organization/Phone/Cell															
	William Gibson	<u>[Signature]</u>	WJG	SNL/08888/505-239-7367/505-239-7367															
	Robert Lynch	<u>[Signature]</u>	RL	SNL/08888/505-844-4013/505-250-7090															
Christopher Hulliger	<u>[Signature]</u>	CH	SNL/08888/505-284-3309/505-382-0353																
Relinquished by <u>[Signature]</u> Org. <u>8888</u> Date <u>10/29/18</u> Time <u>10:41</u>	Relinquished by	Org.	Date	Time															
Received by <u>[Signature]</u> Org. <u>00642</u> Date <u>10/29/18</u> Time <u>10:41</u>	Received by	Org.	Date	Time															
Relinquished by <u>[Signature]</u> Org. <u>00642</u> Date <u>10/29/18</u> Time <u>12:15</u>	Relinquished by	Org.	Date	Time															
Received by <u>[Signature]</u> Org. <u>GEL</u> Date <u>10/30/18</u> Time <u>07:50</u>	Received by	Org.	Date	Time															

Relinquished by <u>[Signature]</u> Org. <u>8888</u> Date <u>10/29/18</u> Time <u>10:41</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u> Org. <u>00642</u> Date <u>10/29/18</u> Time <u>10:41</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u> Org. <u>00642</u> Date <u>10/29/18</u> Time <u>12:15</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u> Org. <u>GEL</u> Date <u>10/30/18</u> Time <u>07:50</u>	Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

ANNEX F

Mixed Waste Landfill Inspection Forms

April 2018-March 2019

Soil-Vapor Monitoring Network

Soil-Moisture Monitoring Network

Groundwater Monitoring Network

Cover Inspection

Biology Inspection

Note: Radon monitoring system inspection forms are provided in Annex A

Mixed Waste Landfill Soil-Vapor Monitoring Network Checklist/Form

1. Date of Inspection 04/25/18
2. Time of Inspection 0829
3. Name of Inspector Robert Lynch

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. SOIL-VAPOR MONITORING LOCATIONS [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	YES	NO	
B. Well cover caps in need of repair/maintenance.	YES	NO	
C. Well casing or sampling ports in need of repair/maintenance.	YES	NO	
D. Monitoring location and sampling ports properly labeled.	YES	NO	
E. Locks in need of cleaning or replacement.	YES	NO	
II. SAMPLING EQUIPMENT [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	YES	NO	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	YES	NO	
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Soil-Vapor Monitoring Network Checklist/Form (Continued)**

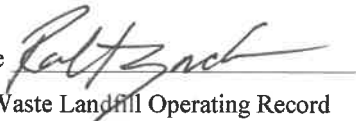
NOTES

Note Number	Description

Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill

Soil-Vapor Monitoring Network Checklist/Form

1. Date of Inspection 10-30-18
2. Time of Inspection 0830
3. Name of Inspector Tim Jackson

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. SOIL-VAPOR MONITORING LOCATIONS [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	Yes	No	
B. Well cover caps in need of repair/maintenance.	Yes	No	
C. Well casing or sampling ports in need of repair/maintenance.	Yes	No	
D. Monitoring location and sampling ports properly labeled.	Yes	No	
E. Locks in need of cleaning or replacement.	Yes	No	
II. SAMPLING EQUIPMENT [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	Yes	No	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	Yes	No	
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Soil-Vapor Monitoring Network Checklist/Form (Continued)**

NOTES

Note Number	Description

TJ
10/30/12

Action (Note Number) _____ assigned to _____ Date action completed _____
 Action (Note Number) _____ assigned to _____ Date action completed _____
 Action (Note Number) _____ assigned to _____ Date action completed _____
 Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature T-J [Signature]

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Soil-Moisture Monitoring Network Checklist/Form

1. Date of Inspection 4/12/18 & 5/3/18
2. Time of Inspection 09:30 & 08:30
3. Name of Inspector Robert Zick

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. SOIL-MOSITURE MONITORING LOCATIONS [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	yes	No	
B. Access tube cover caps in need of repair/maintenance.	yes	No	
C. Access tube casing in need of repair/maintenance.	yes	No	
D. Monitoring location properly labeled.	yes	No	
E. Locks in need of cleaning or replacement.	yes	No	
II. SAMPLING EQUIPMENT [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Neutron probe in need of repair/maintenance.	yes	No	
B. Cable reel or cable in need of repair/maintenance.	yes	yes	1
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

Mixed Waste Landfill
Soil-Moisture Monitoring Network Checklist/Form (Continued)

NOTES

Note Number	Description
1.	Cable connection bad on reel cable that connects to instrument. Cable connection bad on cable that connects from the cable reel to the neutron probe.

