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Submittal of Mixed Waste Landfill Annual Long-Term Monitoring & Maintenance Report, April 2017-March 2018 for Sandia National Laboratories/New Mexico, EPA ID Number NM5890110518, June 2018

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**Sandia
National
Laboratories**

**MIXED WASTE LANDFILL
ANNUAL LONG-TERM MONITORING & MAINTENANCE REPORT
APRIL 2017 – MARCH 2018**

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

JUNE 2018



**U.S. DEPARTMENT OF
ENERGY**



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

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**MIXED WASTE LANDFILL ANNUAL
LONG-TERM MONITORING & MAINTENANCE REPORT
APRIL 2017 – MARCH 2018**

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 No. HWB 04-11(M)* (Curry May 2005); the Compliance Order on Consent (NMED April 2004); and the Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518 (Permit) (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) (Flynn 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 fifth MWL Annual Long-Term Monitoring & Maintenance Report documents monitoring, inspection, maintenance, and repair activities conducted at the MWL during the April 1, 2017 through March 31, 2018 reporting period.

Sampling activities for this reporting period included two semiannual monitoring events each for groundwater and soil-vapor, and four quarterly monitoring events for radon. Annual soil-moisture monitoring was conducted in April 2017, and annual tritium surface soil sampling and annual biota sampling (metals and radionuclides) were conducted in August 2017. 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.

Inspections of the MWL final cover system, storm-water diversion structures, compliance monitoring systems, and security fence were performed in accordance with LTMMP 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 excellent 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. The purpose of ongoing ET Cover maintenance efforts is 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 Mixed Waste Landfill Annual Long-Term Monitoring & Maintenance Report, April 2016-March 2017 (SNL/NM June 2017a) and two submittals of updated reference documents cited in the LTMMP. There were no LTMMP modifications in this reporting period.

All LTMMP requirements have been met for the April 2017 through March 2018 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.

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ACRONYMS AND ABBREVIATIONS

AOP	Administrative Operating Procedure
AR/COC	Analysis Request/Chain-of-Custody
CAC	Corrective Action Complete
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
LTMMP	Long-Term Monitoring and Maintenance Plan
MDA	minimum detectable activity
MDL	method detection limit
mg/L	milligrams per liter
MWL	Mixed Waste Landfill
NMED	New Mexico Environment Department
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
ppmv	parts per million by volume
PQL	practical quantitation limit
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	Sandia National Laboratories
SNL/NM	Sandia National Laboratories, New Mexico
TA	Technical Area
TCE	trichloroethene
VOC	volatile organic compound

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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 and 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, 2017 through March 31, 2018 reporting period. This fifth 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 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*, No. HWB 04-11(M) (Curry 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 EPA ID Number NM5890110518 (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)

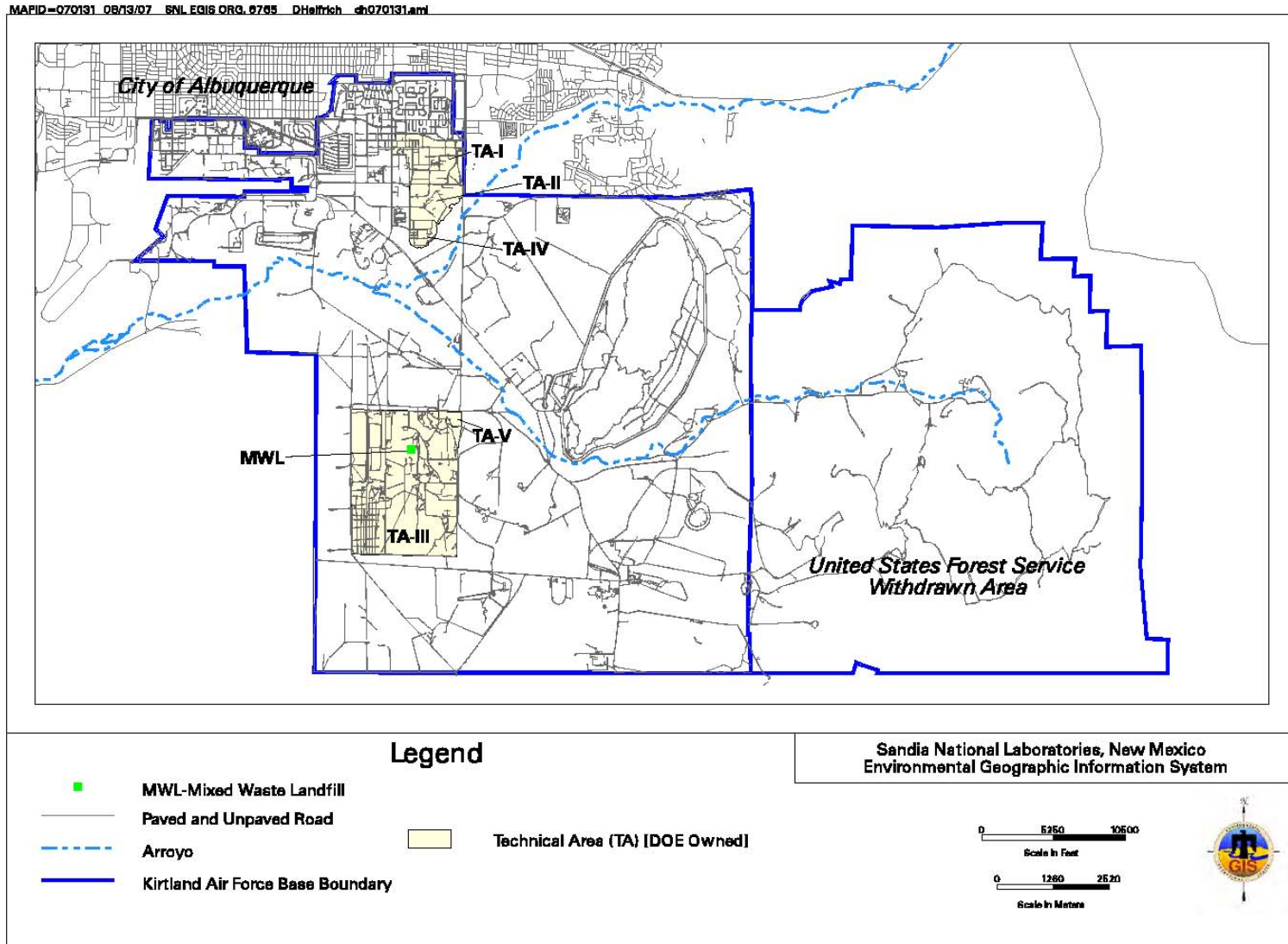


Figure 1-1
Location of the Mixed Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

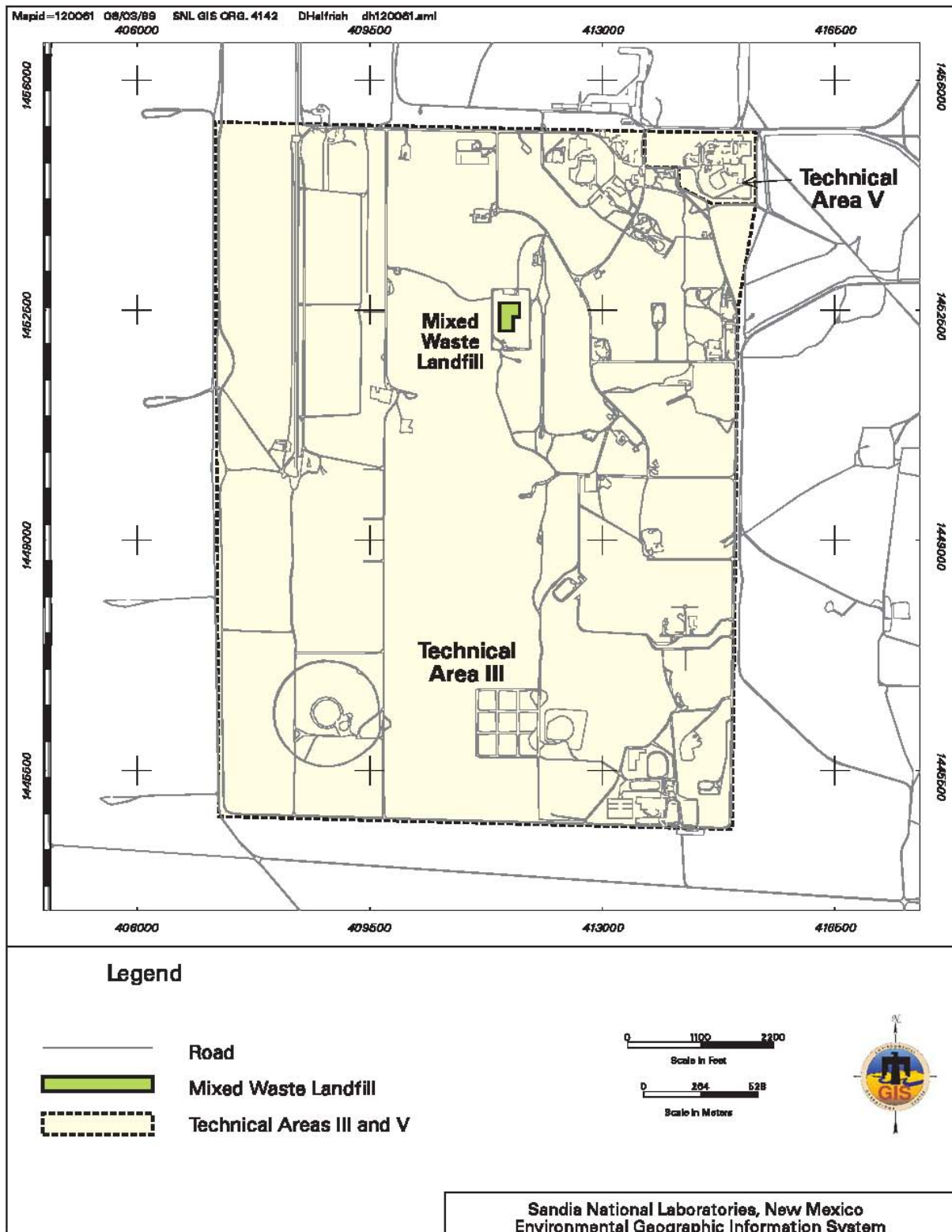


Figure 1-2
Location of the Mixed Waste Landfill within Technical Area III

On February 12, 2016, the New Mexico Environment Department (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) (Flynn 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 (CAC) with Controls. All controls required for the MWL are defined in the MWL LTMMMP that was approved by NMED on January 8, 2014 (Blaine January 2014) and is included in Attachment M of the SNL RCRA Facility Operating Permit (Permit) (Kielsing 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, 2017 through March 31, 2018 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. As a whole, 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 samples, and data evaluation protocols.

Sampling and Analysis Plans (SAPs) for each monitoring activity are included in MWL 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 MWL 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 MWL 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 Reevaluation 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 wind-blown plants and debris	Remove wind-blown 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.

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 MWL 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).

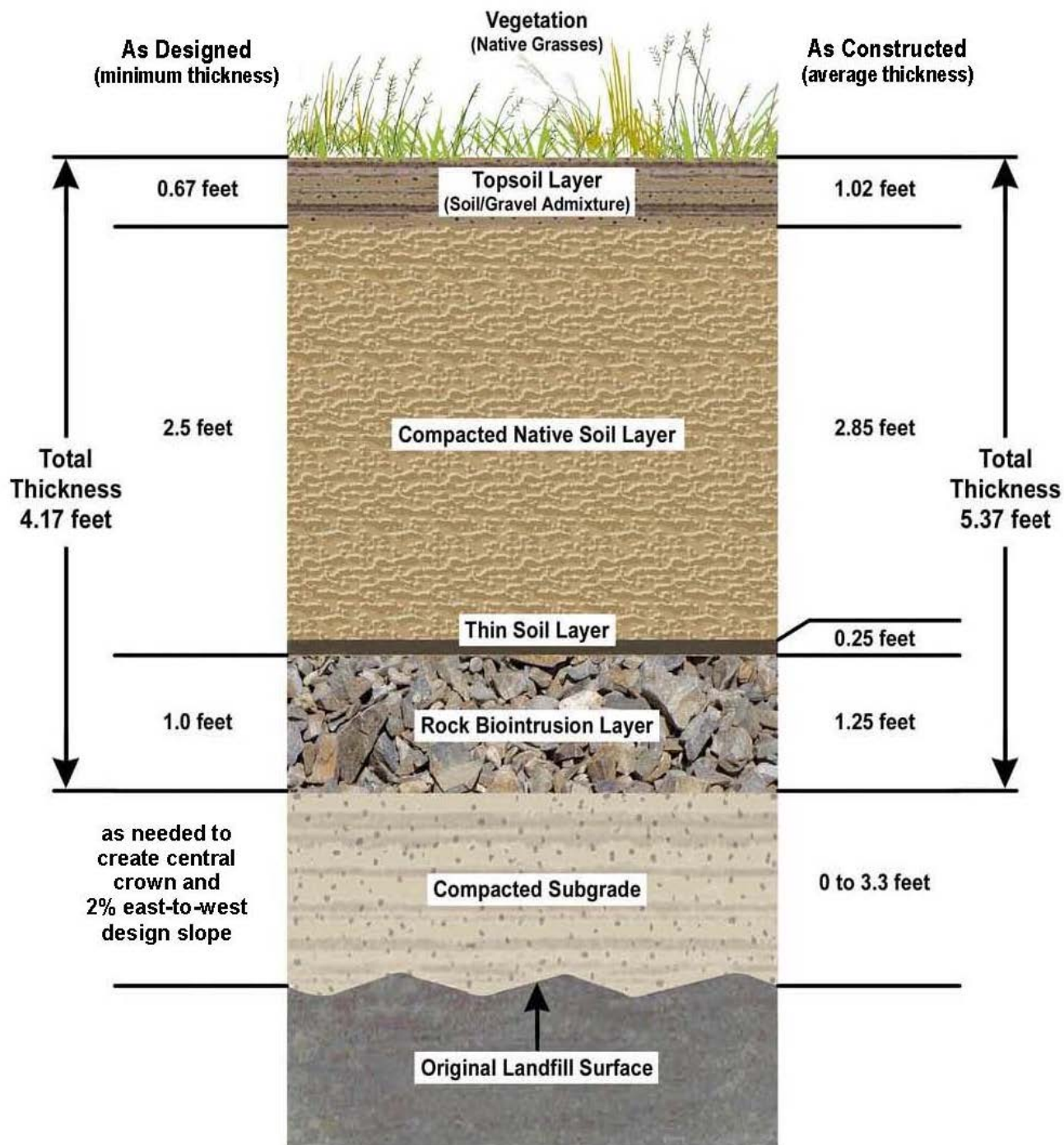


Figure 2-1
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover Layers

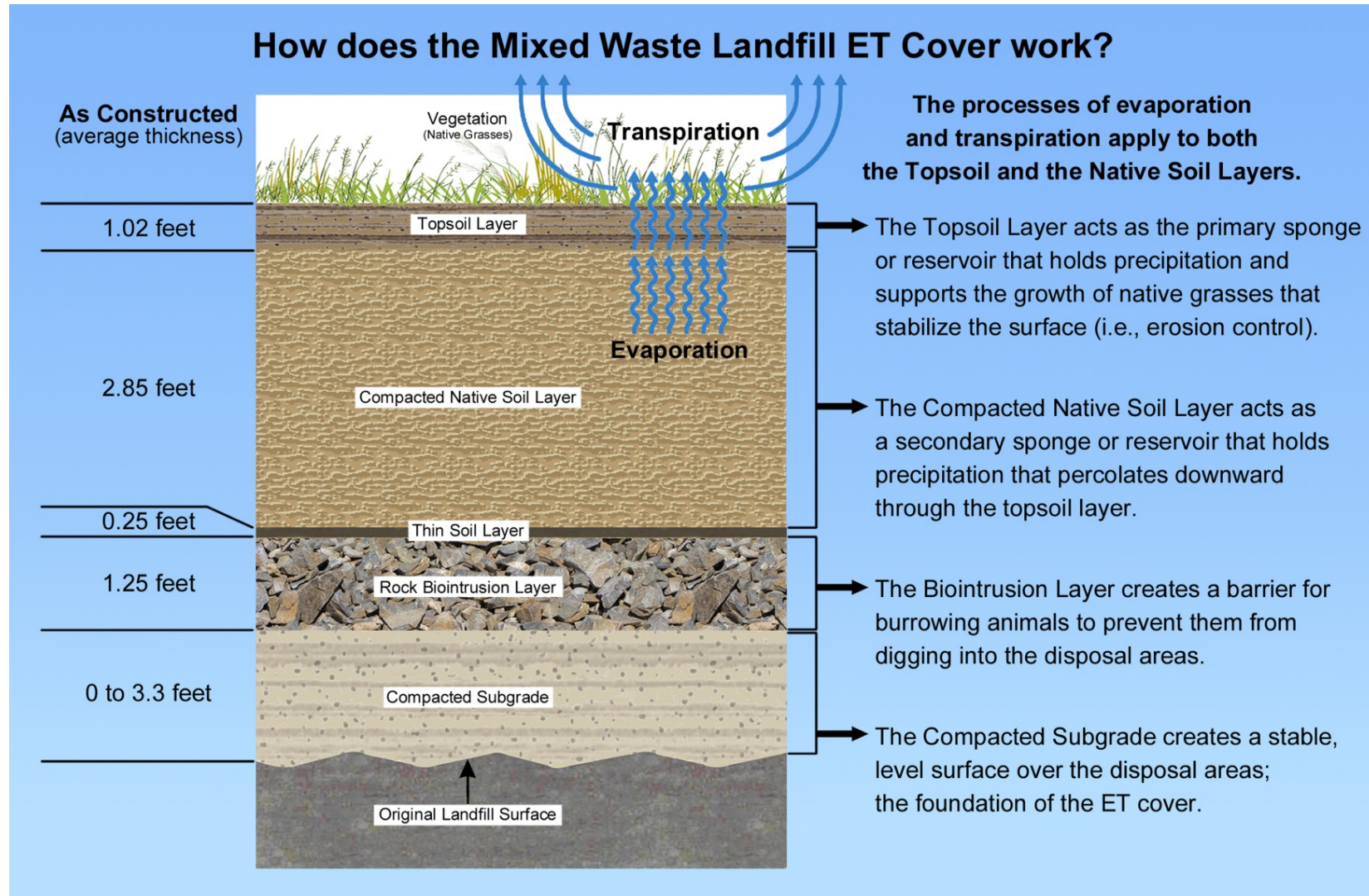


Figure 2-2
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover and How it Works

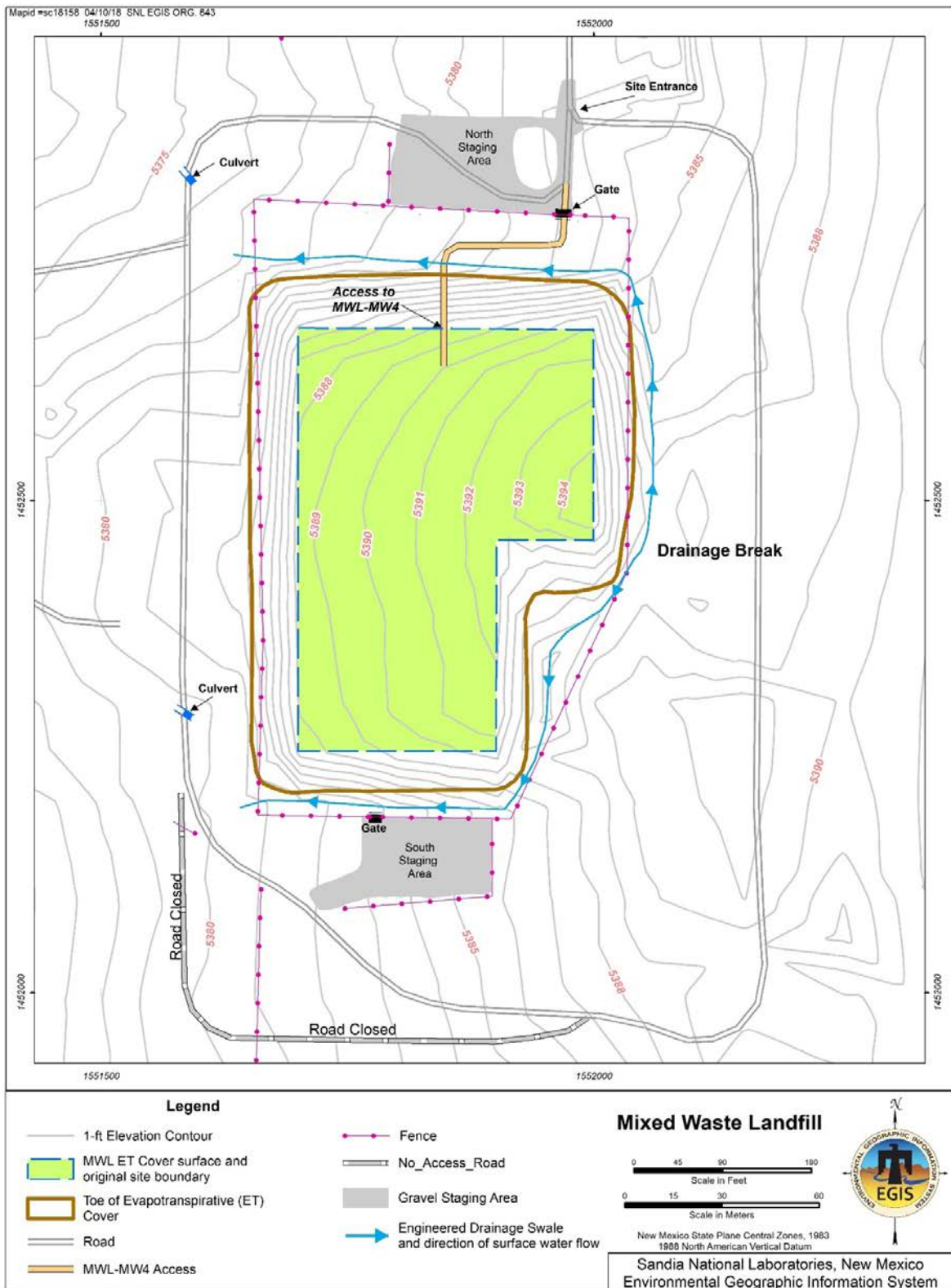


Figure 2-3
 Mixed Waste Landfill Engineered Storm-Water Drainage Swale

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 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 RN 10).

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

This section describes MWL radon monitoring activities conducted in conformance with LTMMP Appendix C, which describes the procedures, methods, and analytical protocols for deploying, collecting, and analyzing radon monitoring samples. Monitoring was conducted during four quarterly periods in calendar year (CY) 2017, fulfilling the LTMMP minimum requirement of semiannual monitoring. Radon monitoring presented for this April 1, 2017 through March 31, 2018 reporting period covers the CY 2017 period January 1, 2017 through December 31, 2017 due to the time required for laboratory analysis and data review after collection of the October through December 2017 detectors in early January 2018. The switch back to quarterly monitoring was made to evaluate the newer radon detectors (Radtrak2®) that were used for the first time for the July through December 2016 semiannual monitoring period.

The radon air measurements were obtained using alpha-track radon gas detectors manufactured by radonova (formerly Landauer® Nordic). Radtrak2® detectors were used for each quarterly monitoring event during CY 2017. Other detectors types, including modified Radtrak2® and RapiDOS® detectors, were also used and deployed with the Radtrak2® detectors to allow comparison of results. 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, average radon air concentrations in picocuries per liter (pCi/L) for each three-month period, and the CY 2017 range of radon air concentrations for each detector type.

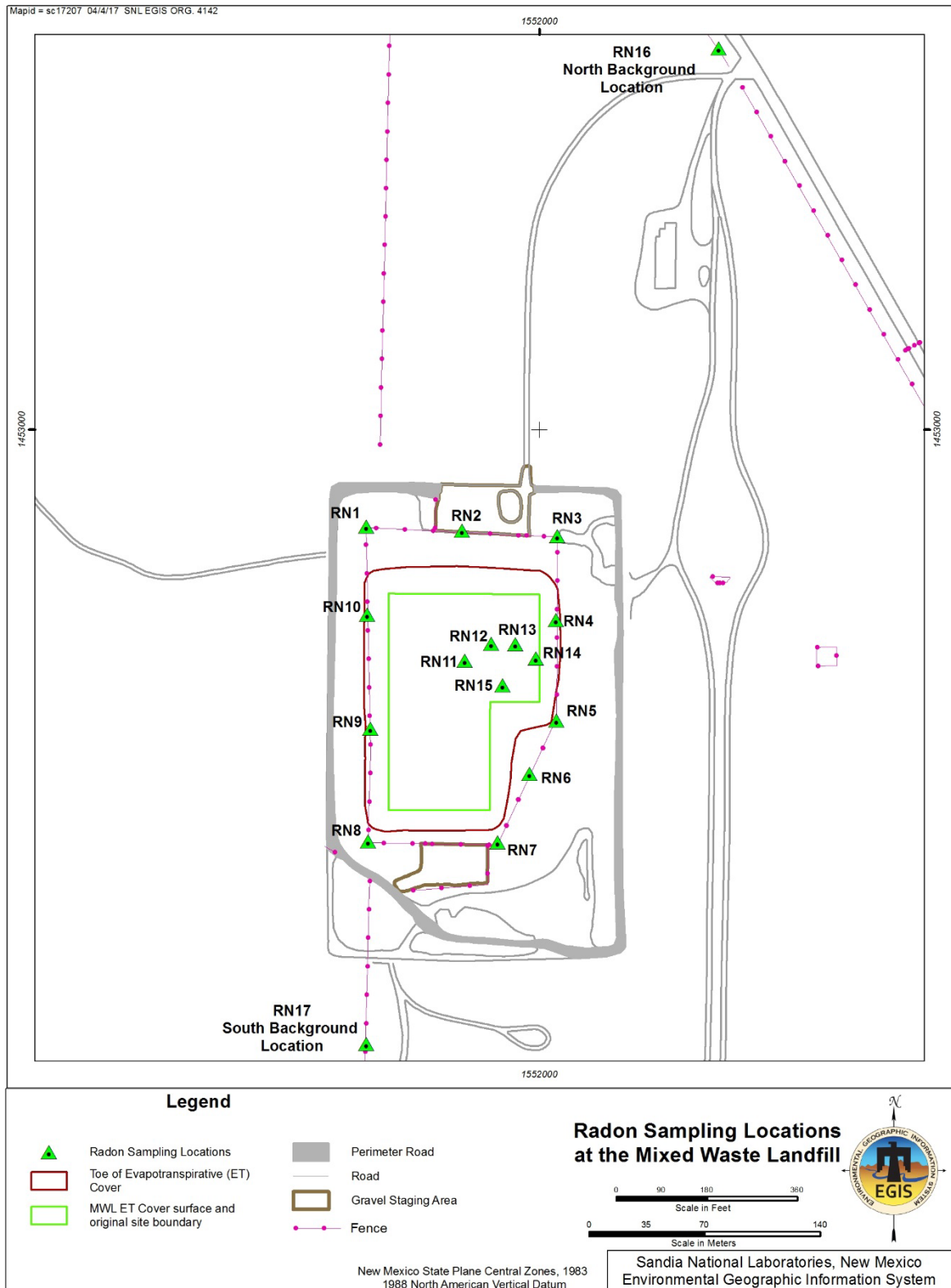


Figure 3-1
 Mixed Waste Landfill Radon Detector Locations

Table 3-1
 Summary of Radon Results
 Mixed Waste Landfill Air Monitoring
 Calendar Year 2017

Deployment Period	1 st Quarter	2 nd Quarter	3 rd Quarter			4 th Quarter			Range of Results Calendar Year 2017			Trigger Level (pCi/L)	
Detector Deployment Date	4-Jan-17	3-Apr-17	5-Jul-17			2-Oct-17							
Detector Collection Date	3-Apr-17	5-Jul-17	2-Oct-17			2-Jan-18							
Sample Location ^a	Detector Type												
	Radtrak2 [®]	Radtrak2 [®]	Rapidos [®]	Radtrak2 [®]	Rapidos [®]	Modified Radtrak2 [®]	Radtrak2 [®]	Rapidos [®]	Modified Radtrak2 [®]	Radtrak2 [®] Range	Modified Radtrak2 [®] Range	Rapidos [®] Range	
	Time-Weighted Average Radon Air Concentration (pCi/L)												
RN1	< 0.4	< 0.4	0.14	< 0.4	0.19	< 0.5	< 0.4	0.46	0.5	< 0.4	< 0.5 - 0.5	0.14 - 0.46	4
RN2	< 0.4	< 0.4	0.11	< 0.4	0.16	< 0.5	< 0.4	0.27	0.6	< 0.4	< 0.5 - 0.6	0.11 - 0.27	4
RN3	< 0.4	< 0.4	0.14	0.6	0.22	< 0.5	0.5	0.43	0.9	<0.4 - 0.6	< 0.5 - 0.9	0.14 - 0.43	4
RN4	< 0.4	< 0.4	< 0.08	< 0.4	0.24	< 0.5	0.4	0.38	< 0.8	< 0.4 - 0.4	< 0.5 - < 0.8	< 0.08 - 0.38	4
RN5	< 0.4	< 0.4	0.16	< 0.4	NR ^b	0.9	< 0.4	0.27	< 0.8	< 0.4	< 0.8 - 0.9	0.16 - 0.27	4
RN6	< 0.4	< 0.4	0.11	< 0.4	0.24	< 0.8	0.5	0.32	< 0.8	< 0.4 - 0.5	< 0.8	0.11 - 0.32	4
RN7	< 0.4	< 0.4	0.14	< 0.4	0.38	< 0.5	< 0.4	0.35	1.3	< 0.4	< 0.5 - 1.3	0.14 - 0.38	4
RN8	< 0.4	< 0.4	0.08	< 0.4	< 0.16	0.7	< 0.4	0.32	0.9	< 0.4	0.7 - 0.9	0.08 - 0.32	4
RN9	< 0.4	< 0.4	0.14	< 0.4	0.24	< 0.5	0.4	0.27	< 0.8	< 0.4 - 0.4	< 0.5 - < 0.8	0.14 - 0.27	4
RN10	< 0.4	< 0.4	< 0.08	< 0.4	< 0.16	0.6	0.5	0.24	0.8	< 0.4 - 0.5	0.6 - 0.8	< 0.08 - 0.24	4
RN11	< 0.4	< 0.4	< 0.08	< 0.4	0.19	0.6	0.4	0.30	< 0.5	< 0.4 - 0.4	< 0.5 - 0.6	< 0.08 - 0.30	NA
RN12	< 0.4	< 0.4	0.11	< 0.4	0.16	0.6	< 0.4	0.43	< 0.8	< 0.4	0.6 - < 0.8	0.11 - 0.43	NA
RN13	< 0.4	< 0.4	0.11	< 0.4	< 0.16	< 0.5	< 0.4	0.38	0.7	< 0.4	< 0.5 - 0.7	0.11 - 0.38	NA
RN14	< 0.4	< 0.4	0.11	< 0.4	< 0.16	< 0.5	0.5	0.30	0.6	< 0.4 - 0.5	< 0.5 - 0.6	0.11 - 0.30	NA
RN15	< 0.4	< 0.4	0.14	< 0.4	0.14	0.6	< 0.4	0.30	< 0.8	< 0.4	0.6 - < 0.8	0.14 - 0.30	NA
RN16	< 0.4	< 0.4	0.11	< 0.4	0.19	< 0.5	< 0.4	0.41	< 0.8	< 0.4	< 0.5 - < 0.8	0.11 - 0.41	NA
RN17	< 0.4	< 0.4	0.11	< 0.4	0.19	1.0	< 0.4	0.27	0.9	< 0.4	0.9 - 1.0	0.11 - 0.27	NA
RNTB	< 0.4	< 0.4	< 0.08	< 0.4	0.16	< 0.5	< 0.4	1.3	< 0.8	< 0.4	< 0.5 - < 0.8	< 0.08 - 1.3	NA

Notes:

^aBolded sample locations are the compliance locations where the trigger level of 4 pCi/L applies.

^bNo result (NR) due to a defect in the detector plastic.

NA = Not applicable.

pCi/L = Picocuries per liter.

RNTB = Trip blank.

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.

As discussed in the June 2017 MWL Annual LTMM Report, Landauer® Nordic phased out the older Radtrak® detectors that had been deployed from January 2014 through June 2016. The new Radtrak2® detectors were deployed for the first time for the July through December 2016 semiannual monitoring period. The Radtrak2® results (time-weighted average radon air concentration in pCi/L) for the July through December 2016 monitoring event were lower at all monitoring locations (RN1 through RN17) when compared to the values obtained during the January through June 2016 monitoring event using the Radtrak® detectors. In 2017, an investigation was initiated to determine why the new Radtrak2® detector results were consistently lower, and the monitoring frequency was changed back to quarterly to allow for more data to be collected and the evaluation of different detectors. This investigation is briefly summarized below.

After receipt of the July through December 2016 Radtrak2® results in early 2017, discussions with the detector manufacturer were initiated to determine why Radtrak2® results were consistently lower than the previous Radtrak® results. Landauer® Nordic first suggested using the more sensitive RapiDOS® detectors, considering the generally low (i.e., equivalent to background) concentrations measured at the site during previous quarterly and semiannual monitoring events. RapiDOS® detectors were not initially selected for monitoring because they can only be deployed for three months, and radon monitoring had already transitioned to semiannual (i.e., six-month) duration.

Monitoring was transitioned back to quarterly monitoring with collection of the Radtrak2® detectors and deployment of a Radtrak2® and RapiDOS® pair at all locations on April 3, 2017. After this dual deployment of the Radtrak2® and RapiDOS® detectors, Landauer® Nordic followed up with correspondence on April 10, 2017 clarifying the new Radtrak2® detectors are designed to have a longer diffusion time than the older Radtrak® detectors, preventing thoron (a decay product of thorium with a half-life of just 56 seconds) from entering the detector and being measured. Measurement of thoron is not part of the monitoring objective. Based on the additional information, the investigation concluded with three sets of detectors deployed for the last two quarters of CY 2017 at all locations. For the July through September and October through December 2017 monitoring periods, the following three detectors were deployed at each location.

- Radtrak2® detectors modified with holes and paper filters to emulate original Radtrak® detectors that measure both radon and thoron
- Radtrak2® detectors (unmodified) that measure only radon
- RapiDOS® detectors that measure only radon but have the lowest detection limit for a three-month monitoring period

The results of CY 2017 radon monitoring and the conclusions of the investigation of various radon detectors are summarized in Section 3.2.1.

3.1.1 Radon Monitoring Detector Deployment and Collection

The radon detectors were deployed and collected on a quarterly schedule in CY 2017 at the 17 sampling locations as shown in Table 3-1 and Figure 3-1. The following detectors were deployed for each quarter:

- January-March 2017: Radtrak2®
- April-June 2017: Radtrak2® and RapiDOS®
- July-September 2017: Radtrak2®, RapiDOS®, and modified Radtrak2®
- October-December 2017: Radtrak2®, RapiDOS®, and modified Radtrak2®

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 quality control (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 2017. 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 2017 range of results for all detectors was <0.08 to 1.3 pCi/L. The range for all background location results

was 0.11 to 1.0 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.

As summarized in Section 3.1 and Table 3-1, various detectors were deployed at each monitoring location during the CY 2017 monitoring quarters to investigate the lower values measured by the Radtrak2[®] detectors during the July through December 2016 monitoring period. As anticipated, the results for the modified Radtrak2[®] detectors, which measure both radon and thoron, showed a slightly higher range (<0.5 to 1.3 pCi/L) relative to the RapiDOS[®] (<0.08 to 0.46 pCi/L) and Radtrak2[®] (<0.4 to 0.6 pCi/L) detectors that measure only radon (combined range = <0.08 to 0.6). These slightly higher results are consistent with results from January 2014 through June 2016 obtained using the original Radtrak[®] detectors (<0.3 to 1.4 pCi/L), which also measure radon and thoron. These data sets confirm that the slightly higher historical results are due to the measurement of both radon and thoron, and the cause of the lower results using the newer Radtrak2[®] detectors is due to the fact that they measure only radon. All radon monitoring results for the MWL indicate very low radon activity consistent with background levels.

Based on the evaluation of MWL radon monitoring results (January 2014 through December 2017), monitoring will proceed in CY 2018 using the Radtrak2[®] detectors at a semiannual frequency. Based on the CY 2017 detector investigation, the Radtrak2[®] detectors will accurately measure radon activity over a six-month period and identify any changes in radon activity. Using an alpha-track detector that measures only radon-222 is an improvement that is consistent with the MWL radon monitoring DQOs and monitoring objective (SNL/NM March 2012). The Radtrak2[®] detector sensitivity will also increase with a longer monitoring period of six months (semiannual duration) versus three months (quarterly duration), providing a lower detection limit.

3.2.2 Field Quality Control Sample Results

Trip blanks for each detector type (designated as RNTB in Table 3-1) were submitted with the detectors collected at the end of each quarterly sampling period. The trip blank results confirmed there was no contamination during storage and shipment of detectors RN1 through RN17. However, the RapiDOS[®] trip blank detector result for the October through December 2017 monitoring period, although a low value (1.3 pCi/L), was unusually high for a TB detector. Past trip blank results have been consistently very low detections or non-detects. Upon further investigation, the RapiDOS[®] detector used for RNTB was a detector that was received from the laboratory in March 2017 and stored in a sealed plastic bag at the Environmental Resources Field Office (ERFO). If the RNTB result is recalculated for the longer exposure period (i.e., 9-month period from March 2017 through December 2017, assuming the plastic bag was not sealed properly) it would be approximately 0.14 pCi/L, which is consistent with past RNTB results. Another explanation could be the detector supplied by the laboratory was exposed prior to receipt at SNL/NM. Regardless, there was no adverse impact as the other two trip blank detectors provided representative results and all results from the 17 monitoring locations are consistent with historical results.

The two field background sample results (RN16 and RN17) for each quarterly period are compared to the quarterly 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 was one data quality issue associated with the July through September monitoring period. No radon result was reported for location RN5 for the RapiDOS[®] detector due to a manufacturer defect in the plastic of the detector, which was identified at the laboratory after the detector was returned for analysis. The defect did not adversely affect data quality because two other detectors were deployed at this location and provided valid results. All other data were acceptable and met the DQOs. The contract verification reviews for each monitoring period is included in Annex A.

3.2.4 Variances

There were no variances from the LTMMP 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 U.S. Environmental Protection Agency (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 2017.

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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 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 Sampling Field Activities

This section describes activities conducted in conformance with LTMMMP Appendix G, which describes the procedures, methods, and analytical protocols for collecting and analyzing tritium surface soil samples. The August 2017 results are presented in the following sections.

Surface soil samples were collected at the four ET Cover corner monitoring locations on August 30, 2017 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.

4.1.1 Field Quality Control

A field QC sample (duplicate soil sample) was collected as part of the August 30, 2017 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 duplicate sample pair be collected for every twenty environmental samples. The environmental-duplicate sample pair for the August 2017 sampling event was collected at the southwest corner of the ET Cover, tritium monitoring location MWL TS-2SW (Figure 4-1).

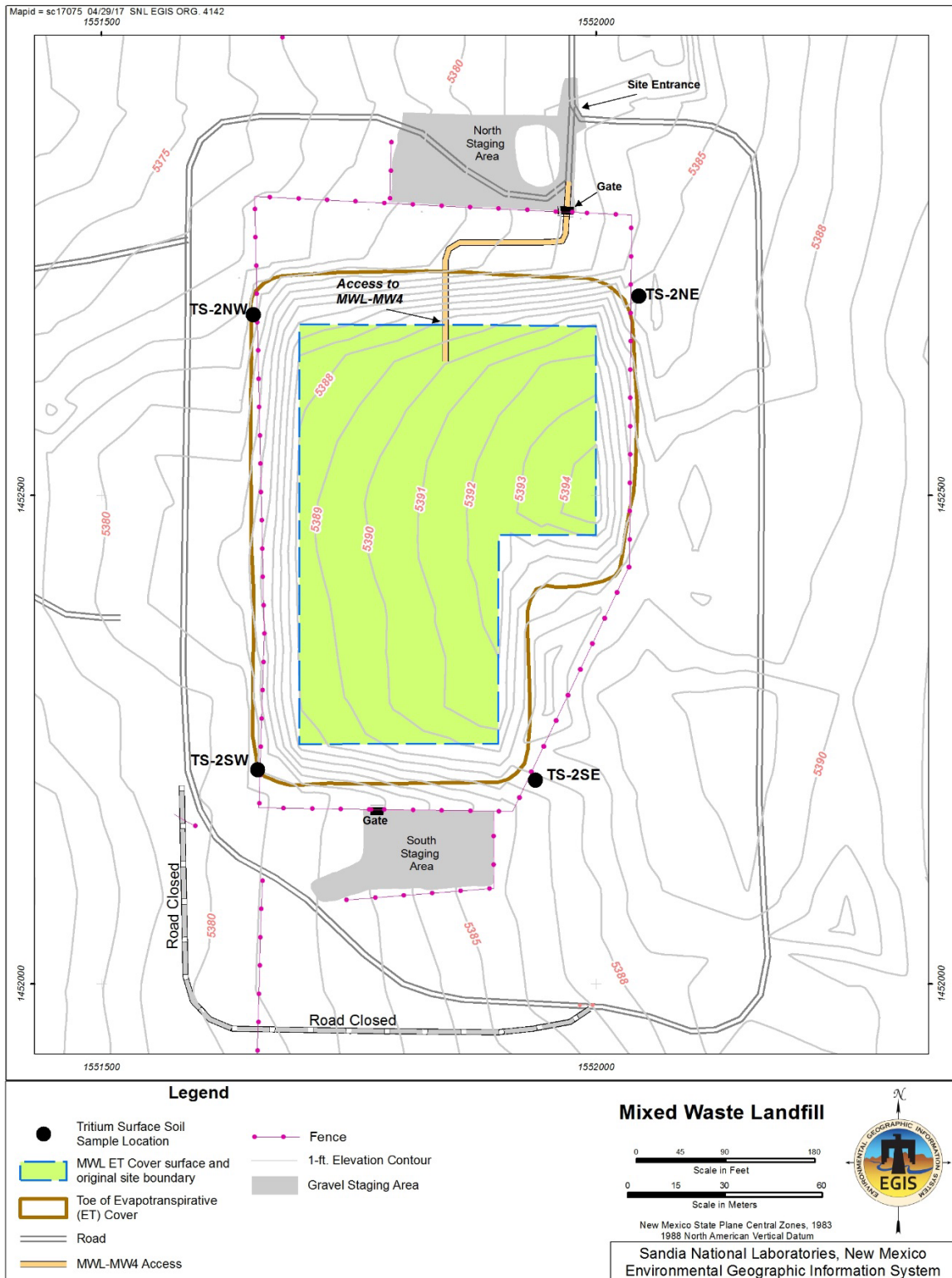


Figure 4-1
 Mixed Waste Landfill Tritium Surface Soil Sampling Locations

4.1.2 Waste Management

Waste generated during sampling activities included personal protective equipment (PPE) (i.e., gloves) and decontamination wipes. Waste was managed in accordance with all applicable requirements. Analytical data collected from the sampling event was used to characterize the waste; it was determined to be non-hazardous and non-radioactive and was managed as solid waste.

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 2017 sampling event. Reported tritium activities for all samples were very low, below the MDA. All samples had good soil moisture content, ranging from 6 to 9 percent by mass, and the MDA ranged from 183 pCi/L (northwest ET Cover corner location, MWL TS-2NW) to 228 pCi/L (northeast ET Cover corner location, MWL TS-2NE). The results are consistent with the August 2016 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 using the following formula.

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

where: R_1 = Analysis result.
 R_2 = Duplicate analysis result.

Tritium was not detected above the MDA in the environmental-duplicate sample pair; therefore, an RPD value was not calculated.

Table 4-1
Summary of Tritium Results (EPA Method 906.0^a)
Mixed Waste Landfill Surface Soil Monitoring
August 2017

Sample Location	Result (pCi/L)	Percent Soil Moisture	MDA (pCi/L)	Laboratory Qualifier ^b	Validation Qualifier ^b	Trigger Level (pCi/L)
	August 2017					
MWL TS-2NW	6.07 ± 105	6.96	183	U	BD	20,000
MWL TS-2SW	51.8 ± 133	8.61	227	U	BD	
MWL TS-2SW (Duplicate)	195 ± 141	9.28	228	U	BD	
MWL TS-2SE	201 ± 140	8.83	227	U	BD	
MWL TS-2NE	191 ± 141	6.88	228	U	BD	

Notes:

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

^bLaboratory/Validation Qualifier

Laboratory Qualifier

U = Analyte activity is below the detection limit.

Validation Qualifier

BD = Result that is not statistically different from zero.

EPA = U.S. Environmental Protection Agency.

MDA = Minimum detectable activity.

MWL = Mixed Waste Landfill.

pCi/L = Picocuries per liter.

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. Data validation and contract verification reviews are provided in Annex B.

4.2.4 Variances

There were no variances from the LTMMP tritium monitoring requirements.

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 2017 sample results exceeded the trigger level.

Tritium surface soil sampling 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. Historical tritium data from 1985 through 1999 did not go through the same rigorous data quality review process as data collected since June 2000, but the earlier data do provide useful information regarding tritium levels over time.

Trend plots are not presented in this Annual LTMM Report because the factors that affect tritium results in surface soil samples at these very low activities (e.g., soil-moisture content and barometric conditions) overwhelm the subtle changes in actual, measurable tritium flux. The data collected in August 2017 are consistent with historical data and reflect tritium activity at very low levels that are close to or below the laboratory MDA. Given the mobility of tritium, the results indicate no new releases from the disposal areas.

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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 LTMMP Sections 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 LTMMP 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 Sampling Field Activities

This section describes soil-vapor monitoring activities conducted at the MWL in conformance with the MWL Soil-Vapor SAP, LTMMP Appendix D, which describes the procedures, methods, and analytical protocols for collecting and analyzing soil-vapor samples. 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.

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, 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, 2017 through March 31, 2018 reporting period fulfilling the LTMMP semiannual monitoring requirement. The two soil-vapor monitoring events are described as follows.

- The first sampling event was conducted on May 30, 2017. Soil-vapor samples were collected from all monitoring well sampling ports. Duplicate samples were collected from two MWL-SV03 sampling ports (200 and 400 ft bgs ports).
- The second sampling event was conducted on October 26, 2017. Soil-vapor samples were collected from all monitoring wells and duplicate samples were collected from the single sampling ports at MWL-SV01 (42.5 ft bgs) and MWL-SV02 sampling port (41.5 ft bgs).

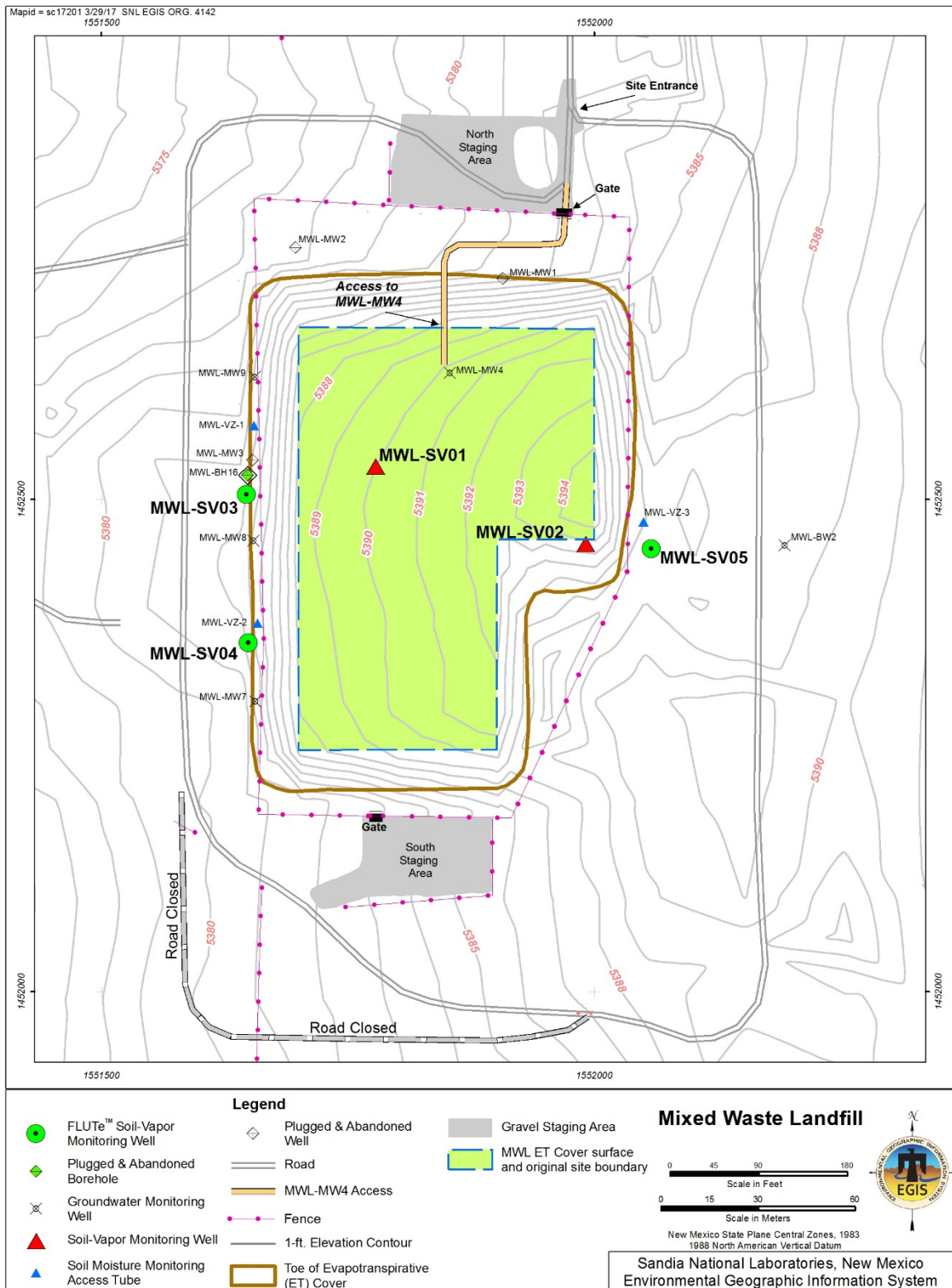


Figure 5-1
 Mixed Waste Landfill Soil-Vapor Monitoring Well Locations

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 08-22, "Soil-Vapor Sampling" (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 (minimum of two per semiannual monitoring event) and field blank samples. Field QC samples were submitted for analysis with the soil-vapor samples and analytical results are presented in Section 5.2.2 and Annex C. Two environmental-duplicate sample pairs were collected from each sampling port selected for the collection of duplicate samples. 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 May and October 2017 sampling events included the collection of an environmental-duplicate sample pair from the sampling ports located at 200 ft bgs and 400 ft bgs at monitoring well MWL-SV03 in May, and the sampling ports located at 42.5 ft bgs and 41.5 ft bgs at monitoring wells MWL-SV01 and MWL-SV02, respectively, in October. 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 Test America 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 LTMMP 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 well below the trigger levels. The PCE maximum concentration was 0.390 ppmv from the May MWL-SV03-400 environmental sample. The TCE maximum concentration was 0.250 ppmv from the May MWL-SV03-400 duplicate sample. The maximum Total VOCs concentration was 0.69654 ppmv from the May MWL-SV03-400 environmental sample.

5.2.1 Environmental Sample Results

This section summarizes soil-vapor monitoring results for the April 1, 2017 through March 31, 2018 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 LTMMP in January 2014) is presented in Section 5.3.

First Sampling Event – May 30, 2017

A total of 27 compounds were detected above laboratory MDLs in May 2017 samples. All of these VOCs were also detected in the October samples except benzene, bromodichloromethane, bromoform, 2-hexanone, 1,1,2-trichloroethane, and vinyl acetate.

Acetone	2-Hexanone
Benzene	Methylene Chloride
Bromodichloromethane	Tetrachloroethene
Bromoform	Toluene
2-Butanone	1,1,2-Trichloro-1,2,2-trifluoroethane
Carbon Disulfide	1,1,1-Trichloroethane
Carbon Tetrachloride	1,1,2-Trichloroethane
Chloroform	Trichloroethene
Chloromethane	Trichlorofluoromethane
Dichlorodifluoromethane	1,2,4-Trimethylbenzene
1,1-Dichloroethane	Vinyl acetate
1,1-Dichloroethene	m, p-Xylene
cis-1,2-Dichloroethene	o-Xylene
Ethyl benzene	

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 0.044 ppmv (MWL-SV05-50) to 0.390 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.049 (MWL-SV05-50) to 0.250 ppmv (MWL-SV03-200 and MWL-SV03-400, duplicate sample). Total VOCs concentrations ranged from 0.232861 ppmv (MWL-SV04-50) to 0.78555 ppmv (MWL-SV03-200, duplicate sample). Other VOCs detected in all monitoring well sampling ports, generally at lower concentrations, include 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 PCE results: 0.390 ppmv (MWL-SV03-400) and 0.300 ppmv (MWL-SV01-42.5).

For the May 2017 results from the three deepest sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05, PCE concentrations ranged from 0.100 ppmv (MWL-SV04-400 and MWL-SV05-400) to 0.390 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.085 ppmv (MWL-SV04-400) to 0.250 ppmv (MWL-SV03-400, duplicate sample). Total VOCs concentrations ranged from 0.29962 ppmv (MWL-SV05-400) to 0.69654 ppmv (MWL-SV03-400).

Second Sampling Event – October 26, 2017

A total of 22 compounds were detected above laboratory MDLs in October 2017 samples. All of these VOCs were also detected in the May samples except 1,3,5-trimethylbenzene.

Acetone	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
1,1-Dichloroethane	1,2,4-Trimethylbenzene
1,1-Dichloroethene	1,3,5-Trimethylbenzene
cis-1,2-Dichloroethene	m, p-Xylene
Ethyl benzene	o-Xylene

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 0.021 ppmv (MWL-SV05-50) to 0.420 ppmv (MWL-SV01-42.5, duplicate sample). TCE concentrations ranged from 0.042 ppmv (MWL-SV05-50) to 0.230 ppmv (MWL-SV03-200 and MWL-SV03-400). Total VOCs concentrations ranged from 0.25573 ppmv (MWL-SV04-50) to 0.89810 ppmv (MWL-SV01-42.5, duplicate sample). Other VOCs detected in all monitoring wells, generally at lower concentrations include chloroform, dichlorodifluoromethane; 1,1-dichloroethane; 1,1-dichloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane; 1,1,1-trichloroethane; and trichlorofluoromethane. The two highest sample port VOC concentrations were both PCE results: 0.420 and 0.340 ppmv (MWL-SV01-42.5, duplicate sample and environmental sample, respectively) and 0.310 ppmv (MWL-SV03-400).

For the October 2017 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 0.310 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.081 ppmv (MWL-SV04-400) to 0.230 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.29543 ppmv (MWL-SV05-400) to 0.62930 ppmv (MWL-SV03-400).

Tables 5-1 and 5-2 (provided at the end of this chapter) summarize detected VOCs results for the May 2017 and October 2017 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 May and October 2017 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 May and October 2017 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 RL. The environmental-duplicate sample pair results and QC field blank results are summarized below.

First Sampling Event – May 30, 2017

The two environmental-duplicate sample pairs collected during the May sampling event were analyzed for all analytical parameters. The calculated RPDs show good agreement for the May environmental-duplicate sample pairs, ranging from less than 1 to 14. An RPD of 50 or less demonstrates acceptable precision of the sampling and analytical processes as previously demonstrated during soil-vapor monitoring at the SNL/NM Chemical Waste Landfill (NMED October 2009 and subsequent revisions).

A total of five field blank samples were submitted for analysis with the May 2017 environmental samples. VOCs detected in field blank samples included acetone (3 samples), benzene (1 sample), carbon disulfide (1 sample), dichlorodifluoromethane (1 sample), methylene chloride (1 sample), toluene (2 samples), and trichlorofluoromethane (1 sample). No corrective action was required for dichlorodifluoromethane or trichlorofluoromethane since these compounds were detected in associated environmental samples at concentrations greater than five times the field blank concentration. Acetone, benzene, carbon disulfide, methylene chloride, and toluene were qualified as not detected during data validation for environmental samples from MWL-SV01, MWL-SV02, MWL-SV03, and MWL-SV05 since these compounds were reported at concentrations less than the laboratory practical quantitation limit (PQL).

Table 5-3
 Summary of Duplicate Samples
 Mixed Waste Landfill Soil-Vapor Monitoring
 May and October 2017

Well ID/Parameter	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a (%)
	(ppbv)		
May 2017 Environmental-Duplicate Sample Pair Results			
MWL-SV03-200			
Dichlorodifluoromethane	51	55	8
1,1-Dichloroethane	7.9	7.9	< 1
1,1-Dichloroethene	33	33	< 1
Tetrachloroethene	210	210	< 1
1,1,2-Trichloro-1,2,2-trifluoroethane	170	170	< 1
Trichloroethene	240	250	4
Trichlorofluoromethane	38	38	< 1
MWL-SV03-400			
1,1-Dichloroethene	21	22	5
Tetrachloroethene	390	340	14
1,1,2-Trichloro-1,2,2-trifluoroethane	28	29	4
Trichloroethene	230	250	8
October 2017 Environmental-Duplicate Sample Pair Results			
MWL-SV01-42.5			
Chloroform	14	14	< 1
Dichlorodifluoromethane	84	84	< 1
Tetrachloroethene	340	420	21
1,1,2-Trichloro-1,2,2-trifluoroethane	67	72	7
1,1,1-Trichloroethane	34	37	8
Trichloroethene	74	86	15
Trichlorofluoromethane	160	170	6
MWL-SV02-41.5			
Dichlorodifluoromethane	80	78	3
Tetrachloroethene	69	72	4
1,1,2-Trichloro-1,2,2-trifluoroethane	49	50	2
1,1,1-Trichloroethane	72	74	3
Trichloroethene	65	67	3
Trichlorofluoromethane	300	310	3

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.
 ppbv = Parts per billion by volume basis.

Second Sampling Event – October 26, 2017

The two environmental-duplicate sample pairs collected during the October sampling event were analyzed for all analytical parameters. The calculated RPDs show good agreement for the October environmental-duplicate sample pairs. The RPD values ranged from less than 1 to 21.

A total of five field blank samples were submitted for analysis with the October 2017 samples. VOCs detected in the field blank samples included acetone (3 samples), benzene (5 samples) chloromethane (1 sample), methylene chloride (2 samples), PCE (3 samples), toluene (2 samples), and TCE (2 samples). 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. Acetone, benzene, chloromethane, methylene chloride, and toluene were qualified as not detected during data validation for various environmental samples from all monitoring wells since these compounds were reported at concentrations less than the PQL.

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 May and October sampling events. All laboratory control sample results for both sampling events met the accuracy (i.e., % recovery) requirement of 50 to 130% for detected compounds (Section 2.2 of LTMMP 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 2014; SNL/NM June 2017b). Based upon the data validation and review criteria, all May 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 LTMMP was identified for the May and October 2017 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 LTMMP. 11.8 eV lamps are not currently available from the manufacturer or the distributors. A permit modification request is being prepared to 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 LTMMP in 2014. Key points from the evaluation of the 2014 through 2017 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 2017 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 well 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 eight sampling events conducted from 2014 to 2017 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 May 2017 results). The PCE concentrations at the MWL-SV03 400 ft bgs sampling port showed slight increases from September 2014 through October 2016. However, the 2017 results are the lowest concentrations measured over the four-year monitoring period indicating stable conditions with small fluctuations over the four-year period. The MWL-SV01 (42.5 foot bgs sampling port) and the MWL-SV03 (400 foot bgs sampling port) locations have consistently shown the highest VOC concentrations (PCE ranging from 0.300 to 0.560 ppmv) and Total VOCs concentrations (ranging from 0.62930 to 1.14010 ppmv). The 2014 through 2017 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)
MWL-SV01-42.5	0.560	0.400	0.460	0.470	0.410	0.450	0.300	0.420
MWL-SV02-41.5	0.086	0.067	0.075	0.068	0.068	0.070	0.071	0.072
MWL-SV03-50	0.140	0.120	0.150	0.110	0.170	0.140	0.100	0.140
MWL-SV03-100	0.210	0.230	0.240	0.220	0.240	0.240	0.160	0.220
MWL-SV03-200	0.300	0.320	0.310	0.290	0.270	0.270	0.210	0.260
MWL-SV03-300	0.290	0.320	0.290	0.370	0.310	0.300	0.220	0.280
MWL-SV03-400	0.390	0.400	0.420	0.450	0.430	0.440	0.390	0.310
MWL-SV04-50	0.072	0.076	0.076	0.074	0.078	0.077	0.052	0.063
MWL-SV04-100	0.130	0.120	0.120	0.120	0.130	0.130	0.089	0.110
MWL-SV04-200	0.180	0.180	0.170	0.150	0.180	0.150	0.110	0.130
MWL-SV04-300	0.110	0.130	0.110	0.120	0.130	0.130	0.095	0.120
MWL-SV04-400	0.110	0.140	0.120	0.140	0.150	0.130	0.100	0.110
MWL-SV05-50	0.052	0.048	0.055	0.040	0.060	0.045	0.044	0.021
MWL-SV05-100	0.092	0.096	0.100	0.077	0.099	0.095	0.089	0.070
MWL-SV05-200	0.140	0.170	0.150	0.120	0.170	0.140	0.140	0.100
MWL-SV05-300	0.090	0.120	0.097	0.110	0.100	0.110	0.110	0.091
MWL-SV05-400	0.100	0.110	0.080	0.120	0.110	0.110	0.100	0.092

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.

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)
MWL-SV01-42.5	0.110	0.090	0.099	0.110	0.091	0.100	0.071	0.086
MWL-SV02-41.5	0.075	0.058	0.067	0.065	0.063	0.065	0.070	0.067
MWL-SV03-50	0.100	0.082	0.097	0.080	0.140	0.110	0.098	0.120
MWL-SV03-100	0.190	0.190	0.200	0.200	0.210	0.210	0.130	0.180
MWL-SV03-200	0.300	0.300	0.290	0.310	0.250	0.270	0.250	0.230
MWL-SV03-300	0.190	0.210	0.170	0.260	0.200	0.220	0.200	0.210
MWL-SV03-400	0.290	0.280	0.260	0.350	0.300	0.320	0.250	0.230
MWL-SV04-50	0.061	0.059	0.060	0.066	0.070	0.067	0.054	0.058
MWL-SV04-100	0.130	0.120	0.120	0.130	0.140	0.150	0.120	0.120
MWL-SV04-200	0.210	0.210	0.190	0.200	0.220	0.200	0.180	0.170
MWL-SV04-300	0.076	0.091	0.064	0.093	0.081	0.097	0.087	0.094
MWL-SV04-400	0.075	0.096	0.060	0.097	0.070	0.091	0.085	0.081
MWL-SV05-50	0.067	0.061	0.064	0.052	0.074	0.058	0.049	0.042
MWL-SV05-100	0.140	0.130	0.130	0.120	0.130	0.130	0.110	0.100
MWL-SV05-200	0.200	0.240	0.210	0.200	0.210	0.200	0.190	0.150
MWL-SV05-300	0.100	0.130	0.082	0.120	0.096	0.120	0.120	0.120
MWL-SV05-400	0.094	0.100	0.066	0.120	0.089	0.100	0.087	0.097

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.

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)
MWL-SV01-42.5	1.14010	1.00870	1.11670	1.03620	0.93510	0.97570	0.740723	0.89810
MWL-SV02-41.5	0.71822	0.67880	0.76470	0.69150	0.71030	0.70780	0.62944	0.67594
MWL-SV03-50	0.36957	0.31750	0.37076	0.30743	0.48016	0.42248	0.34860	0.42918
MWL-SV03-100	0.61151	0.63820	0.69490	0.74420	0.73270	0.73682	0.53366	0.62881
MWL-SV03-200	0.91906	0.94754	0.99016	0.93230	0.84151	0.87920	0.78555	0.78590
MWL-SV03-300	0.64917	0.67835	0.59506	0.83120	0.68678	0.74430	0.61278	0.71640
MWL-SV03-400	0.87270	0.81410	0.85950	0.95920	0.8798	0.89730	0.69654	0.62930
MWL-SV04-50	0.25949	0.26359	0.28424	0.28232	0.30064	0.29728	0.232861	0.25573
MWL-SV04-100	0.45631	0.42879	0.44346	0.46616	0.50930	0.53785	0.40932	0.43340
MWL-SV04-200	0.68361	0.66935	0.64340	0.63160	0.72689	0.66068	0.56579	0.56287
MWL-SV04-300	0.26624	0.32355	0.27345	0.34519	0.32831	0.37126	0.32319	0.35562
MWL-SV04-400	0.25031	0.3246	0.26702	0.35374	0.35148	0.38251	0.31282	0.32932
MWL-SV05-50	0.36547	0.31833	0.33990	0.30406	0.37770	0.35609	0.29951	0.26189
MWL-SV05-100	0.56578	0.54556	0.57169	0.53248	0.59430	0.61891	0.54760	0.51172
MWL-SV05-200	0.70237	0.82115	0.73680	0.65830	0.80567	0.73190	0.69410	0.57349
MWL-SV05-300	0.35628	0.42371	0.33576	0.44336	0.36421	0.46092	0.47695	0.44050
MWL-SV05-400	0.54096	0.39521	0.25075	0.45245	0.30765	0.40839	0.29962	0.29543

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.

ppmv = Parts per million by volume.

VOCs = Volatile organic compounds.