Action (Note Number) 1 assigned to Robert Zick Date action completed 5/3/2018
 Action (Note Number) _____ assigned to _____ Date action completed _____
 Action (Note Number) _____ assigned to _____ Date action completed _____
 Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

1. Replaced entire cable reel set-up with
back up cable reel system. Will repair older
system when parts arrive from the manufacturer.
YRy 5/3/18

Inspector's Signature

Robert Zick

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Groundwater Monitoring Network Checklist/Form

1. Date of Inspection 04/30/18
2. Time of Inspection 0820
3. Name of Inspector Robert Lynch

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. GROUNDWATER MONITORING LOCATIONS [Semiannually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	YES	NO	
B. Well cover caps in need of repair/maintenance.	YES	NO	1
C. Well casing in need of repair/maintenance.	YES	NO	
D. Monitoring well properly labeled.	YES	NO	
E. Locks in need of cleaning or replacement.	YES	NO	
II. GROUNDWATER SAMPLING EQUIPMENT [Semiannually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	YES	NO	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	YES	NO	
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Groundwater Monitoring Network Checklist/Form (Continued)**

NOTES

Note Number	Description
1	Baroball's installed on all wells

Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____
Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Groundwater Monitoring Network Checklist/Form

1. Date of Inspection 10-23-18
2. Time of Inspection 0743
3. Name of Inspector William bibson

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. GROUNDWATER MONITORING LOCATIONS [Semiannually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	Yes	No	
B. Well cover caps in need of repair/maintenance.	Yes	No	1
C. Well casing in need of repair/maintenance.	Yes	No	
D. Monitoring well properly labeled.	Yes	No	
E. Locks in need of cleaning or replacement.	Yes	No	1
II. GROUNDWATER SAMPLING EQUIPMENT [Semiannually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	Yes	No	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	Yes	No	
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Groundwater Monitoring Network Checklist/Form (Continued)**

NOTES

Note Number	Description
1	Baro-Ball assembly mounted on well casing.

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature *William J. [Signature]*

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection 6/12/18
2. Time of Inspection 1018 - 1040
3. Name of Inspector R. Ziock / D. Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

I. COVER SYSTEM [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	YES	NO	
B. Erosion of the soil cover in excess of 6 inches deep.	YES	NO	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	YES	NO	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	YES	NO	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	YES	NO	
F. Potentially deep-rooted plants present. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	YES	NO	
II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	YES	NO	
B. Channel sediment accumulation in excess of 6 inches deep.	YES	NO	
C. Debris that blocks more than 1/3 of the channel width.	YES	NO	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	YES	YES	1
B. Fence wires and posts in need of repair/maintenance.	YES	NO	
C. Gates in need of oiling/repair/maintenance.	YES	NO	
D. Locks in need of cleaning or replacement.	YES	NO	
E. Warning signs in need of repair or replacement.	YES	NO	
F. Survey monuments in vicinity of MWL visible.	YES	NO	
IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	YES	NO	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

NOTES

Note Number	Description
1	wind-blown plant debris removed
	from security fence at time of
	inspection 6/12/12

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1 assigned to R Ziock/D. Michel Date action completed 6/12/18

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature 

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



date: June 19, 2018

to: Mike Mitchell (08888)
Robert Ziock (00641)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **June 2018 Quarterly Inspections - Biology Follow-Up**

Biological Requirement:

Biological Surveys are required prior to driving across any area of native vegetation, spraying herbicides or initiating other work activities that disturb wildlife.

Please submit request three weeks to prior work at: <https://info.sandia.gov/esh/ecoticket/request.php>

Should personnel find a bird's nest during any of the work associated with these sites, they will need to halt work, and contact the Ecology Program at <https://info.sandia.gov/esh/ecoticket/request.php>. If other wildlife is encountered that may cause a health and safety issue, contact the Ecology Program.

All proposed project activities will be conducted in keeping with Corporate Procedure ESH100.2.ENV.2, "Comply with Environmental Requirements for Migratory Birds, Protected Species, and Other Biota".

ET Covers Observations and Recommendations

The biology quarterly evaluation of the three ET Covers was conducted on June 19, 2018.

CAMU

- The ET Cover appears to be in excellent condition, with consideration of the current hot June temperatures and an "Extreme Drought" status according to the U.S. Drought Monitor (<http://droughtmonitor.unl.edu/>).
- The mature native perennial grasses have started to green up at the base of the clumps in response to recent brief rain events.
- Only a few weeds (primarily silverleaf nightshade (*Solanum elaeagnifolium*)) and very few tumbleweeds remnants were observed on the ET Cover.
- The fence lines were clear of tumbleweeds.

CWL

- Overall the ET Cover appears to be in decent condition, with consideration of the current hot June temperatures and an “Extreme Drought” status according to the U.S. Drought Monitor.
- Many of the native grasses have some green blades at the base of their clumps, though it does appear to be less than the grasses at either the CAMU or the MWL. Due to grasses that are not as mature with less developed root systems at the CWL, these grasses appear to be more stressed than at either of the other ET Covers.
- The ET cover is still in the process of developing into a mature native plant community. Currently the majority of grasses are in a middle to older juvenile stage of development. A limited number of grass clumps have fully developed to full size. Due to the vegetative litter raking event in 2017, the spaces between the native grass clumps are more evident than prior to raking. The current spacing between the native grass clumps is much less than the initial “turf-like” tight proximity spacing of young juvenile grasses that originally developed and largely collapsed across the ET cover due to lack of root growth space.
- Very few forbs (wrinkled globemallow (*Sphaeralcea hastulata*)), weedy plant species ((Russian thistle (*Salsola tragus*), silverleaf nightshade (*Solanum elaeagnifolium*)), or tumbleweeds remnants were observed on the ET Cover.
- The fence lines were clear of tumbleweeds.

MWL

- The ET Cover is in very good condition. The mature perennial native grasses are in an initial stage of “greening up” in response to recent brief rains.
- Very few forbs (wrinkled globemallow (*Sphaeralcea hastulata*), wire lettuce (*Stephanomeria pauciflora*), lacy tansyaster (*Xanthisma spinulosum*)), weedy plant species (Russian thistle (*Salsola tragus*), silverleaf nightshade (*Solanum elaeagnifolium*)), or tumbleweeds remnants were observed on the ET Cover.
- The older juvenile native clump grasses on the west side near the relatively new erosion control structures were greening up nicely. The soil in the area appears to possibly be more sandy than other surface soils on the MWL ET Cover.
- The fence lines were clear of tumbleweeds.

ET Covers Recommendations

- Due to the extreme drought conditions and the lack of weeds on any of the ET Covers, the use of a pre-emergent herbicide is not recommended at this time. Although a pre-emergent may be safely used in the presence of established native plants, the risk of any possible adverse impact during this time of extreme drought outweighs the potential benefit. The 2017 annual inspection recommendation of a pre-emergent herbicide application was made as a best management practice in the fall of 2017 for ET Cover maintenance planning purposes, based on the expectation of normal winter moisture. Avoiding unnecessary herbicide application benefits the environment, and supports the SNL Environment, Safety, and Health Corporate Policy of ESH100.
- If the monsoonal rainfall is reduced during the warm growing season, supplemental water should be applied to the CWL in the fall to boost soil moisture and aid the root systems prior to winter.

If you should have any questions, don’t hesitate to contact me at my office 845-9849, cell 218-1815, or email at jjpayne@sandia.gov.

cc: Customer Funded Records Center
Ecology Library
Steve Cox
Robert Ziock
Rick Dotson
Stephanie Salinas

Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection September 12, 2018
2. Time of Inspection 11:15 - 11:54
3. Name of Inspector Robert Ziöck, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

I. COVER SYSTEM [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
F. Potentially deep-rooted plants present. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	

II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	1
B. Fence wires and posts in need of repair/maintenance.	yes	No	
C. Gates in need of oiling/repair/maintenance.	yes	No	
D. Locks in need of cleaning or replacement.	yes	No	
E. Warning signs in need of repair or replacement.	yes	No	
F. Survey monuments in vicinity of MWL visible.	yes	No	
IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

Mixed Waste Landfill Cover Inspection Checklist/Form (continued)

NOTES

[illegible]

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1 assigned to Robert Zick Date action completed 9/12/18

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

1. Wind-blown plant debris was removed from the
security fence at time of the inspection. 9/12/18
RZ

Inspector's Signature

Robert Zick Day M. Michael

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection December 6, 2018
2. Time of Inspection 09:20 to 10:30
3. Name of Inspector Robert Bick, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

I. COVER SYSTEM [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
F. Potentially deep-rooted plants present. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	

II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	1
B. Fence wires and posts in need of repair/maintenance.	yes	No	
C. Gates in need of oiling/repair/maintenance.	yes	No	
D. Locks in need of cleaning or replacement.	yes	No	
E. Warning signs in need of repair or replacement.	yes	No	
F. Survey monuments in vicinity of MWL visible.	yes	No	
IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

NOTES

[illegible]

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1 assigned to Danielle/Michel
Robert Zick Date action completed 12/6/2018

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature Robert Zick Danielle/Michel

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



date: January 21, 2018

to: Mike Mitchell (08888)
Robert Ziock (00641)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **December 2018 Quarterly Inspections - Biology Follow-Up**

Biological Requirement:

Biological Surveys are required prior to driving across any area of native vegetation, spraying herbicides or initiating other work activities that disturb wildlife.

Please submit request three weeks to prior work at: <https://info.sandia.gov/esh/ecoticket/request.php>

Should personnel find a bird's nest during any of the work associated with these sites, they will need to halt work, and contact the Ecology Program at <https://info.sandia.gov/esh/ecoticket/request.php>. If other wildlife is encountered that may cause a health and safety issue, contact the Ecology Program.

All proposed project activities will be conducted in keeping with Corporate Procedure ESH100.2.ENV.2, "Comply with Environmental Requirements for Migratory Birds, Protected Species, and Other Biota".

EU Covers Observations and Recommendations

The biology quarterly evaluation of the three EU Covers was conducted on January 21, 2018.

CAMU

- The EU Cover appears to be in very good condition during winter dormancy.
- The mature native perennial grasses continue to have good, even spacing across the cover.
- Extremely few small winter annuals (weedy species) on the cover.
- The fence lines only had a few tumbleweeds.

CWL

- Overall the EU Cover appears to be in good condition during winter dormancy.
- The native perennial grasses continue to be in a middle to older juvenile stage of development.

- Small winter annuals (weedy species) were observed broadly across the cover. Although individuals are currently not large in size, the population of winter annuals should continue to be monitored for an increased population or larger growth. Based on the continuation of weed growth on the CWL cover during the warm season, I anticipate the CWL will continue to have more winter annuals, and likely more spring annuals, than the other two covers. The above average precipitation this winter is encouraging the growth of annuals. If curbing future growth of winter and spring annuals is of interest, a herbicide application could be implemented.
- The fence lines had very few tumbleweeds.

MWL

- The EU Cover appears to be in very good condition during winter dormancy.
- The mature native perennial grasses continue to have good, even spacing across the cover.
- Extremely few small winter annuals (weedy species) on the cover.
- The fence lines only had a few tumbleweeds.