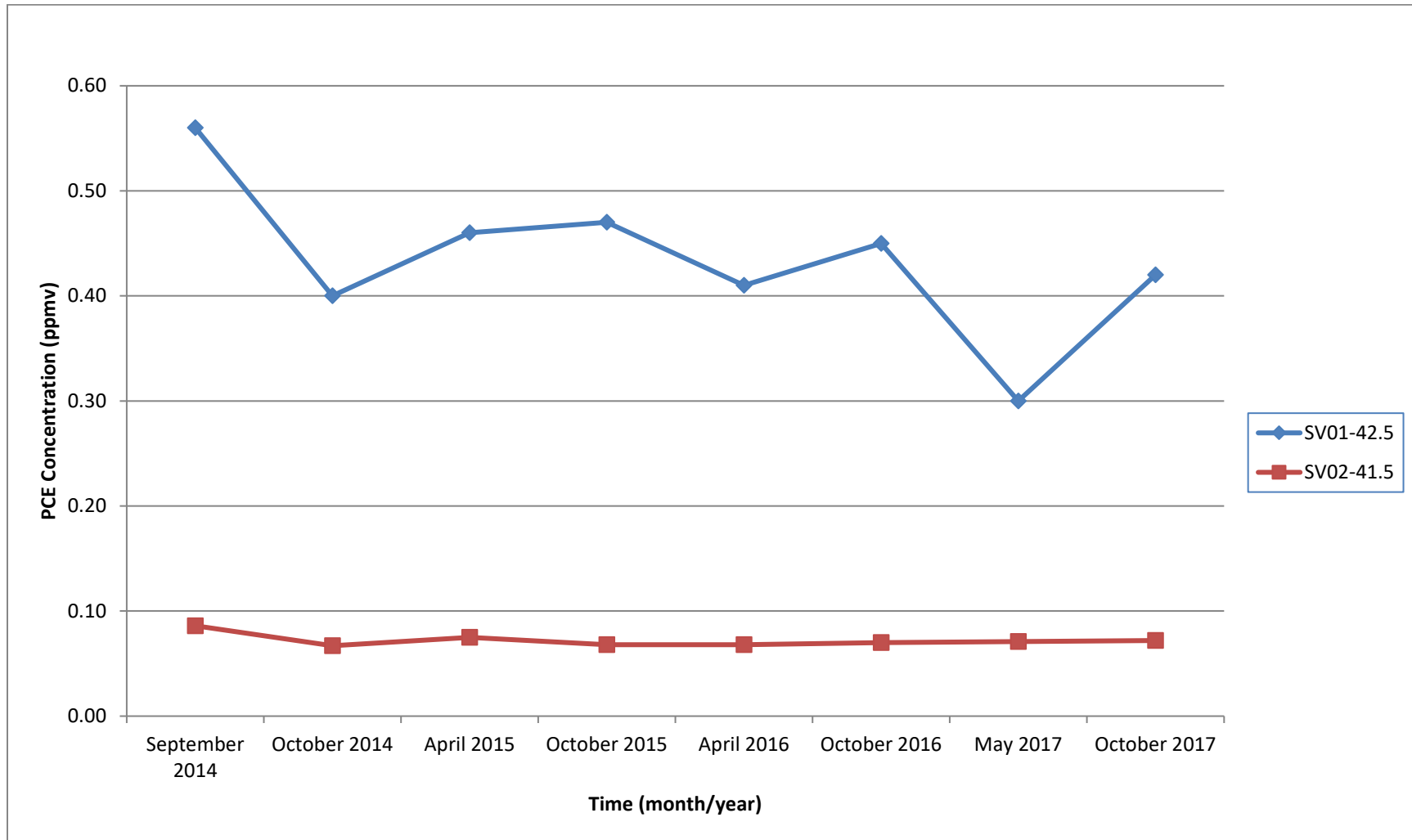


Figure 5-2
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

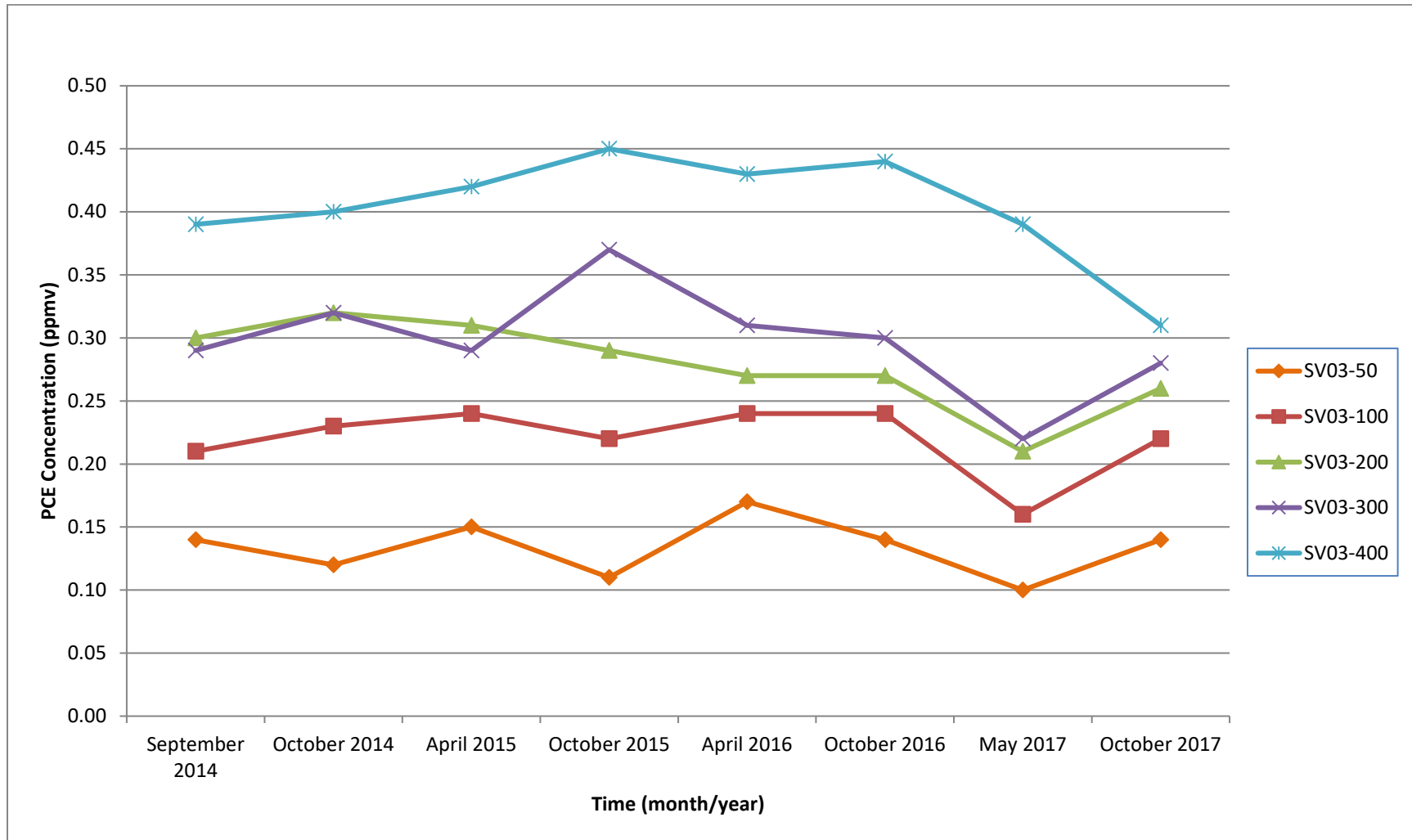


Figure 5-3
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

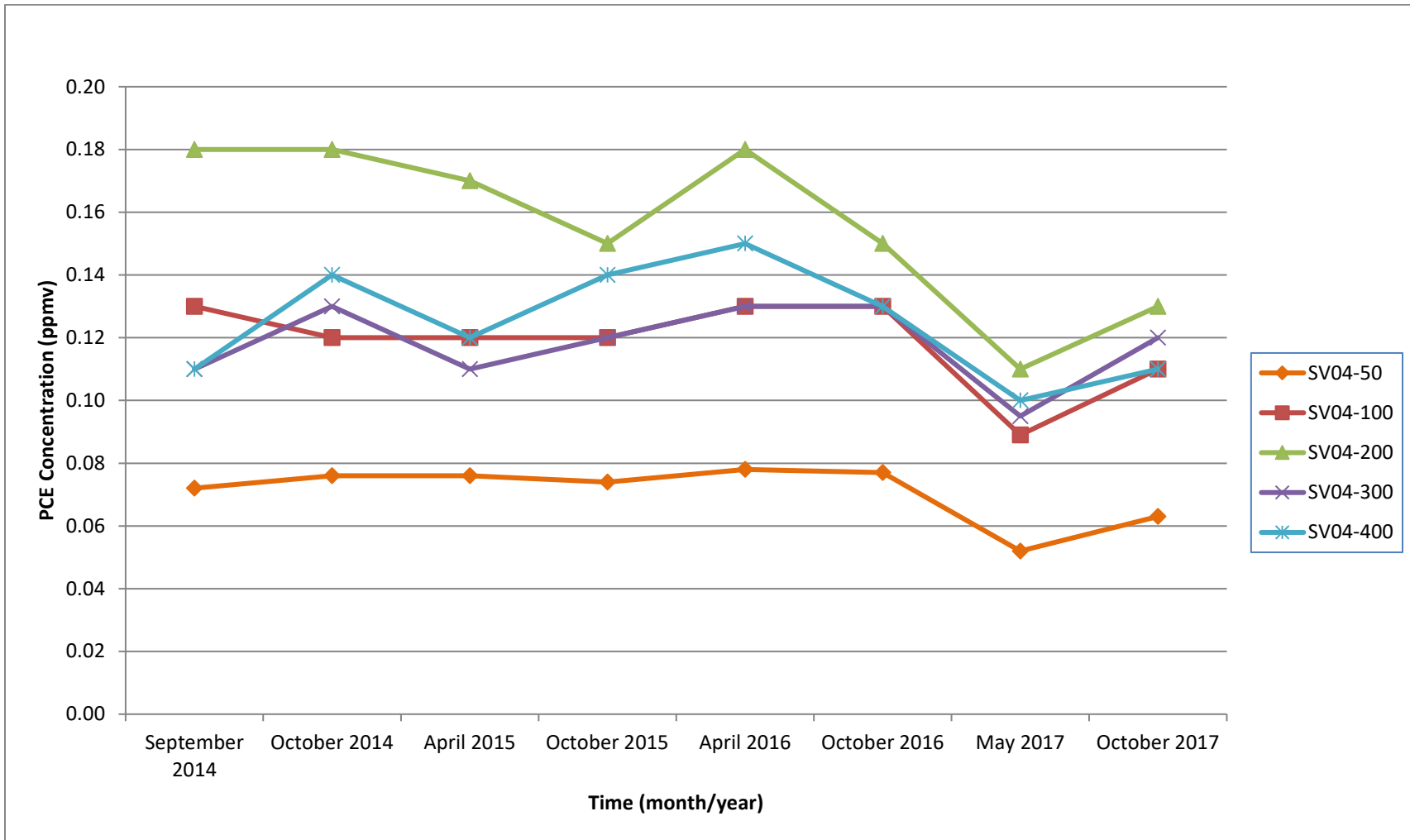


Figure 5-4
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

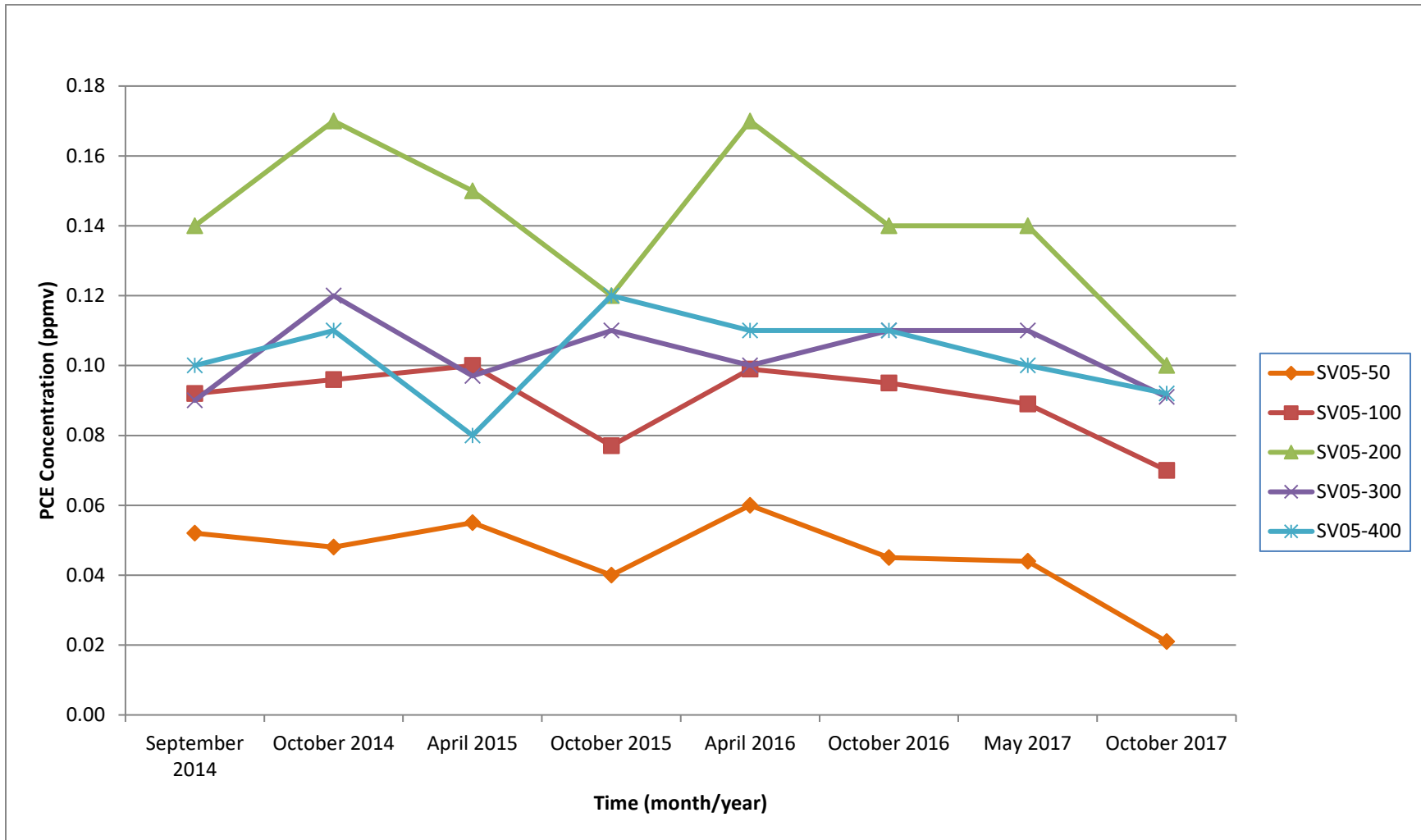


Figure 5-5
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

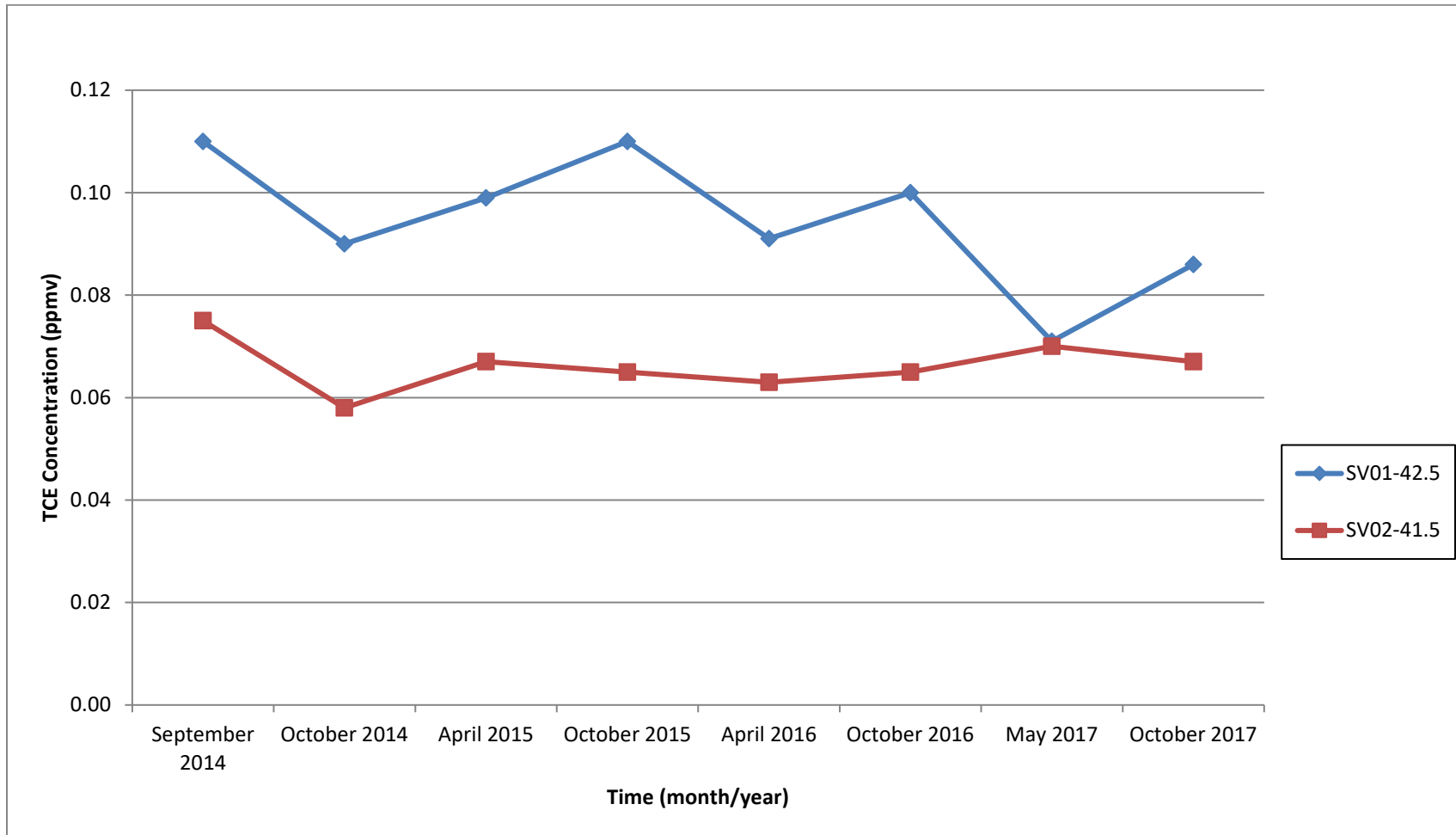


Figure 5-6
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

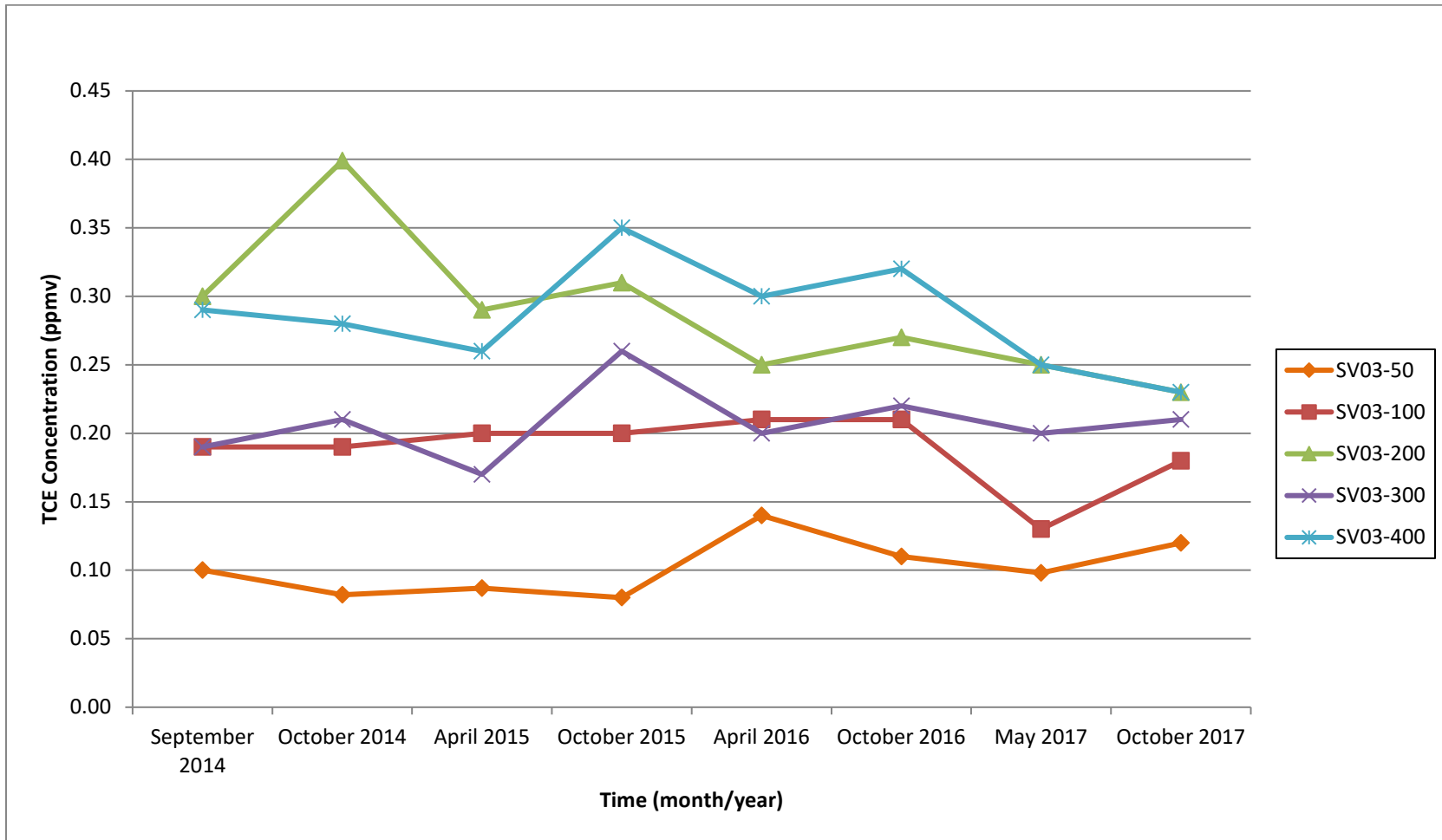


Figure 5-7
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

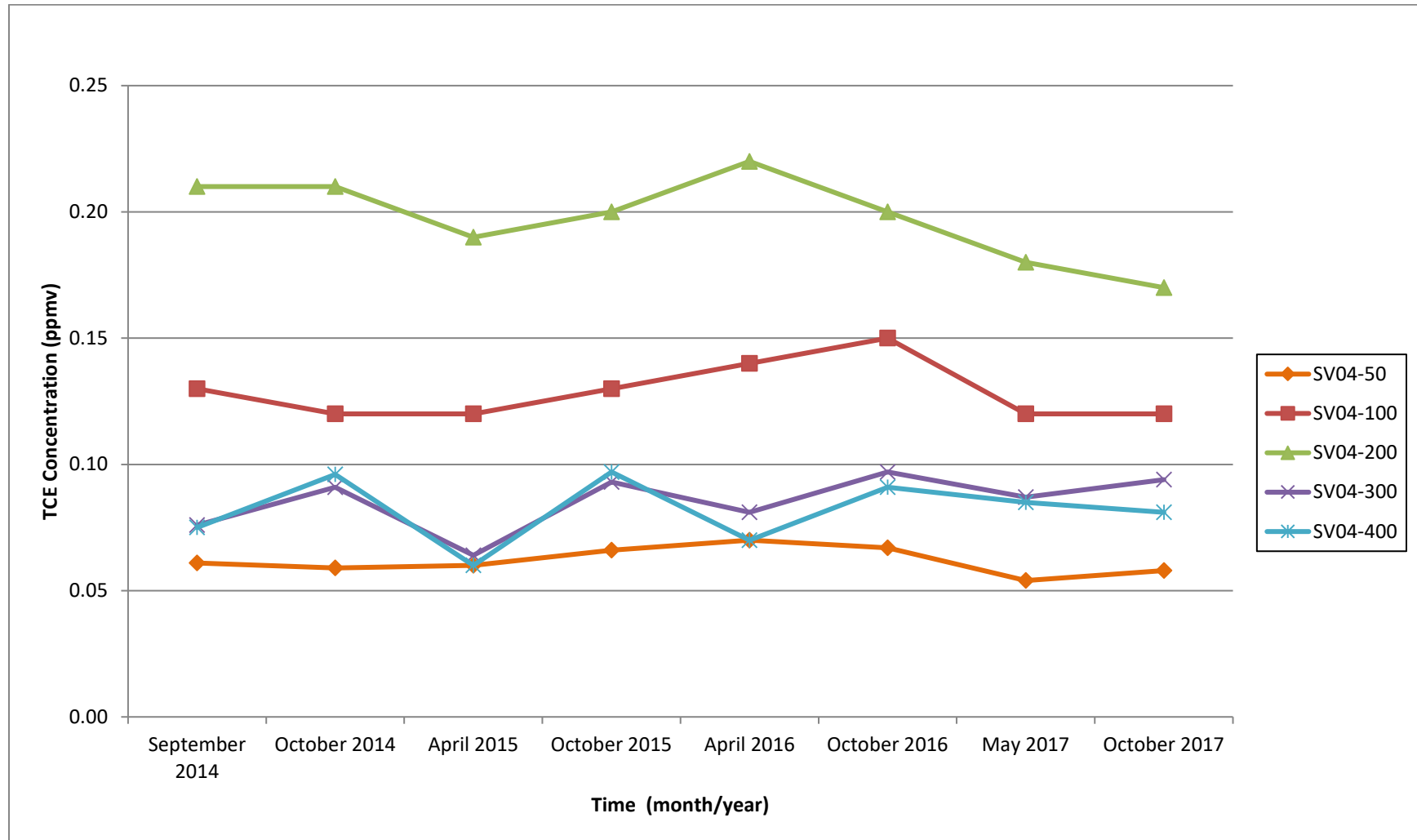


Figure 5-8
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

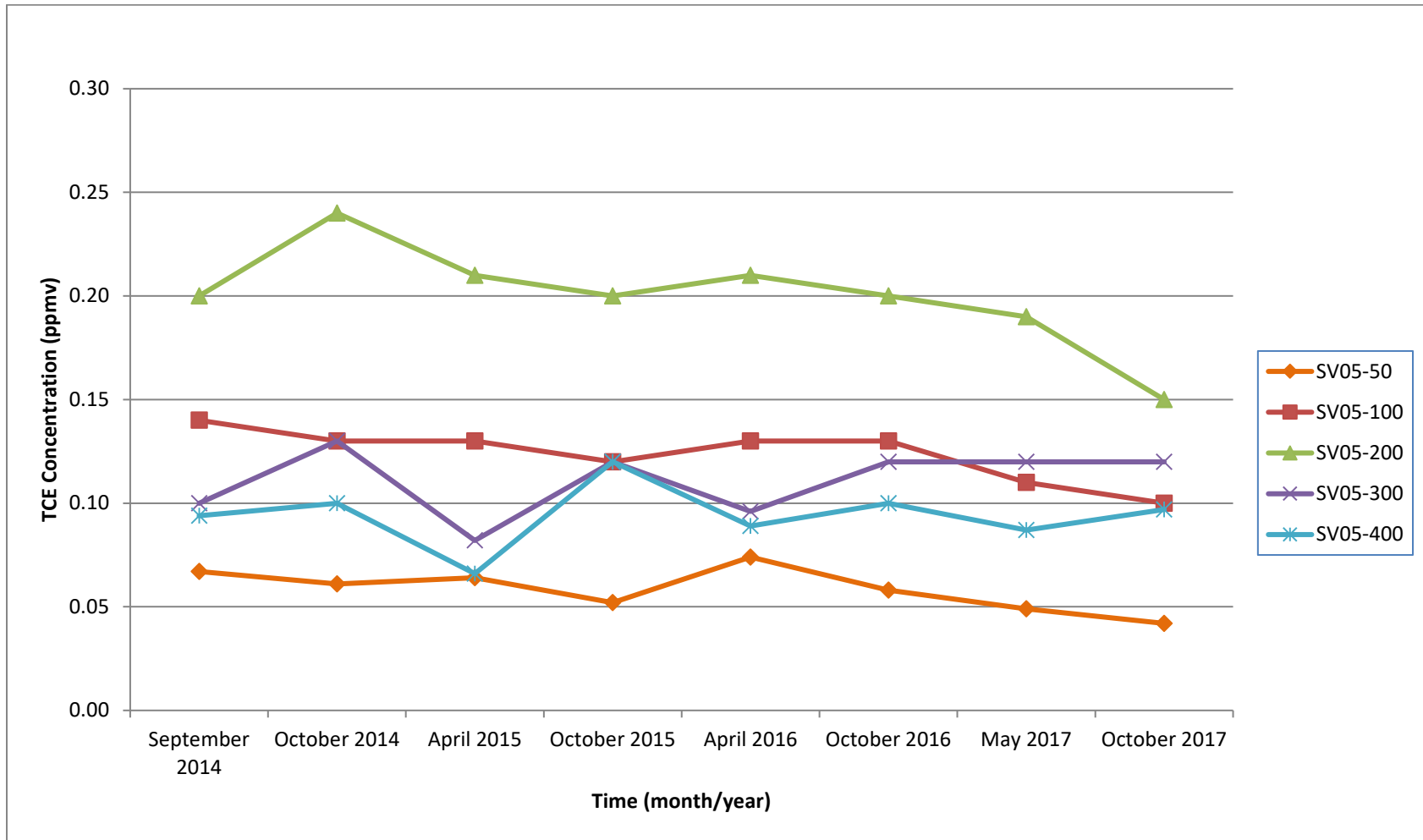


Figure 5-9
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

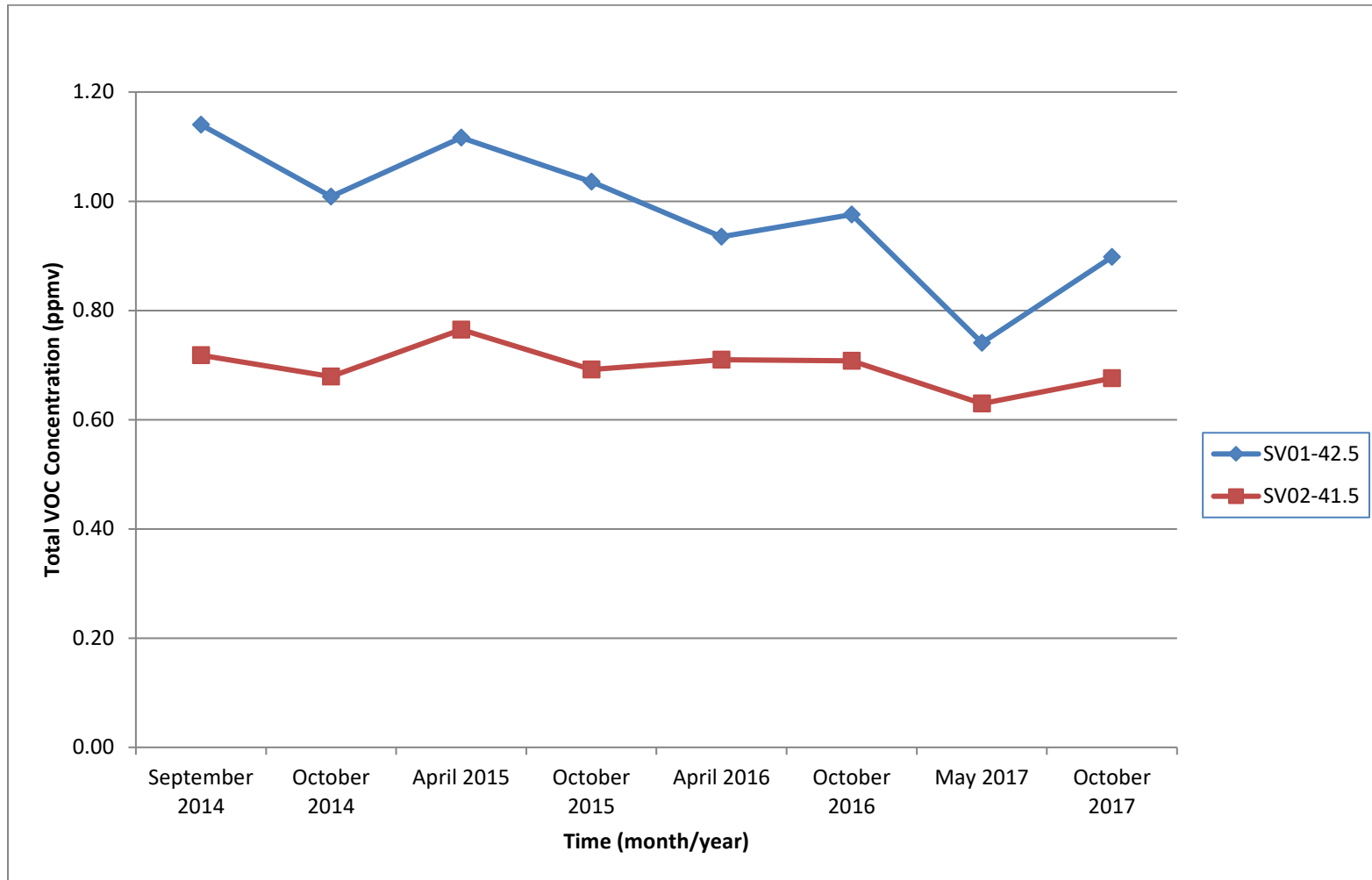


Figure 5-10
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

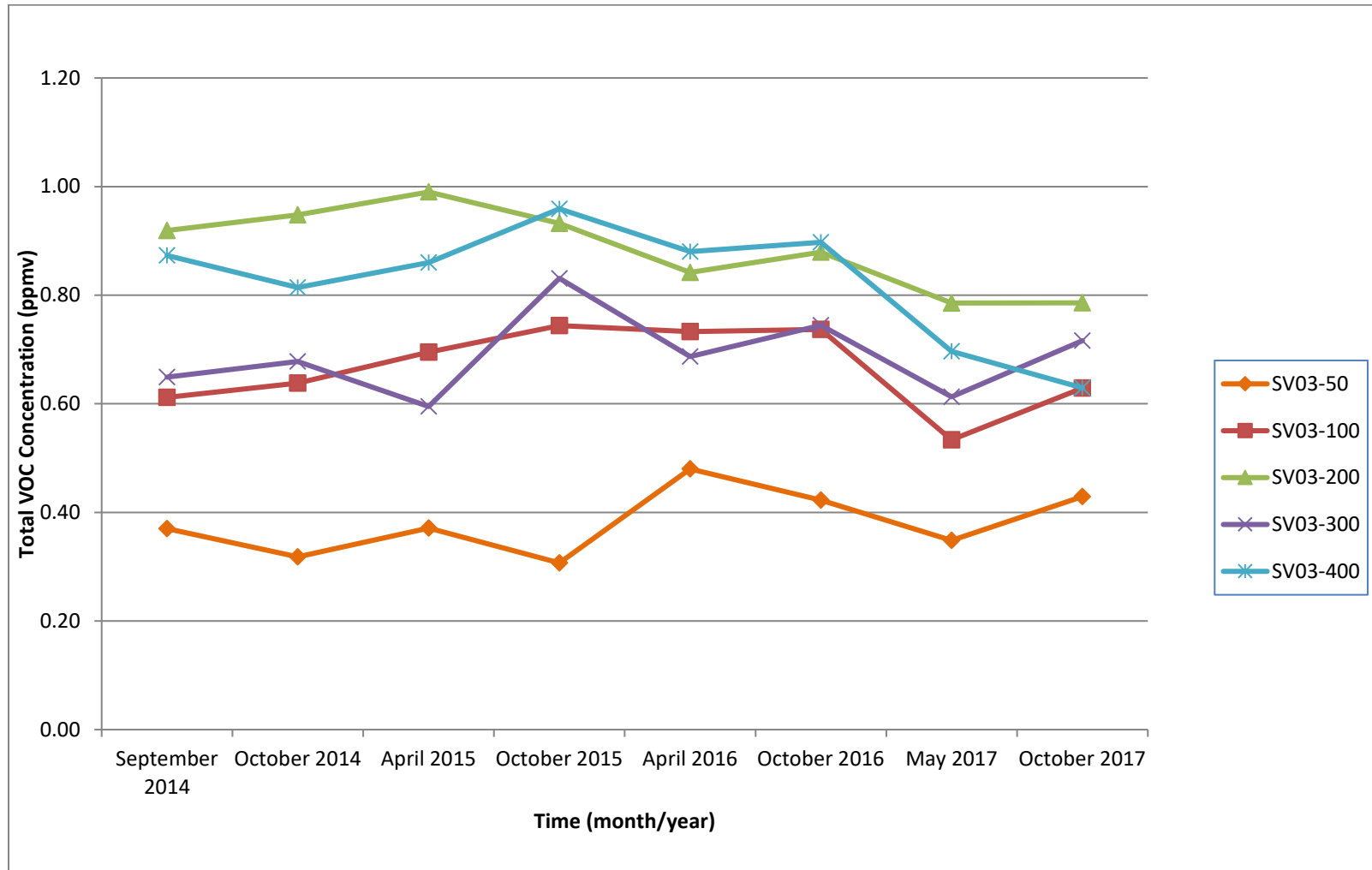


Figure 5-11
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

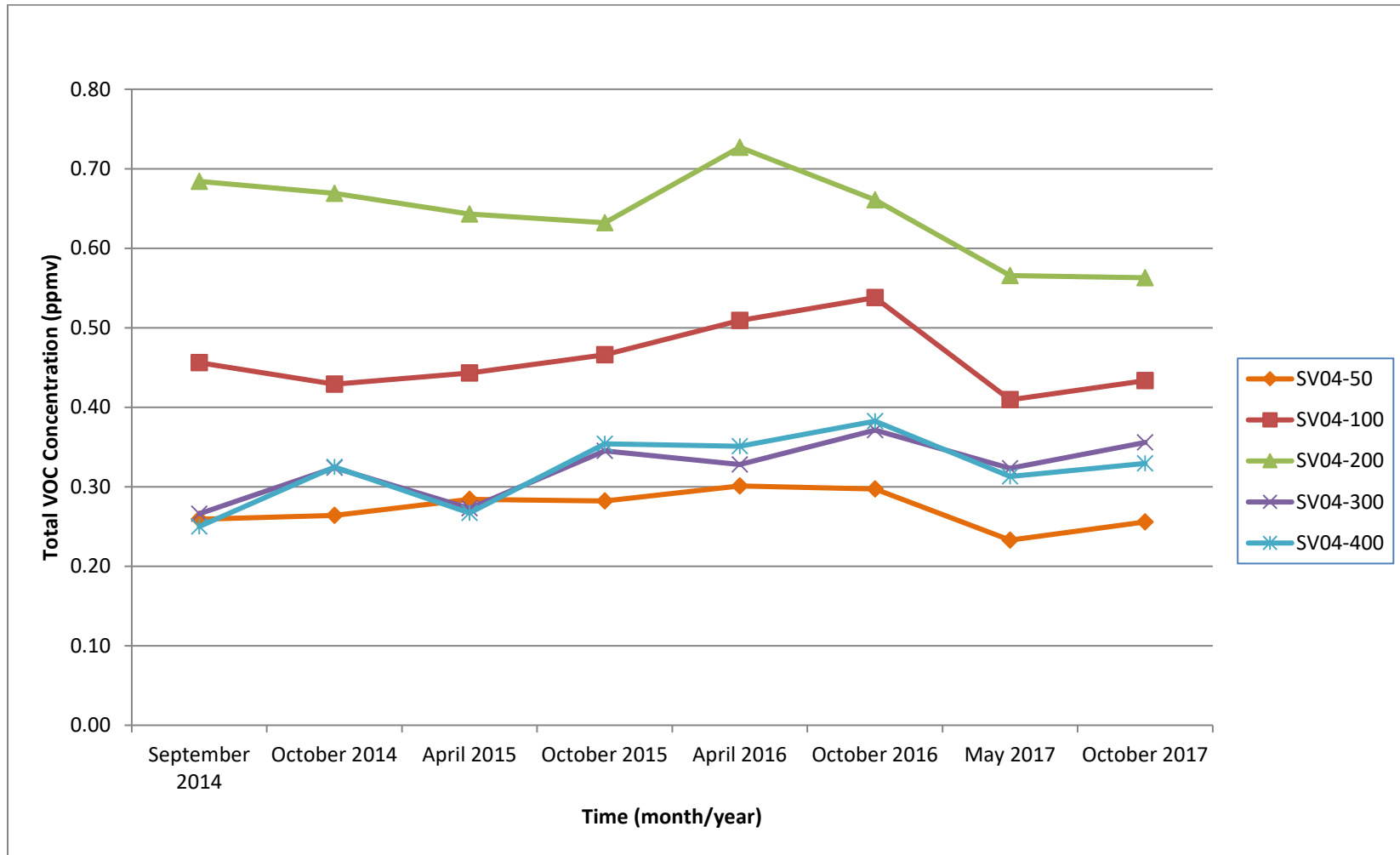


Figure 5-12
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

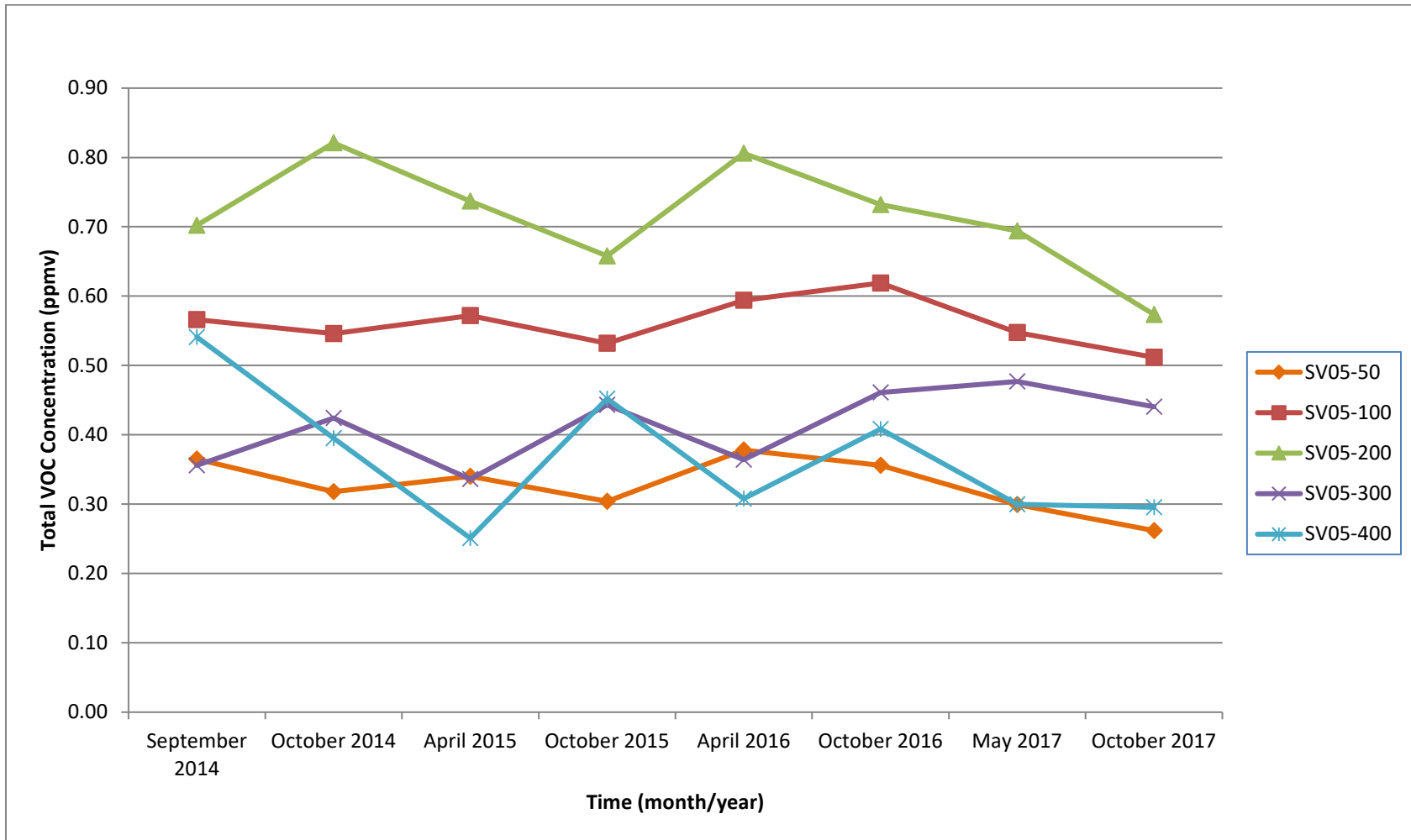


Figure 5-13
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

Table 5-1
Summary of Detected VOCs – May 2017

Table 5-2
Summary of Detected VOCs – October 2017

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Table 5-1
 Summary of Detected VOCs (EPA Method TO-15^a)
 Mixed Waste Landfill Soil-Vapor Monitoring
 May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV01-42.5 30-May-17	Acetone	0.0086	0.18	5.0	--	J+
	Benzene	0.00015	0.079	0.40	J	--
	Bromodichloromethane	0.00064	0.066	0.30	--	--
	Bromoform	0.0001	0.070	0.40	J	--
	2-Butanone	0.0031	0.20	0.80	--	--
	Carbon tetrachloride	0.00039	0.064	0.80	J	--
	Chloroform	0.017	0.095	0.30	--	--
	Dichlorodifluoromethane	0.078	2.0	5.4	--	--
	1,1-Dichloroethane	0.0029	0.072	0.30	--	--
	1,1-Dichloroethene	0.0076	0.13	0.80	--	--
	cis-1,2-Dichloroethene	0.0014	0.089	0.40	--	--
	Ethylbenzene	0.000085	0.063	0.40	J	--
	2-Hexanone	0.00033	0.087	0.40	J	--
	Methylene chloride	0.00053	0.072	0.40	--	--
	Tetrachloroethene	0.300	0.69	5.4	--	--
	Toluene	0.00023	0.051	0.40	J	0.4U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.064	2.2	5.4	--	--
	1,1,1-Trichloroethane	0.044	0.065	0.30	--	--
	1,1,2-Trichloroethane	0.00019	0.067	0.40	J	--
	1,2,4-Trimethylbenzene	0.00039	0.16	0.80	J	--
	Trichloroethene	0.071	1.4	5.4	--	--
	Trichlorofluoromethane	0.140	2.6	5.4	--	--
	m,p-Xylene	0.00022	0.10	0.80	J	--
o-Xylene	0.000098	0.054	0.40	J	--	
Total Organics ^d	0.740723	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
 May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV02-41.5 30-May-17	Acetone	0.013	0.95	27	J	27U
	2-Butanone	0.0074	1.1	4.3	--	--
	Chloroform	0.0031	0.51	1.6	--	--
	Dichlorodifluoromethane	0.100	0.77	2.1	--	--
	1,1-Dichloroethane	0.0026	0.38	1.6	--	--
	1,1-Dichloroethene	0.012	0.69	4.3	--	--
	cis-1,2-Dichloroethene	0.00084	0.47	2.1	J	--
	2-Hexanone	0.0005	0.46	2.1	J	--
	Tetrachloroethene	0.071	0.27	2.1	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.052	0.87	2.1	--	--
	1,1,1-Trichloroethane	0.080	0.35	1.6	--	--
	Trichloroethene	0.070	0.56	2.1	--	--
	Trichlorofluoromethane	0.230	2.1	4.3	--	--
	Total Organics ^d	0.62944	NA	NA	NA	NA
MWL-SV03-50 30-May-17	Acetone	0.0085	0.33	9.3	J	--
	Benzene	0.00044	0.15	0.74	J	0.74U
	2-Butanone	0.00063	0.37	1.5	J	--
	Carbon tetrachloride	0.00026	0.12	1.5	J	--
	Chloroform	0.0016	0.18	0.56	--	--
	Dichlorodifluoromethane	0.019	0.27	0.74	--	--
	1,1-Dichloroethane	0.0031	0.13	0.56	--	--
	1,1-Dichloroethene	0.012	0.24	1.5	--	--
	cis-1,2-Dichloroethene	0.0018	0.16	0.74	--	--
	Methylene chloride	0.00081	0.13	0.74	--	--
	Tetrachloroethene	0.100	0.094	0.74	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.072	0.30	0.74	--	--
	1,1,1-Trichloroethane	0.0039	0.12	0.56	--	--
	Trichloroethene	0.098	0.19	0.74	--	--
	Trichlorofluoromethane	0.027	0.36	0.74	--	--
Total Organics ^d	0.34860	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
May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-100 30-May-17	Acetone	0.0047	0.49	14	J	--
	Benzene	0.00022	0.22	1.1	J	1.1U
	2-Butanone	0.00066	0.55	2.2	J	--
	Carbon tetrachloride	0.0004	0.18	2.2	J	--
	Chloroform	0.0023	0.26	0.82	--	--
	Dichlorodifluoromethane	0.039	0.40	1.1	--	--
	1,1-Dichloroethane	0.0057	0.20	0.82	--	--
	1,1-Dichloroethene	0.023	0.35	2.2	--	--
	cis-1,2-Dichloroethene	0.0034	0.24	1.1	--	--
	Methylene chloride	0.0017	0.20	1.1	--	--
	Tetrachloroethene	0.160	0.14	1.1	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.120	0.45	1.1	--	--
	1,1,1-Trichloroethane	0.0048	0.18	0.82	--	--
	Trichloroethene	0.130	0.35	1.3	--	--
	Trichlorofluoromethane	0.038	0.54	1.1	--	--
Total Organics ^d	0.53366	NA	NA	NA	NA	
MWL-SV03-200 30-May-17	Acetone	0.0054	0.66	19	J	--
	Benzene	0.00029	0.29	1.5	J	1.5U
	Carbon tetrachloride	0.00053	0.24	3.0	J	--
	Chloroform	0.0025	0.35	1.1	--	--
	Dichlorodifluoromethane	0.051	0.54	1.5	--	--
	1,1-Dichloroethane	0.0079	0.27	1.1	--	--
	1,1-Dichloroethene	0.033	0.48	3.0	--	--
	cis-1,2-Dichloroethene	0.005	0.33	1.5	--	--
	Methylene chloride	0.0034	0.27	1.5	--	--
	Tetrachloroethene	0.210	0.19	1.5	--	--
	Toluene	0.00062	0.19	1.5	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.170	0.60	1.5	--	--
	1,1,1-Trichloroethane	0.0032	0.24	1.1	--	--
	Trichloroethene	0.240	0.66	2.5	--	--
	Trichlorofluoromethane	0.038	0.73	1.5	--	--
Total Organics ^d	0.77055	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
 May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-200 (Duplicate) 30-May-17	Acetone	0.0065	0.64	18	J	--
	Benzene	0.00029	0.29	1.4	J	1.4U
	Carbon tetrachloride	0.00051	0.23	2.9	J	--
	Chloroform	0.0025	0.34	1.1	--	--
	Dichlorodifluoromethane	0.055	0.52	1.4	--	--
	1,1-Dichloroethane	0.0079	0.26	1.1	--	--
	1,1-Dichloroethene	0.033	0.47	2.9	--	--
	cis-1,2-Dichloroethene	0.0052	0.32	1.4	--	--
	Methylene chloride	0.0034	0.26	1.4	--	--
	Tetrachloroethene	0.210	0.18	1.4	--	--
	Toluene	0.00044	0.18	1.4	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.170	0.59	1.4	--	--
	1,1,1-Trichloroethane	0.0031	0.24	1.1	--	--
	Trichloroethene	0.250	0.64	2.4	--	--
	Trichlorofluoromethane	0.038	0.71	1.4	--	--
	Total Organics ^d	0.78555	NA	NA	NA	NA
MWL-SV03-300 30-May-17	Acetone	0.0069	0.69	19	J	--
	Benzene	0.0004	0.31	1.6	J	1.6U
	Carbon tetrachloride	0.0004	0.25	3.1	J	--
	Chloroform	0.0015	0.37	1.2	--	--
	Dichlorodifluoromethane	0.027	0.56	1.6	--	--
	1,1-Dichloroethane	0.0037	0.28	1.2	--	--
	1,1-Dichloroethene	0.021	0.50	3.1	--	--
	cis-1,2-Dichloroethene	0.0028	0.35	1.6	--	--
	Methylene chloride	0.0017	0.28	1.6	--	--
	Tetrachloroethene	0.220	0.20	1.6	--	--
	Toluene	0.00038	0.20	1.6	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.110	0.63	1.6	--	--
	1,1,1-Trichloroethane	0.0014	0.25	1.2	--	--
	Trichloroethene	0.200	0.41	1.6	--	--
	Trichlorofluoromethane	0.016	0.76	1.6	--	--
	Total Organics ^d	0.61278	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
May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-400 30-May-17 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0029	0.81	23	J	--
	Benzene	0.00042	0.36	1.8	J	1.8U
	Chloroform	0.0012	0.43	1.4	J	
	Dichlorodifluoromethane	0.0046	0.66	1.8	--	--
	1,1-Dichloroethane	0.0046	0.33	1.4	--	--
	1,1-Dichloroethene	0.021	0.59	3.6	--	--
	cis-1,2-Dichloroethene	0.0023	0.40	1.8	--	--
	Methylene chloride	0.0015	0.33	1.8	J	--
	Tetrachloroethene	0.390	0.40	3.1	--	--
	Toluene	0.00084	0.23	1.8	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.028	0.74	1.8	--	--
	1,1,1-Trichloroethane	0.0018	0.30	1.4	--	--
	Trichloroethene	0.230	0.48	1.8	--	--
	Trichlorofluoromethane	0.0078	0.89	1.8	--	--
	Total Organics ^d	0.69654	NA	NA	NA	NA
MWL-SV03-400 (Duplicate) 30-May-17 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0029	1.1	30	J	--
	Carbon tetrachloride	0.00043	0.38	4.7	J	--
	Chloroform	0.0014	0.56	1.8	J	--
	Dichlorodifluoromethane	0.0054	0.86	2.4	--	--
	1,1-Dichloroethane	0.0048	0.43	1.8	--	--
	1,1-Dichloroethene	0.022	0.76	4.7	--	--
	cis-1,2-Dichloroethene	0.0024	0.53	2.4	--	--
	Methylene chloride	0.0017	0.43	2.4	J	--
	Tetrachloroethene	0.340	0.30	2.4	--	--
	Toluene	0.0011	0.30	2.4	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.029	0.97	2.4	--	--
	1,1,1-Trichloroethane	0.002	0.39	1.8	--	--
	Trichloroethene	0.250	0.62	2.4	--	--
	Total Organics ^d	0.66313	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
May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-50 30-May-17	Acetone	0.0038	0.18	5.0	J	--
	Benzene	0.00039	0.079	0.40	J	--
	2-Butanone	0.00059	0.20	0.80	J	--
	Carbon disulfide	0.0001	0.078	0.80	J	--
	Carbon tetrachloride	0.00023	0.064	0.80	J	--
	Chloroform	0.0019	0.095	0.30	--	--
	Dichlorodifluoromethane	0.013	0.15	0.40	--	--
	1,1-Dichloroethane	0.0014	0.072	0.30	--	--
	1,1-Dichloroethene	0.0068	0.13	0.80	--	--
	cis-1,2-Dichloroethene	0.00056	0.089	0.40	--	--
	Methylene chloride	0.00014	0.072	0.40	J	--
	Tetrachloroethene	0.052	0.051	0.40	--	--
	Toluene	0.000051	0.051	0.40	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.061	0.25	0.62	--	--
	1,1,1-Trichloroethane	0.0079	0.065	0.30	--	--
	Trichloroethene	0.054	0.11	0.40	--	--
	Trichlorofluoromethane	0.029	0.20	0.40	--	--
Total Organics ^d	0.232861	NA	NA	NA	NA	
MWL-SV04-100 30-May-17	Acetone	0.0032	0.27	7.7	J	--
	Benzene	0.00028	0.12	0.62	J	--
	2-Butanone	0.00045	0.31	1.2	J	--
	Carbon disulfide	0.0022	0.12	1.2	--	--
	Carbon tetrachloride	0.0004	0.099	1.2	J	--
	Chloroform	0.002	0.15	0.46	--	--
	Dichlorodifluoromethane	0.024	0.22	0.62	--	--
	1,1-Dichloroethane	0.0031	0.11	0.46	--	--
	1,1-Dichloroethene	0.016	0.20	1.2	--	--
	cis-1,2-Dichloroethene	0.0018	0.14	0.62	--	--
	Methylene chloride	0.00049	0.11	0.62	J	--
	Tetrachloroethene	0.089	0.079	0.62	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.100	0.46	1.1	--	--
	1,1,1-Trichloroethane	0.0064	0.10	0.46	--	--
	Trichloroethene	0.120	0.30	1.1	--	--
	Trichlorofluoromethane	0.040	0.30	0.62	--	--
	Total Organics ^d	0.40932	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
 May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-200 30-May-17	Carbon tetrachloride	0.00059	0.30	3.8	J	--
	Chloroform	0.0016	0.45	1.4	--	--
	Dichlorodifluoromethane	0.042	0.68	1.9	--	--
	1,1-Dichloroethane	0.0052	0.34	1.4	--	--
	1,1-Dichloroethene	0.031	0.61	3.8	--	--
	cis-1,2-Dichloroethene	0.003	0.42	1.9	--	--
	Methylene chloride	0.0017	0.34	1.9	J	--
	Tetrachloroethene	0.110	0.24	1.9	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.150	0.76	1.9	--	--
	1,1,1-Trichloroethane	0.0027	0.30	1.4	--	--
	Trichloroethene	0.180	0.49	1.9	--	--
	Trichlorofluoromethane	0.038	0.92	1.9	--	--
	Total Organics ^d	0.56579	NA	NA	NA	NA
MWL-SV04-300 30-May-17	Acetone	0.005	0.48	14	J	--
	Benzene	0.0003	0.21	1.1	J	--
	Carbon tetrachloride	0.00036	0.17	2.2	J	--
	Chloroform	0.00066	0.26	0.82	J	--
	Dichlorodifluoromethane	0.024	0.39	1.1	--	--
	1,1-Dichloroethane	0.0013	0.20	0.82	--	--
	1,1-Dichloroethene	0.015	0.35	2.2	--	--
	cis-1,2-Dichloroethene	0.00088	0.24	1.1	J	--
	Methylene chloride	0.00039	0.20	1.1	J	--
	Tetrachloroethene	0.095	0.14	1.1	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.076	0.44	1.1	--	--
	1,1,1-Trichloroethane	0.0013	0.18	0.82	--	--
	Trichloroethene	0.087	0.29	1.1	--	--
	Trichlorofluoromethane	0.016	0.53	1.1	--	--
	Total Organics ^d	0.32319	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
 May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-400 30-May-17	Acetone	0.011	0.49	14	J	--
	Benzene	0.0005	0.22	1.1	J	--
	2-Butanone	0.0014	0.55	2.2	J	--
	Carbon disulfide	0.002	0.22	2.2	J	--
	Carbon tetrachloride	0.00023	0.18	2.2	J	--
	Chloroform	0.00067	0.26	0.83	J	--
	Dichlorodifluoromethane	0.017	0.40	1.1	--	--
	1,1-Dichloroethane	0.0013	0.20	0.83	--	--
	1,1-Dichloroethene	0.011	0.36	2.2	--	--
	cis-1,2-Dichloroethene	0.00081	0.25	1.1	J	--
	Methylene chloride	0.00044	0.20	1.1	J	--
	Tetrachloroethene	0.100	0.14	1.1	--	--
	Toluene	0.00017	0.14	1.1	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.066	0.45	1.1	--	--
	1,1,1-Trichloroethane	0.0013	0.18	0.83	--	--
	Trichloroethene	0.085	0.29	1.1	--	--
	Trichlorofluoromethane	0.014	0.54	1.1	--	--
	Total Organics ^d	0.31282	NA	NA	NA	NA
MWL-SV05-50 30-May-17	Acetone	0.0028	0.18	5.0	J	5.0U
	Benzene	0.00018	0.079	0.40	J	--
	2-Butanone	0.00048	0.20	0.80	J	--
	Carbon disulfide	0.00088	0.078	0.80	--	--
	Carbon tetrachloride	0.00033	0.064	0.80	J	--
	Chloroform	0.0013	0.095	0.30	--	--
	Dichlorodifluoromethane	0.023	0.15	0.40	--	--
	1,1-Dichloroethane	0.0017	0.072	0.30	--	--
	1,1-Dichloroethene	0.010	0.13	0.80	--	--
	cis-1,2-Dichloroethene	0.00064	0.089	0.40	--	--
	Methylene chloride	0.00025	0.072	0.40	J	0.4U
	Tetrachloroethene	0.044	0.051	0.40	--	--
	Toluene	0.000085	0.051	0.40	J	0.4U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.044	0.16	0.40	--	--
	1,1,1-Trichloroethane	0.014	0.065	0.30	--	--
	Trichloroethene	0.049	0.11	0.40	--	--
	Trichlorofluoromethane	0.110	0.70	1.4	--	--
	Total Organics ^d	0.29951	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
 May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-100 30-May-17	Acetone	0.0027	0.42	12	J	12U
	Benzene	0.00022	0.18	0.94	J	--
	Carbon tetrachloride	0.00058	0.15	1.9	J	--
	Chloroform	0.0021	0.22	0.70	--	--
	Dichlorodifluoromethane	0.057	0.34	0.94	--	--
	1,1-Dichloroethane	0.0036	0.17	0.70	--	--
	1,1-Dichloroethene	0.023	0.30	1.9	--	--
	cis-1,2-Dichloroethene	0.0016	0.21	0.94	--	--
	Tetrachloroethene	0.089	0.12	0.94	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.091	0.38	0.94	--	--
	1,1,1-Trichloroethane	0.014	0.15	0.70	--	--
	Trichloroethene	0.110	0.25	0.94	--	--
	Trichlorofluoromethane	0.150	0.96	2.0	--	--
	Vinyl acetate	0.0055	0.34	1.9	--	J
Total Organics ^d	0.54760	NA	NA	NA	NA	
MWL-SV05-200 30-May-17	Acetone	0.0033	0.88	25	J	25U
	Carbon disulfide	0.001	0.38	3.9	J	3.9U
	Carbon tetrachloride	0.0011	0.31	3.9	J	--
	Chloroform	0.0022	0.47	1.5	--	--
	Chloromethane	0.0012	0.97	3.9	J	--
	Dichlorodifluoromethane	0.066	0.71	2.0	--	--
	1,1-Dichloroethane	0.0055	0.35	1.5	--	--
	1,1-Dichloroethene	0.042	0.63	3.9	--	--
	cis-1,2-Dichloroethene	0.0028	0.44	2.0	--	--
	Methylene chloride	0.0029	0.35	2.0	--	--
	Tetrachloroethene	0.140	0.25	2.0	--	--
	Toluene	0.00028	0.25	2.0	J	2.0U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.150	0.80	2.0	--	--
	1,1,1-Trichloroethane	0.004	0.32	1.5	--	--
	Trichloroethene	0.190	0.52	2.0	--	--
	Trichlorofluoromethane	0.085	0.96	2.0	--	--
	Vinyl acetate	0.0014	0.71	3.9	J	--
Total Organics ^d	0.69410	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
 May 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-300 30-May-17	Acetone	0.0055	0.54	15	J	15U
	Benzene	0.00025	0.24	1.2	J	--
	Carbon tetrachloride	0.001	0.19	2.4	J	--
	Chloroform	0.001	0.29	0.91	--	--
	Dichlorodifluoromethane	0.040	0.44	1.2	--	--
	1,1-Dichloroethane	0.0025	0.22	0.91	--	--
	1,1-Dichloroethene	0.031	0.39	2.4	--	--
	cis-1,2-Dichloroethene	0.0012	0.27	1.2	--	--
	Methylene chloride	0.0012	0.22	1.2	--	--
	Tetrachloroethene	0.110	0.15	1.2	--	--
	Toluene	0.00019	0.15	1.2	J	1.2U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.130	0.49	1.2	--	--
	1,1,1-Trichloroethane	0.0018	0.20	0.91	--	--
	Trichloroethene	0.120	0.32	1.2	--	--
	Trichlorofluoromethane	0.037	0.59	1.2	--	--
Total Organics ^d	0.47695	NA	NA	NA	NA	
MWL-SV05-400 30-May-17	Acetone	0.0064	0.41	12	J	12U
	Benzene	0.00034	0.18	0.93	J	--
	2-Butanone	0.00074	0.46	1.9	J	--
	Carbon disulfide	0.014	0.18	1.9	--	--
	Carbon tetrachloride	0.00061	0.15	1.9	J	--
	Chloroform	0.00075	0.22	0.70	--	--
	Dichlorodifluoromethane	0.0094	0.34	0.93	--	--
	1,1-Dichloroethane	0.0018	0.17	0.70	--	--
	1,1-Dichloroethene	0.022	0.30	1.9	--	--
	cis-1,2-Dichloroethene	0.00078	0.21	0.93	J	--
	Methylene chloride	0.00085	0.17	0.93	J	0.93U
	Tetrachloroethene	0.100	0.12	0.93	--	--
	Toluene	0.0016	0.12	0.93	--	J+
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.036	0.38	0.93	--	--
	1,1,1-Trichloroethane	0.0016	0.15	0.70	--	--
	Trichloroethene	0.087	0.24	0.93	--	--
	Trichlorofluoromethane	0.023	0.45	0.93	--	--
	Total Organics ^d	0.29962	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
May 2017

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 are reported in ppmv. MDL and RL are reported in ppbv.

^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

J = The associated value is an estimated quantity.

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 ppbv, in accordance with the data validation process.

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

EPA = U.S. Environmental Protection Agency.

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.

ppbv = Parts per billion, by volume basis.

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.

Table 5-2
 Summary of Detected VOCs (EPA Method TO-15^a)
 Mixed Waste Landfill Soil-Vapor Monitoring
 October 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV01-42.5 26-Oct-17	Acetone	0.0047	1.8	51	J	--
	Chloroform	0.014	0.97	3.1	--	--
	Dichlorodifluoromethane	0.084	1.5	4.1	--	--
	1,1-Dichloroethane	0.0024	0.73	3.1	J	--
	1,1-Dichloroethene	0.0065	1.3	8.2	J	--
	cis-1,2-Dichloroethene	0.0012	0.91	4.1	J	--
	Methylene chloride	0.00081	0.73	4.1	J	4.1U
	Tetrachloroethene	0.340	0.52	4.1	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.067	1.7	4.1	--	--
	1,1,1-Trichloroethane	0.034	0.66	3.1	--	--
	Trichloroethene	0.074	1.1	4.1	--	--
	Trichlorofluoromethane	0.160	2.0	4.1	--	--
	Total Organics ^d	0.78780	NA	NA	NA	NA
	MWL-SV01-42.5 (Duplicate) 26-Oct-17	Acetone	0.0051	1.8	51	J
Chloroform		0.014	0.97	3.1	--	--
Dichlorodifluoromethane		0.084	1.5	4.1	--	--
1,1-Dichloroethane		0.0023	0.73	3.1	J	--
1,1-Dichloroethene		0.0066	1.3	8.2	J	--
cis-1,2-Dichloroethene		0.0011	0.91	4.1	J	--
Tetrachloroethene		0.420	0.52	4.1	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane		0.072	1.7	4.1	--	--
1,1,1-Trichloroethane		0.037	0.66	3.1	--	--
Trichloroethene		0.086	1.1	4.1	--	--
Trichlorofluoromethane		0.170	2.0	4.1	--	--
Total Organics ^d		0.89810	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV02-41.5 26-Oct-17	Acetone	0.0073	1.4	38	J	38U
	2-Butanone	0.0035	1.5	6.1	J	--
	Chloroform	0.0028	0.73	2.3	--	--
	Dichlorodifluoromethane	0.080	1.1	3.1	--	--
	1,1-Dichloroethane	0.0023	0.55	2.3	--	--
	1,1-Dichloroethene	0.011	0.99	6.1	--	--
	Tetrachloroethene	0.069	0.39	3.1	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.049	1.2	3.1	--	--
	1,1,1-Trichloroethane	0.072	0.50	2.3	--	--
	Trichloroethene	0.065	0.80	3.1	--	--
	Trichlorofluoromethane	0.300	1.5	3.1	--	--
	Total Organics ^d	0.65460	NA	NA	NA	NA
	MWL-SV02-41.5 (Duplicate) 26-Oct-17	Acetone	0.0059	1.3	37	J
Chloroform		0.0029	0.70	2.2	--	--
Dichlorodifluoromethane		0.078	1.1	2.9	--	--
1,1-Dichloroethane		0.0024	0.53	2.2	--	--
1,1-Dichloroethene		0.011	0.95	5.9	--	--
Ethylbenzene		0.00054	0.46	2.9	J	--
Tetrachloroethene		0.072	0.37	2.9	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane		0.050	1.2	2.9	--	--
1,1,1-Trichloroethane		0.074	0.48	2.2	--	--
Trichloroethene		0.067	0.77	2.9	--	--
Trichlorofluoromethane		0.310	1.4	2.9	--	--
1,2,4-Trimethylbenzene		0.0031	1.2	5.9	J	--
1,3,5-Trimethylbenzene		0.0014	0.92	2.9	J	--
m,p-Xylene		0.0025	0.73	5.9	J	--
o-Xylene		0.0011	0.40	2.9	J	--
Total Organics ^d	0.67594	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-50 26-Oct-17	Acetone	0.0012	0.72	20	J	20U
	Benzene	0.00056	0.32	1.6	J	1.6U
	Chloroform	0.0018	0.38	1.2	--	--
	Dichlorodifluoromethane	0.024	0.59	1.6	--	--
	1,1-Dichloroethane	0.0037	0.29	1.2	--	--
	1,1-Dichloroethene	0.014	0.52	3.2	--	--
	cis-1,2-Dichloroethene	0.0018	0.36	1.6	--	--
	Methylene chloride	0.0011	0.29	1.6	J	--
	Tetrachloroethene	0.140	0.21	1.6	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.086	0.66	1.6	--	--
	1,1,1-Trichloroethane	0.0041	0.26	1.2	--	--
	Trichloroethene	0.120	0.43	1.6	--	--
	Trichlorofluoromethane	0.032	0.79	1.6	--	--
	m,p-Xylene	0.00068	0.41	3.2	J	--
Total Organics ^d	0.42918	NA	NA	NA	NA	
MWL-SV03-100 26-Oct-17	Acetone	0.0033	0.72	20	J	20U
	Carbon tetrachloride	0.00031	0.26	3.3	J	--
	Chloroform	0.0023	0.39	1.2	--	--
	Chloromethane	0.00083	0.80	3.3	J	3.3U
	Dichlorodifluoromethane	0.031	0.59	1.6	--	--
	1,1-Dichloroethane	0.0057	0.29	1.2	--	--
	1,1-Dichloroethene	0.022	0.53	3.3	--	--
	cis-1,2-Dichloroethene	0.0033	0.36	1.6	--	--
	Methylene chloride	0.0018	0.29	1.6	--	--
	Tetrachloroethene	0.220	0.21	1.6	--	--
	Toluene	0.00037	0.21	1.6	J	1.6U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.120	0.66	1.6	--	--
	1,1,1-Trichloroethane	0.0044	0.26	1.2	--	--
	Trichloroethene	0.180	0.43	1.6	--	--
Trichlorofluoromethane	0.038	0.80	1.6	--	--	
Total Organics ^d	0.62881	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-200 26-Oct-17	Acetone	0.0022	1.4	38	J	38U
	Chloroform	0.0023	0.72	2.3	--	--
	Dichlorodifluoromethane	0.050	1.1	3.0	--	--
	1,1-Dichloroethane	0.0074	0.55	2.3	--	--
	1,1-Dichloroethene	0.030	0.98	6.1	--	--
	cis-1,2-Dichloroethene	0.0041	0.68	3.0	--	--
	Methylene chloride	0.0034	0.55	3.0	--	--
	Tetrachloroethene	0.260	0.39	3.0	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.160	1.2	3.0	--	--
	1,1,1-Trichloroethane	0.0027	0.49	2.3	--	--
	Trichloroethene	0.230	0.80	3.0	--	--
	Trichlorofluoromethane	0.036	1.5	3.0	--	--
	Total Organics ^d	0.78590	NA	NA	NA	NA
MWL-SV03-300 26-Oct-17	Acetone	0.0052	1.3	37	J	37U
	Chloroform	0.0014	0.70	2.2	J	--
	Chloromethane	0.0015	1.4	5.9	J	5.9U
	Dichlorodifluoromethane	0.039	1.1	2.9	--	--
	1,1-Dichloroethane	0.0034	0.53	2.2	--	--
	1,1-Dichloroethene	0.022	0.94	5.9	--	--
	Methylene chloride	0.0015	0.53	2.9	J	--
	Tetrachloroethene	0.280	0.37	2.9	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.140	1.2	2.9	--	--
	1,1,1-Trichloroethane	0.0011	0.48	2.2	J	--
	Trichloroethene	0.210	0.77	2.9	--	--
	Trichlorofluoromethane	0.018	1.4	2.9	--	--
	Total Organics ^d	0.71640	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-400 26-Oct-17	Acetone	0.012	1.9	55	J	55U
	Chloroform	0.0015	1.0	3.3	J	--
	Dichlorodifluoromethane	0.013	1.6	4.4	--	--
	1,1-Dichloroethane	0.0035	0.79	3.3	--	--
	1,1-Dichloroethene	0.015	1.4	8.8	--	--
	cis-1,2-Dichloroethene	0.0031	0.97	4.4	J	--
	Methylene chloride	0.0022	0.79	4.4	J	--
	Tetrachloroethene	0.310	0.56	4.4	--	--
	Toluene	0.0039	0.56	4.4	J	4.4U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.042	1.8	4.4	--	--
	1,1,1-Trichloroethane	0.0013	0.71	3.3	J	--
	Trichloroethene	0.230	1.1	4.4	--	--
	Trichlorofluoromethane	0.0077	2.1	4.4	--	--
	Total Organics ^d	0.62930	NA	NA	NA	NA
	MWL-SV04-50 26-Oct-17	Acetone	0.0024	0.36	10	J
Benzene		0.00049	0.16	0.80	J	0.80U
Carbon tetrachloride		0.00021	0.13	1.6	J	--
Chloroform		0.0019	0.19	0.60	--	--
Dichlorodifluoromethane		0.017	0.29	0.80	--	--
1,1-Dichloroethane		0.0016	0.14	0.60	--	--
1,1-Dichloroethene		0.0078	0.26	1.6	--	--
cis-1,2-Dichloroethene		0.00072	0.18	0.80	J	--
Methylene chloride		0.00022	0.14	0.80	J	0.80U
Tetrachloroethene		0.063	0.10	0.80	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane		0.067	0.33	0.80	--	--
1,1,1-Trichloroethane		0.0071	0.13	0.60	--	--
Trichloroethene		0.058	0.21	0.80	--	--
Trichlorofluoromethane		0.029	0.39	0.80	--	--
Total Organics ^d		0.25573	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-100 26-Oct-17	Acetone	0.0038	0.80	22	J	--
	Benzene	0.00044	0.35	1.8	J	1.8U
	Carbon disulfide	0.0012	0.35	3.6	J	--
	Chloroform	0.0019	0.43	1.3	--	--
	Dichlorodifluoromethane	0.032	0.65	1.8	--	--
	1,1-Dichloroethane	0.0033	0.32	1.3	--	--
	1,1-Dichloroethene	0.017	0.58	3.6	--	--
	cis-1,2-Dichloroethene	0.002	0.40	1.8	--	--
	Methylene chloride	0.00076	0.32	1.8	J	1.8U
	Tetrachloroethene	0.110	0.23	1.8	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.100	0.73	1.8	--	--
	1,1,1-Trichloroethane	0.0052	0.29	1.3	--	--
	Trichloroethene	0.120	0.47	1.8	--	--
	Trichlorofluoromethane	0.037	0.88	1.8	--	--
Total Organics ^d	0.43340	NA	NA	NA	NA	
MWL-SV04-200 26-Oct-17	Acetone	0.0052	0.98	28	J	--
	Carbon tetrachloride	0.00047	0.35	4.4	J	--
	Chloroform	0.0015	0.52	1.7	J	--
	Dichlorodifluoromethane	0.041	0.80	2.2	--	--
	1,1-Dichloroethane	0.0052	0.40	1.7	--	--
	1,1-Dichloroethene	0.030	0.71	4.4	--	--
	cis-1,2-Dichloroethene	0.0031	0.49	2.2	--	--
	Methylene chloride	0.0016	0.40	2.2	J	2.2U
	Tetrachloroethene	0.130	0.28	2.2	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.140	0.90	2.2	--	--
	1,1,1-Trichloroethane	0.0024	0.36	1.7	--	--
	Trichloroethene	0.170	0.58	2.2	--	--
	Trichlorofluoromethane	0.034	1.1	2.2	--	--
	Total Organics ^d	0.56287	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-300 26-Oct-17	Acetone	0.0042	0.53	15	J	--
	Benzene	0.00037	0.24	1.2	J	1.2U
	Carbon disulfide	0.00051	0.23	2.4	J	--
	Carbon tetrachloride	0.00029	0.19	2.4	J	--
	Chloroform	0.00064	0.29	0.90	J	--
	Dichlorodifluoromethane	0.018	0.44	1.2	--	--
	1,1-Dichloroethane	0.0016	0.22	0.90	--	--
	1,1-Dichloroethene	0.016	0.39	2.4	--	--
	cis-1,2-Dichloroethene	0.00088	0.27	1.2	J	--
	Methylene chloride	0.00045	0.22	1.2	J	1.2U
	Tetrachloroethene	0.120	0.15	1.2	--	--
	Toluene	0.0002	0.15	1.2	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.082	0.49	1.2	--	--
	1,1,1-Trichloroethane	0.0013	0.20	0.90	--	--
	Trichloroethene	0.094	0.32	1.2	--	--
Trichlorofluoromethane	0.016	0.59	1.2	--	--	
Total Organics ^d	0.35562	NA	NA	NA	NA	
MWL-SV04-400 26-Oct-17 Trigger Levels Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0059	0.53	15	J	--
	Benzene	0.00067	0.24	1.2	J	1.2U
	2-Butanone	0.00085	0.60	2.4	J	--
	Carbon disulfide	0.0042	0.23	2.4	--	--
	Carbon tetrachloride	0.0002	0.19	2.4	J	--
	Chloroform	0.00062	0.29	0.90	J	--
	Dichlorodifluoromethane	0.019	0.44	1.2	--	--
	1,1-Dichloroethane	0.0013	0.22	0.90	--	--
	1,1-Dichloroethene	0.012	0.39	2.4	--	--
	cis-1,2-Dichloroethene	0.00083	0.27	1.2	J	--
	Methylene chloride	0.00041	0.22	1.2	J	1.2U
	Tetrachloroethene	0.110	0.15	1.2	--	--
	Toluene	0.00022	0.15	1.2	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.076	0.49	1.2	--	--
	1,1,1-Trichloroethane	0.0012	0.20	0.90	--	--
	Trichloroethene	0.081	0.32	1.2	--	--
	Trichlorofluoromethane	0.016	0.59	1.2	--	--
Total Organics ^d	0.32932	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-50 26-Oct-17	Acetone	0.0026	0.62	18	J	18U
	Carbon disulfide	0.0011	0.27	2.8	J	--
	Carbon tetrachloride	0.00026	0.22	2.8	J	--
	Chloroform	0.0011	0.33	1.1	--	--
	Dichlorodifluoromethane	0.036	0.51	1.4	--	--
	1,1-Dichloroethane	0.0016	0.25	1.1	--	--
	1,1-Dichloroethene	0.0097	0.45	2.8	--	--
	cis-1,2-Dichloroethene	0.00066	0.31	1.4	J	--
	Methylene chloride	0.00047	0.25	1.4	J	--
	Tetrachloroethene	0.021	0.18	1.4	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.040	0.57	1.4	--	--
	1,1,1-Trichloroethane	0.012	0.23	1.1	--	--
	Trichloroethene	0.042	0.37	1.4	--	--
	Trichlorofluoromethane	0.096	0.69	1.4	--	--
	Total Organics ^d	0.26189	NA	NA	NA	NA
MWL-SV05-100 26-Oct-17	Acetone	0.0029	0.80	23	J	23U
	Carbon tetrachloride	0.00052	0.29	3.6	J	--
	Chloroform	0.0021	0.43	1.4	--	--
	Dichlorodifluoromethane	0.067	0.66	1.8	--	--
	1,1-Dichloroethane	0.0034	0.33	1.4	--	--
	1,1-Dichloroethene	0.023	0.58	3.6	--	--
	cis-1,2-Dichloroethene	0.0016	0.40	1.8	J	--
	Methylene chloride	0.0011	0.33	1.8	J	--
	Tetrachloroethene	0.070	0.23	1.8	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.090	0.74	1.8	--	--
	1,1,1-Trichloroethane	0.013	0.29	1.4	--	--
	Trichloroethene	0.100	0.47	1.8	--	--
	Trichlorofluoromethane	0.140	0.89	1.8	--	--
	Total Organics ^d	0.51172	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-200 26-Oct-17	Acetone	0.0051	0.81	23	J	23U
	Carbon disulfide	0.00062	0.35	3.6	J	--
	Carbon tetrachloride	0.00087	0.29	3.6	J	--
	Chloroform	0.0019	0.43	1.4	--	--
	Dichlorodifluoromethane	0.051	0.66	1.8	--	--
	1,1-Dichloroethane	0.0048	0.33	1.4	--	--
	1,1-Dichloroethene	0.037	0.59	3.6	--	--
	cis-1,2-Dichloroethene	0.0022	0.40	1.8	--	--
	Methylene chloride	0.0025	0.33	1.8	--	--
	Tetrachloroethene	0.100	0.23	1.8	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.140	0.74	1.8	--	--
	1,1,1-Trichloroethane	0.0036	0.30	1.4	--	--
	Trichloroethene	0.150	0.48	1.8	--	--
	Trichlorofluoromethane	0.079	0.89	1.8	--	--
Total Organics ^d	0.57349	NA	NA	NA	NA	
MWL-SV05-300 26-Oct-17	Acetone	0.014	0.71	20	J	20U
	Benzene	0.00038	0.32	1.6	J	1.6U
	2-Butanone	0.0012	0.80	3.2	J	--
	Carbon disulfide	0.0018	0.31	3.2	J	--
	Chloroform	0.0014	0.38	1.2	--	--
	Chloromethane	0.0011	0.79	3.2	J	--
	Dichlorodifluoromethane	0.032	0.58	1.6	--	--
	1,1-Dichloroethane	0.0024	0.29	1.2	--	--
	1,1-Dichloroethene	0.028	0.52	3.2	--	--
	cis-1,2-Dichloroethene	0.0012	0.36	1.6	J	--
	Methylene chloride	0.0014	0.29	1.6	J	--
	Tetrachloroethene	0.091	0.20	1.6	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.120	0.65	1.6	--	--
	1,1,1-Trichloroethane	0.002	0.26	1.2	--	--
Trichloroethene	0.120	0.42	1.6	--	--	
Trichlorofluoromethane	0.037	0.79	1.6	--	--	
Total Organics ^d	0.44050	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 2017

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppbv)	RL ^b (ppbv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-400 26-Oct-17	Acetone	0.0069	0.63	18	J	18U
	Benzene	0.00033	0.28	1.4	J	1.4U
	Carbon tetrachloride	0.00061	0.23	2.8	J	--
	Chloroform	0.00092	0.33	1.1	J	--
	Dichlorodifluoromethane	0.015	0.51	1.4	--	--
	1,1-Dichloroethane	0.0024	0.25	1.1	--	--
	1,1-Dichloroethene	0.018	0.45	2.8	--	--
	cis-1,2-Dichloroethene	0.00097	0.31	1.4	J	--
	Methylene chloride	0.0012	0.25	1.4	J	--
	Tetrachloroethene	0.092	0.18	1.4	--	--
	Toluene	0.00063	0.18	1.4	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.038	0.57	1.4	--	--
	1,1,1-Trichloroethane	0.0027	0.23	1.1	--	--
	Trichloroethene	0.097	0.37	1.4	--	--
	Trichlorofluoromethane	0.026	0.69	1.4	--	--
	Total Organics ^d	0.29543	NA	NA	NA	NA

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 are reported in ppmv. MDL and RL are reported in ppbv.

^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 ppbv, in accordance with the data validation process.

^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.

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.

ppbv = Parts per billion, by volume basis.

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.

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6.0 SOIL-MOISTURE MONITORING RESULTS

This chapter presents soil-moisture monitoring activities (i.e., data collection and evaluation) in accordance with LTMMP Sections 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 LTMMP 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, 2017 through March 31, 2018 reporting period fulfilling the LTMMP annual monitoring requirement. The monitoring event was conducted on April 17, 2017. 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 LTMMP 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.

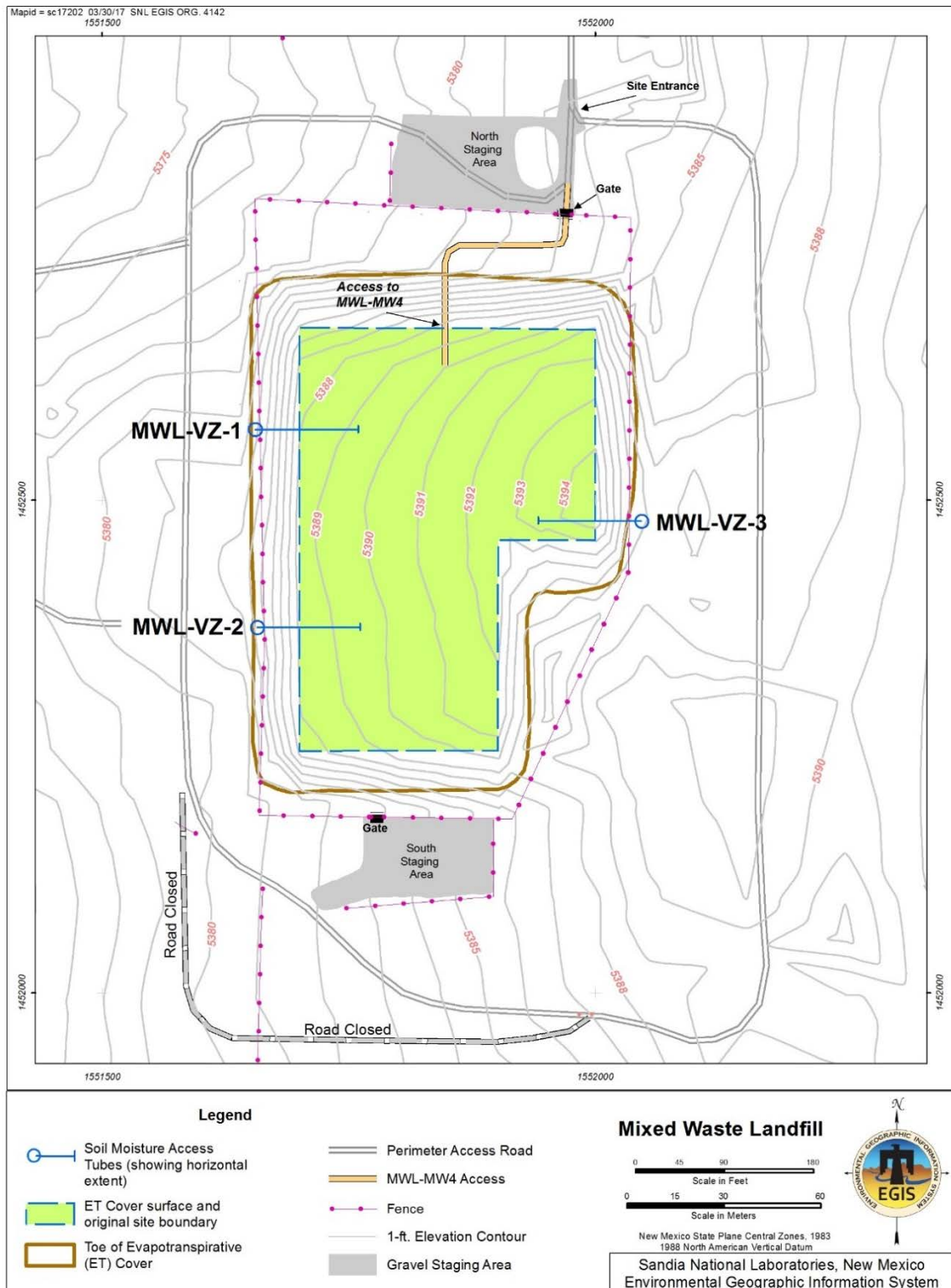


Figure 6-1
 Mixed Waste Landfill Soil-Moisture Monitoring Locations

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 April 17, 2017 annual monitoring event are plotted on these figures along with the baseline soil-moisture content and the trigger level for comparison. Results track very closely with the established soil-moisture baseline for the three access tubes. Soil moisture content by volume is generally consistent with depth, with some slight increases above 5 percent at depths below 80 ft bgs. The April data are consistent with the baseline data and indicate a dry vadose zone.

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 5.2 percent, compared to 1.7 to 5.6 percent baseline. At MWL-VZ-2 the soil-moisture content ranged from 2.0 to 4.6 percent, compared to 2.1 to 5.5 percent baseline. At MWL-VZ-3 the soil-moisture content ranged from 1.3 to 4.1 percent, compared to 1.8 to 4.5 percent baseline.

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

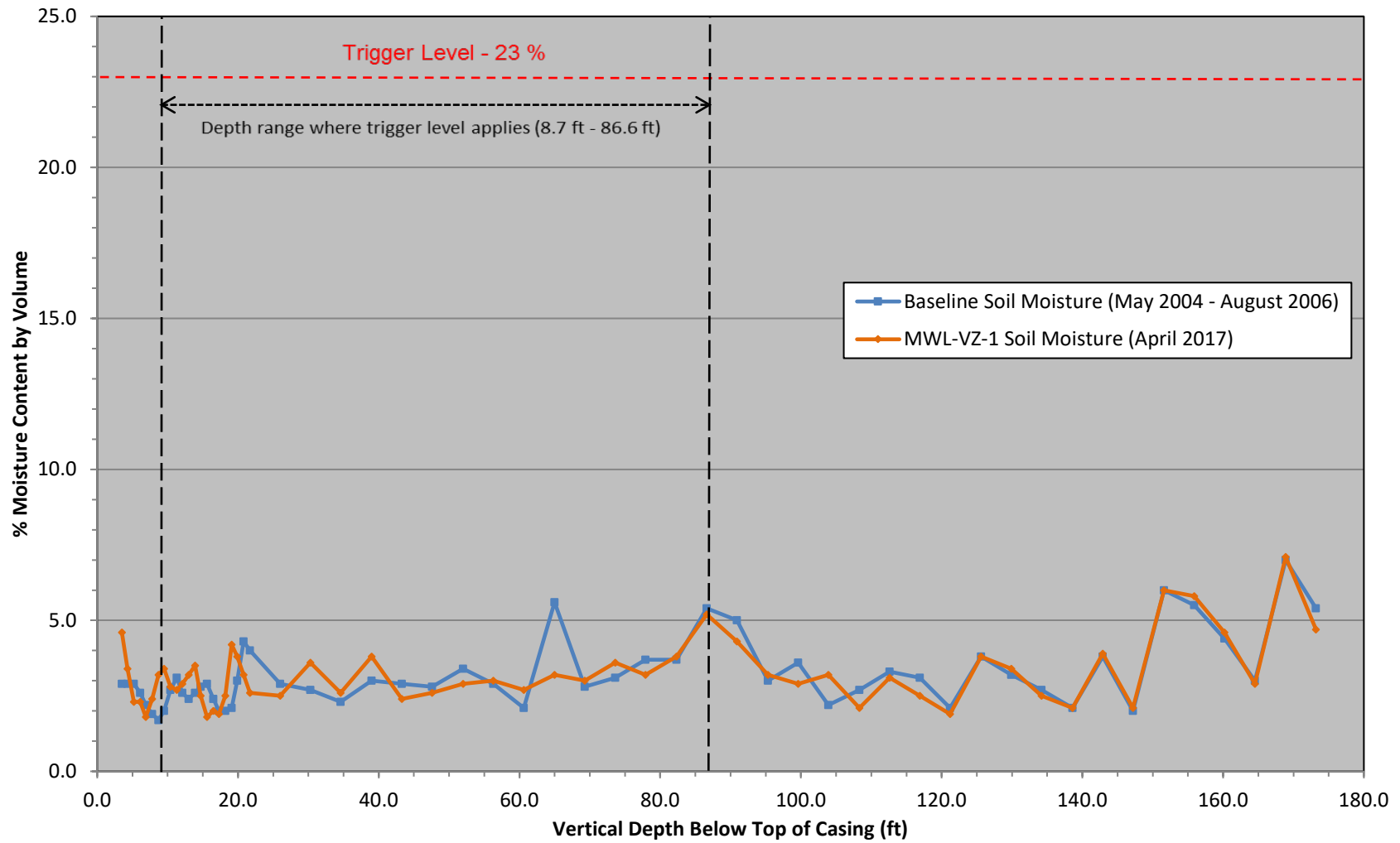


Figure 6-2
Mixed Waste Landfill MWL-VZ-1 Soil-Moisture Monitoring Results

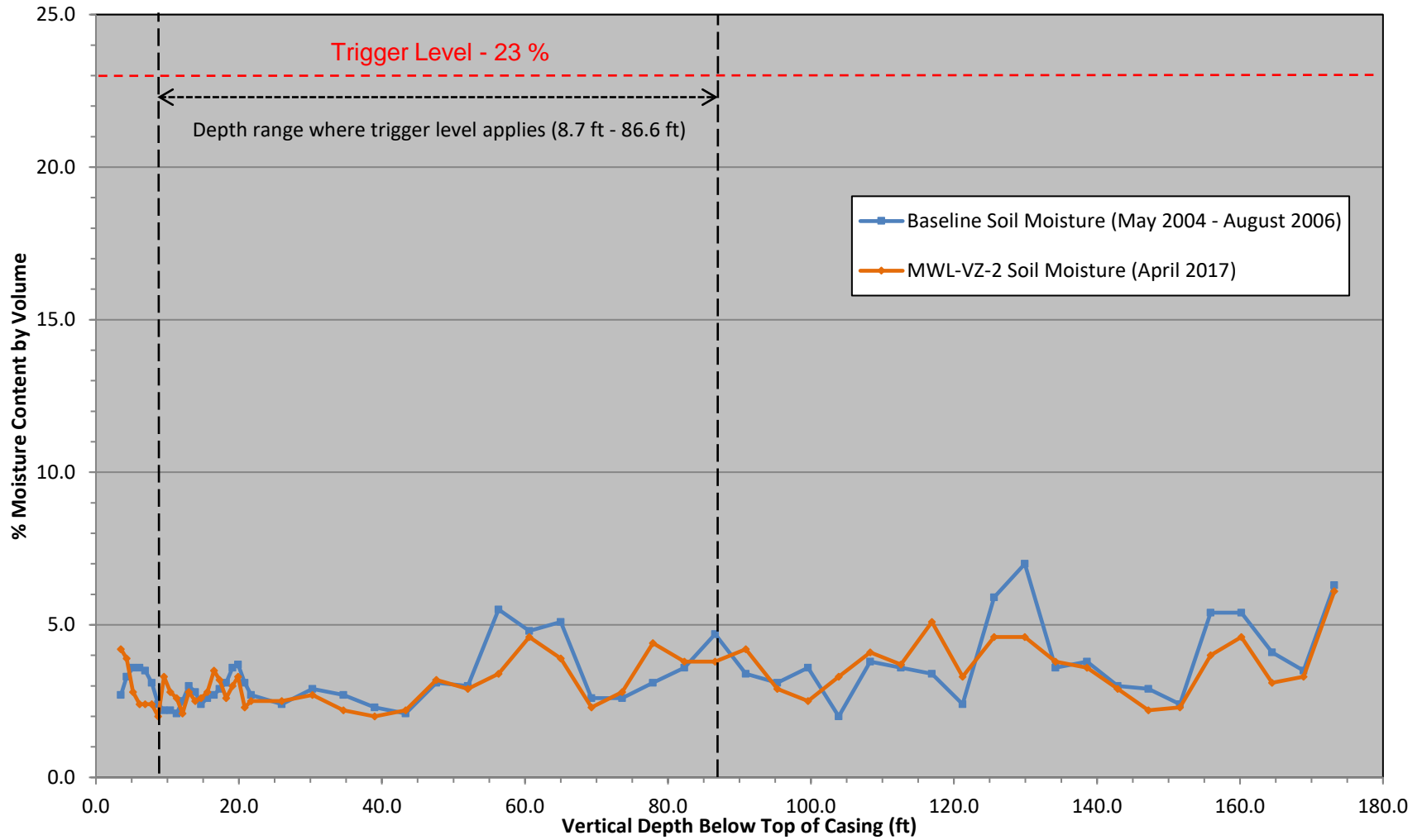


Figure 6-3
Mixed Waste Landfill MWL-VZ-2 Soil-Moisture Monitoring Results

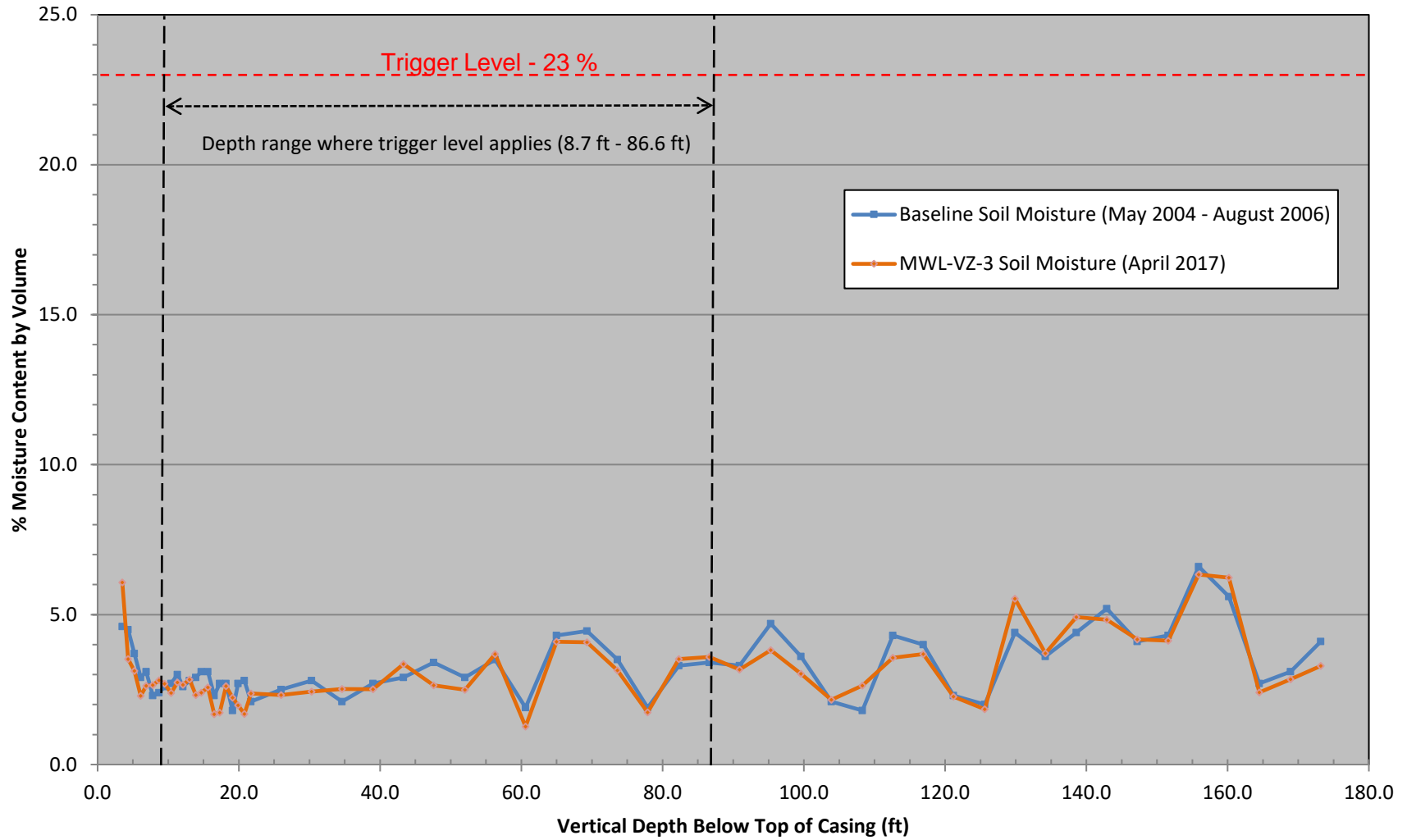


Figure 6-4
Mixed Waste Landfill MWL-VZ-3 Soil-Moisture Monitoring Results

7.0 GROUNDWATER MONITORING RESULTS

This chapter presents groundwater monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with LTMMP Sections 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 MWL 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, 2017 through March 31, 2018 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 May 2 and 8, 2017. An environmental-duplicate sample pair was collected from MWL-MW9.

The second sampling event was conducted between October 17 and 24, 2017. An environmental-duplicate sample pair was collected from MWL-MW8.

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 for a portable piston pump is one saturated screen volume. Purging continued beyond the minimum purge volume until four stable field measurements for temperature, specific conductivity (SC), potential of hydrogen (pH), and turbidity were obtained. Field measurements for water quality parameters were collected using a YSI™ Model EXO1 Water Quality Meter and a HACH™ Model 2100Q portable turbidity meter. Additional water quality measurements included oxidation-reduction potential and dissolved oxygen.

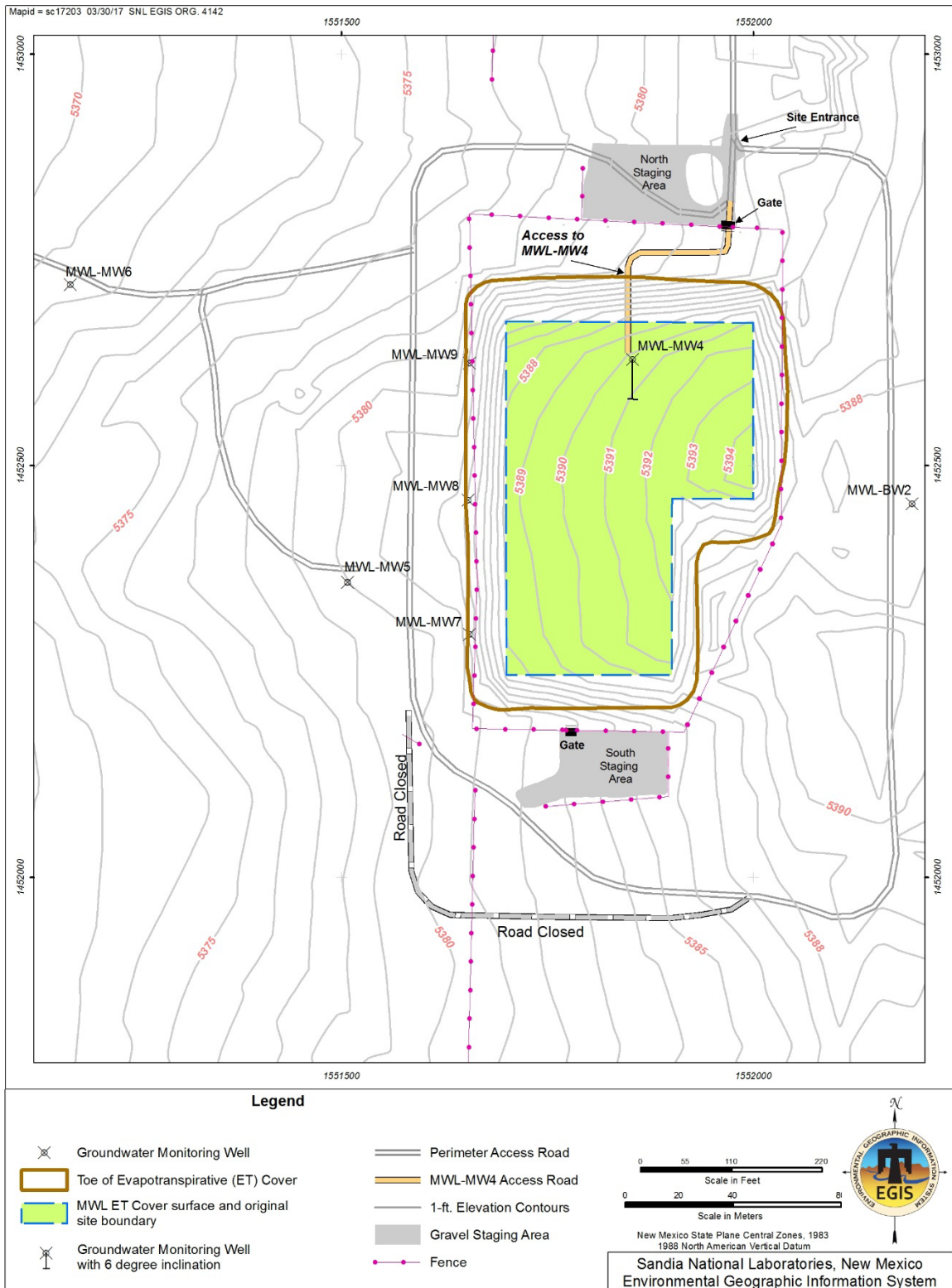


Figure 7-1
 Mixed Waste Landfill Groundwater Monitoring Well Locations

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 LTMMMP 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 (3/8-inch outer diameter and 1/4-inch inner diameter). The average flow rates ranged from 0.12 gallons per minute (gpm) at MWL-MW9 to 0.32 gpm at MWL-BW2 for the May 2017 sampling event. The average flow rates ranged from 0.09 gpm at MWL-MW9 to 0.28 gpm at MWL-BW2 for the October 2017 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 May and October sampling events is provided below. Analytical results are presented in Section 7.2.

First Sampling Event – May 2-8, 2017

One duplicate sample was collected at MWL-MW9. One equipment blank sample was collected prior to sampling monitoring well MWL-MW9. Five field blank samples were collected; one at ERFO and four at the site (one at each monitoring well). Five trip blank samples were also submitted with groundwater samples for analysis of VOCs.

Second Sampling Event – October 17-24, 2017

One duplicate sample was collected at MWL-MW8. One equipment blank sample was collected prior to sampling MWL-MW8. Five field blank samples were collected; one at ERFO and four at the site (one at each monitoring well). Five 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 requirements after characterization data were compared to discharge limits. Approximately 231 gallons of wastewater were generated during the May 2017 groundwater sampling event and approximately 226 gallons were generated during the October 2017 sampling event.

PPE and other solid waste generated during May and October 2017 monitoring activities were managed in accordance with all applicable requirements. Analytical data collected 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, PQLs, 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

LTMMP trigger levels. All results were below applicable LTMMP 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 May and October sampling events. The MDLs for all VOCs are presented in Table 7-2. The 2017 results for cadmium, chromium, nickel, and uranium are provided in Table 7-3, and the radionuclide, gross alpha, gross beta, tritium, and radon results are provided in Table 7-4. Table 7-5 summarizes field water quality measurements taken prior to environmental groundwater sample collection for both 2017 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
 May and October 2017

Well ID	Analyte	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	Trigger Levels (µg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
October 2017 Sampling Event							
MWL-MW8							
24-Oct-2017 (duplicate)	Acetone	1.70	1.5	10.0	3000	J	10U

Notes:

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

^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.

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 µg/L, in accordance with the data validation process.

EPA = U.S. Environmental Protection Agency.

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

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.

VOCs = Volatile organic compounds.

Table 7-2
 Summary of Method Detection Limits for VOCs (EPA Method 8260B^a)
 Mixed Waste Landfill Groundwater Monitoring
 May and October 2017

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.

EPA = U.S. Environmental Protection Agency.

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

µg/L = Micrograms per liter.

VOCs = Volatile organic compounds.

Table 7-3
 Summary of Cadmium, Chromium, Nickel, and Uranium Results (EPA Method 6020^a)
 Mixed Waste Landfill Groundwater Monitoring
 May and October 2017

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Trigger Level (mg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
May 2017 Sampling Event							
MWL-BW2 02-May-17	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	0.00675	0.000067	0.0002	0.015	--	--
MWL-MW7 04-May-17	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	0.00759	0.000067	0.0002	0.015	--	--
MWL-MW8 08-May-17	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	0.0071	0.000067	0.0002	0.015	--	--
MWL-MW9 03-May-17	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	0.00932	0.000067	0.0002	0.015	--	--
MWL-MW9 (Duplicate) 03-May-17	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	0.00902	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
May and October 2017

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Trigger Level (mg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
October 2017 Sampling Event							
MWL-BW2 17-Oct-17	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00157	0.0006	0.002	0.050	J	--
	Uranium	0.00697	0.000067	0.0002	0.015	--	--
MWL-MW7 23-Oct-17	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	0.00745	0.000067	0.0002	0.015	--	--
MWL-MW8 24-Oct-17	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	0.00733	0.000067	0.0002	0.015	--	--
MWL-MW8 (Duplicate) 24-Oct-17	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	0.00776	0.000067	0.0002	0.015	--	--
MWL-MW9 18-Oct-17	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00143	0.0006	0.002	0.050	J	--
	Uranium	0.00925	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.

^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.

U = Analyte was not detected.

EPA = U.S. Environmental Protection Agency.

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

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
 May and October 2017

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
May 2017 Sampling Event							
MWL-BW2 02-May-17	Americium-241	-5.44 ± 16.4	19.0	NE	U	BD	EPA 901.1
	Cesium-137	-1.2 ± 3.30	3.74	NE	U	BD	EPA 901.1
	Cobalt-60	0.609 ± 3.02	3.94	NE	U	BD	EPA 901.1
	Gross Alpha	6.38	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.54 ± 1.26	1.17	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	7.93 ± 82.4	147	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	412 ± 105	59.0	1000 pCi/L	--	--	SM7500 RnB
MWL-MW7 04-May-17	Americium-241	0.0778 ± 7.43	12.9	NE	U	BD	EPA 901.1
	Cesium-137	0.487 ± 1.55	2.79	NE	U	BD	EPA 901.1
	Cobalt-60	2.09 ± 1.83	3.07	NE	U	BD	EPA 901.1
	Gross Alpha	8.01	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.93 ± 1.58	1.37	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-5.79 ± 82.6	150	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	205 ± 58.9	47.7	1000 pCi/L	--	--	SM7500 RnB
MWL-MW8 08-May-17	Americium-241	0.579 ± 15.4	23.8	NE	U	BD	EPA 901.1
	Cesium-137	1.08 ± 1.87	3.26	NE	U	BD	EPA 901.1
	Cobalt-60	0.338 ± 1.77	3.10	NE	U	BD	EPA 901.1
	Gross Alpha	4.36	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.04 ± 1.32	1.36	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	24.2 ± 83.5	147	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	120 ± 60.6	84.5	1000 pCi/L	--	J	SM7500 RnB
MWL-MW9 03-May-17	Americium-241	4.10 ± 10.0	16.8	NE	U	BD	EPA 901.1
	Cesium-137	-1.3 ± 1.86	2.93	NE	U	BD	EPA 901.1
	Cobalt-60	1.21 ± 2.06	3.85	NE	U	BD	EPA 901.1
	Gross Alpha	4.06	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	6.62 ± 1.39	1.10	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-1.18 ± 79.8	144	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	509 ± 125	56.8	1000 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
 May and October 2017

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
May 2017 Sampling Event (Continued)							
MWL-MW9 (Duplicate) 03-May-17	Americium-241	-0.414 ± 6.48	11.2	NE	U	BD	EPA 901.1
	Cesium-137	-0.365 ± 1.77	3.00	NE	U	BD	EPA 901.1
	Cobalt-60	-0.181 ± 1.68	3.02	NE	U	BD	EPA 901.1
	Gross Alpha	6.46	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	6.59 ± 1.39	1.14	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	30.2 ± 81.6	142	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	450 ± 112	56.9	1000 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
May and October 2017

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
October 2017 Sampling Event							
MWL-BW2 17-Oct-17	Americium-241	-5.66 ± 15.9	25.7	NE	U	BD	EPA 901.1
	Cesium-137	-1.29 ± 2.23	3.63	NE	U	BD	EPA 901.1
	Cobalt-60	-1.08 ± 3.71	4.06	NE	U	BD	EPA 901.1
	Gross Alpha	4.57	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	4.13 ± 0.959	0.794	4 mrem/yr	--	J	EPA 900.0
	Tritium ^f	-80.3 ± 98.3	175	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	379 ± 92.7	47.2	1000 pCi/L	--	--	SM7500 Rn B
MWL-MW7 23-Oct-17	Americium-241	-7.34 ± 15.6	23.4	NE	U	BD	EPA 901.1
	Cesium-137	0.250 ± 1.95	3.38	NE	U	BD	EPA 901.1
	Cobalt-60	0.0962 ± 1.93	3.53	NE	U	BD	EPA 901.1
	Gross Alpha	3.39	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.66 ± 1.18	0.781	4 mrem/yr	--	J	EPA 900.0
	Tritium ^f	-89.1 ± 104	185	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	174 ± 62.5	69.2	1000 pCi/L	--	J	SM7500 Rn B
MWL-MW8 24-Oct-17	Americium-241	0.311 ± 14.7	23.9	NE	U	BD	EPA 901.1
	Cesium-137	-0.0501 ± 2.05	3.51	NE	U	BD	EPA 901.1
	Cobalt-60	0.261 ± 1.83	3.43	NE	U	BD	EPA 901.1
	Gross Alpha	10.99	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	4.71 ± 1.02	0.767	4 mrem/yr	--	J	EPA 900.0
	Tritium ^f	61.4 ± 106	179	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	145 ± 52.3	58.0	1000 pCi/L	--	J	SM7500 Rn B
MWL-MW8 (Duplicate) 24-Oct-17	Americium-241	1.06 ± 8.95	14.7	NE	U	BD	EPA 901.1
	Cesium-137	1.39 ± 1.76	3.04	NE	U	BD	EPA 901.1
	Cobalt-60	0.895 ± 1.92	3.55	NE	U	BD	EPA 901.1
	Gross Alpha	6.40	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.06 ± 1.09	0.760	4 mrem/yr	--	J	EPA 900.0
	Tritium ^f	12.3 ± 104	180	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	201 ± 62.6	58.1	1000 pCi/L	--	--	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
May and October 2017

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
October 2017 Sampling Event (Continued)							
MWL-MW9 18-Oct-17	Americium-241	-9.68 ± 16.6	24.5	NE	U	BD	EPA 901.1
	Cesium-137	0.856 ± 2.32	4.05	NE	U	BD	EPA 901.1
	Cobalt-60	-0.898 ± 2.61	4.10	NE	U	BD	EPA 901.1
	Gross Alpha	0.54	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.54 ± 1.19	0.895	4 mrem/yr	--	J	EPA 900.0
	Tritium ^f	-47.7 ± 104	182	4 mrem/yr	U	BD	EPA 906.0 M
	Radon-222	356 ± 85.7	39.5	1000 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% 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, 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.

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
May and October 2017

Well ID/ Sample Date	Temperature (°C)	SC (µmhos/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (% Sat)	DO (mg/L)
May 2017 Sampling Event							
MWL-BW2	21.35	705.9	132.9	7.42	3.62	39.9	3.52
MWL-MW7	21.22	592.3	187.1	7.64	1.22	71.6	6.35
MWL-MW8	22.19	629.3	148.5	7.56	1.63	22.6	2.00
MWL-MW9	21.36	598.4	132.1	7.55	0.49	13.7	1.20
October 2017 Sampling Event							
MWL-BW2	20.85	675.0	140.2	7.29	3.72	38.0	3.39
MWL-MW7	20.91	561.4	107.7	7.48	1.18	73.6	6.54
MWL-MW8	19.20	550.0	175.1	7.42	0.91	23.1	2.15
MWL-MW9	22.91	599.1	253.9	7.28	0.46	15.9	1.34

Notes:

^aField measurements collected prior to sampling.

°C = Degrees Celsius.

% Sat = Percent saturation.

DO = Dissolved oxygen.

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 – May 2-8, 2017

VOCs were not detected in the environmental samples above MDLs. To evaluate previous sporadic, low-concentration detections of PCE in MWL-MW8 groundwater samples, two additional groundwater samples were collected from this well during the purging process. The sample collected after the removal of approximately five gallons had a detection of PCE at 0.370 micrograms per liter. This result is consistent with the hypothesis of PCE soil-gas entering the monitoring well through the unsaturated screen interval (over 20 feet of well screen present above the groundwater elevation in MWL-MW8) and diffusing directly into the groundwater, causing sporadic low-concentration PCE detections. To further test this hypothesis and evaluate conditions in the MWL-MW8 well screen and casing, passive VOC soil-gas samplers will be deployed in MWL-MW8 in 2018. Although there are other possible explanations, this hypothesis is the most likely based on extensive characterization work performed at the nearby Chemical Waste Landfill.

Cadmium, chromium, and nickel were not detected above the associated MDL. Uranium was detected above the associated MDLs and below LTMMMP trigger levels in all groundwater samples. Uranium concentrations ranged from 0.00675 milligrams per liter (mg/L) at MWL-BW2 to 0.00932 mg/L at MWL-MW9. All 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 4.06 pCi/L (MWL-MW9) to 8.01 pCi/L (MWL-MW7). Gross beta activity was detected in all samples ranging from 5.04 pCi/L (MWL-MW8) to 6.62 pCi/L (MWL-MW9). Radon-222 was detected in all samples, with activities ranging from 120 pCi/L at MWL-MW8 to 509 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 LTMMP trigger levels.

Second Sampling Event – October 17-24, 2017

VOCs were not detected in the environmental samples above MDLs, except for acetone in the duplicate sample from monitoring well MWL-MW8. Acetone was qualified as not detected during data validation, as it was also detected in the associated equipment blank sample. Acetone was not detected in the MWL-MW8 environmental sample and is a common laboratory contaminant.

Cadmium and chromium were not detected above the associated MDLs. Nickel was detected in MWL-BW2 and MWL-MW9 samples at concentrations of 0.00157 mg/L and 0.00143 mg/L, respectively. Uranium was detected in all groundwater samples with concentrations ranging from 0.00697 mg/L at MWL-BW2 to 0.00925 mg/L at MWL-MW9. All results are consistent with historical MWL groundwater monitoring results and are below LTMMP 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 0.54 pCi/L (MWL-MW9) to 10.99 pCi/L (MWL-MW8). Gross beta activity was detected in all samples ranging from 4.13 pCi/L (MWL-BW2) to 5.66 pCi/L (MWL-MW7). Radon-222 was detected in all samples, with activities ranging from 145 pCi/L at MWL-MW8 to 379 pCi/L at MWL-BW2. 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 LTMMP 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 for all groundwater monitoring events conducted since implementation of the LTMMP 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.