EU Covers Recommendations

- The only potential issue observed is the number of winter annual weeds at the CWL. As noted above, based on the continued warm season weed growth on the CWL cover I anticipate the CWL will continue to have more winter annuals and likely more spring annuals than either of the other EU Covers. From Bari's Climate Update for January 2019:

"The CPC has increased their forecast to 90% chance of El Niño conditions persisting this winter and a 60% chance this pattern will continue into spring of 2019."

Based on the prediction of continued winter and spring precipitation, the winter and spring annual weeds could be quite abundant this year at the CWL. If this occurs, an increased amount of weed seed will be created for future winter and spring annuals. This year the competition for soil moisture with weedy species may not be significant if a lot of precipitation is received. However, winter and spring soil moisture competition in future years may be more problematic with less precipitation. Applying a pre-emergent herbicide as soon as possible would prevent new growth of winter and spring weeds across the site. In my June 2018 EU Quarterly Inspection Biology Follow-Up memo a pre-emergent herbicide was not recommended due to the extreme drought conditions. With the current good soil moisture conditions a pre-emergent could safely be used. If the weeds were still small at the time of herbicide application, a post-emergent could also be used effectively at the CWL.

If you should have any questions, don't hesitate to contact me at my office 845-9849, cell 218-1815, or email at jjpayne@sandia.gov.

cc: Customer Funded Records Center
Ecology Library
Steve Cox
Robert Ziock
Rick Dotson
Stephanie Salinas

Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection March 4, 2019
2. Time of Inspection 10:04 to 10:37
3. Name of Inspector Robert Zick, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

I. COVER SYSTEM [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
F. Potentially deep-rooted plants present. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	

II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	1
B. Fence wires and posts in need of repair/maintenance.	yes	No	
C. Gates in need of oiling/repair/maintenance.	yes	No	
D. Locks in need of cleaning or replacement.	yes	No	
E. Warning signs in need of repair or replacement.	yes	yes	2
F. Survey monuments in vicinity of MWL visible.	yes	No	
IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

NOTES

[illegible]

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1. assigned to Robert Zick Date action completed 4/4/2019

Action (Note Number) 2. assigned to Robert Zick Date action completed 3/4/2019

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

2. Warning sign was secured at time of the inspection. RZ 3/4/2019

1. BGI was contracted to remove wind-blown plant debris from the security fence. As a "best management practice," BGI applied a pre-emergent, Surflan, at the north and south staging areas, ^{RZ 4/5/19} and along the fence lines, and the north area between the fence line and ET cover. RZ 4/5/19

Inspector's Signature

Robert Zick

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Biology Inspection Checklist/Form for the MWL Cover

Approximate vegetative coverage (actively photosynthesizing*): 48 %

Approximate percent native vegetation of the total vegetative cover: 99 %

Listed below are the main plant species identified as growing on the MWL cover and the percentage of the cover populated by each species.

<u>Scientific Name</u>	<u>Common Name (optional)</u>	<u>% of Cover¹</u>
<u>Pleuraphis jamesii</u>	<u>Galleta grass</u>	<u>40 %</u>
<u>Bouteloua gracilis</u>	<u>Blue grama</u>	<u>2 %</u>
<u>Sporobolus flexuosus</u>	<u>Mesa dropseed</u>	<u>2 %</u>
<u>Bouteloua eriopoda</u>	<u>Black grama</u>	<u>2 %</u>
<u>Sporobolus cryptandrus</u>	<u>Sand dropseed</u>	<u>2 %</u>
<u>Xanthisma spinulosum</u>	<u>Spiny goldenweed</u>	<u>< 0.5%</u>
<u>Salsola tragus</u>	<u>Russian thistle</u>	<u>< 0.5%</u>
<u>Sporobolus contractus</u>	<u>Spike dropseed</u>	<u>< 0.5%</u>
<u>Gutierrezia sarothrae</u>	<u>Broom snakeweed</u>	<u>< 0.5%</u>
<u>Sphaeralcea angustifolia</u>	<u>Narrowleaf globemallow</u>	<u>< 0.5%</u>
<u>Kallstroemia parviflora</u>	<u>Warty carpetweed</u>	<u>< 0.5%</u>
<u>Solanum elaeagnifolium</u>	<u>Silverleaf nightshade</u>	<u>< 0.5%</u>
<u>Opuntia phaeacantha</u>	<u>Brown-spined prickly pear</u>	<u>< 0.5%</u>
<u>Senecio flaccidus</u>	<u>Threadleaf groundsel</u>	<u>< 0.5%</u>

Notes:

* Living plants per Section 4.1 of the MWL LTMMMP.

¹ Percentage of total MWL Cover populated by living plants of these species. All species observed to be present at less than 0.5% are not calculated into the total vegetative coverage.

Mixed Waste Landfill
Biology Inspection Checklist/Form for the MWL Cover
(continued)

Are there any contiguous areas of no vegetation greater than 200 square feet? (approximately 14 x 14 ft)? No

If "Yes," mark such areas on a map and attach to this checklist. Address actions and schedule to improve such area(s) in the notes section below.

Are there any very deeply rooted (roots greater than 8 feet deep at maturity) plant species present on the cover? No

If "Yes," describe the plant(s) and their general distribution. Address actions and schedule to remove plant(s) from the cover in the notes section below.

Notes: _____

Inspection for Animal and Insect Intrusion into MWL Cover

Are any burrows present on the cover? No

Do any of the burrows appear to be active? N/A

Any ant hills/nests? Yes

Describe below observations regarding animal and insect features. If burrows with an entrance diameter of 4 inches or greater are present or appear to be that of a species that is able to burrow 6 feet deep or greater, indicate the location(s) on a map and attach to this checklist. Address actions and schedule to repair cover damage that exceeds prescribed limits. As appropriate, identify animal and insect features and have them surveyed and marked for biota sampling.

Notes: Thirteen ant hills were observed on the cover, occurring primarily on the side-slopes.

Two ant hill locations were selected, flagged for biota sampling, and surveyed using a GPS unit.

The sampling locations are shown in the biological inspection map.

**Mixed Waste Landfill
Biology Inspection Checklist/Form for the MWL Cover
(continued)**

Notes (continued):

General Observations:

- Overall the MWL ET Cover vegetation is in excellent condition. The species complexity, spacing, and appearance of the mature native perennial grasses is similar to that of the surrounding area vegetation.
- Extremely low weed presence on the MWL Cover.
- One active mourning dove bird nest was observed on the cover at the time of the inspection. One egg and one newly hatched young were observed. Five bright pink pinflags were placed at a distance in a ring around the nest to indicate the general location and the nest location was marked on the MWL Biological Inspection map. All personnel who work on the cover were notified of the nest and directed to remain at a distance from the area. The active nest is protected under the International Migratory Bird Treaty Act.
- The active bird nest is the most recent observation of many that the MWL Cover is recognized as native habitat by wildlife.
- The grass seedheads were abundant this year, improving the quantification of the native grass species from 2017 when the inspection was conducted earlier and far fewer warm season grass seedheads had developed.

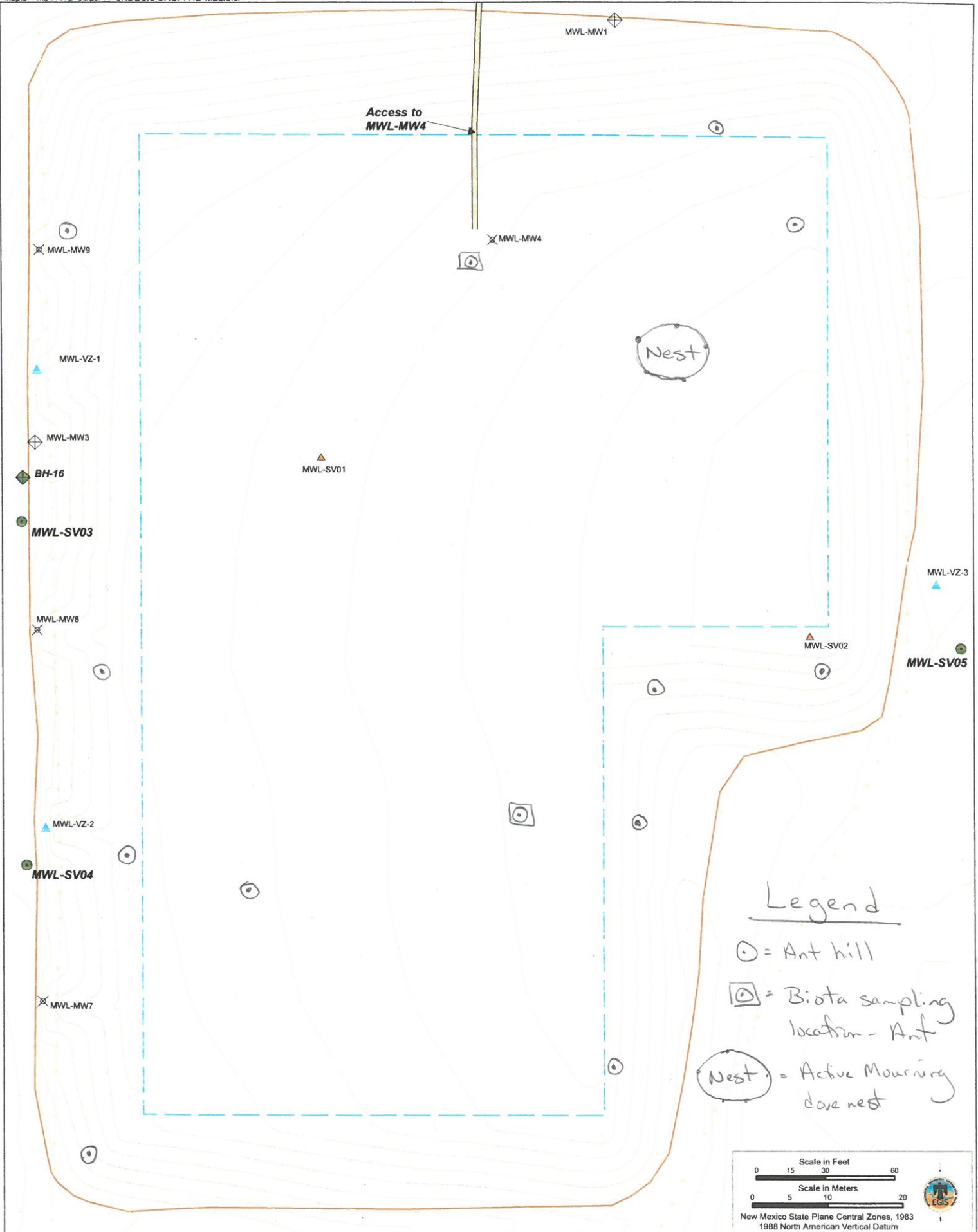
Biological Aspects Map -- [note: sketch map to locate specific features described above will be attached as appropriate]