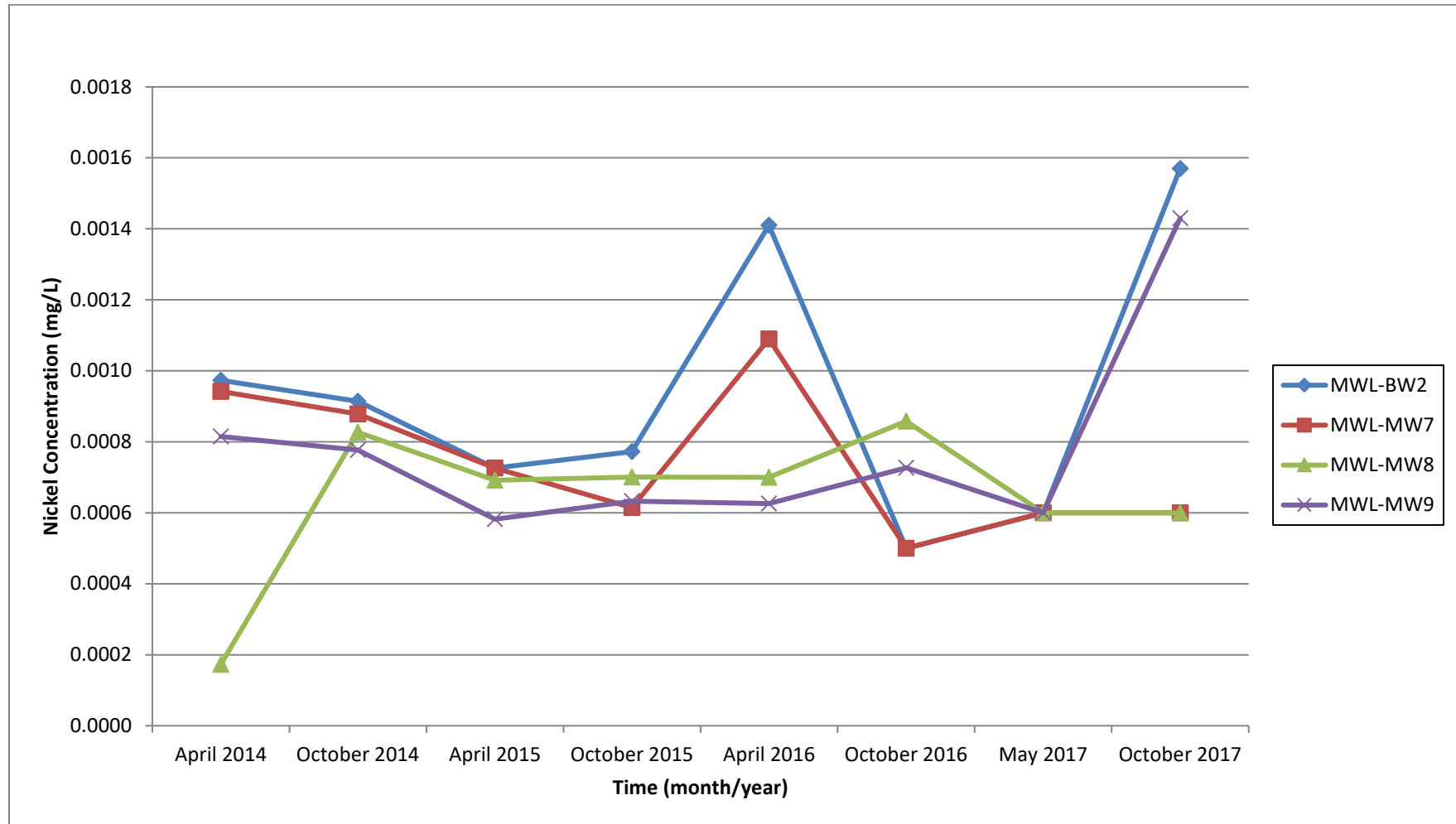


Figure 7-2
Nickel Concentrations vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

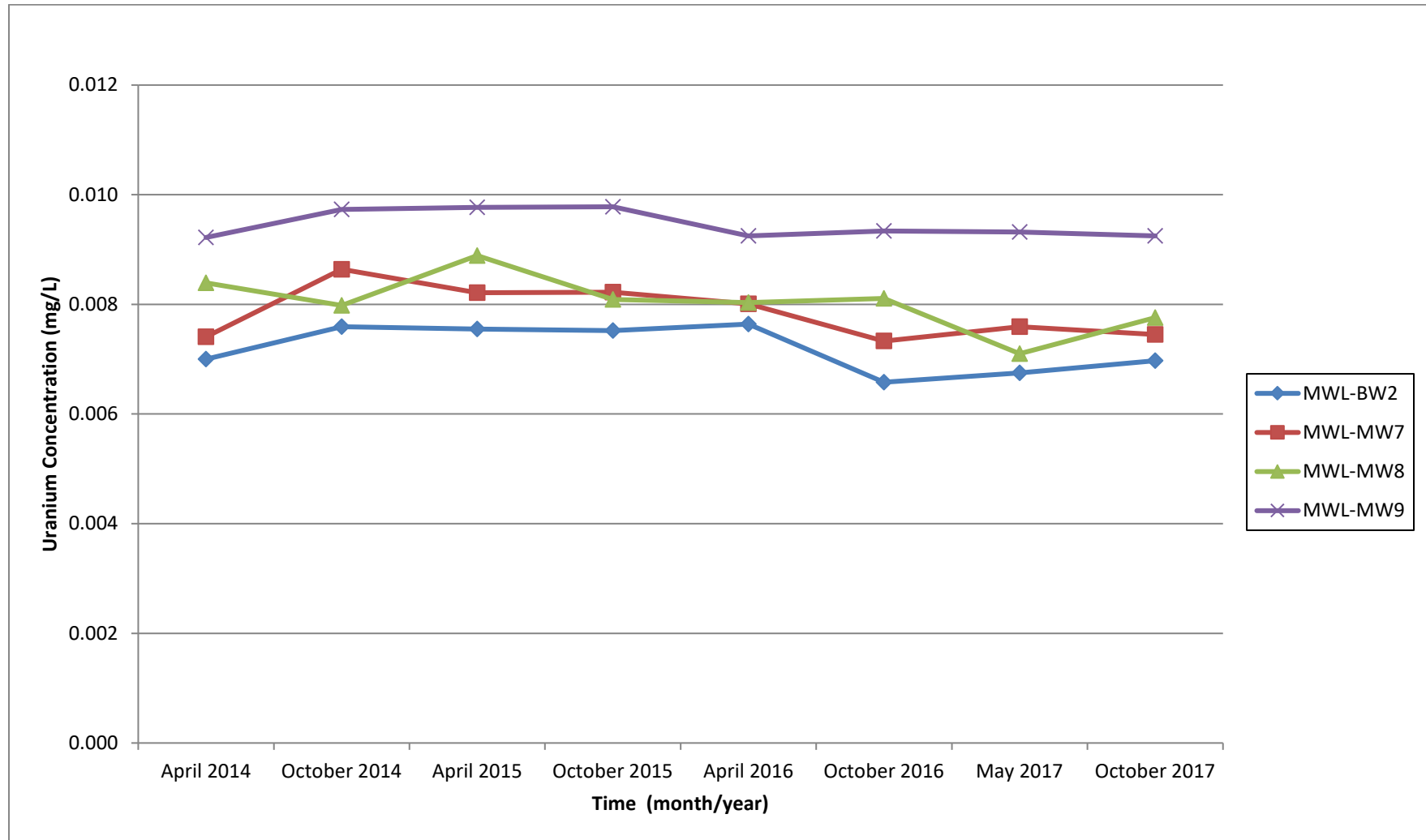


Figure 7-3
Uranium Concentrations vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

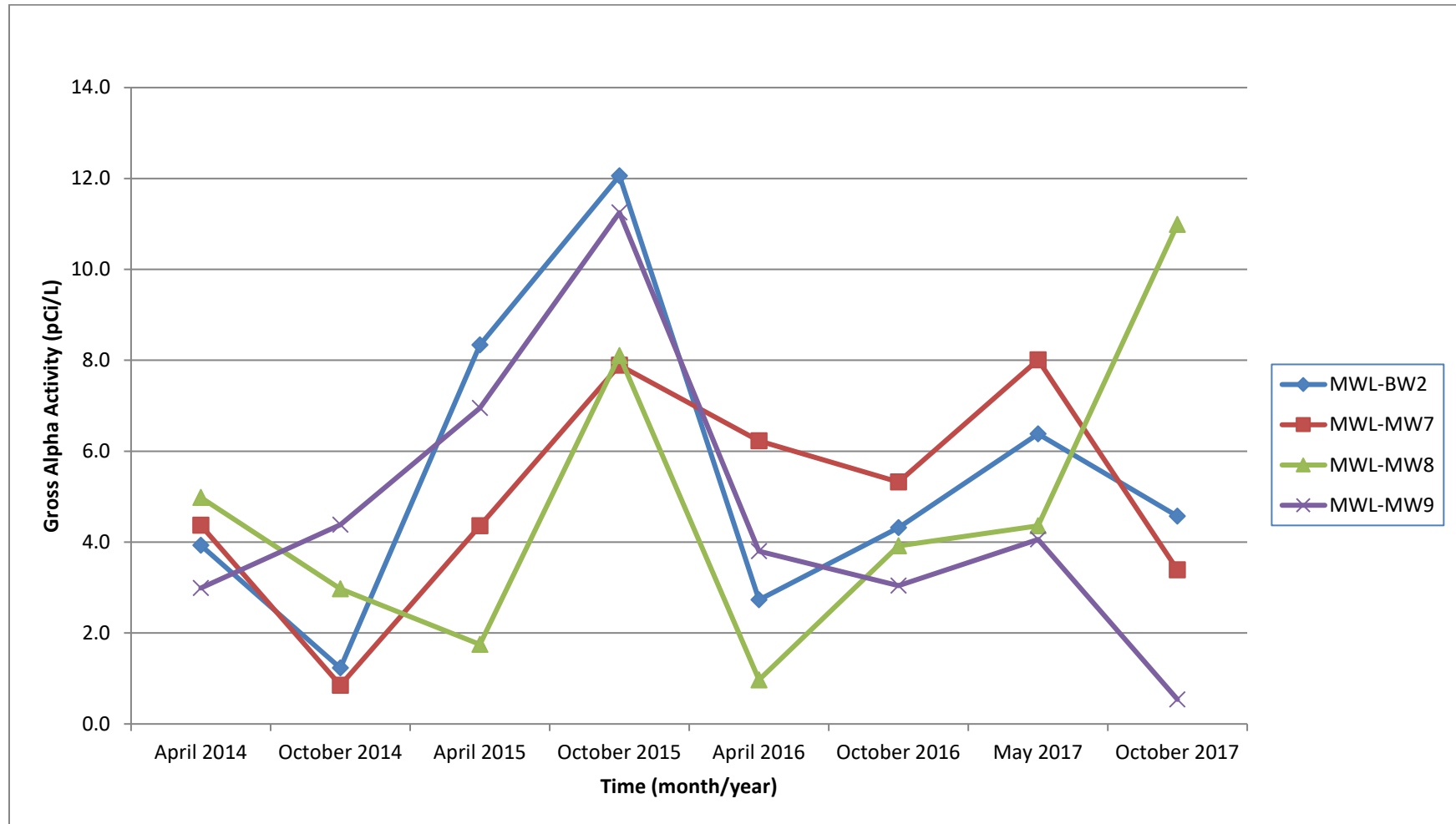


Figure 7-4
Gross Alpha Activity vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

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 May and October 2017 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 3 to 6.

Table 7-6
 Summary of Duplicate Sample Results
 Mixed Waste Landfill Groundwater Monitoring
 May and October 2017

Well ID/Parameter	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a
May Sampling Event			
MWL-MW9			
Uranium (mg/L)	0.00932	0.00902	3
October Sampling Event			
MWL-MW8			
Uranium (mg/L)	0.00733	0.00776	6

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/L = Milligram(s) per liter.

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

First Sampling Event – May 2-8, 2017

The equipment blank sample for the May sampling event was analyzed for all constituents. No constituents were detected above the MDLs in the equipment blank sample.

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

VOCs were not detected in the six trip blank samples associated with the May sampling event.

Second Sampling Event – October 17-24, 2017

The equipment blank sample for the October sampling event was analyzed for all constituents. Acetone and toluene were detected. Acetone in the MWL-MW8 duplicate sample result was qualified as not detected during data validation since the reported acetone concentration was less than ten times the equipment blank concentration. No corrective action was necessary for toluene since this compound was not detected in associated environmental samples. Both of these compounds are common laboratory contaminants.

Of the five field blank samples collected in October, the field blank sample associated with well MWL-MW7 had an acetone detection. No corrective action was necessary since acetone was not detected in the associated environmental sample.

VOCs were not detected in the six trip blank samples associated with the October 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 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 – May 2-8, 2017

All laboratory control sample results met the accuracy (i.e., % recovery) requirement of 50 to 130% for VOCs and 75 to 125% for metals (Section 2.1 of LTMMP Appendix F), except for acetone. The post spike and post spike duplicate recovery for acetone was 133% in the laboratory batch associated with the May equipment blank, MWL-BW2, MWL-MW7, and MWL-MW9 samples. No corrective action was required since acetone was not detected in any of the associated environmental samples.

Second Sampling Event – October 17-24, 2017

All laboratory control sample results met the accuracy (i.e., % recovery) requirement of 50 to 130% for VOCs and 75 to 125% for metals (Section 2.1 of LTMMP Appendix F), except for several VOCs. The matrix spike and matrix spike duplicate recoveries for various compounds were greater than acceptance criteria. No corrective action was necessary, since all laboratory internal standards met QC criteria and analytical method requirements.

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 2014; 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 May and October 2017 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 Albuquerque Bernalillo County Water Utility Authority have profoundly modified the natural groundwater flow regime near the MWL by creating a trough in the water table in the western and northern portions of KAFB. 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 2017. Since 2010, the rate of groundwater elevation decline in all wells has been relatively slow and constant, and less than 2 feet overall. 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 has been approximately 3 feet, reflecting a slightly higher rate of decline than observed in the other wells. Over the past two years the rate of decline has significantly slowed, and between 2015 and 2017 all wells except MWL-BW2 and MWL-MW4 showed an increase ranging from 0.11 to 0.53 feet. From October 2015 to October 2017, the groundwater elevation declined in well MWL-BW2 only 0.52 feet, and the groundwater elevation decline in well MWL-MW4 was 1.60 feet. The subtle water table rebound measured in the monitoring wells on the west side of the MWL has been observed in wells located farther north on KAFB and is most likely related to a relaxation in groundwater removal from the Regional Aquifer by the Albuquerque Bernalillo County Water Utility Authority. 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.

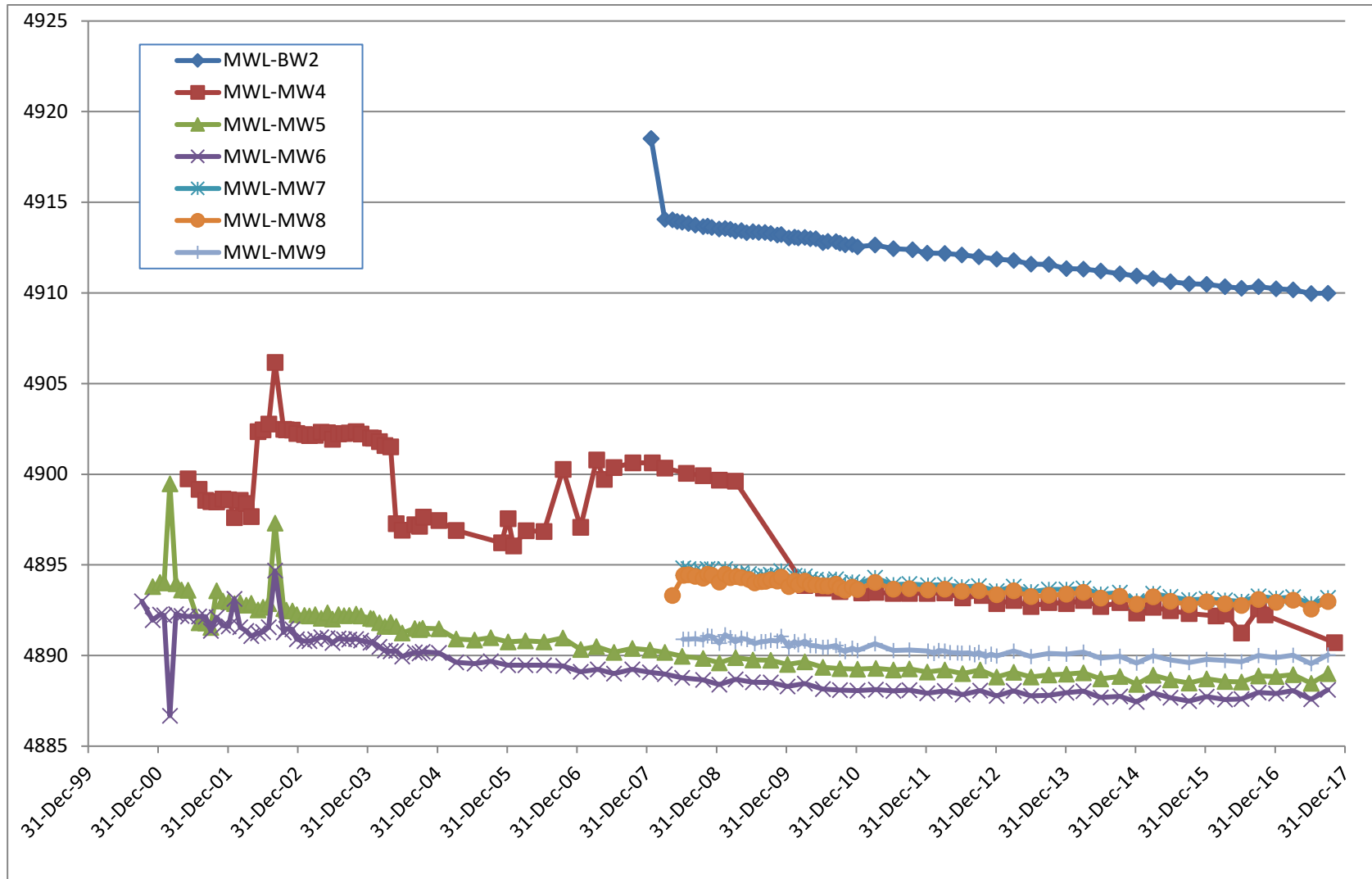


Figure 7-5
Groundwater Level Elevations at Mixed Waste Landfill Groundwater Monitoring Wells

Figure 7-6 shows the October 2017 potentiometric surface of the Regional Aquifer beneath the MWL. Groundwater flows towards the west and northwest. Measured orthogonally from the potentiometric surface contours, the horizontal gradient for October 2016 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 2017 groundwater velocity 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 four years, and are consistent with previous estimates for horizontal groundwater flow at the water table in the MWL vicinity.

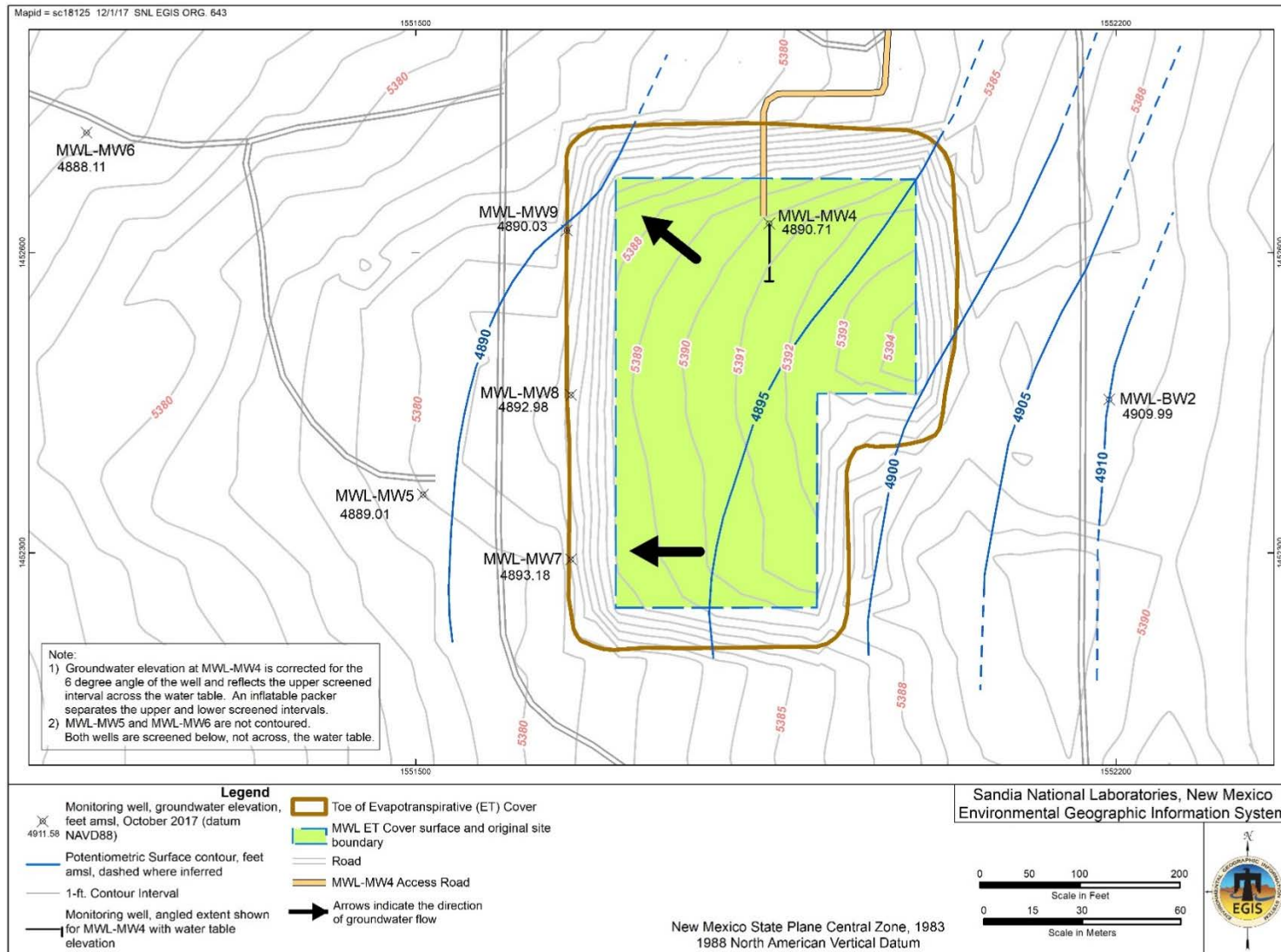


Figure 7-6
 Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2017

8.0 BIOTA MONITORING RESULTS

This chapter presents biota monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with the 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, 2017 through March 31, 2018 reporting period fulfilling the LTMMMP annual monitoring requirement. The biota sampling locations were identified during the annual ET Cover Biology Inspection performed on August 21, 2017. The sampling locations are shown in Figure 8-1 and consist of two ant hills (MWL AHSS-01-2017 and MWL AHSS-02-2017) and two animal burrows (ABSS-01-2017 and ABSS-02-2017). There were no 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. Only four very small (less than 1-inch), inactive, shallow (less than 1.5-inches deep) animal burrows were identified on the south end of the ET Cover during the annual inspection. Two of these locations were selected for sampling as a best practice. Surface soil samples were collected at these locations on August 28, 2017 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 (MWL LTMMMP Appendix G, Table G-4.2-1), one field QC sample (duplicate sample) was collected at MWL ABSS-01-2017.

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.

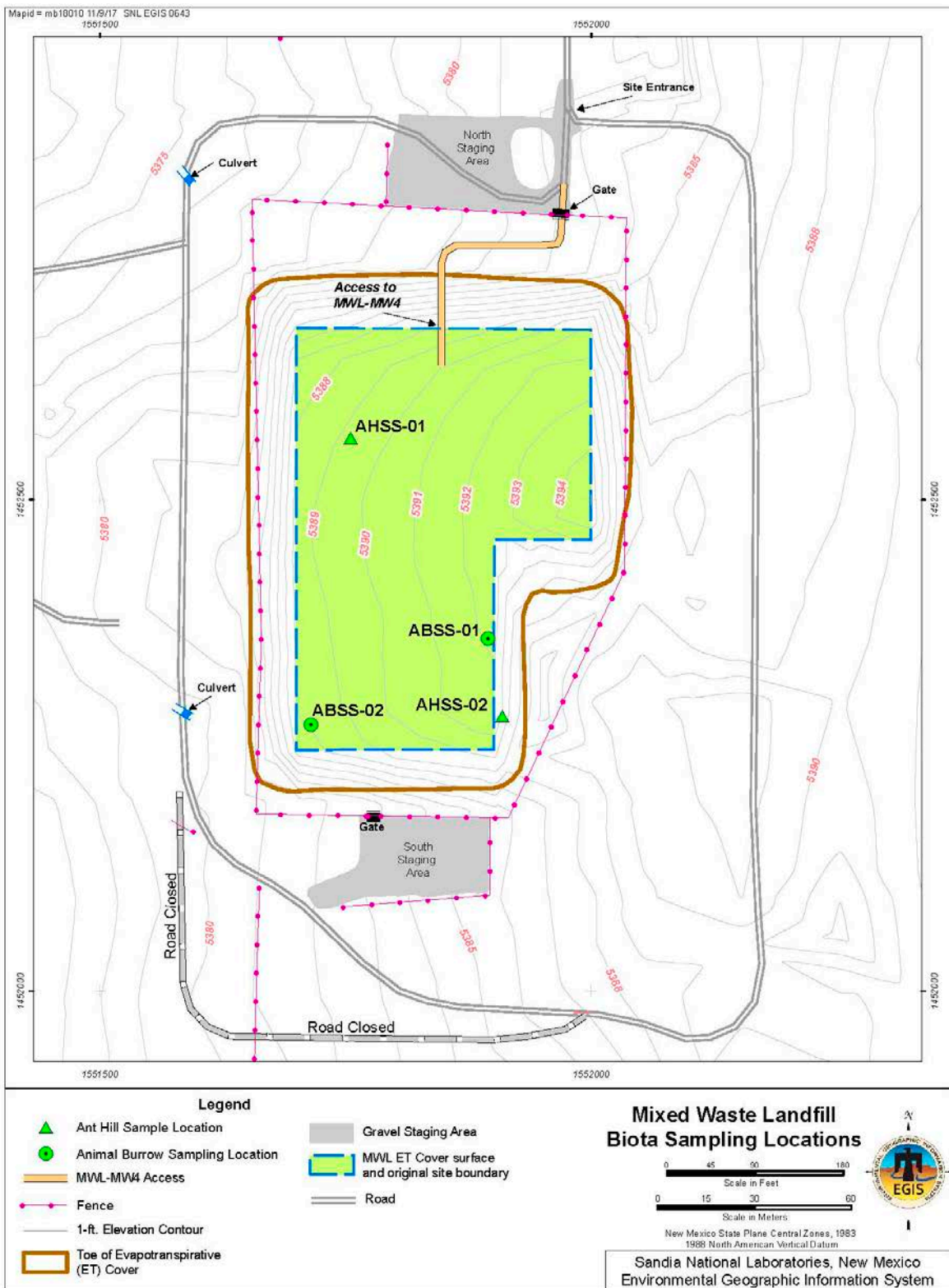


Figure 8-1
 Mixed Waste Landfill Biota Sampling Locations

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 and two animal burrow 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 the respective NMED-approved background concentrations and below trigger levels.

All gamma spectroscopy radionuclide activities were low, below the respective NMED-approved background activities. Thirteen of the 30 results were non-detects. Two of the uranium-238 results were qualified during data validation as estimated values because the result is less than or equal to 3 times the MDA. 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 environmental-duplicate sample pairs and the RPD values calculated for the August 2017 biota data set. An RPD was calculated when metals concentrations were reported in both the environmental and duplicate sample at levels greater than the RL, 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 4 to 23, except for mercury with an RPD of 60. 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. The greater RPD value for mercury is likely related to natural variability in the soil matrix, and not indicative of an issue with data precision. This situation is relatively common for low concentrations of naturally occurring metals. Both mercury results are below the NMED-approved background concentration and below the trigger level. Based on the agreement of the other RPD values, additional corrective actions are not required.

Table 8-1
Summary of Metals Results (EPA Method 6020/7470^a)
Mixed Waste Landfill Biota Monitoring
August 2017

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 ABSS-01-2017 28-Aug-17	Arsenic	2.92	0.324	0.960	5.6	17.7	--	--
	Barium	91.8	0.096	0.384	130	100,000	--	J
	Beryllium	0.448	0.0192	0.096	0.65	2,260	--	--
	Cadmium	0.0766	0.0192	0.192	<1	897	J	0.19U
	Chromium	8.86	0.192	0.576	17.3	63.1	N	J
	Cobalt	3.39	0.0576	0.192	5.2	20,500	--	--
	Copper	5.83	0.0633	0.192	15.4	45,400	--	--
	Lead	6.61	0.096	0.384	21.4	800	N	J
	Mercury	0.041	0.00393	0.0117	<0.25	73.6	--	--
	Nickel	7.11	0.096	0.384	11.5	22,500	--	--
	Selenium	0.885	0.345	0.960	<1	5,680	J	--
	Silver	ND	0.0949	0.474	<1	5,680	U	--
	Vanadium	17.8	0.288	0.960	20.4	5,680	N	J
Zinc	23.5	0.768	1.92	62	100,000	--	J	
MWL ABSS-01-2017 28-Aug-17 (Duplicate)	Arsenic	3.09	0.334	0.988	5.6	17.7	--	--
	Barium	116	0.0988	0.395	130	100,000	--	J
	Beryllium	0.502	0.0198	0.0988	0.65	2,260	--	--
	Cadmium	0.0759	0.0198	0.198	<1	897	J	0.20U
	Chromium	10.1	0.198	0.593	17.3	63.1	N	J
	Cobalt	3.63	0.0593	0.198	5.2	20,500	--	--
	Copper	6.50	0.0652	0.198	15.4	45,400	--	--
	Lead	7.21	0.0988	0.395	21.4	800	N	J
	Mercury	0.0221	0.00393	0.0117	<0.25	73.6	--	--
	Nickel	7.87	0.0988	0.395	11.5	22,500	--	--
	Selenium	0.950	0.356	0.988	<1	5,680	J	--
	Silver	ND	0.0958	0.479	<1	5,680	U	--
	Vanadium	19.5	0.296	0.988	20.4	5,680	N	J
Zinc	24.9	0.791	1.98	62	100,000	--	J	
MWL ABSS-02-2017 28-Aug-17	Arsenic	2.57	0.336	0.994	5.6	17.7	--	--
	Barium	89.7	0.0994	0.398	130	100,000	--	J
	Beryllium	0.414	0.0199	0.0994	0.65	2,260	--	--
	Cadmium	0.106	0.0199	0.199	<1	897	J	0.20U
	Chromium	8.48	0.199	0.596	17.3	63.1	N	J
	Cobalt	3.52	0.0596	0.199	5.2	20,500	--	--
	Copper	5.93	0.0656	0.199	15.4	45,400	--	--
	Lead	7.76	0.0994	0.398	21.4	800	N	J
	Mercury	0.0176	0.0036	0.0108	<0.25	73.6	--	--
	Nickel	6.62	0.0994	0.398	11.5	22,500	--	--
	Selenium	0.926	0.358	0.994	<1	5,680	J	--
	Silver	ND	0.099	0.495	<1	5,680	U	--
	Vanadium	15.1	0.298	0.994	20.4	5,680	N	J
Zinc	23.3	0.795	1.99	62	100,000	--	J	

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
August 2017

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-01-2017 28-Aug-17	Arsenic	2.66	0.328	0.971	5.6	17.7	--	--
	Barium	89.5	0.0971	0.388	130	100,000	--	J
	Beryllium	0.399	0.0194	0.0971	0.65	2,260	--	--
	Cadmium	0.092	0.0194	0.194	<1	897	J	0.19U
	Chromium	8.58	0.194	0.583	17.3	63.1	N	J
	Cobalt	2.97	0.0583	0.194	5.2	20,500	--	--
	Copper	6.36	0.0641	0.194	15.4	45,400	--	--
	Lead	6.56	0.0971	0.388	21.4	800	N	J
	Mercury	0.016	0.00393	0.0117	<0.25	73.6	--	--
	Nickel	6.45	0.0971	0.388	11.5	22,500	--	--
	Selenium	0.896	0.350	0.971	<1	5,680	J	--
	Silver	ND	0.0971	0.485	<1	5,680	U	--
	Vanadium	16.3	0.291	0.971	20.4	5,680	N	J
Zinc	23.5	0.777	1.94	62	100,000	--	J	
MWL AHSS-02-2017 28-Aug-17	Arsenic	2.89	0.324	0.958	5.6	17.7	--	--
	Barium	99.6	0.0958	0.383	130	100,000	--	J
	Beryllium	0.438	0.0192	0.0958	0.65	2,260	--	--
	Cadmium	0.0854	0.0192	0.192	<1	897	J	0.19U
	Chromium	9.62	0.192	0.575	17.3	63.1	N	J
	Cobalt	3.34	0.0575	0.192	5.2	20,500	--	--
	Copper	6.41	0.0632	0.192	15.4	45,400	--	--
	Lead	7.24	0.0958	0.383	21.4	800	N	J
	Mercury	0.0135	0.00383	0.0114	<0.25	73.6	--	--
	Nickel	7.12	0.0958	0.383	11.5	22,500	--	--
	Selenium	0.905	0.345	0.958	<1	5,680	J	--
	Silver	ND	0.0969	0.484	<1	5,680	U	--
	Vanadium	18.3	0.287	0.958	20.4	5,680	N	J
Zinc	24.5	0.766	1.92	62	100,000	--	J	

Notes:

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

^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

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

N = Result for the associated matrix spike had high recovery.

U = Analyte was not detected.

Validation Qualifier

J = Estimated value.

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

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, shown in parentheses.

NMED = New Mexico Environment Department.

Table 8-2
Summary of Gamma Spectroscopy Results (EPA Method 901.1^a)
Mixed Waste Landfill Biota Monitoring
August 2017

Sample Location	Parameter	NMED Background ^b (pCi/g)	Result (pCi/g)	MDA (pCi/g)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL ABSS-01-2017 28-Aug-2017	Cesium-137	1.5	0.0761 ± 0.0311	0.0248	--	--
	Cobalt-60	NA	0.000766 ± 0.0149	0.0275	U	BD
	Radium-226	2.7	0.594 ± 0.0913	0.0469	--	--
	Thorium-232 ^d	1.5	0.939 ± 0.0969	0.0364	--	--
	Uranium-235	0.18	0.00097 ± 0.0832	0.142	U	BD
	Uranium-238	2.3	0.069 ± 1.24	1.13	U	BD
MWL ABSS-01-2017 28-Aug-2017 (Duplicate)	Cesium-137	1.5	0.0662 ± 0.0241	0.0178	--	--
	Cobalt-60	NA	0.000638 ± 0.0105	0.0174	U	BD
	Radium-226	2.7	0.629 ± 0.0748	0.0312	--	--
	Thorium-232 ^d	1.5	0.899 ± 0.0929	0.0256	--	--
	Uranium-235	0.18	-0.00092 ± 0.0561	0.091	U	BD
	Uranium-238	2.3	0.382 ± 0.997	0.541	U	BD
MWL ABSS-02-2017 28-Aug-2017	Cesium-137	1.5	0.138 ± 0.0304	0.0222	--	--
	Cobalt-60	NA	0.00337 ± 0.0149	0.0277	U	BD
	Radium-226	2.7	0.629 ± 0.101	0.0453	--	--
	Thorium-232 ^d	1.5	0.940 ± 0.0975	0.0381	--	--
	Uranium-235	0.18	0.0467 ± 0.0833	0.146	U	BD
	Uranium-238	2.3	0.436 ± 1.11	1.12	U	BD
MWL AHSS-01-2017 28-Aug-2017	Cesium-137	1.5	0.0613 ± 0.0171	0.0157	--	--
	Cobalt-60	NA	-0.00465 ± 0.0104	0.0172	U	BD
	Radium-226	2.7	0.614 ± 0.069	0.0265	--	--
	Thorium-232 ^d	1.5	0.877 ± 0.0808	0.0217	--	--
	Uranium-235	0.18	0.0178 ± 0.0809	0.0724	U	BD
	Uranium-238	2.3	1.06 ± 0.835	0.534	--	J
MWL AHSS-02-2017 28-Aug-2017	Cesium-137	1.5	0.0918 ± 0.0204	0.0165	--	--
	Cobalt-60	NA	0.00803 ± 0.0115	0.0207	U	BD
	Radium-226	2.7	0.604 ± 0.0705	0.0333	--	--
	Thorium-232 ^d	1.5	0.866 ± 0.0857	0.0275	--	--
	Uranium-235	0.18	-0.0322 ± 0.0629	0.0981	U	BD
	Uranium-238	2.3	1.20 ± 0.603	0.427	--	J

Notes:

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

^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.

Validation Qualifier

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

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

^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.

Table 8-3
 Summary of Duplicate Sample Results
 Mixed Waste Landfill Biota Monitoring
 August 2017

Sample Location	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a
MWL ABSS-01-2017 – Metals (mg/kg)			
Arsenic	2.92	3.09	6
Barium	91.8	116	23
Beryllium	0.448	0.502	11
Chromium	8.86	10.1	13
Cobalt	3.39	3.63	7
Copper	5.83	6.50	11
Lead	6.61	7.21	9
Mercury	0.041	0.0221	60
Nickel	7.11	7.87	10
Vanadium	17.8	19.5	9
Zinc	23.5	24.9	6
MWL ABSS-01-2017 – Radionuclides (pCi/g)			
Cesium-137	0.0761	0.0662	14
Radium-226	0.594	0.629	6
Thorium-232	0.939	0.899	4

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 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 with various metals results were identified during data validation and are summarized below. All cadmium results reported by the laboratory were estimated concentrations above the MDL but below the RL; however, were qualified during data validation as non-detects due to calibration blank contamination. All barium and zinc results were qualified

during data validation as estimated values due to lack of matrix spike information. All chromium, lead, and vanadium results were above the RL; however, were qualified during data validation as estimate values due to high matrix spike recoveries.

Based upon the data validation and review criteria, all analytical data were determined acceptable and met 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 surface soil samples collected at ant hills and animal burrows are specified in the MWL 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 surface soil samples collected at ant hills and animal burrows 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 LTMMP 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, 2017 through March 31, 2018 reporting period. Inspection results are presented in the following sections and documented on the inspection forms/checklists called out 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 August 21, 2017 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 LTMMP criteria for successful revegetation. The approximate foliar coverage on the ET Cover was 51 percent, with 99 percent of this coverage composed of native vegetation. The foliar coverage is dominated by native grasses, with *Galleta* grass (native grass species) 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. Sixteen ant hills were observed evenly distributed on the side slopes and cover surface. Four very shallow (less than 1.5-inches deep), small-diameter (less than 1-inch) animal burrow entrance diggings were noted on the ET Cover. No action or repairs were required based on the Biology Inspection. Overall, the ET Cover vegetation and surface is in excellent condition. Additional information is provided on the August 21, 2017 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 performs verification inspections to support the quarterly ET Cover surface inspections performed by a field technician (Section 9.1.2).

Table 9-1
 Inspection Frequency and Dates Performed
 Mixed Waste Landfill
 April 2017 – March 2018 Reporting Period

Inspection Type	Frequency	Form/Checklist ^a	Date Performed
ET Cover Biology Inspection	Annual ^b	Biology Inspection Checklist/Form	August 21, 2017
ET Cover Surface Inspection	Quarterly	Cover Inspection Checklist/Form	June 14, 2017
			September 13, 2017
			December 1, 2017
			March 9, 2018
Storm-Water Diversion Structure Inspection ^c	Quarterly	Cover Inspection Checklist/Form	June 14, 2017
			September 13, 2017
			December 1, 2017
			March 9, 2018
Soil-Vapor Monitoring Network Inspection	Semiannually ^d	Soil-Vapor Monitoring Network Checklist/Form	May 30, 2017 October 26, 2017
Soil-Moisture Monitoring Network Inspection	Annually ^d	Soil-Moisture Monitoring Network Checklist/Form	April 17, 2017
Groundwater Monitoring Network Inspection	Semiannually ^d	Groundwater Monitoring Network Checklist/Form	May 2, 2017
			October 17, 2017
Security Fence Inspection ^c	Quarterly	Cover Inspection Checklist/Form	June 14, 2017
			September 13, 2017
			December 1, 2017
			March 9, 2018

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 are conducted at the same time as the ET Cover Surface Inspection and documented on the same inspection form.

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

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 LTMMP 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 LTMMP inspection requirement (Table 9-1). No inspection items required maintenance or repairs.

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 LTMMP 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 LTMMP 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 14, 2017 Inspection

No inspection items required maintenance or repairs.

September 13, 2017 Inspection

No inspection items required maintenance or repairs.

December 1, 2017 Inspection

No inspection items required maintenance or repairs.

March 9, 2018 Inspection

Accumulation of dead, dry wind-blown tumbleweeds were identified along the perimeter fence. The plant debris was removed by the cover system landscaping/maintenance contractor as of April 27, 2018, 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 2017 as a best practice, from May 8 - 22, July 13 - 17, and September 18 - 21. The May event addressed clearing the perimeter fence of windblown tumbleweeds (requirement) and the removal of an invasive shrub from the western perimeter (best practice), both identified during the March 22, 2017 inspection (last inspection of the previous reporting period). The three events included removal of approximately 36 cubic yards of dead, windblown tumbleweeds from the ET Cover surface, perimeter fence, and drainage swale. A pre-/post-emergent herbicide was applied to North and South Staging Areas during the May and July events, and to the 3-foot area outside the perimeter fence line during the September event. The September event also included the removal of live weeds from the ET Cover, the 3-foot area outside the fence, and a 10-foot area around the monitoring well erosion control features on the western perimeter. These weed control activities help the desired native grasses by reducing the availability of weed seeds and competition from the future growth of invasive plants.

10.0 REGULATORY ACTIVITIES

On January 8, 2014, the NMED approved the MWL LTMMP (Blaine January 2014). All MWL regulatory submittals since approval and full implementation of the LTMMP are summarized in Section 10.1, along with submittals that occurred during this April 1, 2017 through March 31, 2018 reporting period.

Post-LTMMP implementation submittals, including submittals associated with the April 2017 through March 2018 reporting period, are summarized in this Section. There were no LTMMP modification requests, although preparation of an LTMMP permit modification request was initiated during the reporting period.

10.1 MWL Regulatory Submittals

Regulatory submittals during this reporting period include the fourth MWL Annual LTMM Report, April 2016 – March 2017 (SNL/NM June 2017a), approved by NMED in April 2018 (Kieling April 2018). There were also two submittals of updated procedures cited in the LTMMP Sampling and Analysis Plans. These updates keep the procedures current to reflect ongoing modifications and improvements in industry practices. In July 2017, the data validation procedure was submitted, and in February 2018, four groundwater monitoring procedures were submitted to the NMED. Both submittals were within 30 days of the effective date for the updated procedures.

MWL post-LTMMP 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 LTMMP is presented in the MWL Annual LTMM Report, April 2014 – March 2015 (SNL/NM June 2015).

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

Date of Submittal ^a	LTMP 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 LTMP 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.
April 2017 through March 2018 Reporting Period Submittals		
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.

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.

LTMP = 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 and conclusions of all MWL LTMMP monitoring, inspection, and maintenance/repair activities in this reporting period.

11.1 Monitoring Activities

All monitoring activities for the April 1, 2017 through March 31, 2018 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 semiannual, but quarterly monitoring was performed to allow for deployment and testing of multiple detectors. The range of radon activity for all monitoring locations was <0.08 to 1.3 pCi/L, and the range for all background location results was 0.11 to 1.0 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. Radon monitoring will return to a semiannual frequency using the newer Radtrak2® detectors for the next reporting period.

Tritium Surface Soil Monitoring

The tritium surface soil monitoring frequency is annual. Soil samples were collected on August 30, 2017. Reported tritium activities were all below the MDA, consistent with historical data, and below the trigger level of 20,000 pCi/L.

Soil-Vapor Monitoring

The vadose zone soil-vapor monitoring frequency is semiannual. A total of 27 VOCs were detected during the May 2017 sampling event and a total of 22 VOCs were detected during the October 2017 sampling event. 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 0.390 ppmv and 0.250 ppmv, respectively. The maximum concentration for Total VOCs at the 400 ft bgs sampling ports was 0.69654 ppmv. 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 1.8 to 5.2 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 historical MWL groundwater monitoring results.

Biota Monitoring

Biota monitoring frequency is annual. All metals and radionuclide results were below respective NMED-approved background levels and trigger levels.

11.2 Inspections/Maintenance/Repairs Activities

The annual ET Cover Biology Inspection was performed on August 21, 2017 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 was required during this reporting period, and no supplemental watering was needed. The ET Cover vegetation is in excellent condition and no issues requiring maintenance or repairs were identified.

The ET Cover System/Surface Inspection was 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 9, 2018 final inspection. The fence was cleared by the ET Cover maintenance contractor as of April 27, 2018, 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 and no issues requiring repairs or maintenance were identified.

Three routine weed control events were conducted as a best practice during the 2017 growing season. These events included removal of dead, windblown tumbleweeds from the ET Cover surface, perimeter fence, and drainage swale as well as the application of herbicides to North

and South Staging Areas and a 3-foot area outside the perimeter fence. 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.

11.3 Regulatory Activities

Regulatory activities during the April 2017 – March 2018 reporting period included submittal of the fourth MWL Annual LTMM Report, April 2016 – March 2017, in June 2017. NMED approved the report in April 2018 (Kielling April 2018).

Updates to documents used by SNL/NM personnel to perform monitoring activities at the MWL were submitted to NMED in July 2017 and February 2018.

11.4 Conclusions

All required MWL LTMM monitoring, inspection, and maintenance/repair activities for the April 1, 2017 through March 31, 2018 reporting period were performed and documented in this fifth Annual LTMM Report, which meets the requirements of the MWL LTMM, 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 on monitoring and inspection results, site conditions continue to be protective of human health and the environment.

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12.0 REFERENCES

American Public Health Association American Water Works Association, and Water Environment Federation, 1988. "Standard Methods for the Examination of Water and Wastewater," 7500-Rn B Method, 20th Edition, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C., 1998.

Blaine, T. (New Mexico Environment Department), January 2014. Letter to G.L. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and S. Andrew Orrell (Sandia National Laboratories/New Mexico), "Approval, Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, March 2012, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-12-007," January 8, 2014.

Curry, R. (New Mexico Environment Department), May 2005. "Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill, Sandia National Laboratories, Bernalillo County, New Mexico," EPA ID# 5890110518." May 26, 2005.

Dinwiddie, R.S. (New Mexico Environment Department), September 1997. Letter to M.J. Zamorski (U.S. Department of Energy), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB," September 24, 1997.

EPA, see U.S. Environmental Protection Agency.

Flynn, R. (New Mexico Environment Department), February 2016. Final Order No. HWB 15-18 (P), State of New Mexico Before the Secretary of the Environment in the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID #5890110518, To Determine Corrective Action Complete with Controls at the Mixed Waste Landfill, New Mexico Environment Department, Santa Fe, New Mexico, February 12, 2016.

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

Kieling, J.E. (New Mexico Environment Department), February 2016. Letter to J.P. Harrell (U.S. Department of Energy NNSA/Sandia Field Office) and P.B. Davies (Sandia National Laboratories, New Mexico), "Approval, Final Decision on Proposal to Grant Corrective Action Complete with Controls Status for Mixed Waste Landfill, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-14-014," February 18, 2016.

Kieling, J.E. (New Mexico Environment Department), April 2018. Letter to J.P. Harrell (U.S. Department of Energy NNSA/Sandia Field Office) and J. Huff (Sandia National Laboratories, New Mexico), "Approval, Mixed Waste Landfill Annual Long-Term Monitoring & Maintenance Report, April 2016 – March 2017, June 2017, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-17-009," April 6, 2018.

New Mexico Environment Department (NMED), April 2004. "Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act § 74-4-10," prepared by the New Mexico Environment Department in the matter of Respondents U.S. Department of Energy and Sandia Corporation, Sandia National Laboratories, Bernalillo County, New Mexico, April 29, 2004.

New Mexico Environment Department (NMED), October 2009 and subsequent revisions. "Resource Conservation and Recovery Act, Post-Closure Care Permit, EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Chemical Waste Landfill," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, October 15, 2009. Revised November 7, 2013.

New Mexico Environment Department (NMED), January 2015, and subsequent revisions. "Resource Conservation and Recovery Act Facility Operating Permit EPA ID Number NM5890110518 Issued to the U.S. Department of Energy/Sandia Corporation for the Sandia National Laboratories Hazardous and Mixed Waste Treatment and Storage Units and Post-Closure Care of the Corrective Action Management Unit," January 27, 2015.

NMED, see New Mexico Environment Department.

Peace, J.L., T.J. Goering, M.D. McVey, September 2002. "Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico," SAND2002-2997, Sandia National Laboratories, Albuquerque, New Mexico.

Peace, J.L., P.J. Knight, T.S. Ashton, and T.J. Goering, November 2004. "Vegetation Study in Support of the Design and Optimization of Vegetative Soil Covers, Sandia National Laboratories, Albuquerque, New Mexico," SAND2004-6144, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), August 2008. "Investigation Report on the Soil-Vapor Volatile Organic Compounds, Tritium, and Radon Sampling at the Mixed Waste Landfill," Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), June 2010. "Mixed Waste Landfill Groundwater Monitoring Report, Calendar Year 2009," Sandia National Laboratories, Albuquerque, New Mexico, June 7, 2010.

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 2014. "Data Validation Procedure for Chemical and Radiochemical Data," AOP 00-03, Revision 4, Sample Management Office, 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, April 2014 – March 2015," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), October 2016. "Field Operating Procedure, Soil Vapor Monitoring, Revision 04," SNL/NM FOP 08-22, Long-Term Stewardship Department, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), June 2017a. "Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, April 2016 – March 2017," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), June 2017b. "Data Validation Procedure for Chemical and Radiochemical Data," AOP 00-03, Revision 5, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico.

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

Sullivan, R.M., and P.J. Knight, 1992. "Biological Assessment for the Sandia National Laboratories Coyote Canyon Test Complex, Kirtland Air Force Base, Albuquerque, New Mexico," Special Technical Report 1 (Contract AB4892), Physical Sciences Laboratory, Las Cruces, New Mexico.

U.S. Environmental Protection Agency (EPA), 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.

U.S. Environmental Protection Agency (EPA), November 1986. "Test Methods for Evaluating Solid Waste," Third Edition, Update 3, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), August 1993. "Module IV. Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA for Sandia National Laboratories/New Mexico, EPA I.D. Number NM 5890880518," U.S. Environmental Protection Agency, Region VI, Dallas, Texas. August 26, 1993.

U.S. Environmental Protection Agency (EPA), January 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.

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ANNEX A

**Mixed Waste Landfill
Radon Monitoring**

January-December 2017

Data Evaluation Memos

Field Forms

Inspection Forms

Contract Verification Reviews

MIXED WASTE LANDFILL

RADON MONITORING

January-March 2017 Monitoring Period



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

Albuquerque, New Mexico 87185-0651

date: June 5, 2017

to: Mike Mitchell (8854), Robert Ziock (641), Bonnie Little (631), and
Annemarie Rader (641)

from: Kelly Green (628-1) kagreen@sandia.gov *Kelly Green*

subject: Review of MWL Radon Air Data – January through March 2017 Quarterly Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the January through March 2017 quarterly 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, we decided to return to quarterly monitoring for CY 2017 after review of the July through December 2016 results. Details regarding this decision and the ongoing radon detector investigation are provided in this memo after my evaluation of the January through March 2017 quarterly results.

The radon air monitoring measurements were obtained using Radtrak2[®] radon detectors that were submitted to Landauer[®] Nordic Laboratory for analysis on Analysis Request/Chain of Custody (AR/COC) #617811. On January 4, 2017, the detectors were deployed on and around the MWL (locations RN1 through RN15 at the MWL, background locations RN16 and RN17, and a trip blank that was never exposed, RNTB) in accordance with the requirements of Section 3.2.1 of the LTMMP. The detectors remained in the field for approximately 3 months and were collected on April 3, 2017. The protective casing and mounting hardware were inspected during the collection effort and repairs were made if needed. The location of the detectors is shown in Figure 1.

The results for this monitoring period along with supporting field documentation meet the LTMMP DQO and monitoring objectives. The radon results were consistent with the July through December 2016 results. All results were non-detects with a detection limit of 0.4 pCi/L due to the three-month deployment period. The trigger level 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). The results from this quarterly monitoring event will be presented in the next MWL Annual LTMM Report

that will be submitted to NMED in June 2018 (reporting period is April 1, 2017 through March 31, 2018).

Radon Detector Investigation

The July-December 2016 semiannual monitoring event was the first time Radtrak2[®] detectors were used for radon monitoring at the MWL. As documented in my data evaluation memo dated April 12, 2017, the Radtrak[®] detector was phased out by Landauer[®] and replaced with the new Radtrak2[®] detector. The Radtrak2[®] detector was selected because it was the direct replacement for the original Radtrak[®] detector and could be used for a 6-month deployment period. The more sensitive RapiDOS[®] detector was not selected because it has a maximum deployment period of 3 months, and the transition had already been made to semiannual monitoring (i.e., 6-month).

The results for the July through December 2016 monitoring period (obtained from Radtrak2[®] detectors) were lower than previous results measured using the original Radtrak[®] detectors. After receiving the data report for the July through December 2016 monitoring period in February 2017, we initiated our investigation to further evaluate the newer Radtrak2[®] detectors, including the testing of other detector types. As part of this investigation, the decision was made to move back to quarterly monitoring to allow for the collection of more data to support the investigation. The Radtrak2[®] detectors deployed on January 4, 2017 were collected on April 3, 2017 (January through March 2017 quarterly monitoring period). A side-by-side deployment of Radtrak2[®] and RapiDOS[®] detectors, at every monitoring location, is currently in process for the April through June 2017 quarterly monitoring period, as recommended by the Landauer[®] Nordic Laboratory Manager.

The Landauer[®] Nordic Laboratory Manager followed up with correspondence on April 10, 2017 (after the deployment on April 3) that provided a more likely explanation for the lower values measured by the new Radtrak2[®] detectors. He clarified that the new detectors are designed to have a longer diffusion time than the older Radtrak[®] detectors, preventing thoron (Radon-220 with a half-life of just 56 seconds) from entering the detector. In other words, the newer Radtrak2[®] detectors should measure lower activities because they do not measure thoron. Based upon this information, a triple deployment of detectors is now scheduled for the July through September 2017 quarterly monitoring period. This deployment will include 1) Radtrak2[®] detectors modified with holes and paper filters so they measure both thoron and radon, 2) Radtrak2[®] detectors that only measure radon, and 3) RapiDOS[®] detectors that also only measure radon with a lower detection limit. The results from the triple deployment period will help determine the impact thoron may have had on the higher radon values measured in monitoring events conducted through June 2016, using the older Radtrak[®] detectors. A decision regarding which radon monitoring detectors will be used in the future and the corresponding period of deployment will be made based upon evaluation of CY2017 quarterly monitoring data sets.

Attachments:

Analysis Request/Chain of Custody #617811
Landauer Radon Monitoring Report (analytical laboratory results)
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

Internal Lab

Page 1 of 2

Batch No. <i>N/A</i>		SMO Use		AR/COC 617811								
Project Name: MWL RADON MONITORING		Date Samples Shipped: <i>4/5/17</i>		SMO Authorization: <i>[Signature]</i>								
Project/Task Manager: Robert Ziock		Carrier/Waybill No.: <i>263305</i>		SMO Contact Phone: <i>[Signature]</i>								
Project/Task Number: 195122.10.11.08		Lab Contact: Amy Kruszynski		Wendy Palencia/505-844-3132								
Service Order: CF378-17		Lab Destination: LAND		Send Report to SMO: <input checked="" type="checkbox"/> 4° Celsius								
		Contract No.: 1495047		Stephanie Montaño/505.284.2553								
Tech Area:		Operational Site:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154								
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
102233	001	RN-1 Radtrak 627057-3	NA	4/3/17 11:17	AF	N	0 NA	NONE	Collector	Sample	RADON	
102234	001	RN-2 Radtrak 402562-3	NA	4/3/17 10:23	AF	N	0 NA	NONE	Collector	Sample	RADON	
102235	001	RN-3 Radtrak 625656-4	NA	4/3/17 10:31	AF	N	0 NA	NONE	Collector	Sample	RADON	
102236	001	RN-4 Radtrak 703671-8	NA	4/3/17 11:08	AF	N	0 NA	NONE	Collector	Sample	RADON	
102237	001	RN-5 Radtrak 507308-5	NA	4/3/17 12:15	AF	N	0 NA	NONE	Collector	Sample	RADON	
102238	001	RN-6 Radtrak 131171-1	NA	4/3/17 12:10	AF	N	0 NA	NONE	Collector	Sample	RADON	
102239	001	RN-7 Radtrak 612987-8	NA	4/3/17 12:03	AF	N	0 NA	NONE	Collector	Sample	RADON	
102240	001	RN-8 Radtrak 996619-3	NA	4/3/17 11:40	AF	N	0 NA	NONE	Collector	Sample	RADON	
102241	001	RN-9 Radtrak 380112-7	NA	4/3/17 11:32	AF	N	0 NA	NONE	Collector	Sample	RADON	
102242	001	RN-10 Radtrak 658720-8	NA	4/3/17 11:26	AF	N	0 NA	NONE	Collector	Sample	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:		Turnaround Time		<input checked="" type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT								
Confirmatory: <input type="checkbox"/> Yes		QC initials:		Sample Disposal		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Return Samples By:		Comments: Samples were deployed on 1/4/17 and collected on 4/3/17.				
	Annemarie Rader	<i>[Signature]</i>	<i>AR</i>	SNL/04141/505-844-2640/505-382-9197								
Relinquished by <i>[Signature]</i>		Org. 4141	Date 4-4-17	Time 12:20pm	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org. 4131	Date 4/4/17	Time 1:21p	Received by		Org.	Date	Time			
Relinquished by <i>[Signature]</i>		Org. 4131	Date 4/5/17	Time 07:30	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org. 46	Date 4-6-17	Time	Received by		Org.	Date	Time			

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

SMO 2012-ARCOG (4-2012)

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

AOP 95-16

AR/COC **617811**

Project Name: MWL RADON MONITORING		Project/Task Manager: Robert Zlock		Project/Task No.: 195122.10.11.08									
Tech Area:													
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 use	
						Type	Volume					Lab Sample ID	
102243	001	RN-11 Radtrak 975536-4	NA	4/3/17 10:41	AF	N	0 NA	NONE	Collection	Sample	RADON		
102244	001	RN-12 Radtrak 130986-3	NA	4/3/17 10:50	AF	N	0 NA	NONE	Collection	Sample	RADON		
102245	001	RN-13 Radtrak 248716-3	NA	4/3/17 10:56	AF	N	0 NA	NONE	Collection	Sample	RADON		
102246	001	RN-14 Radtrak 987902-4	NA	4/3/17 11:03	AF	N	0 NA	NONE	Collection	Sample	RADON		
102247	001	RN-15 Radtrak 606910-8	NA	4/3/17 10:46	AF	N	0 NA	NONE	Collection	Sample	RADON		
102248	001	RN-16 Radtrak 265664-3	NA	4/3/17 12:20	AF	N	0 NA	NONE	Collection	Sample	RADON		
102249	001	RN-17 Radtrak 771008-0	NA	4/3/17 11:51	AF	N	0 NA	NONE	Collection	Sample	RADON		
102250	001	RNTB Radtrak 715804-1	NA	4/3/17 12:25	AF	N	0 NA	NONE	Collection	Sample	RADON		
Recipient Initials													

87185 US Sida 1



Robert Ziock
MWL Radon Monitoring
P.O. Box 5800
MS-1103
Albuquerque NM 87185
United States

RADON MONITORING REPORT

Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER 4699831:1 REPORT PAGE 1(6)

REPORT DATE 04/17/2017 PRINT DATE 04/17/2017

MEASUREMENT PERFORMED FOR
Robert Ziock
MWL Radon Monitoring
P.O. Box 5800
Albuquerque NM 87185

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 Landauer Nordic 04/06/2017. They were measured 04/12/2017 .

Property data and address

Building Id: 6

MWL Radon Monitoring
P.O. Box 5800
Albuquerque NM 87185

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

MS-1103

Test data have been given by Annemarie Rader

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. LANDAUER NORDIC 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 pCi² days/l will be reported. The reported measured values are related to the detectors as received by Landauer Nordic. Detector deployment is not performed by Landauer Nordic. Measurement information such as monitoring period (dates) and placement location is provided to Landauer Nordic 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 LANDAUER NORDIC 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.

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4699831:1

REPORT PAGE 2 ()

REPORT DATE
 04/17/2017

PRINT DATE
 04/17/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
627057-3	01/04/2017	04/03/2017	RN1	102233-001		< 0.4	< 35
402562-3	01/04/2017	04/03/2017	RN2	102234-001		< 0.4	< 35
625656-4	01/04/2017	04/03/2017	RN3	102235-001		< 0.4	< 35
703671-8	01/04/2017	04/03/2017	RN4	102236-001		< 0.4	< 35
507308-5	01/04/2017	04/03/2017	RN5	102237-001		< 0.4	< 35
131171-1	01/04/2017	04/03/2017	RN6	102238-001		< 0.4	< 35
612987-8	01/04/2017	04/03/2017	RN7	102239-001		< 0.4	< 35
996619-3	01/04/2017	04/03/2017	RN8	102240-001		< 0.4	< 35

RT002LN-V120/2016-04-21 11:01:18

Comment to the results

Detector 380112-7 listed on COC, not received.

Detector 380112-7, RN9, was received by the laboratory, analyzed, and the result (<0.4 pCi/L) provided to SNL on May 11, 2017.

Tryggve Rönnqvist (Electronically signed)

Signature Landauer Nordic Laboratory Measurement Specialist

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87185 US Sida 3



Robert Ziock
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Albuquerque NM 87185
United States

RADON MONITORING REPORT

Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER 4699831:1 REPORT PAGE 3 (6)

REPORT DATE 04/17/2017 PRINT DATE 04/17/2017

MEASUREMENT PERFORMED FOR
Robert Ziock
MWL Radon Monitoring
P.O. Box 5800
Albuquerque NM 87185

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 Landauer Nordic 04/06/2017. They were measured 04/12/2017 .

Property data and address

Building Id: 6

MWL Radon Monitoring
P.O. Box 5800
Albuquerque NM 87185

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

MS-1103

Test data have been given by Annemarie Rader

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. LANDAUER NORDIC 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.

NRFP 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 Landauer Nordic. Detector deployment is not performed by Landauer Nordic. Measurement information such as monitoring period (dates) and placement location is provided to Landauer Nordic 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.

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

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER 4699831:1 REPORT PAGE 4 ()
 REPORT DATE 04/17/2017 PRINT DATE 04/17/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
658720-8	01/04/2017	04/03/2017	RN10	102242-001		< 0.4	< 35
975536-4	01/04/2017	04/03/2017	RN11	102243-001		< 0.4	< 35
130986-3	01/04/2017	04/03/2017	RN12	102244-001		< 0.4	< 35
248716-3	01/04/2017	04/03/2017	RN13	102245-001		< 0.4	< 35
987902-4	01/04/2017	04/03/2017	RN14	102246-001		< 0.4	< 35
606910-8	01/04/2017	04/03/2017	RN15	102247-001		< 0.4	< 35
265664-3	01/04/2017	04/03/2017	RN16	102248-001		< 0.4	< 35
771008-0	01/04/2017	04/03/2017	RN17	102249-001		< 0.4	< 35

RT002LN-V1 2017-04-04 21:11:07 / LB

Comment to the results

Detector 380112-7 listed on COC. not received.

Detector 380112-7, RN9, was received by the laboratory, analyzed, and the result (<0.4 pCi/L) provided to SNL on May 11, 2017.

Trygve Rönnqvist (Electronically signed)

Signature Landauer Nordic Laboratory Measurement Specialist

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87185 US Sida 5



Robert Ziock
MWL Radon Monitoring
P.O. Box 5800
MS-1103
Albuquerque NM 87185
United States

RADON MONITORING REPORT

Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER 4699831:1 REPORT PAGE 5(6)

REPORT DATE 04/17/2017 PRINT DATE 04/17/2017

MEASUREMENT PERFORMED FOR
Robert Ziock
MWL Radon Monitoring
P.O. Box 5800
Albuquerque NM 87185

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 Landauer Nordic 04/06/2017. They were measured 04/12/2017 .

Property data and address

Building Id: 6

MWL Radon Monitoring
P.O. Box 5800
Albuquerque NM 87185

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

MS-1103

Test data have been given by Annemarie Rader

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. LANDAUER NORDIC 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.

NRFP 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 pCi² days/l will be reported. The reported measured values are related to the detectors as received by Landauer Nordic. Detector deployment is not performed by Landauer Nordic. Measurement information such as monitoring period (dates) and placement location is provided to Landauer Nordic 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 LANDAUER NORDIC 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.

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RT002LN-V1-2017-04-21 13:07:18



RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4699831:1

REPORT PAGE 6 ()

REPORT DATE
 04/17/2017

PRINT DATE
 04/17/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
715804-1	01/04/2017	04/03/2017	RNTB	102250-001		< 0.4	< 36

RT002LN -VI.20 / 2016-04-21 / J.O./LB

Comment to the results

Detector 380112-7 listed on COC, not received.

Detector 380112-7, RN9, was received by the laboratory, analyzed, and the result (<0.4 pCi/L) provided to SNL on May 11, 2017.

Tryggve Rönnqvist (Electronically signed)

Signature Landauer Nordic Laboratory Measurement Specialist

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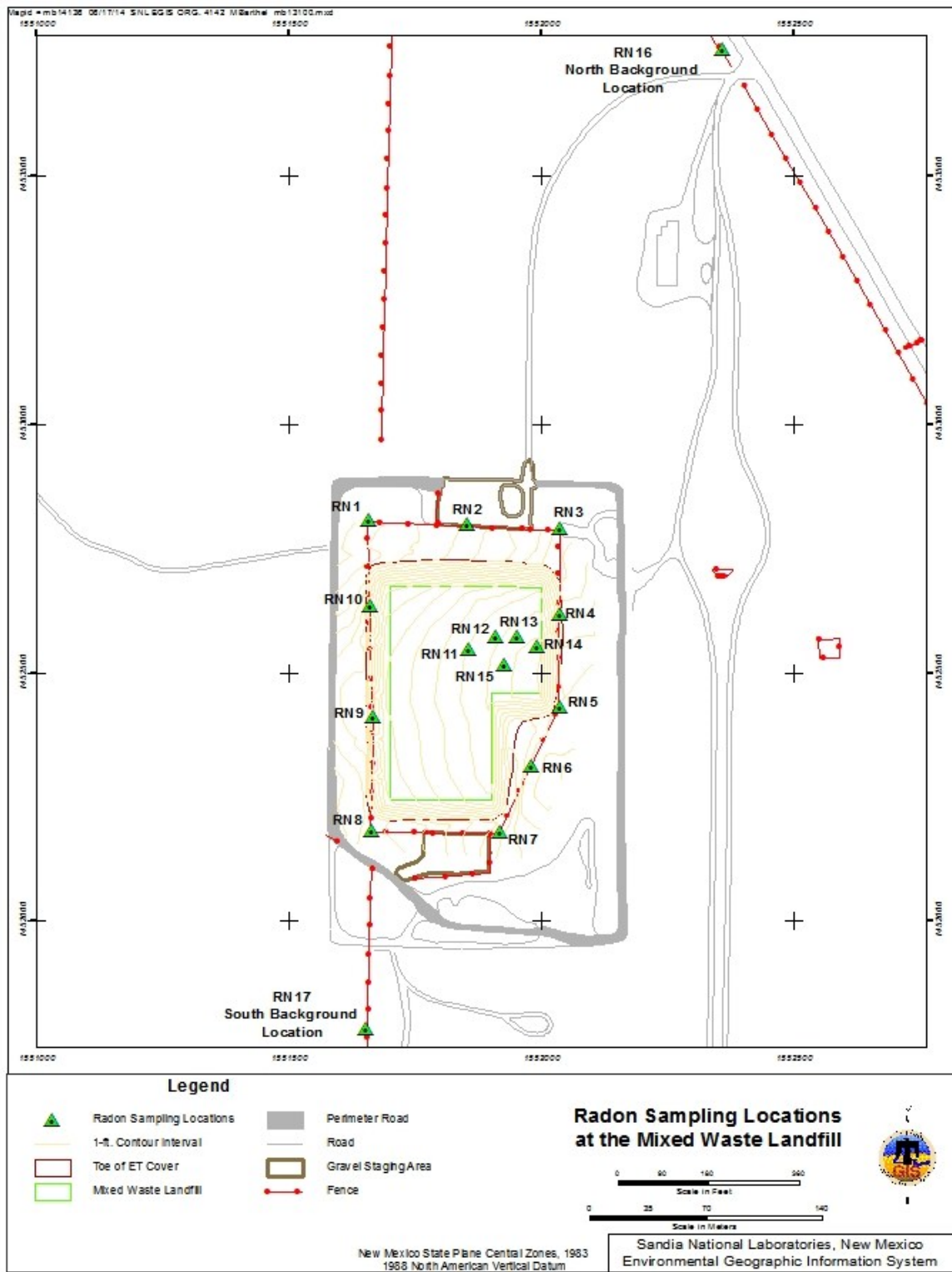


Figure 1. Location of the Alpha Track Detectors at the MWL

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

Name: Annemarie Rader Signature: [Signature] Activity (check all that apply):
 Deployment Collection
 Name: _____ Signature: _____ Deployment Collection
 ARCOG #: 617811 Detector Type: Radtrack

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
627657-3	102233-001	RN1	1-4-17	1530	4-3-17	1117	
402562-3	102234-001	RN2		1515		1023	
625656-4	102235-001	RN3		1510		1031	
703671-8	102236-001	RN4		1607		1108	
507308-5	102237-001	RN5		1645		1215	
131171-1	102238-001	RN6		1640		1210	
612987-8	102239-001	RN7		1636		1203	
996619-3	102240-001	RN8		1620		1140	
380112-7	102241-001	RN9		1616		1132	
658720-8	102242-001	RN10		1610		1126	
975536-4	102243-001	RN11		1540		1041	
130986-3	102244-001	RN12		1545		1050	
248716-3	102245-001	RN13		1550		1056	
987902-4	102246-001	RN14		1555		1103	
606910-8	102247-001	RN15		1600		1046	
265664-3	102248-001	RN16		1525		1220	
771008-0	102249-001	RN17		1630		1151	
715804-1	102250-001	RNTB		0000		1225	

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. 617811

Analytical Lab LAND

SDG No. 4699831-1

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	N/A		
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	X		
3.3	Accuracy	N/A		
	a) Laboratory control sample accuracy reported and met for all samples			
	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	N/A		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data	N/A		
	a) Method or reagent blank data reported and met for all samples			
	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	N/A		
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)	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			
	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: 05-11-2017 11:03:00

Closed by: Wendy Palencia Date: 05-11-2017 11:03:00

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName Annemarie RaderSignature Date of Inspection 2-9-2017

Inspection parameters: Identification labeling; mounting post; mounting bracket and stainless steel clamp; radon monitoring apparatus components (outer metal housing, 2 wing nuts, plastic assembly parts, zip ties, ~~Rapidos~~^{Radiak} detector),
 Radiak ^{on 3-23-17}

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 Form

Name Annemarie Rader

Signature 

Date of Inspection 03-02-17

Inspection parameters: Identification labeling; mounting post; mounting bracket and stainless steel clamp; radon monitoring apparatus components (outer metal housing, 2 wing nuts, plastic assembly parts, zip ties, ~~Rapidos~~ ^{Rapidos} detector).
 Rader 3-23-17

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	Removed spider and web, Resolved 3-2-17.
RN11	None
RN12	None
RN13	None
RN14	None
RN15	None
RN16	None
RN17	Removed spider and web, Resolved 3-2-17

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

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MIXED WASTE LANDFILL

RADON MONITORING

April-June 2017 Monitoring Period



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

Albuquerque, New Mexico 87185-0651

date: September 15, 2017

to: Mike Mitchell (8854), Robert Ziock (641), and Bonnie Little (631)

from: Kelly Green (6283) kagreen@sandia.gov

A handwritten signature in cursive script that reads 'Kelly Green'.

subject: Review of MWL Radon Air Data – April through June 2017 Quarterly Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the April through June 2017 quarterly 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 after review of the July through December 2016 results. Details regarding this decision and the ongoing radon detector investigation are provided in this memo after the evaluation of April through June 2017 results.

Radon air monitoring measurements during the April through June 2017 quarter were obtained using Radtrak2[®] radon detectors and Rapidos[®] detectors that were deployed side by side at each of the monitoring locations (locations are shown in Figure 1). The detectors were deployed on April 3, 2017 and were collected on July 5, 2017 in accordance with the requirements of Section 3.2.1 of the LTMMP. 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 3 months and were submitted to the analytical laboratory for analysis on Analysis Request/Chain of Custody (AR/COC) #617812 and AR/COC #617990, respectively. A trip blank detector (RNTB) was submitted with both sets of detectors.

The results for this monitoring period and associated field documentation meet the LTMMP DQO and monitoring objectives. The radon results were consistent with the January through March 2017 results. All results for the Radtrak2[®] detectors were non-detects with a detection limit of 0.4 pCi/L. The results for the Rapidos[®] detectors, which have a lower detection limit, ranged from non-detects

(< 0.08 pCi/L) at locations RN4, RN10, and RN11 to 0.16 pCi/L at RN5. The Rapido[®] results include detections at 14 of the 17 field locations, with a range of 0.08 pCi/L to 0.16 pCi/L. 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). Both sets of results are consistent and indicate very low activities of radon in the air at the MWL, consistent with background radon activity. The results from this quarterly monitoring event will be presented in the next MWL Annual LTMM Report that will be submitted to NMED in June 2018 (reporting period is April 1, 2017 through March 31, 2018).

Radon Detector Investigation Background Information

The July through December 2016 semiannual monitoring event was the first time Radtrak2[®] detectors were used for radon monitoring at the MWL. As documented in my data evaluation memo dated April 12, 2017, the Radtrak[®] detector was phased out by the manufacturer and replaced with the new Radtrak2[®] detector. The Radtrak2[®] detector was selected because it was the direct replacement for the original Radtrak[®] detector and could be used for a 6-month deployment period. The Rapidos[®] detector has a lower radon detection limit but was not selected because it has a maximum deployment period of 3 months.

The Radtrak2[®] detector results for the July through December 2016 monitoring period were lower than previous results measured using the original Radtrak[®] detectors. After receiving the data report for the July through December 2016 monitoring period in February 2017, we initiated our investigation to further evaluate the newer Radtrak2[®] detectors, including the testing of other detector types. The decision was made to move back to quarterly monitoring to allow for the collection of more data in a shorter period of time to support the investigation.

Based on correspondence with the analytical laboratory manager during April 2017, the most likely explanation for the lower values measured by the new Radtrak2[®] detectors is that they are designed to have a longer diffusion time than the original Radtrak[®] detectors. Because of this design change, thoron (Radon-220 with a half-life of just 56 seconds) is not measured by the Radtrak2[®] detector, but is measured by the original Radtrak[®] detector. In other words, when deployed under the same conditions, the newer Radtrak2[®] detectors should measure lower activities than the Radtrak[®] detectors because they do not measure only radon, not radon and thoron. This information was received after the deployment of detectors for the April through June 2017 monitoring period, so only Rapidos[®] and Radtrak2[®] detectors were deployed at each location.

To test this hypothesis, three sets of detectors were deployed on July 5th for the July through September 2017 quarterly monitoring period. The deployment included placement of three detectors at each monitoring location: 1) thoron detectors (i.e., Radtrak2[®] detectors modified with holes and paper filters so they measure both thoron and radon similar to the original Radtrak[®] detectors), 2) Radtrak2[®] detectors that only measure radon, and 3) Rapidos[®] detectors that also only measure radon but with a lower detection limit than the Radtrak2[®] detectors. The results from this triple deployment (detectors to be collected in early October 2017) will help determine the impact thoron may have had on the higher radon values measured in monitoring events conducted through June 2016, using original Radtrak[®] detectors. A decision regarding the selection of a detector for future monitoring events will be made based upon evaluation of CY2017 quarterly monitoring data sets.

Review of MWL Radon-in-Air Data
2nd Quarter CY 2017 (April - June 2017)
September 15, 2017

Attachments:

Analysis Request/Chain of Custody #617812

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

Analysis Request/Chain of Custody #617990

Landauer Radon Monitoring Report (analytical laboratory results for RapiDOS[®] detectors)

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

SMO 2012-ARCOG (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		617812						
Project Name: MWL RADON MONITORIN		Date Samples Shipped: 7.6.17		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 Zlock		Carrier/Waybill No. 267739		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: Amy Kruszynski		Send Report to SMO: Stephanie Montaño/505.284.2553								
Service Order: CF378-17		Lab Destination: LAND		Contract No.: 1495047								
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					
102251	001	RN1/ Radtrak2 312202-5	N/A	7/5/17 1035	AF	N	0 NA	NONE	C	SA	RADON	
102252	001	RN2/ Radtrak2 312705-7	N/A	7/5/17 1040	AF	N	0 NA	NONE	C	SA	RADON	
102253	001	RN3/ Radtrak2 311785-2	N/A	7/5/17 0908	AF	N	0 NA	NONE	C	SA	RADON	
102254	001	RN4/ Radtrak2 324264-1	N/A	7/5/17 0917	AF	N	0 NA	NONE	C	SA	RADON	
102255	001	RN5/ Radtrak2 317285-5	N/A	7/5/17 0928	AF	N	0 NA	NONE	C	SA	RADON	
102256	001	RN6/ Radtrak2 324550-3	N/A	7/5/17 0936	AF	N	0 NA	NONE	C	SA	RADON	
102257	001	RN7/ Radtrak2 325635-1	N/A	7/5/17 0945	AF	N	0 NA	NONE	C	SA	RADON	
102258	001	RN8/ Radtrak2 324779-8	N/A	7/5/17 1012	AF	N	0 NA	NONE	C	SA	RADON	
102259	001	RN9/ Radtrak2 325782-1	N/A	7/5/17 1025	AF	N	0 NA	NONE	C	SA	RADON	
102260	001	RN10/ Radtrak2 317845-6	N/A	7/5/17 1025	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"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab						
Sample Team Members		Name		Signature		Init.		Company/Organization/Phone/Cell		Return Samples By:		
		Robert Zlock		[Signature]		[Initials]		SNL/00641/505-845-0485/505-238-3668		Comments:		
		Annetmarie Rader		[Signature]		[Initials]		SNL/00641/505-844-2640/505-382-9197				
		Danielle Michel		[Signature]		[Initials]		SNL/00641/505-845-7706/505-219-7143				
Relinquished by [Signature]		Org. 641		Date 7/5/17		Time 1314		Relinquished by [Signature]		Org. Date 7/7/17 Time 5 PM		
Received by [Signature]		Org. 0631		Date 7/6/17		Time 1314		Received by [Signature]		Org. Date 7/11/17 Time 11 AM		
Relinquished by [Signature]		Org. 0631		Date 7/6/17		Time 0800		Relinquished by [Signature]		Org. Date Time		
Received by [Signature]		Org. 0631		Date 7/7/17		Time 2:00		Received by [Signature]		Org. Date Time		

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

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

617812 *MS/A*
 Page 2 of 2

AR/COC **647989**

Project Name:		MWL RADON MONITORIN		Project/Task Manager:		Robert Zlock		Project/Task No.:		195122.10.11.08		Lab use
Tech Area:				Building:				<th colspan="2"> </th>				
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
102261	001	RN11/ Radtrak2 324569-3	N/A	7/5/17 1105	AF	N	0 NA	NONE	C	SA	RADON	
102262	001	RN12/ Radtrak2 324452-2	N/A	1106	AF	N	0 NA	NONE	C	SA	RADON	
102263	001	RN13/ Radtrak2 312506-9	N/A	1109	AF	N	0 NA	NONE	C	SA	RADON	
102264	001	RN14/ Radtrak2 325535-3	N/A	1113	AF	N	0 NA	NONE	C	SA	RADON	
102265	001	RN15/ Radtrak2 316582-6	N/A	1117	AF	N	0 NA	NONE	C	SA	RADON	
102266	001	RN16/ Radtrak2 317047-9	N/A	0850	AF	N	0 NA	NONE	C	SA	RADON	
102267	001	RN17/ Radtrak2 311558-3	N/A	1000	AF	N	0 NA	NONE	C	SA	RADON	
102268	001	RNTB/ Radtrak2 320103-5 511628-2	N/A	7/5/17 1105	AF	N	0 NA	NONE	C	SA	RADON	
Recipient Initials <i>RK</i>												



RADON MONITORING REPORT

Issued by an Accredited Laboratory



Robert Ziock
United States

REPORT NUMBER 4725979:2
REPORT DATE 10/31/2017
MEASUREMENT PERFORMED FOR Robert Ziock
REPORT PAGE 1(6)
PRINT DATE 10/31/2017

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 07/07/2017. They were measured 07/12/2017.

Property data and address

Building Id:

ARCO# 617812

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.

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4725979:2

REPORT PAGE 2(6)

REPORT DATE
 10/31/2017

PRINT DATE
 10/31/2017

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
312202-5	04/03/2017	07/05/2017	RN1			< 0.4	< 37
312705-7	04/03/2017	07/05/2017	RN2			< 0.4	< 37
311765-2	04/03/2017	07/05/2017	RN3			< 0.4	< 37
324264-1	04/03/2017	07/05/2017	RN4			< 0.4	< 37
317285-5	04/03/2017	07/05/2017	RN5			< 0.4	< 37
324550-3	04/03/2017	07/05/2017	RN6			< 0.4	< 37
325635-1	04/03/2017	07/05/2017	RN7			< 0.4	< 37
324779-8	04/03/2017	07/05/2017	RN8			< 0.4	< 37

RT008LJN - V1.40 / 2017-06-22 / JO / LB

Comment to the results

This report replaces 4725979:1. Reason: detector RN9 has been added to this commission and location codes have been updated for all detectors.

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

Radonova Inc.
 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



Robert Ziock
United States

REPORT NUMBER 4725979-2
REPORT DATE 10/31/2017
MEASUREMENT PERFORMED FOR Robert Ziock
REPORT PAGE 3(6)
PRINT DATE 10/31/2017

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 07/07/2017. They were measured 07/12/2017 .

Property data and address

ARCO# 617812

Building Id:

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.

RT002EN - V1.40 / 2017-06-22 / JO / LB



RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4725979:2

REPORT PAGE 4(6)

REPORT DATE
 10/31/2017

PRINT DATE
 10/31/2017

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
317845-6	04/03/2017	07/05/2017	RN10			< 0.4	< 37
324569-3	04/03/2017	07/05/2017	RN11			< 0.4	< 37
324452-2	04/03/2017	07/05/2017	RN12			< 0.4	< 37
312506-9	04/03/2017	07/05/2017	RN13			< 0.4	< 37
325535-3	04/03/2017	07/05/2017	RN14			< 0.4	< 37
316582-6	04/03/2017	07/05/2017	RN15			< 0.4	< 37
317047-9	04/03/2017	07/05/2017	RN16			< 0.4	< 37
311958-3	04/03/2017	07/05/2017	RN17			< 0.4	< 37

RT000LIN - V1:40 / 2017-06-22 / JJO / LLB

Comment to the results

This report replaces 4725979:1. Reason: detector RN9 has been added to this commission and location codes have been updated for all detectors.

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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RADON MONITORING REPORT

Issued by an Accredited Laboratory



Robert Ziock
United States

REPORT NUMBER 4725979:2
REPORT DATE 10/31/2017
MEASUREMENT PERFORMED FOR Robert Ziock

REPORT PAGE 5(6)
PRINT DATE 10/31/2017

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 07/07/2017. They were measured 07/12/2017.

Property data and address

Building Id:

ARCO# 617812

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.

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4725979:2

REPORT PAGE 6(6)

REPORT DATE
 10/31/2017

PRINT DATE
 10/31/2017

Test results

Detector	Start	Stop	Location	Detector comment	Floor level	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
311628-2	04/03/2017	07/05/2017	RNTB			< 0.4	< 37
325782-1	04/03/2017	07/05/2017	RN9			< 0.4	< 37

RT002LN - V1.40 / 2017-06-23 / JJO / LB

Comment to the results

This report replaces 4725979:1. Reason: detector RN9 has been added to this commission and location codes have been updated for all detectors.

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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SMO 2012-ARCO (4-2012)

**CONTRACT LABORATORY
 ANALYSIS REQUEST AND CHAIN OF CUSTODY**

AOP 95-16

Internal Lab
 Batch No. N/A SMO Use AR/COC **617990** Page 1 of 2

Project Name: MWL RADON MONITORIN Date Samples Shipped: 7.6.17 SMO Authorization: [Signature]
 Project/Task Manager: Robert Zlock Carrier/Waybill No. 267739 SMO Contact Phone: [Signature]
 Project/Task Number: 195122.10.11.08 Lab Contact: Amy Kruszynski Wendy Palencia/505-844-3132
 Service Order: CF378-17 Lab Destination: LAND Send Report to SMO: Stephanie Montano/505.284.2553
 Contract No.: 1495047

Tech Area: _____
 Building: _____ Room: _____ Operational Site: _____

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		Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
102997	001	RN1/ Rapios 752802-9	N/A	7/5/17 1035	AF	N	0 NA	NONE	C	SA	RADON	
102998	001	RN2/ Rapios 410589-6	N/A	7/5/17 1040	AF	N	0 NA	NONE	C	SA	RADON	
102999	001	RN3/ Rapios 409238-3	N/A	7/5/17 0928	AF	N	0 NA	NONE	C	SA	RADON	
103000	001	RN4/ Rapios 410999-7	N/A	7/5/17 0917	AF	N	0 NA	NONE	C	SA	RADON	
103001	001	RN5/ Rapios 764163-2	N/A	7/5/17 0925	AF	N	0 NA	NONE	C	SA	RADON	
103002	001	RN6/ Rapios 410870-0	N/A	7/5/17 0936	AF	N	0 NA	NONE	C	SA	RADON	
103003	001	RN7/ Rapios 410065-7	N/A	7/5/17 0945	AF	N	0 NA	NONE	C	SA	RADON	
103004	001	RN8/ Rapios 409428-0	N/A	7/5/17 1012	AF	N	0 NA	NONE	C	SA	RADON	
103005	001	RN9/ Rapios 410504-5	N/A	7/5/17 1028	AF	N	0 NA	NONE	C	SA	RADON	
103006	001	RN10/ Rapios 976967-0	N/A	7/5/17 1025	AF	N	0 NA	NONE	C	SA	RADON	

Last Chain: Yes
 Validation Req'd: Yes
 Background: Yes
 Confirmatory: Yes

Sample Tracking SMO Use
 Date Entered: _____ Entered by: _____
 QC Inits.: _____

Special Instructions/QC Requirements:
 EDD Yes
 Turnaround Time 7-Day* 15-Day* 30-Day
 Negotiated TAT
 Sample Disposal Return to Client Disposal by Lab

Conditions on Receipt

Sample Team Members

Name	Signature	Init.	Company/Organization/Phone/Cell
Robert Zlock	<u>[Signature]</u>	<u>RZ</u>	SNL/00641/505-845-0485/505-238-3668
AnneMarie Badger	<u>[Signature]</u>		SNL/00641/505-844-2640/505-382-9197
Danielle Michel	<u>[Signature]</u>		SNL/00641/505-845-7706/505-219-7143

Return Samples By: _____
 Comments: _____

Lab Use

Relinquished by	Org.	Date	Time	Relinquished by	Org.	Date	Time
<u>[Signature]</u>	641	7/5/17	12:4	<u>[Signature]</u>	641	7/7/17	5 pm
Received by <u>[Signature]</u>	641	7/5/17	13:14	Received by <u>[Signature]</u>	641	7/7/17	11 AM
Relinquished by <u>[Signature]</u>	0621	7/5/17	0900	Relinquished by <u>[Signature]</u>			
Received by <u>[Signature]</u>		7/7/17	2:00	Received by <u>[Signature]</u>			

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

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

AR/COC **617990**

Project Name:		MWL RADON MONITORIN	Project/Task Manager:		Robert Ziock	Project/Task No.:		195122.10.11.08					Lab use	
Tech Area:												Lab use		
Building:												Lab use		
Room:												Lab use		
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		
103007	001	RN11/ RapiDOS 409724-2	N/A	7/5/17 1100	AF	N	0 NA	NONE	C	SA	RADON			
103008	001	RN12/ RapiDOS 410313-1	N/A	7/5/17 1106	AF	N	0 NA	NONE	C	SA	RADON			
103009	001	RN13/ RapiDOS 411020-0	N/A	7/5/17 1109	AF	N	0 NA	NONE	C	SA	RADON			
103010	001	RN14/ RapiDOS 409243-3	N/A	7/5/17 1113	AF	N	0 NA	NONE	C	SA	RADON			
103011	001	RN15/ RapiDOS 158164-4	N/A	7/5/17 1117	AF	N	0 NA	NONE	C	SA	RADON			
103012	001	RN16/ RapiDOS 220527-6	N/A	7/5/17 0850	AF	N	0 NA	NONE	C	SA	RADON			
103013	001	RN17/ RapiDOS 410868-4	N/A	7/5/17 1000	AF	N	0 NA	NONE	C	SA	RADON			
103014	001	RNTB/ RapiDOS 409765-5	N/A	7/5/17 1125	AF	N	0 NA	NONE	C	SA	RADON			
Recipient Initials _____														

87185

US

18445



RADON MONITORING REPORT

Issued by an Accredited Laboratory



NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT NUMBER 4725980:2
REPORT DATE 07/26/2017
MEASUREMENT PERFORMED FOR
REPORT PAGE 1(4)
PRINT DATE 07/26/2017

REPORT RECEIVER(S)
NTESS, LLC

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

Description of the measurement

The measurement was performed with a closed high-sensitivity alpha-track detector.

The detector(s) arrived to Radonova Laboratories AB 07/07/2017. They were measured 07/12/2017.

Property data and address

ARCO# 617990

Transit Detector 1:
Transit Detector 2:
Transit Detector 3:

Test data have been given by Robert Ziock

Measurement method: closed alpha-track high sensitivity 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. Transit detectors are used for the return delivery of the high-sensitivity detectors in order to make a more accurate background subtraction.

Radonova Laboratories AB 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 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.

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.
- A Citizen's Guide to Radon
- Home Buyer's and Seller's Guide to Radon
- Consumer's Guide to Radon Reduction

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.

US_RT_M6_001-V1.10/2017-06-04-7 JO / LB

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4725980:2

REPORT PAGE 2(4)

REPORT DATE
 07/26/2017

PRINT DATE
 07/26/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Location type	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
752802-9	04/03/2017	07/05/2017	102997	RN1		0.14 +/- 0.09	14 +/- 9
410589-6	04/03/2017	07/05/2017	102998	RN2		0.11 +/- 0.06	11 +/- 7
409238-3	04/03/2017	07/05/2017	102999	RN3		0.14 +/- 0.09	14 +/- 9
410999-7	04/03/2017	07/05/2017	103000	RN4		< 0.08	< 7
764163-2	04/03/2017	07/05/2017	103001	RN5		0.16 +/- 0.09	15 +/- 9
410870-0	04/03/2017	07/05/2017	103002	RN6		0.11 +/- 0.06	10 +/- 7
410065-7	04/03/2017	07/05/2017	103003	RN7		0.14 +/- 0.09	12 +/- 9
409428-0	04/03/2017	07/05/2017	103004	RN8		0.08 +/- 0.09	7 +/- 9
410504-5	04/03/2017	07/05/2017	103005	RN9		0.14 +/- 0.09	12 +/- 9
976967-0	04/03/2017	07/05/2017	103006	RN10		< 0.08	< 7

US_RT_H5_001-VL10/2017405-04-110/LB

Comment to the results

This report replaces 4725980:1. Reason: new or corrected measurement information has been received.

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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 900 Oakmont Lane Suite 207, Westmont IL 60559
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RADON MONITORING REPORT

Issued by an Accredited Laboratory



NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT NUMBER 4725980-2
REPORT DATE 07/26/2017
MEASUREMENT PERFORMED FOR
REPORT PAGE 3(4)
PRINT DATE 07/26/2017

REPORT RECEIVER(S)
NTESS, LLC

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

Description of the measurement

The measurement was performed with a closed high-sensitivity alpha-track detector.

The detector(s) arrived to Radonova Laboratories AB 07/07/2017. They were measured 07/12/2017.

Property data and address

ARCO# 617990

Transit Detector 1:
Transit Detector 2:
Transit Detector 3:

Test data have been given by Robert Ziock

Measurement method: closed alpha-track high sensitivity 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. Transit detectors are used for the return delivery of the high-sensitivity detectors in order to make a more accurate background subtraction.

Radonova Laboratories AB 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 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.

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.
- A Citizen's Guide to Radon
- Home Buyer's and Seller's Guide to Radon
- Consumer's Guide to Radon Reduction

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.

US_RT_HL_001 - VI.10/2017-06-04-7 JO / LB

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
4725980:2

REPORT PAGE 4(4)

REPORT DATE
07/26/2017

PRINT DATE
07/26/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Location type	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
409724-2	04/03/2017	07/05/2017	103007	RN11		< 0.08	< 7
410313-1	04/03/2017	07/05/2017	103008	RN12		0.11 +/- 0.09	11 +/- 9
411020-1	04/03/2017	07/05/2017	103009	RN13		0.11 +/- 0.09	10 +/- 9
409243-3	04/03/2017	07/05/2017	103010	RN14		0.11 +/- 0.09	9 +/- 9
158164-4	04/03/2017	07/05/2017	103011	RN15		0.14 +/- 0.09	14 +/- 9
220527-6	04/03/2017	07/05/2017	103012	RN16		0.11 +/- 0.09	11 +/- 9
409765-5	04/03/2017	07/05/2017	103014	RNTB		< 0.08	< 7
410868-4	04/03/2017	07/05/2017	103013	RN17		0.11 +/- 0.09	11 +/- 9

US_RT_HIS_001-V1.10/2017-05-04-FJO/LB

Comment to the results

This report replaces 4725980:1. Reason: new or corrected measurement information has been received.