Inspector's Signature: _____

Date: September 10, 2018

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



MWL Biological Inspection map - Sept. 10, 2018

ANNEX G

Mixed Waste Landfill Biology Report

April 2018-March 2019

2018-2019 Mixed Waste Landfill Biology Report

1.0 Introduction

As required by the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (LTMMMP) (SNL/NM March 2012, Section 4.2.1), this summary report for the annual reporting period (April 1, 2018-March 31, 2019) presents the results of vegetation inspection and monitoring activities performed by the staff biologist on the MWL Evapotranspirative (ET) Cover. The purpose of this report is to provide relevant background information, describe local climate trends over the 2018 growing season and reporting period, expand on the inspection results, if appropriate, and provide recommendations for future ET Cover vegetation monitoring and maintenance. The annual Biology Inspection of the ET Cover was conducted on September 10, 2018. The inspection observations are documented on the *Biology Inspection Checklist/Form for the MWL Cover* and included in Annex F of this MWL Annual Long-Term Monitoring and Maintenance (LTMM) Report. The staff biologist also provided support during the other quarterly ET Cover Inspections (June and December 2018, and March 2019) as a best practice.

A self-sustaining plant community is an important component of overall ET Cover performance. Vegetation minimizes erosion by stabilizing the ET Cover surface and moves soil moisture from the ET Cover Topsoil and Native Soil Layers to the atmosphere through transpiration. Vegetation species that are native to the area create the optimal, self-sustaining plant community because the species are specifically adapted to the local climate and soil conditions. The MWL is located at an elevation of 5,380 feet in a challenging, semi-arid climate that experiences high temperatures throughout the summer, cold temperatures in the winter, drying winds in the spring, and infrequent precipitation. Perennial native grass species are ideal due to their extensive near-surface root systems that are poised to uptake moisture throughout the year and prevent precipitation from percolating more deeply into the subsurface soil. The deeper, permanent roots of perennial native grasses enable them to withstand drought conditions, provide soil stabilization, and remove moisture from deeper within the Native Soil Layer relative to non-native or annual species.

2.0 Background Information

To meet the revegetation criteria as required in the MWL LTMMMP, Section 4.1, the MWL was seeded in August 2009 after cover construction was completed. The native seed mix was drill-seeded and hand-broadcast uniformly across the cover. To facilitate seed germination and seedling growth, supplemental watering was performed as approved by NMED (Bearzi December 2008). Specific conditions and limits for supplemental watering are addressed in Section 4.2.3 of the LTMMMP (SNL/NM March 2012). All cover maintenance and supplemental watering activities from 2009 through 2011 are documented in Appendix B of the LTMMMP. ET Cover maintenance and supplemental watering activities performed since 2011 are documented in MWL Annual LTMM Reports.

ET Cover Biology Inspections were initiated in May 2013 prior to LTMMMP approval, which occurred on January 8, 2014. The ET Cover has met the LTMMMP criteria for successful revegetation as documented in all quarterly inspections. In accordance with the LTMMMP, the frequency of Biology Inspections transitioned to an annual frequency after the August

2018-2019 Mixed Waste Landfill Biology Report

2014 growing season inspection, which provided confirmation that all successful revegetation criteria had been met (SNL/NM June 2015).

Percentage of cover of each species across the site is determined by dividing the cover into smaller sections of approximately 35 meters by 35 meters. Each section is visually assessed for the percent cover of each species; the sections are then averaged overall for the entire cover. Species that are present at a density of less than one-half of one-percent are recorded as "< 0.5%." Due to the presence of these species in very low numbers, they are not calculated into the total vegetative coverage. Species that are present between one-half and one percent are recorded as "1%" and are calculated into the total vegetative coverage.

3.0 Local Climate Trends for 2018 Growing Season

Climate trends for north-central New Mexico are presented in this section as they have a significant impact on the cover vegetation. Since the seeding occurred in August 2009, the local climate has primarily been dominated by below average precipitation with temperature extremes across the seasons.

Vegetation during the growing season is directly affected by the summer meteorological conditions, and it is also strongly influenced by the conditions during the preceding autumn, winter, and spring. Soil moisture during the dormant seasons can significantly stress or assist the root systems, which compose the bulk of each native plant. An extended period of very low soil moisture can severely injure root systems during the dormant season, whereas ample soil moisture during the dormant season can promote vigorous above ground growth during the growing season.

The eight months of October 2017 through May 2018 was a period of below average precipitation and associated low relative humidity. Total precipitation for this period was 1.24 inches, which is only 31% of normal, 2.78 inches below the mean precipitation of 4.02 inches. This lengthy period of below normal moisture stresses native vegetation due to prolonged soil drying prior to the growing season.

Table 1 provides meteorological data for CY 2018. Table 2 provides meteorological data for the first 3-month period of CY 2019. A 20-year data set (1995-2014) provides the reference mean monthly meteorological data and will be the reference mean data set until late 2019, when a 25-year data set will be created for the 1994-2018 time period.

Precipitation, Relative Humidity and Winds

Warmer than average temperatures with below average precipitation have been the meteorological norm in the MWL area since 2008. As of March 28, 2019, the area was categorized as "Abnormally Dry" according to the U.S. Drought Monitor (U.S. Drought Monitor March 2019).

Total annual precipitation for 2018 was 11.34 inches, 30% above the 20-year annual precipitation mean of 8.72 inches. Precipitation during the first five months of 2018 was collectively 45% below normal, followed by above normal rainfall during the months of

2018-2019 Mixed Waste Landfill Biology Report

Table 1
Summary of 2018 Meteorological Data at the Mixed Waste Landfill^a

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	
Year	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	
Temperature (°F)													Annual ^b
Monthly Mean	40.6	45.3	50.5	60.3	71.4	79.5	77.9	75.9	71.4	57.9	44.6	37.2	59.4
20-year Temp Means	37.7	41.7	48.8	55.8	66.1	75.4	76.7	74.8	68.9	57.9	46.4	37.0	57.3
Precipitation (Inches)													Annual ^c
Monthly Total	0.05	0.71	0.28	0.01	0.12	1.14	4.37	0.55	1.45	1.85	0.00	0.81	11.34
20-year Precip Means	0.34	0.45	0.56	0.50	0.26	0.49	1.64	1.57	1.00	0.93	0.41	0.57	8.72
Relative Humidity (%)													Annual ^b
Monthly Mean	38.8	38.1	31.6	22.0	17.6	22.2	42.1	43.5	43.9	55.9	41.2	52.7	37.5
20-year RH Means	49.9	44.9	36.4	30.3	26.3	24.9	40.9	44.6	45.6	46.6	47.6	48.6	40.6
Wind (Miles/hour)													Annual ^b
Monthly Mean	6.6	8.7	8.7	11.4	9.7	9.1	9.2	7.3	7.4	9.0	6.6	6.8	8.4
20-year Wind Means	6.94	8.13	9.10	10.47	9.96	9.76	8.42	7.91	7.99	7.81	7.08	6.77	8.36

^aInformation Source: SNL/NM Meteorological Monitoring Network.

^bValues provided are averages of the monthly data.

^cValues provided are totals of the monthly data.

2018-2019 Mixed Waste Landfill Biology Report

Table 2
Summary of January-March 2019 Meteorological Data at the Mixed Waste Landfill^a

Month	January	February	March
Temperature (°F)			
Monthly Mean	35.9	39.9	53.6
20-year Temp Means	37.7	41.7	48.8
Precipitation (Inches)			
Monthly Total	0.60	0.46	0.00
20-year Precip Means	0.34	0.45	0.56
Relative Humidity (%)			
Monthly Mean	61.2	47.3	37.5
20-year RH Means	49.9	44.9	36.4
Wind (Miles/hour)			
Monthly Mean	6.3	8.9	8.4
20-year Wind Means	6.9	8.1	9.1

^aInformation Source: SNL/NM Meteorological Monitoring Network.

2018 Mixed Waste Landfill Biology Report

June and July 2018. This monsoonal rainfall significantly improved depleted soil moisture conditions. June 2018 received greater than twice its normal precipitation, 0.65 inches above the monthly mean of 0.49 inches. This long-awaited precipitation was followed by a very wet July when 4.37 inches of rain fell, significantly above the monthly average of 1.64 inches. Thunderstorms brought regular rainfall during the 2nd and 4th weeks of July, with several events including heavy downpours and significant hail. A downpour on July 27th yielded 0.98 inches in a 15-minute period, an occurrence that equates to a 50-year return interval (i.e., 50-year rainfall event). The active native vegetation growing season of June through September 2018 received 7.51 inches of precipitation, well above the historical mean of 4.70 inches. October continued this wetter than normal stretch, receiving 1.85 inches, which is twice the mean rainfall for the month.

Relative humidity for June-October 2018 was 41.5%, above the 20-year annual mean for the period of 39.1%. Average relative humidity for 2018 was 37.5%, which is 3.1% below the 20-year annual mean of 40.6%.

The 2018 monthly and annual wind speed means were very close to 20-year monthly and annual means. The largest difference was in October 2018, which experienced an average wind speed that was 1.2 miles per hour above the 20-year mean. All other months recorded average wind speeds that were within 1.0 mile per hour of their respective 20-year monthly mean.

Temperature

In CY 2018 the MWL experienced 98.2 degrees of temperature variability, with a low of 2.4°F in December 2018 and a high of 100.6°F in June 2018. The monthly temperature means in January through September were all more than one-degree Fahrenheit above normal. January, February, April, May and June 2018 had more significant departures of 2.9°F, 3.6°F, 4.5°F, 5.3°F and 4.1°F above their respective historical mean temperatures. Average annual temperature for 2018 was 59.4°F, which is 2.1°F above the 20-year annual mean of 57.3°F

4.0 September 2018 Inspection Results

The September 10, 2018 MWL ET Cover Biology Inspection occurred near the end of the New Mexico growing season, which typically ends in mid-September as evening temperatures begin to fall. The growing season inspections allow the most accurate assessment of living plant coverage because the greatest amount of photosynthesis occurs during this time of the year.