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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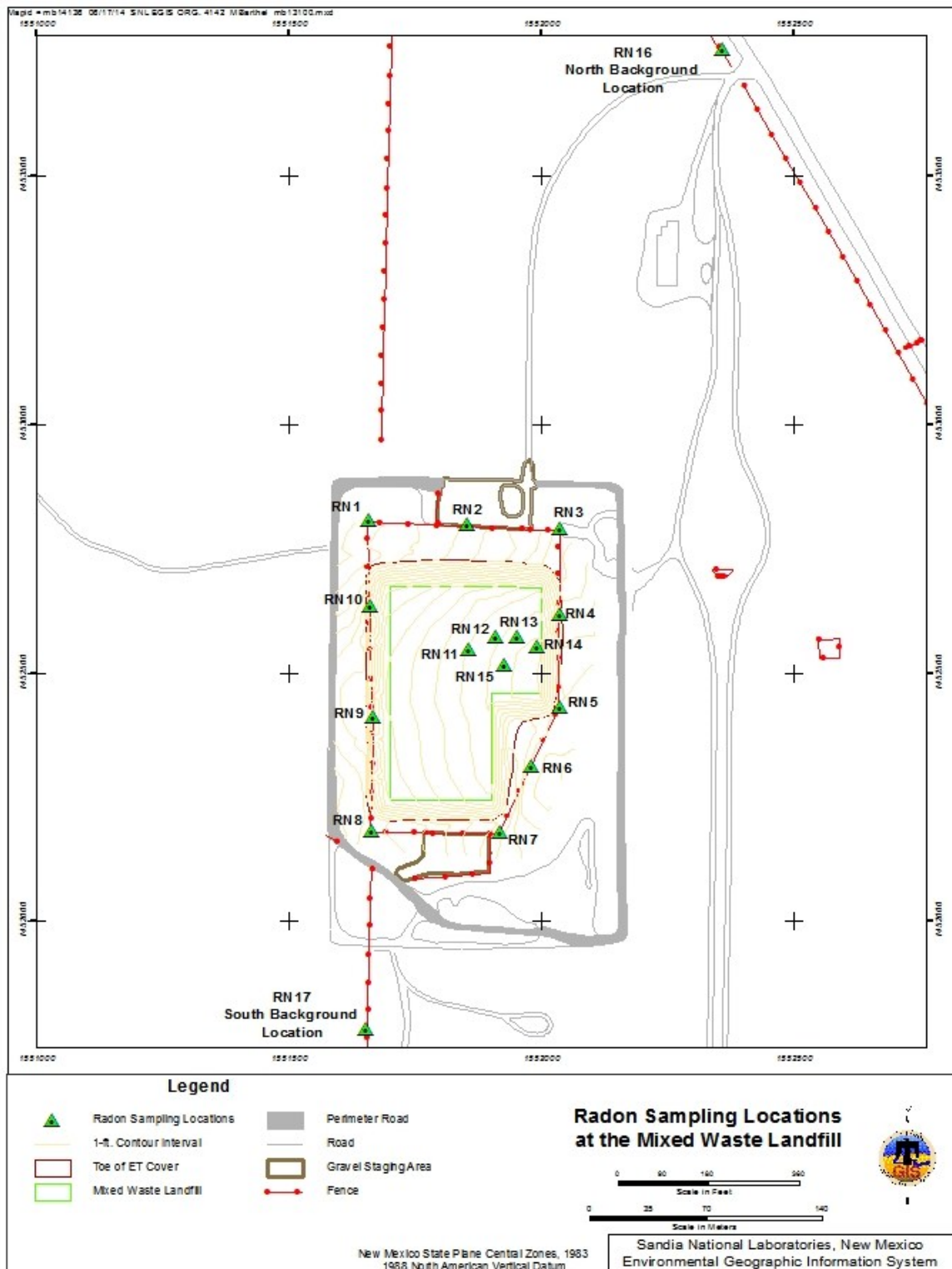


Figure 1. Location of Radon Detectors at the MWL

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

Name: Annemarie Rudy Signature: [Signature] Activity (check all that apply): Deployment Collection
 Name: Robert Cook Signature: [Signature] Deployment Collection
Danielle Michel Signature: [Signature] Collection
 ARCOC #: 417812 Detector Type: Rad track 2

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
312262-5	102251-001	RN1	4-3-17	1117	7/5/17	1035	none
312765-7	102252	RN2	/	1023		1040	none
311765-2	102253	RN3		1031		0908	none
324264-1	102254	RN4		1108		0919	none
317285-5	102255	RN5		1215		0928	none
324550-3	102256	RN6		1210		0936	none
325635-1	102257	RN7		1203		0945	none
324779-8	102258	RN8		1140		1012	none
325782-1	102259	RN9		1132		1020	none
317845-6	102260	RN10		1126		1025	none
324569-3	102261	RN11		1041		1100	none
324452-2	102262	RN12		1050		1106	none
312506-9	102263	RN13		1056		1109	none
325535-3	102264	RN14		1103		1113	none
316582-6	102265	RN15		1046		1117	none
317047-9	102266	RN16		1220		0850	none
311958-3	102267	RN17		1151		1000	none
324103-5 311628-2	102268	RNTB			7/5/17 0850		1125

Additional Comments: _____

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

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

Name: Annemarie Roder Signature: [Signature] Activity (check all that apply):
 Deployment Collection
 Name: Robert Zick Signature: [Signature] Deployment Collection
Danielle Michel [Signature] Collection
 ARCOG #: 617990 Detector Type: Rapidos Collection

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
752802-9	102997	RN1	4-3-17	1117	7/5/17	1035	NONE
410589-6	102998	RN2		1023		1040	NONE
409238-3	102999	RN3		1031		0908	NONE
410999-2	103000	RN4		1108		0917	NONE
764163-2	103001	RN5		1245		0928	NONE
410870-0	103002	RN6		1210		0936	NONE
410065-7	103003	RN7		1203		0945	NONE
409428-0	103004	RN8		1140		1012	NONE
410504-5	103005	RN9		1132		1020	NONE
976967-0	103006	RN10		1126		1025	NONE
409724-2	103007	RN11		1041		1100	NONE
410313-1	103008	RN12		1050		1106	NONE
411020-1	103009	RN13		1056		1109	NONE
409243-3	103010	RN14		1103		1113	NONE
158164-4	103011	RN15		1046		1117	NONE
220527-6	103012	RN16		1151 1120		0850	NONE
410868-4	103013	RN17		1151		1000	NONE
409765-5	103014	RNTB	✓	7/5/17 0850	✓	1125	NONE

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. 617812

Analytical Lab Radonova

SDG No. 4725979-1

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	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	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)	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			
	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: 10-23-2017 11:03:00

Closed by: Wendy Palencia Date: 10-23-2017 11:03:00

Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL Radon Monitoring

Project/Task No. 195122_10.11.08

ARCOC No. 617990

Analytical Lab Radonova

SDG No. 4725980-1

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	Results for sample 103013-001 not reported

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)	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			
	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
103013-001	Radon	Results not reported

Were deficiencies unresolved? Yes No

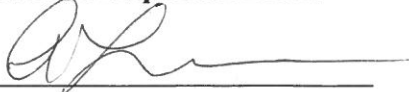
Based on the review, this data package is complete. Yes No

If no, provide nonconformance report or correction request number and date correction request was submitted: 07-18-2017

Reviewed by: Wendy Palencia Date: 07-26-2017 08:52:00

Were resolutions adequate and data package complete? Yes No

Closed by: Wendy Palencia Date: 07-26-2017 15:33:00

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Annemarie RaderSignature: Date of Inspection: 5-10-17

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	Unit number was fading, touched up paint on #. 5-10-17
RN12	None
RN13	None
RN14	Unit # fading, touched up paint on #. 5-10-17
RN15	None
RN16	None
RN17	None

Original to: Mixed Waste Landfill Operating Record
Copy to: SNL/NM Records Center**IMPORTANT NOTICE:** A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Robert ZiockSignature: Date of Inspection: June 21, 2017

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

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

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

Name: Robert ZiockSignature: Collection Date: 7/5/2017Detector Type: Rapidos & Radtrak2Radon 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	

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**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

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

MIXED WASTE LANDFILL

RADON MONITORING

July-September 2017 Monitoring Period



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

Albuquerque, New Mexico 87185-0651

date: November 10, 2017

to: Mike Mitchell (8854), Robert Ziock (641), and Bonnie Little (631)

from: Kelly Green (6283) kagreen@sandia.gov *Kelly Green*

subject: Review of MWL Radon Air Data – July through September 2017 Quarterly Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the July through September 2017 quarterly 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 after review of the July through December 2016 results. Details regarding this decision and the ongoing radon detector investigation are provided in this memorandum after the evaluation of July through September 2017 results.

Radon air monitoring measurements during the July through September 2017 quarter were obtained using three different detectors: Radtrak2[®] detectors (measure radon only), RapiDOS[®] detectors (measure radon only with a lower detection limit), and Modified Radtrak2[®] detectors (measure radon and thoron). The three detectors were deployed at each monitoring location (Figure 1) on July 5, 2017 and were collected on October 2, 2017. 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 three months and were submitted to the analytical laboratory for analysis on Analysis Request/Chain of Custody (AR/COC) #617986 (Radtrak2[®]), AR/COC #617987 (RapiDOS[®]), and AR/COC #617988 (Modified Radtrak2[®]). A trip blank detector (RNTB) was submitted with each set of detectors (total of 3 trip blanks). In the attached data reports from the analytical laboratory, the Radtrak2[®] and Modified Radtrak2[®] results (AR/COCs #617986 and #617988) are combined in one report (total of 2 data reports).

The results for this quarterly monitoring period and associated field documentation meet the LTMMP DQO and monitoring objectives. The radon results from the Radtrak2[®] and RapiDOS[®] detectors were consistent with the July through December 2016 (6-month monitoring period) and April through June

2017 (3-month monitoring period) results. The radon plus thoron results from the Modified Radtrak2[®] detectors were slightly higher, and consistent with historic data from the original Radtrak[®] detectors (January 2014 through June 2016, 8 quarterly and 1 semiannual monitoring events) that also measured radon and thoron. The results from the three detector sets are briefly summarized below.

- All results for the Radtrak2[®] detectors (radon only) were non-detects with a detection limit of 0.4 pCi/L, with the exception of location RN3 (detection of 0.6 pCi/L).
- Results for the RapiDOS[®] detectors (radon only with lower detection limit) ranged from non-detects (< 0.16 pCi/L) at locations RN8, RN10, RN13 and RN14 to 0.38 pCi/L at RN7. There was one location (RN5) that had no result for the quarter due to a plastic quality problem in the detector's alpha-track film. The 12 RapiDOS[®] detections ranged from 0.16 to 0.38 pCi/L.
- Results for the Modified Radtrak2[®] detectors (radon plus thoron) ranged from non-detects (<0.5 or <0.8 pCi/L) at locations RN1, RN2, RN3, RN4, RN6, RN7, RN9, RN13, RN14, and RN16 to 1.0 pCi/L at RN17. The Modified Radtrak2[®] results included detections at 7 of the 17 locations, with a range of 0.6 to 1.0 pCi/L.

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 background radon activity. When thoron was measured along with radon (Modified Radtrak2[®] detector), the results were slightly higher and consistent with historic data (January 2014 through June 2016), which also measured radon and thoron (data from original Radtrak[®] detectors). The results from this quarterly monitoring event will be presented in the next MWL Annual LTMM Report that will be submitted to NMED in June 2018 (reporting period is April 1, 2017 through March 31, 2018).

Radon Detector Investigation Background Information

As previously reported, the July through December 2016 semiannual monitoring event was the first time Radtrak2[®] detectors were used for radon monitoring at the MWL and results were lower than previous results (January 2014 through June 2016, 8 quarterly and 1 semiannual monitoring events) measured using the original Radtrak[®] detectors. As documented in my data evaluation memorandum dated April 12, 2017, the Radtrak[®] detector was phased out by the manufacturer and replaced with the new Radtrak2[®] detector. The Radtrak2[®] detector was selected because it was the direct replacement for the original Radtrak[®] detector and could be used for a 6-month deployment period. The RapiDOS[®] detector has a lower radon detection limit but was not selected because it has a maximum deployment period of 3 months.

After receiving the data report for the July through December 2016 monitoring period in February 2017, we initiated our investigation to evaluate the newer Radtrak2[®] detectors to determine why the results were lower. This investigation included the testing of other detector types (i.e., RapiDOS[®] and Modified Radtrak2[®] detectors) at a quarterly frequency to allow for the collection and comparison of more data in a shorter period of time. Based on correspondence with the analytical laboratory manager during April 2017, the most likely explanation for the lower values measured by the new Radtrak2[®] detectors is that

they are designed to have a longer diffusion time than the original Radtrak[®] detectors. Because of this design change, thoron (Radon-220 with a half-life of just 56 seconds) is not measured by the Radtrak2[®] or RapiDOS[®] detector, but is measured by the original Radtrak[®] detector. In other words, when deployed under the same conditions, the newer Radtrak2[®] detectors should measure lower activities than the older Radtrak[®] detectors because they measure only radon, not radon and thoron. This information was received after the deployment of detectors for the April through June 2017 monitoring period, so the deployment of Modified Radtrak2[®] detectors to confirm this hypothesis did not occur until the July through September quarterly monitoring period described in this memorandum.

As summarized earlier, three sets of detectors were deployed at each monitoring location for the July through September 2017 quarterly monitoring period. The results from this triple deployment have confirmed the impact of thoron on the MWL radon monitoring effort. Results for the Modified Radtrak2[®] detectors show a slightly higher range (<0.5 to 1.0 pCi/L), which is consistent with results from January 2014 through June 2016 using the original Radtrak[®] detectors (<0.3 to 1.4 pCi/L). The range for all “radon only” results using RapiDOS[®] and Radtrak2[®] detectors (July 2016 through September 2017) is slightly lower (<0.08 to 0.6 pCi/L). As determined by comparing the RapiDOS[®] and Modified Radtrak2[®] results for the four locations where a detection was reported for both detectors, the estimated thoron range is 0.41 to 0.81 pCi/L. All of this information is consistent with the explanation that historic results and recent results from detectors that measure both radon and thoron are slightly higher than results from detectors that measure only radon. All radon monitoring results for the MWL indicate very low radon activity consistent with background conditions.

Based on the evaluation of all MWL radon monitoring results, I recommend using the Radtrak2[®] detector for semiannual monitoring for CY 2018 and beyond. These detectors will accurately measure radon activity in air over a 6-month period and identify any changes in radon activity if they occur. With completion of the detector investigation, focusing on one detector that measures only radon is an improvement that is consistent with the MWL radon monitoring DQO and monitoring objectives. In addition, the Radtrak2[®] detection limit will decrease with a monitoring period of 6-months (semiannual frequency) versus 3-months (quarterly frequency).

An additional quarter of monitoring with the three different detectors is ongoing for the October through December 2017 monitoring period, and will provide one more data set to evaluate and confirm the impact of thoron on MWL radon monitoring results. When these detectors are collected in January 2018, only the Radtrak2[®] detectors should be deployed, marking the change back to semiannual monitoring with only one set of detectors that measure only radon.

Attachments:

Analysis Request/Chain of Custody #617986

Analysis Request/Chain of Custody #617988

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

Analysis Request/Chain of Custody #617987

radonova Radon Monitoring Report (analytical laboratory results for RapiDOS[®] 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**

July-Sept. 2017
 AOP 95-16

Internal Lab Page 1 of 2

Batch No. NA SMO Use AR/COC **617986**

Project Name: MWL RADON MONITORING		Date Samples Shipped: <u>10/3/17</u>	SMO Authorization: <u>[Signature]</u>		<input type="checkbox"/> Waste Characterization
Project/Task Manager: Robert Ziock		Carrier/Waybill No. <u>272351</u>	SMO Contact Phone: <u>SMO</u>		<input type="checkbox"/> RMA
Project/Task Number: 195122.10.11.08		Lab Contact: Amy Kruszynski	Wendy Palencia/505-844-3132		<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Service Order: CF378-18		Lab Destination: <u>M LAND Radonova</u>	Send Report to SMO: Stephanie Montaño/505.284.2553		
Tech Area:		Contract No.: 1495047	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					
102907	001	RN1/ Radtrak2 200144-4	N/A	10/2/17 09:55	AF	N	0 NA	NONE	C	SA	RADON	
102908	001	RN2/ Radtrak2 202032-0	N/A	10/2/17 10:00	AF	N	0 NA	NONE	C	SA	RADON	
102909	001	RN3/ Radtrak2 159248-4	N/A	10/2/17 08:43	AF	N	0 NA	NONE	C	SA	RADON	
102910	001	RN4/ Radtrak2 612821-9	N/A	10/2/17 08:50	AF	N	0 NA	NONE	C	SA	RADON	
102911	001	RN5/ Radtrak2 111649-0	N/A	10/2/17 08:57	AF	N	0 NA	NONE	C	SA	RADON	
102912	001	RN6/ Radtrak2 138218-3	N/A	10/2/17 09:03	AF	N	0 NA	NONE	C	SA	RADON	
102913	001	RN7/ Radtrak2 206677-7	N/A	10/2/17 09:08	AF	N	0 NA	NONE	C	SA	RADON	
102914	001	RN8/ Radtrak2 609073-2	N/A	10/2/17 09:13	AF	N	0 NA	NONE	C	SA	RADON	
102915	001	RN9/ Radtrak2 126183-3	N/A	10/2/17 09:26	AF	N	0 NA	NONE	C	SA	RADON	
102916	001	RN10/ Radtrak2 189047-4	N/A	10/2/17 09:30	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							
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		Name		Signature		Init.		Company/Organization/Phone/Cell		Sample Disposal		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab	
Members		Robert Ziock		[Signature]		[Signature]		SNL/00641/505-845-0485/505-238-3668		Return Samples By:		Comments:	
		Danielle Michel		[Signature]		[Signature]		SNL/00641/505-845-7706/505-219-7143					

Relinquished by <u>Danielle Michel</u>	Org. <u>064</u>	Date <u>10/2/17</u>	Time <u>14:05</u>	Relinquished by <u>[Signature]</u>	Org. <u>Radon</u>	Date <u>10/09/17</u>	Time <u>11:30</u>
Received by <u>[Signature]</u>	Org. <u>063</u>	Date <u>10/2/17</u>	Time <u>14:25</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>0043</u>	Date <u>10/3/17</u>	Time <u>11:00</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org.	Date <u>10/4/17</u>	Time <u>3pm</u>	Received by	Org.	Date	Time

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

SMO 2012-ARCOG (4-2012)

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

July - Sept 2017
 AOP 95-16

Page 2 of 2

AR/COC **617986**

Project Name:		MWL RADON MONITORING		Project/Task Manager:		Robert Ziock		Project/Task No.:		195122.10.11.08			
Tech Area:													
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	
102917	001	RN11/ Radtrak2 202876-9	N/A	10/2/17 10:06	AF	N	0 NA	NONE	C	SA	RADON		
102918	001	RN12/ Radtrak2 425700-2	N/A	10/2/17 10:05	AF	N	0 NA	NONE	C	SA	RADON		
102919	001	RN13/ Radtrak2 160180-6	N/A	10/2/17 10:12	AF	N	0 NA	NONE	C	SA	RADON		
102920	001	RN14/ Radtrak2 985810-1	N/A	10/2/17 10:20	AF	N	0 NA	NONE	C	SA	RADON		
102921	001	RN15/ Radtrak2 208677-5	N/A	10/2/17 10:15	AF	N	0 NA	NONE	C	SA	RADON		
102922	001	RN16/ Radtrak2 559713-3	N/A	10/2/17 08:30	AF	N	0 NA	NONE	C	SA	RADON		
102923	001	RN17/ Radtrak2 992164-4	N/A	10/2/17 09:17	AF	N	0 NA	NONE	C	SA	RADON		
102924	001	RNTB/ Radtrak2 231289-0	N/A	10/2/17 10:25	AF	N	0 NA	NONE	C	SA	RADON		
Recipient Initials <i>TL</i>													

SMO 2012-ARCO (4-2012)

**CONTRACT LABORATORY
 ANALYSIS REQUEST AND CHAIN OF CUSTODY**

July - Sept. 2017
 AOP 95-16

Internal Lab

Page 1 of 2

Batch No. <i>n/a</i>	SMO Use		AR/COC	617988								
Project Name: MWL RADON MONITORIN	Date Samples Shipped: <i>10/3/17</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization									
Project/Task Manager: Robert Ziock	Carrier/Waybill No. <i>272351</i>	SMO Contact Phone: <i>510</i>	<input type="checkbox"/> RMA									
Project/Task Number: 195122.10.11.08	Lab Contact: Amy Kruszynski	Wendy Palencia/505-844-3132	<input type="checkbox"/> Released by COC No.									
Service Order: CF378-18	Lab Destination: <i>LAND Radonova</i>	Send Report to SMO:	<input checked="" type="checkbox"/> 4° Celsius									
	Contract No.: 1495047	Stephanie Montaño/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154									
Tech Area:	Room:	Operational Site:										
Building:												
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
102943	001	RN1/ Thoron 660360-9	N/A	10/2/17 09:55	AF	N	0 NA	NONE	C	SA	RADON	
102944	001	RN2/ Thoron 466380-3	N/A	10/2/17 10:00	AF	N	0 NA	NONE	C	SA	RADON	
102945	001	RN3/ Thoron 660358-3	N/A	10/2/17 08:43	AF	N	0 NA	NONE	C	SA	RADON	
102946	001	RN4/ Thoron 466333-2	N/A	10/2/17 08:50	AF	N	0 NA	NONE	C	SA	RADON	
102947	001	RN5/ Thoron 466345-6	N/A	10/2/17 08:57	AF	N	0 NA	NONE	C	SA	RADON	
102948	001	RN6/ Thoron 660544-8	N/A	10/2/17 09:03	AF	N	0 NA	NONE	C	SA	RADON	
102949	001	RN7/ Thoron 466383-7	N/A	10/2/17 09:08	AF	N	0 NA	NONE	C	SA	RADON	
102950	001	RN8/ Thoron 660445-8	N/A	10/2/17 09:13	AF	N	0 NA	NONE	C	SA	RADON	
102951	001	RN9/ Thoron 466417-3	N/A	10/2/17 09:26	AF	N	0 NA	NONE	C	SA	RADON	
102952	001	RN10/ Thoron 466346-4	N/A	10/2/17 09:30	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.:		Negotiated TAT		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day							
Confirmatory: <input type="checkbox"/> Yes	Name		Signature		Return Samples By:							
Sample Team Members	Robert Ziock		<i>[Signature]</i>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			Lab Use				
	Danielle Michel		<i>[Signature]</i>		Comments:							
Relinquished by <i>[Signature]</i>		Org. <i>0641</i>	Date <i>10/2/17</i>	Time <i>14:25</i>	Relinquished by <i>[Signature]</i>		Org. <i>Radonova</i>	Date <i>10/09/17</i>	Time <i>11 AM</i>			
Received by <i>[Signature]</i>		Org. <i>0651</i>	Date <i>10/11/17</i>	Time <i>14:25</i>	Received by		Org.	Date	Time			
Relinquished by <i>[Signature]</i>		Org. <i>00671</i>	Date <i>10/3/17</i>	Time <i>11:10</i>	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org.	Date <i>10/4/17</i>	Time <i>3 pm</i>	Received by		Org.	Date	Time			

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

Review of MWL Radon-in-Air Data
 3rd Quarter CY 2017 (July - September 2017)
 November 10, 2017

SMO 2012-ARCO (4-2012)

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

July - Sept. 2017
 AOP 95-16

Page 2 of 2

AR/COC 617988

Project Name:		MWL RADON MONITORING			Project/Task Manager:		Robert Ziock			Project/Task No.:		195122.10.11.08			AR/COC	617988
Tech Area:																
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 use				
						Type	Volume					Lab Sample ID				
102953	001	RN11/ Thoron 660467-2	N/A	10/2/17 10:06	AF	N	0 NA	NONE	C	SA	RADON					
102954	001	RN12/ Thoron 466335-7	N/A	10/2/17 10:05	AF	N	0 NA	NONE	C	SA	RADON					
102955	001	RN13/ Thoron 686996-0	N/A	10/2/17 10:12	AF	N	0 NA	NONE	C	SA	RADON					
102956	001	RN14/ Thoron 466390-2	N/A	10/2/17 10:20	AF	N	0 NA	NONE	C	SA	RADON					
102957	001	RN15/ Thoron 466411-6	N/A	10/2/17 10:15	AF	N	0 NA	NONE	C	SA	RADON					
102958	001	RN16/ Thoron 466384-5	N/A	10/2/17 08:30	AF	N	0 NA	NONE	C	SA	RADON					
102959	001	RN17/ Thoron 466371-2	N/A	10/2/17 09:17	AF	N	0 NA	NONE	C	SA	RADON					
102960	001	RNTB/ Thoron 466341-5	N/A	10/2/17 10:25	AF	N	0 NA	NONE	C	SA	RADON					
Recipient Initials <i>TL</i>																

87185

US

18445



RADON/THORON MONITORING REPORT
Issued by an Accredited Laboratory



NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT NUMBER: 4742341-1
REPORT DATE: 10/17/2017
MEASUREMENT PERFORMED FOR:
REPORT PAGE: 1(4)
PRINT DATE: 10/19/2017

REPORT RECEIVER(S)
NTESS, LLC

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

Description of the measurement

The measurement was performed with closed radon/thoron alpha-track detectors.

Property address

Measurement method: closed alpha-track detector

The radon measurement was performed with a closed alpha-track detector following the quality guidance given in EPA 402-R-95-012. The detector container is manufactured from electrically conducting plastic. Through a small slit (filter) in the radon detector, radon gas enters the detector but the diffusion time is long enough to prevent thoron gas from entering. Through holes covered by paper filters in the thoron detector, both thoron and radon gas enter the detector. The thoron concentration is calculated by subtracting the radon contribution in the thoron detector as measured with the radon detector. The track-detecting material (film) inside the detectors are hit by alpha particles generated by radon and thoron entering the detectors and the decay products formed from them. On the film, alpha particles make small tracks which are enlarged through chemical etching and later analyzed via our proprietary Track-Etch methodology to determine the radon and thoron exposures. Radonova Laboratories AB (P.O. Box 6522, SE-751 28 Uppsala, Sweden) is accredited (no. 1489) by SWEDAC to conduct radon-gas measurements using closed alpha-track detector method. The thoron measurement is not part of the accredited measurement methods. The analysis equipment is checked daily and the detectors are calibrated at regular intervals.

Measured radon and thoron concentrations

For each detector, the measured value of the radon and thoron concentration is given. The radon detector is marked with (R) after the detector number in the result table and the thoron detector with (T). For each value an uncertainty associated with the measurement to a 95% confidence level also given. For example a measurement result of 4.0 ± 0.5 pCi/l means that the radon and thoron 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 and thoron concentration cannot be calculated. In such cases, the total exposure in pCi^h days/l will be reported.

Signature on the report

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

US_RP_TH_001-V1.10 /2017.08.04- /JO /LB

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Review of MWL Radon-in-Air Data
 3rd Quarter CY 2017 (July - September 2017)
 November 10, 2017



RADON/THORON MONITORING REPORT
Issued by an Accredited Laboratory



REPORT NUMBER 4742341:1 REPORT PAGE 2(4)
 REPORT DATE 10/17/2017 PRINT DATE 10/19/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Avg Radon/Thoron Conc. pCi/l	Total Radon/Thoron Exp pCi-days/l
200144-4 (R)	07/05/2017	10/02/2017	RN1		< 0.4	< 36
660360-9 (T)	07/05/2017	10/02/2017	RN1		< 0.5	< 47
292032-0 (R)	07/05/2017	10/02/2017	RN2		< 0.4	< 36
466380-3 (T)	07/05/2017	10/02/2017	RN2		< 0.5	< 47
159248-4 (R)	07/05/2017	10/02/2017	RN3		0.6 +/- 0.2	53 +/- 16
660358-3 (T)	07/05/2017	10/02/2017	RN3		< 0.5	< 47
612821-9 (R)	07/05/2017	10/02/2017	RN4		< 0.4	< 36
466333-2 (T)	07/05/2017	10/02/2017	RN4		< 0.5	< 47
111649-0 (R)	07/05/2017	10/02/2017	RN5		< 0.4	< 36
466345-6 (T)	07/05/2017	10/02/2017	RN5		0.9 +/- 0.4	81 +/- 38
138218-3 (R)	07/05/2017	10/02/2017	RN6		< 0.4	< 36
660544-8 (T)	07/05/2017	10/02/2017	RN6		< 0.8	< 72
206677-7 (R)	07/05/2017	10/02/2017	RN7		< 0.4	< 36
466383-7 (T)	07/05/2017	10/02/2017	RN7		< 0.5	< 47
609073-2 (R)	07/05/2017	10/02/2017	RN8		< 0.4	< 36
660445-8 (T)	07/05/2017	10/02/2017	RN8		0.7 +/- 0.4	62 +/- 34
126183-3 (R)	07/05/2017	10/02/2017	RN9		< 0.4	< 36
466417-3 (T)	07/05/2017	10/02/2017	RN9		< 0.5	< 47
189047-4 (R)	07/05/2017	10/02/2017	RN10		< 0.4	< 36
466346-4 (T)	07/05/2017	10/02/2017	RN10		0.6 +/- 0.5	51 +/- 45

US_RT_TH_001 - V.10/2017-05-04 / JO / LB

Comment to the results

Tryggve Rönnqvist (Electronically signed)
 Signature Radonova Laboratories AB Laboratory Measurement Specialist
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 900 Oakmont Lane Suite 207, Westmont IL 60559
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RADON/THORON MONITORING REPORT
Issued by an Accredited Laboratory



NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT NUMBER 4742341:1
REPORT DATE 10/17/2017
MEASUREMENT PERFORMED FOR
REPORT PAGE 3(4)
PRINT DATE 10/19/2017

REPORT RECEIVER(S)
NTESS, LLC

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

Description of the measurement

The measurement was performed with closed radon/thoron alpha-track detectors.

Property address

Measurement method: closed alpha-track detector

The radon measurement was performed with a closed alpha-track detector following the quality guidance given in EPA 402-R-95-012. The detector container is manufactured from electrically conducting plastic. Through a small slit (filter) in the radon detector, radon gas enters the detector but the diffusion time is long enough to prevent thoron gas from entering. Through holes covered by paper filters in the thoron detector, both thoron and radon gas enter the detector. The thoron concentration is calculated by subtracting the radon contribution in the thoron detector as measured with the radon detector. The track-detecting material (film) inside the detectors are hit by alpha particles generated by radon and thoron entering the detectors and the decay products formed from them. On the film, alpha particles make small tracks which are enlarged through chemical etching and later analyzed via our proprietary Track-Etch methodology to determine the radon and thoron exposures. Radonova Laboratories AB (P.O. Box 6522, SE-751 28 Uppsala, Sweden) is accredited (no. 1489) by SWEDAC to conduct radon-gas measurements using closed alpha-track detector method. The thoron measurement is not part of the accredited measurement methods. The analysis equipment is checked daily and the detectors are calibrated at regular intervals.

Measured radon and thoron concentrations

For each detector, the measured value of the radon and thoron concentration is given. The radon detector is marked with (R) after the detector number in the result table and the thoron detector with (T). For each value an uncertainty associated with the measurement to a 95% confidence level also given. For example a measurement result of 4.0 ± 0.5 pCi/l means that the radon and thoron 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 and thoron concentration cannot be calculated. In such cases, the total exposure in pCi*days/l will be reported.

Signature on the report

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

US_RT_TH_001 - V: 10/2017-05-04 - /JO/ LB

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Review of MWL Radon-in-Air Data
 3rd Quarter CY 2017 (July - September 2017)
 November 10, 2017



RADON/THORON MONITORING REPORT
Issued by an Accredited Laboratory



REPORT NUMBER
4742341:1

REPORT PAGE 4(4)

REPORT DATE
10/17/2017

PRINT DATE
10/19/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Avg Radon/Thoron Conc. pCi/l	Total Radon/Thoron Exp pCi-days/l
202876-9 (R)	07/05/2017	10/02/2017	RN11		< 0.4	< 36
660467-2 (T)	07/05/2017	10/02/2017	RN11		0.6 +/- 0.4	51 +/- 38
425700-2 (R)	07/05/2017	10/02/2017	RN12		< 0.4	< 36
466335-7 (T)	07/05/2017	10/02/2017	RN12		0.6 +/- 0.5	55 +/- 41
160180-6 (R)	07/05/2017	10/02/2017	RN13		< 0.4	< 36
686996-0 (T)	07/05/2017	10/02/2017	RN13		< 0.5	< 47
985810-1 (R)	07/05/2017	10/02/2017	RN14		< 0.4	< 36
466390-2 (T)	07/05/2017	10/02/2017	RN14		< 0.5	< 47
208677-5 (R)	07/05/2017	10/02/2017	RN15		< 0.4	< 36
466411-6 (T)	07/05/2017	10/02/2017	RN15		0.6 +/- 0.4	57 +/- 38
559713-3 (R)	07/05/2017	10/02/2017	RN16		< 0.4	< 36
466384-5 (T)	07/05/2017	10/02/2017	RN16		< 0.5	< 47
992164-4 (R)	07/05/2017	10/02/2017	RN17		< 0.4	< 36
466371-2 (T)	07/05/2017	10/02/2017	RN17		1.0 +/- 0.5	90 +/- 41
231289-0 (R)	07/05/2017	10/02/2017	RNTB		< 0.4	< 36
466341-5 (T)	07/05/2017	10/02/2017	RNTB		< 0.5	< 47

US_RT_TH_001-V1.10 / 2017-05-04 / JO / LB

Comment to the results

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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SMO 2012-ARCO (4-2012)

**CONTRACT LABORATORY
 ANALYSIS REQUEST AND CHAIN OF CUSTODY**

July - Sept 2017
 AOP 95-16

Internal Lab

Page 1 of 2

Batch No. <i>N/A</i>		SMO Use		AR/COC 617987	
Project Name: MWL RADON MONITORIN	Date Samples Shipped: <i>10/3/17</i>	SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization	
Project/Task Manager: Robert Ziock	Carrier/Waybill No. <i>242351</i>	SMO Contact Phone: <i>SMO</i>		<input type="checkbox"/> RMA	
Project/Task Number: 195122.10.11.08	Lab Contact: Amy Kruszynski	Wendy Palencia/505-844-3132		<input type="checkbox"/> Released by COC No.	
Service Order: CF378-18	Lab Destination: <i>OR LAND Radonova</i>	Send Report to SMO:		<input checked="" type="checkbox"/> 4° Celsius	
	Contract No.: 1495047	Stephanie Montaño/505.284.2553		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		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
102925	001	RN1/ Rapios 206899-7	N/A	10/2/17 09:55	AF	N	0 NA	NONE	C	SA	RADON	
102926	001	RN2/ Rapios 693556-3	N/A	10/2/17 10:00	AF	N	0 NA	NONE	C	SA	RADON	
102927	001	RN3/ Rapios 130016-9	N/A	10/2/17 08:43	AF	N	0 NA	NONE	C	SA	RADON	
102928	001	RN4/ Rapios 623600-4	N/A	10/2/17 08:50	AF	N	0 NA	NONE	C	SA	RADON	
102929	001	RN5/ Rapios 745915-9	N/A	10/2/17 08:57	AF	N	0 NA	NONE	C	SA	RADON	
102930	001	RN6/ Rapios 219977-6	N/A	10/2/17 09:03	AF	N	0 NA	NONE	C	SA	RADON	
102931	001	RN7/ Rapios 402294-3	N/A	10/2/17 09:08	AF	N	0 NA	NONE	C	SA	RADON	
102932	001	RN8/ Rapios 467745-6 <i>499857-6</i>	N/A	10/2/17 09:13	AF	N	0 NA	NONE	C	SA	RADON	
102933	001	RN9/ Rapios 768115-8	N/A	10/2/17 09:26	AF	N	0 NA	NONE	C	SA	RADON	
102934	001	RN10/ Rapios 204812-2	N/A	10/2/17 09:30	AF	N	0 NA	NONE	C	SA	RADON	

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	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: Comments:	Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:			
Background: <input type="checkbox"/> Yes	Entered by:			
Confirmatory: <input type="checkbox"/> Yes	QC inits.:			
Sample Team Members	Name	Signature		
	Robert Ziock	<i>[Signature]</i>	<i>RZ</i>	SNL/00641/505-845-0485/505-238-3668
	Danielle Michel	<i>[Signature]</i>	<i>DM</i>	SNL/00641/505-845-7706/505-219-7143

Relinquished by <i>[Signature]</i>	Org. <i>64</i>	Date <i>10/2/17</i>	Time <i>1425</i>	Relinquished by <i>[Signature]</i>	Org. <i>Radon</i>	Date <i>10/09/17</i>	Time <i>11 AM</i>
Received by <i>[Signature]</i>	Org. <i>631</i>	Date <i>10/2/17</i>	Time <i>1425</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>10/3/17</i>	Time <i>1410</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date <i>10/11/17</i>	Time <i>3pm</i>	Received by	Org.	Date	Time

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

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RADON MONITORING REPORT

Issued by an Accredited Laboratory



NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT NUMBER: 4742342-2
REPORT DATE: 10/25/2017
MEASUREMENT PERFORMED FOR:
REPORT PAGE: 1(4)
PRINT DATE: 10/25/2017

REPORT RECEIVED BY:
NTESS, LLC

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

Description of the measurement

The measurement was performed with a closed high-sensitivity alpha-track detector.

The detector(s) arrived to Radonova Laboratories AB 10/04/2017. They were measured 10/10/2017.

Property data and address

Transit Detector 1:
Transit Detector 2:
Transit Detector 3:

Measurement method: closed alpha-track high sensitivity 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. Transit detectors are used for the return delivery of the high-sensitivity detectors in order to make a more accurate background subtraction.

Radonova Laboratories AB is accredited (no. 1489) by SWEDAC to conduct radon-gas measurements using the closed alpha-track detector method. The analysts 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 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.

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.
- A Citizen's Guide to Radon
- Home Buyer's and Seller's Guide to Radon
- Consumer's Guide to Radon Reduction

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.

US_RT_HE_001-V1.10-2017-05-06-110/LB

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4742342.2

REPORT PAGE 2 (4)

REPORT DATE
 10/25/2017

PRINT DATE
 10/25/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Location type	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
206899-7	07/05/2017	10/02/2017	RN1			0.19 +/- 0.06	17 +/- 7
693556-3	07/05/2017	10/02/2017	RN2			0.16 +/- 0.06	15 +/- 7
130016-9	07/05/2017	10/02/2017	RN3			0.22 +/- 0.11	19 +/- 9
623600-4	07/05/2017	10/02/2017	RN4			0.24 +/- 0.09	21 +/- 9
219977-6	07/05/2017	10/02/2017	RN6			0.24 +/- 0.11	23 +/- 9
402294-3	07/05/2017	10/02/2017	RN7			0.38 +/- 0.11	33 +/- 9
477457-6	07/05/2017	10/02/2017	RN8			< 0.16	< 15
768115-8	07/05/2017	10/02/2017	RN9			0.24 +/- 0.11	23 +/- 9
204812-2	07/05/2017	10/02/2017	RN10			< 0.16	< 15
573636-8	07/05/2017	10/02/2017	RN11			0.19 +/- 0.06	18 +/- 7

US_RTE_HIS_001 - V1, 10/17/2013 05:06:11 J.O./L.B.

Comment to the results

This report replaces 4742342:1. Reason: information added that due to found plastic quality problems in the alpha-track film for detector 745915-9 (RN5), the results for that detector could not be reported.

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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RADON MONITORING REPORT

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Wendy Palencia
Mailstop 1103
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1515 Eubank SE
Albuquerque NM 87185
United States

REPORT NUMBER: 4742342-2
REPORT DATE: 10/25/2017
MEASUREMENT PERFORMED FOR:
REPORT PAGE: 3(4)
PRINT DATE: 10/25/2017

REPORT RECEIVED BY:
NTESS, LLC

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

Description of the measurement

The measurement was performed with a closed high-sensitivity alpha-track detector.

The detector(s) arrived to Radonova Laboratories AB 10/04/2017. They were measured 10/10/2017.

Property data and address

Transit Detector 1:
Transit Detector 2:
Transit Detector 3:

Measurement method: closed alpha-track high sensitivity 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. Transit detectors are used for the return delivery of the high-sensitivity detectors in order to make a more accurate background subtraction.

Radonova Laboratories AB 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 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.

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.
- A Citizen's Guide to Radon
- Home Buyer's and Seller's Guide to Radon
- Consumer's Guide to Radon Reduction

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 procedure follows the guidance in accordance with EPA 402-R-95-012 and that the demands from SWEDAC are fulfilled.

US_RT_R6_001-V1.10 / 2017-05-06 - JJO/LS

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4742342:2
 REPORT DATE
 10/25/2017

REPORT PAGE 4(4)
 PRINT DATE
 10/25/2017

Test results

Detector	Start date	Stop date	Location	Detector comment	Location type	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
209479-5	07/05/2017	10/02/2017	RN12			0.16 +/- 0.06	15 +/- 7
560189-3	07/05/2017	10/02/2017	RN13			< 0.16	< 15
662712-9	07/05/2017	10/02/2017	RN14			< 0.16	< 15
151098-1	07/05/2017	10/02/2017	RN15			0.14 +/- 0.06	12 +/- 7
411414-6	07/05/2017	10/02/2017	RN16			0.19 +/- 0.11	17 +/- 9
207338-5	07/05/2017	10/02/2017	RN17			0.19 +/- 0.11	16 +/- 9
562557-9	07/05/2017	10/02/2017	RNTB			0.16 +/- 0.11	15 +/- 9

US_RT_H5_001 - 91_10/201705-04-11/01/LB

Comment to the results

This report replaces 4742342:1. Reason: information added that due to found plastic quality problems in the alpha-track film for detector 745915-9 (RN5), the results for that detector could not be reported..

Tryggve Rönngqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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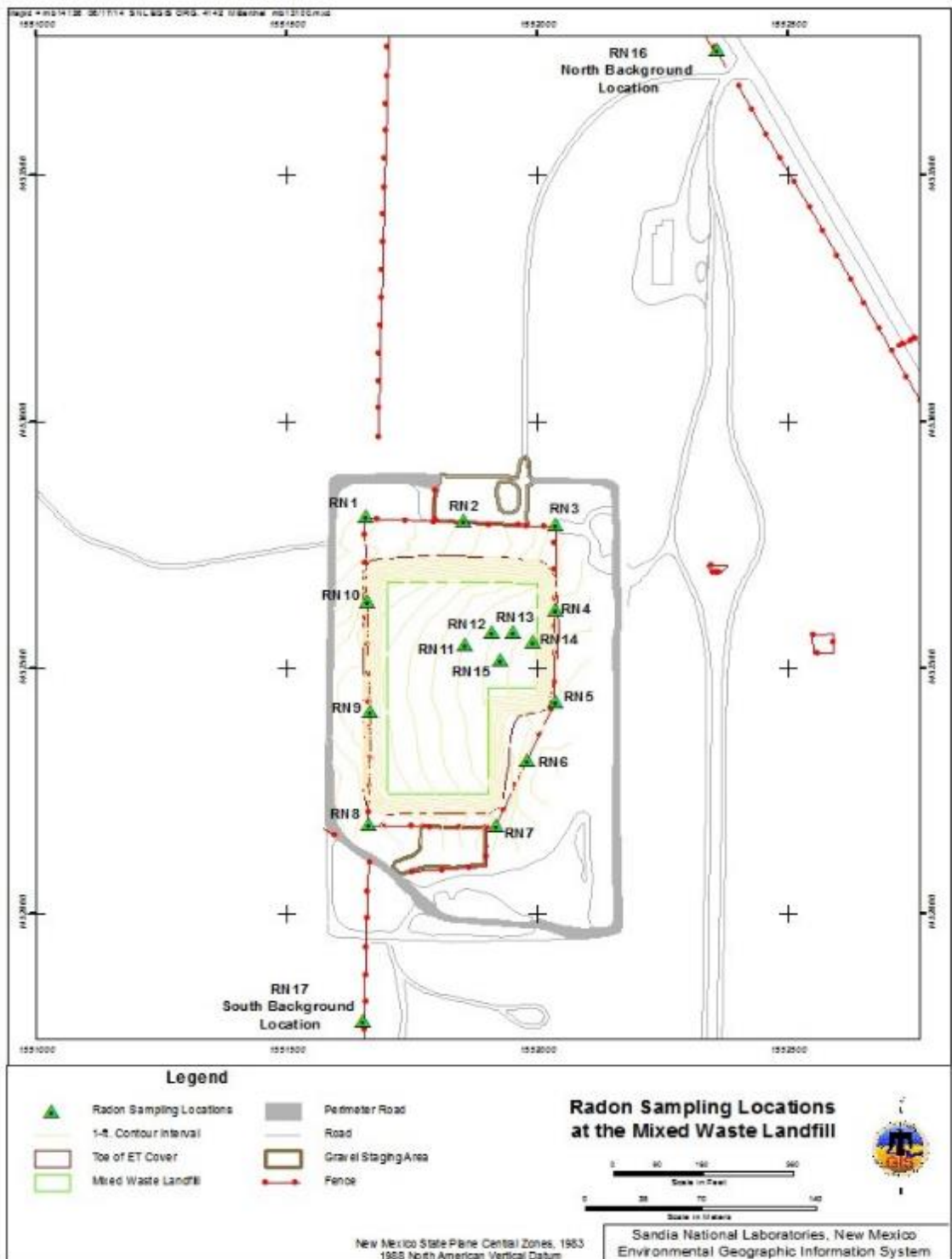


Figure 1. Location of Radon Detectors at the MWL

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

Name: Robert Ziock

Signature: [Signature]

Activity (check all that apply):

Deployment

Collection

Name: Danielle Michel

Signature: [Signature]

Deployment

Collection

ARCOC #: 617986

Detector Type: Radtrack2

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
200144-4	102907	RN1	7/5/17	1036	10/2/17	0955	NONE
292032-0	102908	RN2		1043		1000	NONE
159248-4	102909	RN3		0911		0843	NONE
612821-9	102910	RN4		0921		0850	NONE
111649-0	102911	RN5		0929		0857	NONE
138218-3	102912	RN6		0940		0903	NONE
206677-7	102913	RN7		0947		0908	NONE
609073-2	102914	RN8		1013		0913	NONE
126183-3	102915	RN9		1020		0926	NONE
189047-4	102916	RN10		1027		0930	NONE
202876-9	102917	RN11		1101		1006	NONE
425700-2	102918	RN12		1106		1005	NONE
160180-6	102919	RN13		1111		1012	NONE
985810-1	102920	RN14		1114		1020	NONE
208677-5	102921	RN15		1119		1015	NONE
559713-3	102922	RN16		0855		0830	NONE
992164-4	102923	RN17		1005		0917	NONE
231289-0	102924	RNTB	✓	NA	✓	1025	NONE

Additional Comments: _____

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

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

Name: Robert Ziock Signature: [Signature] Activity (check all that apply):
 Deployment Collection
 Name: Danielle Michael Signature: [Signature] Deployment Collection
 ARCOG #: 617988 Detector Type: Thoron

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
660360-9	102943	RN1	7/5/17	1036	10/2/17	0955	NONE
466380-3	102944	RN2		1043		1000	NONE
660352-3	102945	RN3		0911		0843	NONE
466333-2	102946	RN4		0921		0850	NONE
466345-6	102947	RN5		0929		0857	NONE
660544-8	102948	RN6		0940		0903	NONE
466383-7	102949	RN7		0947		0908	NONE
⁶⁶⁰⁴⁴⁵⁻⁸ 466371-2	102950	RN8		1013		0913	NONE
466417-3	102951	RN9		1020		0926	NONE
466346-4	102952	RN10		1027		0930	NONE
660467-2	102953	RN11		1101		1006	NONE
466335-7	102954	RN12		1106		1005	NONE
626996-0	102955	RN13		1116		1012	NONE
466390-2	102956	RN14		1114		1020	NONE
466411-6	102957	RN15		1119		1015	NONE
466384-5	102958	RN16		0855		0830	NONE
466371-2	102959	RN17		1005		0917	NONE
466341-5	102960	RNTB		NA		1025	NONE

Additional Comments: _____

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

Name: Robert Ziock Signature: *Robert Ziock* Activity (check all that apply):
 Deployment Collection
 Name: Danielle Michal Signature: *Danielle Michal* Deployment Collection
 ARCOG #: 617987 Detector Type: Rapidos

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
206899-7	102925	RN1	7/5/17	1036	10/2/17	0955	NONE
693556-3	102926	RN2		1043		1000	NONE
130016-9	102927	RN3		0911		0843	NONE
623600-4	102928	RN4		0921		0850	NONE
745915-9	102929	RN5		0929		0857	NONE
219977-6	102930	RN6		0940		0903	NONE
402294-3	102931	RN7		0947		0908	NONE
467745-6	102932	RN8		1013		0913	NONE
768115-8	102933	RN9		1020		0926	NONE
207812-2	102934	RN10		1027		0930	NONE
573636-8	102935	RN11		1101		1006	NONE
209479-5	102936	RN12		1106		1005	NONE
560189-3	102937	RN13		1111		1012	NONE
662712-9	102938	RN14		1114		1000	NONE
151098-1	102939	RN15		1119		1015	NONE
411414-6	102940	RN16		0855		0830	NONE
207338-5	102941	RN17		1005		0917	NONE
409765-8 562557-9	102942	RNTB		NA		1025	NONE

Additional Comments: _____

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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. 617986 & 617988

Analytical Lab Radonova

SDG No. 4742341-1

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	N/A		
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	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	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		
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)	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			
	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: 10-25-2017 09:14:00

Closed by: Wendy Palencia Date: 10-25-2017 09:14:00

Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL Radon Monitoring

Project/Task No. 195122_10.11.08

ARCOC No. 617987

Analytical Lab Radonova

SDG No. 4742342-1

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	N/A		
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	N/A		
2.14	All requested result and TIC (if requested) data provided		X	No results were reported for detector RN5 (745915-9) due to plastic quality problems in the alpha-track film.

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	N/A		
	a) Laboratory control sample accuracy reported and met for all samples			
	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	N/A		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data	N/A		
	a) Method or reagent blank data reported and met for all samples			

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		
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		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		
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			
	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)	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		

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: 10-25-2017 07:50:00

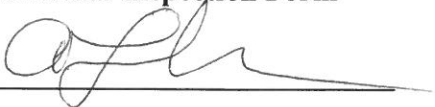
Closed by: Wendy Palencia Date: 10-25-2017 07:50:00

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Annemarie RadarSignature: Date of Inspection: 8-10-17

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 Added clamp to housing 8-10-17
RN8	Added clamp to new housing 8-10-17
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**IMPORTANT NOTICE:** A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Annemarie RaderSignature: Date of Inspection: 9/8/2017

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

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

Name: Robert ZiockSignature: Collection Date: 10/2/17Detector Type: RapidosRadon 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.	Good	No	

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**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

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

Name: Robert ZiockSignature: Collection Date: 10/2/17Detector Type: Radtrak2Radon 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	yes	RN15
<i>Radon Monitoring Detectors Inspection Parameters</i>			
F. Condition of radon detector at time of collection.	Good	No	

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**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	Spider web & nest removed from enclosure
RN16	None
RN17	None

Original to: Mixed Waste Landfill Operating Record
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**Mixed Waste Landfill
Radon Detector Collection Inspection Form**

Name: Robert ZiockSignature: Collection Date: 10/2/17Detector Type: ThoronRadon 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	yes	RN15
<i>Radon Monitoring Detectors Inspection Parameters</i>			
F. Condition of radon detector at time of collection.	good	No	

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**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	Spider web and nest removed from enclosure
RN16	None
RN17	None

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

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MIXED WASTE LANDFILL

RADON MONITORING

October-December 2017 Monitoring Period

Review of MWL Radon-in-Air Data
4th Quarter CY 2017 (October - December 2017)
February 14, 2018



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

Albuquerque, New Mexico 87185-0651

date: February 14, 2018

to: Mike Mitchell (8854), Robert Ziock (641), and Bonnie Little (631)

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

subject: Review of MWL Radon Air Data – October through December 2017 Quarterly Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the October through December 2017 quarterly 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 after review of the July through December 2016 results. Details regarding this decision and the ongoing radon detector investigation are provided in this memorandum after the evaluation of October through December 2017 results.

Radon air monitoring measurements during the October through December 2017 quarter were obtained using three different detectors: Radtrak2[®] detectors (measure radon only), RapiDOS[®] detectors (measure radon only with a lower detection limit), and Modified Radtrak2[®] detectors (measure radon and thoron). The three detectors were deployed at each monitoring location (Figure 1) on October 2, 2017 and were collected on January 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 three months and were submitted to the analytical laboratory for analysis on Analysis Request/Chain of Custody (AR/COC) #618180 (Radtrak2[®]), AR/COC #618227 (RapiDOS[®]), and AR/COC #618001 (Modified Radtrak2[®]). A trip blank detector (RNTB) was submitted with each set of detectors (total of 3 trip blanks). In the attached data reports from the analytical laboratory, the Radtrak2[®] and Modified Radtrak2[®] results (AR/COCs #618180 and #618001) are combined in one report (total of 2 data reports).

The results for this quarterly monitoring period and associated field documentation meet the LTMMMP DQO and monitoring objectives. The radon results from the Radtrak2[®] and RapiDOS[®] detectors were

consistent with the July through December 2016 (6-month monitoring period), the April through June 2017, and the July through October 2017 (3-month monitoring period) results. The radon plus thoron results from the Modified Radtrak2[®] detectors were slightly higher, and consistent with historical data from the original Radtrak[®] detectors (January 2014 through June 2016, 8 quarterly and 1 semiannual monitoring events) that also measured radon and thoron. The results from the three detector sets are briefly summarized below.

- Results for the Radtrak2[®] detectors (radon only) ranged from non-detects (<0.4 pCi/L) at locations RN1, RN2, RN5, RN7, RN8, RN12, RN13, RN15, RN16, and RN17 to 0.5 pCi/L at locations RN3, RN6, RN10, and RN14. The Radtrak2[®] results included detections at 7 of the 17 locations, with a range of 0.4 to 0.5 pCi/L.
- Results for the RapiDOS[®] detectors (radon only with lower detection limit) ranged from 0.24 pCi/L at RN10 to 0.46 pCi/L at RN1. The background locations RN16 and RN17 results were 0.41 and 0.27 pCi/L respectively, which are very low and consistent with previous results. The RapiDOS[®] trip blank detector (RNTB) result was unusually high at 1.3 pCi/L, but still a very low value. Past trip blank results have been consistently very low or non-detects. Upon further investigation, the RapiDOS[®] detector used for RNTB is a detector that was received from the laboratory in March 2017. It is possible the detector was exposed to background levels of radon since March 2017. If the RNTB result is recalculated for the longer exposure period (i.e., 9-month period from March 2017 through December 2017) it would be approximately 0.14 pCi/L, which is more in line with past RNTB results. Based on the two other trip blank results and previous results, the RapiDOS[®] RNTB result is not valid. There is no adverse impact as the other two trip blank detectors provided representative results and all results from the 17 monitoring locations are consistent with historical results.
- Results for the Modified Radtrak2[®] detectors (radon plus thoron) ranged from non-detects (<0.5 or <0.8 pCi/L) at locations RN4, RN5, RN6, RN9, RN11, RN12, RN15, and RN16 to 1.3 pCi/L at RN7. The Modified Radtrak2[®] results included detections at 9 of the 17 locations, with a range of 0.5 to 1.3 pCi/L.

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. When thoron was measured along with radon (Modified Radtrak2[®] detector), the results were slightly higher and consistent with historical data (January 2014 through June 2016), which also measured radon and thoron (data from original Radtrak[®] detectors). The results from this quarterly monitoring event will be presented in the next MWL Annual LTMM Report that will be submitted to NMED in June 2018 (reporting period is April 1, 2017 through March 31, 2018).

Radon Detector Investigation Background Information

As previously reported, the July through December 2016 semiannual monitoring event was the first time Radtrak2[®] detectors were used for radon monitoring at the MWL and results were lower than previous results (January 2014 through June 2016, 8 quarterly and 1 semiannual monitoring events) measured using the original Radtrak[®] detectors. As documented in my data evaluation memorandum dated April 12, 2017, the Radtrak[®] detector was phased out by the manufacturer and replaced with the new

Radtrak2[®] detector. The Radtrak2[®] detector was selected because it was the direct replacement for the original Radtrak[®] detector and could be used for a 6-month deployment period. The RapiDOS[®] detector has a lower radon detection limit but was not selected because it has a maximum deployment period of 3 months.

After receiving the data report for the July through December 2016 monitoring period in February 2017, we initiated our investigation to evaluate the newer Radtrak2[®] detectors to determine why the results were lower. This investigation included the testing of other detector types (i.e., RapiDOS[®] and Modified Radtrak2[®] detectors) at a quarterly frequency to allow for the collection and comparison of more data in a shorter period of time. Based on correspondence with the analytical laboratory manager during April 2017, the most likely explanation for the lower values measured by the new Radtrak2[®] detectors is that they are designed to have a longer diffusion time than the original Radtrak[®] detectors. Because of this design change, thoron (Radon-220 with a half-life of just 56 seconds) is not measured by the Radtrak2[®] or RapiDOS[®] detector, but is measured by the original Radtrak[®] detector. In other words, when deployed under the same conditions, the newer Radtrak2[®] detectors should measure lower activities than the older Radtrak[®] detectors because they measure only radon, not radon and thoron. This information was received after the deployment of detectors for the April through June 2017 monitoring period, so the deployment of Modified Radtrak2[®] detectors to confirm this hypothesis did not begin until the July through September 2017 monitoring period, and now concludes with the October through December 2017 quarterly monitoring period described in this memorandum.

As summarized earlier, three sets of detectors were deployed at each monitoring location for the October through December 2017 quarterly monitoring period. The results from this triple deployment have confirmed the impact of thoron on the MWL radon monitoring effort consistent with the July through October 2017 triple deployment results. Results for the Modified Radtrak2[®] detectors show a slightly higher range (<0.5 to 1.3 pCi/L) consistent with the July through September 2017 results (<0.5 to 1.0 pCi/L), and the results from January 2014 through June 2016 using the original Radtrak[®] detectors (<0.3 to 1.4 pCi/L). The range for all “radon only” results using RapiDOS[®] and Radtrak2[®] detectors (July 2016 through December 2017) is slightly lower (<0.08 to 0.6 pCi/L). As determined by comparing the RapiDOS[®] and Modified Radtrak2[®] results for the nine locations where a detection was reported for both detectors, the estimated thoron range is 0.30 to 0.95 pCi/L with the exception one location with an estimated value of 0.04 pCi/L. In June through September 2017, the estimated thoron range was 0.41 to 0.81 pCi/L. This information is consistent with the explanation that historical results and recent results from detectors that measure both radon and thoron are slightly higher than results from detectors that measure only radon. All radon monitoring results for the MWL indicate very low radon activity consistent with background conditions and well below the trigger level of 4 pCi/L.

As stated in my data evaluation memorandum dated November 10, 2017, based on the evaluation of all MWL radon monitoring results, I recommend using the Radtrak2[®] detector for semiannual monitoring for CY 2018 and beyond. These detectors will accurately measure radon activity in air over a 6-month period and identify any changes in radon activity if they occur. With completion of the detector investigation, focusing on one detector that measures only radon is an improvement that is consistent with the MWL radon monitoring DQO and monitoring objectives. In addition, the Radtrak2[®] detection limit will decrease with a monitoring period of 6-months (semiannual frequency) versus 3-months (quarterly frequency).

Review of MWL Radon-in-Air Data
4th Quarter CY 2017 (October - December 2017)
February 14, 2018

Attachments:

Analysis Request/Chain of Custody #618180

Analysis Request/Chain of Custody #618001

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

Analysis Request/Chain of Custody #618227

radonova Radon Monitoring Report (analytical laboratory results for RapiDOS[®] 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

Internal Lab

Page 1 of 2

Batch No. <i>MA</i>		SMO Use		AR/COG 618180								
Project Name: MWL RADON MONITORIN		Date Samples Shipped: <i>1/3/18</i>		SMO Authorization: <i>[Signature]</i>								
Project/Task Manager: Robert Zlock		Carrier/Waybill No. <i>276350</i>		SMO Contact Phone: <i>[Signature]</i>								
Project/Task Number: 195122.10.11.08		Lab Contact: Amy Kruszynski/		Wendy Palencia/505-844-3132								
Service Order: CF378-18		Lab Destination: LAND		Send Report to SMO:								
		Contract No.: 1495047		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								
		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
103638	001	RN1/ Radtrak2 651919-3	N/A	1/2/18 09:56	AF	N	0 NA	NONE	C	SA	RADON	
103639	001	RN2/ Radtrak2 496020-9	N/A	1/2/18 10:00	AF	N	0 NA	NONE	C	SA	RADON	
103640	001	RN3/ Radtrak2 188184-6	N/A	1/2/18 09:08	AF	N	0 NA	NONE	C	SA	RADON	
103641	001	RN4/ Radtrak2 203160-7	N/A	1/2/18 09:14	AF	N	0 NA	NONE	C	SA	RADON	
103642	001	RN5/ Radtrak2 178747-2	N/A	1/2/18 09:19	AF	N	0 NA	NONE	C	SA	RADON	
103643	001	RN6/ Radtrak2 202807-4	N/A	1/2/18 09:23	AF	N	0 NA	NONE	C	SA	RADON	
103644	001	RN7/ Radtrak2 758051-7	N/A	1/2/18 09:27	AF	N	0 NA	NONE	C	SA	RADON	
103645	001	RN8/ Radtrak2 987084-1	N/A	1/2/18 09:40	AF	N	0 NA	NONE	C	SA	RADON	
103646	001	RN9/ Radtrak2 203338-9	N/A	1/2/18 09:46	AF	N	0 NA	NONE	C	SA	RADON	
103647	001	RN10/ Radtrak2 524243-3	N/A	1/2/18 09:51	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"/>								
Confirmatory: <input type="checkbox"/> Yes		QC Inits.:		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab								
Sample Team Members		Name		Signature		Init.		Company/Organization/Phone/Cell		Return Samples By:		
		Danielle Michel		<i>[Signature]</i>		ML		SNL/00641/505-845-7706/505-219-7143		Comments:		
		Mark Lyon		<i>[Signature]</i>		ML		SNL/00631/505-284-3982		Deployed 10/2/17		
Relinquished by <i>[Signature]</i>		Org. <i>00641</i>		Date <i>1/3/18</i>		Time <i>0740</i>		Relinquished by <i>[Signature]</i>		Org. <i>00641</i>		
Received by <i>[Signature]</i>		Org. <i>00631</i>		Date <i>1/3/18</i>		Time <i>0740</i>		Received by <i>[Signature]</i>		Org. <i>00631</i>		
Relinquished by <i>[Signature]</i>		Org. <i>00631</i>		Date <i>1/3/18</i>		Time <i>0931</i>		Relinquished by <i>[Signature]</i>		Org. <i>00631</i>		
Received by <i>[Signature]</i>		Org. <i>00631</i>		Date <i>1/4/18</i>		Time <i>12m</i>		Received by <i>[Signature]</i>		Org. <i>00631</i>		

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

SMO 2012-ARCO (4-2012)

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

AOP 95-16

AR/COC **618180**

Project Name: MWL RADON MONITORING		Project/Task Manager: Robert Zlock			Project/Task No.: 195122.10.11.08								
Tech Area:												Lab use	
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						
103648	001	RN11/ Radtrak2 981385-8	N/A	1/2/18 10:11	AF	N	0 NA	NONE	C	SA	RADON		
103649	001	RN12/ Radtrak2 202728-2	N/A	1/2/18 10:15	AF	N	0 NA	NONE	C	SA	RADON		
103650	001	RN13/ Radtrak2 607884-4	N/A	1/2/18 10:24	AF	N	0 NA	NONE	C	SA	RADON		
103651	001	RN14/ Radtrak2 701773-4	N/A	1/2/18 10:28	AF	N	0 NA	NONE	C	SA	RADON		
103652	001	RN15/ Radtrak2 668252-0	N/A	1/2/18 10:20	AF	N	0 NA	NONE	C	SA	RADON		
103653	001	RN16/ Radtrak2 726753-7	N/A	1/2/18 09:00	AF	N	0 NA	NONE	C	SA	RADON		
103654	001	RN17/ Radtrak2 760827-6	N/A	1/2/18 09:32	AF	N	0 NA	NONE	C	SA	RADON		
103655	001	RNTB/ Radtrak2 461376-9	N/A	1/2/18 09:00	AF	N	0 NA	NONE	C	SA	RADON		
Recipient Initials _____													

Review of MWL Radon-in-Air Data
 4th Quarter CY 2017 (October - December 2017)
 February 14, 2018

SMO 2012-ARCOC (4-2012)

**CONTRACT LABORATORY
 ANALYSIS REQUEST AND CHAIN OF CUSTODY**

AOP 95-18

Internal Lab

Page 1 of 2

Batch No. <i>11/1</i>		SMO Use		AR/COC		618001									
Project Name: MWL RADON MONITORING		Date Samples Shipped: <i>1/3/18</i>		SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization									
Project/Task Manager: Robert Zlock		Carrier/Waybill No. <i>276350</i>		SMO Contact Phone: <i>[Signature]</i>		<input type="checkbox"/> RMA									
Project/Task Number: 195122.10.11.08		Lab Contact: Amy Kruszynski		Wendy Palencia/505-844-3132		<input type="checkbox"/> Released by COC No.									
Service Order: CF378-18		Lab Destination: LAND		Send Report to SMO: Stephanie Montaño/505.284.2553		<input checked="" type="checkbox"/> 4° Celsius									
Contract No.: 1495047						Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154									
Tech Area:		Room:		Operational Site:											
Building:															
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			
103050	001	RN1/ Thoron 660573-7	N/A	1/2/18 09:56	AF	N	0 NA	NONE	C	SA	RADON				
103051	001	RN2/ Thoron 660181-9	N/A	1/2/18 10:00	AF	N	0 NA	NONE	C	SA	RADON				
103052	001	RN3/ Thoron 660541-4	N/A	1/2/18 09:08	AF	N	0 NA	NONE	C	SA	RADON				
103053	001	RN4/ Thoron 466415-7	N/A	1/2/18 09:14	AF	N	0 NA	NONE	C	SA	RADON				
103054	001	RN5/ Thoron 466395-1	N/A	1/2/18 09:19	AF	N	0 NA	NONE	C	SA	RADON				
103055	001	RN6/ Thoron 660432-6	N/A	1/2/18 09:23	AF	N	0 NA	NONE	C	SA	RADON				
103056	001	RN7/ Thoron 660509-1	N/A	1/2/18 09:27	AF	N	0 NA	NONE	C	SA	RADON				
103057	001	RN8/ Thoron 687144-6	N/A	1/2/18 09:40	AF	N	0 NA	NONE	C	SA	RADON				
103058	001	RN9/ Thoron 466397-7	N/A	1/2/18 09:46	AF	N	0 NA	NONE	C	SA	RADON				
103059	001	RN10/ Thoron 686936-6	N/A	1/2/18 09:51	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		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day							
Background: <input type="checkbox"/> Yes		QC Inits.:		Negotiated TAT <input type="checkbox"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Return Samples By:							
Confirmatory: <input type="checkbox"/> Yes		Name		Signature		Init.		Company/Organization/Phone/Cell							
Sample Team Members		Danielle Michel		<i>[Signature]</i>		SNL/00641/505-945-7706/505-219-7143		Comments: <i>Deployed 10/2/17</i>							
		Mark Lyon		<i>[Signature]</i>		SNL/00631/505-284-3982									
Relinquished by <i>[Signature]</i>		Org. <i>SNL</i>		Date <i>1/3/18</i>		Time <i>0930</i>		Relinquished by <i>[Signature]</i>		Org. <i>SNL</i>		Date <i>1/5/18</i>		Time <i>2 pm</i>	
Received by <i>[Signature]</i>		Org. <i>SNL</i>		Date <i>1/3/18</i>		Time <i>0740</i>		Received by <i>[Signature]</i>		Org. <i>SNL</i>		Date <i>1/2/18</i>		Time <i>1</i>	
Relinquished by <i>[Signature]</i>		Org. <i>SNL</i>		Date <i>1/3/18</i>		Time <i>0930</i>		Relinquished by <i>[Signature]</i>		Org. <i>SNL</i>		Date		Time	
Received by <i>[Signature]</i>		Org. <i>SNL</i>		Date <i>1/4/18</i>		Time <i>1 pm</i>		Received by		Org.		Date		Time	

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

SMO 2012-ARCOG (4-2012)

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

AOP 95-16

AR/COC **618001**

Project Name: MWL RADON MONITORING		Project/Task Manager: Robert Ziock			Project/Task No.: 195122.10.11.08								
Tech Area:													
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						
103060	001	RN11/ Thoron 660225-4	N/A	1/2/18 10:11	AF	N	0 NA	NONE	C	SA	RADON		
103061	001	RN12/ Thoron 466355-5	N/A	1/2/18 10:15	AF	N	0 NA	NONE	C	SA	RADON		
103062	001	RN13/ Thoron 660542-2	N/A	1/2/18 10:24	AF	N	0 NA	NONE	C	SA	RADON		
103063	001	RN14/ Thoron 660127-2	N/A	1/2/18 10:28	AF	N	0 NA	NONE	C	SA	RADON		
103064	001	RN15/ Thoron 466382-9	N/A	1/2/18 10:20	AF	N	0 NA	NONE	C	SA	RADON		
103065	001	RN16/ Thoron 466387-8	N/A	1/2/18 09:00	AF	N	0 NA	NONE	C	SA	RADON		
103066	001	RN17/ Thoron 466408-2	N/A	1/2/18 09:32	AF	N	0 NA	NONE	C	SA	RADON		
103067	001	RNTB/ Thoron (660238-7)	N/A	1/2/18 09:00	AF	N	0 NA	NONE	C	SA	RADON		
Recipient Initials _____													

87185

US

18445



RADON/THORON MONITORING REPORT
Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER
4813903:1

REPORT PAGE 1(4)

REPORT DATE
01/11/2018

PRINT DATE
01/11/2018

MEASUREMENT PERFORMED FOR
ROBERT ZIOCK

NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT RECEIVER(S)
NTESS, LLC

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

Description of the measurement

The measurement was performed with closed radon/thoron alpha-track detectors.

Property address

AR/COC 618180 & 618001

Measurement method: closed alpha-track detector

The radon measurement was performed with a closed alpha-track detector following the quality guidance given in EPA 402-R-95-012. The detector container is manufactured from electrically conducting plastic. Through a small slit (filter) in the radon detector, radon gas enters the detector but the diffusion time is long enough to prevent thoron gas from entering. Through holes covered by paper filters in the thoron detector, both thoron and radon gas enter the detector. The thoron concentration is calculated by subtracting the radon contribution in the thoron detector as measured with the radon detector. The track-detecting material (film) inside the detectors are hit by alpha particles generated by radon and thoron entering the detectors and the decay products formed from them. On the film, alpha particles make small tracks which are enlarged through chemical etching and later analyzed via our proprietary Track-Etch methodology to determine the radon and thoron exposures. Radonova Laboratories AB (P.O. Box 6522, SE-751 28 Uppsala, Sweden) is accredited (no. 1489) by SWEDAC to conduct radon-gas measurements using closed alpha-track detector method. The thoron measurement is not part of the accredited measurement methods. The analysis equipment is checked daily and the detectors are calibrated at regular intervals.

Measured radon and thoron concentrations

For each detector, the measured value of the radon and thoron concentration is given. The radon detector is marked with (R) after the detector number in the result table and the thoron detector with (T). For each value an uncertainty associated with the measurement to a 95% confidence level also given. For example a measurement result of 4.0 ± 0.5 pCi/l means that the radon and thoron 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 and thoron concentration cannot be calculated. In such cases, the total exposure in pCi^h days/l will be reported.

Signature on the report

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

US_RT_001-V1.10/201740504-1/0/1/LB

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.

Review of MWL Radon-in-Air Data
 4th Quarter CY 2017 (October - December 2017)
 February 14, 2018



RADON/THORON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4813903:1

REPORT PAGE 2(4)

REPORT DATE
 01/11/2018

PRINT DATE
 01/11/2018

Test results

Detector	Start date	Stop date	Location	Detector comment	Avg Radon/Thoron Conc. pCi/l	Total Radon/Thoron Exp pCi-days/l
651919-3 (R)	10/02/2017	01/02/2018	RN1		< 0.4	< 37
660573-7 (T)	10/02/2017	01/02/2018	RN1		0.5 +/- 0.5	51 +/- 41
496020-9 (R)	10/02/2017	01/02/2018	RN2		< 0.4	< 37
660181-9 (T)	10/02/2017	01/02/2018	RN2		0.6 +/- 0.5	57 +/- 43
188184-6 (R)	10/02/2017	01/02/2018	RN3		0.5 +/- 0.2	44 +/- 16
660541-4 (T)	10/02/2017	01/02/2018	RN3		0.9 +/- 0.5	81 +/- 47
203160-7 (R)	10/02/2017	01/02/2018	RN4		0.4 +/- 0.3	38 +/- 20
466415-7 (T)	10/02/2017	01/02/2018	RN4		< 0.8	< 74
178747-2 (R)	10/02/2017	01/02/2018	RN5		< 0.4	< 37
466395-1 (T)	10/02/2017	01/02/2018	RN5		< 0.8	< 74
202807-4 (R)	10/02/2017	01/02/2018	RN6		0.5 +/- 0.3	48 +/- 20
660432-6 (T)	10/02/2017	01/02/2018	RN6		< 0.8	< 74
758051-7 (R)	10/02/2017	01/02/2018	RN7		< 0.4	< 37
660509-1 (T)	10/02/2017	01/02/2018	RN7		1.3 +/- 0.5	120 +/- 45
987084-1 (R)	10/02/2017	01/02/2018	RN8		< 0.4	< 37
687144-6 (T)	10/02/2017	01/02/2018	RN8		0.9 +/- 0.5	83 +/- 41
203338-9 (R)	10/02/2017	01/02/2018	RN9		0.4 +/- 0.3	37 +/- 20
466397-7 (T)	10/02/2017	01/02/2018	RN9		< 0.8	< 74
524243-3 (R)	10/02/2017	01/02/2018	RN10		0.5 +/- 0.2	46 +/- 16
686936-6 (T)	10/02/2017	01/02/2018	RN10		0.8 +/- 0.5	72 +/- 47

US_RT_Th_001_V1.10 / 2017-05-04 - / JOI / LB

Comment to the results

Tryggve Rönnqvist (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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87185

US

18445



RADON/THORON MONITORING REPORT
Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER
4813903:1

REPORT PAGE 3(4)

REPORT DATE
01/11/2018

PRINT DATE
01/11/2018

MEASUREMENT PERFORMED FOR
ROBERT ZIOCK

NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT RECEIVER(S)
NTESS, LLC

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

Description of the measurement

The measurement was performed with closed radon/thoron alpha-track detectors.

Property address

AR/COC 618180 & 618001

Measurement method: closed alpha-track detector

The radon measurement was performed with a closed alpha-track detector following the quality guidance given in EPA 402-R-95-012. The detector container is manufactured from electrically conducting plastic. Through a small slit (filter) in the radon detector, radon gas enters the detector but the diffusion time is long enough to prevent thoron gas from entering. Through holes covered by paper filters in the thoron detector, both thoron and radon gas enter the detector. The thoron concentration is calculated by subtracting the radon contribution in the thoron detector as measured with the radon detector. The track-detecting material (film) inside the detectors are hit by alpha particles generated by radon and thoron entering the detectors and the decay products formed from them. On the film, alpha particles make small tracks which are enlarged through chemical etching and later analyzed via our proprietary Track-Etch methodology to determine the radon and thoron exposures. Radonova Laboratories AB (P.O. Box 6522, SE-751 28 Uppsala, Sweden) is accredited (no. 1489) by SWEDAC to conduct radon-gas measurements using closed alpha-track detector method. The thoron measurement is not part of the accredited measurement methods. The analysis equipment is checked daily and the detectors are calibrated at regular intervals.

Measured radon and thoron concentrations

For each detector, the measured value of the radon and thoron concentration is given. The radon detector is marked with (R) after the detector number in the result table and the thoron detector with (T). For each value an uncertainty associated with the measurement to a 95% confidence level also given. For example a measurement result of 4.0 ± 0.5 pCi/l means that the radon and thoron 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 and thoron concentration cannot be calculated. In such cases, the total exposure in pCi³days/l will be reported.

Signature on the report

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

US_RT_Th_001-V1.10/2017-05-04-/JO/LB

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RADON/THORON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4813903:1

REPORT PAGE 4(4)

REPORT DATE
 01/11/2018

PRINT DATE
 01/11/2018

Test results

Detector	Start date	Stop date	Location	Detector comment	Avg Radon/Thoron Conc. pCi/l	Total Radon/Thoron Exp pCi-days/l
981385-8 (R)	10/02/2017	01/02/2018	RN11		0.4 +/- 0.2	39 +/- 16
660225-4 (T)	10/02/2017	01/02/2018	RN11		< 0.5	< 50
202728-2 (R)	10/02/2017	01/02/2018	RN12		< 0.4	< 37
466355-5 (T)	10/02/2017	01/02/2018	RN12		< 0.8	< 74
607884-4 (R)	10/02/2017	01/02/2018	RN13		< 0.4	< 37
660542-2 (T)	10/02/2017	01/02/2018	RN13		0.7 +/- 0.5	68 +/- 41
701773-4 (R)	10/02/2017	01/02/2018	RN14		0.5 +/- 0.2	42 +/- 16
660127-2 (T)	10/02/2017	01/02/2018	RN14		0.6 +/- 0.5	55 +/- 43
668252-0 (R)	10/02/2017	01/02/2018	RN15		< 0.4	< 37
466382-9 (T)	10/02/2017	01/02/2018	RN15		< 0.8	< 74
726753-7 (R)	10/02/2017	01/02/2018	RN16		< 0.4	< 37
466387-8 (T)	10/02/2017	01/02/2018	RN16		< 0.8	< 74
760827-6 (R)	10/02/2017	01/02/2018	RN17		< 0.4	< 37
466408-2 (T)	10/02/2017	01/02/2018	RN17		0.9 +/- 0.6	83 +/- 56
401376-9 (R)	10/02/2017	01/02/2018	RNTB		< 0.4	< 37
660238-7 (T)	10/02/2017	01/02/2018	RNTB		< 0.8	< 74

US_RT_Th_001 - V1.10 / 2017-05-04 - JJO / LB

Comment to the results

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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Review of MWL Radon-in-Air Data
 4th Quarter CY 2017 (October - December 2017)
 February 14, 2018

SMO 2012-ARCOC (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 618227	
Project Name: MWL RADON MONITORING		Date Samples Shipped: <u>1/3/18</u>		SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Robert Zlock		Center/Waybill No. <u>276350</u>		SMO Contact Phone: <u>Wendy Palencia/505-844-3132</u>	
Project/Task Number: 195122.10.11.08		Lab Contact: Amy Kruszynski		Send Report to SMO: <u>Stephanie Montaño/505.284.2553</u>	
Service Order: CF378-18		Lab Destination: LAND		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by CDC No. <input checked="" type="checkbox"/> 4° Celsius	
Contract No.: 1495047		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					
103773	001	RN1/ Rapiidos 968916-7	N/A	1/2/18 09:56	AF	N	0 NA	NONE	C	SA	RADON	
103774	001	RN2/ Rapiidos 234134-5	N/A	1/2/18 10:00	AF	N	0 NA	NONE	C	SA	RADON	
103775	001	RN3/ Rapiidos 308633-7	N/A	1/2/18 09:08	AF	N	0 NA	NONE	C	SA	RADON	
103776	001	RN4/ Rapiidos 196111-9	N/A	1/2/18 09:14	AF	N	0 NA	NONE	C	SA	RADON	
103777	001	RN5/ Rapiidos 373172-6	N/A	1/2/18 09:19	AF	N	0 NA	NONE	C	SA	RADON	
103778	001	RN6/ Rapiidos 693878-1	N/A	1/2/18 09:23	AF	N	0 NA	NONE	C	SA	RADON	
103779	001	RN7/ Rapiidos 778752-6	N/A	1/2/18 09:27	AF	N	0 NA	NONE	C	SA	RADON	
103780	001	RN8/ Rapiidos 132850-9	N/A	1/2/18 09:40	AF	N	0 NA	NONE	C	SA	RADON	
103781	001	RN9/ Rapiidos 231209-8	N/A	1/2/18 09:46	AF	N	0 NA	NONE	C	SA	RADON	
103782	001	RN10/ Rapiidos 767139-9	N/A	1/2/18 09:51	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									
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		Return to Client		<input checked="" type="checkbox"/> Disposal by Lab	
		Danielle Michel		<i>[Signature]</i>		SNL/00641/505-845-7706/505-219-7143		Return Samples By:		Comments:		Deployed 10/2/17			
		Mark Lyon		<i>[Signature]</i>		SNL/00631/505-284-3982									

Relinquished by <i>[Signature]</i>	Org. <u>0041</u>	Date <u>1/3/18</u>	Time <u>0940</u>	Relinquished by <i>[Signature]</i>	Org.	Date <u>1/5/18</u>	Time <u>3pm</u>
Received by <i>[Signature]</i>	Org. <u>0031</u>	Date <u>1/3/18</u>	Time <u>0740</u>	Received by <i>[Signature]</i>	Org.	Date <u>1/9/18</u>	Time <u>1</u>
Relinquished by <i>[Signature]</i>	Org. <u>0003</u>	Date <u>1/3/18</u>	Time <u>0930</u>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date <u>1/4/18</u>	Time <u>1pm</u>	Received by	Org.	Date	Time

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

SMO 2012-ARCO (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AOP 95-16

AR/COC 618227

Project Name:		MWL RADON MONITORING		Project/Task Manager:		Robert Zlock		Project/Task No.:		195122.10.11.08				
Tech Area:														Lab use
Building:	Room:													
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected		Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested		
							Type	Volume						
103783	001	RN11/ Rapidos 1293201-8	N/A	1/2/18	10:11	AF	N	0 NA	NONE	C	SA	RADON		
103784	001	RN12/ Rapidos 234218-6	N/A	1/2/18	10:15	AF	N	0 NA	NONE	C	SA	RADON		
103785	001	RN13/ Rapidos 673879-3	N/A	1/2/18	10:24	AF	N	0 NA	NONE	C	SA	RADON		
103786	001	RN14/ Rapidos 772317-4	N/A	1/2/18	10:28	AF	N	0 NA	NONE	C	SA	RADON		
103787	001	RN15/ Rapidos 109531-4	N/A	1/2/18	10:20	AF	N	0 NA	NONE	C	SA	RADON		
103788	001	RN16/ Rapidos 163067-2	N/A	1/2/18	09:00	AF	N	0 NA	NONE	C	SA	RADON		
103789	001	RN17/ Rapidos 251872-8	N/A	1/2/18	09:32	AF	N	0 NA	NONE	C	SA	RADON		
103790	001	RNTB/ Rapidos 207221-4	N/A	1/2/18	09:00	AF	N	0 NA	NONE	C	SA	RADON		
Recipient Initials _____														

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RADON MONITORING REPORT

Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER
4813904:3

REPORT PAGE 1(4)

REPORT DATE
01/22/2018

PRINT DATE
01/22/2018

MEASUREMENT PERFORMED FOR

NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT RECEIVER(S)
NTESS, LLC

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

Description of the measurement

The measurement was performed with a closed high-sensitivity alpha-track detector.

The detector(s) arrived to Radonova Laboratories AB 01/04/2018. They were measured 01/10/2018.

Property data and address

AR/COC 618227

Transit Detector 1:
Transit Detector 2:
Transit Detector 3:

Measurement method: closed alpha-track high sensitivity 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. Transit detectors are used for the return delivery of the high-sensitivity detectors in order to make a more accurate background subtraction.

Radonova Laboratories AB 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 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.

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.
- A Citizen's Guide to Radon
- Home Buyer's and Seller's Guide to Radon
- Consumer's Guide to Radon Reduction

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.

US_RT_HQ_001-V1.1.0/2017-05-04-1/JO/LB

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4813904:3

REPORT PAGE 2(4)

REPORT DATE
 01/22/2018

PRINT DATE
 01/22/2018

Test results

Detector	Start date	Stop date	Location	Detector comment	Location type	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
968916-7	10/02/2017	01/02/2018	RN1			0.46 ± 0.11	42 ± 11
234134-5	10/02/2017	01/02/2018	RN2			0.27 ± 0.09	24 ± 9
308633-7	10/02/2017	01/02/2018	RN3			0.43 ± 0.11	39 ± 11
196111-9	10/02/2017	01/02/2018	RN4			0.38 ± 0.11	35 ± 11
373172-6	10/02/2017	01/02/2018	RN5			0.27 ± 0.09	24 ± 9
693878-1	10/02/2017	01/02/2018	RN6			0.32 ± 0.11	29 ± 11
778752-6	10/02/2017	01/02/2018	RN7			0.35 ± 0.11	32 ± 11
132850-9	10/02/2017	01/02/2018	RN8			0.32 ± 0.11	30 ± 11
231209-8	10/02/2017	01/02/2018	RN9			0.27 ± 0.09	24 ± 9
767139-9	10/02/2017	01/02/2018	RN10			0.24 ± 0.09	23 ± 9

US_RT_RS_001 - V1.10 / 2017-05-04 - JJO / LB

Comment to the results

Detector 207881-4 (RNTB) was delivered in March 2017 compared to the other detectors which were delivered in September 2017. The unusual high RNTB value might be explained if the exposure of that detector was started at delivery. This report replaces 4813904:1. Reason: new or corrected measurement information has been received.
 This report replaces 4813904:2. Reason: new or corrected measurement information has been received.

Trygve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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RADON MONITORING REPORT

Issued by an Accredited Laboratory



107831-AL, 107830-RT

REPORT NUMBER
4813904:3

REPORT PAGE 3(4)

REPORT DATE
01/22/2018

PRINT DATE
01/22/2018

MEASUREMENT PERFORMED FOR

NTESS, LLC
Wendy Palencia
Mailstop 1103
PO Box 5800
1515 Eubank SE
Albuquerque NM 87185
United States

REPORT RECEIVER(S)
NTESS, LLC

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

Description of the measurement

The measurement was performed with a closed high-sensitivity alpha-track detector.

The detector(s) arrived to Radonova Laboratories AB 01/04/2018. They were measured 01/10/2018.

Property data and address

AR/COC 618227

Transit Detector 1:
Transit Detector 2:
Transit Detector 3:

Measurement method: closed alpha-track high sensitivity 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. Transit detectors are used for the return delivery of the high-sensitivity detectors in order to make a more accurate background subtraction.

Radonova Laboratories AB 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 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.

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.
- A Citizen's Guide to Radon
- Home Buyer's and Seller's Guide to Radon
- Consumer's Guide to Radon Reduction

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.

US_RT_HS_001-V1.10/20170504-1/JO/LB

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RADON MONITORING REPORT
 Issued by an Accredited Laboratory



REPORT NUMBER
 4813904:3

REPORT PAGE 4(4)

REPORT DATE
 01/22/2018

PRINT DATE
 01/22/2018

Test results

Detector	Start date	Stop date	Location	Detector comment	Location type	Avg Radon Conc. pCi/l	Total Radon Exp pCi-days/l
129301-8	10/02/2017	01/02/2018	RN11			0.30 ± 0.11	28 ± 11
234218-6	10/02/2017	01/02/2018	RN12			0.43 ± 0.11	39 ± 11
673879-3	10/02/2017	01/02/2018	RN13			0.38 ± 0.11	35 ± 11
772317-4	10/02/2017	01/02/2018	RN14			0.30 ± 0.11	28 ± 11
163067-2	10/02/2017	01/02/2018	RN16			0.41 ± 0.11	37 ± 11
251872-8	10/02/2017	01/02/2018	RN17			0.27 ± 0.11	26 ± 11
207881-4	10/02/2017	01/02/2018	RNTB			1.3 ± 0.19	122 ± 18
190531-4	10/02/2017	01/02/2018	RN15			0.30 ± 0.11	28 ± 11

US_RT_H5_001 - V1.10 / 2017-05-04 - /JO / LB

Comment to the results

Detector 207881-4 (RNTB) was delivered in March 2017 compared to the other detectors which were delivered in September 2017. The unusual high RNTB value might be explained if the exposure of that detector was started at delivery. This report replaces 4813904:1. Reason: new or corrected measurement information has been received.
 This report replaces 4813904:2. Reason: new or corrected measurement information has been received.

Tryggve Rönnqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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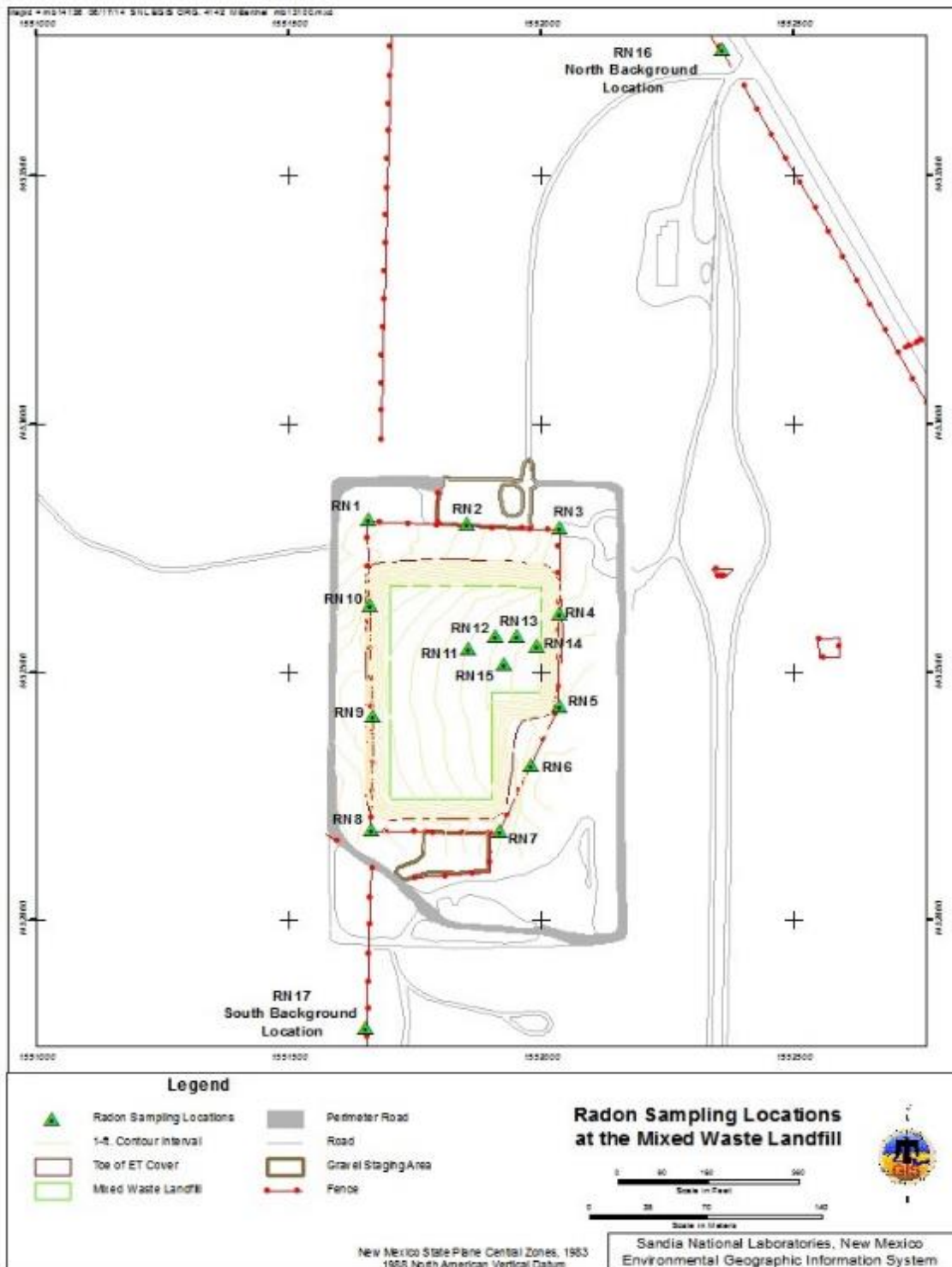


Figure 1. Location of Radon Detectors at the MWL

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

Name: Robert Ziock Signature: *Robert Ziock* Activity (check all that apply): Deployment Collection

Name: Danielle Michel Signature: *Danielle Michel* Deployment Collection
Mark Lyon
 ARCOG #: 618180 Detector Type: Radtrack2 *Collection*

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
651919-3 726753-7 10/21/17	103638	RN1	10/2/17	0955 0830	1/2/18	0956	10/2/17 NONE
496020-9	103639	RN2		1000		1000	NONE
182184-6	103640	RN3		0843		0908	NONE
003160-7	103641	RN4		0850		0914	NONE
178747-2	103642	RN5		0857		0919	NONE
002807-4	103643	RN6		0903		0923	NONE
758051-7	103644	RN7		0908		0927	NONE
987024-1	103645	RN8		0913		0940	NONE
203332-9	103646	RN9		0926		0946	NONE
524243-3	103647	RN10		0930		0951	NONE
981325-8	103648	RN11		1006		1011	NONE
000722-2	103649	RN12		1005		1015	NONE
607884-4	103650	RN13		1012		1024	NONE
701773-1	103651	RN14		1020		1028	NONE
668052-0	103652	RN15		1015		1020	Spider nest removed
726753-7	103653	RN16		0830		0900	NONE
760827-6	103654	RN17		0917		0932	NONE
401376-9	103655	RNTB	✓	NA	✓	0900	NONE

Additional Comments: _____

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

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

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

Name: Robert Ziock Signature: [Signature] Activity (check all that apply):
 Deployment Collection

Name: Danielle Michel Signature: [Signature] Deployment Collection
Mark Lyon [Signature] Collection
 ARCO #: 618001 Detector Type: Thoron

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
660573-7 466387-8	103050	RN1	10/2/17	0955 0830	11/2/18	0956	10/2/19 NONE
660181-9	103051	RN2		1000		1000	NONE
660544-4	103052	RN3		0843		0908	NONE
466415-7	103053	RN4		0850		0914	NONE
466395-1	103054	RN5		0857		0919	NONE
660432-6	103055	RN6		0903		0923	NONE
660509-1	103056	RN7		0908		0927	NONE
687144-6	103057	RN8		0913		0940	NONE
466397-7	103058	RN9		0926		0946	NONE
686936-6	103059	RN10		0930		0951	NONE
660225-4	103060	RN11		1006		1011	NONE
466355-5	103061	RN12		1005		1015	NONE
660542-2	103062	RN13		1012		1024	NONE
660127-2	103063	RN14		1020 1018		1028	NONE
466382-9	103064	RN15		1015		1020	spider nest removed
466387-8	103065	RN16		0830		0900	NONE
466408-2	103066	RN17		0917	↓	0932	NONE
660238-7	103067	RNTB	↓	NA	↓	0900	NONE

Additional Comments: _____

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

Name: Robert Ziock

Signature: *Robert Ziock*

Activity (check all that apply):
 Deployment Collection

Name: Danielle Michel

Signature: *Danielle Michel*

Deployment Collection
 ✓ Collection

ARCOC #: 618227

Detector Type: Rapidos

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time	Comments
168916-7 163067-2	103773	RN1	10/2/17	0838 0850 10/2/17	11/2/18	0956	10/2/17 NONE
234134-5	103774	RN2		1000		1000	NONE
302633-7	103775	RN3		0843		0908	NONE
196111-9	103776	RN4		0850		0914	NONE
373172-6	103777	RN5		0257		0919	NONE
693878-1	103778	RN6		0903		0923	NONE
778752-6	103779	RN7		0908		0927	NONE
132850-9	103780	RN8		0913		0940	NONE
231269-8	103781	RN9		0926		0946	NONE
767139-9	103782	RN10		0930		0951	NONE
129301-8	103783	RN11		1006		^{PH} 0958 0958	NONE
034212-6	103784	RN12		1005		1015	NONE
673879-3	103785	RN13		1012		1024	NONE
772317-4	103786	RN14		1020 1018		1028	NONE
190531-4	103787	RN15		1015		1020	Spider nest removed NONE
163067-2	103788	RN16		0830		0900	NONE
251872-8	103789	RN17		0917		0932	NONE
207821-4	103790	RNTB	↓	NA	↓	0900	NONE

Additional Comments: _____

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 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. 618001 & 618180

Analytical Lab Radonova

SDG No. 4813903-1

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	N/A		
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	N/A		
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)	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		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	N/A		
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			
	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: 02-06-2018 12:51:00

Closed by: Wendy Palencia Date: 02-06-2018 12:51:00

Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL Radon Monitoring

Project/Task No. 195122_10.11.08

ARCOC No. 618227

Analytical Lab Radonova

SDG No. 4813904-1

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		Detector number on ARCOG for RN15 was 109531-4, but the actual detector was 190531-4. Detector number on ARCOG for RN11 was 1293201-8, but the actual detector was 129301-8.
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	N/A		
	a) Laboratory control sample accuracy reported and met for all samples			
	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	N/A		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data	N/A		
	a) Method or reagent blank data reported and met for all samples			

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	Radon detected on RNTB
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	N/A		
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		

Line No.	Item	Yes	No	Comments
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		
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			
	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)	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		

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: 02-06-2018 13:26:00

Closed by: Wendy Palencia Date: 02-06-2018 13:26:00

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection Form

Name: MARK LYONSignature: Mark LyonDate of Inspection: Nov. 2, 2017

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

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection FormName: Danielle Wickel / Mark LyonSignature: Danielle Wickel / Mark LyonDate of Inspection: 12/4/17

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**IMPORTANT NOTICE:** A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

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

Name: Danielle MichelSignature: Danielle MichelCollection Date: 1/2/18Detector Type: Radtrack 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	

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**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	Replaced plastic assembly
RN9	None
RN10	None
RN11	None
RN12	None
RN13	None
RN14	None
RN15	Secondary plastic assembly broke; not used - not replaced
RN16	None
RN17	None

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

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ANNEX B

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

April 2017-March 2018

Data Evaluation Memo

Data Validation Reports

Contract Verification Reviews



date: October 4, 2017

to: Mike Mitchell (8854), Robert Ziock (641), and Bonnie Little (631)

from: Kelly Green (6283) *Kelly Green*

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 tritium-in-soil monitoring data results for the 8/30/17 sample event.