The September 2018 MWL ET Cover Biology Inspection results confirmed the ET Cover continues to meet the successful revegetation criteria defined in the MWL LTMMMP, Section 4.1 (SNL/NM March 2012). The approximate foliar coverage of living plants was 48%, with 99% of the foliar coverage comprised of native perennial species. There were no contiguous bare areas that exceeded 200 square feet.

2018 Mixed Waste Landfill Biology Report

Nearly all of the MWL ET Cover vegetation was comprised of grasses, with galleta grass continuing as the dominant grass species (Figures 1 and 2). The vegetative community was observed to be very healthy overall, with native species spaced evenly across the cover and juvenile native grass clumps also occurring across the ET Cover. The grass seedheads were abundant at the time of inspection, allowing for good accuracy in the quantification of native grass species. The overall species complexity, spacing, and appearance of the mature native grass community was very similar to the surrounding vegetation in Technical Area III. Weeds were present in very low numbers on the MWL ET Cover.

No burrows were observed on the MWL ET Cover during the September 2018 Biology Inspection. Thirteen ant hills were observed across the ET Cover on both the side-slopes and top.

Biota sampling locations were identified for ant hills during the September 2018 Biology Inspection. Two ant hills were marked in the field and surveyed. The ant hill sampling locations were selected based on signs of current ant activity and to obtain samples from different areas of the ET Cover. No potentially deep-rooted plants were observed in 2018. Biota sampling activities and results are presented in Chapter 8 of this MWL Annual LTMM Report.

One active mourning dove bird nest with one egg and one newly hatched young was observed on the MWL ET Cover at the time of inspection. Active nests are protected under the International Migratory Bird Treaty Act. Five bright pink pin flags were placed at a distance in a ring around the nest and the nest location was marked on the MWL Biological Inspection map. All personnel who work on the cover were notified of the nest and directed to remain at a distance from the area. The active bird nest is the most recent observation of many that wildlife use the MWL Cover as native habitat.

5.0 Cover Maintenance

Maintenance activities performed on the MWL ET Cover during the 2018 – 2019 reporting period are summarized in Section 9.7 of this MWL Annual LTMM Report. Three routine weed control events were conducted in April and October 2018 and March-April 2019 as a best practice. These events included removal of live and dead, windblown tumbleweeds from the ET Cover surface, perimeter fence, and drainage swale, as well as removal of minimal live weeds from the ET Cover, perimeter fence line, and 10-foot perimeter around erosion control features on the western perimeter. Weed control activities completed during the October 2018 maintenance event also included the application of an sterilant to the North and South Staging Areas, and the application of a pre-emergent herbicide to the area between the north toe of the ET Cover and the north fence and the 3-foot area outside the perimeter fence. Both the sterilant and pre-emergent herbicide are approved for use at SNL/NM, were applied selectively in accordance with the manufacturer's specifications, and do not carry a bee precaution rating according to the University of California Integrated Pest Management. The weed control activities help promote the growth and health of the desired native grass species by reducing competition with weedy species for limited moisture and nutrients.

2018 Mixed Waste Landfill Biology Report

6.0 Recommendations

The MWL ET Cover Biology Inspections will continue on an annual frequency and be conducted in August or September. As a best practice, the SNL staff biologist will continue to support quarterly ET Cover inspections, document observations, and provide recommendations to maintain or improve the ecological health and integrity of the ET Cover.

Routine weed removal events will likely be needed during the 2019 – 2020 reporting period to clear the perimeter fence and remove windblown tumbleweeds from the ET Cover, perimeter drainage, and perimeter area based on LTMMMP inspection requirements and best practice. Pre-emergent, post-emergent and/or sterilant herbicides should be applied as needed to the graveled staging areas and along the perimeter fence, which is prone to weed growth due to the unavoidable accumulation of windblown weeds and their seeds. If present, other annual weedy species on the MWL ET Cover should also be considered for removal during the growing season weed removal events if they pose a threat to the established native grasses. If observed, four-wing saltbush and any other potentially deep-rooted plants will be pulled by hand, clipped at the ground surface, or removed for biota sampling. These routine weed control activities help the desired native grasses by reducing the availability of weed seeds and competition from the future growth of invasive plants. Based on experience since initial seeding of the ET Cover in 2009, these activities have had a significant, positive impact on the establishment of healthy, self-sustaining native grasses in a relatively short period of time. Successful revegetation requirements were met in 5 years after initial seeding; this is a process that could take 50 years or more without active seeding and maintenance activities.

8.0 References

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

Sandia National Laboratories/New Mexico (SNL/NM), March 2012. "Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill," Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 2015. "Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, January – March 2015," Sandia National Laboratories, Albuquerque, New Mexico.

U. S. Drought Monitor (March 2019)
Accessed April 2019.
<http://droughtmonitor.unl.edu/>

2018 Mixed Waste Landfill Biology Report



North portion of the cover from approximate center of ET cover



West portion of the cover from approximate center of ET cover



South portion of the cover from approximate center of ET cover



East portion of the cover from approximate center of ET cover

Figure 1 September 10, 2018 MWL ET Cover Photographs – Main Cover Surface

2018 Mixed Waste Landfill Biology Report



North Slope: facing west from the eastern end



West Slope: facing south from northern end



South Slope: facing east from the western end



East Slope: facing north from south of the dogleg bend

Figure 2 September 10, 2018 MWL ET Cover Photographs – Cover Side Slopes