Summary of Tritium Results (EPA Method 906.0^a)
Mixed Waste Landfill Surface Soil Monitoring
August 30, 2017

Sample Location	Result (pCi/L)	Percent Soil Moisture	Laboratory Qualifier	Validation Qualifier	Trigger Level (pCi/L)
MWL TS-2NW	99.8 ± 263	6.96	U	BD, FR3	20,000
MWL TS-2SW	51.8 ± 133	8.61	U	BD, FR3	
MWL TS-2SW (Duplicate)	195 ± 141	9.28	U	BD, FR3	
MWL TS-2SE	201 ± 140	8.83	U	BD, FR3	
MWL TS-2NE	191 ± 141	6.88	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.

These results are slightly higher than the August 2016 monitoring data (MWL Annual LTMM Report, June 2017) which ranged from 28.3 pCi/L to 151 pCi/L and are far below the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (LTMMP) trigger level of 20,000 pCi/L. The results are also consistent with historic monitoring data collected at the MWL as part of the routine Terrestrial Surveillance Program where the data collected between 2000 and 2014 ranged from 182 pCi/L ("not detected, or "U" qualified) to 6140 pCi/L.

I recommend results be presented in tabular form and be evaluated relative to the historic data set and the LTMMP trigger level of 20,000 pCi/L. If the tritium flux from the disposal areas increases in the future due to changing conditions, they will be detected, compared to the trigger level, and reported appropriately.

cc: CFRC

Revised Memorandum

Date: October 26, 2017
To: File
From: Mary Donovan
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL Surface Soil Monitoring
ARCOG: 617998
SDG: 431847
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 soil samples were prepared and analyzed with approved procedures using method EPA 906.0 modified (tritium) [GL-RAD-A-002]. Problems were identified with the data package that resulted in the qualification of data.

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

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

Holding Times and Preservation

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

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

Tracers or carriers were not required for this method.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Laboratory Control Sample (LCS)

The LCS recovery met QC acceptance criteria,

Detection Limits/Dilutions

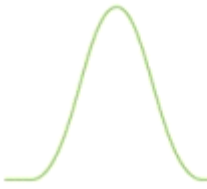
The samples were not diluted. The required detection limits were met.

Other QC

One set of field duplicates was submitted. 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: Linda Thal **Level:** I **Date:** 10/02 and 10/27/17



Sample Findings Summary



AR/COC: 617998

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
GL-RAD-A-002			
	103318-001/MWL TS-2NW	Tritium (10028-17-8)	BD, FR3
	103319-001/MWL TS-2SW	Tritium (10028-17-8)	BD, FR3
	103320-001/MWL TS-2SE	Tritium (10028-17-8)	BD, FR3
	103321-001/MWL TS-2NE	Tritium (10028-17-8)	BD, FR3
	103322-001/MWL TS-2SW	Tritium (10028-17-8)	BD, FR3

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

Sandia Data Validation Summary Worksheet

ARCOG#: 617998	Site/Project: MWL Surface Soil Monitoring	Validation Date: 10/02/2017 and 10/26/2017
SDG #: 431847	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Soil	# of Samples: 5	CVR present: Yes
ARCOG(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: 08/30/2017

Per client request, sample 431847001 (103318-001) was recounted with a longer count time in order to meet the required critical level.

Validated by:

Mary A. Donovan

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab		AR/COG 617998	
Batch No. <i>n/a</i>		SMO Use	
Project Name: MWL SURFACE SOIL MON	Date Samples Shipped: <i>8/30/17</i>	SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Robert Ziock	Carrier/Waybill No. <i>270676</i>	SMO Contact Phone: <i>Wendy Palencia/505-844-3132</i>	
Project/Task Number: 195122.10.11.08	Lab Contact: <i>Eddie Kent/843-769-7385</i>	Send Report to SMO: <i>Stephanie Montaño/505.284.2553</i>	
Service Order: CF426-17	Lab Destination: GEL		
Contract No.: 1303873		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <i>n/a</i> <input checked="" type="checkbox"/> 4° Celsius	
Tech Area:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>431847</i>	
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					
103318	001	MWL TS-2NW	N/A	<i>8/30/17 0720</i>	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	<i>001</i>
103319	001	MWL TS-2SW	N/A	<i>0730</i>	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	<i>002</i>
103320	001	MWL TS-2SE	N/A	<i>0740</i>	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	<i>003</i>
103321	001	MWL TS-2NE	N/A	<i>0745</i>	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	<i>004</i>
103322	001	MWL TS-2SW	N/A	<i>0730</i>	SOIL	P	2x1 L	None	G	DU	TRITIUM (EPA 906)	<i>005</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:		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		Init.		Company/Organization/Phone/Cell		Negotiated TAT <input type="checkbox"/>				
Sample Team Members		Name		Signature		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				

Danielle Michel		<i>[Signature]</i>		SNL/0641/505-845-7706		Return Samples By:				Lab Use			
Relinquished by <i>Danielle Michel</i>		Org. <i>0641</i>		Date <i>8/30/17</i>		Time <i>0756</i>		Relinquished by			Org.	Date	Time
Received by <i>[Signature]</i>		Org. <i>0631</i>		Date <i>8/30/17</i>		Time <i>0756</i>		Received by			Org.	Date	Time
Relinquished by <i>[Signature]</i>		Org. <i>0631</i>		Date <i>8/30/17</i>		Time <i>1100</i>		Relinquished by			Org.	Date	Time
Received by <i>[Signature]</i>		Org.		Date <i>8/31/17</i>		Time <i>7:45</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 Monitoring

Project/Task No. 195122 / 10.11.08

ARCOC No. 617998

Analytical Lab GWL

SDG No. 431847

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	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)	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			
	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: 10-31-2017 09:02:00

Closed by: Mark L Lyon Date: 10-31-2017 09:02:00

Mixed Waste Landfill
Biota Monitoring
September 2017 Sampling Event

Memorandum

Date: September 29, 2017
To: File
From: Mary Donovan
Subject: Inorganic Data Review and Validation – SNL
Site: MWL Surface Soil Monitoring
ARCOG: 617999
SDG: 431737
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 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 Ba and Zn, 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% for Cr, Pb and V. The PS %R was ≤125%. The associated sample results were detects and will be **qualified J, MS2** due to the high MS and passing PS recoveries.
3. Cd was detected at ≤ the PQL in a bracketing CCB. All associated sample results were detects ≤ their respective PQLs and will be **qualified U,B3** at their respective PQLs.

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 properly preserved.

ICP-MS Instrument Tune

The ICP-MS tunes 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 the blanks except as noted above in the Summary section and as follows. Be was detected at \leq the PQL in a bracketing CCB. All associated sample results were detects $>$ the PQL and $> 5X$ the CCB concentration 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 replicates 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 and correctly adjusted for dilutions. The ICP-MS samples were diluted the standard 2X.

ICP Interference Check Sample (ICS A and AB)

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

ICP Serial Dilution

The serial dilutions met all QC acceptance criteria.

Other QC

One field duplicate was submitted with the ARCOG. 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: Linda Thal

Level: I

Date: 10/02/17

Memorandum

Date: October 2, 2017
To: File
From: Mary Donovan
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL Surface Soil Monitoring
ARCOG: 617999
SDG: 431737
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 soil samples were prepared and analyzed with approved procedures using method DOE HASL 300, 4.5.2.3/Ga-01-R (gamma spec, solid – long list). Problems were identified with the data package that resulted in the qualification of data.

1. All sample results which were either $<$ the associated 2-sigma TPU or $<$ the associated MDA will be **qualified BD,FR3**.
2. All sample results that were $>$ the MDA but $\leq 3X$ the MDA will be **qualified J,FR7**.
3. The Bi-212 result for sample 431737003 was rejected by the laboratory due to the peak not meeting identification criteria and will be **qualified R,Z2**.
4. According to the case narrative, no peaks were identified for Bi-212 in sample -001. The associated sample result is considered non-detect at the calculated MDA and will be **qualified BD,Z2**.

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 properly preserved and prepared and analyzed within the prescribed holding time.

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

Tracers or carriers were not required for this method.

Matrix Spike (MS)

MS analysis was not required for this method.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria,

Detection Limits/Dilutions

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

Other QC

One set of field duplicates was submitted. 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: Linda Thal

Level: I

Date: 10/02/17



Sample Findings Summary



AR/COC: 617999

Page 1 of 6

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE HASL 300, 4.5.2.3/Ga-			
	103324-001/MWL ABSS-01-2017	Americium-241 (14596-10-2)	BD, FR3
	103324-001/MWL ABSS-01-2017	Beryllium-7 (13966-02-4)	BD, FR3
	103324-001/MWL ABSS-01-2017	Bismuth-212 (14913-49-6)	BD, Z2
	103324-001/MWL ABSS-01-2017	Cobalt-60 (10198-40-0)	BD, FR3
	103324-001/MWL ABSS-01-2017	Neptunium-237 (13994-20-2)	BD, FR3
	103324-001/MWL ABSS-01-2017	Radium-223 (15623-45-7)	BD, FR3
	103324-001/MWL ABSS-01-2017	Radium-224 (13233-32-4)	J, FR7
	103324-001/MWL ABSS-01-2017	Sodium-22 (13966-32-0)	BD, FR3
	103324-001/MWL ABSS-01-2017	Thorium-227 (15623-47-9)	BD, FR3
	103324-001/MWL ABSS-01-2017	Thorium-231 (14932-40-2)	BD, FR3
	103324-001/MWL ABSS-01-2017	Thorium-234 (15065-10-8)	BD, FR3
	103324-001/MWL ABSS-01-2017	Uranium-235 (15117-96-1)	BD, FR3
	103324-001/MWL ABSS-01-2017	Uranium-238 (7440-61-1)	BD, FR3
	103325-001/MWL ABSS-02-2017	Americium-241 (14596-10-2)	BD, FR3
	103325-001/MWL ABSS-02-2017	Beryllium-7 (13966-02-4)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	103325-001/MWL ABSS-02-2017	Bismuth-212 (14913-49-6)	R, Z2
	103325-001/MWL ABSS-02-2017	Cobalt-60 (10198-40-0)	BD, FR3
	103325-001/MWL ABSS-02-2017	Neptunium-237 (13994-20-2)	BD, FR3
	103325-001/MWL ABSS-02-2017	Radium-223 (15623-45-7)	BD, FR3
	103325-001/MWL ABSS-02-2017	Sodium-22 (13966-32-0)	BD, FR3
	103325-001/MWL ABSS-02-2017	Thorium-227 (15623-47-9)	BD, FR3
	103325-001/MWL ABSS-02-2017	Thorium-231 (14932-40-2)	BD, FR3
	103325-001/MWL ABSS-02-2017	Thorium-234 (15065-10-8)	BD, FR3
	103325-001/MWL ABSS-02-2017	Uranium-235 (15117-96-1)	BD, FR3
	103325-001/MWL ABSS-02-2017	Uranium-238 (7440-61-1)	BD, FR3
	103326-001/MWL AHSS-01-2017	Americium-241 (14596-10-2)	BD, FR3
	103326-001/MWL AHSS-01-2017	Beryllium-7 (13966-02-4)	J, FR7
	103326-001/MWL AHSS-01-2017	Cobalt-60 (10198-40-0)	BD, FR3
	103326-001/MWL AHSS-01-2017	Neptunium-237 (13994-20-2)	BD, FR3
	103326-001/MWL AHSS-01-2017	Radium-223 (15623-45-7)	BD, FR3
	103326-001/MWL AHSS-01-2017	Sodium-22 (13966-32-0)	BD, FR3
	103326-001/MWL AHSS-01-2017	Thorium-227 (15623-47-9)	BD, FR3
	103326-001/MWL AHSS-01-2017	Thorium-231 (14932-40-2)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	103326-001/MWL AHSS-01-2017	Thorium-234 (15065-10-8)	J, FR7
	103326-001/MWL AHSS-01-2017	Uranium-235 (15117-96-1)	BD, FR3
	103326-001/MWL AHSS-01-2017	Uranium-238 (7440-61-1)	J, FR7
	103427-001/MWL AHSS-02-2017	Americium-241 (14596-10-2)	BD, FR3
	103427-001/MWL AHSS-02-2017	Beryllium-7 (13966-02-4)	J, FR7
	103427-001/MWL AHSS-02-2017	Cobalt-60 (10198-40-0)	BD, FR3
	103427-001/MWL AHSS-02-2017	Neptunium-237 (13994-20-2)	BD, FR3
	103427-001/MWL AHSS-02-2017	Radium-223 (15623-45-7)	BD, FR3
	103427-001/MWL AHSS-02-2017	Sodium-22 (13966-32-0)	BD, FR3
	103427-001/MWL AHSS-02-2017	Thorium-227 (15623-47-9)	BD, FR3
	103427-001/MWL AHSS-02-2017	Thorium-231 (14932-40-2)	BD, FR3
	103427-001/MWL AHSS-02-2017	Thorium-234 (15065-10-8)	J, FR7
	103427-001/MWL AHSS-02-2017	Uranium-235 (15117-96-1)	BD, FR3
	103427-001/MWL AHSS-02-2017	Uranium-238 (7440-61-1)	J, FR7
	103428-001/MWL ABSS-01-2017	Americium-241 (14596-10-2)	BD, FR3
	103428-001/MWL ABSS-01-2017	Beryllium-7 (13966-02-4)	BD, FR3
	103428-001/MWL ABSS-01-2017	Cobalt-60 (10198-40-0)	BD, FR3
	103428-001/MWL ABSS-01-2017	Neptunium-237 (13994-20-2)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	103428-001/MWL ABSS-01-2017	Radium-223 (15623-45-7)	BD, FR3
	103428-001/MWL ABSS-01-2017	Sodium-22 (13966-32-0)	BD, FR3
	103428-001/MWL ABSS-01-2017	Thorium-227 (15623-47-9)	BD, FR3
	103428-001/MWL ABSS-01-2017	Thorium-231 (14932-40-2)	BD, FR3
	103428-001/MWL ABSS-01-2017	Thorium-234 (15065-10-8)	BD, FR3
	103428-001/MWL ABSS-01-2017	Uranium-235 (15117-96-1)	BD, FR3
	103428-001/MWL ABSS-01-2017	Uranium-238 (7440-61-1)	BD, FR3
SW846 3050B/6020			
	103324-002/MWL ABSS-01-2017	Barium (7440-39-3)	J, MS1
	103324-002/MWL ABSS-01-2017	Cadmium (7440-43-9)	0.19U, B3
	103324-002/MWL ABSS-01-2017	Chromium (7440-47-3)	J, MS2
	103324-002/MWL ABSS-01-2017	Lead (7439-92-1)	J, MS2
	103324-002/MWL ABSS-01-2017	Vanadium (7440-62-2)	J, MS2
	103324-002/MWL ABSS-01-2017	Zinc (7440-66-6)	J, MS1
	103325-002/MWL ABSS-02-2017	Barium (7440-39-3)	J, MS1
	103325-002/MWL ABSS-02-2017	Cadmium (7440-43-9)	0.20U, B3
	103325-002/MWL ABSS-02-2017	Chromium (7440-47-3)	J, MS2
	103325-002/MWL ABSS-02-2017	Lead (7439-92-1)	J, MS2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	103325-002/MWL ABSS-02-2017	Vanadium (7440-62-2)	J, MS2
	103325-002/MWL ABSS-02-2017	Zinc (7440-66-6)	J, MS1
	103326-002/MWL AHSS-01-2017	Barium (7440-39-3)	J, MS1
	103326-002/MWL AHSS-01-2017	Cadmium (7440-43-9)	0.19U, B3
	103326-002/MWL AHSS-01-2017	Chromium (7440-47-3)	J, MS2
	103326-002/MWL AHSS-01-2017	Lead (7439-92-1)	J, MS2
	103326-002/MWL AHSS-01-2017	Vanadium (7440-62-2)	J, MS2
	103326-002/MWL AHSS-01-2017	Zinc (7440-66-6)	J, MS1
	103427-002/MWL AHSS-02-2017	Barium (7440-39-3)	J, MS1
	103427-002/MWL AHSS-02-2017	Cadmium (7440-43-9)	0.19U, B3
	103427-002/MWL AHSS-02-2017	Chromium (7440-47-3)	J, MS2
	103427-002/MWL AHSS-02-2017	Lead (7439-92-1)	J, MS2
	103427-002/MWL AHSS-02-2017	Vanadium (7440-62-2)	J, MS2
	103427-002/MWL AHSS-02-2017	Zinc (7440-66-6)	J, MS1
	103428-002/MWL ABSS-01-2017	Barium (7440-39-3)	J, MS1
	103428-002/MWL ABSS-01-2017	Cadmium (7440-43-9)	0.20U, B3
	103428-002/MWL ABSS-01-2017	Chromium (7440-47-3)	J, MS2
	103428-002/MWL ABSS-01-2017	Lead (7439-92-1)	J, MS2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	103428-002/MWL ABSS-01-2017	Vanadium (7440-62-2)	J, MS2
	103428-002/MWL ABSS-01-2017	Zinc (7440-66-6)	J, MS1

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

Sandia Data Validation Summary Worksheet

ARCOG#: 617999	Site/Project: MWL Surface Soil Monitoring	Validation Date: 09/29/2017
SDG #: 431737	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Soil	# of Samples: 10	CVR present: Yes
ARCOG(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
None								

Comments: Collected: 08/28/2017
Validated by: <div style="text-align: center; font-family: cursive; font-size: 1.2em;"> Mary A. Donovan </div>

Sandia Inorganic Metals Worksheet

ARCO # (s): 617999	SDG # (s): 431737	Matrix: Soil
--------------------	-------------------	--------------

Laboratory Sample IDs: 431737002, -004, -006, -008, -010

Method/Batch #: **3050B/6020** 1697160/1697161 **3050B/6010B** 1697191/1697192 **7471A** 1700926/1700934

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

Analyte (outliers)	Calibration						MB mg/kg	5X Blank (5X abs. val.) mg/kg	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R	PS			
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
ICP-MS																			
Ba	NA	✓	✓	✓	✓	✓	✓	NA	✓	570*	✓	✓	NA	NA	✓	NA			
Cr	NA	✓	✓	✓	✓	✓	✓	NA	✓	163	✓	✓	NA	NA	✓	✓			
Pb	NA	✓	✓	✓	✓	✓	✓	NA	✓	135	✓	✓	NA	NA	✓	✓			
V	NA	✓	✓	✓	✓	✓	✓	NA	✓	178	✓	✓	NA	NA	✓	✓			
Zn	NA	✓	✓	✓	✓	✓	✓	NA	✓	159*	✓	✓	NA	NA	✓	NA			
Be	NA	✓	✓	✓	✓	.181J	✓	0.18	✓	✓	✓	✓	NA	NA	✓	NA			
Cd	NA	✓	✓	✓	✓	.245J	✓	0.24	✓	✓	✓	✓	NA	NA	✓	NA			

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

Comments: HTs OK; Matrix QC performed on sample -002 * MS parent sample concentration >4X spike concentration
 Al, Ca, Fe and Mg < ICSA conc. in all samples for ICP-MS and ICP-AES analysis
 Dilutions: The samples were initially diluted the standard 2X for ICP-MS analysis.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A* SMO Use *1* AR/COC **617999**

Project Name: MWL SURFACE SOIL MON	Date Samples Shipped: <i>8/29/17</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Robert Zlock	Carrier/Waybill No. <i>270575</i>	SMO Contact Phone: <i>[Signature]</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: CF426-17	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505.284.2553	<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 <i>431737</i>

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					
103324	001	MWL ABSS-01-2017	NA	<i>8/28/17 0055</i>	AN	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	<i>001</i>
103324	002	MWL ABSS-01-2017	NA	<i>↓</i>	AN	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	<i>002</i>
103325	001	MWL ABSS-02-2017	NA	<i>0905</i>	AN	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	<i>003</i>
103325	002	MWL ABSS-02-2017	NA	<i>↓</i>	AN	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	<i>004</i>
103326	001	MWL AHSS-01-2017	NA	<i>0911</i>	AN	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	<i>005</i>
103326	002	MWL AHSS-01-2017	NA	<i>↓</i>	AN	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	<i>006</i>
103427	001	MWL AHSS-02-2017	NA	<i>0916</i>	AN	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	<i>007</i>
103427	002	MWL AHSS-02-2017	NA	<i>↓</i>	AN	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	<i>008</i>
103428	001	MWL ABSS-01-2017	NA	<i>0855</i>	AN	P	250 ml	None	G	DU	GAMMA SPEC (EPA 901)	<i>009</i>
103428	002	MWL ABSS-01-2017	NA	<i>↓</i>	AN	P	250 ml	None	G	DU	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	<i>010</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
	Danielle Michel	<i>[Signature]</i>		SNL/0641/505-845-7706	Return Samples By:
					Comments:

Relinquished by <i>[Signature]</i> Org. <i>0641</i> Date <i>8/28/17</i> Time <i>1005</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>8/28/17</i> Time <i>1005</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. <i>00631</i> Date <i>8/29/17</i> Time <i>0830</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>8/30/17</i> Time <i>7:40</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

Batch No. *N/A*

SMO Use

AR/COC **617999**

Project Name: MWL SURFACE SOIL MON	Date Samples Shipped: <i>8/29/17</i>	SMO Authorization: <i>[Signature]</i>
Project/Task Manager: Robert Ziock	Carrier/Waybill No. <i>270575</i>	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: CF426-17	Lab Destination: GEL	Send Report to SMO: <i>SMO</i>
	Contract No.: 1303873	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: *ML 8/30/17*

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					
103324	001	MWL ABSS-01-2017	NA	<i>8/28/17 0655</i>	<i>SOIL AN</i>	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	
103324	002	MWL ABSS-01-2017	NA	↓	<i>AN</i>	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	
103325	001	MWL ABSS-02-2017	NA	<i>0905</i>	<i>AN</i>	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	
103325	002	MWL ABSS-02-2017	NA	↓	<i>AN</i>	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	
103326	001	MWL AHSS-01-2017	NA	<i>0911</i>	<i>AN</i>	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	
103326	002	MWL AHSS-01-2017	NA	↓	<i>AN</i>	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	
103427	001	MWL AHSS-02-2017	NA	<i>0916</i>	<i>AN</i>	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	
103427	002	MWL AHSS-02-2017	NA	↓	<i>AN</i>	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470): Be, Co, Cu, Ni, V, Zn	
103428	001	MWL ABSS-01-2017	NA	<i>0855</i>	<i>AN</i>	P	250 ml	None	G	DU	GAMMA SPEC (EPA 901)	
103428	002	MWL ABSS-01-2017	NA	↓	<i>AN</i>	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 Team Members	Name	Signature	Company/Organization/Phone/Cell	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Danielle Michel	<i>[Signature]</i>	SNL/0641/505-845-7706	Return Samples By:
				Comments:

Relinquished by <i>[Signature]</i> Org. <i>0641</i> Date <i>8/28/17</i> Time <i>1005</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>00630</i> Date <i>8/28/17</i> Time <i>1005</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. <i>00631</i> Date <i>8/29/17</i> Time <i>0830</i>	Relinquished by	Org.	Date	Time
Received by	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. 617999

Analytical Lab GEL

SDG No. 431737

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		Sample matrix edited, corrected and forwarded to the lab
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	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	X		
	a) Laboratory control sample accuracy reported and met for all samples			
	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	103324-002MS, Chromium (163%), Lead (135%), Vanadium (178%)
3.4	Precision	X		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5	Blank data	X		
	a) Method or reagent blank data reported and met for all samples			
	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)	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			
	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
103324-002MS	EPA 6020	Chromium (163%), Lead (135%), Vanadium (178%) matrix spike recoveries exceed the upper acceptance limit of 125%. Data were flagged and reported. Sample heterogeneity narrated as a possible cause.

Were deficiencies unresolved? Yes No

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

Reviewed by: Mark L Lyon Date: 09-29-2017 14:07:00

Closed by: Mark L Lyon Date: 09-29-2017 14:07:00

ANNEX C

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

April 2017-March 2018

Field Forms

Data Validation Reports

Contract Verification Reviews

Certificates of Analysis – provided on compact disc in plastic sleeve insert

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
MAY 2017 SOIL-VAPOR MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: MWL Date: 05/30/17 Time: 0810

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

Weather Conditions:
 Temp: 64 °F Wind Speed: ~3 MPH Humidity: 27 % Wind Chill: NA °F

Chemicals Used: None Preservatives in sample bottles Other: N₂ GAS
 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 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 checked="" 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.

Robert Thynch
 Printed Name

Robert L. Quintana
 Printed Name

ALFRED SANTILLANES
 Printed Name

William Gibson
 Printed Name

Tim Jackson
 Printed Name

 Printed Name

Attendees

Robert Thynch
 Signature

Robert L. Quintana
 Signature

Alfred Santillanes
 Signature

William Gibson
 Signature

T-Jackson
 Signature

 Signature

Notes

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cu-ft/hr)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-SV01- 41 5/30/17	5/30/17	1130	7797	NA	NA	-20	-8	FB
MWL-SV01-42.5	↓	1132	NA	0.0	8.0	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
↓	↓	1133	34000483	NA	NA	-26	-8	OB split
MWL-SV02	5/30/17	1133	34001274	NA	NA	-26	-8	FB
MWL-SV02-41.5	↓	1140	NA	0.0	8	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
↓	↓	1141	↓	↓	↓	↓	↓	
↓	↓	1142	34000176	NA	NA	-27	-8	OB split

Field Notes:
 Elevation ~ 5400 ft
 PID # 592-914942
 Background = 0.0
 Continuous PID readings during purge

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cc/hr)	Initial Canister Vacuum (psi)	Ending Canister Vacuum (psi)	Comments
MWL-SV03	5/30/17	826	34000553	NA	NA	-25	-8	F13
MWL-SV03-50		849	NA	0.0	8	NA	NA	
↓		850	↓	↓	↓	↓	↓	
↓		851	34000341	NA	NA	-26	-8	
MWL-SV03-100		853	NA	0.0	8	NA	NA	
↓		854	↓	↓	↓	↓	↓	
↓		855	34000342	NA	NA	-26	-8	
MWL-SV03-200		856	NA	0.0	8	NA	NA	
↓		858	↓	↓	↓	↓	↓	
↓		900	34002005	NA	NA	-26	-8	
↓		901	34001363	↓	↓	-26	-8	Duplicate
MWL-SV03-300		902	NA	0.0	8	NA	NA	
↓		904	↓	↓	↓	↓	↓	
↓		907	34000856	NA	NA	-26	-8	NEG OB Split
MWL-SV03-400		919	NA	0.0	15	NA	NA	
↓		920	↓	↓	↓	↓	↓	
↓		946	34001390	NA	NA	-26	-9	
↓		946	8119	NA	NA	-26	-9	Duplicate NEG OB Split

Field Notes:

elevation = 5400 ftmsl
 continuous PID field readings during purge
 SV03 + SV04 - slow sample fill
 SV04 - Purge flow rate increase to stabilize flow.

Background = 0.0 ppm
 PID # - 592-914942

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-SV04	5/30/17	1010	0272	NA	NA	-25	-0	
MWL-SV04-60		1013	NA	0.0	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1014	↓	↓	↓	↓	↓	
		1017	34000285	NA	NA	-26	-0	
MWL-SV04-100		1017	NA	0.0	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1019	↓	↓	↓	↓	↓	
		1020	34000430	NA	NA	-27	-0	
MWL-SV04-200		1020	NA	0.0	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1023	↓	↓	↓	↓	↓	
		1024	34000300	NA	NA	-27	-0	
MWL-SV04-300		1025	NA	0.1	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1027	↓	↓	↓	↓	↓	
		1028	B121	NA	NA	-27	-0	OB split
MWL-SV04-400		1031	NA	0.1	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1033	↓	↓	↓	↓	↓	
		1034	3400077B	NA	NA	-27	-0	OB split

Field Notes: Background = 0.0 ppm Elevation ~ 5400 ftmsl
 PID # 592-91494 ~
 continuous PID readings during purge

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-SV05	5/30/17	1049	34000247	NA	NA	-26	-8	FB
MWL-SV05-50		1050	NA	0.0	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1051	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		1052	7523	NA	NA	-26	-8	
MWL-SV05-100		1053	NA	0.0	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1054	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		1055	7844	NA	NA	-26	-8	
MWL-SV05-200		1055	NA	0.0	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1057	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		1058	34000530	NA	NA	-27	-8	
MWL-SV05-300		1100	NA	0.1	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1102	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		1103	7796	NA	NA	-27	-8	OB split + Dup
MWL-SV05-400		1107	NA	0.1	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1109	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		1111	34000510	NA	NA	-27	-8	OB split

Field Notes:

Elevation ~ 5400 fmsl Background = 0.0 ppm
 PID # 592-914942
 continuous PID readings during purge

**SUMMARY SHEET FOR
MAY 2017 SOIL-VAPOR SAMPLES**

**Sample Summary for MWL Soil Vapor Monitoring
May 2017**

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 146422.10.11.08 / Service Order Number CF 01-16								
MWL-SV01	30-May-17	MWL-SV01-42.5	34000483	617838	102458	Environmental	617838 / 102457	
			7797		102457	Field QC	n/a	Ultra Pure N2
MWL-SV02	30-May-17	MWL-SV02-41.5	34000176	617839	102460	Environmental	617839 / 102459	
		MWL-SV-FB2	34001274		102459	Field QC	n/a	Ultra Pure N2
MWL-SV03	30-May-17	MWL-SV03-50	34000341	617840	102463	Environmental	617840 / 102462	
		MWL-SV03-100	34000342		102464	Environmental		
		MWL-SV03-200	34002085		102465	Environmental		
		MWL-SV03-200	34001363		102466	Duplicate		
		MWL-SV03-300	34000856		102467	Environmental		
		MWL-SV03-400	34001390		102468	Environmental		
		MWL-SV03-400	8119		102469	Duplicate		
		MWL-SV-FB3	34000553		102462	Field QC		n/a
MWL-SV04	30-May-17	MWL-SV04-50	34000285	617841	102471	Environmental	617841 / 102470	
		MWL-SV04-100	34000438		102472	Environmental		
		MWL-SV04-200	34000386		102473	Environmental		
		MWL-SV04-300	8121		102474	Environmental		
		MWL-SV04-400	34000778		102475	Environmental		
		MWL-SV-FB4	8272		102470	Field QC		n/a
MWL-SV05	30-May-17	MWL-SV05-50	7523	617842	102478	Environmental	617842 / 102477	
		MWL-SV05-100	7844		102479	Environmental		
		MWL-SV05-200	34000530		102480	Environmental		
		MWL-SV05-300	7796		102481	Environmental		
		MWL-SV05-400	34000510		102482	Environmental		
		MWL-SV-FB5	34000247		102477	Field QC		n/a

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES

SOIL-VAPOR MONITORING

MAY 2017

AR/COC NUMBERS 617838, 617839, 617840, 617841, 617842

Memorandum

Date: July 17, 2017

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL SVM
ARCO: 617838, 617839, 617840, 617841 and 617842
SDG: 320-28713 and 320-28716
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. Data are evaluated using SNL/NM SMO 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. Benzene was detected at < the PQL in FB3, sample 320-28713-1, associated with samples -2 through -8. The associated result for samples -2 through -7 were detects < the PQL and will be **qualified 0.74U,B2; 1.1U,B2; 1.5U,B2; 1.4U,B2; 1.6U,B2 and 1.8U,B2** respectively at their PQLs.
2. Acetone was detected at < the PQL in FB5, sample 320-28713-15, associated with samples -16 through -20. All associated sample results were detects < the PQL and will be **qualified 5.0U,B2; 12U,B2; 25U,B2; 15U,B2 and 12U,B2** respectively at their PQLs.
3. Carbon disulfide was detected at < the PQL in FB5, sample -15, associated with samples -16 through -20. The associated result for sample -18 was a detect < the PQL and will be **qualified 3.9U,B2** at the PQL.
4. Methylene chloride was detected at < the PQL in FB5, sample -15, associated with samples -16 through -20. The associated result for samples -16 and -020 were detects < the PQL and will be **qualified 0.40U,B2 and 0.93U,B2** respectively at their PQLs.
5. Toluene was detected at < the PQL in FB5, sample -15, associated with samples -16 through -20. The associated result for samples -16, -18 and -019 were detects < the PQL and will be **qualified**

0.40U,B2; 2.0U,B2 and 1.2U,B2 respectively at their PQLs. The associated result for sample -20 was a detect <10X the FB value and will be **qualified J+,B2**.

6. Acetone and toluene were detected at < the PQL in FB1, sample 320-28716-1, associated with sample -2. The toluene result for sample -2 was a detect < the PQL and will be **qualified 0.40U,B2** at the PQL. The acetone result for sample -2 was a detect > the PQL but <10X the FB value and will be **qualified J+,B2**.
7. Acetone was detected at < the PQL in FB2, sample 320-28716-3, associated with sample -4. The acetone result for sample -4 was a detect < the PQL and will be **qualified 27U,B2** at the PQL.
8. For the initial calibration associated with samples 320-28716-1 through -4, the intercept was positive and > the MDL for acetone. The acetone results for samples -1 and -3 were detects <3X the value of the intercept and will be **qualified J+,I5**.
9. For the LCS/LCSD associated with samples 320-28713-1 through -14, the relative percent difference was > laboratory acceptance criteria for 2-hexanone. The associated sample results were non-detect and will be **qualified UJ,RP2**.
10. Dichlorodifluoromethane and trichlorofluoromethane were detected at > the PQL in FB2, sample 320-28716-3. Sample -3 was analyzed immediately after the undiluted analysis of sample -2 and, therefore, these results should be **qualified J,X1** due to possible carry-over.
11. The vinyl acetate result for sample -17 was reported as a detect > the PQL and should be **qualified J,Z1** due to a poor mass spectral match.

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 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. For the initial calibration associated with samples 320-28716-1 through -4, the intercept was positive and > the MDL for acetone. The acetone results for samples -2 and -4 were detects >3X the value of the intercept and will not be qualified.

For the ICV associated with samples 320-28713-1 through -14, the %Ds were >30% with positive bias for 1,2,4-trichlorobenzene and hexachlorobutadiene. 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.

Benzene was detected at < the PQL in FB3, sample 320-28713-1, associated with samples -2 through -8. The associated result for sample -8 was non-detect and will not be qualified.

Carbon disulfide was detected at < the PQL in FB5, sample 320-28713-15, associated with samples -16 through -20. The associated result for samples -16 and -20 were detects >5X the FB value and will not be qualified. The associated results for samples -17 and -19 were non-detect and will not be qualified.

Methylene chloride was detected at < the PQL in FB5, sample -15, associated with samples -16 through -20. The associated result for samples -018 and -019 were detects >10X the FB value and will not be qualified. The associated result for sample -17 was non-detect and will not be qualified.

Toluene was detected at < the PQL in FB5, sample -15, associated with samples -16 through -20. The associated result for sample -17 was non-detect and will not be qualified.

Dichlorodifluoromethane and trichlorofluoromethane were detected at > the PQL in FB2, sample 320-28716-3, associated with sample -4. The associated sample results were detects >5X the FB concentrations 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 except as noted above in the Summary section.

Detection Limits/Dilutions

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

Sample 320-28713-2 (1.85X), sample -3 (2.74X and 3.33X for trichloroethene); sample -4 (3.7X and 6.28X for trichloroethene); sample -5 (3.62X and 6.12X for trichloroethene); sample -6 (3.88X); sample -7 (4.54X and 7.87X for tetrachloroethene); sample -8 (5.93X); sample -10 (1.55X for 1,1,2-trichloro-1,2,2-trifluoroethane); sample -11 (1.54X and 2.81X for 1,1,2-trichloro-1,2,2-trifluoroethane and trichloroethene); sample -12 (4.69X); sample -13 (2.72X); sample -14 (2.78X); sample -16 (3.58 for trichlorofluoromethane); sample -17 (2.34X and 4.88X for trichlorofluoromethane); sample -18 (4.92X); sample -19 (3.02X); sample -20 (2.32X); sample 320-28716-2 (13.5X for dichlorodifluoromethane, tetrachloroethene, trichloroethene, trichlorofluoromethane and 1,1,2-trichloro-1,2,2-trifluoroethane) and sample -4 (5.33X and 10.7 X for 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, one with each ARCO. Two field duplicate pairs were submitted with ARCO 617840. 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: 07/17/17



Sample Findings Summary



AR/COC: 617838, 617839, 617840, 617841, 617842

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15			
	102457-001/MWL-SV-FB1	ACETONE (67-64-1)	J+, I5
	102458-001/MWL-SV01-42.5	ACETONE (67-64-1)	J+, B2
	102458-001/MWL-SV01-42.5	TOLUENE (108-88-3)	0.4U, B2
	102459-001/MWL-SV-FB2	ACETONE (67-64-1)	J+, I5
	102459-001/MWL-SV-FB2	DICHLORODIFLUOROMETHANE (75-71-8)	J, X1
	102459-001/MWL-SV-FB2	TRICHLOROFUOROMETHANE (75-69-4)	J, X1
	102460-001/MWL-SV02-41.5	ACETONE (67-64-1)	27U, B2
	102462-001/MWL-SV-FB3	2-HEXANONE (591-78-6)	UJ, RP2
	102463-001/MWL-SV03-50	2-HEXANONE (591-78-6)	UJ, RP2
	102463-001/MWL-SV03-50	BENZENE (71-43-2)	0.74U, B2
	102464-001/MWL-SV03-100	2-HEXANONE (591-78-6)	UJ, RP2
	102464-001/MWL-SV03-100	BENZENE (71-43-2)	1.1U, B2
	102465-001/MWL-SV03-200	2-HEXANONE (591-78-6)	UJ, RP2
	102465-001/MWL-SV03-200	BENZENE (71-43-2)	1.5U, B2
	102466-001/MWL-SV03-200	2-HEXANONE (591-78-6)	UJ, RP2
	102466-001/MWL-SV03-200	BENZENE (71-43-2)	1.4U, B2
	102467-001/MWL-SV03-300	2-HEXANONE (591-78-6)	UJ, RP2
	102467-001/MWL-SV03-300	BENZENE (71-43-2)	1.6U, B2
	102468-001/MWL-SV03-400	2-HEXANONE (591-78-6)	UJ, RP2
	102468-001/MWL-SV03-400	BENZENE (71-43-2)	1.8U, B2
	102469-001/MWL-SV03-400	2-HEXANONE (591-78-6)	UJ, RP2
	102470-001/MWL-SV-FB4	2-HEXANONE (591-78-6)	UJ, RP2
	102471-001/MWL-SV04-50	2-HEXANONE (591-78-6)	UJ, RP2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	102472-001/MWL-SV04-100	2-HEXANONE (591-78-6)	UJ, RP2
	102473-001/MWL-SV04-200	2-HEXANONE (591-78-6)	UJ, RP2
	102474-001/MWL-SV04-300	2-HEXANONE (591-78-6)	UJ, RP2
	102475-001/MWL-SV04-400	2-HEXANONE (591-78-6)	UJ, RP2
	102478-001/MWL-SV05-50	ACETONE (67-64-1)	5.0U, B2
	102478-001/MWL-SV05-50	METHYLENE CHLORIDE (75-09-2)	0.4U, B2
	102478-001/MWL-SV05-50	TOLUENE (108-88-3)	0.4U, B2
	102479-001/MWL-SV05-100	ACETONE (67-64-1)	12U, B2
	102479-001/MWL-SV05-100	VINYL ACETATE (108-05-4)	J, Z1
	102480-001/MWL-SV05-200	ACETONE (67-64-1)	25U, B2
	102480-001/MWL-SV05-200	CARBON DISULFIDE (75-15-0)	3.9U, B2
	102480-001/MWL-SV05-200	TOLUENE (108-88-3)	2.0U, B2
	102481-001/MWL-SV05-300	ACETONE (67-64-1)	15U, B2
	102481-001/MWL-SV05-300	TOLUENE (108-88-3)	1.2U, B2
	102482-001/MWL-SV05-400	ACETONE (67-64-1)	12U, B2
	102482-001/MWL-SV05-400	METHYLENE CHLORIDE (75-09-2)	0.93U, B2
	102482-001/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

ARCO#s: 617838, 617839, 617840, 617841 and 617842	Site/Project: MWL SVM	Validation Date: 07/14/2017
SDG #:320-28713 and 320-28716	Laboratory: TA Laboratories Inc. - West Sacramento, CA	Validator: Linda Thal
Matrix: Air	# of Samples: 24	CVR present: Yes
ARCO(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 05/30/2017

ARCO# 617839 lists the field blank sample type as "SA" and the sample type for MWL-SVO2-41.5 as "FB".

Case narrative (job narrative) missing for 320-28716

Validated by: 

Sandia Organic Worksheet (GC/MS VOC)

ARCOG #:617838, 617839, 617840, 617841 and 617842	SDG:320-28713 and 320-28716	Matrix: Air
Laboratory Sample IDs:320-28713-1 through -20 and 320-28716-1 through -4		
Method/Batch #s:TO-15/169436 (samples 28713-1 thru -14);169640 (samples 28716-1 thru -4); 170389 (samples 28713 -15 thru -20 and dilutions for -3, -4, -5, -7, -10, -11, -16, -17) and 170534 (dilutions for 28716 -2 and -4)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB3 -1	X5	FB4 -9	X5
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D									
ATMS 9 05/02/2017													
batch 169436 (28713-1 thru -14)													
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.081J	.405	✓	NA
2-Hexanone	NA	✓	✓	✓	✓	NA	✓	✓	29	✓	NA	✓	NA
1,2,4-Trichlorobenzene	NA	✓	✓	(+37)	✓	NA	✓	✓	✓	✓	NA	✓	NA
Hexachlorobutadiene	NA	✓	✓	(+35)	✓	NA	✓	✓	✓	✓	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

Sample ID	FBZ		Chl-d5		1,4-DCB-d4						
	Area	RT	Area	RT	Area	RT					
none											

Comments: HTs OK . LCS/LCSD (lab limits)

Sandia Organic Worksheet (GC/MS VOC)

ARCOG #:617838, 617839, 617840, 617841 and 617842	SDG:320-28713 and 320-28716	Matrix: Air
Laboratory Sample IDs:320-28713-1 through -20 and 320-28716-1 through -4		
Method/Batch #s:TO-15/169436 (samples 28713-1 thru -14);169640 (samples 28716-1 thru -4); 170389 (samples 28713 -15 thru -20 and dilutions for -3, -4, -5, -7, -10, -11, -16, -17) and 170534 (dilutions for 28716 -2 and -4)	Tuning (pass/fail):yes	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB5 -15	X5 (X10)				
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D											
ATMS 9 06/20/2017															
batch 170389 (28713-15 thru -20 +DL for -3, -4, -5, -7, -10, -11, -16, -17)															
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.87J	(8.7)				
Carbon disulfide	NA	✓	✓	✓	✓	NA	✓	✓	✓	.09J	.45				
Methylene chloride	NA	✓	✓	✓	✓	NA	✓	✓	✓	.1J	(1.0)				
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.26J	(2.6)				

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

Sample ID	FBZ		ChI-d5		1,4-DCB-d4								
	Area	RT	Area	RT	Area	RT							
none													

Comments: HTs OK . LCS/LCSD (lab limits)

-17 vinyl acetate mass spectra missing 86 ion sample result 2.9X > RL qualify J

-18 vinyl acetate mass spectra missing 86 ion sample result < RL J qualified by the lab

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #:617838, 617839, 617840, 617841 and 617842	SDG:320-28713 and 320-28716	Matrix: Air
Laboratory Sample IDs:320-28713-1 through -20 and 320-28716-1 through -4		
Method/Batch #s:TO-15/169436 (samples 28713-1 thru -14);169640 (samples 28716-1 thru -4); 170389 (samples 28713 -15 thru -20 and dilutions for -3, -4, -5, -7, -10, -11, -16, -17) and 170534 (dilutions for 28716 -2 and -4)	Tuning (pass/fail):yes	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB1 -1	X5 (X10)	FB2 -3	X5 (X10)
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D									
ATMS 11 06/05/2017													
batch 169640 (28716-1 thru -4)													
Acetone	.85	✓	✓	✓	✓	NA	✓	✓	✓	1.1J	(11)	.79J	(7.9)
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.35J	(3.5)	✓	NA
Dichlorodifluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	.65	3.25
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	.94	4.7
ATMS 9 06/20/2017													
batch 170534 (28716-2 DL, -4 DL)													
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

Sample ID	FBZ		Chl-d5		1,4-DCB-d4	
	Area	RT	Area	RT	Area	RT
none						

Comments: HTs OK . LCS/LCSD

-3 (FB2) carryover of dichlorodifluoromethane and trichlorofluoromethane from undiluted sample -2 qualify J

ATMS 11 06/05/2017 Linear: Acetone

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY



320-28713 Chain of Custody

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC **617840**

Project Name: MWL GWM / SVM	Date Samples Shipped: <i>5/31/17</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>265998</i>	SMO Contact Phone: Wendy Palencia/505-844-3132	<input type="checkbox"/> RMA
Project/Task Number: 195122.10.11.08	Lab Contact: Lee Ann Heathcote/	Send Report to SMO: Stephanie Montaño/505.284.2553	<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Service Order: CF01-17	Lab Destination: TA/ West Sacramento		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154
	Contract No.: 1636780		
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					
102462	001	MWL-SV-FB3	NA	<i>5/30/17 0826</i>	SG	S	6 L	None	G	FB	VOC (TO-15)	
102463	001	MWL-SV03-50	50	<i>0851</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
102464	001	MWL-SV03-100	100	<i>0855</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
102465	001	MWL-SV03-200	200	<i>0900</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
102466	001	MWL-SV03-200	200	<i>0900</i>	SG	S	6 L	None	G	DU	VOC (TO-15)	
102467	001	MWL-SV03-300	300	<i>0907</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
102468	001	MWL-SV03-400	400	<i>0946</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
102469	001	MWL-SV03-400	400	<i>0946</i>	SG	S	6 L	None	G	DU	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	Receipt																												
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"/>																													
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Received by: <i>[Signature]</i>	Org. _____	Date <i>6/6/17</i>	Time <i>1020</i>	Received by: _____																												

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

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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. <i>N/A</i>	SMO Use	AR/COC	617841
Project Name: MWL GWM / SVM	Date Samples Shipped: <i>5-31-17</i>	SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>265998</i>	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08	Lab Contact: Lee Ann Heathcote/	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Service Order: CF01-17	Lab Destination: TA / West Sacramento		
	Contract No.: 1636780	Send Report to SMO: Stephanie Montaño/505.284.2553	

Tech Area: _____
 Building: _____ Room: _____ Operational Site: _____
 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		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
102470	001	MWL-SV-FB4	NA	5/30/17 10:10	SG	S	6 L	None	G	FB	VOC (TO-15)	
102471	001	MWL-SV04-50	50	5/30/17 10:17	SG	S	6 L	None	G	SA	VOC (TO-15)	
102472	001	MWL-SV04-100	100	5/30/17 10:20	SG	S	6 L	None	G	SA	VOC (TO-15)	
102473	001	MWL-SV04-200	200	5/30/17 10:24	SG	S	6 L	None	G	SA	VOC (TO-15)	
102474	001	MWL-SV04-300	300	5/30/17 10:28	SG	S	6 L	None	G	SA	VOC (TO-15)	
102475	001	MWL-SV04-400	400	5/30/17 10:34	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 Disposal <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:
		Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/0631/505-284-2547/505-280-1265	<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Gilbert Quintana	<i>[Signature]</i>	<i>GQ</i>	SNL/0641/505-844-2507/505-228-2606		
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/0641/505-239-7367/505-239-7367		
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/0641/505-844-4013/505-250-7090		
	Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/0641/505-284-6870/505-228-0710		

Relinquished by <i>TJ</i>	Org. <i>0631</i>	Date <i>5/30/17</i>	Time <i>1343</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>0631</i>	Date <i>5/30/17</i>	Time <i>1343</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>0631</i>	Date <i>5/31/17</i>	Time <i>0907</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date <i>6/6/17</i>	Time <i>1020</i>	Received by	Org.	Date	Time

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

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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC **617842**

Project Name: MWL GWM / SVM	Date Samples Shipped: <i>5-31-17</i>	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. <i>265998</i>	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08	Lab Contact: Lee Ann Heathcote/	Send Report to SMO: Stephanie Montaño/505.284.2553	
Service Order: CF01-17	Lab Destination: TA / West Sacramento		
	Contract No.: 1636780		
Tech Area:		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					
102477	001	MWL-SV-FB5	NA	5/30/17	10:49	SG	S	6 L	None	G	FB	VOC (TO-15)	
102478	001	MWL-SV05-50	50	5/30/17	10:52	SG	S	6 L	None	G	SA	VOC (TO-15)	
102479	001	MWL-SV05-100	100	5/30/17	10:55	SG	S	6 L	None	G	SA	VOC (TO-15)	
102480	001	MWL-SV05-200	200	5/30/17	10:58	SG	S	6 L	None	G	SA	VOC (TO-15)	
102481	001	MWL-SV05-300	300	5/30/17	11:03	SG	S	6 L	None	G	SA	VOC (TO-15)	
102482	001	MWL-SV05-400	400	5/30/17	11:11	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																														
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Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell																													
	Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/0631/505-284-2567/505-280-1265																													
	Gilbert Quintana	<i>[Signature]</i>	<i>GQ</i>	SNL/0641/505-844-2507/505-228-2606																													
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Relinquished by <i>TJ</i>	Org. <i>0631</i>	Date <i>5/30/17</i>	Time <i>1343</i>	Relinquished by	Org.	Date	Time																										
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Received by <i>[Signature]</i>	Org.	Date <i>6/6/17</i>	Time <i>1020</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

Batch No. N/A SMO Use AR/COC **617838**

Project Name: MWL GWM / SVM	Date Samples Shipped: <u>5-31-17</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: Timmie Jackson	Carrier/Waybill No: <u>265998</u>	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08	Lab Contact: Lee Ann Heathcote/	Send Report to SMO: Stephanie Montaño/505.284.2553	
Service Order: CF01-17	Lab Destination: TA/West Sacramento	Contract No.: 1636780	

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		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
				Type	Volume								
102457	001	MWL-SV-FB1	NA	5/30/17	11:30	SG	S	6 L	None	G	FB	VOC (TO-15)	
102458	001	MWL-SV01-42.5	42.5	5/30/17	11:33	SG	S	6 L	None	G	SA	VOC (TO-15)	



320-28716 Chain of Custody

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		
	Tim Jackson	<u>[Signature]</u>	<u>TJ</u>	SNL/0631/505-284-2547/505-280-1265	Return Samples By: Comments: Elevation 5400 ft FAMSL. See attached field forms		
	Gilbert Quintana	<u>[Signature]</u>	<u>GQ</u>	SNL/0641/505-844-2507/505-228-2606			
	William Gibson	<u>[Signature]</u>	<u>WG</u>	SNL/0641/505-239-7367/505-239-7367			
	Robert Lynch	<u>[Signature]</u>	<u>RL</u>	SNL/0641/505-844-4013/505-250-7090			
Alfred Santillanes	<u>[Signature]</u>	<u>AS</u>	SNL/0641/505-284-6870/505-228-0710				
Relinquished by <u>TJ</u>	Org. <u>0631</u>	Date <u>5/30/17</u>	Time <u>1343</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>0631</u>	Date <u>5/30/17</u>	Time <u>1343</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>0631</u>	Date <u>5/31/17</u>	Time <u>0908</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org.	Date <u>6/6/17</u>	Time <u>1020</u>	Received by	Org.	Date	Time

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

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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC **617839**

Project Name: MWL GWM / SVM	Date Samples Shipped: <i>5/31/17</i>	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. <i>265998</i>	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08	Lab Contact: Lee Ann Heathcote/	Send Report to SMO: Stephanie Montaño/505.284.2553	
Service Order: CF01-17	Lab Destination: TA/West Sacramento	Contract No.: 1636780	

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		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
102459	001	MWL-SV-FB2	NA	5/30/17 11:33	SG	S	6 L	None	G	SA	VOC (TO-15)	
102460	001	MWL-SV02-41.5	41.5	5/30/17 11:42	SG	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																								
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	Name	Signature	Init.	Company/Organization/Phone/Cell																							
	Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/0631/505-284-2547/505-280-1265																							
	Gilbert Quintana	<i>[Signature]</i>	<i>GQ</i>	SNL/0641/505-844-2507/505-228-2606																							
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/0641/505-239-7367/505-239-7367																							
Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/0641/505-844-4013/505-250-7090																								
Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/0641/505-284-6870/505-228-0710																								
Relinquished by <i>[Signature]</i>	Org. <i>0631</i> Date <i>5/30/17</i> Time <i>1343</i>	Relinquished by	Org. Date Time																								
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Relinquished by <i>[Signature]</i>	Org. <i>0631</i> Date <i>5/31/17</i> Time <i>0908</i>	Relinquished by	Org. Date Time																								
Received by <i>[Signature]</i>	Org. <i>0631</i> Date <i>6/6/17</i> Time <i>1020</i>	Received by	Org. Date Time																								

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

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CONTRACT VERIFICATION REVIEW FORMS

AR/COC Number	Sample Type
617838	Environmental*
617839	Environmental*
617840	Environmental*
617841	Environmental*
617842	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. 617838, 617839, 617840, 617841 & 617842

Analytical Lab TAL-WS

SDG No. 320-28713-1

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		RPD for 2-hexanone outside acceptance range for LCS/LCSD (batch 169436)
	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	Methylene chloride detected in method blank (batch 170534)

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	Benzene detected in MWL-SV-FB3. Acetone, carbon disulfide, methylene chloride and toluene detected in MWL-SV-FB5. Acetone and toluene detected in MWL-SV-FB1. Acetone, dichlorodifluoromethane and trichlorofluoromethane detected in MWL-SV-FB2.
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
102462-001 102463-001 102464-001 102465-001	TO-15	Sample receipt date incorrect on COAs, lab chronicle and sample summary
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

Were deficiencies unresolved? Yes No

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

If no, provide nonconformance report or correction request number and date correction request was submitted: 06-30-2017

Reviewed by: Wendy Palencia Date: 06-30-2017 10:03:00

Were resolutions adequate and data package complete? Yes No

Closed by: Wendy Palencia Date: 07-19-2017 08:31:00

FIELD SAMPLING FORMS
OCTOBER 2017 SOIL-VAPOR MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: MWL Date: 10/26/17 Time: 0812

Activities: Soil Vapor well Sampling
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: 43 °F Wind Speed: LS MPH Humidity: 64 % Wind Chill: 43 °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 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 checked="" 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.

Robert Lynch
 Printed Name
Thomas Evans
 Printed Name
Tim Jackson
 Printed Name
William Gibson
 Printed Name
Chris HULLIGER
 Printed Name
Steven Iveson
 Printed Name
ALFRED SANTILLANAS

Attendees
Raltzack
 Signature
Thuro
 Signature
T. H. H.
 Signature
William J. Galt
 Signature
[Signature]
 Signature
[Signature]
 Signature

Notes

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB1	10/26/17	1124	34001329	NA	NA	-26	-0	
MWL-5001-42.5		1137	NA	0.3	0	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
↓	↓	1137	↓	↓	↓	↓	↓	
↓	↓	1139	8010	NA	NA	-27	-0	
↓	↓	↓	34000349	↓	↓	-27	-8	
MWL-FB2	10/26/17	1125	34000303	NA	NA	-26	-0	
MWL-5002-41.5		1146	NA	0.1	8	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
↓	↓	1146	↓	↓	↓	↓	↓	
↓	↓	1148	34000856	NA	NA	-27	-8	
↓	↓	↓	8253	↓	↓	-27	-8	

T-A [Signature]
10/26/17

Field Notes:
 elevation ~ 5400 fms!
 PID H 17222
 Background = 0.3 ppm

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (L/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB3	10/26/17	824	34002027	NA	8	-24	-8	
MWL-SV03-50		910	NA	0.7	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		912	7835	NA	NA	-26	-8	
MWL-SV03-100		913	NA	0.7	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		914						
		916	34000113	NA	NA	-24	-8	
MWL-SV03-200		917	NA	0.7	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		918						
		920	34001274	NA	NA	-26	-8	
MWL-SV03-300		920	NA	0.7	15	NA	NA	
		↓	↓	↓	↓	↓	↓	
		921						
		924	34000168	NA	NA	-24	-8	
MWL-SV03-400		929	NA	0.8	22	NA	NA	
		↓	↓	↓	↓	↓	↓	
		930						
		943	7521	NA	NA	-24	-8	slow sample flow

Tripalgar
10/26/17

Field Notes: Elevation = ~ 5400 famsi
 PID # 17222, mini RAE 3000, model # PGM 7320
 Background = 0.7 ppm
 IH on site → EA
 Continuous PID purge meas

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cc-min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB 4	10/26/17	1004	34000171	NA	NA	-26	-8	
MWL-5604-50		1008	NA	0.7	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1009		↓	↓	↓	↓	
		1012	34000797	NA	NA	-24	-8	slow sample flow
MWL-5604-100		1012	NA	0.6	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1013		↓	↓	↓	↓	
		1014	34001452	NA	NA	-26	-8	
MWL-5604-200		1015	NA	0.6	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1016		↓	↓	↓	↓	
		1019	34000128	NA	NA	-24	-8	
MWL-5604-300		1019	NA	0.5	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1021		↓	↓	↓	↓	
		1023	7758	NA	NA	-26	-8	
MWL-5604-400		1026	NA	0.4	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1028		↓	↓	↓	↓	
		1029	34000517	NA	NA	-25	-8	

T-A 11/4
10/26/17

Field Notes:
 Elevation ~ 5400 fmsl
 PID # 17222
 Background = 0.7 ppm
 IH on-site

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cc/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FBS	10/26/17	1048	34000160	NA	NA	-26	-8	
MWL-5005-50		1046	NA	0.4	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1049	34001126	NA	NA	-26	-8	
MWL-5005-100		1049	NA	0.3	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1050						
		1051	34000017	NA	NA	-24	-8	
MWL-5005-200		1052	NA	0.3	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1054						
		1055	7520	NA	NA	-26	-8	
MWL-5005-300		1056	NA	0.3	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1058						
		1100	34000170	NA	NA	-25	-8	
MWL-5005-400		1102	NA	0.4	8	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1104						
		1106	7701	NA	NA	-26	-8	

10/26/17

Field Notes:
 elevation ~ 5400
 PID # 17222
 Background = 0.4 ppm

**SUMMARY SHEET FOR
OCTOBER 2017 SOIL-VAPOR SAMPLES**

**Sample Summary for MWL Soil Vapor Monitoring
FY18 1st Quarter**

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	26-Oct-17	MWL-SV01-42.5	8018	618269	103911	Environmental	618269 / 103910	
		MWL-SV01-42.5	34000349		103912	Duplicate		
		MWL-FB 1	34001329		103910	Field QC	n/a	Ultra Pure N2
MWL-SV02	26-Oct-17	MWL-SV02-41.5	34000856	618270	103914	Environmental	618270 / 103913	
		MWL-SV02-41.5	8253		103915	Duplicate		
		MWL-FB 2	34000383		103913	Field QC	n/a	Ultra Pure N2
MWL-SV03	26-Oct-17	MWL-SV03-50	7835	618271	103917	Environmental	618271 / 103916	
		MWL-SV03-100	34000113		103918	Environmental		
		MWL-SV03-200	34001274		103919	Environmental		
		MWL-SV03-300	34000168		103920	Environmental		
		MWL-SV03-400	7521		103921	Environmental		
		MWL-FB 3	34002027		103916	Field QC	n/a	Ultra Pure N2
MWL-SV04	26-Oct-17	MWL-SV04-50	34000797	618272	103923	Environmental	618272 / 103922	
		MWL-SV04-100	34001452		103924	Environmental		
		MWL-SV04-200	34000128		103925	Environmental		
		MWL-SV04-300	7758		103926	Environmental		
		MWL-SV04-400	34000517		103927	Environmental		
		MWL-FB 4	34000171		103922	Field QC	n/a	Ultra Pure N2
MWL-SV05	26-Oct-17	MWL-SV05-50	34001126	618268	103930	Environmental	618268 / 103929	
		MWL-SV05-100	34000017		103931	Environmental		
		MWL-SV05-200	7526		103932	Environmental		
		MWL-SV05-300	34000170		103933	Environmental		
		MWL-SV05-400	7701		103934	Environmental		
		MWL-FB 5	34000160		103929	Field QC	n/a	Ultra Pure N2

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES

SOIL-VAPOR MONITORING

OCTOBER 2017

Memorandum

Date: December 4, 2017

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL SVM
ARCOG: 618268, 618269, 618270, 618271 and 618272
SDG: 320-32934
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. Benzene was detected at > the PQL in FB5, sample 320-32934-1, associated with samples -2 through -6. The associated result for samples -5 and -6 were detects \leq the PQL and will be **qualified 1.6U,B2 and 1.4U,B2** respectively at their PQLs.
2. Acetone was detected at \leq the PQL in FB5, sample -1, associated with samples -2 through -6. All associated sample results were detects \leq the PQL and will be **qualified 18U,B2; 23U,B2; 23U,B2; 20U,B2 and 18U,B2** respectively at their PQLs.
3. Methylene chloride was detected at \leq the PQL in FB1, sample -7, associated with samples -8 and -9. The methylene chloride result for sample -8 was a detect \leq the PQL and will be **qualified 4.1U,B2** at the PQL.
4. Acetone was detected at \leq the PQL in FB2, sample -10, associated with samples -11 and -12. The acetone results for samples -11 and -12 were detects \leq the PQL and will be **qualified 38U,B2 and 37U,B2** respectively at their PQLs.
5. Acetone was detected at \leq the PQL in FB3, sample -13, associated with samples -14 through -18. All associated sample results were detects < the PQL and will be **qualified 20U,B2; 20U,B2; 38U,B2; 37U,B2 and 55U,B2** respectively at their PQLs.

6. Chloromethane and toluene were detected at \leq the PQL and benzene at $>$ the PQL in FB3, sample -13, associated with samples -14 through -18. The benzene result for sample -14 was a detect \leq the PQL and will be **qualified 1.6U,B2** at the PQL. The chloromethane results for samples -15 and -17 were detects \leq the PQL and will be **qualified 3.3U,B2 and 5.9U,B2** at their respective PQLs. The toluene results for samples -15 and -18 were detects \leq the PQL and will be **qualified 1.6U,B2 and 4.4U,B2** at their respective PQLs.
7. Methylene chloride was detected at \leq the PQL and benzene at $>$ the PQL in FB4, sample -19, associated with samples -20 through -24. The benzene results for all samples *except* sample -22 were detects \leq the PQL and will be **qualified 0.80U,B2; 1.8U,B2;1.2U,B2 and 1.2U,B2** at their respective PQLs. The methylene chloride results for all samples were detects \leq the PQL and will be **qualified 0.80U,B2; 1.8U,B2;2.2U,B2; 1.2U,B2 and 1.2U,B2** at their respective PQLs.

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 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 $>$ the PQL in FB5, sample -1, associated with samples -2 through -6. The associated result for samples -2 through -4 were non-detect and will not be qualified.

Methylene chloride was detected at \leq the PQL and benzene at $>$ the PQL in FB1, sample -7, associated with samples -8 and -9. The associated sample results *except* the methylene chloride result for sample -8 were non-detect and will not be qualified.

Acetone, tetrachloroethene and toluene were detected at \leq the PQL and benzene at $>$ the PQL in FB2, sample -10, associated with samples -11 and -12. The tetrachloroethene results for samples -11 and -12 were detects $>$ the PQL and $>5X$ the FB value and will not be qualified. The benzene and toluene results for samples -11 and -12 were non-detect and will not be qualified.

Trichloroethene, tetrachloroethene, chloromethane and toluene were detected at \leq the PQL and benzene at $>$ the PQL in FB3, sample -13, associated with samples -14 through -18. The tetrachloroethene and trichloroethene results for all associated samples were detects $>$ the PQL and $>5X$ the FB values and will not be qualified. The remaining associated sample results, *except* the benzene result for sample -14, the chloromethane results for samples -15 and -17 and the toluene results for sample -15 and -18, were non-detect and will not be qualified.

Trichloroethene and tetrachloroethene were detected at \leq the PQL and benzene at $>$ the PQL in FB4, sample -19, associated with samples -20 through -24. The benzene result for sample -22 was non-detect and will not be qualified. The tetrachloroethene and trichloroethene results for all associated samples were detects $>$ the PQL and $>5X$ 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 (3.51X); sample -3 (4.52X); sample -4 (4.54X); sample -5 (4.01X); sample -6 (3.52X); sample -8 (10.2X); sample -9 (10.2X); sample -11 (7.65X); sample -12 (7.34X); sample -14 (4.05X); sample -15 (4.07X); sample -16 (7.59X); sample -17 (7.32X); sample -18 (10.94X); sample -20 (2X); sample -21 (4.48X); sample -22 (5.51X); sample -23 (3X) and sample -24 (3X).

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 ARCO. Two field duplicate pairs were submitted with ARCO 618269 and 618270. 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: 12/04/17



Sample Findings Summary



AR/COC: 618268, 618269, 618270, 618271, 618272

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15			
	103911-001/MWL-SV01-42.5	METHYLENE CHLORIDE (75-09-2)	4.1U, B2
	103914-001/MWL-SV02-41.5	ACETONE (67-64-1)	38U, B2
	103915-001/MWL-SV02-41.5	ACETONE (67-64-1)	37U, B2
	103917-001/MWL-SV03-50	ACETONE (67-64-1)	20U, B2
	103917-001/MWL-SV03-50	BENZENE (71-43-2)	1.6U, B2
	103918-001/MWL-SV03-100	ACETONE (67-64-1)	20U, B2
	103918-001/MWL-SV03-100	CHLOROMETHANE (74-87-3)	3.3U, B2
	103918-001/MWL-SV03-100	TOLUENE (108-88-3)	1.6U, B2
	103919-001/MWL-SV03-200	ACETONE (67-64-1)	38U, B2
	103920-001/MWL-SV03-300	ACETONE (67-64-1)	37U, B2
	103920-001/MWL-SV03-300	CHLOROMETHANE (74-87-3)	5.9U, B2
	103921-001/MWL-SV03-400	ACETONE (67-64-1)	55U, B2
	103921-001/MWL-SV03-400	TOLUENE (108-88-3)	4.4U, B2
	103923-001/MWL-SV04-50	BENZENE (71-43-2)	0.80U, B2
	103923-001/MWL-SV04-50	METHYLENE CHLORIDE (75-09-2)	0.80U, B2
	103924-001/MWL-SV04-100	BENZENE (71-43-2)	1.8U, B2
	103924-001/MWL-SV04-100	METHYLENE CHLORIDE (75-09-2)	1.8U, B2
	103925-001/MWL-SV04-200	METHYLENE CHLORIDE (75-09-2)	2.2U, B2
	103926-001/MWL-SV04-300	BENZENE (71-43-2)	1.2U, B2
	103926-001/MWL-SV04-300	METHYLENE CHLORIDE (75-09-2)	1.2U, B2
	103927-001/MWL-SV04-400	BENZENE (71-43-2)	1.2U, B2
	103927-001/MWL-SV04-400	METHYLENE CHLORIDE (75-09-2)	1.2U, B2
	103930-001/MWL-SV05-50	ACETONE (67-64-1)	18U, B2
	103931-001/MWL-SV05-100	ACETONE (67-64-1)	23U, B2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	103932-001/MWL-SV05-200	ACETONE (67-64-1)	23U, B2
	103933-001/MWL-SV05-300	ACETONE (67-64-1)	20U, B2
	103933-001/MWL-SV05-300	BENZENE (71-43-2)	1.6U, B2
	103934-001/MWL-SV05-400	ACETONE (67-64-1)	18U, B2
	103934-001/MWL-SV05-400	BENZENE (71-43-2)	1.4U, B2

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

Sandia Data Validation Summary Worksheet

ARCOG#: 618268, 618269, 618270, 618271 and 618272	Site/Project: MWL SVM	Validation Date: 12/01/2017
SDG #:320-32934	Laboratory: TA Laboratories Inc. - West Sacramento, CA	Validator: Linda Thal
Matrix: Air	# of Samples: 24	CVR present: Yes
ARCOG(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 10/26/2017
Validated by:

Sandia Organic Worksheet (GC/MS VOC)

ARCO #: 618268, 618269, 618270, 618271 and 618272	SDG: 320-32934	Matrix: Air
Laboratory Sample IDs: 320-32934-1 through -24		
Method/Batch #s: TO-15/192764 (samples -1 thru -8); 192736 (samples -9 thru -17); 193020 (samples -18 thru -24)	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB2 -10	X5 (X10)	FB3 -13	X5 (X10)
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D									
ATMS 7 10/05/2017													
batch 192736 -9 thru -17)													
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.43J	(4.3)	.42J	(4.2)
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	5.9	29.5	4.7	23.5
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.25J	1.25	.079J	.395
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.058J	(.58)	.2J	(2.0)
Chloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	.2J	1.0
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	.34J	1.7

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

Sample ID	FBZ		Chl-d5		1,4-DCB-d4						
	Area	RT	Area	RT	Area	RT					
none											

Comments: HTs OK. LCS/LCSD (lab limits)
ATMS 7 All avg RF

Sandia Organic Worksheet (GC/MS VOC)

ARCOG #: 618268, 618269, 618270, 618271 and 618272	SDG: 320-32934	Matrix: Air
Laboratory Sample IDs:320-32934-1 through -24		
Method/Batch #s:TO-15/192764 (samples -1 thru -8);192736 (samples -9 thru -17); 193020 (samples -18 thru -24)	Tuning (pass/fail):yes	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	LCSD %R	LCS/ LCSD RPD	FB5 -1	X5 (X10)	FB1 -7	X5 (X10)
	Int.	RF/ Slope	RSD/r ²	(ICV)/ CCV %D									
ATMS 9 10/26/2017													
batch 192764 (-1 thru -8)													
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.24J	(2.4)	✓	NA
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	4.8	24	5.0	25
Methylene chloride	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	.076J	(.76)
Dichlorodifluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	✓	NA
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	✓	NA
ATMS 9 10/26/2017										FB4	X5		
batch 193020 (-18 thru -24)										-19			
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	4.0	20		
Methylene chloride	NA	✓	✓	✓	✓	NA	✓	✓	✓	.099J	(.99)		
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.11J	.55		
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.19J	.95		

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

Sample ID	FBZ		ChI-d5		1,4-DCB-d4						
	Area	RT	Area	RT	Area	RT					
none											

Comments: HTs OK. LCS/LCSD (lab limits)
ATMS 9 All avg RF

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.		SMO Use		AR/COC 618268	
Project Name: MWL GWM / SVM		Date Samples Shipped: 10-27-17		SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No: 273752		SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122 10.11.08		Lab Contact: Lee Ann Heathcote/		Send Report to SMO: Stephanie Montaño/505.284.2553	
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	
Tech Area:		Contract No.: 1636780			
Building:		Room:		Operational Site:	
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		Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
103929	001	MWL-FB 5 34000160	NA	10/26/17 1048	UPN	S	6 L	None	G	FB	VOC (TO-15)	
103930	001	MWL-SV05-50 34001126	50	10/26/17 1049	SG	S	6 L	None	G	SA	VOC (TO-15)	
103931	001	MWL-SV05-100 34000017	100	10/26/17 1051	SG	S	6 L	None	G	SA	VOC (TO-15)	
103932	001	MWL-SV05-200 7526	200	10/26/17 1055	SG	S	6 L	None	G	SA	VOC (TO-15)	
103933	001	MWL-SV05-300 34000170	300	10/26/17 1100	SG	S	6 L	None	G	SA	VOC (TO-15)	
103934	001	MWL-SV05-400 7701	400	10/26/17 1106	SG	S	6 L	None	G	SA	VOC (TO-15)	



320-32934 Chain of Custody

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		Negotiated TAT <input type="checkbox"/>		
Confirmatory: <input type="checkbox"/> Yes		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Return Samples By:		Comments: Elevation and ambient pressure information on attached forms.		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal		Lab Use
	Thomas Evans	<i>[Signature]</i>	TE	AIS/00641/505-284-0804		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
	Chris Hulliger	<i>[Signature]</i>	CH	AIS/00641/505-284-3309/505-382-0353		Return Samples By:		
	William Gibson	<i>[Signature]</i>	WG	SNL/00641/505-239-7367/505-239-7367		Comments: Elevation and ambient pressure information on attached forms.		
	Robert Lynch	<i>[Signature]</i>	RL	SNL/00641/505-844-4013/505-250-7090				
	Alfred Santillanes	<i>[Signature]</i>	AS	SNL/00641/505-284-6870/505-228-0710				
Relinquished by	<i>[Signature]</i>	Org. 0641	Date 10-27-17	Time 09:06	Relinquished by	Org.	Date	Time
Received by	<i>[Signature]</i>	Org. 0631	Date 10-27-17	Time 09:06	Received by	Org.	Date	Time
Relinquished by	<i>[Signature]</i>	Org. 0631	Date 10-27-17	Time 12:30	Relinquished by	Org.	Date	Time
Received by	<i>[Signature]</i>	Org.	Date 11/02/17	Time 09:30	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 618269	
Project Name:	MWL GWM / SVM	Date Samples Shipped:	10-27-17	SMO Authorization:	<i>[Signature]</i>
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.:	273752	SMO Contact Phone:	Wendy Palencia/505-844-3132
Project/Task Number:	195122.10.11.08	Lab Contact:	Lee Ann Heathcote/	Send Report to SMO:	Stephanie Montaño/505.284.2553
Service Order:	CF01-18	Lab Destination:	TAL-WS		
		Contract No.:	1636780		
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:				Bill to: Sandia National Laboratories (Accounts Payable),	
Room:				P.O. Box 5800, MS-0154	
Operational Site:				Albuquerque, NM 87185-0154	

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					
103910	001	MWL-FB 1 34001329	NA	10/26/17 1124	UPN	S	6 L	None	G	FB	VOC (TO-15)	
103911	001	MWL-SV01-42.5 8018	42.5	10/26/17 1139	SG	S	6 L	None	G	SA	VOC (TO-15)	
103912	001	MWL-SV01-42.5 34000349	42.5	10/26/17 1139	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:		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		Init.		Company/Organization/Phone/Cell		Negotiated TAT <input type="checkbox"/> Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			
Sample Team Members	Name		Signature		Company/Organization/Phone/Cell		Return Samples By:		
	Thomas Evans		<i>[Signature]</i>		TE AIS/00641/505-284-0804		Comments: Request each sample container is certified clean. TE 10/26/17 Elevation and ambient pressure information on attached forms. TE 10/26/17		
	Chris Hulliger		<i>[Signature]</i>		CH AIS/00641/505-284-3309/505-382-0353				
	William Gibson		<i>[Signature]</i>		WG SNL/00641/505-239-7367/505-239-7367				
	Robert Lynch		<i>[Signature]</i>		RL SNL/00641/505-844-4013/505-250-7090				
Alfred Santillanes		<i>[Signature]</i>		AS SNL/00641/505-284-6870/505-228-0710					

Relinquished by <i>[Signature]</i>	Org. 0641	Date 10-27-17	Time 0901	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. 0631	Date 10-27-17	Time 0901	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. 063	Date 10-27-17	Time 1330	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date 11/02/17	Time 09:30	Received by	Org.	Date	Time

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

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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No.		SMO Use			AR/COC		618270				
Project Name:	MWL GWM / SVM	Date Samples Shipped:	10-27-17		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.:	273752		SMO Contact Phone:						
Project/Task Number:	195122.10.11.08	Lab Contact:	Lee Ann Heathcote/								
Service Order:	CF01-18	Lab Destination:	TAL-WS								
		Contract No.:	1636780		Send Report to SMO:						
Tech Area:					Stephanie Montaño/505.284.2553		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					
103913	001	MWL-FB 2 34000383	NA	10/26/17 1125	UPN	S	6 L	None	G	FB	VOC (TO-15)	
103914	001	MWL-SV02-41.5 34000856	41.5	10/26/17 1148	SG	S	6 L	None	G	SA	VOC (TO-15)	
103915	001	MWL-SV02-41.5 8253	41.5	10/26/17 1148	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			
	Thomas Evans	<i>[Signature]</i>	TE	AIS/00641/505-284-0804		Return Samples By:			
	Chris Hulliger	<i>[Signature]</i>	CH	AIS/00641/505-284-3309/505-382-0353		Comments: Elevation and ambient pressure information on attached forms.			
	William Gibson	<i>[Signature]</i>	WG	SNL/00641/505-239-7367/505-239-7367					
	Robert Lynch	<i>[Signature]</i>	RL	SNL/00641/505-844-4013/505-250-7090					
Alfred Santillanes	<i>[Signature]</i>	AS	SNL/00641/505-284-6870/505-228-0710		Lab Use				

Relinquished by <i>[Signature]</i>	Org. 0641	Date 10-27-17	Time 0900	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. 0631	Date 10-27-17	Time 0900	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. 0631	Date 10-27-17	Time 1330	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date 11-02-2002	Time 09:30	Received by	Org.	Date	Time

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

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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.		SMO Use		AR/COC 618271	
Project Name:	MWL GWM / SVM	Date Samples Shipped:	10-27-17	SMO Authorization:	XXXXXXXXXX
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.:	273752	SMO Contact Phone:	Wendy Palencia/505-844-3132
Project/Task Number:	195122.10.11.08	Lab Contact:	Lee Ann Heathcote/	Send Report to SMO:	Stephanie Montaño/505.284.2553
Service Order:	CF01-18	Lab Destination:	TAL-WS		
		Contract No.:	1636780		
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:				Bill to: Sandia National Laboratories (Accounts Payable),	
Room:				P.O. Box 5800, MS-0154	
Operational Site:				Albuquerque, NM 87185-0154	

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Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
103916	001	MWL-FB 3 34002027	NA	10/26/17 0824	UPN	S	6 L	None	G	FB	VOC (TO-15)	
103917	001	MWL-SV03-50 7835	50	10/26/17 0912	SG	S	6 L	None	G	SA	VOC (TO-15)	
103918	001	MWL-SV03-100 34000113	100	10/26/17 0916	SG	S	6 L	None	G	SA	VOC (TO-15)	
103919	001	MWL-SV03-200 34001274	200	10/26/17 0920	SG	S	6 L	None	G	SA	VOC (TO-15)	
103920	001	MWL-SV03-300 34000168	300	10/26/17 0924	SG	S	6 L	None	G	SA	VOC (TO-15)	
103921	001	MWL-SV03-400 7521	400	10/26/17 0943	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:		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		Company/Organization/Phone/Cell		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			Lab Use	
	Thomas Evans	<i>Thomas Evans</i>	TE	AIS/00641/505-284-0804		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				
	Chris Hulliger	<i>Chris Hulliger</i>	CH	AIS/00641/505-284-3309/505-382-0353		Return Samples By:				
	William Gibson	<i>William Gibson</i>	WG	SNL/00641/505-239-7367/505-239-7367		Comments: Elevation and ambient pressure information on attached forms.				
	Robert Lynch	<i>Robert Lynch</i>	RL	SNL/00641/505-844-4013/505-250-7090						
Alfred Santillanes	<i>Alfred Santillanes</i>	AS	SNL/00641/505-284-6870/505-228-0710							
Relinquished by	<i>William Gibson</i>	Org. 0641	Date	10-27-17	Time	0910	Relinquished by	Org.	Date	Time
Received by	<i>Chris Hulliger</i>	Org. 0671	Date	10-27-17	Time	0910	Received by	Org.	Date	Time
Relinquished by	<i>Tom Jackson</i>	Org. 0631	Date	10-27-17	Time	1304	Relinquished by	Org.	Date	Time
Received by	<i>Hulliger</i>	Org.	Date	11-02-17	Time	09:30	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

Batch No.	SMO Use	AR/COC	618272
Project Name: MWL GWM / SVM	Date Samples Shipped: 10.27.17	SMO Authorization:	
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. 273752	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08	Lab Contact: Lee Ann Heathcote/	Send Report to SMO: Stephanie Montaño/505.284.2553	
Service Order: CF01-18	Lab Destination: TAL-WS		
	Contract No.: 1636780	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	

Tech Area:	Operational Site:	Bill to: Sandia National Laboratories (Accounts Payable),	P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154
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					
103922	001	MWL-FB 4 34000171	NA	10/26/17 1004	UPN	S	6 L	None	G	FB	VOC (TO-15)	
103923	001	MWL-SV04-50 34000797	50	10/26/17 1012	SG	S	6 L	None	G	SA	VOC (TO-15)	
103924	001	MWL-SV04-100 34001452	100	10/26/17 1014	SG	S	6 L	None	G	SA	VOC (TO-15)	
103925	001	MWL-SV04-200 34000128	200	10/26/17 1019	SG	S	6 L	None	G	SA	VOC (TO-15)	
103926	001	MWL-SV04-300 7758	300	10/26/17 1023	SG	S	6 L	None	G	SA	VOC (TO-15)	
103927	001	MWL-SV04-400 34000517	400	10/26/17 1029	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
	Thomas Evans		TE	AIS/00641/505-284-0804	Return Samples By: Comments: Elevation and ambient pressure information on attached forms.
	Chris Hulliger		CH	AIS/00641/505-284-3309/505-382-0353	
	William Gibson		WG	SNL/00641/505-239-7367/505-239-7367	
	Robert Lynch		RL	SNL/00641/505-844-4013/505-250-7090	
Alfred Santillanes		AS	SNL/00641/505-284-6870/505-228-0710		

Relinquished by	Org. 0641	Date 10.27.17	Time 09:07	Relinquished by	Org.	Date	Time
Received by	Org. 0631	Date 10.27.17	Time 09:57	Received by	Org.	Date	Time
Relinquished by	Org. 0631	Date 10.27.17	Time 12:40	Relinquished by	Org.	Date	Time
Received by	Org.	Date 11-02-17	Time 09:30	Received by	Org.	Date	Time

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

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REVISED

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. _____ SMO Use _____ AR/COC **618269**

Project Name: MWL GWM / SVM	Date Samples Shipped: _____	SMO Authorization: <u>TOSS</u>	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. _____	SMO Contact Phone: _____	<input type="checkbox"/> RMA
Project/Task Number: 195122 10 11 08	Lab Contact: Lee Ann Heathcote/	Wendy Palencia/505-844-3132	<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Service Order: CF01-18	Lab Destination: TAL-WS	Send Report to SMO: _____	
	Contract No.: 1636780	Stephanie Montaño/505 284 2553	

Tech Area: _____
 Building: _____ Room: _____ Operational Site: _____
 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		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
103910	001	MWL-FB 1 34001329	NA	10/26/17 1124	UPN	S	6 L	None	G	FB	VOC (TO-15)	
103911	001	MWL-SV01-42.5 8018	42.5	10/26/17 1139	SG	S	6 L	None	G	SA	VOC (TO-15)	
103912	001	MWL-SV01-42.5 34000349	42.5	10/26/17 1139	SG	S	6 L	None	G	SA BU T9	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: Request each sample container is certified clean. 72 10/26/17 Elevation and ambient pressure information on attached forms. 72 10/26/17	

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
		Thomas Evans	<i>[Signature]</i>	TE
	Chris Hulliger	<i>[Signature]</i>	CAH	AIS/00641/505-284-3309/505-382-0353
	William Gibson	<i>[Signature]</i>	WG	SNL/00641/505-239-7367/505-239-7367
	Robert Lynch	<i>[Signature]</i>	RL	SNL/00641/505-844-4013/505-250-7090
	Alfred Santillanes	<i>[Signature]</i>	AS	SNL/00641/505-284-6870/505-228-0710

Relinquished by <i>[Signature]</i> Org. 0641 Date 10-27-17 Time 0901	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <i>[Signature]</i> Org. 0631 Date 10-27-17 Time 0901	Received by _____ Org. _____ Date _____ Time _____
Relinquished by _____ Org. _____ Date _____ Time _____	Relinquished by _____ Org. _____ Date _____ Time _____
Received by _____ Org. _____ Date _____ Time _____	Received by _____ Org. _____ Date _____ Time _____

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

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11/30/2017

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

REVISED

Internal Lab

Batch No		SMO Use		AR/COG	618270
Project Name:	MWL GWM / SVM	Date Samples Shipped:	SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.:	SMO Contact Phone: Wendy Palencia/505-844-3132		<input type="checkbox"/> RMA
Project/Task Number:	195122.10.11.08	Lab Contact:	Lee Ann Heathcote/		<input type="checkbox"/> Released by COC No.
Service Order:	CF01-18	Lab Destination:	TAL-WS		<input checked="" type="checkbox"/> 4° Celsius
		Contract No.:	1636780		Send Report to SMO: Stephanie Montaño/505.284.2553

Bill to: Sandia National Laboratories (Accounts Payable),
P.O. Box 5600, MS-0154
Albuquerque, NM 87185-0154

Tech Area:		Room:		Operational Site:									
Sample No.	Fraction	Sample Location Detail		Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
							Type	Volume					
103913	001	MWL-FB 2	34000383	NA	10/26/17 1125	UPN	S	6 L	None	G	FB	VOC (TO-15)	
103914	001	MWL-SV02-41.5	34000856	41.5	10/26/17 1148	SG	S	6 L	None	G	SA	VOC (TO-15)	
103915	001	MWL-SV02-41.5	8253	41.5	10/26/17 1148	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:		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"/>						
Sample Team Members	Name		Signature		Init		Company/Organization/Phone/Cell		Sample Disposal		Lab Use	
	Thomas Evans		<i>[Signature]</i>		TE		AIS/00641/505-284-0804		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			
	Chris Hulliger		<i>[Signature]</i>		CH		AIS/00641/505-284-3309/505-382-0353		Return Samples By:			
	William Gibson		<i>[Signature]</i>		WG		SNL/00641/505-239-7367/505-239-7367		Comments: Elevation and ambient pressure information on attached forms.			
	Robert Lynch		<i>[Signature]</i>		RL		SNL/00641/505-844-4013/505-250-7090					
Alfred Santillanes		<i>[Signature]</i>		AS		SNL/00641/505-284-6870/505-228-0710						
Relinquished by <i>[Signature]</i>		Org. 06641		Date 10-27-17		Time 0900		Relinquished by		Org. Date Time		
Received by <i>[Signature]</i>		Org. 0651		Date 10-27-17		Time 0900		Received by		Org. Date Time		
Relinquished by		Org.		Date		Time		Relinquished by		Org. Date Time		
Received by		Org.		Date		Time		Received by		Org. Date Time		

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

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11/30/2017

CONTRACT VERIFICATION REVIEW FORMS

AR/COC Number	Sample Type
618268	Environmental*
618269	Environmental*
618270	Environmental*
618271	Environmental*
618272	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. 618268, 618269, 618270, 618271 & 618272

Analytical Lab TAL-WS

SDG No. 320-32934-1

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 benzene detected in MWL-FB5. Benzene and methylene chloride detected in MWL-FB1. Acetone, benzene, tetrachloroethene and toluene detected in MWL-FB2. Acetone, benzene, chloromethane, tetrachloroethene, toluene and trichloroethene detected in MWL-FB3. Benzene, methylene chloride, tetrachloroethene and trichloroethene detected in MWL-FB4.
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		

Line No.	Item	Yes	No	Comments
	b) Initial calibration provided	X		
	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		

Line No.	Item	Yes	No	Comments
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: 12-01-2017 09:53:00

Closed by: Wendy Palencia Date: 12-01-2017 09:53:00

SOIL-VAPOR SAMPLING RESULTS

CERTIFICATES OF ANALYSIS

Mixed Waste Landfill

April 2017-March 2018 Reporting Period

Note: Certificates of Analysis are provided on compact disc only, for printed copies of this report.

MAY 2017 SOIL-VAPOR SAMPLING RESULTS
CERTIFICATES OF ANALYSIS

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102462-001/MWL-SV-FB3

Lab Sample ID: 320-28713-1

Date Collected: 05/30/17 08:26

Matrix: Air

Date Received: 06/06/17 10:20

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		5.0	0.18	ppb v/v			06/15/17 19:03	1
Benzene	0.081	J	0.40	0.079	ppb v/v			06/15/17 19:03	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			06/15/17 19:03	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			06/15/17 19:03	1
Bromoform	ND		0.40	0.070	ppb v/v			06/15/17 19:03	1
Bromomethane	ND		0.80	0.34	ppb v/v			06/15/17 19:03	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			06/15/17 19:03	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			06/15/17 19:03	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			06/15/17 19:03	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			06/15/17 19:03	1
Chloroethane	ND		0.80	0.31	ppb v/v			06/15/17 19:03	1
Chloroform	ND		0.30	0.095	ppb v/v			06/15/17 19:03	1
Chloromethane	ND		0.80	0.20	ppb v/v			06/15/17 19:03	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			06/15/17 19:03	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			06/15/17 19:03	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			06/15/17 19:03	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			06/15/17 19:03	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			06/15/17 19:03	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			06/15/17 19:03	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			06/15/17 19:03	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			06/15/17 19:03	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			06/15/17 19:03	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			06/15/17 19:03	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			06/15/17 19:03	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			06/15/17 19:03	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			06/15/17 19:03	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			06/15/17 19:03	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			06/15/17 19:03	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			06/15/17 19:03	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			06/15/17 19:03	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			06/15/17 19:03	1
2-Hexanone	ND	*	0.40	0.087	ppb v/v			06/15/17 19:03	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			06/15/17 19:03	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			06/15/17 19:03	1
Styrene	ND		0.40	0.059	ppb v/v			06/15/17 19:03	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			06/15/17 19:03	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			06/15/17 19:03	1
Toluene	ND		0.40	0.051	ppb v/v			06/15/17 19:03	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			06/15/17 19:03	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			06/15/17 19:03	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			06/15/17 19:03	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			06/15/17 19:03	1
Trichloroethene	ND		0.40	0.11	ppb v/v			06/15/17 19:03	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			06/15/17 19:03	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			06/15/17 19:03	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			06/15/17 19:03	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			06/15/17 19:03	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			06/15/17 19:03	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102462-001/MWL-SV-FB3

Lab Sample ID: 320-28713-1

Date Collected: 05/30/17 08:26

Matrix: Air

Date Received: 06/06/17 10:20

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		0.80	0.10	ppb v/v			06/15/17 19:03	1
o-Xylene	ND		0.40	0.054	ppb v/v			06/15/17 19:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	126		70 - 130					06/15/17 19:03	1
1,2-Dichloroethane-d4 (Surr)	115		70 - 130					06/15/17 19:03	1
Toluene-d8 (Surr)	123		70 - 130					06/15/17 19:03	1

Client Sample ID: 102463-001/MWL-SV03-50

Lab Sample ID: 320-28713-2

Date Collected: 05/30/17 08:51

Matrix: Air

Date Received: 06/06/17 10:20

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	8.5	J	9.3	0.33	ppb v/v			06/15/17 19:57	1.85
Benzene	0.44	J	0.74	0.15	ppb v/v			06/15/17 19:57	1.85
Benzyl chloride	ND		1.5	0.30	ppb v/v			06/15/17 19:57	1.85
Bromodichloromethane	ND		0.56	0.12	ppb v/v			06/15/17 19:57	1.85
Bromoform	ND		0.74	0.13	ppb v/v			06/15/17 19:57	1.85
Bromomethane	ND		1.5	0.62	ppb v/v			06/15/17 19:57	1.85
2-Butanone (MEK)	0.63	J	1.5	0.37	ppb v/v			06/15/17 19:57	1.85
Carbon disulfide	ND		1.5	0.14	ppb v/v			06/15/17 19:57	1.85
Carbon tetrachloride	0.26	J	1.5	0.12	ppb v/v			06/15/17 19:57	1.85
Chlorobenzene	ND		0.56	0.12	ppb v/v			06/15/17 19:57	1.85
Chloroethane	ND		1.5	0.57	ppb v/v			06/15/17 19:57	1.85
Chloroform	1.6		0.56	0.18	ppb v/v			06/15/17 19:57	1.85
Chloromethane	ND		1.5	0.36	ppb v/v			06/15/17 19:57	1.85
Dibromochloromethane	ND		0.74	0.15	ppb v/v			06/15/17 19:57	1.85
1,2-Dibromoethane (EDB)	ND		1.5	0.14	ppb v/v			06/15/17 19:57	1.85
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.74	0.29	ppb v/v			06/15/17 19:57	1.85
1,2-Dichlorobenzene	ND		0.74	0.24	ppb v/v			06/15/17 19:57	1.85
1,3-Dichlorobenzene	ND		0.74	0.20	ppb v/v			06/15/17 19:57	1.85
1,4-Dichlorobenzene	ND		0.74	0.28	ppb v/v			06/15/17 19:57	1.85
Dichlorodifluoromethane	19		0.74	0.27	ppb v/v			06/15/17 19:57	1.85
1,1-Dichloroethane	3.1		0.56	0.13	ppb v/v			06/15/17 19:57	1.85
1,2-Dichloroethane	ND		1.5	0.16	ppb v/v			06/15/17 19:57	1.85
1,1-Dichloroethene	12		1.5	0.24	ppb v/v			06/15/17 19:57	1.85
cis-1,2-Dichloroethene	1.8		0.74	0.16	ppb v/v			06/15/17 19:57	1.85
trans-1,2-Dichloroethene	ND		0.74	0.19	ppb v/v			06/15/17 19:57	1.85
1,2-Dichloropropane	ND		0.74	0.44	ppb v/v			06/15/17 19:57	1.85
cis-1,3-Dichloropropene	ND		0.74	0.19	ppb v/v			06/15/17 19:57	1.85
trans-1,3-Dichloropropene	ND		0.74	0.16	ppb v/v			06/15/17 19:57	1.85
Ethylbenzene	ND		0.74	0.12	ppb v/v			06/15/17 19:57	1.85
4-Ethyltoluene	ND		0.74	0.35	ppb v/v			06/15/17 19:57	1.85
Hexachlorobutadiene	ND		3.7	0.80	ppb v/v			06/15/17 19:57	1.85
2-Hexanone	ND *		0.74	0.16	ppb v/v			06/15/17 19:57	1.85
4-Methyl-2-pentanone (MIBK)	ND		0.74	0.25	ppb v/v			06/15/17 19:57	1.85
Methylene Chloride	0.81		0.74	0.13	ppb v/v			06/15/17 19:57	1.85

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102463-001/MWL-SV03-50

Lab Sample ID: 320-28713-2

Date Collected: 05/30/17 08:51

Matrix: Air

Date Received: 06/06/17 10:20

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		0.74	0.11	ppb v/v			06/15/17 19:57	1.85
1,1,2,2-Tetrachloroethane	ND		0.74	0.13	ppb v/v			06/15/17 19:57	1.85
Tetrachloroethene	100		0.74	0.094	ppb v/v			06/15/17 19:57	1.85
Toluene	ND		0.74	0.094	ppb v/v			06/15/17 19:57	1.85
1,1,2-Trichloro-1,2,2-trifluoroethane	72		0.74	0.30	ppb v/v			06/15/17 19:57	1.85
1,2,4-Trichlorobenzene	ND		3.7	0.80	ppb v/v			06/15/17 19:57	1.85
1,1,1-Trichloroethane	3.9		0.56	0.12	ppb v/v			06/15/17 19:57	1.85
1,1,2-Trichloroethane	ND		0.74	0.12	ppb v/v			06/15/17 19:57	1.85
Trichloroethene	98		0.74	0.19	ppb v/v			06/15/17 19:57	1.85
Trichlorofluoromethane	27		0.74	0.36	ppb v/v			06/15/17 19:57	1.85
1,2,4-Trimethylbenzene	ND		1.5	0.30	ppb v/v			06/15/17 19:57	1.85
1,3,5-Trimethylbenzene	ND		0.74	0.23	ppb v/v			06/15/17 19:57	1.85
Vinyl acetate	ND		1.5	0.27	ppb v/v			06/15/17 19:57	1.85
Vinyl chloride	ND		0.74	0.22	ppb v/v			06/15/17 19:57	1.85
m,p-Xylene	ND		1.5	0.19	ppb v/v			06/15/17 19:57	1.85
o-Xylene	ND		0.74	0.10	ppb v/v			06/15/17 19:57	1.85

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	123		70 - 130		06/15/17 19:57	1.85
1,2-Dichloroethane-d4 (Surr)	114		70 - 130		06/15/17 19:57	1.85
Toluene-d8 (Surr)	122		70 - 130		06/15/17 19:57	1.85

Client Sample ID: 102464-001/MWL-SV03-100

Lab Sample ID: 320-28713-3

Date Collected: 05/30/17 08:55

Matrix: Air

Date Received: 06/06/17 10:20

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	4.7	J	14	0.49	ppb v/v			06/15/17 20:51	2.74
Benzene	0.22	J	1.1	0.22	ppb v/v			06/15/17 20:51	2.74
Benzyl chloride	ND		2.2	0.45	ppb v/v			06/15/17 20:51	2.74
Bromodichloromethane	ND		0.82	0.18	ppb v/v			06/15/17 20:51	2.74
Bromoform	ND		1.1	0.19	ppb v/v			06/15/17 20:51	2.74
Bromomethane	ND		2.2	0.92	ppb v/v			06/15/17 20:51	2.74
2-Butanone (MEK)	0.66	J	2.2	0.55	ppb v/v			06/15/17 20:51	2.74
Carbon disulfide	ND		2.2	0.21	ppb v/v			06/15/17 20:51	2.74
Carbon tetrachloride	0.40	J	2.2	0.18	ppb v/v			06/15/17 20:51	2.74
Chlorobenzene	ND		0.82	0.18	ppb v/v			06/15/17 20:51	2.74
Chloroethane	ND		2.2	0.84	ppb v/v			06/15/17 20:51	2.74
Chloroform	2.3		0.82	0.26	ppb v/v			06/15/17 20:51	2.74
Chloromethane	ND		2.2	0.54	ppb v/v			06/15/17 20:51	2.74
Dibromochloromethane	ND		1.1	0.22	ppb v/v			06/15/17 20:51	2.74
1,2-Dibromoethane (EDB)	ND		2.2	0.21	ppb v/v			06/15/17 20:51	2.74
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.1	0.42	ppb v/v			06/15/17 20:51	2.74
1,2-Dichlorobenzene	ND		1.1	0.36	ppb v/v			06/15/17 20:51	2.74
1,3-Dichlorobenzene	ND		1.1	0.30	ppb v/v			06/15/17 20:51	2.74
1,4-Dichlorobenzene	ND		1.1	0.41	ppb v/v			06/15/17 20:51	2.74

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102464-001/MWL-SV03-100

Lab Sample ID: 320-28713-3

Date Collected: 05/30/17 08:55

Matrix: Air

Date Received: 06/06/17 10:20

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	39		1.1	0.40	ppb v/v			06/15/17 20:51	2.74
1,1-Dichloroethane	5.7		0.82	0.20	ppb v/v			06/15/17 20:51	2.74
1,2-Dichloroethane	ND		2.2	0.24	ppb v/v			06/15/17 20:51	2.74
1,1-Dichloroethene	23		2.2	0.35	ppb v/v			06/15/17 20:51	2.74
cis-1,2-Dichloroethene	3.4		1.1	0.24	ppb v/v			06/15/17 20:51	2.74
trans-1,2-Dichloroethene	ND		1.1	0.27	ppb v/v			06/15/17 20:51	2.74
1,2-Dichloropropane	ND		1.1	0.66	ppb v/v			06/15/17 20:51	2.74
cis-1,3-Dichloropropene	ND		1.1	0.28	ppb v/v			06/15/17 20:51	2.74
trans-1,3-Dichloropropene	ND		1.1	0.24	ppb v/v			06/15/17 20:51	2.74
Ethylbenzene	ND		1.1	0.17	ppb v/v			06/15/17 20:51	2.74
4-Ethyltoluene	ND		1.1	0.51	ppb v/v			06/15/17 20:51	2.74
Hexachlorobutadiene	ND		5.5	1.2	ppb v/v			06/15/17 20:51	2.74
2-Hexanone	ND *		1.1	0.24	ppb v/v			06/15/17 20:51	2.74
4-Methyl-2-pentanone (MIBK)	ND		1.1	0.37	ppb v/v			06/15/17 20:51	2.74
Methylene Chloride	1.7		1.1	0.20	ppb v/v			06/15/17 20:51	2.74
Styrene	ND		1.1	0.16	ppb v/v			06/15/17 20:51	2.74
1,1,2,2-Tetrachloroethane	ND		1.1	0.19	ppb v/v			06/15/17 20:51	2.74
Tetrachloroethene	160		1.1	0.14	ppb v/v			06/15/17 20:51	2.74
Toluene	ND		1.1	0.14	ppb v/v			06/15/17 20:51	2.74
1,1,2-Trichloro-1,2,2-trifluoroethane	120		1.1	0.45	ppb v/v			06/15/17 20:51	2.74
1,2,4-Trichlorobenzene	ND		5.5	1.2	ppb v/v			06/15/17 20:51	2.74
1,1,1-Trichloroethane	4.8		0.82	0.18	ppb v/v			06/15/17 20:51	2.74
1,1,2-Trichloroethane	ND		1.1	0.18	ppb v/v			06/15/17 20:51	2.74
Trichlorofluoromethane	38		1.1	0.54	ppb v/v			06/15/17 20:51	2.74
1,2,4-Trimethylbenzene	ND		2.2	0.44	ppb v/v			06/15/17 20:51	2.74
1,3,5-Trimethylbenzene	ND		1.1	0.34	ppb v/v			06/15/17 20:51	2.74
Vinyl acetate	ND		2.2	0.40	ppb v/v			06/15/17 20:51	2.74
Vinyl chloride	ND		1.1	0.33	ppb v/v			06/15/17 20:51	2.74
m,p-Xylene	ND		2.2	0.27	ppb v/v			06/15/17 20:51	2.74
o-Xylene	ND		1.1	0.15	ppb v/v			06/15/17 20:51	2.74

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	124		70 - 130		06/15/17 20:51	2.74
1,2-Dichloroethane-d4 (Surr)	113		70 - 130		06/15/17 20:51	2.74
Toluene-d8 (Surr)	121		70 - 130		06/15/17 20:51	2.74

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	130		1.3	0.35	ppb v/v			06/21/17 19:05	3.33

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		70 - 130		06/21/17 19:05	3.33
1,2-Dichloroethane-d4 (Surr)	104		70 - 130		06/21/17 19:05	3.33
Toluene-d8 (Surr)	105		70 - 130		06/21/17 19:05	3.33

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102465-001/MWL-SV03-200

Lab Sample ID: 320-28713-4

Date Collected: 05/30/17 09:00

Matrix: Air

Date Received: 06/06/17 10:20

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	5.4	J	19	0.66	ppb v/v			06/15/17 21:44	3.7
Benzene	0.29	J	1.5	0.29	ppb v/v			06/15/17 21:44	3.7
Benzyl chloride	ND		3.0	0.60	ppb v/v			06/15/17 21:44	3.7
Bromodichloromethane	ND		1.1	0.24	ppb v/v			06/15/17 21:44	3.7
Bromoform	ND		1.5	0.26	ppb v/v			06/15/17 21:44	3.7
Bromomethane	ND		3.0	1.2	ppb v/v			06/15/17 21:44	3.7
2-Butanone (MEK)	ND		3.0	0.74	ppb v/v			06/15/17 21:44	3.7
Carbon disulfide	ND		3.0	0.29	ppb v/v			06/15/17 21:44	3.7
Carbon tetrachloride	0.53	J	3.0	0.24	ppb v/v			06/15/17 21:44	3.7
Chlorobenzene	ND		1.1	0.24	ppb v/v			06/15/17 21:44	3.7
Chloroethane	ND		3.0	1.1	ppb v/v			06/15/17 21:44	3.7
Chloroform	2.5		1.1	0.35	ppb v/v			06/15/17 21:44	3.7
Chloromethane	ND		3.0	0.73	ppb v/v			06/15/17 21:44	3.7
Dibromochloromethane	ND		1.5	0.29	ppb v/v			06/15/17 21:44	3.7
1,2-Dibromoethane (EDB)	ND		3.0	0.28	ppb v/v			06/15/17 21:44	3.7
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.5	0.57	ppb v/v			06/15/17 21:44	3.7
1,2-Dichlorobenzene	ND		1.5	0.48	ppb v/v			06/15/17 21:44	3.7
1,3-Dichlorobenzene	ND		1.5	0.41	ppb v/v			06/15/17 21:44	3.7
1,4-Dichlorobenzene	ND		1.5	0.55	ppb v/v			06/15/17 21:44	3.7
Dichlorodifluoromethane	51		1.5	0.54	ppb v/v			06/15/17 21:44	3.7
1,1-Dichloroethane	7.9		1.1	0.27	ppb v/v			06/15/17 21:44	3.7
1,2-Dichloroethane	ND		3.0	0.33	ppb v/v			06/15/17 21:44	3.7
1,1-Dichloroethene	33		3.0	0.48	ppb v/v			06/15/17 21:44	3.7
cis-1,2-Dichloroethene	5.0		1.5	0.33	ppb v/v			06/15/17 21:44	3.7
trans-1,2-Dichloroethene	ND		1.5	0.37	ppb v/v			06/15/17 21:44	3.7
1,2-Dichloropropane	ND		1.5	0.89	ppb v/v			06/15/17 21:44	3.7
cis-1,3-Dichloropropene	ND		1.5	0.38	ppb v/v			06/15/17 21:44	3.7
trans-1,3-Dichloropropene	ND		1.5	0.33	ppb v/v			06/15/17 21:44	3.7
Ethylbenzene	ND		1.5	0.23	ppb v/v			06/15/17 21:44	3.7
4-Ethyltoluene	ND		1.5	0.69	ppb v/v			06/15/17 21:44	3.7
Hexachlorobutadiene	ND		7.4	1.6	ppb v/v			06/15/17 21:44	3.7
2-Hexanone	ND *		1.5	0.32	ppb v/v			06/15/17 21:44	3.7
4-Methyl-2-pentanone (MIBK)	ND		1.5	0.50	ppb v/v			06/15/17 21:44	3.7
Methylene Chloride	3.4		1.5	0.27	ppb v/v			06/15/17 21:44	3.7
Styrene	ND		1.5	0.22	ppb v/v			06/15/17 21:44	3.7
1,1,2,2-Tetrachloroethane	ND		1.5	0.26	ppb v/v			06/15/17 21:44	3.7
Tetrachloroethene	210		1.5	0.19	ppb v/v			06/15/17 21:44	3.7
Toluene	0.62	J	1.5	0.19	ppb v/v			06/15/17 21:44	3.7
1,1,2-Trichloro-1,2,2-trifluoroethane	170		1.5	0.60	ppb v/v			06/15/17 21:44	3.7
1,2,4-Trichlorobenzene	ND		7.4	1.6	ppb v/v			06/15/17 21:44	3.7
1,1,1-Trichloroethane	3.2		1.1	0.24	ppb v/v			06/15/17 21:44	3.7
1,1,2-Trichloroethane	ND		1.5	0.25	ppb v/v			06/15/17 21:44	3.7
Trichlorofluoromethane	38		1.5	0.73	ppb v/v			06/15/17 21:44	3.7
1,2,4-Trimethylbenzene	ND		3.0	0.60	ppb v/v			06/15/17 21:44	3.7
1,3,5-Trimethylbenzene	ND		1.5	0.46	ppb v/v			06/15/17 21:44	3.7
Vinyl acetate	ND		3.0	0.54	ppb v/v			06/15/17 21:44	3.7
Vinyl chloride	ND		1.5	0.44	ppb v/v			06/15/17 21:44	3.7
m,p-Xylene	ND		3.0	0.37	ppb v/v			06/15/17 21:44	3.7

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102465-001/MWL-SV03-200

Lab Sample ID: 320-28713-4

Date Collected: 05/30/17 09:00

Matrix: Air

Date Received: 06/06/17 10:20

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		1.5	0.20	ppb v/v			06/15/17 21:44	3.7

Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	121		70 - 130					06/15/17 21:44	3.7
1,2-Dichloroethane-d4 (Surr)	115		70 - 130					06/15/17 21:44	3.7
Toluene-d8 (Surr)	123		70 - 130					06/15/17 21:44	3.7

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	240		2.5	0.66	ppb v/v			06/21/17 19:57	6.28

Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					06/21/17 19:57	6.28
1,2-Dichloroethane-d4 (Surr)	104		70 - 130					06/21/17 19:57	6.28
Toluene-d8 (Surr)	106		70 - 130					06/21/17 19:57	6.28

Client Sample ID: 102466-001/MWL-SV03-200

Lab Sample ID: 320-28713-5

Date Collected: 05/30/17 09:00

Matrix: Air

Date Received: 06/06/17 10:20

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	6.5	J	18	0.64	ppb v/v			06/15/17 22:36	3.62
Benzene	0.29	J	1.4	0.29	ppb v/v			06/15/17 22:36	3.62
Benzyl chloride	ND		2.9	0.59	ppb v/v			06/15/17 22:36	3.62
Bromodichloromethane	ND		1.1	0.24	ppb v/v			06/15/17 22:36	3.62
Bromoform	ND		1.4	0.25	ppb v/v			06/15/17 22:36	3.62
Bromomethane	ND		2.9	1.2	ppb v/v			06/15/17 22:36	3.62
2-Butanone (MEK)	ND		2.9	0.72	ppb v/v			06/15/17 22:36	3.62
Carbon disulfide	ND		2.9	0.28	ppb v/v			06/15/17 22:36	3.62
Carbon tetrachloride	0.51	J	2.9	0.23	ppb v/v			06/15/17 22:36	3.62
Chlorobenzene	ND		1.1	0.23	ppb v/v			06/15/17 22:36	3.62
Chloroethane	ND		2.9	1.1	ppb v/v			06/15/17 22:36	3.62
Chloroform	2.5		1.1	0.34	ppb v/v			06/15/17 22:36	3.62
Chloromethane	ND		2.9	0.71	ppb v/v			06/15/17 22:36	3.62
Dibromochloromethane	ND		1.4	0.29	ppb v/v			06/15/17 22:36	3.62
1,2-Dibromoethane (EDB)	ND		2.9	0.27	ppb v/v			06/15/17 22:36	3.62
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.56	ppb v/v			06/15/17 22:36	3.62
1,2-Dichlorobenzene	ND		1.4	0.47	ppb v/v			06/15/17 22:36	3.62
1,3-Dichlorobenzene	ND		1.4	0.40	ppb v/v			06/15/17 22:36	3.62
1,4-Dichlorobenzene	ND		1.4	0.54	ppb v/v			06/15/17 22:36	3.62
Dichlorodifluoromethane	55		1.4	0.52	ppb v/v			06/15/17 22:36	3.62
1,1-Dichloroethane	7.9		1.1	0.26	ppb v/v			06/15/17 22:36	3.62
1,2-Dichloroethane	ND		2.9	0.32	ppb v/v			06/15/17 22:36	3.62
1,1-Dichloroethene	33		2.9	0.47	ppb v/v			06/15/17 22:36	3.62
cis-1,2-Dichloroethene	5.2		1.4	0.32	ppb v/v			06/15/17 22:36	3.62
trans-1,2-Dichloroethene	ND		1.4	0.36	ppb v/v			06/15/17 22:36	3.62
1,2-Dichloropropane	ND		1.4	0.87	ppb v/v			06/15/17 22:36	3.62

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102466-001/MWL-SV03-200

Lab Sample ID: 320-28713-5

Date Collected: 05/30/17 09:00

Matrix: Air

Date Received: 06/06/17 10:20

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		1.4	0.38	ppb v/v			06/15/17 22:36	3.62
trans-1,3-Dichloropropene	ND		1.4	0.32	ppb v/v			06/15/17 22:36	3.62
Ethylbenzene	ND		1.4	0.23	ppb v/v			06/15/17 22:36	3.62
4-Ethyltoluene	ND		1.4	0.68	ppb v/v			06/15/17 22:36	3.62
Hexachlorobutadiene	ND		7.2	1.6	ppb v/v			06/15/17 22:36	3.62
2-Hexanone	ND *		1.4	0.31	ppb v/v			06/15/17 22:36	3.62
4-Methyl-2-pentanone (MIBK)	ND		1.4	0.49	ppb v/v			06/15/17 22:36	3.62
Methylene Chloride	3.4		1.4	0.26	ppb v/v			06/15/17 22:36	3.62
Styrene	ND		1.4	0.21	ppb v/v			06/15/17 22:36	3.62
1,1,2,2-Tetrachloroethane	ND		1.4	0.25	ppb v/v			06/15/17 22:36	3.62
Tetrachloroethene	210		1.4	0.18	ppb v/v			06/15/17 22:36	3.62
Toluene	0.44 J		1.4	0.18	ppb v/v			06/15/17 22:36	3.62
1,1,2-Trichloro-1,2,2-trifluoroethane	170		1.4	0.59	ppb v/v			06/15/17 22:36	3.62
1,2,4-Trichlorobenzene	ND		7.2	1.6	ppb v/v			06/15/17 22:36	3.62
1,1,1-Trichloroethane	3.1		1.1	0.24	ppb v/v			06/15/17 22:36	3.62
1,1,2-Trichloroethane	ND		1.4	0.24	ppb v/v			06/15/17 22:36	3.62
Trichlorofluoromethane	38		1.4	0.71	ppb v/v			06/15/17 22:36	3.62
1,2,4-Trimethylbenzene	ND		2.9	0.59	ppb v/v			06/15/17 22:36	3.62
1,3,5-Trimethylbenzene	ND		1.4	0.45	ppb v/v			06/15/17 22:36	3.62
Vinyl acetate	ND		2.9	0.52	ppb v/v			06/15/17 22:36	3.62
Vinyl chloride	ND		1.4	0.43	ppb v/v			06/15/17 22:36	3.62
m,p-Xylene	ND		2.9	0.36	ppb v/v			06/15/17 22:36	3.62
o-Xylene	ND		1.4	0.20	ppb v/v			06/15/17 22:36	3.62

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	122		70 - 130		06/15/17 22:36	3.62
1,2-Dichloroethane-d4 (Surr)	115		70 - 130		06/15/17 22:36	3.62
Toluene-d8 (Surr)	122		70 - 130		06/15/17 22:36	3.62

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	250		2.4	0.64	ppb v/v			06/21/17 20:49	6.12

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		06/21/17 20:49	6.12
1,2-Dichloroethane-d4 (Surr)	102		70 - 130		06/21/17 20:49	6.12
Toluene-d8 (Surr)	104		70 - 130		06/21/17 20:49	6.12

Client Sample ID: 102467-001/MWL-SV03-300

Lab Sample ID: 320-28713-6

Date Collected: 05/30/17 09:07

Matrix: Air

Date Received: 06/06/17 10:20

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	6.9 J		19	0.69	ppb v/v			06/15/17 23:28	3.88
Benzene	0.40 J		1.6	0.31	ppb v/v			06/15/17 23:28	3.88
Benzyl chloride	ND		3.1	0.63	ppb v/v			06/15/17 23:28	3.88
Bromodichloromethane	ND		1.2	0.26	ppb v/v			06/15/17 23:28	3.88

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102467-001/MWL-SV03-300

Lab Sample ID: 320-28713-6

Date Collected: 05/30/17 09:07

Matrix: Air

Date Received: 06/06/17 10:20

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		1.6	0.27	ppb v/v			06/15/17 23:28	3.88
Bromomethane	ND		3.1	1.3	ppb v/v			06/15/17 23:28	3.88
2-Butanone (MEK)	ND		3.1	0.77	ppb v/v			06/15/17 23:28	3.88
Carbon disulfide	ND		3.1	0.30	ppb v/v			06/15/17 23:28	3.88
Carbon tetrachloride	0.40	J	3.1	0.25	ppb v/v			06/15/17 23:28	3.88
Chlorobenzene	ND		1.2	0.25	ppb v/v			06/15/17 23:28	3.88
Chloroethane	ND		3.1	1.2	ppb v/v			06/15/17 23:28	3.88
Chloroform	1.5		1.2	0.37	ppb v/v			06/15/17 23:28	3.88
Chloromethane	ND		3.1	0.76	ppb v/v			06/15/17 23:28	3.88
Dibromochloromethane	ND		1.6	0.31	ppb v/v			06/15/17 23:28	3.88
1,2-Dibromoethane (EDB)	ND		3.1	0.29	ppb v/v			06/15/17 23:28	3.88
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.6	0.60	ppb v/v			06/15/17 23:28	3.88
1,2-Dichlorobenzene	ND		1.6	0.50	ppb v/v			06/15/17 23:28	3.88
1,3-Dichlorobenzene	ND		1.6	0.43	ppb v/v			06/15/17 23:28	3.88
1,4-Dichlorobenzene	ND		1.6	0.58	ppb v/v			06/15/17 23:28	3.88
Dichlorodifluoromethane	27		1.6	0.56	ppb v/v			06/15/17 23:28	3.88
1,1-Dichloroethane	3.7		1.2	0.28	ppb v/v			06/15/17 23:28	3.88
1,2-Dichloroethane	ND		3.1	0.34	ppb v/v			06/15/17 23:28	3.88
1,1-Dichloroethene	21		3.1	0.50	ppb v/v			06/15/17 23:28	3.88
cis-1,2-Dichloroethene	2.8		1.6	0.35	ppb v/v			06/15/17 23:28	3.88
trans-1,2-Dichloroethene	ND		1.6	0.39	ppb v/v			06/15/17 23:28	3.88
1,2-Dichloropropane	ND		1.6	0.93	ppb v/v			06/15/17 23:28	3.88
cis-1,3-Dichloropropene	ND		1.6	0.40	ppb v/v			06/15/17 23:28	3.88
trans-1,3-Dichloropropene	ND		1.6	0.34	ppb v/v			06/15/17 23:28	3.88
Ethylbenzene	ND		1.6	0.24	ppb v/v			06/15/17 23:28	3.88
4-Ethyltoluene	ND		1.6	0.73	ppb v/v			06/15/17 23:28	3.88
Hexachlorobutadiene	ND		7.8	1.7	ppb v/v			06/15/17 23:28	3.88
2-Hexanone	ND *		1.6	0.34	ppb v/v			06/15/17 23:28	3.88
4-Methyl-2-pentanone (MIBK)	ND		1.6	0.52	ppb v/v			06/15/17 23:28	3.88
Methylene Chloride	1.7		1.6	0.28	ppb v/v			06/15/17 23:28	3.88
Styrene	ND		1.6	0.23	ppb v/v			06/15/17 23:28	3.88
1,1,2,2-Tetrachloroethane	ND		1.6	0.27	ppb v/v			06/15/17 23:28	3.88
Tetrachloroethene	220		1.6	0.20	ppb v/v			06/15/17 23:28	3.88
Toluene	0.38	J	1.6	0.20	ppb v/v			06/15/17 23:28	3.88
1,1,2-Trichloro-1,2,2-trifluoroethane	110		1.6	0.63	ppb v/v			06/15/17 23:28	3.88
1,2,4-Trichlorobenzene	ND		7.8	1.7	ppb v/v			06/15/17 23:28	3.88
1,1,1-Trichloroethane	1.4		1.2	0.25	ppb v/v			06/15/17 23:28	3.88
1,1,2-Trichloroethane	ND		1.6	0.26	ppb v/v			06/15/17 23:28	3.88
Trichloroethene	200		1.6	0.41	ppb v/v			06/15/17 23:28	3.88
Trichlorofluoromethane	16		1.6	0.76	ppb v/v			06/15/17 23:28	3.88
1,2,4-Trimethylbenzene	ND		3.1	0.63	ppb v/v			06/15/17 23:28	3.88
1,3,5-Trimethylbenzene	ND		1.6	0.49	ppb v/v			06/15/17 23:28	3.88
Vinyl acetate	ND		3.1	0.56	ppb v/v			06/15/17 23:28	3.88
Vinyl chloride	ND		1.6	0.47	ppb v/v			06/15/17 23:28	3.88
m,p-Xylene	ND		3.1	0.39	ppb v/v			06/15/17 23:28	3.88
o-Xylene	ND		1.6	0.21	ppb v/v			06/15/17 23:28	3.88

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102467-001/MWL-SV03-300

Lab Sample ID: 320-28713-6

Date Collected: 05/30/17 09:07

Matrix: Air

Date Received: 06/06/17 10:20

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	123		70 - 130		06/15/17 23:28	3.88
1,2-Dichloroethane-d4 (Surr)	114		70 - 130		06/15/17 23:28	3.88
Toluene-d8 (Surr)	123		70 - 130		06/15/17 23:28	3.88

Client Sample ID: 102468-001/MWL-SV03-400

Lab Sample ID: 320-28713-7

Date Collected: 05/30/17 09:46

Matrix: Air

Date Received: 06/06/17 10:20

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	2.9	J	23	0.81	ppb v/v			06/16/17 00:20	4.54
Benzene	0.42	J	1.8	0.36	ppb v/v			06/16/17 00:20	4.54
Benzyl chloride	ND		3.6	0.74	ppb v/v			06/16/17 00:20	4.54
Bromodichloromethane	ND		1.4	0.30	ppb v/v			06/16/17 00:20	4.54
Bromoform	ND		1.8	0.32	ppb v/v			06/16/17 00:20	4.54
Bromomethane	ND		3.6	1.5	ppb v/v			06/16/17 00:20	4.54
2-Butanone (MEK)	ND		3.6	0.90	ppb v/v			06/16/17 00:20	4.54
Carbon disulfide	ND		3.6	0.35	ppb v/v			06/16/17 00:20	4.54
Carbon tetrachloride	ND		3.6	0.29	ppb v/v			06/16/17 00:20	4.54
Chlorobenzene	ND		1.4	0.29	ppb v/v			06/16/17 00:20	4.54
Chloroethane	ND		3.6	1.4	ppb v/v			06/16/17 00:20	4.54
Chloroform	1.2	J	1.4	0.43	ppb v/v			06/16/17 00:20	4.54
Chloromethane	ND		3.6	0.89	ppb v/v			06/16/17 00:20	4.54
Dibromochloromethane	ND		1.8	0.36	ppb v/v			06/16/17 00:20	4.54
1,2-Dibromoethane (EDB)	ND		3.6	0.34	ppb v/v			06/16/17 00:20	4.54
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.8	0.70	ppb v/v			06/16/17 00:20	4.54
1,2-Dichlorobenzene	ND		1.8	0.59	ppb v/v			06/16/17 00:20	4.54
1,3-Dichlorobenzene	ND		1.8	0.50	ppb v/v			06/16/17 00:20	4.54
1,4-Dichlorobenzene	ND		1.8	0.68	ppb v/v			06/16/17 00:20	4.54
Dichlorodifluoromethane	4.6		1.8	0.66	ppb v/v			06/16/17 00:20	4.54
1,1-Dichloroethane	4.6		1.4	0.33	ppb v/v			06/16/17 00:20	4.54
1,2-Dichloroethane	ND		3.6	0.40	ppb v/v			06/16/17 00:20	4.54
1,1-Dichloroethene	21		3.6	0.59	ppb v/v			06/16/17 00:20	4.54
cis-1,2-Dichloroethene	2.3		1.8	0.40	ppb v/v			06/16/17 00:20	4.54
trans-1,2-Dichloroethene	ND		1.8	0.45	ppb v/v			06/16/17 00:20	4.54
1,2-Dichloropropane	ND		1.8	1.1	ppb v/v			06/16/17 00:20	4.54
cis-1,3-Dichloropropene	ND		1.8	0.47	ppb v/v			06/16/17 00:20	4.54
trans-1,3-Dichloropropene	ND		1.8	0.40	ppb v/v			06/16/17 00:20	4.54
Ethylbenzene	ND		1.8	0.29	ppb v/v			06/16/17 00:20	4.54
4-Ethyltoluene	ND		1.8	0.85	ppb v/v			06/16/17 00:20	4.54
Hexachlorobutadiene	ND		9.1	2.0	ppb v/v			06/16/17 00:20	4.54
2-Hexanone	ND	*	1.8	0.39	ppb v/v			06/16/17 00:20	4.54
4-Methyl-2-pentanone (MIBK)	ND		1.8	0.61	ppb v/v			06/16/17 00:20	4.54
Methylene Chloride	1.5	J	1.8	0.33	ppb v/v			06/16/17 00:20	4.54
Styrene	ND		1.8	0.27	ppb v/v			06/16/17 00:20	4.54
1,1,2,2-Tetrachloroethane	ND		1.8	0.31	ppb v/v			06/16/17 00:20	4.54
Toluene	0.84	J	1.8	0.23	ppb v/v			06/16/17 00:20	4.54

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102468-001/MWL-SV03-400

Lab Sample ID: 320-28713-7

Date Collected: 05/30/17 09:46

Matrix: Air

Date Received: 06/06/17 10:20

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	28		1.8	0.74	ppb v/v			06/16/17 00:20	4.54
1,2,4-Trichlorobenzene	ND		9.1	2.0	ppb v/v			06/16/17 00:20	4.54
1,1,1-Trichloroethane	1.8		1.4	0.30	ppb v/v			06/16/17 00:20	4.54
1,1,2-Trichloroethane	ND		1.8	0.30	ppb v/v			06/16/17 00:20	4.54
Trichloroethene	230		1.8	0.48	ppb v/v			06/16/17 00:20	4.54
Trichlorofluoromethane	7.8		1.8	0.89	ppb v/v			06/16/17 00:20	4.54
1,2,4-Trimethylbenzene	ND		3.6	0.74	ppb v/v			06/16/17 00:20	4.54
1,3,5-Trimethylbenzene	ND		1.8	0.57	ppb v/v			06/16/17 00:20	4.54
Vinyl acetate	ND		3.6	0.66	ppb v/v			06/16/17 00:20	4.54
Vinyl chloride	ND		1.8	0.54	ppb v/v			06/16/17 00:20	4.54
m,p-Xylene	ND		3.6	0.45	ppb v/v			06/16/17 00:20	4.54
o-Xylene	ND		1.8	0.25	ppb v/v			06/16/17 00:20	4.54

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	124		70 - 130		06/16/17 00:20	4.54
1,2-Dichloroethane-d4 (Surr)	115		70 - 130		06/16/17 00:20	4.54
Toluene-d8 (Surr)	122		70 - 130		06/16/17 00:20	4.54

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	390		3.1	0.40	ppb v/v			06/21/17 21:41	7.87

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130		06/21/17 21:41	7.87
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		06/21/17 21:41	7.87
Toluene-d8 (Surr)	105		70 - 130		06/21/17 21:41	7.87

Client Sample ID: 102469-001/MWL-SV03-400

Lab Sample ID: 320-28713-8

Date Collected: 05/30/17 09:46

Matrix: Air

Date Received: 06/06/17 10:20

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	2.9	J	30	1.1	ppb v/v			06/16/17 01:12	5.93
Benzene	ND		2.4	0.47	ppb v/v			06/16/17 01:12	5.93
Benzyl chloride	ND		4.7	0.97	ppb v/v			06/16/17 01:12	5.93
Bromodichloromethane	ND		1.8	0.39	ppb v/v			06/16/17 01:12	5.93
Bromoform	ND		2.4	0.42	ppb v/v			06/16/17 01:12	5.93
Bromomethane	ND		4.7	2.0	ppb v/v			06/16/17 01:12	5.93
2-Butanone (MEK)	ND		4.7	1.2	ppb v/v			06/16/17 01:12	5.93
Carbon disulfide	ND		4.7	0.46	ppb v/v			06/16/17 01:12	5.93
Carbon tetrachloride	0.43	J	4.7	0.38	ppb v/v			06/16/17 01:12	5.93
Chlorobenzene	ND		1.8	0.38	ppb v/v			06/16/17 01:12	5.93
Chloroethane	ND		4.7	1.8	ppb v/v			06/16/17 01:12	5.93
Chloroform	1.4	J	1.8	0.56	ppb v/v			06/16/17 01:12	5.93
Chloromethane	ND		4.7	1.2	ppb v/v			06/16/17 01:12	5.93
Dibromochloromethane	ND		2.4	0.47	ppb v/v			06/16/17 01:12	5.93
1,2-Dibromoethane (EDB)	ND		4.7	0.44	ppb v/v			06/16/17 01:12	5.93

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102469-001/MWL-SV03-400

Lab Sample ID: 320-28713-8

Date Collected: 05/30/17 09:46

Matrix: Air

Date Received: 06/06/17 10:20

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-Dichloro-1,1,2,2-tetrafluoroethane	ND		2.4	0.92	ppb v/v			06/16/17 01:12	5.93
1,2-Dichlorobenzene	ND		2.4	0.77	ppb v/v			06/16/17 01:12	5.93
1,3-Dichlorobenzene	ND		2.4	0.65	ppb v/v			06/16/17 01:12	5.93
1,4-Dichlorobenzene	ND		2.4	0.88	ppb v/v			06/16/17 01:12	5.93
Dichlorodifluoromethane	5.4		2.4	0.86	ppb v/v			06/16/17 01:12	5.93
1,1-Dichloroethane	4.8		1.8	0.43	ppb v/v			06/16/17 01:12	5.93
1,2-Dichloroethane	ND		4.7	0.52	ppb v/v			06/16/17 01:12	5.93
1,1-Dichloroethene	22		4.7	0.76	ppb v/v			06/16/17 01:12	5.93
cis-1,2-Dichloroethene	2.4		2.4	0.53	ppb v/v			06/16/17 01:12	5.93
trans-1,2-Dichloroethene	ND		2.4	0.59	ppb v/v			06/16/17 01:12	5.93
1,2-Dichloropropane	ND		2.4	1.4	ppb v/v			06/16/17 01:12	5.93
cis-1,3-Dichloropropene	ND		2.4	0.62	ppb v/v			06/16/17 01:12	5.93
trans-1,3-Dichloropropene	ND		2.4	0.52	ppb v/v			06/16/17 01:12	5.93
Ethylbenzene	ND		2.4	0.37	ppb v/v			06/16/17 01:12	5.93
4-Ethyltoluene	ND		2.4	1.1	ppb v/v			06/16/17 01:12	5.93
Hexachlorobutadiene	ND		12	2.6	ppb v/v			06/16/17 01:12	5.93
2-Hexanone	ND *		2.4	0.52	ppb v/v			06/16/17 01:12	5.93
4-Methyl-2-pentanone (MIBK)	ND		2.4	0.80	ppb v/v			06/16/17 01:12	5.93
Methylene Chloride	1.7	J	2.4	0.43	ppb v/v			06/16/17 01:12	5.93
Styrene	ND		2.4	0.35	ppb v/v			06/16/17 01:12	5.93
1,1,2,2-Tetrachloroethane	ND		2.4	0.41	ppb v/v			06/16/17 01:12	5.93
Tetrachloroethene	340		2.4	0.30	ppb v/v			06/16/17 01:12	5.93
Toluene	1.1	J	2.4	0.30	ppb v/v			06/16/17 01:12	5.93
1,1,2-Trichloro-1,2,2-trifluoroethane	29		2.4	0.97	ppb v/v			06/16/17 01:12	5.93
1,2,4-Trichlorobenzene	ND		12	2.6	ppb v/v			06/16/17 01:12	5.93
1,1,1-Trichloroethane	2.0		1.8	0.39	ppb v/v			06/16/17 01:12	5.93
1,1,2-Trichloroethane	ND		2.4	0.40	ppb v/v			06/16/17 01:12	5.93
Trichloroethene	250		2.4	0.62	ppb v/v			06/16/17 01:12	5.93
Trichlorofluoromethane	ND		2.4	1.2	ppb v/v			06/16/17 01:12	5.93
1,2,4-Trimethylbenzene	ND		4.7	0.96	ppb v/v			06/16/17 01:12	5.93
1,3,5-Trimethylbenzene	ND		2.4	0.74	ppb v/v			06/16/17 01:12	5.93
Vinyl acetate	ND		4.7	0.86	ppb v/v			06/16/17 01:12	5.93
Vinyl chloride	ND		2.4	0.71	ppb v/v			06/16/17 01:12	5.93
m,p-Xylene	ND		4.7	0.59	ppb v/v			06/16/17 01:12	5.93
o-Xylene	ND		2.4	0.32	ppb v/v			06/16/17 01:12	5.93

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	122		70 - 130		06/16/17 01:12	5.93
1,2-Dichloroethane-d4 (Surr)	118		70 - 130		06/16/17 01:12	5.93
Toluene-d8 (Surr)	125		70 - 130		06/16/17 01:12	5.93

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102470-001/MWL-SV-FB4

Lab Sample ID: 320-28713-9

Date Collected: 05/30/17 10:10

Matrix: Air

Date Received: 06/06/17 10:20

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		5.0	0.18	ppb v/v			06/16/17 02:10	1
Benzene	ND		0.40	0.079	ppb v/v			06/16/17 02:10	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			06/16/17 02:10	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			06/16/17 02:10	1
Bromoform	ND		0.40	0.070	ppb v/v			06/16/17 02:10	1
Bromomethane	ND		0.80	0.34	ppb v/v			06/16/17 02:10	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			06/16/17 02:10	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			06/16/17 02:10	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			06/16/17 02:10	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			06/16/17 02:10	1
Chloroethane	ND		0.80	0.31	ppb v/v			06/16/17 02:10	1
Chloroform	ND		0.30	0.095	ppb v/v			06/16/17 02:10	1
Chloromethane	ND		0.80	0.20	ppb v/v			06/16/17 02:10	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			06/16/17 02:10	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			06/16/17 02:10	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			06/16/17 02:10	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			06/16/17 02:10	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			06/16/17 02:10	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			06/16/17 02:10	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			06/16/17 02:10	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			06/16/17 02:10	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			06/16/17 02:10	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			06/16/17 02:10	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			06/16/17 02:10	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			06/16/17 02:10	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			06/16/17 02:10	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			06/16/17 02:10	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			06/16/17 02:10	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			06/16/17 02:10	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			06/16/17 02:10	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			06/16/17 02:10	1
2-Hexanone	ND *		0.40	0.087	ppb v/v			06/16/17 02:10	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			06/16/17 02:10	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			06/16/17 02:10	1
Styrene	ND		0.40	0.059	ppb v/v			06/16/17 02:10	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			06/16/17 02:10	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			06/16/17 02:10	1
Toluene	ND		0.40	0.051	ppb v/v			06/16/17 02:10	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			06/16/17 02:10	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			06/16/17 02:10	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			06/16/17 02:10	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			06/16/17 02:10	1
Trichloroethene	ND		0.40	0.11	ppb v/v			06/16/17 02:10	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			06/16/17 02:10	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			06/16/17 02:10	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			06/16/17 02:10	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			06/16/17 02:10	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			06/16/17 02:10	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102470-001/MWL-SV-FB4

Lab Sample ID: 320-28713-9

Date Collected: 05/30/17 10:10

Matrix: Air

Date Received: 06/06/17 10:20

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		0.80	0.10	ppb v/v			06/16/17 02:10	1
o-Xylene	ND		0.40	0.054	ppb v/v			06/16/17 02:10	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	124		70 - 130					06/16/17 02:10	1
1,2-Dichloroethane-d4 (Surr)	118		70 - 130					06/16/17 02:10	1
Toluene-d8 (Surr)	125		70 - 130					06/16/17 02:10	1

Client Sample ID: 102471-001/MWL-SV04-50

Lab Sample ID: 320-28713-10

Date Collected: 05/30/17 10:17

Matrix: Air

Date Received: 06/06/17 10:20

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	3.8	J	5.0	0.18	ppb v/v			06/16/17 03:09	1
Benzene	0.39	J	0.40	0.079	ppb v/v			06/16/17 03:09	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			06/16/17 03:09	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			06/16/17 03:09	1
Bromoform	ND		0.40	0.070	ppb v/v			06/16/17 03:09	1
Bromomethane	ND		0.80	0.34	ppb v/v			06/16/17 03:09	1
2-Butanone (MEK)	0.59	J	0.80	0.20	ppb v/v			06/16/17 03:09	1
Carbon disulfide	0.10	J	0.80	0.078	ppb v/v			06/16/17 03:09	1
Carbon tetrachloride	0.23	J	0.80	0.064	ppb v/v			06/16/17 03:09	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			06/16/17 03:09	1
Chloroethane	ND		0.80	0.31	ppb v/v			06/16/17 03:09	1
Chloroform	1.9		0.30	0.095	ppb v/v			06/16/17 03:09	1
Chloromethane	ND		0.80	0.20	ppb v/v			06/16/17 03:09	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			06/16/17 03:09	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			06/16/17 03:09	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			06/16/17 03:09	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			06/16/17 03:09	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			06/16/17 03:09	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			06/16/17 03:09	1
Dichlorodifluoromethane	13		0.40	0.15	ppb v/v			06/16/17 03:09	1
1,1-Dichloroethane	1.4		0.30	0.072	ppb v/v			06/16/17 03:09	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			06/16/17 03:09	1
1,1-Dichloroethene	6.8		0.80	0.13	ppb v/v			06/16/17 03:09	1
cis-1,2-Dichloroethene	0.56		0.40	0.089	ppb v/v			06/16/17 03:09	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			06/16/17 03:09	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			06/16/17 03:09	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			06/16/17 03:09	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			06/16/17 03:09	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			06/16/17 03:09	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			06/16/17 03:09	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			06/16/17 03:09	1
2-Hexanone	ND *		0.40	0.087	ppb v/v			06/16/17 03:09	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			06/16/17 03:09	1
Methylene Chloride	0.14	J	0.40	0.072	ppb v/v			06/16/17 03:09	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102471-001/MWL-SV04-50

Lab Sample ID: 320-28713-10

Date Collected: 05/30/17 10:17

Matrix: Air

Date Received: 06/06/17 10:20

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		0.40	0.059	ppb v/v			06/16/17 03:09	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			06/16/17 03:09	1
Tetrachloroethene	52		0.40	0.051	ppb v/v			06/16/17 03:09	1
Toluene	0.051 J		0.40	0.051	ppb v/v			06/16/17 03:09	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			06/16/17 03:09	1
1,1,1-Trichloroethane	7.9		0.30	0.065	ppb v/v			06/16/17 03:09	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			06/16/17 03:09	1
Trichloroethene	54		0.40	0.11	ppb v/v			06/16/17 03:09	1
Trichlorofluoromethane	29		0.40	0.20	ppb v/v			06/16/17 03:09	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			06/16/17 03:09	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			06/16/17 03:09	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			06/16/17 03:09	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			06/16/17 03:09	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			06/16/17 03:09	1
o-Xylene	ND		0.40	0.054	ppb v/v			06/16/17 03:09	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	125		70 - 130		06/16/17 03:09	1
1,2-Dichloroethane-d4 (Surr)	117		70 - 130		06/16/17 03:09	1
Toluene-d8 (Surr)	125		70 - 130		06/16/17 03:09	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	61		0.62	0.25	ppb v/v			06/21/17 22:36	1.55

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		06/21/17 22:36	1.55
1,2-Dichloroethane-d4 (Surr)	104		70 - 130		06/21/17 22:36	1.55
Toluene-d8 (Surr)	107		70 - 130		06/21/17 22:36	1.55

Client Sample ID: 102472-001/MWL-SV04-100

Lab Sample ID: 320-28713-11

Date Collected: 05/30/17 10:20

Matrix: Air

Date Received: 06/06/17 10:20

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	3.2 J		7.7	0.27	ppb v/v			06/16/17 04:04	1.54
Benzene	0.28 J		0.62	0.12	ppb v/v			06/16/17 04:04	1.54
Benzyl chloride	ND		1.2	0.25	ppb v/v			06/16/17 04:04	1.54
Bromodichloromethane	ND		0.46	0.10	ppb v/v			06/16/17 04:04	1.54
Bromoform	ND		0.62	0.11	ppb v/v			06/16/17 04:04	1.54
Bromomethane	ND		1.2	0.52	ppb v/v			06/16/17 04:04	1.54
2-Butanone (MEK)	0.45 J		1.2	0.31	ppb v/v			06/16/17 04:04	1.54
Carbon disulfide	2.2		1.2	0.12	ppb v/v			06/16/17 04:04	1.54
Carbon tetrachloride	0.40 J		1.2	0.099	ppb v/v			06/16/17 04:04	1.54
Chlorobenzene	ND		0.46	0.099	ppb v/v			06/16/17 04:04	1.54
Chloroethane	ND		1.2	0.47	ppb v/v			06/16/17 04:04	1.54
Chloroform	2.0		0.46	0.15	ppb v/v			06/16/17 04:04	1.54

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102472-001/MWL-SV04-100

Lab Sample ID: 320-28713-11

Date Collected: 05/30/17 10:20

Matrix: Air

Date Received: 06/06/17 10:20

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		1.2	0.30	ppb v/v			06/16/17 04:04	1.54
Dibromochloromethane	ND		0.62	0.12	ppb v/v			06/16/17 04:04	1.54
1,2-Dibromoethane (EDB)	ND		1.2	0.12	ppb v/v			06/16/17 04:04	1.54
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.62	0.24	ppb v/v			06/16/17 04:04	1.54
1,2-Dichlorobenzene	ND		0.62	0.20	ppb v/v			06/16/17 04:04	1.54
1,3-Dichlorobenzene	ND		0.62	0.17	ppb v/v			06/16/17 04:04	1.54
1,4-Dichlorobenzene	ND		0.62	0.23	ppb v/v			06/16/17 04:04	1.54
Dichlorodifluoromethane	24		0.62	0.22	ppb v/v			06/16/17 04:04	1.54
1,1-Dichloroethane	3.1		0.46	0.11	ppb v/v			06/16/17 04:04	1.54
1,2-Dichloroethane	ND		1.2	0.14	ppb v/v			06/16/17 04:04	1.54
1,1-Dichloroethene	16		1.2	0.20	ppb v/v			06/16/17 04:04	1.54
cis-1,2-Dichloroethene	1.8		0.62	0.14	ppb v/v			06/16/17 04:04	1.54
trans-1,2-Dichloroethene	ND		0.62	0.15	ppb v/v			06/16/17 04:04	1.54
1,2-Dichloropropane	ND		0.62	0.37	ppb v/v			06/16/17 04:04	1.54
cis-1,3-Dichloropropene	ND		0.62	0.16	ppb v/v			06/16/17 04:04	1.54
trans-1,3-Dichloropropene	ND		0.62	0.14	ppb v/v			06/16/17 04:04	1.54
Ethylbenzene	ND		0.62	0.097	ppb v/v			06/16/17 04:04	1.54
4-Ethyltoluene	ND		0.62	0.29	ppb v/v			06/16/17 04:04	1.54
Hexachlorobutadiene	ND		3.1	0.67	ppb v/v			06/16/17 04:04	1.54
2-Hexanone	ND	*	0.62	0.13	ppb v/v			06/16/17 04:04	1.54
4-Methyl-2-pentanone (MIBK)	ND		0.62	0.21	ppb v/v			06/16/17 04:04	1.54
Methylene Chloride	0.49	J	0.62	0.11	ppb v/v			06/16/17 04:04	1.54
Styrene	ND		0.62	0.091	ppb v/v			06/16/17 04:04	1.54
1,1,2,2-Tetrachloroethane	ND		0.62	0.11	ppb v/v			06/16/17 04:04	1.54
Tetrachloroethene	89		0.62	0.079	ppb v/v			06/16/17 04:04	1.54
Toluene	ND		0.62	0.079	ppb v/v			06/16/17 04:04	1.54
1,2,4-Trichlorobenzene	ND		3.1	0.67	ppb v/v			06/16/17 04:04	1.54
1,1,1-Trichloroethane	6.4		0.46	0.10	ppb v/v			06/16/17 04:04	1.54
1,1,2-Trichloroethane	ND		0.62	0.10	ppb v/v			06/16/17 04:04	1.54
Trichlorofluoromethane	40		0.62	0.30	ppb v/v			06/16/17 04:04	1.54
1,2,4-Trimethylbenzene	ND		1.2	0.25	ppb v/v			06/16/17 04:04	1.54
1,3,5-Trimethylbenzene	ND		0.62	0.19	ppb v/v			06/16/17 04:04	1.54
Vinyl acetate	ND		1.2	0.22	ppb v/v			06/16/17 04:04	1.54
Vinyl chloride	ND		0.62	0.18	ppb v/v			06/16/17 04:04	1.54
m,p-Xylene	ND		1.2	0.15	ppb v/v			06/16/17 04:04	1.54
o-Xylene	ND		0.62	0.083	ppb v/v			06/16/17 04:04	1.54

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	121		70 - 130		06/16/17 04:04	1.54
1,2-Dichloroethane-d4 (Surr)	113		70 - 130		06/16/17 04:04	1.54
Toluene-d8 (Surr)	125		70 - 130		06/16/17 04:04	1.54

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	100		1.1	0.46	ppb v/v			06/21/17 23:30	2.81
Trichloroethene	120		1.1	0.30	ppb v/v			06/21/17 23:30	2.81

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102472-001/MWL-SV04-100

Lab Sample ID: 320-28713-11

Date Collected: 05/30/17 10:20

Matrix: Air

Date Received: 06/06/17 10:20

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130		06/21/17 23:30	2.81
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		06/21/17 23:30	2.81
Toluene-d8 (Surr)	100		70 - 130		06/21/17 23:30	2.81

Client Sample ID: 102473-001/MWL-SV04-200

Lab Sample ID: 320-28713-12

Date Collected: 05/30/17 10:24

Matrix: Air

Date Received: 06/06/17 10:20

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		23	0.83	ppb v/v			06/16/17 04:57	4.69
Benzene	ND		1.9	0.37	ppb v/v			06/16/17 04:57	4.69
Benzyl chloride	ND		3.8	0.76	ppb v/v			06/16/17 04:57	4.69
Bromodichloromethane	ND		1.4	0.31	ppb v/v			06/16/17 04:57	4.69
Bromoform	ND		1.9	0.33	ppb v/v			06/16/17 04:57	4.69
Bromomethane	ND		3.8	1.6	ppb v/v			06/16/17 04:57	4.69
2-Butanone (MEK)	ND		3.8	0.93	ppb v/v			06/16/17 04:57	4.69
Carbon disulfide	ND		3.8	0.37	ppb v/v			06/16/17 04:57	4.69
Carbon tetrachloride	0.59	J	3.8	0.30	ppb v/v			06/16/17 04:57	4.69
Chlorobenzene	ND		1.4	0.30	ppb v/v			06/16/17 04:57	4.69
Chloroethane	ND		3.8	1.4	ppb v/v			06/16/17 04:57	4.69
Chloroform	1.6		1.4	0.45	ppb v/v			06/16/17 04:57	4.69
Chloromethane	ND		3.8	0.92	ppb v/v			06/16/17 04:57	4.69
Dibromochloromethane	ND		1.9	0.37	ppb v/v			06/16/17 04:57	4.69
1,2-Dibromoethane (EDB)	ND		3.8	0.35	ppb v/v			06/16/17 04:57	4.69
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.9	0.73	ppb v/v			06/16/17 04:57	4.69
1,2-Dichlorobenzene	ND		1.9	0.61	ppb v/v			06/16/17 04:57	4.69
1,3-Dichlorobenzene	ND		1.9	0.52	ppb v/v			06/16/17 04:57	4.69
1,4-Dichlorobenzene	ND		1.9	0.70	ppb v/v			06/16/17 04:57	4.69
Dichlorodifluoromethane	42		1.9	0.68	ppb v/v			06/16/17 04:57	4.69
1,1-Dichloroethane	5.2		1.4	0.34	ppb v/v			06/16/17 04:57	4.69
1,2-Dichloroethane	ND		3.8	0.41	ppb v/v			06/16/17 04:57	4.69
1,1-Dichloroethene	31		3.8	0.61	ppb v/v			06/16/17 04:57	4.69
cis-1,2-Dichloroethene	3.0		1.9	0.42	ppb v/v			06/16/17 04:57	4.69
trans-1,2-Dichloroethene	ND		1.9	0.47	ppb v/v			06/16/17 04:57	4.69
1,2-Dichloropropane	ND		1.9	1.1	ppb v/v			06/16/17 04:57	4.69
cis-1,3-Dichloropropene	ND		1.9	0.49	ppb v/v			06/16/17 04:57	4.69
trans-1,3-Dichloropropene	ND		1.9	0.41	ppb v/v			06/16/17 04:57	4.69
Ethylbenzene	ND		1.9	0.30	ppb v/v			06/16/17 04:57	4.69
4-Ethyltoluene	ND		1.9	0.88	ppb v/v			06/16/17 04:57	4.69
Hexachlorobutadiene	ND		9.4	2.0	ppb v/v			06/16/17 04:57	4.69
2-Hexanone	ND	*	1.9	0.41	ppb v/v			06/16/17 04:57	4.69
4-Methyl-2-pentanone (MIBK)	ND		1.9	0.63	ppb v/v			06/16/17 04:57	4.69
Methylene Chloride	1.7	J	1.9	0.34	ppb v/v			06/16/17 04:57	4.69
Styrene	ND		1.9	0.28	ppb v/v			06/16/17 04:57	4.69
1,1,2,2-Tetrachloroethane	ND		1.9	0.32	ppb v/v			06/16/17 04:57	4.69
Tetrachloroethene	110		1.9	0.24	ppb v/v			06/16/17 04:57	4.69
Toluene	ND		1.9	0.24	ppb v/v			06/16/17 04:57	4.69

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102473-001/MWL-SV04-200

Lab Sample ID: 320-28713-12

Date Collected: 05/30/17 10:24

Matrix: Air

Date Received: 06/06/17 10:20

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	150		1.9	0.76	ppb v/v			06/16/17 04:57	4.69
1,2,4-Trichlorobenzene	ND		9.4	2.0	ppb v/v			06/16/17 04:57	4.69
1,1,1-Trichloroethane	2.7		1.4	0.30	ppb v/v			06/16/17 04:57	4.69
1,1,2-Trichloroethane	ND		1.9	0.31	ppb v/v			06/16/17 04:57	4.69
Trichloroethene	180		1.9	0.49	ppb v/v			06/16/17 04:57	4.69
Trichlorofluoromethane	38		1.9	0.92	ppb v/v			06/16/17 04:57	4.69
1,2,4-Trimethylbenzene	ND		3.8	0.76	ppb v/v			06/16/17 04:57	4.69
1,3,5-Trimethylbenzene	ND		1.9	0.59	ppb v/v			06/16/17 04:57	4.69
Vinyl acetate	ND		3.8	0.68	ppb v/v			06/16/17 04:57	4.69
Vinyl chloride	ND		1.9	0.56	ppb v/v			06/16/17 04:57	4.69
m,p-Xylene	ND		3.8	0.47	ppb v/v			06/16/17 04:57	4.69
o-Xylene	ND		1.9	0.25	ppb v/v			06/16/17 04:57	4.69

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	122		70 - 130		06/16/17 04:57	4.69
1,2-Dichloroethane-d4 (Surr)	113		70 - 130		06/16/17 04:57	4.69
Toluene-d8 (Surr)	124		70 - 130		06/16/17 04:57	4.69

Client Sample ID: 102474-001/MWL-SV04-300

Lab Sample ID: 320-28713-13

Date Collected: 05/30/17 10:28

Matrix: Air

Date Received: 06/06/17 10:20

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	5.0	J	14	0.48	ppb v/v			06/16/17 05:51	2.72
Benzene	0.30	J	1.1	0.21	ppb v/v			06/16/17 05:51	2.72
Benzyl chloride	ND		2.2	0.44	ppb v/v			06/16/17 05:51	2.72
Bromodichloromethane	ND		0.82	0.18	ppb v/v			06/16/17 05:51	2.72
Bromoform	ND		1.1	0.19	ppb v/v			06/16/17 05:51	2.72
Bromomethane	ND		2.2	0.91	ppb v/v			06/16/17 05:51	2.72
2-Butanone (MEK)	ND		2.2	0.54	ppb v/v			06/16/17 05:51	2.72
Carbon disulfide	ND		2.2	0.21	ppb v/v			06/16/17 05:51	2.72
Carbon tetrachloride	0.36	J	2.2	0.17	ppb v/v			06/16/17 05:51	2.72
Chlorobenzene	ND		0.82	0.17	ppb v/v			06/16/17 05:51	2.72
Chloroethane	ND		2.2	0.84	ppb v/v			06/16/17 05:51	2.72
Chloroform	0.66	J	0.82	0.26	ppb v/v			06/16/17 05:51	2.72
Chloromethane	ND		2.2	0.54	ppb v/v			06/16/17 05:51	2.72
Dibromochloromethane	ND		1.1	0.21	ppb v/v			06/16/17 05:51	2.72
1,2-Dibromoethane (EDB)	ND		2.2	0.20	ppb v/v			06/16/17 05:51	2.72
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.1	0.42	ppb v/v			06/16/17 05:51	2.72
1,2-Dichlorobenzene	ND		1.1	0.35	ppb v/v			06/16/17 05:51	2.72
1,3-Dichlorobenzene	ND		1.1	0.30	ppb v/v			06/16/17 05:51	2.72
1,4-Dichlorobenzene	ND		1.1	0.41	ppb v/v			06/16/17 05:51	2.72
Dichlorodifluoromethane	24		1.1	0.39	ppb v/v			06/16/17 05:51	2.72
1,1-Dichloroethane	1.3		0.82	0.20	ppb v/v			06/16/17 05:51	2.72
1,2-Dichloroethane	ND		2.2	0.24	ppb v/v			06/16/17 05:51	2.72
1,1-Dichloroethene	15		2.2	0.35	ppb v/v			06/16/17 05:51	2.72

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102474-001/MWL-SV04-300

Lab Sample ID: 320-28713-13

Date Collected: 05/30/17 10:28

Matrix: Air

Date Received: 06/06/17 10:20

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	0.88	J	1.1	0.24	ppb v/v			06/16/17 05:51	2.72
trans-1,2-Dichloroethene	ND		1.1	0.27	ppb v/v			06/16/17 05:51	2.72
1,2-Dichloropropane	ND		1.1	0.65	ppb v/v			06/16/17 05:51	2.72
cis-1,3-Dichloropropene	ND		1.1	0.28	ppb v/v			06/16/17 05:51	2.72
trans-1,3-Dichloropropene	ND		1.1	0.24	ppb v/v			06/16/17 05:51	2.72
Ethylbenzene	ND		1.1	0.17	ppb v/v			06/16/17 05:51	2.72
4-Ethyltoluene	ND		1.1	0.51	ppb v/v			06/16/17 05:51	2.72
Hexachlorobutadiene	ND		5.4	1.2	ppb v/v			06/16/17 05:51	2.72
2-Hexanone	ND *		1.1	0.24	ppb v/v			06/16/17 05:51	2.72
4-Methyl-2-pentanone (MIBK)	ND		1.1	0.37	ppb v/v			06/16/17 05:51	2.72
Methylene Chloride	0.39	J	1.1	0.20	ppb v/v			06/16/17 05:51	2.72
Styrene	ND		1.1	0.16	ppb v/v			06/16/17 05:51	2.72
1,1,2,2-Tetrachloroethane	ND		1.1	0.19	ppb v/v			06/16/17 05:51	2.72
Tetrachloroethene	95		1.1	0.14	ppb v/v			06/16/17 05:51	2.72
Toluene	ND		1.1	0.14	ppb v/v			06/16/17 05:51	2.72
1,1,2-Trichloro-1,2,2-trifluoroethane	76		1.1	0.44	ppb v/v			06/16/17 05:51	2.72
1,2,4-Trichlorobenzene	ND		5.4	1.2	ppb v/v			06/16/17 05:51	2.72
1,1,1-Trichloroethane	1.3		0.82	0.18	ppb v/v			06/16/17 05:51	2.72
1,1,2-Trichloroethane	ND		1.1	0.18	ppb v/v			06/16/17 05:51	2.72
Trichloroethene	87		1.1	0.29	ppb v/v			06/16/17 05:51	2.72
Trichlorofluoromethane	16		1.1	0.53	ppb v/v			06/16/17 05:51	2.72
1,2,4-Trimethylbenzene	ND		2.2	0.44	ppb v/v			06/16/17 05:51	2.72
1,3,5-Trimethylbenzene	ND		1.1	0.34	ppb v/v			06/16/17 05:51	2.72
Vinyl acetate	ND		2.2	0.39	ppb v/v			06/16/17 05:51	2.72
Vinyl chloride	ND		1.1	0.33	ppb v/v			06/16/17 05:51	2.72
m,p-Xylene	ND		2.2	0.27	ppb v/v			06/16/17 05:51	2.72
o-Xylene	ND		1.1	0.15	ppb v/v			06/16/17 05:51	2.72

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	126		70 - 130		06/16/17 05:51	2.72
1,2-Dichloroethane-d4 (Surr)	114		70 - 130		06/16/17 05:51	2.72
Toluene-d8 (Surr)	123		70 - 130		06/16/17 05:51	2.72

Client Sample ID: 102475-001/MWL-SV04-400

Lab Sample ID: 320-28713-14

Date Collected: 05/30/17 10:34

Matrix: Air

Date Received: 06/06/17 10:20

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	11	J	14	0.49	ppb v/v			06/16/17 06:45	2.78
Benzene	0.50	J	1.1	0.22	ppb v/v			06/16/17 06:45	2.78
Benzyl chloride	ND		2.2	0.45	ppb v/v			06/16/17 06:45	2.78
Bromodichloromethane	ND		0.83	0.18	ppb v/v			06/16/17 06:45	2.78
Bromoform	ND		1.1	0.19	ppb v/v			06/16/17 06:45	2.78
Bromomethane	ND		2.2	0.93	ppb v/v			06/16/17 06:45	2.78
2-Butanone (MEK)	1.4	J	2.2	0.55	ppb v/v			06/16/17 06:45	2.78
Carbon disulfide	2.0	J	2.2	0.22	ppb v/v			06/16/17 06:45	2.78

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102475-001/MWL-SV04-400

Lab Sample ID: 320-28713-14

Date Collected: 05/30/17 10:34

Matrix: Air

Date Received: 06/06/17 10:20

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	0.23	J	2.2	0.18	ppb v/v			06/16/17 06:45	2.78
Chlorobenzene	ND		0.83	0.18	ppb v/v			06/16/17 06:45	2.78
Chloroethane	ND		2.2	0.86	ppb v/v			06/16/17 06:45	2.78
Chloroform	0.67	J	0.83	0.26	ppb v/v			06/16/17 06:45	2.78
Chloromethane	ND		2.2	0.55	ppb v/v			06/16/17 06:45	2.78
Dibromochloromethane	ND		1.1	0.22	ppb v/v			06/16/17 06:45	2.78
1,2-Dibromoethane (EDB)	ND		2.2	0.21	ppb v/v			06/16/17 06:45	2.78
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.1	0.43	ppb v/v			06/16/17 06:45	2.78
1,2-Dichlorobenzene	ND		1.1	0.36	ppb v/v			06/16/17 06:45	2.78
1,3-Dichlorobenzene	ND		1.1	0.31	ppb v/v			06/16/17 06:45	2.78
1,4-Dichlorobenzene	ND		1.1	0.41	ppb v/v			06/16/17 06:45	2.78
Dichlorodifluoromethane	17		1.1	0.40	ppb v/v			06/16/17 06:45	2.78
1,1-Dichloroethane	1.3		0.83	0.20	ppb v/v			06/16/17 06:45	2.78
1,2-Dichloroethane	ND		2.2	0.24	ppb v/v			06/16/17 06:45	2.78
1,1-Dichloroethene	11		2.2	0.36	ppb v/v			06/16/17 06:45	2.78
cis-1,2-Dichloroethene	0.81	J	1.1	0.25	ppb v/v			06/16/17 06:45	2.78
trans-1,2-Dichloroethene	ND		1.1	0.28	ppb v/v			06/16/17 06:45	2.78
1,2-Dichloropropane	ND		1.1	0.67	ppb v/v			06/16/17 06:45	2.78
cis-1,3-Dichloropropene	ND		1.1	0.29	ppb v/v			06/16/17 06:45	2.78
trans-1,3-Dichloropropene	ND		1.1	0.24	ppb v/v			06/16/17 06:45	2.78
Ethylbenzene	ND		1.1	0.18	ppb v/v			06/16/17 06:45	2.78
4-Ethyltoluene	ND		1.1	0.52	ppb v/v			06/16/17 06:45	2.78
Hexachlorobutadiene	ND		5.6	1.2	ppb v/v			06/16/17 06:45	2.78
2-Hexanone	ND *		1.1	0.24	ppb v/v			06/16/17 06:45	2.78
4-Methyl-2-pentanone (MIBK)	ND		1.1	0.38	ppb v/v			06/16/17 06:45	2.78
Methylene Chloride	0.44	J	1.1	0.20	ppb v/v			06/16/17 06:45	2.78
Styrene	ND		1.1	0.16	ppb v/v			06/16/17 06:45	2.78
1,1,1,2-Tetrachloroethane	ND		1.1	0.19	ppb v/v			06/16/17 06:45	2.78
Tetrachloroethene	100		1.1	0.14	ppb v/v			06/16/17 06:45	2.78
Toluene	0.17	J	1.1	0.14	ppb v/v			06/16/17 06:45	2.78
1,1,2-Trichloro-1,2,2-trifluoroethane	66		1.1	0.45	ppb v/v			06/16/17 06:45	2.78
1,2,4-Trichlorobenzene	ND		5.6	1.2	ppb v/v			06/16/17 06:45	2.78
1,1,1-Trichloroethane	1.3		0.83	0.18	ppb v/v			06/16/17 06:45	2.78
1,1,2-Trichloroethane	ND		1.1	0.19	ppb v/v			06/16/17 06:45	2.78
Trichloroethene	85		1.1	0.29	ppb v/v			06/16/17 06:45	2.78
Trichlorofluoromethane	14		1.1	0.54	ppb v/v			06/16/17 06:45	2.78
1,2,4-Trimethylbenzene	ND		2.2	0.45	ppb v/v			06/16/17 06:45	2.78
1,3,5-Trimethylbenzene	ND		1.1	0.35	ppb v/v			06/16/17 06:45	2.78
Vinyl acetate	ND		2.2	0.40	ppb v/v			06/16/17 06:45	2.78
Vinyl chloride	ND		1.1	0.33	ppb v/v			06/16/17 06:45	2.78
m,p-Xylene	ND		2.2	0.28	ppb v/v			06/16/17 06:45	2.78
o-Xylene	ND		1.1	0.15	ppb v/v			06/16/17 06:45	2.78

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	125		70 - 130		06/16/17 06:45	2.78
1,2-Dichloroethane-d4 (Surr)	119		70 - 130		06/16/17 06:45	2.78
Toluene-d8 (Surr)	122		70 - 130		06/16/17 06:45	2.78

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102477-001/MWL-SV-FB5

Lab Sample ID: 320-28713-15

Date Collected: 05/30/17 10:49

Matrix: Air

Date Received: 06/06/17 10:20

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	0.87	J	5.0	0.18	ppb v/v			06/22/17 00:27	1
Benzene	ND		0.40	0.079	ppb v/v			06/22/17 00:27	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			06/22/17 00:27	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			06/22/17 00:27	1
Bromoform	ND		0.40	0.070	ppb v/v			06/22/17 00:27	1
Bromomethane	ND		0.80	0.34	ppb v/v			06/22/17 00:27	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			06/22/17 00:27	1
Carbon disulfide	0.090	J	0.80	0.078	ppb v/v			06/22/17 00:27	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			06/22/17 00:27	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			06/22/17 00:27	1
Chloroethane	ND		0.80	0.31	ppb v/v			06/22/17 00:27	1
Chloroform	ND		0.30	0.095	ppb v/v			06/22/17 00:27	1
Chloromethane	ND		0.80	0.20	ppb v/v			06/22/17 00:27	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			06/22/17 00:27	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			06/22/17 00:27	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			06/22/17 00:27	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			06/22/17 00:27	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			06/22/17 00:27	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			06/22/17 00:27	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			06/22/17 00:27	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			06/22/17 00:27	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			06/22/17 00:27	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			06/22/17 00:27	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			06/22/17 00:27	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			06/22/17 00:27	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			06/22/17 00:27	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			06/22/17 00:27	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			06/22/17 00:27	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			06/22/17 00:27	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			06/22/17 00:27	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			06/22/17 00:27	1
2-Hexanone	ND		0.40	0.087	ppb v/v			06/22/17 00:27	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			06/22/17 00:27	1
Methylene Chloride	0.10	J	0.40	0.072	ppb v/v			06/22/17 00:27	1
Styrene	ND		0.40	0.059	ppb v/v			06/22/17 00:27	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			06/22/17 00:27	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			06/22/17 00:27	1
Toluene	0.26	J	0.40	0.051	ppb v/v			06/22/17 00:27	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			06/22/17 00:27	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			06/22/17 00:27	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			06/22/17 00:27	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			06/22/17 00:27	1
Trichloroethene	ND		0.40	0.11	ppb v/v			06/22/17 00:27	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			06/22/17 00:27	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			06/22/17 00:27	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			06/22/17 00:27	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			06/22/17 00:27	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			06/22/17 00:27	1

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102477-001/MWL-SV-FB5

Lab Sample ID: 320-28713-15

Date Collected: 05/30/17 10:49

Matrix: Air

Date Received: 06/06/17 10:20

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		0.80	0.10	ppb v/v			06/22/17 00:27	1
o-Xylene	ND		0.40	0.054	ppb v/v			06/22/17 00:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130					06/22/17 00:27	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 130					06/22/17 00:27	1
Toluene-d8 (Surr)	103		70 - 130					06/22/17 00:27	1

Client Sample ID: 102478-001/MWL-SV05-50

Lab Sample ID: 320-28713-16

Date Collected: 05/30/17 10:52

Matrix: Air

Date Received: 06/06/17 10:20

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	2.8	J	5.0	0.18	ppb v/v			06/22/17 01:25	1
Benzene	0.18	J	0.40	0.079	ppb v/v			06/22/17 01:25	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			06/22/17 01:25	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			06/22/17 01:25	1
Bromoform	ND		0.40	0.070	ppb v/v			06/22/17 01:25	1
Bromomethane	ND		0.80	0.34	ppb v/v			06/22/17 01:25	1
2-Butanone (MEK)	0.48	J	0.80	0.20	ppb v/v			06/22/17 01:25	1
Carbon disulfide	0.88		0.80	0.078	ppb v/v			06/22/17 01:25	1
Carbon tetrachloride	0.33	J	0.80	0.064	ppb v/v			06/22/17 01:25	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			06/22/17 01:25	1
Chloroethane	ND		0.80	0.31	ppb v/v			06/22/17 01:25	1
Chloroform	1.3		0.30	0.095	ppb v/v			06/22/17 01:25	1
Chloromethane	ND		0.80	0.20	ppb v/v			06/22/17 01:25	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			06/22/17 01:25	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			06/22/17 01:25	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			06/22/17 01:25	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			06/22/17 01:25	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			06/22/17 01:25	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			06/22/17 01:25	1
Dichlorodifluoromethane	23		0.40	0.15	ppb v/v			06/22/17 01:25	1
1,1-Dichloroethane	1.7		0.30	0.072	ppb v/v			06/22/17 01:25	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			06/22/17 01:25	1
1,1-Dichloroethene	10		0.80	0.13	ppb v/v			06/22/17 01:25	1
cis-1,2-Dichloroethene	0.64		0.40	0.089	ppb v/v			06/22/17 01:25	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			06/22/17 01:25	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			06/22/17 01:25	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			06/22/17 01:25	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			06/22/17 01:25	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			06/22/17 01:25	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			06/22/17 01:25	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			06/22/17 01:25	1
2-Hexanone	ND		0.40	0.087	ppb v/v			06/22/17 01:25	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			06/22/17 01:25	1
Methylene Chloride	0.25	J	0.40	0.072	ppb v/v			06/22/17 01:25	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102478-001/MWL-SV05-50

Lab Sample ID: 320-28713-16

Date Collected: 05/30/17 10:52

Matrix: Air

Date Received: 06/06/17 10:20

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		0.40	0.059	ppb v/v			06/22/17 01:25	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			06/22/17 01:25	1
Tetrachloroethene	44		0.40	0.051	ppb v/v			06/22/17 01:25	1
Toluene	0.085 J		0.40	0.051	ppb v/v			06/22/17 01:25	1
1,1,2-Trichloro-1,2,2-trifluoroethane	44		0.40	0.16	ppb v/v			06/22/17 01:25	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			06/22/17 01:25	1
1,1,1-Trichloroethane	14		0.30	0.065	ppb v/v			06/22/17 01:25	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			06/22/17 01:25	1
Trichloroethene	49		0.40	0.11	ppb v/v			06/22/17 01:25	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			06/22/17 01:25	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			06/22/17 01:25	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			06/22/17 01:25	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			06/22/17 01:25	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			06/22/17 01:25	1
o-Xylene	ND		0.40	0.054	ppb v/v			06/22/17 01:25	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		06/22/17 01:25	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		06/22/17 01:25	1
Toluene-d8 (Surr)	104		70 - 130		06/22/17 01:25	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	110		1.4	0.70	ppb v/v			06/22/17 08:41	3.58

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130		06/22/17 08:41	3.58
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		06/22/17 08:41	3.58
Toluene-d8 (Surr)	99		70 - 130		06/22/17 08:41	3.58

Client Sample ID: 102479-001/MWL-SV05-100

Lab Sample ID: 320-28713-17

Date Collected: 05/30/17 10:55

Matrix: Air

Date Received: 06/06/17 10:20

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	2.7 J		12	0.42	ppb v/v			06/22/17 02:20	2.34
Benzene	0.22 J		0.94	0.18	ppb v/v			06/22/17 02:20	2.34
Benzyl chloride	ND		1.9	0.38	ppb v/v			06/22/17 02:20	2.34
Bromodichloromethane	ND		0.70	0.15	ppb v/v			06/22/17 02:20	2.34
Bromoform	ND		0.94	0.16	ppb v/v			06/22/17 02:20	2.34
Bromomethane	ND		1.9	0.78	ppb v/v			06/22/17 02:20	2.34
2-Butanone (MEK)	ND		1.9	0.47	ppb v/v			06/22/17 02:20	2.34
Carbon disulfide	ND		1.9	0.18	ppb v/v			06/22/17 02:20	2.34
Carbon tetrachloride	0.58 J		1.9	0.15	ppb v/v			06/22/17 02:20	2.34
Chlorobenzene	ND		0.70	0.15	ppb v/v			06/22/17 02:20	2.34
Chloroethane	ND		1.9	0.72	ppb v/v			06/22/17 02:20	2.34
Chloroform	2.1		0.70	0.22	ppb v/v			06/22/17 02:20	2.34

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102479-001/MWL-SV05-100

Lab Sample ID: 320-28713-17

Date Collected: 05/30/17 10:55

Matrix: Air

Date Received: 06/06/17 10:20

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		1.9	0.46	ppb v/v			06/22/17 02:20	2.34
Dibromochloromethane	ND		0.94	0.18	ppb v/v			06/22/17 02:20	2.34
1,2-Dibromoethane (EDB)	ND		1.9	0.18	ppb v/v			06/22/17 02:20	2.34
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.94	0.36	ppb v/v			06/22/17 02:20	2.34
1,2-Dichlorobenzene	ND		0.94	0.30	ppb v/v			06/22/17 02:20	2.34
1,3-Dichlorobenzene	ND		0.94	0.26	ppb v/v			06/22/17 02:20	2.34
1,4-Dichlorobenzene	ND		0.94	0.35	ppb v/v			06/22/17 02:20	2.34
Dichlorodifluoromethane	57		0.94	0.34	ppb v/v			06/22/17 02:20	2.34
1,1-Dichloroethane	3.6		0.70	0.17	ppb v/v			06/22/17 02:20	2.34
1,2-Dichloroethane	ND		1.9	0.21	ppb v/v			06/22/17 02:20	2.34
1,1-Dichloroethene	23		1.9	0.30	ppb v/v			06/22/17 02:20	2.34
cis-1,2-Dichloroethene	1.6		0.94	0.21	ppb v/v			06/22/17 02:20	2.34
trans-1,2-Dichloroethene	ND		0.94	0.23	ppb v/v			06/22/17 02:20	2.34
1,2-Dichloropropane	ND		0.94	0.56	ppb v/v			06/22/17 02:20	2.34
cis-1,3-Dichloropropene	ND		0.94	0.24	ppb v/v			06/22/17 02:20	2.34
trans-1,3-Dichloropropene	ND		0.94	0.21	ppb v/v			06/22/17 02:20	2.34
Ethylbenzene	ND		0.94	0.15	ppb v/v			06/22/17 02:20	2.34
4-Ethyltoluene	ND		0.94	0.44	ppb v/v			06/22/17 02:20	2.34
Hexachlorobutadiene	ND		4.7	1.0	ppb v/v			06/22/17 02:20	2.34
2-Hexanone	ND		0.94	0.20	ppb v/v			06/22/17 02:20	2.34
4-Methyl-2-pentanone (MIBK)	ND		0.94	0.32	ppb v/v			06/22/17 02:20	2.34
Methylene Chloride	ND		0.94	0.17	ppb v/v			06/22/17 02:20	2.34
Styrene	ND		0.94	0.14	ppb v/v			06/22/17 02:20	2.34
1,1,2,2-Tetrachloroethane	ND		0.94	0.16	ppb v/v			06/22/17 02:20	2.34
Tetrachloroethene	89		0.94	0.12	ppb v/v			06/22/17 02:20	2.34
Toluene	ND		0.94	0.12	ppb v/v			06/22/17 02:20	2.34
1,1,2-Trichloro-1,2,2-trifluoroethane	91		0.94	0.38	ppb v/v			06/22/17 02:20	2.34
1,2,4-Trichlorobenzene	ND		4.7	1.0	ppb v/v			06/22/17 02:20	2.34
1,1,1-Trichloroethane	14		0.70	0.15	ppb v/v			06/22/17 02:20	2.34
1,1,2-Trichloroethane	ND		0.94	0.16	ppb v/v			06/22/17 02:20	2.34
Trichloroethene	110		0.94	0.25	ppb v/v			06/22/17 02:20	2.34
1,2,4-Trimethylbenzene	ND		1.9	0.38	ppb v/v			06/22/17 02:20	2.34
1,3,5-Trimethylbenzene	ND		0.94	0.29	ppb v/v			06/22/17 02:20	2.34
Vinyl acetate	5.5		1.9	0.34	ppb v/v			06/22/17 02:20	2.34
Vinyl chloride	ND		0.94	0.28	ppb v/v			06/22/17 02:20	2.34
m,p-Xylene	ND		1.9	0.23	ppb v/v			06/22/17 02:20	2.34
o-Xylene	ND		0.94	0.13	ppb v/v			06/22/17 02:20	2.34

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		06/22/17 02:20	2.34
1,2-Dichloroethane-d4 (Surr)	106		70 - 130		06/22/17 02:20	2.34
Toluene-d8 (Surr)	104		70 - 130		06/22/17 02:20	2.34

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	150		2.0	0.96	ppb v/v			06/22/17 09:34	4.88

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102479-001/MWL-SV05-100

Lab Sample ID: 320-28713-17

Date Collected: 05/30/17 10:55

Matrix: Air

Date Received: 06/06/17 10:20

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		70 - 130		06/22/17 09:34	4.88
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		06/22/17 09:34	4.88
Toluene-d8 (Surr)	101		70 - 130		06/22/17 09:34	4.88

Client Sample ID: 102480-001/MWL-SV05-200

Lab Sample ID: 320-28713-18

Date Collected: 05/30/17 10:58

Matrix: Air

Date Received: 06/06/17 10:20

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	3.3	J	25	0.88	ppb v/v			06/22/17 03:12	4.92
Benzene	ND		2.0	0.39	ppb v/v			06/22/17 03:12	4.92
Benzyl chloride	ND		3.9	0.80	ppb v/v			06/22/17 03:12	4.92
Bromodichloromethane	ND		1.5	0.32	ppb v/v			06/22/17 03:12	4.92
Bromoform	ND		2.0	0.34	ppb v/v			06/22/17 03:12	4.92
Bromomethane	ND		3.9	1.6	ppb v/v			06/22/17 03:12	4.92
2-Butanone (MEK)	ND		3.9	0.98	ppb v/v			06/22/17 03:12	4.92
Carbon disulfide	1.0	J	3.9	0.38	ppb v/v			06/22/17 03:12	4.92
Carbon tetrachloride	1.1	J	3.9	0.31	ppb v/v			06/22/17 03:12	4.92
Chlorobenzene	ND		1.5	0.31	ppb v/v			06/22/17 03:12	4.92
Chloroethane	ND		3.9	1.5	ppb v/v			06/22/17 03:12	4.92
Chloroform	2.2		1.5	0.47	ppb v/v			06/22/17 03:12	4.92
Chloromethane	1.2	J	3.9	0.97	ppb v/v			06/22/17 03:12	4.92
Dibromochloromethane	ND		2.0	0.39	ppb v/v			06/22/17 03:12	4.92
1,2-Dibromoethane (EDB)	ND		3.9	0.37	ppb v/v			06/22/17 03:12	4.92
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		2.0	0.76	ppb v/v			06/22/17 03:12	4.92
1,2-Dichlorobenzene	ND		2.0	0.64	ppb v/v			06/22/17 03:12	4.92
1,3-Dichlorobenzene	ND		2.0	0.54	ppb v/v			06/22/17 03:12	4.92
1,4-Dichlorobenzene	ND		2.0	0.73	ppb v/v			06/22/17 03:12	4.92
Dichlorodifluoromethane	66		2.0	0.71	ppb v/v			06/22/17 03:12	4.92
1,1-Dichloroethane	5.5		1.5	0.35	ppb v/v			06/22/17 03:12	4.92
1,2-Dichloroethane	ND		3.9	0.43	ppb v/v			06/22/17 03:12	4.92
1,1-Dichloroethene	42		3.9	0.63	ppb v/v			06/22/17 03:12	4.92
cis-1,2-Dichloroethene	2.8		2.0	0.44	ppb v/v			06/22/17 03:12	4.92
trans-1,2-Dichloroethene	ND		2.0	0.49	ppb v/v			06/22/17 03:12	4.92
1,2-Dichloropropane	ND		2.0	1.2	ppb v/v			06/22/17 03:12	4.92
cis-1,3-Dichloropropene	ND		2.0	0.51	ppb v/v			06/22/17 03:12	4.92
trans-1,3-Dichloropropene	ND		2.0	0.43	ppb v/v			06/22/17 03:12	4.92
Ethylbenzene	ND		2.0	0.31	ppb v/v			06/22/17 03:12	4.92
4-Ethyltoluene	ND		2.0	0.92	ppb v/v			06/22/17 03:12	4.92
Hexachlorobutadiene	ND		9.8	2.1	ppb v/v			06/22/17 03:12	4.92
2-Hexanone	ND		2.0	0.43	ppb v/v			06/22/17 03:12	4.92
4-Methyl-2-pentanone (MIBK)	ND		2.0	0.66	ppb v/v			06/22/17 03:12	4.92
Methylene Chloride	2.9		2.0	0.35	ppb v/v			06/22/17 03:12	4.92
Styrene	ND		2.0	0.29	ppb v/v			06/22/17 03:12	4.92
1,1,2,2-Tetrachloroethane	ND		2.0	0.34	ppb v/v			06/22/17 03:12	4.92
Tetrachloroethene	140		2.0	0.25	ppb v/v			06/22/17 03:12	4.92
Toluene	0.28	J	2.0	0.25	ppb v/v			06/22/17 03:12	4.92

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102480-001/MWL-SV05-200

Lab Sample ID: 320-28713-18

Date Collected: 05/30/17 10:58

Matrix: Air

Date Received: 06/06/17 10:20

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	150		2.0	0.80	ppb v/v			06/22/17 03:12	4.92
1,2,4-Trichlorobenzene	ND		9.8	2.1	ppb v/v			06/22/17 03:12	4.92
1,1,1-Trichloroethane	4.0		1.5	0.32	ppb v/v			06/22/17 03:12	4.92
1,1,2-Trichloroethane	ND		2.0	0.33	ppb v/v			06/22/17 03:12	4.92
Trichloroethene	190		2.0	0.52	ppb v/v			06/22/17 03:12	4.92
Trichlorofluoromethane	85		2.0	0.96	ppb v/v			06/22/17 03:12	4.92
1,2,4-Trimethylbenzene	ND		3.9	0.80	ppb v/v			06/22/17 03:12	4.92
1,3,5-Trimethylbenzene	ND		2.0	0.62	ppb v/v			06/22/17 03:12	4.92
Vinyl acetate	1.4 J		3.9	0.71	ppb v/v			06/22/17 03:12	4.92
Vinyl chloride	ND		2.0	0.59	ppb v/v			06/22/17 03:12	4.92
m,p-Xylene	ND		3.9	0.49	ppb v/v			06/22/17 03:12	4.92
o-Xylene	ND		2.0	0.27	ppb v/v			06/22/17 03:12	4.92
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130					06/22/17 03:12	4.92
1,2-Dichloroethane-d4 (Surr)	104		70 - 130					06/22/17 03:12	4.92
Toluene-d8 (Surr)	101		70 - 130					06/22/17 03:12	4.92

Client Sample ID: 102481-001/MWL-SV05-300

Lab Sample ID: 320-28713-19

Date Collected: 05/30/17 11:03

Matrix: Air

Date Received: 06/06/17 10:20

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	5.5 J		15	0.54	ppb v/v			06/22/17 04:06	3.02
Benzene	0.25 J		1.2	0.24	ppb v/v			06/22/17 04:06	3.02
Benzyl chloride	ND		2.4	0.49	ppb v/v			06/22/17 04:06	3.02
Bromodichloromethane	ND		0.91	0.20	ppb v/v			06/22/17 04:06	3.02
Bromoform	ND		1.2	0.21	ppb v/v			06/22/17 04:06	3.02
Bromomethane	ND		2.4	1.0	ppb v/v			06/22/17 04:06	3.02
2-Butanone (MEK)	ND		2.4	0.60	ppb v/v			06/22/17 04:06	3.02
Carbon disulfide	ND		2.4	0.24	ppb v/v			06/22/17 04:06	3.02
Carbon tetrachloride	1.0 J		2.4	0.19	ppb v/v			06/22/17 04:06	3.02
Chlorobenzene	ND		0.91	0.19	ppb v/v			06/22/17 04:06	3.02
Chloroethane	ND		2.4	0.93	ppb v/v			06/22/17 04:06	3.02
Chloroform	1.0		0.91	0.29	ppb v/v			06/22/17 04:06	3.02
Chloromethane	ND		2.4	0.59	ppb v/v			06/22/17 04:06	3.02
Dibromochloromethane	ND		1.2	0.24	ppb v/v			06/22/17 04:06	3.02
1,2-Dibromoethane (EDB)	ND		2.4	0.23	ppb v/v			06/22/17 04:06	3.02
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.2	0.47	ppb v/v			06/22/17 04:06	3.02
1,2-Dichlorobenzene	ND		1.2	0.39	ppb v/v			06/22/17 04:06	3.02
1,3-Dichlorobenzene	ND		1.2	0.33	ppb v/v			06/22/17 04:06	3.02
1,4-Dichlorobenzene	ND		1.2	0.45	ppb v/v			06/22/17 04:06	3.02
Dichlorodifluoromethane	40		1.2	0.44	ppb v/v			06/22/17 04:06	3.02
1,1-Dichloroethane	2.5		0.91	0.22	ppb v/v			06/22/17 04:06	3.02
1,2-Dichloroethane	ND		2.4	0.27	ppb v/v			06/22/17 04:06	3.02
1,1-Dichloroethene	31		2.4	0.39	ppb v/v			06/22/17 04:06	3.02

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102481-001/MWL-SV05-300

Lab Sample ID: 320-28713-19

Date Collected: 05/30/17 11:03

Matrix: Air

Date Received: 06/06/17 10:20

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	1.2		1.2	0.27	ppb v/v			06/22/17 04:06	3.02
trans-1,2-Dichloroethene	ND		1.2	0.30	ppb v/v			06/22/17 04:06	3.02
1,2-Dichloropropane	ND		1.2	0.72	ppb v/v			06/22/17 04:06	3.02
cis-1,3-Dichloropropene	ND		1.2	0.31	ppb v/v			06/22/17 04:06	3.02
trans-1,3-Dichloropropene	ND		1.2	0.27	ppb v/v			06/22/17 04:06	3.02
Ethylbenzene	ND		1.2	0.19	ppb v/v			06/22/17 04:06	3.02
4-Ethyltoluene	ND		1.2	0.56	ppb v/v			06/22/17 04:06	3.02
Hexachlorobutadiene	ND		6.0	1.3	ppb v/v			06/22/17 04:06	3.02
2-Hexanone	ND		1.2	0.26	ppb v/v			06/22/17 04:06	3.02
4-Methyl-2-pentanone (MIBK)	ND		1.2	0.41	ppb v/v			06/22/17 04:06	3.02
Methylene Chloride	1.2		1.2	0.22	ppb v/v			06/22/17 04:06	3.02
Styrene	ND		1.2	0.18	ppb v/v			06/22/17 04:06	3.02
1,1,2,2-Tetrachloroethane	ND		1.2	0.21	ppb v/v			06/22/17 04:06	3.02
Tetrachloroethene	110		1.2	0.15	ppb v/v			06/22/17 04:06	3.02
Toluene	0.19	J	1.2	0.15	ppb v/v			06/22/17 04:06	3.02
1,1,2-Trichloro-1,2,2-trifluoroethane	130		1.2	0.49	ppb v/v			06/22/17 04:06	3.02
1,2,4-Trichlorobenzene	ND		6.0	1.3	ppb v/v			06/22/17 04:06	3.02
1,1,1-Trichloroethane	1.8		0.91	0.20	ppb v/v			06/22/17 04:06	3.02
1,1,2-Trichloroethane	ND		1.2	0.20	ppb v/v			06/22/17 04:06	3.02
Trichloroethene	120		1.2	0.32	ppb v/v			06/22/17 04:06	3.02
Trichlorofluoromethane	37		1.2	0.59	ppb v/v			06/22/17 04:06	3.02
1,2,4-Trimethylbenzene	ND		2.4	0.49	ppb v/v			06/22/17 04:06	3.02
1,3,5-Trimethylbenzene	ND		1.2	0.38	ppb v/v			06/22/17 04:06	3.02
Vinyl acetate	ND		2.4	0.44	ppb v/v			06/22/17 04:06	3.02
Vinyl chloride	ND		1.2	0.36	ppb v/v			06/22/17 04:06	3.02
m,p-Xylene	ND		2.4	0.30	ppb v/v			06/22/17 04:06	3.02
o-Xylene	ND		1.2	0.16	ppb v/v			06/22/17 04:06	3.02

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130		06/22/17 04:06	3.02
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		06/22/17 04:06	3.02
Toluene-d8 (Surr)	102		70 - 130		06/22/17 04:06	3.02

Client Sample ID: 102482-001/MWL-SV05-400

Lab Sample ID: 320-28713-20

Date Collected: 05/30/17 11:11

Matrix: Air

Date Received: 06/06/17 10:20

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	6.4	J	12	0.41	ppb v/v			06/22/17 05:00	2.32
Benzene	0.34	J	0.93	0.18	ppb v/v			06/22/17 05:00	2.32
Benzyl chloride	ND		1.9	0.38	ppb v/v			06/22/17 05:00	2.32
Bromodichloromethane	ND		0.70	0.15	ppb v/v			06/22/17 05:00	2.32
Bromoform	ND		0.93	0.16	ppb v/v			06/22/17 05:00	2.32
Bromomethane	ND		1.9	0.78	ppb v/v			06/22/17 05:00	2.32
2-Butanone (MEK)	0.74	J	1.9	0.46	ppb v/v			06/22/17 05:00	2.32
Carbon disulfide	14		1.9	0.18	ppb v/v			06/22/17 05:00	2.32

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102482-001/MWL-SV05-400

Lab Sample ID: 320-28713-20

Date Collected: 05/30/17 11:11

Matrix: Air

Date Received: 06/06/17 10:20

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	0.61	J	1.9	0.15	ppb v/v			06/22/17 05:00	2.32
Chlorobenzene	ND		0.70	0.15	ppb v/v			06/22/17 05:00	2.32
Chloroethane	ND		1.9	0.71	ppb v/v			06/22/17 05:00	2.32
Chloroform	0.75		0.70	0.22	ppb v/v			06/22/17 05:00	2.32
Chloromethane	ND		1.9	0.46	ppb v/v			06/22/17 05:00	2.32
Dibromochloromethane	ND		0.93	0.18	ppb v/v			06/22/17 05:00	2.32
1,2-Dibromoethane (EDB)	ND		1.9	0.17	ppb v/v			06/22/17 05:00	2.32
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.93	0.36	ppb v/v			06/22/17 05:00	2.32
1,2-Dichlorobenzene	ND		0.93	0.30	ppb v/v			06/22/17 05:00	2.32
1,3-Dichlorobenzene	ND		0.93	0.26	ppb v/v			06/22/17 05:00	2.32
1,4-Dichlorobenzene	ND		0.93	0.35	ppb v/v			06/22/17 05:00	2.32
Dichlorodifluoromethane	9.4		0.93	0.34	ppb v/v			06/22/17 05:00	2.32
1,1-Dichloroethane	1.8		0.70	0.17	ppb v/v			06/22/17 05:00	2.32
1,2-Dichloroethane	ND		1.9	0.20	ppb v/v			06/22/17 05:00	2.32
1,1-Dichloroethene	22		1.9	0.30	ppb v/v			06/22/17 05:00	2.32
cis-1,2-Dichloroethene	0.78	J	0.93	0.21	ppb v/v			06/22/17 05:00	2.32
trans-1,2-Dichloroethene	ND		0.93	0.23	ppb v/v			06/22/17 05:00	2.32
1,2-Dichloropropane	ND		0.93	0.56	ppb v/v			06/22/17 05:00	2.32
cis-1,3-Dichloropropene	ND		0.93	0.24	ppb v/v			06/22/17 05:00	2.32
trans-1,3-Dichloropropene	ND		0.93	0.20	ppb v/v			06/22/17 05:00	2.32
Ethylbenzene	ND		0.93	0.15	ppb v/v			06/22/17 05:00	2.32
4-Ethyltoluene	ND		0.93	0.43	ppb v/v			06/22/17 05:00	2.32
Hexachlorobutadiene	ND		4.6	1.0	ppb v/v			06/22/17 05:00	2.32
2-Hexanone	ND		0.93	0.20	ppb v/v			06/22/17 05:00	2.32
4-Methyl-2-pentanone (MIBK)	ND		0.93	0.31	ppb v/v			06/22/17 05:00	2.32
Methylene Chloride	0.85	J	0.93	0.17	ppb v/v			06/22/17 05:00	2.32
Styrene	ND		0.93	0.14	ppb v/v			06/22/17 05:00	2.32
1,1,1,2-Tetrachloroethane	ND		0.93	0.16	ppb v/v			06/22/17 05:00	2.32
Tetrachloroethene	100		0.93	0.12	ppb v/v			06/22/17 05:00	2.32
Toluene	1.6		0.93	0.12	ppb v/v			06/22/17 05:00	2.32
1,1,2-Trichloro-1,2,2-trifluoroethane	36		0.93	0.38	ppb v/v			06/22/17 05:00	2.32
1,2,4-Trichlorobenzene	ND		4.6	1.0	ppb v/v			06/22/17 05:00	2.32
1,1,1-Trichloroethane	1.6		0.70	0.15	ppb v/v			06/22/17 05:00	2.32
1,1,2-Trichloroethane	ND		0.93	0.16	ppb v/v			06/22/17 05:00	2.32
Trichloroethene	87		0.93	0.24	ppb v/v			06/22/17 05:00	2.32
Trichlorofluoromethane	23		0.93	0.45	ppb v/v			06/22/17 05:00	2.32
1,2,4-Trimethylbenzene	ND		1.9	0.38	ppb v/v			06/22/17 05:00	2.32
1,3,5-Trimethylbenzene	ND		0.93	0.29	ppb v/v			06/22/17 05:00	2.32
Vinyl acetate	ND		1.9	0.34	ppb v/v			06/22/17 05:00	2.32
Vinyl chloride	ND		0.93	0.28	ppb v/v			06/22/17 05:00	2.32
m,p-Xylene	ND		1.9	0.23	ppb v/v			06/22/17 05:00	2.32
o-Xylene	ND		0.93	0.13	ppb v/v			06/22/17 05:00	2.32

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130		06/22/17 05:00	2.32
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		06/22/17 05:00	2.32
Toluene-d8 (Surr)	102		70 - 130		06/22/17 05:00	2.32

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102457-001/MWL-SV-FB1

Lab Sample ID: 320-28716-1

Date Collected: 05/30/17 11:30

Matrix: Air

Date Received: 06/06/17 10:20

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	1.1	J	5.0	0.18	ppb v/v			06/16/17 20:03	1
Benzene	ND		0.40	0.079	ppb v/v			06/16/17 20:03	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			06/16/17 20:03	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			06/16/17 20:03	1
Bromoform	ND		0.40	0.070	ppb v/v			06/16/17 20:03	1
Bromomethane	ND		0.80	0.34	ppb v/v			06/16/17 20:03	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			06/16/17 20:03	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			06/16/17 20:03	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			06/16/17 20:03	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			06/16/17 20:03	1
Chloroethane	ND		0.80	0.31	ppb v/v			06/16/17 20:03	1
Chloroform	ND		0.30	0.095	ppb v/v			06/16/17 20:03	1
Chloromethane	ND		0.80	0.20	ppb v/v			06/16/17 20:03	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			06/16/17 20:03	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			06/16/17 20:03	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			06/16/17 20:03	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			06/16/17 20:03	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			06/16/17 20:03	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			06/16/17 20:03	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			06/16/17 20:03	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			06/16/17 20:03	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			06/16/17 20:03	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			06/16/17 20:03	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			06/16/17 20:03	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			06/16/17 20:03	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			06/16/17 20:03	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			06/16/17 20:03	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			06/16/17 20:03	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			06/16/17 20:03	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			06/16/17 20:03	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			06/16/17 20:03	1
2-Hexanone	ND		0.40	0.087	ppb v/v			06/16/17 20:03	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			06/16/17 20:03	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			06/16/17 20:03	1
Styrene	ND		0.40	0.059	ppb v/v			06/16/17 20:03	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			06/16/17 20:03	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			06/16/17 20:03	1
Toluene	0.35	J	0.40	0.051	ppb v/v			06/16/17 20:03	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			06/16/17 20:03	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			06/16/17 20:03	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			06/16/17 20:03	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			06/16/17 20:03	1
Trichloroethene	ND		0.40	0.11	ppb v/v			06/16/17 20:03	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			06/16/17 20:03	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			06/16/17 20:03	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			06/16/17 20:03	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			06/16/17 20:03	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			06/16/17 20:03	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102457-001/MWL-SV-FB1

Lab Sample ID: 320-28716-1

Date Collected: 05/30/17 11:30

Matrix: Air

Date Received: 06/06/17 10:20

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		0.80	0.10	ppb v/v			06/16/17 20:03	1
o-Xylene	ND		0.40	0.054	ppb v/v			06/16/17 20:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	121		70 - 130					06/16/17 20:03	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 130					06/16/17 20:03	1
Toluene-d8 (Surr)	101		70 - 130					06/16/17 20:03	1

Client Sample ID: 102458-001/MWL-SV01-42.5

Lab Sample ID: 320-28716-2

Date Collected: 05/30/17 11:33

Matrix: Air

Date Received: 06/06/17 10:20

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	8.6		5.0	0.18	ppb v/v			06/16/17 20:54	1
Benzene	0.15	J	0.40	0.079	ppb v/v			06/16/17 20:54	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			06/16/17 20:54	1
Bromodichloromethane	0.64		0.30	0.066	ppb v/v			06/16/17 20:54	1
Bromoform	0.10	J	0.40	0.070	ppb v/v			06/16/17 20:54	1
Bromomethane	ND		0.80	0.34	ppb v/v			06/16/17 20:54	1
2-Butanone (MEK)	3.1		0.80	0.20	ppb v/v			06/16/17 20:54	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			06/16/17 20:54	1
Carbon tetrachloride	0.39	J	0.80	0.064	ppb v/v			06/16/17 20:54	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			06/16/17 20:54	1
Chloroethane	ND		0.80	0.31	ppb v/v			06/16/17 20:54	1
Chloroform	17		0.30	0.095	ppb v/v			06/16/17 20:54	1
Chloromethane	ND		0.80	0.20	ppb v/v			06/16/17 20:54	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			06/16/17 20:54	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			06/16/17 20:54	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			06/16/17 20:54	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			06/16/17 20:54	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			06/16/17 20:54	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			06/16/17 20:54	1
1,1-Dichloroethane	2.9		0.30	0.072	ppb v/v			06/16/17 20:54	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			06/16/17 20:54	1
1,1-Dichloroethene	7.6		0.80	0.13	ppb v/v			06/16/17 20:54	1
cis-1,2-Dichloroethene	1.4		0.40	0.089	ppb v/v			06/16/17 20:54	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			06/16/17 20:54	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			06/16/17 20:54	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			06/16/17 20:54	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			06/16/17 20:54	1
Ethylbenzene	0.085	J	0.40	0.063	ppb v/v			06/16/17 20:54	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			06/16/17 20:54	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			06/16/17 20:54	1
2-Hexanone	0.33	J	0.40	0.087	ppb v/v			06/16/17 20:54	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			06/16/17 20:54	1
Methylene Chloride	0.53		0.40	0.072	ppb v/v			06/16/17 20:54	1
Styrene	ND		0.40	0.059	ppb v/v			06/16/17 20:54	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102458-001/MWL-SV01-42.5

Lab Sample ID: 320-28716-2

Date Collected: 05/30/17 11:33

Matrix: Air

Date Received: 06/06/17 10:20

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
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			06/16/17 20:54	1
Toluene	0.23	J	0.40	0.051	ppb v/v			06/16/17 20:54	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			06/16/17 20:54	1
1,1,1-Trichloroethane	44		0.30	0.065	ppb v/v			06/16/17 20:54	1
1,1,2-Trichloroethane	0.19	J	0.40	0.067	ppb v/v			06/16/17 20:54	1
1,2,4-Trimethylbenzene	0.39	J	0.80	0.16	ppb v/v			06/16/17 20:54	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			06/16/17 20:54	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			06/16/17 20:54	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			06/16/17 20:54	1
m,p-Xylene	0.22	J	0.80	0.10	ppb v/v			06/16/17 20:54	1
o-Xylene	0.098	J	0.40	0.054	ppb v/v			06/16/17 20:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	124		70 - 130					06/16/17 20:54	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					06/16/17 20:54	1
Toluene-d8 (Surr)	101		70 - 130					06/16/17 20:54	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	78		5.4	2.0	ppb v/v			06/22/17 17:32	13.5
Tetrachloroethene	300		5.4	0.69	ppb v/v			06/22/17 17:32	13.5
1,1,2-Trichloro-1,2,2-trifluoroethane	64		5.4	2.2	ppb v/v			06/22/17 17:32	13.5
Trichloroethene	71		5.4	1.4	ppb v/v			06/22/17 17:32	13.5
Trichlorofluoromethane	140		5.4	2.6	ppb v/v			06/22/17 17:32	13.5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					06/22/17 17:32	13.5
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					06/22/17 17:32	13.5
Toluene-d8 (Surr)	105		70 - 130					06/22/17 17:32	13.5

Client Sample ID: 102459-001/MWL-SV-FB2

Lab Sample ID: 320-28716-3

Date Collected: 05/30/17 11:33

Matrix: Air

Date Received: 06/06/17 10:20

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	0.79	J	5.0	0.18	ppb v/v			06/16/17 21:45	1
Benzene	ND		0.40	0.079	ppb v/v			06/16/17 21:45	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			06/16/17 21:45	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			06/16/17 21:45	1
Bromoform	ND		0.40	0.070	ppb v/v			06/16/17 21:45	1
Bromomethane	ND		0.80	0.34	ppb v/v			06/16/17 21:45	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			06/16/17 21:45	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			06/16/17 21:45	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			06/16/17 21:45	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			06/16/17 21:45	1
Chloroethane	ND		0.80	0.31	ppb v/v			06/16/17 21:45	1
Chloroform	ND		0.30	0.095	ppb v/v			06/16/17 21:45	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102459-001/MWL-SV-FB2

Lab Sample ID: 320-28716-3

Date Collected: 05/30/17 11:33

Matrix: Air

Date Received: 06/06/17 10:20

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		0.80	0.20	ppb v/v			06/16/17 21:45	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			06/16/17 21:45	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			06/16/17 21:45	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			06/16/17 21:45	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			06/16/17 21:45	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			06/16/17 21:45	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			06/16/17 21:45	1
Dichlorodifluoromethane	0.65		0.40	0.15	ppb v/v			06/16/17 21:45	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			06/16/17 21:45	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			06/16/17 21:45	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			06/16/17 21:45	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			06/16/17 21:45	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			06/16/17 21:45	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			06/16/17 21:45	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			06/16/17 21:45	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			06/16/17 21:45	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			06/16/17 21:45	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			06/16/17 21:45	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			06/16/17 21:45	1
2-Hexanone	ND		0.40	0.087	ppb v/v			06/16/17 21:45	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			06/16/17 21:45	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			06/16/17 21:45	1
Styrene	ND		0.40	0.059	ppb v/v			06/16/17 21:45	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			06/16/17 21:45	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			06/16/17 21:45	1
Toluene	ND		0.40	0.051	ppb v/v			06/16/17 21:45	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			06/16/17 21:45	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			06/16/17 21:45	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			06/16/17 21:45	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			06/16/17 21:45	1
Trichloroethene	ND		0.40	0.11	ppb v/v			06/16/17 21:45	1
Trichlorofluoromethane	0.94		0.40	0.20	ppb v/v			06/16/17 21:45	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			06/16/17 21:45	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			06/16/17 21:45	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			06/16/17 21:45	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			06/16/17 21:45	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			06/16/17 21:45	1
o-Xylene	ND		0.40	0.054	ppb v/v			06/16/17 21:45	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	116		70 - 130		06/16/17 21:45	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 130		06/16/17 21:45	1
Toluene-d8 (Surr)	99		70 - 130		06/16/17 21:45	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102460-001/MWL-SV02-41.5

Lab Sample ID: 320-28716-4

Date Collected: 05/30/17 11:42

Matrix: Air

Date Received: 06/06/17 10:20

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	13	J	27	0.95	ppb v/v			06/16/17 22:32	5.33
Benzene	ND		2.1	0.42	ppb v/v			06/16/17 22:32	5.33
Benzyl chloride	ND		4.3	0.87	ppb v/v			06/16/17 22:32	5.33
Bromodichloromethane	ND		1.6	0.35	ppb v/v			06/16/17 22:32	5.33
Bromoform	ND		2.1	0.37	ppb v/v			06/16/17 22:32	5.33
Bromomethane	ND		4.3	1.8	ppb v/v			06/16/17 22:32	5.33
2-Butanone (MEK)	7.4		4.3	1.1	ppb v/v			06/16/17 22:32	5.33
Carbon disulfide	ND		4.3	0.42	ppb v/v			06/16/17 22:32	5.33
Carbon tetrachloride	ND		4.3	0.34	ppb v/v			06/16/17 22:32	5.33
Chlorobenzene	ND		1.6	0.34	ppb v/v			06/16/17 22:32	5.33
Chloroethane	ND		4.3	1.6	ppb v/v			06/16/17 22:32	5.33
Chloroform	3.1		1.6	0.51	ppb v/v			06/16/17 22:32	5.33
Chloromethane	ND		4.3	1.1	ppb v/v			06/16/17 22:32	5.33
Dibromochloromethane	ND		2.1	0.42	ppb v/v			06/16/17 22:32	5.33
1,2-Dibromoethane (EDB)	ND		4.3	0.40	ppb v/v			06/16/17 22:32	5.33
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		2.1	0.83	ppb v/v			06/16/17 22:32	5.33
1,2-Dichlorobenzene	ND		2.1	0.69	ppb v/v			06/16/17 22:32	5.33
1,3-Dichlorobenzene	ND		2.1	0.59	ppb v/v			06/16/17 22:32	5.33
1,4-Dichlorobenzene	ND		2.1	0.79	ppb v/v			06/16/17 22:32	5.33
Dichlorodifluoromethane	100		2.1	0.77	ppb v/v			06/16/17 22:32	5.33
1,1-Dichloroethane	2.6		1.6	0.38	ppb v/v			06/16/17 22:32	5.33
1,2-Dichloroethane	ND		4.3	0.47	ppb v/v			06/16/17 22:32	5.33
1,1-Dichloroethene	12		4.3	0.69	ppb v/v			06/16/17 22:32	5.33
cis-1,2-Dichloroethene	0.84	J	2.1	0.47	ppb v/v			06/16/17 22:32	5.33
trans-1,2-Dichloroethene	ND		2.1	0.53	ppb v/v			06/16/17 22:32	5.33
1,2-Dichloropropane	ND		2.1	1.3	ppb v/v			06/16/17 22:32	5.33
cis-1,3-Dichloropropene	ND		2.1	0.55	ppb v/v			06/16/17 22:32	5.33
trans-1,3-Dichloropropene	ND		2.1	0.47	ppb v/v			06/16/17 22:32	5.33
Ethylbenzene	ND		2.1	0.34	ppb v/v			06/16/17 22:32	5.33
4-Ethyltoluene	ND		2.1	1.0	ppb v/v			06/16/17 22:32	5.33
Hexachlorobutadiene	ND		11	2.3	ppb v/v			06/16/17 22:32	5.33
2-Hexanone	0.50	J	2.1	0.46	ppb v/v			06/16/17 22:32	5.33
4-Methyl-2-pentanone (MIBK)	ND		2.1	0.72	ppb v/v			06/16/17 22:32	5.33
Methylene Chloride	ND		2.1	0.38	ppb v/v			06/16/17 22:32	5.33
Styrene	ND		2.1	0.31	ppb v/v			06/16/17 22:32	5.33
1,1,2,2-Tetrachloroethane	ND		2.1	0.37	ppb v/v			06/16/17 22:32	5.33
Tetrachloroethene	71		2.1	0.27	ppb v/v			06/16/17 22:32	5.33
Toluene	ND		2.1	0.27	ppb v/v			06/16/17 22:32	5.33
1,1,2-Trichloro-1,2,2-trifluoroethane	52		2.1	0.87	ppb v/v			06/16/17 22:32	5.33
1,2,4-Trichlorobenzene	ND		11	2.3	ppb v/v			06/16/17 22:32	5.33
1,1,1-Trichloroethane	80		1.6	0.35	ppb v/v			06/16/17 22:32	5.33
1,1,2-Trichloroethane	ND		2.1	0.36	ppb v/v			06/16/17 22:32	5.33
Trichloroethene	70		2.1	0.56	ppb v/v			06/16/17 22:32	5.33
1,2,4-Trimethylbenzene	ND		4.3	0.86	ppb v/v			06/16/17 22:32	5.33
1,3,5-Trimethylbenzene	ND		2.1	0.67	ppb v/v			06/16/17 22:32	5.33
Vinyl acetate	ND		4.3	0.77	ppb v/v			06/16/17 22:32	5.33
Vinyl chloride	ND		2.1	0.64	ppb v/v			06/16/17 22:32	5.33
m,p-Xylene	ND		4.3	0.53	ppb v/v			06/16/17 22:32	5.33

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM/SVM

TestAmerica Job ID: 320-28713-1

Client Sample ID: 102460-001/MWL-SV02-41.5

Lab Sample ID: 320-28716-4

Date Collected: 05/30/17 11:42

Matrix: Air

Date Received: 06/06/17 10:20

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		2.1	0.29	ppb v/v			06/16/17 22:32	5.33

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	128		70 - 130		06/16/17 22:32	5.33
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		06/16/17 22:32	5.33
Toluene-d8 (Surr)	98		70 - 130		06/16/17 22:32	5.33

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	230		4.3	2.1	ppb v/v			06/22/17 18:24	10.7

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		06/22/17 18:24	10.7
1,2-Dichloroethane-d4 (Surr)	102		70 - 130		06/22/17 18:24	10.7
Toluene-d8 (Surr)	106		70 - 130		06/22/17 18:24	10.7

OCTOBER 2017 SOIL-VAPOR SAMPLING RESULTS
CERTIFICATES OF ANALYSIS

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103929-001/MWL-FB5

Lab Sample ID: 320-32934-1

Date Collected: 10/26/17 10:48

Matrix: Air

Date Received: 11/02/17 09:30

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	0.24	J	5.0	0.18	ppb v/v			11/03/17 19:46	1
Benzene	4.8		0.40	0.079	ppb v/v			11/03/17 19:46	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			11/03/17 19:46	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			11/03/17 19:46	1
Bromoform	ND		0.40	0.070	ppb v/v			11/03/17 19:46	1
Bromomethane	ND		0.80	0.34	ppb v/v			11/03/17 19:46	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			11/03/17 19:46	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			11/03/17 19:46	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			11/03/17 19:46	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			11/03/17 19:46	1
Chloroethane	ND		0.80	0.31	ppb v/v			11/03/17 19:46	1
Chloroform	ND		0.30	0.095	ppb v/v			11/03/17 19:46	1
Chloromethane	ND		0.80	0.20	ppb v/v			11/03/17 19:46	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			11/03/17 19:46	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			11/03/17 19:46	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			11/03/17 19:46	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			11/03/17 19:46	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			11/03/17 19:46	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			11/03/17 19:46	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			11/03/17 19:46	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			11/03/17 19:46	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			11/03/17 19:46	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			11/03/17 19:46	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			11/03/17 19:46	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			11/03/17 19:46	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			11/03/17 19:46	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			11/03/17 19:46	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			11/03/17 19:46	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			11/03/17 19:46	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			11/03/17 19:46	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			11/03/17 19:46	1
2-Hexanone	ND		0.40	0.087	ppb v/v			11/03/17 19:46	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			11/03/17 19:46	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			11/03/17 19:46	1
Styrene	ND		0.40	0.059	ppb v/v			11/03/17 19:46	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			11/03/17 19:46	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			11/03/17 19:46	1
Toluene	ND		0.40	0.051	ppb v/v			11/03/17 19:46	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			11/03/17 19:46	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			11/03/17 19:46	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			11/03/17 19:46	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			11/03/17 19:46	1
Trichloroethene	ND		0.40	0.11	ppb v/v			11/03/17 19:46	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			11/03/17 19:46	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			11/03/17 19:46	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			11/03/17 19:46	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			11/03/17 19:46	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			11/03/17 19:46	1

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103929-001/MWL-FB5

Lab Sample ID: 320-32934-1

Date Collected: 10/26/17 10:48

Matrix: Air

Date Received: 11/02/17 09:30

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		0.80	0.10	ppb v/v			11/03/17 19:46	1
o-Xylene	ND		0.40	0.054	ppb v/v			11/03/17 19:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130					11/03/17 19:46	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					11/03/17 19:46	1
Toluene-d8 (Surr)	103		70 - 130					11/03/17 19:46	1

Client Sample ID: 103930-001/MWL-SV05-50

Lab Sample ID: 320-32934-2

Date Collected: 10/26/17 10:49

Matrix: Air

Date Received: 11/02/17 09:30

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	2.6	J	18	0.62	ppb v/v			11/03/17 20:38	3.51
Benzene	ND		1.4	0.28	ppb v/v			11/03/17 20:38	3.51
Benzyl chloride	ND		2.8	0.57	ppb v/v			11/03/17 20:38	3.51
Bromodichloromethane	ND		1.1	0.23	ppb v/v			11/03/17 20:38	3.51
Bromoform	ND		1.4	0.25	ppb v/v			11/03/17 20:38	3.51
Bromomethane	ND		2.8	1.2	ppb v/v			11/03/17 20:38	3.51
2-Butanone (MEK)	ND		2.8	0.70	ppb v/v			11/03/17 20:38	3.51
Carbon disulfide	1.1	J	2.8	0.27	ppb v/v			11/03/17 20:38	3.51
Carbon tetrachloride	0.26	J	2.8	0.22	ppb v/v			11/03/17 20:38	3.51
Chlorobenzene	ND		1.1	0.22	ppb v/v			11/03/17 20:38	3.51
Chloroethane	ND		2.8	1.1	ppb v/v			11/03/17 20:38	3.51
Chloroform	1.1		1.1	0.33	ppb v/v			11/03/17 20:38	3.51
Chloromethane	ND		2.8	0.69	ppb v/v			11/03/17 20:38	3.51
Dibromochloromethane	ND		1.4	0.28	ppb v/v			11/03/17 20:38	3.51
1,2-Dibromoethane (EDB)	ND		2.8	0.26	ppb v/v			11/03/17 20:38	3.51
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.54	ppb v/v			11/03/17 20:38	3.51
1,2-Dichlorobenzene	ND		1.4	0.46	ppb v/v			11/03/17 20:38	3.51
1,3-Dichlorobenzene	ND		1.4	0.39	ppb v/v			11/03/17 20:38	3.51
1,4-Dichlorobenzene	ND		1.4	0.52	ppb v/v			11/03/17 20:38	3.51
Dichlorodifluoromethane	36		1.4	0.51	ppb v/v			11/03/17 20:38	3.51
1,1-Dichloroethane	1.6		1.1	0.25	ppb v/v			11/03/17 20:38	3.51
1,2-Dichloroethane	ND		2.8	0.31	ppb v/v			11/03/17 20:38	3.51
1,1-Dichloroethene	9.7		2.8	0.45	ppb v/v			11/03/17 20:38	3.51
cis-1,2-Dichloroethene	0.66	J	1.4	0.31	ppb v/v			11/03/17 20:38	3.51
trans-1,2-Dichloroethene	ND		1.4	0.35	ppb v/v			11/03/17 20:38	3.51
1,2-Dichloropropane	ND		1.4	0.84	ppb v/v			11/03/17 20:38	3.51
cis-1,3-Dichloropropene	ND		1.4	0.37	ppb v/v			11/03/17 20:38	3.51
trans-1,3-Dichloropropene	ND		1.4	0.31	ppb v/v			11/03/17 20:38	3.51
Ethylbenzene	ND		1.4	0.22	ppb v/v			11/03/17 20:38	3.51
4-Ethyltoluene	ND		1.4	0.66	ppb v/v			11/03/17 20:38	3.51
Hexachlorobutadiene	ND		7.0	1.5	ppb v/v			11/03/17 20:38	3.51
2-Hexanone	ND		1.4	0.31	ppb v/v			11/03/17 20:38	3.51
4-Methyl-2-pentanone (MIBK)	ND		1.4	0.47	ppb v/v			11/03/17 20:38	3.51
Methylene Chloride	0.47	J	1.4	0.25	ppb v/v			11/03/17 20:38	3.51

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103930-001/MWL-SV05-50

Lab Sample ID: 320-32934-2

Date Collected: 10/26/17 10:49

Matrix: Air

Date Received: 11/02/17 09:30

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		1.4	0.21	ppb v/v			11/03/17 20:38	3.51
1,1,2,2-Tetrachloroethane	ND		1.4	0.24	ppb v/v			11/03/17 20:38	3.51
Tetrachloroethene	21		1.4	0.18	ppb v/v			11/03/17 20:38	3.51
Toluene	ND		1.4	0.18	ppb v/v			11/03/17 20:38	3.51
1,1,2-Trichloro-1,2,2-trifluoroethane	40		1.4	0.57	ppb v/v			11/03/17 20:38	3.51
1,2,4-Trichlorobenzene	ND		7.0	1.5	ppb v/v			11/03/17 20:38	3.51
1,1,1-Trichloroethane	12		1.1	0.23	ppb v/v			11/03/17 20:38	3.51
1,1,2-Trichloroethane	ND		1.4	0.24	ppb v/v			11/03/17 20:38	3.51
Trichloroethene	42		1.4	0.37	ppb v/v			11/03/17 20:38	3.51
Trichlorofluoromethane	96		1.4	0.69	ppb v/v			11/03/17 20:38	3.51
1,2,4-Trimethylbenzene	ND		2.8	0.57	ppb v/v			11/03/17 20:38	3.51
1,3,5-Trimethylbenzene	ND		1.4	0.44	ppb v/v			11/03/17 20:38	3.51
Vinyl acetate	ND		2.8	0.51	ppb v/v			11/03/17 20:38	3.51
Vinyl chloride	ND		1.4	0.42	ppb v/v			11/03/17 20:38	3.51
m,p-Xylene	ND		2.8	0.35	ppb v/v			11/03/17 20:38	3.51
o-Xylene	ND		1.4	0.19	ppb v/v			11/03/17 20:38	3.51

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		11/03/17 20:38	3.51
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		11/03/17 20:38	3.51
Toluene-d8 (Surr)	104		70 - 130		11/03/17 20:38	3.51

Client Sample ID: 103931-001/MWL-SV05-100

Lab Sample ID: 320-32934-3

Date Collected: 10/26/17 10:51

Matrix: Air

Date Received: 11/02/17 09:30

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	2.9	J	23	0.80	ppb v/v			11/03/17 21:30	4.52
Benzene	ND		1.8	0.36	ppb v/v			11/03/17 21:30	4.52
Benzyl chloride	ND		3.6	0.74	ppb v/v			11/03/17 21:30	4.52
Bromodichloromethane	ND		1.4	0.30	ppb v/v			11/03/17 21:30	4.52
Bromoform	ND		1.8	0.32	ppb v/v			11/03/17 21:30	4.52
Bromomethane	ND		3.6	1.5	ppb v/v			11/03/17 21:30	4.52
2-Butanone (MEK)	ND		3.6	0.90	ppb v/v			11/03/17 21:30	4.52
Carbon disulfide	ND		3.6	0.35	ppb v/v			11/03/17 21:30	4.52
Carbon tetrachloride	0.52	J	3.6	0.29	ppb v/v			11/03/17 21:30	4.52
Chlorobenzene	ND		1.4	0.29	ppb v/v			11/03/17 21:30	4.52
Chloroethane	ND		3.6	1.4	ppb v/v			11/03/17 21:30	4.52
Chloroform	2.1		1.4	0.43	ppb v/v			11/03/17 21:30	4.52
Chloromethane	ND		3.6	0.89	ppb v/v			11/03/17 21:30	4.52
Dibromochloromethane	ND		1.8	0.36	ppb v/v			11/03/17 21:30	4.52
1,2-Dibromoethane (EDB)	ND		3.6	0.34	ppb v/v			11/03/17 21:30	4.52
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.8	0.70	ppb v/v			11/03/17 21:30	4.52
1,2-Dichlorobenzene	ND		1.8	0.59	ppb v/v			11/03/17 21:30	4.52
1,3-Dichlorobenzene	ND		1.8	0.50	ppb v/v			11/03/17 21:30	4.52
1,4-Dichlorobenzene	ND		1.8	0.67	ppb v/v			11/03/17 21:30	4.52

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103931-001/MWL-SV05-100

Lab Sample ID: 320-32934-3

Date Collected: 10/26/17 10:51

Matrix: Air

Date Received: 11/02/17 09:30

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	67		1.8	0.66	ppb v/v			11/03/17 21:30	4.52
1,1-Dichloroethane	3.4		1.4	0.33	ppb v/v			11/03/17 21:30	4.52
1,2-Dichloroethane	ND		3.6	0.40	ppb v/v			11/03/17 21:30	4.52
1,1-Dichloroethene	23		3.6	0.58	ppb v/v			11/03/17 21:30	4.52
cis-1,2-Dichloroethene	1.6	J	1.8	0.40	ppb v/v			11/03/17 21:30	4.52
trans-1,2-Dichloroethene	ND		1.8	0.45	ppb v/v			11/03/17 21:30	4.52
1,2-Dichloropropane	ND		1.8	1.1	ppb v/v			11/03/17 21:30	4.52
cis-1,3-Dichloropropene	ND		1.8	0.47	ppb v/v			11/03/17 21:30	4.52
trans-1,3-Dichloropropene	ND		1.8	0.40	ppb v/v			11/03/17 21:30	4.52
Ethylbenzene	ND		1.8	0.28	ppb v/v			11/03/17 21:30	4.52
4-Ethyltoluene	ND		1.8	0.85	ppb v/v			11/03/17 21:30	4.52
Hexachlorobutadiene	ND		9.0	2.0	ppb v/v			11/03/17 21:30	4.52
2-Hexanone	ND		1.8	0.39	ppb v/v			11/03/17 21:30	4.52
4-Methyl-2-pentanone (MIBK)	ND		1.8	0.61	ppb v/v			11/03/17 21:30	4.52
Methylene Chloride	1.1	J	1.8	0.33	ppb v/v			11/03/17 21:30	4.52
Styrene	ND		1.8	0.27	ppb v/v			11/03/17 21:30	4.52
1,1,2,2-Tetrachloroethane	ND		1.8	0.31	ppb v/v			11/03/17 21:30	4.52
Tetrachloroethene	70		1.8	0.23	ppb v/v			11/03/17 21:30	4.52
Toluene	ND		1.8	0.23	ppb v/v			11/03/17 21:30	4.52
1,1,2-Trichloro-1,2,2-trifluoroethane	90		1.8	0.74	ppb v/v			11/03/17 21:30	4.52
1,2,4-Trichlorobenzene	ND		9.0	2.0	ppb v/v			11/03/17 21:30	4.52
1,1,1-Trichloroethane	13		1.4	0.29	ppb v/v			11/03/17 21:30	4.52
1,1,2-Trichloroethane	ND		1.8	0.30	ppb v/v			11/03/17 21:30	4.52
Trichloroethene	100		1.8	0.47	ppb v/v			11/03/17 21:30	4.52
Trichlorofluoromethane	140		1.8	0.89	ppb v/v			11/03/17 21:30	4.52
1,2,4-Trimethylbenzene	ND		3.6	0.73	ppb v/v			11/03/17 21:30	4.52
1,3,5-Trimethylbenzene	ND		1.8	0.57	ppb v/v			11/03/17 21:30	4.52
Vinyl acetate	ND		3.6	0.66	ppb v/v			11/03/17 21:30	4.52
Vinyl chloride	ND		1.8	0.54	ppb v/v			11/03/17 21:30	4.52
m,p-Xylene	ND		3.6	0.45	ppb v/v			11/03/17 21:30	4.52
o-Xylene	ND		1.8	0.24	ppb v/v			11/03/17 21:30	4.52

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		11/03/17 21:30	4.52
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		11/03/17 21:30	4.52
Toluene-d8 (Surr)	104		70 - 130		11/03/17 21:30	4.52

Client Sample ID: 103932-001/MWL-SV05-200

Lab Sample ID: 320-32934-4

Date Collected: 10/26/17 10:55

Matrix: Air

Date Received: 11/02/17 09:30

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	5.1	J	23	0.81	ppb v/v			11/03/17 22:22	4.54
Benzene	ND		1.8	0.36	ppb v/v			11/03/17 22:22	4.54
Benzyl chloride	ND		3.6	0.74	ppb v/v			11/03/17 22:22	4.54
Bromodichloromethane	ND		1.4	0.30	ppb v/v			11/03/17 22:22	4.54

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103932-001/MWL-SV05-200

Lab Sample ID: 320-32934-4

Date Collected: 10/26/17 10:55

Matrix: Air

Date Received: 11/02/17 09:30

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		1.8	0.32	ppb v/v			11/03/17 22:22	4.54
Bromomethane	ND		3.6	1.5	ppb v/v			11/03/17 22:22	4.54
2-Butanone (MEK)	ND		3.6	0.90	ppb v/v			11/03/17 22:22	4.54
Carbon disulfide	0.62	J	3.6	0.35	ppb v/v			11/03/17 22:22	4.54
Carbon tetrachloride	0.87	J	3.6	0.29	ppb v/v			11/03/17 22:22	4.54
Chlorobenzene	ND		1.4	0.29	ppb v/v			11/03/17 22:22	4.54
Chloroethane	ND		3.6	1.4	ppb v/v			11/03/17 22:22	4.54
Chloroform	1.9		1.4	0.43	ppb v/v			11/03/17 22:22	4.54
Chloromethane	ND		3.6	0.89	ppb v/v			11/03/17 22:22	4.54
Dibromochloromethane	ND		1.8	0.36	ppb v/v			11/03/17 22:22	4.54
1,2-Dibromoethane (EDB)	ND		3.6	0.34	ppb v/v			11/03/17 22:22	4.54
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.8	0.70	ppb v/v			11/03/17 22:22	4.54
1,2-Dichlorobenzene	ND		1.8	0.59	ppb v/v			11/03/17 22:22	4.54
1,3-Dichlorobenzene	ND		1.8	0.50	ppb v/v			11/03/17 22:22	4.54
1,4-Dichlorobenzene	ND		1.8	0.68	ppb v/v			11/03/17 22:22	4.54
Dichlorodifluoromethane	51		1.8	0.66	ppb v/v			11/03/17 22:22	4.54
1,1-Dichloroethane	4.8		1.4	0.33	ppb v/v			11/03/17 22:22	4.54
1,2-Dichloroethane	ND		3.6	0.40	ppb v/v			11/03/17 22:22	4.54
1,1-Dichloroethene	37		3.6	0.59	ppb v/v			11/03/17 22:22	4.54
cis-1,2-Dichloroethene	2.2		1.8	0.40	ppb v/v			11/03/17 22:22	4.54
trans-1,2-Dichloroethene	ND		1.8	0.45	ppb v/v			11/03/17 22:22	4.54
1,2-Dichloropropane	ND		1.8	1.1	ppb v/v			11/03/17 22:22	4.54
cis-1,3-Dichloropropene	ND		1.8	0.47	ppb v/v			11/03/17 22:22	4.54
trans-1,3-Dichloropropene	ND		1.8	0.40	ppb v/v			11/03/17 22:22	4.54
Ethylbenzene	ND		1.8	0.29	ppb v/v			11/03/17 22:22	4.54
4-Ethyltoluene	ND		1.8	0.85	ppb v/v			11/03/17 22:22	4.54
Hexachlorobutadiene	ND		9.1	2.0	ppb v/v			11/03/17 22:22	4.54
2-Hexanone	ND		1.8	0.39	ppb v/v			11/03/17 22:22	4.54
4-Methyl-2-pentanone (MIBK)	ND		1.8	0.61	ppb v/v			11/03/17 22:22	4.54
Methylene Chloride	2.5		1.8	0.33	ppb v/v			11/03/17 22:22	4.54
Styrene	ND		1.8	0.27	ppb v/v			11/03/17 22:22	4.54
1,1,2,2-Tetrachloroethane	ND		1.8	0.31	ppb v/v			11/03/17 22:22	4.54
Tetrachloroethene	100		1.8	0.23	ppb v/v			11/03/17 22:22	4.54
Toluene	ND		1.8	0.23	ppb v/v			11/03/17 22:22	4.54
1,1,2-Trichloro-1,2,2-trifluoroethane	140		1.8	0.74	ppb v/v			11/03/17 22:22	4.54
1,2,4-Trichlorobenzene	ND		9.1	2.0	ppb v/v			11/03/17 22:22	4.54
1,1,1-Trichloroethane	3.6		1.4	0.30	ppb v/v			11/03/17 22:22	4.54
1,1,2-Trichloroethane	ND		1.8	0.30	ppb v/v			11/03/17 22:22	4.54
Trichloroethene	150		1.8	0.48	ppb v/v			11/03/17 22:22	4.54
Trichlorofluoromethane	79		1.8	0.89	ppb v/v			11/03/17 22:22	4.54
1,2,4-Trimethylbenzene	ND		3.6	0.74	ppb v/v			11/03/17 22:22	4.54
1,3,5-Trimethylbenzene	ND		1.8	0.57	ppb v/v			11/03/17 22:22	4.54
Vinyl acetate	ND		3.6	0.66	ppb v/v			11/03/17 22:22	4.54
Vinyl chloride	ND		1.8	0.54	ppb v/v			11/03/17 22:22	4.54
m,p-Xylene	ND		3.6	0.45	ppb v/v			11/03/17 22:22	4.54
o-Xylene	ND		1.8	0.25	ppb v/v			11/03/17 22:22	4.54

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103932-001/MWL-SV05-200

Lab Sample ID: 320-32934-4

Date Collected: 10/26/17 10:55

Matrix: Air

Date Received: 11/02/17 09:30

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		11/03/17 22:22	4.54
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		11/03/17 22:22	4.54
Toluene-d8 (Surr)	102		70 - 130		11/03/17 22:22	4.54

Client Sample ID: 103933-001/MWL-SV05-300

Lab Sample ID: 320-32934-5

Date Collected: 10/26/17 11:00

Matrix: Air

Date Received: 11/02/17 09:30

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	14	J	20	0.71	ppb v/v			11/03/17 23:15	4.01
Benzene	0.38	J	1.6	0.32	ppb v/v			11/03/17 23:15	4.01
Benzyl chloride	ND		3.2	0.65	ppb v/v			11/03/17 23:15	4.01
Bromodichloromethane	ND		1.2	0.26	ppb v/v			11/03/17 23:15	4.01
Bromoform	ND		1.6	0.28	ppb v/v			11/03/17 23:15	4.01
Bromomethane	ND		3.2	1.3	ppb v/v			11/03/17 23:15	4.01
2-Butanone (MEK)	1.2	J	3.2	0.80	ppb v/v			11/03/17 23:15	4.01
Carbon disulfide	1.8	J	3.2	0.31	ppb v/v			11/03/17 23:15	4.01
Carbon tetrachloride	ND		3.2	0.26	ppb v/v			11/03/17 23:15	4.01
Chlorobenzene	ND		1.2	0.26	ppb v/v			11/03/17 23:15	4.01
Chloroethane	ND		3.2	1.2	ppb v/v			11/03/17 23:15	4.01
Chloroform	1.4		1.2	0.38	ppb v/v			11/03/17 23:15	4.01
Chloromethane	1.1	J	3.2	0.79	ppb v/v			11/03/17 23:15	4.01
Dibromochloromethane	ND		1.6	0.32	ppb v/v			11/03/17 23:15	4.01
1,2-Dibromoethane (EDB)	ND		3.2	0.30	ppb v/v			11/03/17 23:15	4.01
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.6	0.62	ppb v/v			11/03/17 23:15	4.01
1,2-Dichlorobenzene	ND		1.6	0.52	ppb v/v			11/03/17 23:15	4.01
1,3-Dichlorobenzene	ND		1.6	0.44	ppb v/v			11/03/17 23:15	4.01
1,4-Dichlorobenzene	ND		1.6	0.60	ppb v/v			11/03/17 23:15	4.01
Dichlorodifluoromethane	32		1.6	0.58	ppb v/v			11/03/17 23:15	4.01
1,1-Dichloroethane	2.4		1.2	0.29	ppb v/v			11/03/17 23:15	4.01
1,2-Dichloroethane	ND		3.2	0.35	ppb v/v			11/03/17 23:15	4.01
1,1-Dichloroethene	28		3.2	0.52	ppb v/v			11/03/17 23:15	4.01
cis-1,2-Dichloroethene	1.2	J	1.6	0.36	ppb v/v			11/03/17 23:15	4.01
trans-1,2-Dichloroethene	ND		1.6	0.40	ppb v/v			11/03/17 23:15	4.01
1,2-Dichloropropane	ND		1.6	0.96	ppb v/v			11/03/17 23:15	4.01
cis-1,3-Dichloropropene	ND		1.6	0.42	ppb v/v			11/03/17 23:15	4.01
trans-1,3-Dichloropropene	ND		1.6	0.35	ppb v/v			11/03/17 23:15	4.01
Ethylbenzene	ND		1.6	0.25	ppb v/v			11/03/17 23:15	4.01
4-Ethyltoluene	ND		1.6	0.75	ppb v/v			11/03/17 23:15	4.01
Hexachlorobutadiene	ND		8.0	1.7	ppb v/v			11/03/17 23:15	4.01
2-Hexanone	ND		1.6	0.35	ppb v/v			11/03/17 23:15	4.01
4-Methyl-2-pentanone (MIBK)	ND		1.6	0.54	ppb v/v			11/03/17 23:15	4.01
Methylene Chloride	1.4	J	1.6	0.29	ppb v/v			11/03/17 23:15	4.01
Styrene	ND		1.6	0.24	ppb v/v			11/03/17 23:15	4.01
1,1,2,2-Tetrachloroethane	ND		1.6	0.28	ppb v/v			11/03/17 23:15	4.01
Tetrachloroethene	91		1.6	0.20	ppb v/v			11/03/17 23:15	4.01
Toluene	ND		1.6	0.20	ppb v/v			11/03/17 23:15	4.01

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103933-001/MWL-SV05-300

Lab Sample ID: 320-32934-5

Date Collected: 10/26/17 11:00

Matrix: Air

Date Received: 11/02/17 09:30

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	120		1.6	0.65	ppb v/v			11/03/17 23:15	4.01
1,2,4-Trichlorobenzene	ND		8.0	1.7	ppb v/v			11/03/17 23:15	4.01
1,1,1-Trichloroethane	2.0		1.2	0.26	ppb v/v			11/03/17 23:15	4.01
1,1,2-Trichloroethane	ND		1.6	0.27	ppb v/v			11/03/17 23:15	4.01
Trichloroethene	120		1.6	0.42	ppb v/v			11/03/17 23:15	4.01
Trichlorofluoromethane	37		1.6	0.79	ppb v/v			11/03/17 23:15	4.01
1,2,4-Trimethylbenzene	ND		3.2	0.65	ppb v/v			11/03/17 23:15	4.01
1,3,5-Trimethylbenzene	ND		1.6	0.50	ppb v/v			11/03/17 23:15	4.01
Vinyl acetate	ND		3.2	0.58	ppb v/v			11/03/17 23:15	4.01
Vinyl chloride	ND		1.6	0.48	ppb v/v			11/03/17 23:15	4.01
m,p-Xylene	ND		3.2	0.40	ppb v/v			11/03/17 23:15	4.01
o-Xylene	ND		1.6	0.22	ppb v/v			11/03/17 23:15	4.01

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130		11/03/17 23:15	4.01
1,2-Dichloroethane-d4 (Surr)	102		70 - 130		11/03/17 23:15	4.01
Toluene-d8 (Surr)	103		70 - 130		11/03/17 23:15	4.01

Client Sample ID: 103934-001/MWL-SV05-400

Lab Sample ID: 320-32934-6

Date Collected: 10/26/17 11:06

Matrix: Air

Date Received: 11/02/17 09:30

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	6.9	J	18	0.63	ppb v/v			11/04/17 00:08	3.52
Benzene	0.33	J	1.4	0.28	ppb v/v			11/04/17 00:08	3.52
Benzyl chloride	ND		2.8	0.57	ppb v/v			11/04/17 00:08	3.52
Bromodichloromethane	ND		1.1	0.23	ppb v/v			11/04/17 00:08	3.52
Bromoform	ND		1.4	0.25	ppb v/v			11/04/17 00:08	3.52
Bromomethane	ND		2.8	1.2	ppb v/v			11/04/17 00:08	3.52
2-Butanone (MEK)	ND		2.8	0.70	ppb v/v			11/04/17 00:08	3.52
Carbon disulfide	ND		2.8	0.27	ppb v/v			11/04/17 00:08	3.52
Carbon tetrachloride	0.61	J	2.8	0.23	ppb v/v			11/04/17 00:08	3.52
Chlorobenzene	ND		1.1	0.23	ppb v/v			11/04/17 00:08	3.52
Chloroethane	ND		2.8	1.1	ppb v/v			11/04/17 00:08	3.52
Chloroform	0.92	J	1.1	0.33	ppb v/v			11/04/17 00:08	3.52
Chloromethane	ND		2.8	0.69	ppb v/v			11/04/17 00:08	3.52
Dibromochloromethane	ND		1.4	0.28	ppb v/v			11/04/17 00:08	3.52
1,2-Dibromoethane (EDB)	ND		2.8	0.26	ppb v/v			11/04/17 00:08	3.52
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.55	ppb v/v			11/04/17 00:08	3.52
1,2-Dichlorobenzene	ND		1.4	0.46	ppb v/v			11/04/17 00:08	3.52
1,3-Dichlorobenzene	ND		1.4	0.39	ppb v/v			11/04/17 00:08	3.52
1,4-Dichlorobenzene	ND		1.4	0.52	ppb v/v			11/04/17 00:08	3.52
Dichlorodifluoromethane	15		1.4	0.51	ppb v/v			11/04/17 00:08	3.52
1,1-Dichloroethane	2.4		1.1	0.25	ppb v/v			11/04/17 00:08	3.52
1,2-Dichloroethane	ND		2.8	0.31	ppb v/v			11/04/17 00:08	3.52
1,1-Dichloroethene	18		2.8	0.45	ppb v/v			11/04/17 00:08	3.52

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103934-001/MWL-SV05-400

Lab Sample ID: 320-32934-6

Date Collected: 10/26/17 11:06

Matrix: Air

Date Received: 11/02/17 09:30

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	0.97	J	1.4	0.31	ppb v/v			11/04/17 00:08	3.52
trans-1,2-Dichloroethene	ND		1.4	0.35	ppb v/v			11/04/17 00:08	3.52
1,2-Dichloropropane	ND		1.4	0.84	ppb v/v			11/04/17 00:08	3.52
cis-1,3-Dichloropropene	ND		1.4	0.37	ppb v/v			11/04/17 00:08	3.52
trans-1,3-Dichloropropene	ND		1.4	0.31	ppb v/v			11/04/17 00:08	3.52
Ethylbenzene	ND		1.4	0.22	ppb v/v			11/04/17 00:08	3.52
4-Ethyltoluene	ND		1.4	0.66	ppb v/v			11/04/17 00:08	3.52
Hexachlorobutadiene	ND		7.0	1.5	ppb v/v			11/04/17 00:08	3.52
2-Hexanone	ND		1.4	0.31	ppb v/v			11/04/17 00:08	3.52
4-Methyl-2-pentanone (MIBK)	ND		1.4	0.48	ppb v/v			11/04/17 00:08	3.52
Methylene Chloride	1.2	J	1.4	0.25	ppb v/v			11/04/17 00:08	3.52
Styrene	ND		1.4	0.21	ppb v/v			11/04/17 00:08	3.52
1,1,2,2-Tetrachloroethane	ND		1.4	0.24	ppb v/v			11/04/17 00:08	3.52
Tetrachloroethene	92		1.4	0.18	ppb v/v			11/04/17 00:08	3.52
Toluene	0.63	J	1.4	0.18	ppb v/v			11/04/17 00:08	3.52
1,1,2-Trichloro-1,2,2-trifluoroethane	38		1.4	0.57	ppb v/v			11/04/17 00:08	3.52
1,2,4-Trichlorobenzene	ND		7.0	1.5	ppb v/v			11/04/17 00:08	3.52
1,1,1-Trichloroethane	2.7		1.1	0.23	ppb v/v			11/04/17 00:08	3.52
1,1,2-Trichloroethane	ND		1.4	0.24	ppb v/v			11/04/17 00:08	3.52
Trichloroethene	97		1.4	0.37	ppb v/v			11/04/17 00:08	3.52
Trichlorofluoromethane	26		1.4	0.69	ppb v/v			11/04/17 00:08	3.52
1,2,4-Trimethylbenzene	ND		2.8	0.57	ppb v/v			11/04/17 00:08	3.52
1,3,5-Trimethylbenzene	ND		1.4	0.44	ppb v/v			11/04/17 00:08	3.52
Vinyl acetate	ND		2.8	0.51	ppb v/v			11/04/17 00:08	3.52
Vinyl chloride	ND		1.4	0.42	ppb v/v			11/04/17 00:08	3.52
m,p-Xylene	ND		2.8	0.35	ppb v/v			11/04/17 00:08	3.52
o-Xylene	ND		1.4	0.19	ppb v/v			11/04/17 00:08	3.52
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130					11/04/17 00:08	3.52
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/04/17 00:08	3.52
Toluene-d8 (Surr)	103		70 - 130					11/04/17 00:08	3.52

Client Sample ID: 103910-001/MWL-FB1

Lab Sample ID: 320-32934-7

Date Collected: 10/26/17 11:24

Matrix: Air

Date Received: 11/02/17 09:30

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		5.0	0.18	ppb v/v			11/04/17 01:05	1
Benzene	5.0		0.40	0.079	ppb v/v			11/04/17 01:05	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			11/04/17 01:05	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			11/04/17 01:05	1
Bromoform	ND		0.40	0.070	ppb v/v			11/04/17 01:05	1
Bromomethane	ND		0.80	0.34	ppb v/v			11/04/17 01:05	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			11/04/17 01:05	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			11/04/17 01:05	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103910-001/MWL-FB1

Lab Sample ID: 320-32934-7

Date Collected: 10/26/17 11:24

Matrix: Air

Date Received: 11/02/17 09:30

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	ND		0.80	0.064	ppb v/v			11/04/17 01:05	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			11/04/17 01:05	1
Chloroethane	ND		0.80	0.31	ppb v/v			11/04/17 01:05	1
Chloroform	ND		0.30	0.095	ppb v/v			11/04/17 01:05	1
Chloromethane	ND		0.80	0.20	ppb v/v			11/04/17 01:05	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			11/04/17 01:05	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			11/04/17 01:05	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			11/04/17 01:05	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			11/04/17 01:05	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			11/04/17 01:05	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			11/04/17 01:05	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			11/04/17 01:05	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			11/04/17 01:05	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			11/04/17 01:05	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			11/04/17 01:05	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			11/04/17 01:05	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			11/04/17 01:05	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			11/04/17 01:05	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			11/04/17 01:05	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			11/04/17 01:05	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			11/04/17 01:05	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			11/04/17 01:05	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			11/04/17 01:05	1
2-Hexanone	ND		0.40	0.087	ppb v/v			11/04/17 01:05	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			11/04/17 01:05	1
Methylene Chloride	0.076	J	0.40	0.072	ppb v/v			11/04/17 01:05	1
Styrene	ND		0.40	0.059	ppb v/v			11/04/17 01:05	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			11/04/17 01:05	1
Tetrachloroethene	ND		0.40	0.051	ppb v/v			11/04/17 01:05	1
Toluene	ND		0.40	0.051	ppb v/v			11/04/17 01:05	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			11/04/17 01:05	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			11/04/17 01:05	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			11/04/17 01:05	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			11/04/17 01:05	1
Trichloroethene	ND		0.40	0.11	ppb v/v			11/04/17 01:05	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			11/04/17 01:05	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			11/04/17 01:05	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			11/04/17 01:05	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			11/04/17 01:05	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			11/04/17 01:05	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			11/04/17 01:05	1
o-Xylene	ND		0.40	0.054	ppb v/v			11/04/17 01:05	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		11/04/17 01:05	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		11/04/17 01:05	1
Toluene-d8 (Surr)	103		70 - 130		11/04/17 01:05	1

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103911-001/MWL-SV01-42.5

Lab Sample ID: 320-32934-8

Date Collected: 10/26/17 11:39

Matrix: Air

Date Received: 11/02/17 09:30

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	4.7	J	51	1.8	ppb v/v			11/04/17 01:56	10.2
Benzene	ND		4.1	0.81	ppb v/v			11/04/17 01:56	10.2
Benzyl chloride	ND		8.2	1.7	ppb v/v			11/04/17 01:56	10.2
Bromodichloromethane	ND		3.1	0.67	ppb v/v			11/04/17 01:56	10.2
Bromoform	ND		4.1	0.71	ppb v/v			11/04/17 01:56	10.2
Bromomethane	ND		8.2	3.4	ppb v/v			11/04/17 01:56	10.2
2-Butanone (MEK)	ND		8.2	2.0	ppb v/v			11/04/17 01:56	10.2
Carbon disulfide	ND		8.2	0.80	ppb v/v			11/04/17 01:56	10.2
Carbon tetrachloride	ND		8.2	0.65	ppb v/v			11/04/17 01:56	10.2
Chlorobenzene	ND		3.1	0.65	ppb v/v			11/04/17 01:56	10.2
Chloroethane	ND		8.2	3.1	ppb v/v			11/04/17 01:56	10.2
Chloroform	14		3.1	0.97	ppb v/v			11/04/17 01:56	10.2
Chloromethane	ND		8.2	2.0	ppb v/v			11/04/17 01:56	10.2
Dibromochloromethane	ND		4.1	0.81	ppb v/v			11/04/17 01:56	10.2
1,2-Dibromoethane (EDB)	ND		8.2	0.77	ppb v/v			11/04/17 01:56	10.2
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		4.1	1.6	ppb v/v			11/04/17 01:56	10.2
1,2-Dichlorobenzene	ND		4.1	1.3	ppb v/v			11/04/17 01:56	10.2
1,3-Dichlorobenzene	ND		4.1	1.1	ppb v/v			11/04/17 01:56	10.2
1,4-Dichlorobenzene	ND		4.1	1.5	ppb v/v			11/04/17 01:56	10.2
Dichlorodifluoromethane	84		4.1	1.5	ppb v/v			11/04/17 01:56	10.2
1,1-Dichloroethane	2.4	J	3.1	0.73	ppb v/v			11/04/17 01:56	10.2
1,2-Dichloroethane	ND		8.2	0.90	ppb v/v			11/04/17 01:56	10.2
1,1-Dichloroethene	6.5	J	8.2	1.3	ppb v/v			11/04/17 01:56	10.2
cis-1,2-Dichloroethene	1.2	J	4.1	0.91	ppb v/v			11/04/17 01:56	10.2
trans-1,2-Dichloroethene	ND		4.1	1.0	ppb v/v			11/04/17 01:56	10.2
1,2-Dichloropropane	ND		4.1	2.4	ppb v/v			11/04/17 01:56	10.2
cis-1,3-Dichloropropene	ND		4.1	1.1	ppb v/v			11/04/17 01:56	10.2
trans-1,3-Dichloropropene	ND		4.1	0.90	ppb v/v			11/04/17 01:56	10.2
Ethylbenzene	ND		4.1	0.64	ppb v/v			11/04/17 01:56	10.2
4-Ethyltoluene	ND		4.1	1.9	ppb v/v			11/04/17 01:56	10.2
Hexachlorobutadiene	ND		20	4.4	ppb v/v			11/04/17 01:56	10.2
2-Hexanone	ND		4.1	0.89	ppb v/v			11/04/17 01:56	10.2
4-Methyl-2-pentanone (MIBK)	ND		4.1	1.4	ppb v/v			11/04/17 01:56	10.2
Methylene Chloride	0.81	J	4.1	0.73	ppb v/v			11/04/17 01:56	10.2
Styrene	ND		4.1	0.60	ppb v/v			11/04/17 01:56	10.2
1,1,2,2-Tetrachloroethane	ND		4.1	0.70	ppb v/v			11/04/17 01:56	10.2
Tetrachloroethene	340		4.1	0.52	ppb v/v			11/04/17 01:56	10.2
Toluene	ND		4.1	0.52	ppb v/v			11/04/17 01:56	10.2
1,1,2-Trichloro-1,2,2-trifluoroethane	67		4.1	1.7	ppb v/v			11/04/17 01:56	10.2
1,2,4-Trichlorobenzene	ND		20	4.4	ppb v/v			11/04/17 01:56	10.2
1,1,1-Trichloroethane	34		3.1	0.66	ppb v/v			11/04/17 01:56	10.2
1,1,2-Trichloroethane	ND		4.1	0.68	ppb v/v			11/04/17 01:56	10.2
Trichloroethene	74		4.1	1.1	ppb v/v			11/04/17 01:56	10.2
Trichlorofluoromethane	160		4.1	2.0	ppb v/v			11/04/17 01:56	10.2
1,2,4-Trimethylbenzene	ND		8.2	1.7	ppb v/v			11/04/17 01:56	10.2
1,3,5-Trimethylbenzene	ND		4.1	1.3	ppb v/v			11/04/17 01:56	10.2
Vinyl acetate	ND		8.2	1.5	ppb v/v			11/04/17 01:56	10.2
Vinyl chloride	ND		4.1	1.2	ppb v/v			11/04/17 01:56	10.2

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103911-001/MWL-SV01-42.5

Lab Sample ID: 320-32934-8

Date Collected: 10/26/17 11:39

Matrix: Air

Date Received: 11/02/17 09:30

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		8.2	1.0	ppb v/v			11/04/17 01:56	10.2
o-Xylene	ND		4.1	0.55	ppb v/v			11/04/17 01:56	10.2
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					11/04/17 01:56	10.2
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					11/04/17 01:56	10.2
Toluene-d8 (Surr)	104		70 - 130					11/04/17 01:56	10.2

Client Sample ID: 103912-001/MWL-SV01-42.5

Lab Sample ID: 320-32934-9

Date Collected: 10/26/17 11:39

Matrix: Air

Date Received: 11/02/17 09:30

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	5.1	J	51	1.8	ppb v/v			11/03/17 18:17	10.2
Benzene	ND		4.1	0.81	ppb v/v			11/03/17 18:17	10.2
Benzyl chloride	ND		8.2	1.7	ppb v/v			11/03/17 18:17	10.2
Bromodichloromethane	ND		3.1	0.67	ppb v/v			11/03/17 18:17	10.2
Bromoform	ND		4.1	0.71	ppb v/v			11/03/17 18:17	10.2
Bromomethane	ND		8.2	3.4	ppb v/v			11/03/17 18:17	10.2
2-Butanone (MEK)	ND		8.2	2.0	ppb v/v			11/03/17 18:17	10.2
Carbon disulfide	ND		8.2	0.80	ppb v/v			11/03/17 18:17	10.2
Carbon tetrachloride	ND		8.2	0.65	ppb v/v			11/03/17 18:17	10.2
Chlorobenzene	ND		3.1	0.65	ppb v/v			11/03/17 18:17	10.2
Chloroethane	ND		8.2	3.1	ppb v/v			11/03/17 18:17	10.2
Chloroform	14		3.1	0.97	ppb v/v			11/03/17 18:17	10.2
Chloromethane	ND		8.2	2.0	ppb v/v			11/03/17 18:17	10.2
Dibromochloromethane	ND		4.1	0.81	ppb v/v			11/03/17 18:17	10.2
1,2-Dibromoethane (EDB)	ND		8.2	0.77	ppb v/v			11/03/17 18:17	10.2
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		4.1	1.6	ppb v/v			11/03/17 18:17	10.2
1,2-Dichlorobenzene	ND		4.1	1.3	ppb v/v			11/03/17 18:17	10.2
1,3-Dichlorobenzene	ND		4.1	1.1	ppb v/v			11/03/17 18:17	10.2
1,4-Dichlorobenzene	ND		4.1	1.5	ppb v/v			11/03/17 18:17	10.2
Dichlorodifluoromethane	84		4.1	1.5	ppb v/v			11/03/17 18:17	10.2
1,1-Dichloroethane	2.3	J	3.1	0.73	ppb v/v			11/03/17 18:17	10.2
1,2-Dichloroethane	ND		8.2	0.90	ppb v/v			11/03/17 18:17	10.2
1,1-Dichloroethene	6.6	J	8.2	1.3	ppb v/v			11/03/17 18:17	10.2
cis-1,2-Dichloroethene	1.1	J	4.1	0.91	ppb v/v			11/03/17 18:17	10.2
trans-1,2-Dichloroethene	ND		4.1	1.0	ppb v/v			11/03/17 18:17	10.2
1,2-Dichloropropane	ND		4.1	2.4	ppb v/v			11/03/17 18:17	10.2
cis-1,3-Dichloropropene	ND		4.1	1.1	ppb v/v			11/03/17 18:17	10.2
trans-1,3-Dichloropropene	ND		4.1	0.90	ppb v/v			11/03/17 18:17	10.2
Ethylbenzene	ND		4.1	0.64	ppb v/v			11/03/17 18:17	10.2
4-Ethyltoluene	ND		4.1	1.9	ppb v/v			11/03/17 18:17	10.2
Hexachlorobutadiene	ND		20	4.4	ppb v/v			11/03/17 18:17	10.2
2-Hexanone	ND		4.1	0.89	ppb v/v			11/03/17 18:17	10.2
4-Methyl-2-pentanone (MIBK)	ND		4.1	1.4	ppb v/v			11/03/17 18:17	10.2
Methylene Chloride	ND		4.1	0.73	ppb v/v			11/03/17 18:17	10.2

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103912-001/MWL-SV01-42.5

Lab Sample ID: 320-32934-9

Date Collected: 10/26/17 11:39

Matrix: Air

Date Received: 11/02/17 09:30

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		4.1	0.60	ppb v/v			11/03/17 18:17	10.2
1,1,2,2-Tetrachloroethane	ND		4.1	0.70	ppb v/v			11/03/17 18:17	10.2
Tetrachloroethene	420		4.1	0.52	ppb v/v			11/03/17 18:17	10.2
Toluene	ND		4.1	0.52	ppb v/v			11/03/17 18:17	10.2
1,1,2-Trichloro-1,2,2-trifluoroethane	72		4.1	1.7	ppb v/v			11/03/17 18:17	10.2
1,2,4-Trichlorobenzene	ND		20	4.4	ppb v/v			11/03/17 18:17	10.2
1,1,1-Trichloroethane	37		3.1	0.66	ppb v/v			11/03/17 18:17	10.2
1,1,2-Trichloroethane	ND		4.1	0.68	ppb v/v			11/03/17 18:17	10.2
Trichloroethene	86		4.1	1.1	ppb v/v			11/03/17 18:17	10.2
Trichlorofluoromethane	170		4.1	2.0	ppb v/v			11/03/17 18:17	10.2
1,2,4-Trimethylbenzene	ND		8.2	1.7	ppb v/v			11/03/17 18:17	10.2
1,3,5-Trimethylbenzene	ND		4.1	1.3	ppb v/v			11/03/17 18:17	10.2
Vinyl acetate	ND		8.2	1.5	ppb v/v			11/03/17 18:17	10.2
Vinyl chloride	ND		4.1	1.2	ppb v/v			11/03/17 18:17	10.2
m,p-Xylene	ND		8.2	1.0	ppb v/v			11/03/17 18:17	10.2
o-Xylene	ND		4.1	0.55	ppb v/v			11/03/17 18:17	10.2

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		11/03/17 18:17	10.2
1,2-Dichloroethane-d4 (Surr)	100		70 - 130		11/03/17 18:17	10.2
Toluene-d8 (Surr)	92		70 - 130		11/03/17 18:17	10.2

Client Sample ID: 103913-001/MWL-FB2

Lab Sample ID: 320-32934-10

Date Collected: 10/26/17 11:25

Matrix: Air

Date Received: 11/02/17 09:30

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	0.43	J	5.0	0.18	ppb v/v			11/03/17 19:15	1
Benzene	5.9		0.40	0.079	ppb v/v			11/03/17 19:15	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			11/03/17 19:15	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			11/03/17 19:15	1
Bromoform	ND		0.40	0.070	ppb v/v			11/03/17 19:15	1
Bromomethane	ND		0.80	0.34	ppb v/v			11/03/17 19:15	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			11/03/17 19:15	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			11/03/17 19:15	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			11/03/17 19:15	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			11/03/17 19:15	1
Chloroethane	ND		0.80	0.31	ppb v/v			11/03/17 19:15	1
Chloroform	ND		0.30	0.095	ppb v/v			11/03/17 19:15	1
Chloromethane	ND		0.80	0.20	ppb v/v			11/03/17 19:15	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			11/03/17 19:15	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			11/03/17 19:15	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			11/03/17 19:15	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			11/03/17 19:15	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			11/03/17 19:15	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			11/03/17 19:15	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103913-001/MWL-FB2

Lab Sample ID: 320-32934-10

Date Collected: 10/26/17 11:25

Matrix: Air

Date Received: 11/02/17 09:30

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	ND		0.40	0.15	ppb v/v			11/03/17 19:15	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			11/03/17 19:15	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			11/03/17 19:15	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			11/03/17 19:15	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			11/03/17 19:15	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			11/03/17 19:15	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			11/03/17 19:15	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			11/03/17 19:15	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			11/03/17 19:15	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			11/03/17 19:15	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			11/03/17 19:15	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			11/03/17 19:15	1
2-Hexanone	ND		0.40	0.087	ppb v/v			11/03/17 19:15	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			11/03/17 19:15	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			11/03/17 19:15	1
Styrene	ND		0.40	0.059	ppb v/v			11/03/17 19:15	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			11/03/17 19:15	1
Tetrachloroethene	0.25	J	0.40	0.051	ppb v/v			11/03/17 19:15	1
Toluene	0.058	J	0.40	0.051	ppb v/v			11/03/17 19:15	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			11/03/17 19:15	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			11/03/17 19:15	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			11/03/17 19:15	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			11/03/17 19:15	1
Trichloroethene	ND		0.40	0.11	ppb v/v			11/03/17 19:15	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			11/03/17 19:15	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			11/03/17 19:15	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			11/03/17 19:15	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			11/03/17 19:15	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			11/03/17 19:15	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			11/03/17 19:15	1
o-Xylene	ND		0.40	0.054	ppb v/v			11/03/17 19:15	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130		11/03/17 19:15	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		11/03/17 19:15	1
Toluene-d8 (Surr)	96		70 - 130		11/03/17 19:15	1

Client Sample ID: 103914-001/MWL-SV02-41.5

Lab Sample ID: 320-32934-11

Date Collected: 10/26/17 11:48

Matrix: Air

Date Received: 11/02/17 09:30

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	7.3	J	38	1.4	ppb v/v			11/03/17 20:07	7.65
Benzene	ND		3.1	0.60	ppb v/v			11/03/17 20:07	7.65
Benzyl chloride	ND		6.1	1.2	ppb v/v			11/03/17 20:07	7.65
Bromodichloromethane	ND		2.3	0.50	ppb v/v			11/03/17 20:07	7.65
Bromoform	ND		3.1	0.54	ppb v/v			11/03/17 20:07	7.65

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103914-001/MWL-SV02-41.5

Lab Sample ID: 320-32934-11

Date Collected: 10/26/17 11:48

Matrix: Air

Date Received: 11/02/17 09:30

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		6.1	2.6	ppb v/v			11/03/17 20:07	7.65
2-Butanone (MEK)	3.5	J	6.1	1.5	ppb v/v			11/03/17 20:07	7.65
Carbon disulfide	ND		6.1	0.60	ppb v/v			11/03/17 20:07	7.65
Carbon tetrachloride	ND		6.1	0.49	ppb v/v			11/03/17 20:07	7.65
Chlorobenzene	ND		2.3	0.49	ppb v/v			11/03/17 20:07	7.65
Chloroethane	ND		6.1	2.4	ppb v/v			11/03/17 20:07	7.65
Chloroform	2.8		2.3	0.73	ppb v/v			11/03/17 20:07	7.65
Chloromethane	ND		6.1	1.5	ppb v/v			11/03/17 20:07	7.65
Dibromochloromethane	ND		3.1	0.60	ppb v/v			11/03/17 20:07	7.65
1,2-Dibromoethane (EDB)	ND		6.1	0.57	ppb v/v			11/03/17 20:07	7.65
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		3.1	1.2	ppb v/v			11/03/17 20:07	7.65
1,2-Dichlorobenzene	ND		3.1	0.99	ppb v/v			11/03/17 20:07	7.65
1,3-Dichlorobenzene	ND		3.1	0.84	ppb v/v			11/03/17 20:07	7.65
1,4-Dichlorobenzene	ND		3.1	1.1	ppb v/v			11/03/17 20:07	7.65
Dichlorodifluoromethane	80		3.1	1.1	ppb v/v			11/03/17 20:07	7.65
1,1-Dichloroethane	2.3		2.3	0.55	ppb v/v			11/03/17 20:07	7.65
1,2-Dichloroethane	ND		6.1	0.67	ppb v/v			11/03/17 20:07	7.65
1,1-Dichloroethene	11		6.1	0.99	ppb v/v			11/03/17 20:07	7.65
cis-1,2-Dichloroethene	ND		3.1	0.68	ppb v/v			11/03/17 20:07	7.65
trans-1,2-Dichloroethene	ND		3.1	0.77	ppb v/v			11/03/17 20:07	7.65
1,2-Dichloropropane	ND		3.1	1.8	ppb v/v			11/03/17 20:07	7.65
cis-1,3-Dichloropropene	ND		3.1	0.80	ppb v/v			11/03/17 20:07	7.65
trans-1,3-Dichloropropene	ND		3.1	0.67	ppb v/v			11/03/17 20:07	7.65
Ethylbenzene	ND		3.1	0.48	ppb v/v			11/03/17 20:07	7.65
4-Ethyltoluene	ND		3.1	1.4	ppb v/v			11/03/17 20:07	7.65
Hexachlorobutadiene	ND		15	3.3	ppb v/v			11/03/17 20:07	7.65
2-Hexanone	ND		3.1	0.67	ppb v/v			11/03/17 20:07	7.65
4-Methyl-2-pentanone (MIBK)	ND		3.1	1.0	ppb v/v			11/03/17 20:07	7.65
Methylene Chloride	ND		3.1	0.55	ppb v/v			11/03/17 20:07	7.65
Styrene	ND		3.1	0.45	ppb v/v			11/03/17 20:07	7.65
1,1,2,2-Tetrachloroethane	ND		3.1	0.53	ppb v/v			11/03/17 20:07	7.65
Tetrachloroethene	69		3.1	0.39	ppb v/v			11/03/17 20:07	7.65
Toluene	ND		3.1	0.39	ppb v/v			11/03/17 20:07	7.65
1,1,2-Trichloro-1,2,2-trifluoroethane	49		3.1	1.2	ppb v/v			11/03/17 20:07	7.65
1,2,4-Trichlorobenzene	ND		15	3.3	ppb v/v			11/03/17 20:07	7.65
1,1,1-Trichloroethane	72		2.3	0.50	ppb v/v			11/03/17 20:07	7.65
1,1,2-Trichloroethane	ND		3.1	0.51	ppb v/v			11/03/17 20:07	7.65
Trichloroethene	65		3.1	0.80	ppb v/v			11/03/17 20:07	7.65
Trichlorofluoromethane	300		3.1	1.5	ppb v/v			11/03/17 20:07	7.65
1,2,4-Trimethylbenzene	ND		6.1	1.2	ppb v/v			11/03/17 20:07	7.65
1,3,5-Trimethylbenzene	ND		3.1	0.96	ppb v/v			11/03/17 20:07	7.65
Vinyl acetate	ND		6.1	1.1	ppb v/v			11/03/17 20:07	7.65
Vinyl chloride	ND		3.1	0.92	ppb v/v			11/03/17 20:07	7.65
m,p-Xylene	ND		6.1	0.77	ppb v/v			11/03/17 20:07	7.65
o-Xylene	ND		3.1	0.41	ppb v/v			11/03/17 20:07	7.65

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130		11/03/17 20:07	7.65

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103914-001/MWL-SV02-41.5

Lab Sample ID: 320-32934-11

Date Collected: 10/26/17 11:48

Matrix: Air

Date Received: 11/02/17 09:30

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)	101		70 - 130		11/03/17 20:07	7.65
Toluene-d8 (Surr)	97		70 - 130		11/03/17 20:07	7.65

Client Sample ID: 103915-001/MWL-SV02-41.5

Lab Sample ID: 320-32934-12

Date Collected: 10/26/17 11:48

Matrix: Air

Date Received: 11/02/17 09:30

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	5.9	J	37	1.3	ppb v/v			11/03/17 20:58	7.34
Benzene	ND		2.9	0.58	ppb v/v			11/03/17 20:58	7.34
Benzyl chloride	ND		5.9	1.2	ppb v/v			11/03/17 20:58	7.34
Bromodichloromethane	ND		2.2	0.48	ppb v/v			11/03/17 20:58	7.34
Bromoform	ND		2.9	0.51	ppb v/v			11/03/17 20:58	7.34
Bromomethane	ND		5.9	2.5	ppb v/v			11/03/17 20:58	7.34
2-Butanone (MEK)	ND		5.9	1.5	ppb v/v			11/03/17 20:58	7.34
Carbon disulfide	ND		5.9	0.57	ppb v/v			11/03/17 20:58	7.34
Carbon tetrachloride	ND		5.9	0.47	ppb v/v			11/03/17 20:58	7.34
Chlorobenzene	ND		2.2	0.47	ppb v/v			11/03/17 20:58	7.34
Chloroethane	ND		5.9	2.3	ppb v/v			11/03/17 20:58	7.34
Chloroform	2.9		2.2	0.70	ppb v/v			11/03/17 20:58	7.34
Chloromethane	ND		5.9	1.4	ppb v/v			11/03/17 20:58	7.34
Dibromochloromethane	ND		2.9	0.58	ppb v/v			11/03/17 20:58	7.34
1,2-Dibromoethane (EDB)	ND		5.9	0.55	ppb v/v			11/03/17 20:58	7.34
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		2.9	1.1	ppb v/v			11/03/17 20:58	7.34
1,2-Dichlorobenzene	ND		2.9	0.95	ppb v/v			11/03/17 20:58	7.34
1,3-Dichlorobenzene	ND		2.9	0.81	ppb v/v			11/03/17 20:58	7.34
1,4-Dichlorobenzene	ND		2.9	1.1	ppb v/v			11/03/17 20:58	7.34
Dichlorodifluoromethane	78		2.9	1.1	ppb v/v			11/03/17 20:58	7.34
1,1-Dichloroethane	2.4		2.2	0.53	ppb v/v			11/03/17 20:58	7.34
1,2-Dichloroethane	ND		5.9	0.65	ppb v/v			11/03/17 20:58	7.34
1,1-Dichloroethene	11		5.9	0.95	ppb v/v			11/03/17 20:58	7.34
cis-1,2-Dichloroethene	ND		2.9	0.65	ppb v/v			11/03/17 20:58	7.34
trans-1,2-Dichloroethene	ND		2.9	0.73	ppb v/v			11/03/17 20:58	7.34
1,2-Dichloropropane	ND		2.9	1.8	ppb v/v			11/03/17 20:58	7.34
cis-1,3-Dichloropropene	ND		2.9	0.76	ppb v/v			11/03/17 20:58	7.34
trans-1,3-Dichloropropene	ND		2.9	0.65	ppb v/v			11/03/17 20:58	7.34
Ethylbenzene	0.54	J	2.9	0.46	ppb v/v			11/03/17 20:58	7.34
4-Ethyltoluene	ND		2.9	1.4	ppb v/v			11/03/17 20:58	7.34
Hexachlorobutadiene	ND		15	3.2	ppb v/v			11/03/17 20:58	7.34
2-Hexanone	ND		2.9	0.64	ppb v/v			11/03/17 20:58	7.34
4-Methyl-2-pentanone (MIBK)	ND		2.9	0.99	ppb v/v			11/03/17 20:58	7.34
Methylene Chloride	ND		2.9	0.53	ppb v/v			11/03/17 20:58	7.34
Styrene	ND		2.9	0.43	ppb v/v			11/03/17 20:58	7.34
1,1,2,2-Tetrachloroethane	ND		2.9	0.51	ppb v/v			11/03/17 20:58	7.34
Tetrachloroethene	72		2.9	0.37	ppb v/v			11/03/17 20:58	7.34
Toluene	ND		2.9	0.37	ppb v/v			11/03/17 20:58	7.34

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103915-001/MWL-SV02-41.5

Lab Sample ID: 320-32934-12

Date Collected: 10/26/17 11:48

Matrix: Air

Date Received: 11/02/17 09:30

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	50		2.9	1.2	ppb v/v			11/03/17 20:58	7.34
1,2,4-Trichlorobenzene	ND		15	3.2	ppb v/v			11/03/17 20:58	7.34
1,1,1-Trichloroethane	74		2.2	0.48	ppb v/v			11/03/17 20:58	7.34
1,1,2-Trichloroethane	ND		2.9	0.49	ppb v/v			11/03/17 20:58	7.34
Trichloroethene	67		2.9	0.77	ppb v/v			11/03/17 20:58	7.34
Trichlorofluoromethane	310		2.9	1.4	ppb v/v			11/03/17 20:58	7.34
1,2,4-Trimethylbenzene	3.1 J		5.9	1.2	ppb v/v			11/03/17 20:58	7.34
1,3,5-Trimethylbenzene	1.4 J		2.9	0.92	ppb v/v			11/03/17 20:58	7.34
Vinyl acetate	ND		5.9	1.1	ppb v/v			11/03/17 20:58	7.34
Vinyl chloride	ND		2.9	0.88	ppb v/v			11/03/17 20:58	7.34
m,p-Xylene	2.5 J		5.9	0.73	ppb v/v			11/03/17 20:58	7.34
o-Xylene	1.1 J		2.9	0.40	ppb v/v			11/03/17 20:58	7.34

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		70 - 130		11/03/17 20:58	7.34
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		11/03/17 20:58	7.34
Toluene-d8 (Surr)	97		70 - 130		11/03/17 20:58	7.34

Client Sample ID: 103916-001/MWL-FB3

Lab Sample ID: 320-32934-13

Date Collected: 10/26/17 08:24

Matrix: Air

Date Received: 11/02/17 09:30

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	0.42 J		5.0	0.18	ppb v/v			11/03/17 21:57	1
Benzene	4.7		0.40	0.079	ppb v/v			11/03/17 21:57	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			11/03/17 21:57	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			11/03/17 21:57	1
Bromoform	ND		0.40	0.070	ppb v/v			11/03/17 21:57	1
Bromomethane	ND		0.80	0.34	ppb v/v			11/03/17 21:57	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			11/03/17 21:57	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			11/03/17 21:57	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			11/03/17 21:57	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			11/03/17 21:57	1
Chloroethane	ND		0.80	0.31	ppb v/v			11/03/17 21:57	1
Chloroform	ND		0.30	0.095	ppb v/v			11/03/17 21:57	1
Chloromethane	0.20 J		0.80	0.20	ppb v/v			11/03/17 21:57	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			11/03/17 21:57	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			11/03/17 21:57	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			11/03/17 21:57	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			11/03/17 21:57	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			11/03/17 21:57	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			11/03/17 21:57	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			11/03/17 21:57	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			11/03/17 21:57	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			11/03/17 21:57	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			11/03/17 21:57	1

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103916-001/MWL-FB3

Lab Sample ID: 320-32934-13

Date Collected: 10/26/17 08:24

Matrix: Air

Date Received: 11/02/17 09:30

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	ND		0.40	0.089	ppb v/v			11/03/17 21:57	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			11/03/17 21:57	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			11/03/17 21:57	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			11/03/17 21:57	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			11/03/17 21:57	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			11/03/17 21:57	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			11/03/17 21:57	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			11/03/17 21:57	1
2-Hexanone	ND		0.40	0.087	ppb v/v			11/03/17 21:57	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			11/03/17 21:57	1
Methylene Chloride	ND		0.40	0.072	ppb v/v			11/03/17 21:57	1
Styrene	ND		0.40	0.059	ppb v/v			11/03/17 21:57	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			11/03/17 21:57	1
Tetrachloroethene	0.079	J	0.40	0.051	ppb v/v			11/03/17 21:57	1
Toluene	0.20	J	0.40	0.051	ppb v/v			11/03/17 21:57	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16	ppb v/v			11/03/17 21:57	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			11/03/17 21:57	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			11/03/17 21:57	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			11/03/17 21:57	1
Trichloroethene	0.34	J	0.40	0.11	ppb v/v			11/03/17 21:57	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			11/03/17 21:57	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			11/03/17 21:57	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			11/03/17 21:57	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			11/03/17 21:57	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			11/03/17 21:57	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			11/03/17 21:57	1
o-Xylene	ND		0.40	0.054	ppb v/v			11/03/17 21:57	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130					11/03/17 21:57	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/03/17 21:57	1
Toluene-d8 (Surr)	91		70 - 130					11/03/17 21:57	1

Client Sample ID: 103917-001/MWL-SV03-50

Lab Sample ID: 320-32934-14

Date Collected: 10/26/17 09:12

Matrix: Air

Date Received: 11/02/17 09:30

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	1.2	J	20	0.72	ppb v/v			11/03/17 22:49	4.05
Benzene	0.56	J	1.6	0.32	ppb v/v			11/03/17 22:49	4.05
Benzyl chloride	ND		3.2	0.66	ppb v/v			11/03/17 22:49	4.05
Bromodichloromethane	ND		1.2	0.27	ppb v/v			11/03/17 22:49	4.05
Bromoform	ND		1.6	0.28	ppb v/v			11/03/17 22:49	4.05
Bromomethane	ND		3.2	1.4	ppb v/v			11/03/17 22:49	4.05
2-Butanone (MEK)	ND		3.2	0.81	ppb v/v			11/03/17 22:49	4.05
Carbon disulfide	ND		3.2	0.32	ppb v/v			11/03/17 22:49	4.05
Carbon tetrachloride	ND		3.2	0.26	ppb v/v			11/03/17 22:49	4.05

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103917-001/MWL-SV03-50

Lab Sample ID: 320-32934-14

Date Collected: 10/26/17 09:12

Matrix: Air

Date Received: 11/02/17 09:30

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		1.2	0.26	ppb v/v			11/03/17 22:49	4.05
Chloroethane	ND		3.2	1.2	ppb v/v			11/03/17 22:49	4.05
Chloroform	1.8		1.2	0.38	ppb v/v			11/03/17 22:49	4.05
Chloromethane	ND		3.2	0.80	ppb v/v			11/03/17 22:49	4.05
Dibromochloromethane	ND		1.6	0.32	ppb v/v			11/03/17 22:49	4.05
1,2-Dibromoethane (EDB)	ND		3.2	0.30	ppb v/v			11/03/17 22:49	4.05
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.6	0.63	ppb v/v			11/03/17 22:49	4.05
1,2-Dichlorobenzene	ND		1.6	0.53	ppb v/v			11/03/17 22:49	4.05
1,3-Dichlorobenzene	ND		1.6	0.45	ppb v/v			11/03/17 22:49	4.05
1,4-Dichlorobenzene	ND		1.6	0.60	ppb v/v			11/03/17 22:49	4.05
Dichlorodifluoromethane	24		1.6	0.59	ppb v/v			11/03/17 22:49	4.05
1,1-Dichloroethane	3.7		1.2	0.29	ppb v/v			11/03/17 22:49	4.05
1,2-Dichloroethane	ND		3.2	0.36	ppb v/v			11/03/17 22:49	4.05
1,1-Dichloroethene	14		3.2	0.52	ppb v/v			11/03/17 22:49	4.05
cis-1,2-Dichloroethene	1.8		1.6	0.36	ppb v/v			11/03/17 22:49	4.05
trans-1,2-Dichloroethene	ND		1.6	0.41	ppb v/v			11/03/17 22:49	4.05
1,2-Dichloropropane	ND		1.6	0.97	ppb v/v			11/03/17 22:49	4.05
cis-1,3-Dichloropropene	ND		1.6	0.42	ppb v/v			11/03/17 22:49	4.05
trans-1,3-Dichloropropene	ND		1.6	0.36	ppb v/v			11/03/17 22:49	4.05
Ethylbenzene	ND		1.6	0.26	ppb v/v			11/03/17 22:49	4.05
4-Ethyltoluene	ND		1.6	0.76	ppb v/v			11/03/17 22:49	4.05
Hexachlorobutadiene	ND		8.1	1.7	ppb v/v			11/03/17 22:49	4.05
2-Hexanone	ND		1.6	0.35	ppb v/v			11/03/17 22:49	4.05
4-Methyl-2-pentanone (MIBK)	ND		1.6	0.55	ppb v/v			11/03/17 22:49	4.05
Methylene Chloride	1.1	J	1.6	0.29	ppb v/v			11/03/17 22:49	4.05
Styrene	ND		1.6	0.24	ppb v/v			11/03/17 22:49	4.05
1,1,2,2-Tetrachloroethane	ND		1.6	0.28	ppb v/v			11/03/17 22:49	4.05
Tetrachloroethene	140		1.6	0.21	ppb v/v			11/03/17 22:49	4.05
Toluene	ND		1.6	0.21	ppb v/v			11/03/17 22:49	4.05
1,1,2-Trichloro-1,2,2-trifluoroethane	86		1.6	0.66	ppb v/v			11/03/17 22:49	4.05
1,2,4-Trichlorobenzene	ND		8.1	1.8	ppb v/v			11/03/17 22:49	4.05
1,1,1-Trichloroethane	4.1		1.2	0.26	ppb v/v			11/03/17 22:49	4.05
1,1,2-Trichloroethane	ND		1.6	0.27	ppb v/v			11/03/17 22:49	4.05
Trichloroethene	120		1.6	0.43	ppb v/v			11/03/17 22:49	4.05
Trichlorofluoromethane	32		1.6	0.79	ppb v/v			11/03/17 22:49	4.05
1,2,4-Trimethylbenzene	ND		3.2	0.66	ppb v/v			11/03/17 22:49	4.05
1,3,5-Trimethylbenzene	ND		1.6	0.51	ppb v/v			11/03/17 22:49	4.05
Vinyl acetate	ND		3.2	0.59	ppb v/v			11/03/17 22:49	4.05
Vinyl chloride	ND		1.6	0.49	ppb v/v			11/03/17 22:49	4.05
m,p-Xylene	0.68	J	3.2	0.41	ppb v/v			11/03/17 22:49	4.05
o-Xylene	ND		1.6	0.22	ppb v/v			11/03/17 22:49	4.05
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	108		70 - 130					11/03/17 22:49	4.05
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					11/03/17 22:49	4.05
Toluene-d8 (Surr)	91		70 - 130					11/03/17 22:49	4.05

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103918-001/MWL-SV03-100

Lab Sample ID: 320-32934-15

Date Collected: 10/26/17 09:16

Matrix: Air

Date Received: 11/02/17 09:30

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	3.3	J	20	0.72	ppb v/v			11/03/17 23:42	4.07
Benzene	ND		1.6	0.32	ppb v/v			11/03/17 23:42	4.07
Benzyl chloride	ND		3.3	0.66	ppb v/v			11/03/17 23:42	4.07
Bromodichloromethane	ND		1.2	0.27	ppb v/v			11/03/17 23:42	4.07
Bromoform	ND		1.6	0.28	ppb v/v			11/03/17 23:42	4.07
Bromomethane	ND		3.3	1.4	ppb v/v			11/03/17 23:42	4.07
2-Butanone (MEK)	ND		3.3	0.81	ppb v/v			11/03/17 23:42	4.07
Carbon disulfide	ND		3.3	0.32	ppb v/v			11/03/17 23:42	4.07
Carbon tetrachloride	0.31	J	3.3	0.26	ppb v/v			11/03/17 23:42	4.07
Chlorobenzene	ND		1.2	0.26	ppb v/v			11/03/17 23:42	4.07
Chloroethane	ND		3.3	1.3	ppb v/v			11/03/17 23:42	4.07
Chloroform	2.3		1.2	0.39	ppb v/v			11/03/17 23:42	4.07
Chloromethane	0.83	J	3.3	0.80	ppb v/v			11/03/17 23:42	4.07
Dibromochloromethane	ND		1.6	0.32	ppb v/v			11/03/17 23:42	4.07
1,2-Dibromoethane (EDB)	ND		3.3	0.31	ppb v/v			11/03/17 23:42	4.07
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.6	0.63	ppb v/v			11/03/17 23:42	4.07
1,2-Dichlorobenzene	ND		1.6	0.53	ppb v/v			11/03/17 23:42	4.07
1,3-Dichlorobenzene	ND		1.6	0.45	ppb v/v			11/03/17 23:42	4.07
1,4-Dichlorobenzene	ND		1.6	0.61	ppb v/v			11/03/17 23:42	4.07
Dichlorodifluoromethane	31		1.6	0.59	ppb v/v			11/03/17 23:42	4.07
1,1-Dichloroethane	5.7		1.2	0.29	ppb v/v			11/03/17 23:42	4.07
1,2-Dichloroethane	ND		3.3	0.36	ppb v/v			11/03/17 23:42	4.07
1,1-Dichloroethene	22		3.3	0.53	ppb v/v			11/03/17 23:42	4.07
cis-1,2-Dichloroethene	3.3		1.6	0.36	ppb v/v			11/03/17 23:42	4.07
trans-1,2-Dichloroethene	ND		1.6	0.41	ppb v/v			11/03/17 23:42	4.07
1,2-Dichloropropane	ND		1.6	0.98	ppb v/v			11/03/17 23:42	4.07
cis-1,3-Dichloropropene	ND		1.6	0.42	ppb v/v			11/03/17 23:42	4.07
trans-1,3-Dichloropropene	ND		1.6	0.36	ppb v/v			11/03/17 23:42	4.07
Ethylbenzene	ND		1.6	0.26	ppb v/v			11/03/17 23:42	4.07
4-Ethyltoluene	ND		1.6	0.76	ppb v/v			11/03/17 23:42	4.07
Hexachlorobutadiene	ND		8.1	1.8	ppb v/v			11/03/17 23:42	4.07
2-Hexanone	ND		1.6	0.35	ppb v/v			11/03/17 23:42	4.07
4-Methyl-2-pentanone (MIBK)	ND		1.6	0.55	ppb v/v			11/03/17 23:42	4.07
Methylene Chloride	1.8		1.6	0.29	ppb v/v			11/03/17 23:42	4.07
Styrene	ND		1.6	0.24	ppb v/v			11/03/17 23:42	4.07
1,1,2,2-Tetrachloroethane	ND		1.6	0.28	ppb v/v			11/03/17 23:42	4.07
Tetrachloroethene	220		1.6	0.21	ppb v/v			11/03/17 23:42	4.07
Toluene	0.37	J	1.6	0.21	ppb v/v			11/03/17 23:42	4.07
1,1,2-Trichloro-1,2,2-trifluoroethane	120		1.6	0.66	ppb v/v			11/03/17 23:42	4.07
1,2,4-Trichlorobenzene	ND		8.1	1.8	ppb v/v			11/03/17 23:42	4.07
1,1,1-Trichloroethane	4.4		1.2	0.26	ppb v/v			11/03/17 23:42	4.07
1,1,2-Trichloroethane	ND		1.6	0.27	ppb v/v			11/03/17 23:42	4.07
Trichloroethene	180		1.6	0.43	ppb v/v			11/03/17 23:42	4.07
Trichlorofluoromethane	38		1.6	0.80	ppb v/v			11/03/17 23:42	4.07
1,2,4-Trimethylbenzene	ND		3.3	0.66	ppb v/v			11/03/17 23:42	4.07
1,3,5-Trimethylbenzene	ND		1.6	0.51	ppb v/v			11/03/17 23:42	4.07
Vinyl acetate	ND		3.3	0.59	ppb v/v			11/03/17 23:42	4.07
Vinyl chloride	ND		1.6	0.49	ppb v/v			11/03/17 23:42	4.07

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103918-001/MWL-SV03-100

Lab Sample ID: 320-32934-15

Date Collected: 10/26/17 09:16

Matrix: Air

Date Received: 11/02/17 09:30

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		3.3	0.41	ppb v/v			11/03/17 23:42	4.07
o-Xylene	ND		1.6	0.22	ppb v/v			11/03/17 23:42	4.07

Surrogate	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130				11/03/17 23:42	4.07
1,2-Dichloroethane-d4 (Surr)	102		70 - 130				11/03/17 23:42	4.07
Toluene-d8 (Surr)	92		70 - 130				11/03/17 23:42	4.07

Client Sample ID: 103919-001/MWL-SV03-200

Lab Sample ID: 320-32934-16

Date Collected: 10/26/17 09:20

Matrix: Air

Date Received: 11/02/17 09:30

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	2.2	J	38	1.4	ppb v/v			11/04/17 00:34	7.59
Benzene	ND		3.0	0.60	ppb v/v			11/04/17 00:34	7.59
Benzyl chloride	ND		6.1	1.2	ppb v/v			11/04/17 00:34	7.59
Bromodichloromethane	ND		2.3	0.50	ppb v/v			11/04/17 00:34	7.59
Bromoform	ND		3.0	0.53	ppb v/v			11/04/17 00:34	7.59
Bromomethane	ND		6.1	2.5	ppb v/v			11/04/17 00:34	7.59
2-Butanone (MEK)	ND		6.1	1.5	ppb v/v			11/04/17 00:34	7.59
Carbon disulfide	ND		6.1	0.59	ppb v/v			11/04/17 00:34	7.59
Carbon tetrachloride	ND		6.1	0.49	ppb v/v			11/04/17 00:34	7.59
Chlorobenzene	ND		2.3	0.49	ppb v/v			11/04/17 00:34	7.59
Chloroethane	ND		6.1	2.3	ppb v/v			11/04/17 00:34	7.59
Chloroform	2.3		2.3	0.72	ppb v/v			11/04/17 00:34	7.59
Chloromethane	ND		6.1	1.5	ppb v/v			11/04/17 00:34	7.59
Dibromochloromethane	ND		3.0	0.60	ppb v/v			11/04/17 00:34	7.59
1,2-Dibromoethane (EDB)	ND		6.1	0.57	ppb v/v			11/04/17 00:34	7.59
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		3.0	1.2	ppb v/v			11/04/17 00:34	7.59
1,2-Dichlorobenzene	ND		3.0	0.99	ppb v/v			11/04/17 00:34	7.59
1,3-Dichlorobenzene	ND		3.0	0.83	ppb v/v			11/04/17 00:34	7.59
1,4-Dichlorobenzene	ND		3.0	1.1	ppb v/v			11/04/17 00:34	7.59
Dichlorodifluoromethane	50		3.0	1.1	ppb v/v			11/04/17 00:34	7.59
1,1-Dichloroethane	7.4		2.3	0.55	ppb v/v			11/04/17 00:34	7.59
1,2-Dichloroethane	ND		6.1	0.67	ppb v/v			11/04/17 00:34	7.59
1,1-Dichloroethene	30		6.1	0.98	ppb v/v			11/04/17 00:34	7.59
cis-1,2-Dichloroethene	4.1		3.0	0.68	ppb v/v			11/04/17 00:34	7.59
trans-1,2-Dichloroethene	ND		3.0	0.76	ppb v/v			11/04/17 00:34	7.59
1,2-Dichloropropane	ND		3.0	1.8	ppb v/v			11/04/17 00:34	7.59
cis-1,3-Dichloropropene	ND		3.0	0.79	ppb v/v			11/04/17 00:34	7.59
trans-1,3-Dichloropropene	ND		3.0	0.67	ppb v/v			11/04/17 00:34	7.59
Ethylbenzene	ND		3.0	0.48	ppb v/v			11/04/17 00:34	7.59
4-Ethyltoluene	ND		3.0	1.4	ppb v/v			11/04/17 00:34	7.59
Hexachlorobutadiene	ND		15	3.3	ppb v/v			11/04/17 00:34	7.59
2-Hexanone	ND		3.0	0.66	ppb v/v			11/04/17 00:34	7.59
4-Methyl-2-pentanone (MIBK)	ND		3.0	1.0	ppb v/v			11/04/17 00:34	7.59
Methylene Chloride	3.4		3.0	0.55	ppb v/v			11/04/17 00:34	7.59

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103919-001/MWL-SV03-200

Lab Sample ID: 320-32934-16

Date Collected: 10/26/17 09:20

Matrix: Air

Date Received: 11/02/17 09:30

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		3.0	0.45	ppb v/v			11/04/17 00:34	7.59
1,1,2,2-Tetrachloroethane	ND		3.0	0.52	ppb v/v			11/04/17 00:34	7.59
Tetrachloroethene	260		3.0	0.39	ppb v/v			11/04/17 00:34	7.59
Toluene	ND		3.0	0.39	ppb v/v			11/04/17 00:34	7.59
1,1,2-Trichloro-1,2,2-trifluoroethane	160		3.0	1.2	ppb v/v			11/04/17 00:34	7.59
1,2,4-Trichlorobenzene	ND		15	3.3	ppb v/v			11/04/17 00:34	7.59
1,1,1-Trichloroethane	2.7		2.3	0.49	ppb v/v			11/04/17 00:34	7.59
1,1,2-Trichloroethane	ND		3.0	0.51	ppb v/v			11/04/17 00:34	7.59
Trichloroethene	230		3.0	0.80	ppb v/v			11/04/17 00:34	7.59
Trichlorofluoromethane	36		3.0	1.5	ppb v/v			11/04/17 00:34	7.59
1,2,4-Trimethylbenzene	ND		6.1	1.2	ppb v/v			11/04/17 00:34	7.59
1,3,5-Trimethylbenzene	ND		3.0	0.95	ppb v/v			11/04/17 00:34	7.59
Vinyl acetate	ND		6.1	1.1	ppb v/v			11/04/17 00:34	7.59
Vinyl chloride	ND		3.0	0.91	ppb v/v			11/04/17 00:34	7.59
m,p-Xylene	ND		6.1	0.76	ppb v/v			11/04/17 00:34	7.59
o-Xylene	ND		3.0	0.41	ppb v/v			11/04/17 00:34	7.59

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		70 - 130		11/04/17 00:34	7.59
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		11/04/17 00:34	7.59
Toluene-d8 (Surr)	90		70 - 130		11/04/17 00:34	7.59

Client Sample ID: 103920-001/MWL-SV03-300

Lab Sample ID: 320-32934-17

Date Collected: 10/26/17 09:24

Matrix: Air

Date Received: 11/02/17 09:30

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	5.2	J	37	1.3	ppb v/v			11/04/17 01:26	7.32
Benzene	ND		2.9	0.58	ppb v/v			11/04/17 01:26	7.32
Benzyl chloride	ND		5.9	1.2	ppb v/v			11/04/17 01:26	7.32
Bromodichloromethane	ND		2.2	0.48	ppb v/v			11/04/17 01:26	7.32
Bromoform	ND		2.9	0.51	ppb v/v			11/04/17 01:26	7.32
Bromomethane	ND		5.9	2.5	ppb v/v			11/04/17 01:26	7.32
2-Butanone (MEK)	ND		5.9	1.5	ppb v/v			11/04/17 01:26	7.32
Carbon disulfide	ND		5.9	0.57	ppb v/v			11/04/17 01:26	7.32
Carbon tetrachloride	ND		5.9	0.47	ppb v/v			11/04/17 01:26	7.32
Chlorobenzene	ND		2.2	0.47	ppb v/v			11/04/17 01:26	7.32
Chloroethane	ND		5.9	2.3	ppb v/v			11/04/17 01:26	7.32
Chloroform	1.4	J	2.2	0.70	ppb v/v			11/04/17 01:26	7.32
Chloromethane	1.5	J	5.9	1.4	ppb v/v			11/04/17 01:26	7.32
Dibromochloromethane	ND		2.9	0.58	ppb v/v			11/04/17 01:26	7.32
1,2-Dibromoethane (EDB)	ND		5.9	0.55	ppb v/v			11/04/17 01:26	7.32
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		2.9	1.1	ppb v/v			11/04/17 01:26	7.32
1,2-Dichlorobenzene	ND		2.9	0.95	ppb v/v			11/04/17 01:26	7.32
1,3-Dichlorobenzene	ND		2.9	0.81	ppb v/v			11/04/17 01:26	7.32
1,4-Dichlorobenzene	ND		2.9	1.1	ppb v/v			11/04/17 01:26	7.32

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103920-001/MWL-SV03-300

Lab Sample ID: 320-32934-17

Date Collected: 10/26/17 09:24

Matrix: Air

Date Received: 11/02/17 09:30

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	39		2.9	1.1	ppb v/v			11/04/17 01:26	7.32
1,1-Dichloroethane	3.4		2.2	0.53	ppb v/v			11/04/17 01:26	7.32
1,2-Dichloroethane	ND		5.9	0.64	ppb v/v			11/04/17 01:26	7.32
1,1-Dichloroethene	22		5.9	0.94	ppb v/v			11/04/17 01:26	7.32
cis-1,2-Dichloroethene	ND		2.9	0.65	ppb v/v			11/04/17 01:26	7.32
trans-1,2-Dichloroethene	ND		2.9	0.73	ppb v/v			11/04/17 01:26	7.32
1,2-Dichloropropane	ND		2.9	1.8	ppb v/v			11/04/17 01:26	7.32
cis-1,3-Dichloropropene	ND		2.9	0.76	ppb v/v			11/04/17 01:26	7.32
trans-1,3-Dichloropropene	ND		2.9	0.64	ppb v/v			11/04/17 01:26	7.32
Ethylbenzene	ND		2.9	0.46	ppb v/v			11/04/17 01:26	7.32
4-Ethyltoluene	ND		2.9	1.4	ppb v/v			11/04/17 01:26	7.32
Hexachlorobutadiene	ND		15	3.2	ppb v/v			11/04/17 01:26	7.32
2-Hexanone	ND		2.9	0.64	ppb v/v			11/04/17 01:26	7.32
4-Methyl-2-pentanone (MIBK)	ND		2.9	0.99	ppb v/v			11/04/17 01:26	7.32
Methylene Chloride	1.5	J	2.9	0.53	ppb v/v			11/04/17 01:26	7.32
Styrene	ND		2.9	0.43	ppb v/v			11/04/17 01:26	7.32
1,1,2,2-Tetrachloroethane	ND		2.9	0.51	ppb v/v			11/04/17 01:26	7.32
Tetrachloroethene	280		2.9	0.37	ppb v/v			11/04/17 01:26	7.32
Toluene	ND		2.9	0.37	ppb v/v			11/04/17 01:26	7.32
1,1,2-Trichloro-1,2,2-trifluoroethane	140		2.9	1.2	ppb v/v			11/04/17 01:26	7.32
1,2,4-Trichlorobenzene	ND		15	3.2	ppb v/v			11/04/17 01:26	7.32
1,1,1-Trichloroethane	1.1	J	2.2	0.48	ppb v/v			11/04/17 01:26	7.32
1,1,2-Trichloroethane	ND		2.9	0.49	ppb v/v			11/04/17 01:26	7.32
Trichloroethene	210		2.9	0.77	ppb v/v			11/04/17 01:26	7.32
Trichlorofluoromethane	18		2.9	1.4	ppb v/v			11/04/17 01:26	7.32
1,2,4-Trimethylbenzene	ND		5.9	1.2	ppb v/v			11/04/17 01:26	7.32
1,3,5-Trimethylbenzene	ND		2.9	0.92	ppb v/v			11/04/17 01:26	7.32
Vinyl acetate	ND		5.9	1.1	ppb v/v			11/04/17 01:26	7.32
Vinyl chloride	ND		2.9	0.88	ppb v/v			11/04/17 01:26	7.32
m,p-Xylene	ND		5.9	0.73	ppb v/v			11/04/17 01:26	7.32
o-Xylene	ND		2.9	0.40	ppb v/v			11/04/17 01:26	7.32

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		70 - 130		11/04/17 01:26	7.32
1,2-Dichloroethane-d4 (Surr)	104		70 - 130		11/04/17 01:26	7.32
Toluene-d8 (Surr)	97		70 - 130		11/04/17 01:26	7.32

Client Sample ID: 103921-001/MWL-SV03-400

Lab Sample ID: 320-32934-18

Date Collected: 10/26/17 09:43

Matrix: Air

Date Received: 11/02/17 09:30

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	12	J	55	1.9	ppb v/v			11/06/17 15:47	10.94
Benzene	ND		4.4	0.86	ppb v/v			11/06/17 15:47	10.94
Benzyl chloride	ND		8.8	1.8	ppb v/v			11/06/17 15:47	10.94
Bromodichloromethane	ND		3.3	0.72	ppb v/v			11/06/17 15:47	10.94

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103921-001/MWL-SV03-400

Lab Sample ID: 320-32934-18

Date Collected: 10/26/17 09:43

Matrix: Air

Date Received: 11/02/17 09:30

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		4.4	0.77	ppb v/v			11/06/17 15:47	10.94
Bromomethane	ND		8.8	3.7	ppb v/v			11/06/17 15:47	10.94
2-Butanone (MEK)	ND		8.8	2.2	ppb v/v			11/06/17 15:47	10.94
Carbon disulfide	ND		8.8	0.85	ppb v/v			11/06/17 15:47	10.94
Carbon tetrachloride	ND		8.8	0.70	ppb v/v			11/06/17 15:47	10.94
Chlorobenzene	ND		3.3	0.70	ppb v/v			11/06/17 15:47	10.94
Chloroethane	ND		8.8	3.4	ppb v/v			11/06/17 15:47	10.94
Chloroform	1.5	J	3.3	1.0	ppb v/v			11/06/17 15:47	10.94
Chloromethane	ND		8.8	2.2	ppb v/v			11/06/17 15:47	10.94
Dibromochloromethane	ND		4.4	0.86	ppb v/v			11/06/17 15:47	10.94
1,2-Dibromoethane (EDB)	ND		8.8	0.82	ppb v/v			11/06/17 15:47	10.94
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		4.4	1.7	ppb v/v			11/06/17 15:47	10.94
1,2-Dichlorobenzene	ND		4.4	1.4	ppb v/v			11/06/17 15:47	10.94
1,3-Dichlorobenzene	ND		4.4	1.2	ppb v/v			11/06/17 15:47	10.94
1,4-Dichlorobenzene	ND		4.4	1.6	ppb v/v			11/06/17 15:47	10.94
Dichlorodifluoromethane	13		4.4	1.6	ppb v/v			11/06/17 15:47	10.94
1,1-Dichloroethane	3.5		3.3	0.79	ppb v/v			11/06/17 15:47	10.94
1,2-Dichloroethane	ND		8.8	0.96	ppb v/v			11/06/17 15:47	10.94
1,1-Dichloroethene	15		8.8	1.4	ppb v/v			11/06/17 15:47	10.94
cis-1,2-Dichloroethene	3.1	J	4.4	0.97	ppb v/v			11/06/17 15:47	10.94
trans-1,2-Dichloroethene	ND		4.4	1.1	ppb v/v			11/06/17 15:47	10.94
1,2-Dichloropropane	ND		4.4	2.6	ppb v/v			11/06/17 15:47	10.94
cis-1,3-Dichloropropene	ND		4.4	1.1	ppb v/v			11/06/17 15:47	10.94
trans-1,3-Dichloropropene	ND		4.4	0.96	ppb v/v			11/06/17 15:47	10.94
Ethylbenzene	ND		4.4	0.69	ppb v/v			11/06/17 15:47	10.94
4-Ethyltoluene	ND		4.4	2.0	ppb v/v			11/06/17 15:47	10.94
Hexachlorobutadiene	ND		22	4.7	ppb v/v			11/06/17 15:47	10.94
2-Hexanone	ND		4.4	0.95	ppb v/v			11/06/17 15:47	10.94
4-Methyl-2-pentanone (MIBK)	ND		4.4	1.5	ppb v/v			11/06/17 15:47	10.94
Methylene Chloride	2.2	J	4.4	0.79	ppb v/v			11/06/17 15:47	10.94
Styrene	ND		4.4	0.65	ppb v/v			11/06/17 15:47	10.94
1,1,2,2-Tetrachloroethane	ND		4.4	0.75	ppb v/v			11/06/17 15:47	10.94
Tetrachloroethene	310		4.4	0.56	ppb v/v			11/06/17 15:47	10.94
Toluene	3.9	J	4.4	0.56	ppb v/v			11/06/17 15:47	10.94
1,1,2-Trichloro-1,2,2-trifluoroethane	42		4.4	1.8	ppb v/v			11/06/17 15:47	10.94
1,2,4-Trichlorobenzene	ND		22	4.7	ppb v/v			11/06/17 15:47	10.94
1,1,1-Trichloroethane	1.3	J	3.3	0.71	ppb v/v			11/06/17 15:47	10.94
1,1,2-Trichloroethane	ND		4.4	0.73	ppb v/v			11/06/17 15:47	10.94
Trichloroethene	230		4.4	1.1	ppb v/v			11/06/17 15:47	10.94
Trichlorofluoromethane	7.7		4.4	2.1	ppb v/v			11/06/17 15:47	10.94
1,2,4-Trimethylbenzene	ND		8.8	1.8	ppb v/v			11/06/17 15:47	10.94
1,3,5-Trimethylbenzene	ND		4.4	1.4	ppb v/v			11/06/17 15:47	10.94
Vinyl acetate	ND		8.8	1.6	ppb v/v			11/06/17 15:47	10.94
Vinyl chloride	ND		4.4	1.3	ppb v/v			11/06/17 15:47	10.94
m,p-Xylene	ND		8.8	1.1	ppb v/v			11/06/17 15:47	10.94
o-Xylene	ND		4.4	0.59	ppb v/v			11/06/17 15:47	10.94

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103921-001/MWL-SV03-400

Lab Sample ID: 320-32934-18

Date Collected: 10/26/17 09:43

Matrix: Air

Date Received: 11/02/17 09:30

Sample Container: Summa Canister 6L

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		70 - 130		11/06/17 15:47	10.94
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		11/06/17 15:47	10.94
Toluene-d8 (Surr)	104		70 - 130		11/06/17 15:47	10.94

Client Sample ID: 103922-001/MWL-FB4

Lab Sample ID: 320-32934-19

Date Collected: 10/26/17 10:04

Matrix: Air

Date Received: 11/02/17 09:30

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		5.0	0.18	ppb v/v			11/06/17 16:45	1
Benzene	4.0		0.40	0.079	ppb v/v			11/06/17 16:45	1
Benzyl chloride	ND		0.80	0.16	ppb v/v			11/06/17 16:45	1
Bromodichloromethane	ND		0.30	0.066	ppb v/v			11/06/17 16:45	1
Bromoform	ND		0.40	0.070	ppb v/v			11/06/17 16:45	1
Bromomethane	ND		0.80	0.34	ppb v/v			11/06/17 16:45	1
2-Butanone (MEK)	ND		0.80	0.20	ppb v/v			11/06/17 16:45	1
Carbon disulfide	ND		0.80	0.078	ppb v/v			11/06/17 16:45	1
Carbon tetrachloride	ND		0.80	0.064	ppb v/v			11/06/17 16:45	1
Chlorobenzene	ND		0.30	0.064	ppb v/v			11/06/17 16:45	1
Chloroethane	ND		0.80	0.31	ppb v/v			11/06/17 16:45	1
Chloroform	ND		0.30	0.095	ppb v/v			11/06/17 16:45	1
Chloromethane	ND		0.80	0.20	ppb v/v			11/06/17 16:45	1
Dibromochloromethane	ND		0.40	0.079	ppb v/v			11/06/17 16:45	1
1,2-Dibromoethane (EDB)	ND		0.80	0.075	ppb v/v			11/06/17 16:45	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16	ppb v/v			11/06/17 16:45	1
1,2-Dichlorobenzene	ND		0.40	0.13	ppb v/v			11/06/17 16:45	1
1,3-Dichlorobenzene	ND		0.40	0.11	ppb v/v			11/06/17 16:45	1
1,4-Dichlorobenzene	ND		0.40	0.15	ppb v/v			11/06/17 16:45	1
Dichlorodifluoromethane	ND		0.40	0.15	ppb v/v			11/06/17 16:45	1
1,1-Dichloroethane	ND		0.30	0.072	ppb v/v			11/06/17 16:45	1
1,2-Dichloroethane	ND		0.80	0.088	ppb v/v			11/06/17 16:45	1
1,1-Dichloroethene	ND		0.80	0.13	ppb v/v			11/06/17 16:45	1
cis-1,2-Dichloroethene	ND		0.40	0.089	ppb v/v			11/06/17 16:45	1
trans-1,2-Dichloroethene	ND		0.40	0.10	ppb v/v			11/06/17 16:45	1
1,2-Dichloropropane	ND		0.40	0.24	ppb v/v			11/06/17 16:45	1
cis-1,3-Dichloropropene	ND		0.40	0.10	ppb v/v			11/06/17 16:45	1
trans-1,3-Dichloropropene	ND		0.40	0.088	ppb v/v			11/06/17 16:45	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			11/06/17 16:45	1
4-Ethyltoluene	ND		0.40	0.19	ppb v/v			11/06/17 16:45	1
Hexachlorobutadiene	ND		2.0	0.43	ppb v/v			11/06/17 16:45	1
2-Hexanone	ND		0.40	0.087	ppb v/v			11/06/17 16:45	1
4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14	ppb v/v			11/06/17 16:45	1
Methylene Chloride	0.099	J	0.40	0.072	ppb v/v			11/06/17 16:45	1
Styrene	ND		0.40	0.059	ppb v/v			11/06/17 16:45	1
1,1,2,2-Tetrachloroethane	ND		0.40	0.069	ppb v/v			11/06/17 16:45	1
Tetrachloroethene	0.11	J	0.40	0.051	ppb v/v			11/06/17 16:45	1
Toluene	ND		0.40	0.051	ppb v/v			11/06/17 16:45	1

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103922-001/MWL-FB4

Lab Sample ID: 320-32934-19

Date Collected: 10/26/17 10:04

Matrix: Air

Date Received: 11/02/17 09:30

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		0.40	0.16	ppb v/v			11/06/17 16:45	1
1,2,4-Trichlorobenzene	ND		2.0	0.43	ppb v/v			11/06/17 16:45	1
1,1,1-Trichloroethane	ND		0.30	0.065	ppb v/v			11/06/17 16:45	1
1,1,2-Trichloroethane	ND		0.40	0.067	ppb v/v			11/06/17 16:45	1
Trichloroethene	0.19	J	0.40	0.11	ppb v/v			11/06/17 16:45	1
Trichlorofluoromethane	ND		0.40	0.20	ppb v/v			11/06/17 16:45	1
1,2,4-Trimethylbenzene	ND		0.80	0.16	ppb v/v			11/06/17 16:45	1
1,3,5-Trimethylbenzene	ND		0.40	0.13	ppb v/v			11/06/17 16:45	1
Vinyl acetate	ND		0.80	0.15	ppb v/v			11/06/17 16:45	1
Vinyl chloride	ND		0.40	0.12	ppb v/v			11/06/17 16:45	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			11/06/17 16:45	1
o-Xylene	ND		0.40	0.054	ppb v/v			11/06/17 16:45	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130					11/06/17 16:45	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 130					11/06/17 16:45	1
Toluene-d8 (Surr)	104		70 - 130					11/06/17 16:45	1

Client Sample ID: 103923-001/MWL-SV04-50

Lab Sample ID: 320-32934-20

Date Collected: 10/26/17 10:12

Matrix: Air

Date Received: 11/02/17 09:30

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	2.4	J	10	0.36	ppb v/v			11/06/17 17:39	2
Benzene	0.49	J	0.80	0.16	ppb v/v			11/06/17 17:39	2
Benzyl chloride	ND		1.6	0.33	ppb v/v			11/06/17 17:39	2
Bromodichloromethane	ND		0.60	0.13	ppb v/v			11/06/17 17:39	2
Bromoform	ND		0.80	0.14	ppb v/v			11/06/17 17:39	2
Bromomethane	ND		1.6	0.67	ppb v/v			11/06/17 17:39	2
2-Butanone (MEK)	ND		1.6	0.40	ppb v/v			11/06/17 17:39	2
Carbon disulfide	ND		1.6	0.16	ppb v/v			11/06/17 17:39	2
Carbon tetrachloride	0.21	J	1.6	0.13	ppb v/v			11/06/17 17:39	2
Chlorobenzene	ND		0.60	0.13	ppb v/v			11/06/17 17:39	2
Chloroethane	ND		1.6	0.62	ppb v/v			11/06/17 17:39	2
Chloroform	1.9		0.60	0.19	ppb v/v			11/06/17 17:39	2
Chloromethane	ND		1.6	0.39	ppb v/v			11/06/17 17:39	2
Dibromochloromethane	ND		0.80	0.16	ppb v/v			11/06/17 17:39	2
1,2-Dibromoethane (EDB)	ND		1.6	0.15	ppb v/v			11/06/17 17:39	2
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.80	0.31	ppb v/v			11/06/17 17:39	2
1,2-Dichlorobenzene	ND		0.80	0.26	ppb v/v			11/06/17 17:39	2
1,3-Dichlorobenzene	ND		0.80	0.22	ppb v/v			11/06/17 17:39	2
1,4-Dichlorobenzene	ND		0.80	0.30	ppb v/v			11/06/17 17:39	2
Dichlorodifluoromethane	17		0.80	0.29	ppb v/v			11/06/17 17:39	2
1,1-Dichloroethane	1.6		0.60	0.14	ppb v/v			11/06/17 17:39	2
1,2-Dichloroethane	ND		1.6	0.18	ppb v/v			11/06/17 17:39	2
1,1-Dichloroethene	7.8		1.6	0.26	ppb v/v			11/06/17 17:39	2
cis-1,2-Dichloroethene	0.72	J	0.80	0.18	ppb v/v			11/06/17 17:39	2

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103923-001/MWL-SV04-50

Lab Sample ID: 320-32934-20

Date Collected: 10/26/17 10:12

Matrix: Air

Date Received: 11/02/17 09:30

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		0.80	0.20	ppb v/v			11/06/17 17:39	2
1,2-Dichloropropane	ND		0.80	0.48	ppb v/v			11/06/17 17:39	2
cis-1,3-Dichloropropene	ND		0.80	0.21	ppb v/v			11/06/17 17:39	2
trans-1,3-Dichloropropene	ND		0.80	0.18	ppb v/v			11/06/17 17:39	2
Ethylbenzene	ND		0.80	0.13	ppb v/v			11/06/17 17:39	2
4-Ethyltoluene	ND		0.80	0.37	ppb v/v			11/06/17 17:39	2
Hexachlorobutadiene	ND		4.0	0.86	ppb v/v			11/06/17 17:39	2
2-Hexanone	ND		0.80	0.17	ppb v/v			11/06/17 17:39	2
4-Methyl-2-pentanone (MIBK)	ND		0.80	0.27	ppb v/v			11/06/17 17:39	2
Methylene Chloride	0.22	J	0.80	0.14	ppb v/v			11/06/17 17:39	2
Styrene	ND		0.80	0.12	ppb v/v			11/06/17 17:39	2
1,1,2,2-Tetrachloroethane	ND		0.80	0.14	ppb v/v			11/06/17 17:39	2
Tetrachloroethene	63		0.80	0.10	ppb v/v			11/06/17 17:39	2
Toluene	ND		0.80	0.10	ppb v/v			11/06/17 17:39	2
1,1,2-Trichloro-1,2,2-trifluoroethane	67		0.80	0.33	ppb v/v			11/06/17 17:39	2
1,2,4-Trichlorobenzene	ND		4.0	0.87	ppb v/v			11/06/17 17:39	2
1,1,1-Trichloroethane	7.1		0.60	0.13	ppb v/v			11/06/17 17:39	2
1,1,2-Trichloroethane	ND		0.80	0.13	ppb v/v			11/06/17 17:39	2
Trichloroethene	58		0.80	0.21	ppb v/v			11/06/17 17:39	2
Trichlorofluoromethane	29		0.80	0.39	ppb v/v			11/06/17 17:39	2
1,2,4-Trimethylbenzene	ND		1.6	0.32	ppb v/v			11/06/17 17:39	2
1,3,5-Trimethylbenzene	ND		0.80	0.25	ppb v/v			11/06/17 17:39	2
Vinyl acetate	ND		1.6	0.29	ppb v/v			11/06/17 17:39	2
Vinyl chloride	ND		0.80	0.24	ppb v/v			11/06/17 17:39	2
m,p-Xylene	ND		1.6	0.20	ppb v/v			11/06/17 17:39	2
o-Xylene	ND		0.80	0.11	ppb v/v			11/06/17 17:39	2
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					11/06/17 17:39	2
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					11/06/17 17:39	2
Toluene-d8 (Surr)	105		70 - 130					11/06/17 17:39	2

Client Sample ID: 103924-001/MWL-SV04-100

Lab Sample ID: 320-32934-21

Date Collected: 10/26/17 10:14

Matrix: Air

Date Received: 11/02/17 09:30

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	3.8	J	22	0.80	ppb v/v			11/06/17 18:31	4.48
Benzene	0.44	J	1.8	0.35	ppb v/v			11/06/17 18:31	4.48
Benzyl chloride	ND		3.6	0.73	ppb v/v			11/06/17 18:31	4.48
Bromodichloromethane	ND		1.3	0.30	ppb v/v			11/06/17 18:31	4.48
Bromoform	ND		1.8	0.31	ppb v/v			11/06/17 18:31	4.48
Bromomethane	ND		3.6	1.5	ppb v/v			11/06/17 18:31	4.48
2-Butanone (MEK)	ND		3.6	0.89	ppb v/v			11/06/17 18:31	4.48
Carbon disulfide	1.2	J	3.6	0.35	ppb v/v			11/06/17 18:31	4.48
Carbon tetrachloride	ND		3.6	0.29	ppb v/v			11/06/17 18:31	4.48

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103924-001/MWL-SV04-100

Lab Sample ID: 320-32934-21

Date Collected: 10/26/17 10:14

Matrix: Air

Date Received: 11/02/17 09:30

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		1.3	0.29	ppb v/v			11/06/17 18:31	4.48
Chloroethane	ND		3.6	1.4	ppb v/v			11/06/17 18:31	4.48
Chloroform	1.9		1.3	0.43	ppb v/v			11/06/17 18:31	4.48
Chloromethane	ND		3.6	0.88	ppb v/v			11/06/17 18:31	4.48
Dibromochloromethane	ND		1.8	0.35	ppb v/v			11/06/17 18:31	4.48
1,2-Dibromoethane (EDB)	ND		3.6	0.34	ppb v/v			11/06/17 18:31	4.48
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.8	0.69	ppb v/v			11/06/17 18:31	4.48
1,2-Dichlorobenzene	ND		1.8	0.58	ppb v/v			11/06/17 18:31	4.48
1,3-Dichlorobenzene	ND		1.8	0.49	ppb v/v			11/06/17 18:31	4.48
1,4-Dichlorobenzene	ND		1.8	0.67	ppb v/v			11/06/17 18:31	4.48
Dichlorodifluoromethane	32		1.8	0.65	ppb v/v			11/06/17 18:31	4.48
1,1-Dichloroethane	3.3		1.3	0.32	ppb v/v			11/06/17 18:31	4.48
1,2-Dichloroethane	ND		3.6	0.39	ppb v/v			11/06/17 18:31	4.48
1,1-Dichloroethene	17		3.6	0.58	ppb v/v			11/06/17 18:31	4.48
cis-1,2-Dichloroethene	2.0		1.8	0.40	ppb v/v			11/06/17 18:31	4.48
trans-1,2-Dichloroethene	ND		1.8	0.45	ppb v/v			11/06/17 18:31	4.48
1,2-Dichloropropane	ND		1.8	1.1	ppb v/v			11/06/17 18:31	4.48
cis-1,3-Dichloropropene	ND		1.8	0.47	ppb v/v			11/06/17 18:31	4.48
trans-1,3-Dichloropropene	ND		1.8	0.39	ppb v/v			11/06/17 18:31	4.48
Ethylbenzene	ND		1.8	0.28	ppb v/v			11/06/17 18:31	4.48
4-Ethyltoluene	ND		1.8	0.84	ppb v/v			11/06/17 18:31	4.48
Hexachlorobutadiene	ND		9.0	1.9	ppb v/v			11/06/17 18:31	4.48
2-Hexanone	ND		1.8	0.39	ppb v/v			11/06/17 18:31	4.48
4-Methyl-2-pentanone (MIBK)	ND		1.8	0.60	ppb v/v			11/06/17 18:31	4.48
Methylene Chloride	0.76	J	1.8	0.32	ppb v/v			11/06/17 18:31	4.48
Styrene	ND		1.8	0.26	ppb v/v			11/06/17 18:31	4.48
1,1,2,2-Tetrachloroethane	ND		1.8	0.31	ppb v/v			11/06/17 18:31	4.48
Tetrachloroethene	110		1.8	0.23	ppb v/v			11/06/17 18:31	4.48
Toluene	ND		1.8	0.23	ppb v/v			11/06/17 18:31	4.48
1,1,2-Trichloro-1,2,2-trifluoroethane	100		1.8	0.73	ppb v/v			11/06/17 18:31	4.48
1,2,4-Trichlorobenzene	ND		9.0	1.9	ppb v/v			11/06/17 18:31	4.48
1,1,1-Trichloroethane	5.2		1.3	0.29	ppb v/v			11/06/17 18:31	4.48
1,1,2-Trichloroethane	ND		1.8	0.30	ppb v/v			11/06/17 18:31	4.48
Trichloroethene	120		1.8	0.47	ppb v/v			11/06/17 18:31	4.48
Trichlorofluoromethane	37		1.8	0.88	ppb v/v			11/06/17 18:31	4.48
1,2,4-Trimethylbenzene	ND		3.6	0.73	ppb v/v			11/06/17 18:31	4.48
1,3,5-Trimethylbenzene	ND		1.8	0.56	ppb v/v			11/06/17 18:31	4.48
Vinyl acetate	ND		3.6	0.65	ppb v/v			11/06/17 18:31	4.48
Vinyl chloride	ND		1.8	0.54	ppb v/v			11/06/17 18:31	4.48
m,p-Xylene	ND		3.6	0.45	ppb v/v			11/06/17 18:31	4.48
o-Xylene	ND		1.8	0.24	ppb v/v			11/06/17 18:31	4.48
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130					11/06/17 18:31	4.48
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/06/17 18:31	4.48
Toluene-d8 (Surr)	103		70 - 130					11/06/17 18:31	4.48

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103925-001/MWL-SV04-200

Lab Sample ID: 320-32934-22

Date Collected: 10/26/17 10:19

Matrix: Air

Date Received: 11/02/17 09:30

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	5.2	J	28	0.98	ppb v/v			11/06/17 19:23	5.51
Benzene	ND		2.2	0.44	ppb v/v			11/06/17 19:23	5.51
Benzyl chloride	ND		4.4	0.90	ppb v/v			11/06/17 19:23	5.51
Bromodichloromethane	ND		1.7	0.36	ppb v/v			11/06/17 19:23	5.51
Bromoform	ND		2.2	0.39	ppb v/v			11/06/17 19:23	5.51
Bromomethane	ND		4.4	1.8	ppb v/v			11/06/17 19:23	5.51
2-Butanone (MEK)	ND		4.4	1.1	ppb v/v			11/06/17 19:23	5.51
Carbon disulfide	ND		4.4	0.43	ppb v/v			11/06/17 19:23	5.51
Carbon tetrachloride	0.47	J	4.4	0.35	ppb v/v			11/06/17 19:23	5.51
Chlorobenzene	ND		1.7	0.35	ppb v/v			11/06/17 19:23	5.51
Chloroethane	ND		4.4	1.7	ppb v/v			11/06/17 19:23	5.51
Chloroform	1.5	J	1.7	0.52	ppb v/v			11/06/17 19:23	5.51
Chloromethane	ND		4.4	1.1	ppb v/v			11/06/17 19:23	5.51
Dibromochloromethane	ND		2.2	0.44	ppb v/v			11/06/17 19:23	5.51
1,2-Dibromoethane (EDB)	ND		4.4	0.41	ppb v/v			11/06/17 19:23	5.51
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		2.2	0.85	ppb v/v			11/06/17 19:23	5.51
1,2-Dichlorobenzene	ND		2.2	0.72	ppb v/v			11/06/17 19:23	5.51
1,3-Dichlorobenzene	ND		2.2	0.61	ppb v/v			11/06/17 19:23	5.51
1,4-Dichlorobenzene	ND		2.2	0.82	ppb v/v			11/06/17 19:23	5.51
Dichlorodifluoromethane	41		2.2	0.80	ppb v/v			11/06/17 19:23	5.51
1,1-Dichloroethane	5.2		1.7	0.40	ppb v/v			11/06/17 19:23	5.51
1,2-Dichloroethane	ND		4.4	0.48	ppb v/v			11/06/17 19:23	5.51
1,1-Dichloroethene	30		4.4	0.71	ppb v/v			11/06/17 19:23	5.51
cis-1,2-Dichloroethene	3.1		2.2	0.49	ppb v/v			11/06/17 19:23	5.51
trans-1,2-Dichloroethene	ND		2.2	0.55	ppb v/v			11/06/17 19:23	5.51
1,2-Dichloropropane	ND		2.2	1.3	ppb v/v			11/06/17 19:23	5.51
cis-1,3-Dichloropropene	ND		2.2	0.57	ppb v/v			11/06/17 19:23	5.51
trans-1,3-Dichloropropene	ND		2.2	0.48	ppb v/v			11/06/17 19:23	5.51
Ethylbenzene	ND		2.2	0.35	ppb v/v			11/06/17 19:23	5.51
4-Ethyltoluene	ND		2.2	1.0	ppb v/v			11/06/17 19:23	5.51
Hexachlorobutadiene	ND		11	2.4	ppb v/v			11/06/17 19:23	5.51
2-Hexanone	ND		2.2	0.48	ppb v/v			11/06/17 19:23	5.51
4-Methyl-2-pentanone (MIBK)	ND		2.2	0.74	ppb v/v			11/06/17 19:23	5.51
Methylene Chloride	1.6	J	2.2	0.40	ppb v/v			11/06/17 19:23	5.51
Styrene	ND		2.2	0.33	ppb v/v			11/06/17 19:23	5.51
1,1,2,2-Tetrachloroethane	ND		2.2	0.38	ppb v/v			11/06/17 19:23	5.51
Tetrachloroethene	130		2.2	0.28	ppb v/v			11/06/17 19:23	5.51
Toluene	ND		2.2	0.28	ppb v/v			11/06/17 19:23	5.51
1,1,2-Trichloro-1,2,2-trifluoroethane	140		2.2	0.90	ppb v/v			11/06/17 19:23	5.51
1,2,4-Trichlorobenzene	ND		11	2.4	ppb v/v			11/06/17 19:23	5.51
1,1,1-Trichloroethane	2.4		1.7	0.36	ppb v/v			11/06/17 19:23	5.51
1,1,2-Trichloroethane	ND		2.2	0.37	ppb v/v			11/06/17 19:23	5.51
Trichloroethene	170		2.2	0.58	ppb v/v			11/06/17 19:23	5.51
Trichlorofluoromethane	34		2.2	1.1	ppb v/v			11/06/17 19:23	5.51
1,2,4-Trimethylbenzene	ND		4.4	0.89	ppb v/v			11/06/17 19:23	5.51
1,3,5-Trimethylbenzene	ND		2.2	0.69	ppb v/v			11/06/17 19:23	5.51
Vinyl acetate	ND		4.4	0.80	ppb v/v			11/06/17 19:23	5.51
Vinyl chloride	ND		2.2	0.66	ppb v/v			11/06/17 19:23	5.51

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103925-001/MWL-SV04-200

Lab Sample ID: 320-32934-22

Date Collected: 10/26/17 10:19

Matrix: Air

Date Received: 11/02/17 09:30

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		4.4	0.55	ppb v/v			11/06/17 19:23	5.51
o-Xylene	ND		2.2	0.30	ppb v/v			11/06/17 19:23	5.51
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					11/06/17 19:23	5.51
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					11/06/17 19:23	5.51
Toluene-d8 (Surr)	104		70 - 130					11/06/17 19:23	5.51

Client Sample ID: 103926-001/MWL-SV04-300

Lab Sample ID: 320-32934-23

Date Collected: 10/26/17 10:23

Matrix: Air

Date Received: 11/02/17 09:30

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	4.2	J	15	0.53	ppb v/v			11/06/17 20:16	3
Benzene	0.37	J	1.2	0.24	ppb v/v			11/06/17 20:16	3
Benzyl chloride	ND		2.4	0.49	ppb v/v			11/06/17 20:16	3
Bromodichloromethane	ND		0.90	0.20	ppb v/v			11/06/17 20:16	3
Bromoform	ND		1.2	0.21	ppb v/v			11/06/17 20:16	3
Bromomethane	ND		2.4	1.0	ppb v/v			11/06/17 20:16	3
2-Butanone (MEK)	ND		2.4	0.60	ppb v/v			11/06/17 20:16	3
Carbon disulfide	0.51	J	2.4	0.23	ppb v/v			11/06/17 20:16	3
Carbon tetrachloride	0.29	J	2.4	0.19	ppb v/v			11/06/17 20:16	3
Chlorobenzene	ND		0.90	0.19	ppb v/v			11/06/17 20:16	3
Chloroethane	ND		2.4	0.92	ppb v/v			11/06/17 20:16	3
Chloroform	0.64	J	0.90	0.29	ppb v/v			11/06/17 20:16	3
Chloromethane	ND		2.4	0.59	ppb v/v			11/06/17 20:16	3
Dibromochloromethane	ND		1.2	0.24	ppb v/v			11/06/17 20:16	3
1,2-Dibromoethane (EDB)	ND		2.4	0.23	ppb v/v			11/06/17 20:16	3
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.2	0.47	ppb v/v			11/06/17 20:16	3
1,2-Dichlorobenzene	ND		1.2	0.39	ppb v/v			11/06/17 20:16	3
1,3-Dichlorobenzene	ND		1.2	0.33	ppb v/v			11/06/17 20:16	3
1,4-Dichlorobenzene	ND		1.2	0.45	ppb v/v			11/06/17 20:16	3
Dichlorodifluoromethane	18		1.2	0.44	ppb v/v			11/06/17 20:16	3
1,1-Dichloroethane	1.6		0.90	0.22	ppb v/v			11/06/17 20:16	3
1,2-Dichloroethane	ND		2.4	0.26	ppb v/v			11/06/17 20:16	3
1,1-Dichloroethene	16		2.4	0.39	ppb v/v			11/06/17 20:16	3
cis-1,2-Dichloroethene	0.88	J	1.2	0.27	ppb v/v			11/06/17 20:16	3
trans-1,2-Dichloroethene	ND		1.2	0.30	ppb v/v			11/06/17 20:16	3
1,2-Dichloropropane	ND		1.2	0.72	ppb v/v			11/06/17 20:16	3
cis-1,3-Dichloropropene	ND		1.2	0.31	ppb v/v			11/06/17 20:16	3
trans-1,3-Dichloropropene	ND		1.2	0.26	ppb v/v			11/06/17 20:16	3
Ethylbenzene	ND		1.2	0.19	ppb v/v			11/06/17 20:16	3
4-Ethyltoluene	ND		1.2	0.56	ppb v/v			11/06/17 20:16	3
Hexachlorobutadiene	ND		6.0	1.3	ppb v/v			11/06/17 20:16	3
2-Hexanone	ND		1.2	0.26	ppb v/v			11/06/17 20:16	3
4-Methyl-2-pentanone (MIBK)	ND		1.2	0.41	ppb v/v			11/06/17 20:16	3
Methylene Chloride	0.45	J	1.2	0.22	ppb v/v			11/06/17 20:16	3

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103926-001/MWL-SV04-300

Lab Sample ID: 320-32934-23

Date Collected: 10/26/17 10:23

Matrix: Air

Date Received: 11/02/17 09:30

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		1.2	0.18	ppb v/v			11/06/17 20:16	3
1,1,2,2-Tetrachloroethane	ND		1.2	0.21	ppb v/v			11/06/17 20:16	3
Tetrachloroethene	120		1.2	0.15	ppb v/v			11/06/17 20:16	3
Toluene	0.20	J	1.2	0.15	ppb v/v			11/06/17 20:16	3
1,1,2-Trichloro-1,2,2-trifluoroethane	82		1.2	0.49	ppb v/v			11/06/17 20:16	3
1,2,4-Trichlorobenzene	ND		6.0	1.3	ppb v/v			11/06/17 20:16	3
1,1,1-Trichloroethane	1.3		0.90	0.20	ppb v/v			11/06/17 20:16	3
1,1,2-Trichloroethane	ND		1.2	0.20	ppb v/v			11/06/17 20:16	3
Trichloroethene	94		1.2	0.32	ppb v/v			11/06/17 20:16	3
Trichlorofluoromethane	16		1.2	0.59	ppb v/v			11/06/17 20:16	3
1,2,4-Trimethylbenzene	ND		2.4	0.49	ppb v/v			11/06/17 20:16	3
1,3,5-Trimethylbenzene	ND		1.2	0.38	ppb v/v			11/06/17 20:16	3
Vinyl acetate	ND		2.4	0.44	ppb v/v			11/06/17 20:16	3
Vinyl chloride	ND		1.2	0.36	ppb v/v			11/06/17 20:16	3
m,p-Xylene	ND		2.4	0.30	ppb v/v			11/06/17 20:16	3
o-Xylene	ND		1.2	0.16	ppb v/v			11/06/17 20:16	3

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		70 - 130		11/06/17 20:16	3
1,2-Dichloroethane-d4 (Surr)	102		70 - 130		11/06/17 20:16	3
Toluene-d8 (Surr)	104		70 - 130		11/06/17 20:16	3

Client Sample ID: 103927-001/MWL-SV04-400

Lab Sample ID: 320-32934-24

Date Collected: 10/26/17 10:29

Matrix: Air

Date Received: 11/02/17 09:30

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	5.9	J	15	0.53	ppb v/v			11/06/17 21:09	3
Benzene	0.67	J	1.2	0.24	ppb v/v			11/06/17 21:09	3
Benzyl chloride	ND		2.4	0.49	ppb v/v			11/06/17 21:09	3
Bromodichloromethane	ND		0.90	0.20	ppb v/v			11/06/17 21:09	3
Bromoform	ND		1.2	0.21	ppb v/v			11/06/17 21:09	3
Bromomethane	ND		2.4	1.0	ppb v/v			11/06/17 21:09	3
2-Butanone (MEK)	0.85	J	2.4	0.60	ppb v/v			11/06/17 21:09	3
Carbon disulfide	4.2		2.4	0.23	ppb v/v			11/06/17 21:09	3
Carbon tetrachloride	0.20	J	2.4	0.19	ppb v/v			11/06/17 21:09	3
Chlorobenzene	ND		0.90	0.19	ppb v/v			11/06/17 21:09	3
Chloroethane	ND		2.4	0.92	ppb v/v			11/06/17 21:09	3
Chloroform	0.62	J	0.90	0.29	ppb v/v			11/06/17 21:09	3
Chloromethane	ND		2.4	0.59	ppb v/v			11/06/17 21:09	3
Dibromochloromethane	ND		1.2	0.24	ppb v/v			11/06/17 21:09	3
1,2-Dibromoethane (EDB)	ND		2.4	0.23	ppb v/v			11/06/17 21:09	3
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.2	0.47	ppb v/v			11/06/17 21:09	3
1,2-Dichlorobenzene	ND		1.2	0.39	ppb v/v			11/06/17 21:09	3
1,3-Dichlorobenzene	ND		1.2	0.33	ppb v/v			11/06/17 21:09	3
1,4-Dichlorobenzene	ND		1.2	0.45	ppb v/v			11/06/17 21:09	3

TestAmerica Sacramento

Client Sample Results

Client: Sandia National Laboratories
 Project/Site: MWL GWM / SVM

TestAmerica Job ID: 320-32934-1

Client Sample ID: 103927-001/MWL-SV04-400

Lab Sample ID: 320-32934-24

Date Collected: 10/26/17 10:29

Matrix: Air

Date Received: 11/02/17 09:30

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	19		1.2	0.44	ppb v/v			11/06/17 21:09	3
1,1-Dichloroethane	1.3		0.90	0.22	ppb v/v			11/06/17 21:09	3
1,2-Dichloroethane	ND		2.4	0.26	ppb v/v			11/06/17 21:09	3
1,1-Dichloroethene	12		2.4	0.39	ppb v/v			11/06/17 21:09	3
cis-1,2-Dichloroethene	0.83	J	1.2	0.27	ppb v/v			11/06/17 21:09	3
trans-1,2-Dichloroethene	ND		1.2	0.30	ppb v/v			11/06/17 21:09	3
1,2-Dichloropropane	ND		1.2	0.72	ppb v/v			11/06/17 21:09	3
cis-1,3-Dichloropropene	ND		1.2	0.31	ppb v/v			11/06/17 21:09	3
trans-1,3-Dichloropropene	ND		1.2	0.26	ppb v/v			11/06/17 21:09	3
Ethylbenzene	ND		1.2	0.19	ppb v/v			11/06/17 21:09	3
4-Ethyltoluene	ND		1.2	0.56	ppb v/v			11/06/17 21:09	3
Hexachlorobutadiene	ND		6.0	1.3	ppb v/v			11/06/17 21:09	3
2-Hexanone	ND		1.2	0.26	ppb v/v			11/06/17 21:09	3
4-Methyl-2-pentanone (MIBK)	ND		1.2	0.41	ppb v/v			11/06/17 21:09	3
Methylene Chloride	0.41	J	1.2	0.22	ppb v/v			11/06/17 21:09	3
Styrene	ND		1.2	0.18	ppb v/v			11/06/17 21:09	3
1,1,2,2-Tetrachloroethane	ND		1.2	0.21	ppb v/v			11/06/17 21:09	3
Tetrachloroethene	110		1.2	0.15	ppb v/v			11/06/17 21:09	3
Toluene	0.22	J	1.2	0.15	ppb v/v			11/06/17 21:09	3
1,1,2-Trichloro-1,2,2-trifluoroethane	76		1.2	0.49	ppb v/v			11/06/17 21:09	3
1,2,4-Trichlorobenzene	ND		6.0	1.3	ppb v/v			11/06/17 21:09	3
1,1,1-Trichloroethane	1.2		0.90	0.20	ppb v/v			11/06/17 21:09	3
1,1,2-Trichloroethane	ND		1.2	0.20	ppb v/v			11/06/17 21:09	3
Trichloroethene	81		1.2	0.32	ppb v/v			11/06/17 21:09	3
Trichlorofluoromethane	16		1.2	0.59	ppb v/v			11/06/17 21:09	3
1,2,4-Trimethylbenzene	ND		2.4	0.49	ppb v/v			11/06/17 21:09	3
1,3,5-Trimethylbenzene	ND		1.2	0.38	ppb v/v			11/06/17 21:09	3
Vinyl acetate	ND		2.4	0.44	ppb v/v			11/06/17 21:09	3
Vinyl chloride	ND		1.2	0.36	ppb v/v			11/06/17 21:09	3
m,p-Xylene	ND		2.4	0.30	ppb v/v			11/06/17 21:09	3
o-Xylene	ND		1.2	0.16	ppb v/v			11/06/17 21:09	3

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		11/06/17 21:09	3
1,2-Dichloroethane-d4 (Surr)	104		70 - 130		11/06/17 21:09	3
Toluene-d8 (Surr)	104		70 - 130		11/06/17 21:09	3

ANNEX D

**Mixed Waste Landfill
Soil-Moisture Monitoring Forms**

April 2017-March 2018

Field Forms and Tables

HEALTH & SAFETY MEETING FORM

Dept: 441 Facility: MWL Date: 4/17/17 Time: 0900

Activities: MWL 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: _____ °F Wind Speed: _____ MPH Humidity: _____ % 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

<input type="checkbox"/> Wear safety glasses	<input 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 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 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 Stock
 Printed Name

 Printed Name

 Printed Name

 Printed Name

 Printed Name

Attendees
Danielle Michel
 Signature
Robert Stock
 Signature

 Signature

 Signature

 Signature

 Signature

Notes

Mixed Waste Landfill Neutron Logging Data Field Form

Name: <u>Daniel Michel</u>	Standard Count: <u>6741</u>	Chi: <u>0.95</u>			
Name: <u>Robert Ziock</u>	Previous Count: <u>6580</u>	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	Date/Time	Date/Time
0.0	0	0	<u>4-17-17/0925</u>	<u>4-17-17/1245</u>	<u>4-17-17/1253</u>
0.9	1	9999	<u>3467</u>	<u>2873</u>	<u>2840</u>
1.7	2	9998	<u>3796</u>	<u>2719</u>	<u>2924</u>
2.6	3	9997	<u>3431</u>	<u>2417</u>	<u>2708</u>
3.5	4	9996	<u>3090</u>	<u>2398</u>	<u>2516</u>
4.3	5	9995	<u>2120</u>	<u>2264</u>	<u>2091</u>
5.2	6	9994	<u>1971</u>	<u>1851</u>	<u>1666</u>
6.1	7	9993	<u>1657</u>	<u>1690</u>	<u>1658</u>
6.9	8	9992	<u>1784</u>	<u>1686</u>	<u>1487</u>
7.8	9	9991	<u>1794</u>	<u>1711</u>	<u>1703</u>
8.7	10	9990	<u>1852</u>	<u>1539</u>	<u>2003</u>
9.5	11	9989	<u>1810</u>	<u>2038</u>	<u>2083</u>
10.4	12	9988	<u>1693</u>	<u>1846</u>	<u>1860</u>
11.3	13	9987	<u>1825</u>	<u>1761</u>	<u>1795</u>
12.1	14	9986	<u>1795</u>	<u>1582</u>	<u>1899</u>
13.0	15	9985	<u>1861</u>	<u>1852</u>	<u>1983</u>
13.9	16	9984	<u>1668</u>	<u>1718</u>	<u>2124</u>
14.7	17	9983	<u>1696</u>	<u>1784</u>	<u>1743</u>
15.6	18	9982	<u>1762</u>	<u>1847</u>	<u>1475</u>
16.5	19	9981	<u>1426</u>	<u>2102</u>	<u>1938</u>
17.3	20	9980	<u>1445</u>	<u>2009</u>	<u>1519</u>
18.2	21	9979	<u>1781</u>	<u>1762</u>	<u>1723</u>
19.1	22	9978	<u>1633</u>	<u>1923</u>	<u>2381</u>
19.9	23	9977	<u>1538</u>	<u>2027</u>	<u>2241</u>
20.8	24	9976	<u>1429</u>	<u>1674</u>	<u>2004</u>
21.7	25	9975	<u>1688</u>	<u>1723</u>	<u>1787</u>

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	1666	1720	1725
30.3	35	9965	1710	1817	2149
34.6	40	9960	1744	1619	1767
39.0	45	9955	1740	1554	2218
43.3	50	9950	2057	1677	1709
47.6	55	9945	1789	1990	1759
52.0	60	9940	1734	1893	1884
56.3	65	9935	2186	2089	1915
60.6	70	9930	1269	2535	1802
65.0	75	9925	2339	2263	2013
69.3	80	9920	2335	1649	1943
73.6	85	9915	1980	1855	2141
77.9	90	9910	1449	2446	1999
82.3	95	9905	2122	2233	2236
86.6	100	9900	2148	2226	2742
90.9	105	9895	1990	2385	2424
95.3	110	9890	2235	1875	2010
99.6	115	9885	1934	1752	1901
103.9	120	9880	1607	2024	2001
108.3	125	9875	1786	2334	1590
112.6	130	9870	2139	2181	1945
116.9	135	9865	2186	2715	1718
121.2	140	9860	1648	2049	1504
125.6	145	9855	1487	2521	2235
129.9	150	9850	2884	2531	2077
134.2	155	9845	2195	2227	1743
138.6	160	9840	2651	2159	1587
142.9	165	9835	2618	1084	2265
147.2	170	9830	2371	1622	1589
151.6	175	9825	2353	1643	3046
155.9	180	9820	3190	2320	2975
160.2	185	9815	3151	2530	2532
164.5	190	9810	1700	1972	1877
168.9	195	9805	1866	2058	3465
173.2	200	9800	2035	3111	2583

MIXED WASTE LANDFILL
SOIL MOISTURE MONITORING

Soil Moisture Monitoring Results Tables

Table D-1
VZ-1 Soil-Moisture Monitoring Results
April 2017

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2017	Baseline Average (2004-2006)	Difference between Baseline Average & April 2017	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	4.6	2.9	1.7	NA
4.3	5	3.4	2.9	0.5	NA
5.2	6	2.3	2.9	-0.6	NA
6.1	7	2.3	2.6	-0.3	NA
6.9	8	1.8	2.2	-0.4	NA
7.8	9	2.4	1.9	0.5	NA
8.7	10	3.2	1.7	1.5	23
9.5	11	3.4	2.0	1.4	23
10.4	12	2.8	2.7	0.1	23
11.3	13	2.7	3.1	-0.4	23
12.1	14	2.9	2.6	0.3	23
13.0	15	3.2	2.4	0.8	23
13.9	16	3.5	2.6	0.9	23
14.7	17	2.5	2.8	-0.3	23
15.6	18	1.8	2.9	-1.1	23
16.5	19	2.0	2.4	-0.4	23
17.3	20	1.9	2.0	-0.1	23
18.2	21	2.5	2.0	0.5	23
19.1	22	4.2	2.1	2.1	23
19.9	23	3.8	3.0	0.8	23
20.8	24	3.2	4.3	-1.1	23
21.7	25	2.6	4.0	-1.4	23
26.0	30	2.5	2.9	-0.4	23
30.3	35	3.6	2.7	0.9	23
34.6	40	2.6	2.3	0.3	23
39.0	45	3.8	3.0	0.8	23
43.3	50	2.4	2.9	-0.5	23
47.6	55	2.6	2.8	-0.2	23
52.0	60	2.9	3.4	-0.5	23
56.3	65	3.0	2.9	0.1	23

Table D-1 (Concluded)
VZ-1 Soil-Moisture Monitoring Results
April 2017

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2017	Baseline Average (2004-2006)	Difference between Baseline Average & April 2017	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	2.7	2.1	0.6	23
65.0	75	3.2	5.6	-2.4	23
69.3	80	3.0	2.8	0.2	23
73.6	85	3.6	3.1	0.5	23
77.9	90	3.2	3.7	-0.5	23
82.3	95	3.8	3.7	0.1	23
86.6	100	5.2	5.4	-0.2	23
90.9	105	4.3	5.0	-0.7	NA
95.3	110	3.2	3.0	0.2	NA
99.6	115	2.9	3.6	-0.7	NA
103.9	120	3.2	2.2	1.0	NA
108.3	125	2.1	2.7	-0.6	NA
112.6	130	3.1	3.3	-0.2	NA
116.9	135	2.5	3.1	-0.6	NA
121.2	140	1.9	2.1	-0.2	NA
125.6	145	3.8	3.8	0.0	NA
129.9	150	3.4	3.2	0.2	NA
134.2	155	2.5	2.7	-0.2	NA
138.6	160	2.1	2.1	0.0	NA
142.9	165	3.9	3.8	0.1	NA
147.2	170	2.1	2.0	0.1	NA
151.6	175	6.0	6.0	0.0	NA
155.9	180	5.8	5.5	0.3	NA
160.2	185	4.6	4.4	0.2	NA
164.5	190	2.9	3.0	-0.1	NA
168.9	195	7.1	7.0	0.1	NA
173.2	200	4.7	5.4	-0.7	NA
	Average	3.2	3.2		

Note: Shaded area represents depths where 23% soil moisture trigger applies.

NA = Not applicable.

Table D-2
VZ-2 Soil-Moisture Monitoring Results
April 2017

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2017	Baseline Average (2004-2006)	Difference between Baseline Average & April 2017	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	4.2	2.7	1.5	NA
4.3	5	3.9	3.3	0.6	NA
5.2	6	2.8	3.6	-0.8	NA
6.1	7	2.4	3.6	-1.2	NA
6.9	8	2.4	3.5	-1.1	NA
7.8	9	2.4	3.1	-0.7	NA
8.7	10	2.0	2.4	-0.4	23
9.5	11	3.3	2.2	1.1	23
10.4	12	2.8	2.2	0.6	23
11.3	13	2.6	2.1	0.5	23
12.1	14	2.1	2.5	-0.4	23
13.0	15	2.8	3.0	-0.2	23
13.9	16	2.5	2.8	-0.3	23
14.7	17	2.6	2.4	0.2	23
15.6	18	2.8	2.6	0.2	23
16.5	19	3.5	2.7	0.8	23
17.3	20	3.2	2.9	0.3	23
18.2	21	2.6	3.1	-0.5	23
19.1	22	3.0	3.6	-0.6	23
19.9	23	3.3	3.7	-0.4	23
20.8	24	2.3	3.1	-0.8	23
21.7	25	2.5	2.7	-0.2	23
26.0	30	2.5	2.4	0.1	23
30.3	35	2.7	2.9	-0.2	23
34.6	40	2.2	2.7	-0.5	23
39.0	45	2.0	2.3	-0.3	23
43.3	50	2.2	2.1	0.1	23
47.6	55	3.2	3.1	0.1	23
52.0	60	2.9	3.0	-0.1	23
56.3	65	3.4	5.5	-2.1	23

Table D-2 (Concluded)
VZ-2 Soil-Moisture Monitoring Results
April 2017

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2017	Baseline Average (2004-2006)	Difference between Baseline Average & April 2017	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	4.6	4.8	-0.2	23
65.0	75	3.9	5.1	-1.2	23
69.3	80	2.3	2.6	-0.3	23
73.6	85	2.8	2.6	0.2	23
77.9	90	4.4	3.1	1.3	23
82.3	95	3.8	3.6	0.2	23
86.6	100	3.8	4.7	-0.9	23
90.9	105	4.2	3.4	0.8	NA
95.3	110	2.9	3.1	-0.2	NA
99.6	115	2.5	3.6	-1.1	NA
103.9	120	3.3	2.0	1.3	NA
108.3	125	4.1	3.8	0.3	NA
112.6	130	3.7	3.6	0.1	NA
116.9	135	5.1	3.4	1.7	NA
121.2	140	3.3	2.4	0.9	NA
125.6	145	4.6	5.9	-1.3	NA
129.9	150	4.6	7.0	-2.4	NA
134.2	155	3.8	3.6	0.2	NA
138.6	160	3.6	3.8	-0.2	NA
142.9	165	2.9	3.0	-0.1	NA
147.2	170	2.2	2.9	-0.7	NA
151.6	175	2.3	2.4	-0.1	NA
155.9	180	4.0	5.4	-1.4	NA
160.2	185	4.6	5.4	-0.8	NA
164.5	190	3.1	4.1	-1.0	NA
168.9	195	3.3	3.5	-0.2	NA
173.2	200	6.1	6.3	-0.2	NA
	Average	3.2	3.4		

Note: Shaded area represents depths where 23% soil moisture trigger applies.
NA = Not applicable.

Table D-3
VZ-3 Soil-Moisture Monitoring Results
April 2017

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2017	Baseline Average (2004-2006)	Difference between Baseline Average & April 2017	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	6.1	4.6	1.5	NA
4.3	5	3.5	4.5	-1.0	NA
5.2	6	3.1	3.7	-0.6	NA
6.1	7	2.3	2.9	-0.6	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	2.4	2.7	-0.3	23
11.3	13	2.7	3.0	-0.3	23
12.1	14	2.7	2.6	0.1	23
13.0	15	2.8	2.8	0.0	23
13.9	16	2.3	2.9	-0.6	23
14.7	17	2.4	3.1	-0.7	23
15.6	18	2.6	3.1	-0.5	23
16.5	19	1.7	2.3	-0.6	23
17.3	20	1.7	2.7	-1.0	23
18.2	21	2.6	2.7	-0.1	23
19.1	22	2.2	1.8	0.4	23
19.9	23	2.0	2.7	-0.7	23
20.8	24	1.7	2.8	-1.1	23
21.7	25	2.4	2.1	0.3	23
26.0	30	2.3	2.5	-0.2	23
30.3	35	2.4	2.8	-0.4	23
34.6	40	2.5	2.1	0.4	23
39.0	45	2.5	2.7	-0.2	23
43.3	50	3.3	2.9	0.4	23
47.6	55	2.6	3.4	-0.8	23
52.0	60	2.5	2.9	-0.4	23
56.3	65	3.7	3.5	0.2	23

Table D-3 (Concluded)
VZ-3 Soil-Moisture Monitoring Results
April 2017

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2017	Baseline Average (2004-2006)	Difference between Baseline Average & April 2017	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	1.3	1.9	-0.6	23
65.0	75	4.1	4.3	-0.2	23
69.3	80	4.1	4.5	-0.4	23
73.6	85	3.1	3.5	-0.4	23
77.9	90	1.7	1.9	-0.2	23
82.3	95	3.5	3.3	0.2	23
86.6	100	3.6	3.4	0.2	23
90.9	105	3.2	3.3	-0.1	NA
95.3	110	3.8	4.7	-0.9	NA
99.6	115	3.0	3.6	-0.6	NA
103.9	120	2.2	2.1	0.1	NA
108.3	125	2.6	1.8	0.8	NA
112.6	130	3.6	4.3	-0.7	NA
116.9	135	3.7	4.0	-0.3	NA
121.2	140	2.3	2.3	0.0	NA
125.6	145	1.8	2.0	-0.2	NA
129.9	150	5.5	4.4	1.1	NA
134.2	155	3.7	3.6	0.1	NA
138.6	160	4.9	4.4	0.5	NA
142.9	165	4.8	5.2	-0.4	NA
147.2	170	4.2	4.1	0.1	NA
151.6	175	4.1	4.3	-0.2	NA
155.9	180	6.3	6.6	-0.3	NA
160.2	185	6.2	5.6	0.6	NA
164.5	190	2.4	2.7	-0.3	NA
168.9	195	2.8	3.1	-0.3	NA
173.2	200	3.3	4.1	-0.8	NA
	Average	3.1	3.2		

Note: Shaded area represents depths where 23% soil moisture trigger applies.

NA = Not applicable.

ANNEX E

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

April 2017-March 2018

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
MAY 2017 GROUNDWATER MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 641 Facility: MWL-BWA Date: 05/02/17 Time: 0813

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

Weather Conditions:
 Temp: 68 °F Wind Speed: 5 MPH Humidity: 26 % 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 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 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
ALFRED SANTILLANES
 Printed Name
William Gibson
 Printed Name

 Printed Name

 Printed Name

 Printed Name

Attendees

Robert Lynch
 Signature
Alfred Santillanes
 Signature
William Gibson
 Signature

 Signature

 Signature

 Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 644 641 Facility: MWL-MW9 Date: 05/03/17 Time: 0815

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

Weather Conditions:
 Temp: 66 °F Wind Speed: 5 MPH Humidity: 28 % 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 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 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 T Lynch
 Printed Name ALFRED SANTILLANES
 Printed Name William Gibson
 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-MW7 Date: 05/04/17 Time: 0814

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

Weather Conditions:
 Temp: 60 °F Wind Speed: 1 MPH Humidity: 38 % Wind Chill: N/A °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 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 <u>NO</u> . If answered YES explain.		

Robert Lynch
 Printed Name
ALFRED SANTILLANES
 Printed Name
William Gibson
 Printed Name

 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-mw8 Date: 05/08/17 Time: 0812

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

Weather Conditions:
 Temp: 70 °F Wind Speed: 8 MPH Humidity: 26 % Wind Chill: N/A °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 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 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 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 ALFRED SANTILLANES
 Printed Name William Gibson
 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		
Well I.D.: MWL-BW 2	Date: 05/02/17	
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)
481.03	0828	Start							
483.69	0852	5	19.82	688.3	183.0	7.39	0.73	13.1	1.19
484.76	0907	10	20.57	681.9	152.3	7.41	1.25	13.1	1.18
485.41	0923	15	20.97	691.1	139.2	7.41	1.37	13.7	1.22
486.14	0939	20	21.07	703.6	131.7	7.39	1.07	11.2	0.99
487.21	0954	25	21.07	707.9	126.0	7.39	1.65	12.5	1.11
488.25	1010	30	21.20	709.4	126.9	7.40	7.72	21.5	1.91
488.64	1017	32	21.29	710.2	128.6	7.40	6.40	23.9	2.12
488.85	1020	33	21.31	710.5	130.0	7.40	6.30	26.4	2.35
489.01	1024	34	21.30	709.9	131.0	7.41	5.21	30.0	2.66
489.21	1027	35	21.27	708.9	132.6	7.41	5.51	30.7	2.72
489.37	1030	36	21.27	709.0	132.4	7.41	5.00	34.5	3.06
489.54	1033	37	21.30	708.1	130.5	7.42	4.54	37.1	3.28
489.88	1037	38	21.32	709.2	132.8	7.42	4.11	38.5	3.41
489.99	1040	39	21.34	706.2	132.7	7.42	3.78	44.0	3.69
490.34	1043	40	21.35	705.9	130.9	7.42	3.62	39.9	3.52
	1044		Sampling						

Comments: ~1.5 gals purged from tubing 0836

FB Lot # 061

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL		
Well I.D.: MWL-MW 8	Date: 05/08/17	
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 497'

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)
491.85	0829	Start							
493.75	0854	2	21.15	594.6	185.6	7.61	0.69	49.5	4.39
494.48	0910	4	22.38	609.3	168.3	7.61	0.87	47.9	4.15
494.76	0918	5	22.67	614.3	164.7	7.60	0.69	46.4	4.00
495.07	0927	6	22.30	614.1	161.1	7.59	0.61	43.0	3.73
495.43	0936	7	22.25	618.6	159.0	7.59	0.75	38.5	3.34
495.60	0945	8	22.26	626.5	155.2	7.57	0.51	32.0	2.77
495.95	0954	9	22.15	629.0	150.3	7.57	1.36	26.9	2.34
496.05	1001	10	22.18	629.9	148.6	7.57	2.35	24.9	2.16
496.26	1008	11	22.19	629.3	148.5	7.56	1.63	22.6	2.00
	1009	Sampling							
496.44	1015								
496.58	1022								

Comments: ~1.5 gals purged from tubing 0840
 FB Lot # 057

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG **Page 1 of 2**

SNL/NM Project Name: MWL							
Calibrations done by: R Lynch				Date: 05/02/17			
Make & Model: EXO 1							
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 13C101167							
Other (S/N): NA							
pH Calibration/Check							
pH Calibrated to (std): 7.00				pH sloped to (std): 10.00			
Reference value:	4.00		7.00		10.00		
	Value	Temp	Value	Temp	Value	Temp	
1. Time:	0615	3.99	20.6	7.00	20.6	9.99	20.6
2. Time:	1133	4.01	20.8	7.00	20.8	10.00	20.8
3. Time:							
4. Time:							
Standard lot no.:	5GE740	6GH909	5AD829	666018	5GE556	66F797	
Expiration date:	5/17	8/18	4/17	7/18	5/17	6/18	
SC Calibration/Check							
Reference Value: 1413 uS				Standard Lot No.: 5AD820 6GH952			
	Value	Temp	Expiration Date: 4/17 8/17				
1. Time:	0613	1412.8	20.6				
2. Time:	1131	1413.3	20.8				
3. Time:							
4. Time:							
ORP Calibration/Check							
Reference Value: 220 mV				Standard Lot No. 5GH308 6GH952 7661123			
	Value	Temp	Expiration Date: 5/18 12/17				
1. Time:	0617	220.1	20.6				
2. Time:	1135	219.9	20.8				
3. Time:							
4. Time:							
DO Calibration/Check							
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg				
1. Time:	0612	81.7	24.64				
2. Time:	1130	81.9	24.69				
3. Time:							
4. Time:							

TJ
5/22/17TJ
5/22/17TJ
5/22/17

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 05/02/17	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 14060C033238	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0820	10.3	19.7	104	802
2. Time 1055	10.1	20.3	101	810
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: R Lynch				Date: 05/03/17		
Make & Model: EXO 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 13C101167						
Other (S/N): NA						
pH Calibration/Check						
pH Calibrated to (std): 7.00			pH sloped to (std): 10.00			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0612	4.02	20.8	7.00	20.8	10.01
2. Time:	1322	4.01	20.9	6.99	20.9	10.01
3. Time:						
4. Time:						
Standard lot no.:	5GE740	66H409	5AD820	66G018	5GE556	66F797
Expiration date:	547	8/10	447	7/18	547	6/18
SC Calibration/Check						
Reference Value: 1413 uS			Standard Lot No.: 5AD820 66H952			
	Value	Temp	Expiration Date: 447 8/17			
1. Time:	0610	1412.7	20.8			
2. Time:	1321	1414.0	20.9			
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220 mV			Standard Lot No. 5GH308 66H97661128			
	Value	Temp	Expiration Date: 548 12/17			
1. Time:	0614	219.6	20.8			
2. Time:	1324	220.1	20.9			
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0609	81.9	24.72			
2. Time:	1320	82.0	24.74			
3. Time:						
4. Time:						

TJ
5/22/17

TJ
5/22/17

TJ
5/22/17

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 05/03/17	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 16040C049087	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time	0820	10.2	20.3	104
2. Time	1035	10.1	20.4	101
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: R Lynch				Date: 05/04/17		
Make & Model: EXO 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 13C101167						
Other (S/N): NA						
pH Calibration/Check						
pH Calibrated to (std): 7.00			pH sloped to (std): 10.00			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: 0623	3.99	20.6	7.00	20.6	9.99	20.6
2. Time: 1121	4.01	20.6	7.00	20.6	10.00	20.6
3. Time:						
4. Time:						
Standard lot no.:	5GE740 6GH909		5AD820 6GG018		5GE556 6GF797	
Expiration date:	5/17 8/18		4/17 7/18		5/17 6/18	
SC Calibration/Check						
Reference Value: 1413 uS			Standard Lot No.: 5AD820 6GH952			
	Value	Temp	Expiration Date: 4/17 8/17			
1. Time: 0622	1413.3	20.6				
2. Time: 1120	1413.7	20.6				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220 mV			Standard Lot No. 5GH308 7GL1123			
	Value	Temp	Expiration Date: 5/16 12/17			
1. Time: 0625	219.8	20.6				
2. Time: 1123	220.2	20.6				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: 0621	82.0		24.88			
2. Time: 1119	82.1		24.89			
3. Time:						
4. Time:						

7/1 5/22/17

7/1 5/22/17

7/1 5/22/17

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GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 05/04/17	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 16040C049087	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0820	9.96	20.3	101	797
2. Time 1034	10.2	20.1	104	795
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: R Lynch				Date: 05/08/17			
Make & Model: EXO 1							
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 13C101167							
Other (S/N): NA							
pH Calibration/Check							
pH Calibrated to (std): 7.00			pH sloped to (std): 10.00				
Reference value:	4.00		7.00		10.00		
	Value	Temp	Value	Temp	Value	Temp	
1. Time:	0620	3.99	20.8	7.00	20.8	10.01	20.8
2. Time:	1122	3.98	20.8	7.00	20.8	10.00	20.8
3. Time:							
4. Time:							
Standard lot no.:	5GE740	66H909	5AD829	666018	5GE556	66GF797	TJ 5/22/17
Expiration date:	5/17	8/18	4/17	7/18	5/17	6/18	
SC Calibration/Check							
Reference Value: 1413 uS			Standard Lot No.: 5AD820 66H952				
	Value	Temp	Expiration Date: 4/17 8/17				
1. Time:	0619	1413.3					
2. Time:	1121	1412.9					
3. Time:							
4. Time:							
ORP Calibration/Check							
Reference Value: 220 mV			Standard Lot No. 5GH308 76C1123				
	Value	Temp	Expiration Date: 5/18 12/17				
1. Time:	0622	219.6					
2. Time:	1124	220.4					
3. Time:							
4. Time:							
DO Calibration/Check							
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg				
1. Time:	0618	82.0	24.56				
2. Time:	1120	82.1	24.54				
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: R Lynch			Date: 05/08/17	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 16040C049087	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0815	9.96	20.3	99.4	807
2. Time 1030	10.2	19.9	103	802
3. Time				
4. Time		•		
Comments:				

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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>05/02/17</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>
--	---

Personnel Performing Decontamination:

Robert lynch
 Print Name: _____ Initial: RL

William Gibson
 Print Name: _____ Initial: WJG

Condition of Equipment

Pump: Excellent Tubing Bundle: Excellent Water Level Indicator: Good

List of Decontamination Materials

Deionized Water	HNO₃
Source: <u>1090</u>	Grade: <u>Reagent</u>
Lot Number: <u>028,025,071,010,006,050</u>	UN #: <u>2031</u>
	Manufacturer: <u>ACROS</u>
	Lot Number: <u>A0358899</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>05/03/17</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>
--	---

Personnel Performing Decontamination:

Robert Lynch _____

Print Name:

RL
Initial:

William Gibson _____

Print Name:

WJG
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	HNO ₃
Source: <u>Bldg. 1090</u>	Grade: <u>Reagent</u>
Lot Number: <u>061,020,024,048,059,039</u>	UN #: <u>2031</u>
	Manufacturer: <u>ACROS</u>
	Lot Number: <u>A0358899</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>05/04/17</u>
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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>
---	--

Personnel Performing Decontamination:

<u>Robert Lynch</u> Print Name:	<u>RL</u> Initial:
<u>Alfred Santillanes</u> Print Name:	<u>[Signature]</u> Initial:

Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>

List of Decontamination Materials	
<p align="center">Deionized Water</p> <p>Source: <u>Bldg. 1090</u></p> <p>Lot Number: <u>030,052,011,002,005,022</u></p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ACROS</u></p> <p>Lot Number: <u>A0358899</u></p>

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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>05/08/17</u>
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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>
---	--

Personnel Performing Decontamination:

Robert Lynch

Print Name:



Initial:

Alfred Santillanes

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

<p align="center">Deionized Water</p> <p>Source: <u>Bldg. 1090</u></p> <p>Lot Number: <u>003,044,012,013,068,055</u></p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ACROS</u></p> <p>Lot Number: <u>A0358899</u></p>
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**SUMMARY SHEET FOR
MAY 2017 GROUNDWATER SAMPLES**

Sample Summary for May 2017 Mixed Waste Landfill Groundwater Monitoring

Well ID	Sample Date	ARCOG	Sample Number	Sample Type	Associated Equipment Blank (ARCOG #/Sample #)	Associated Trip Blank (ARCOG # / Sample #)	Associated Field Blank (ARCOG # / Sample #)	Comments
GEL Analytical Data: Project Task # 195122.10.11.08, Service Order # CF01-17								
MWL-BW2	2-May-17	617845	102593	Environmental	n/a	617845 / 102594	617845 / 102592	
MWL-MW7	4-May-17	617848	102602	Environmental	n/a	617848 / 102603	617848 / 102601	
MWL-MW8	8-May-17	617850	102606	Environmental	n/a	617850 / 102610	n/a	at 1-gallon purge
MWL-MW8	8-May-17	617850	102607	Environmental	n/a	617850 / 102610	n/a	at 5-gallon purge
MWL-MW8	8-May-17	617850	102609	Environmental	n/a	617850 / 102610	617850 / 102608	
MWL-MW9	3-May-17	617847	102598	Environmental	617846 / 102595	617847 / 102600	617847 / 102597	
MWL-MW9	3-May-17	617847	102599	Duplicate	617846 / 102595	617847 / 102600	617847 / 102597	
MWL-EB1	2-May-17	617846	102595	Equipment Blank	n/a	617846 / 102596	n/a	Equipment blank sample prior to MWL-MW9.
MWL QC/DIW	2-May-17	617849	102604	DIW QC	n/a	617849 / 102605	n/a	DIW - source water for EB-1
MWL FB-1	2-May-17	617845	102592	Field Blank	n/a	617845 / 102594	n/a	at MWL-BW2
MWL FB-2	3-May-17	617847	102597	Field Blank	n/a	617847 / 102600	n/a	at MWL-MW9
MWL FB-3	4-May-17	617848	102601	Field Blank	n/a	617848 / 102603	n/a	at MWL-MW7
MWL FB-4	8-May-17	617850	102608	Field Blank	n/a	617850 / 102610	n/a	at MWL-MW8

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES

GROUNDWATER MONITORING

MAY 2017

AR/COC NUMBERS 617845, 617846, 617847, 617848, 617849

Memorandum

Date: June 7, 2017
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL GWM
ARCO: 617845, 617846, 617847, 617848 and 617849
SDG: 422295
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. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 4.

Summary

Fourteen samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. 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

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 follows. The ICAL 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.

Blanks

No target analytes were detected in any of the blanks.

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

Five TBs were submitted, one for each ARCO. FBs were submitted with ARCOs 617845, 617847 and 617848 and were associated with the samples on their respective ARCOs. A DIW QC sample was submitted with ARCO 617849 and was the source water for the EB submitted on ARCO 617846. The EB submitted with ARCO 617846 was associated with samples submitted with ARCO 617847. A field duplicate pair was submitted with ARCO 617847. 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: 06/07/17

Memorandum

Date: June 7, 2017
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL GWM
ARCO: 617845, 617846, 617847, 617848 and 617849
SDG: 422295
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 ER Project AOP 00-03 Rev 4.

Summary

Six 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 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 CRI recoveries associated with the samples met QC acceptance criteria.

It should be noted that the CRI was analyzed at the PQL and not at 2X the PQL for all target analytes.

Blanks

No target analytes were detected in any of the blanks except as follows. U was detected at < the PQL in the continuing calibration blanks bracketing the samples. The associated sample results were either non-detect or detects >5X the highest 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.

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

A DIW QC sample was submitted with ARCOG 617849 and was the source water for the EB submitted on ARCOG 617846. The EB submitted with ARCOG 617846 was associated with samples submitted with ARCOG 617847. A field duplicate pair was submitted with ARCOG 617847. 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: 06/07/17

Memorandum

Date: June 7, 2017
To: File
From: Linda Thal
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL GWM
ARCO: 617845, 617846, 617847, 617848 and 617849
SDG: 422295
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 ER Project AOP 00-03 Rev 4.

Summary

Six 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.

All analyses:

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

Gross A/B:

1. The gross alpha result for sample 422295005 was > 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.

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

A DIW QC sample was submitted with ARCOG 617849 and was the source water for the EB submitted on ARCOG 617846. The EB submitted with ARCOG 617846 was associated with samples submitted with ARCOG 617847. A field duplicate pair was submitted with ARCOG 617847. 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: 06/07/17



Sample Findings Summary



AR/COC: 617845, 617846, 617847, 617848, 617849

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	102593-004/MWL-BW2	ALPHA (12587-46-1)	J, FR7
	102595-004/MWL EB-1	ALPHA (12587-46-1)	BD, FR3
	102595-004/MWL EB-1	BETA (12587-47-2)	BD, FR3
	102604-004/MWL QC/DIW	ALPHA (12587-46-1)	BD, FR3
	102604-004/MWL QC/DIW	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	102593-003/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	102593-003/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3
	102593-003/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	102593-003/MWL-BW2	Potassium-40 (13966-00-2)	BD, FR3
	102595-003/MWL EB-1	Americium-241 (14596-10-2)	BD, FR3
	102595-003/MWL EB-1	Cesium-137 (10045-97-3)	BD, FR3
	102595-003/MWL EB-1	Cobalt-60 (10198-40-0)	BD, FR3
	102595-003/MWL EB-1	Potassium-40 (13966-00-2)	BD, FR3
	102598-003/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	102598-003/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3
	102598-003/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	102598-003/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
	102599-003/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	102599-003/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3
	102599-003/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	102599-003/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
	102602-003/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	102602-003/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	102602-003/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	102602-003/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
	102604-003/MWL QC/DIW	Americium-241 (14596-10-2)	BD, FR3
	102604-003/MWL QC/DIW	Cesium-137 (10045-97-3)	BD, FR3
	102604-003/MWL QC/DIW	Cobalt-60 (10198-40-0)	BD, FR3
	102604-003/MWL QC/DIW	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	102593-005/MWL-BW2	Tritium (10028-17-8)	BD, FR3
	102595-005/MWL EB-1	Tritium (10028-17-8)	BD, FR3
	102598-005/MWL-MW9	Tritium (10028-17-8)	BD, FR3
	102599-005/MWL-MW9	Tritium (10028-17-8)	BD, FR3
	102602-005/MWL-MW7	Tritium (10028-17-8)	BD, FR3
	102604-005/MWL QC/DIW	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	102595-006/MWL EB-1	Radon-222 (14859-67-7)	BD, FR3
	102604-006/MWL QC/DIW	Radon-222 (14859-67-7)	BD, FR3

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

Sandia Data Validation Summary Worksheet

ARCO#(s): 617845, 617846, 617847, 617848 and 617849	Site/Project: MWL GWM	Validation Date: 06/07/2017
SDG: 422295	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 44	CVR present: Yes
ARCO(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: 05/02 through 05/04/2017

ARCO# 617847 (corrected copy) is missing the final received by signature date and time.

The client was notified that 1 vial for sample 422295015(102596-001) and 2 vials each for samples 422295029(102600-001) and 422295036(102605-001) were received with headspace.

Validated by:

L. Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 617845, 617846, 617847, 617848 and 617849	SDG: 422295	Matrix: Aqueous
Laboratory Sample IDs: 422295001, -002, -008, -009, -015, -016, -017, -023, -029, -030, -036, -037, -038, -044		
Method/Batch #s: 8260B /1664377	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	TB1 -008 TB2 -015 TB3 -029 TB4 -044 TB5 -036	FB1 -001 FB2 -016 FB3 -037	EB1 -009	DIW QC -030
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
cis -1,3-Dichloropropylene	+0.51	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
trans-1,3-Dichloropropylene	+0.60	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Acetone	NA	✓	✓	+33 ¹	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
2-Butanone	NA	✓	✓	+26 ¹	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
2-Hexanone	NA	✓	✓	+25 ¹	✓	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

Sample ID	FBZ		Chl-d5		1,4-DCB-d4							
	Area	RT	Area	RT	Area	RT						
None												

Comments: HTs OK. MS/MSD -002

ICAL VOA1.I 04/19/2017. Linear: cis and trans-1,3-dichloropropylene

¹ associated with the MS/MSD only

Mass spectra NA-all sample results ND

Sandia Inorganic Metals Worksheet

ARCO # (s): 617845, 617846, 617847, 617848 and 617849	SDG # (s): 422295	Matrix: Aqueous
Laboratory Sample IDs: 422295003, -010, -018, -024, -031, -039 (Cd, Cr, Ni, U)		
Method/Batch #s: 3005A/6020 /1662483/1662484		

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

Analyte (outliers)	Calibration						MB mg/L	5X Blank (5X MDL) mg/L	LCS %R	MS %R	DUP RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	CRI %R	EB1 -010	DIW QC -031		
	Int. mg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L													
U	NA	✓	✓	✓	✓	.085J	✓	.00043	✓	✓	✓	✓	NA	NA	✓	✓	✓		

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

Comments: HTs OK. MS, DUP, SD performed on sample -003
Ca, Mg, Fe, Al < ICS A.

Sandia Radiochemistry Worksheet

ARCOC #(s): 617845, 617846, 617847, 617848 and 617849	SDG #:422295	Matrix: Aqueous
Laboratory Sample IDs:422295 – see below		
Method/Batch#: EPA 901.1 (gammaspect)/1663341 Samples -004, -011, -019, -025, -032, -040		
Method/Batch#: EPA 900.0/SW846 9310 (gross A/B)/1665158 Samples -005, -012, -020, -026, -033, -041		
Method/Batch#: SM 7500 Rn B (Rn-222)/1662059 Samples -007, -014 and 1662460 Samples -022, -028, -035, -043		
Method/Batch#: EPA 906.0 Modified (tritium)/1664463 Samples -006, -013, -021, -027, -034, -042		

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	EB1	DIW QC		
None													

Tracer/Carrier Recovery Outliers

Sample ID	Tracer/Carrier	%R	Sample ID	Tracer/Carrier	%R	Sample ID	Tracer/Carrier	%R
NA								

Comments: HTs OK. Matrix QC on this SDG for all

Tritium: Parent and dup sample 50ml; MS 25ml; 2X dilution – no data qualified.

Gross A/B: Parent and dup sample 150ml; MS/MSD 50ml; 3X dilution – no data qualified.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab Page 1 of 1
 Batch No. N/A SMO Use AR/COC **617845**

Project Name: MWL GWM / SVM	Date Samples Shipped: <u>5/3/17</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: Timmie Jackson	Carrier/Waybill No: <u>617845</u>	SMO Contact Phone: <u>SMO</u>	
Project/Task Number: 195122.10.11.08	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF01-17	Lab Destination: GEL	Send Report to SMO:	
Contract No.: 1303873		Stephanie Montaño/505.284.2553	

Tech Area: _____
 Building: _____ Room: _____ Operational Site: _____
 Bill to: Sandia National Laboratories (Accounts Payable),
 P.O. Box 5800, MS-0154
 Albuquerque, NM 87185-0154 422295

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					
102592	001	MWL FB-1	NA	5/2/17	10:44	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	<u>001</u>
102593	001	MWL-BW2	496	5/2/17	10:44	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	<u>002</u>
102593	002	MWL-BW2	496	5/2/17	10:46	GW	P	500 ml	HNO3	G	SA	METALS, TAL (SW846-6020/7470): Cd, Cr, Ni, U	<u>003</u>
102593	003	MWL-BW2	496	5/2/17	10:47	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<u>004</u>
102593	004	MWL-BW2	496	5/2/17	10:48	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<u>005</u>
102593	005	MWL-BW2	496	5/2/17	10:49	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<u>006</u>
102593	006	MWL-BW2	496	5/2/17	10:50	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<u>007</u>
102594	001	MWL-TB1	NA	5/2/17	10:44	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<u>008</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
	William Gibson	<u>[Signature]</u>	<u>WG</u>	SNL/04141/505-284-3307/505-239-7367	Return Samples By: Comments: Report specific list of VOCs (LTMMP list provided by SNL/NM SMO). If MeCl, acetone, toluene, or MEK detected > MDL, then request reanalysis.
	Robert Lynch	<u>[Signature]</u>	<u>RL</u>	SNL/04141/505-844-4013/505-250-7090	
	Alfred Santillanes	<u>[Signature]</u>	<u>AS</u>	SNL/04141/505-284-6870/505-228-0710	

Relinquished by <u>[Signature]</u> Org. <u>4141</u> Date <u>5/2/17</u> Time <u>1124</u>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <u>[Signature]</u> Org. <u>4131</u> Date <u>5/2/17</u> Time <u>1124</u>	Received by _____ Org. _____ Date _____ Time _____
Relinquished by <u>[Signature]</u> Org. <u>00631</u> Date <u>5/3/17</u> Time <u>0830</u>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <u>[Signature]</u> Org. _____ Date <u>5-4-17</u> Time <u>7:35</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 *NA*

AR/COC **617846**

Batch No. <i>NA</i>		SMO Use		AR/COC 617846			
Project Name:	MWL GWM / SVM	Date Samples Shipped:	<i>5/3/17</i>		SMO Authorization:	<i>To [Signature]</i>	
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.:	<i>617845</i>		SMO Contact Phone:	Wendy Palencia/505-844-3132	
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:	CF01-17	Lab Destination:	GEL				
		Contract No.:	1303873				

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 *422295*

Tech Area:		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
102595	001	MWL EB-1	NA	5/2/17	13:35	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMP (SW846-8260B)	<i>009</i>
102595	002	MWL EB-1	NA	5/2/17	13:36	DIW	P	500 ml	HNO3	G	EB	METALS, TAL (SW846-6020/7470); Cd, Cr, Ni, U GAMMA SPEC, SHORT LIST (EPA 901)	<i>010</i>
102595	003	MWL EB-1	NA	5/2/17	13:37	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	<i>011</i>
102595	004	MWL EB-1	NA	5/2/17	13:38	DIW	P	1 L	HNO3	G	EB	TRITIUM (EPA 906)	<i>012</i>
102595	005	MWL EB-1	NA	5/2/17	13:39	DIW	AG	250 ml	NONE	G	EB	RADON (SM7500 Rn B)	<i>013</i>
102595	006	MWL EB-1	NA	5/2/17	13:40	DIW	AG	2x40 ml	NONE	G	EB	VOC-LTMMP (SW846-8260B)	<i>014</i>
102596	001	MWL-TB 2	NA	5/2/17	13:35	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<i>015</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		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/0641/505-284-3307/505-239-7367		Return Samples By:		Comments: Report specific list of VOCs (LTMMP list provided by SNL/NM SMO). If MeCl, acetone, toluene, or MEK detected > MDL, then request reanalysis.		
	Gilbert Quintana	<i>[Signature]</i>	<i>GQ</i>	SNL/0641/505-844-2507/505-228-2606						
	Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/0641/505-284-6870/505-228-0710						
Relinquished by <i>[Signature]</i>		Org. <i>0641</i>	Date <i>5/2/17</i>	Time <i>1423</i>	Relinquished by		Org.	Date	Time	
Received by <i>[Signature]</i>		Org. <i>00631</i>	Date <i>5/2/17</i>	Time <i>1423</i>	Received by		Org.	Date	Time	
Relinquished by <i>[Signature]</i>		Org. <i>00631</i>	Date <i>5/3/17</i>	Time <i>0830</i>	Relinquished by		Org.	Date	Time	
Received by <i>[Signature]</i>		Org.	Date <i>5-4-17</i>	Time <i>7:35</i>	Received by		Org.	Date	Time	

Relinquished by <i>[Signature]</i>	Org. <i>0641</i>	Date <i>5/2/17</i>	Time <i>1423</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>5/2/17</i>	Time <i>1423</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00631</i>	Date <i>5/3/17</i>	Time <i>0830</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date <i>5-4-17</i>	Time <i>7:35</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. <i>WLA</i>		SMO Use		AR/COC		617847	
Project Name: MWL GWM / SVM		Date Samples Shipped: <i>5/4/17</i>		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. <i>264726</i>		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: CF01-16		Lab Destination: GEL		Send Report to SMO:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>422295</i>	
Tech Area:		Contract No.: 1303873		Stephanie Montaño/505.284.2553			
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					
102597	001	MWL FB-3	NA	5/3/17	10:15	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	<i>016</i>
102598	001	MWL-MW9	497	5/3/17	10:15	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	<i>017</i>
102598	002	MWL-MW9	497	5/3/17	10:17	GW	P	500 ml	HNO3	G	SA	METALS, TAL (SW846-6020/7470): Cd, Cr, Ni, U	<i>018</i>
102598	003	MWL-MW9	497	5/3/17	10:20	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>019</i>
102598	004	MWL-MW9	497	5/3/17	10:25	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>020</i>
102598	005	MWL-MW9	497	5/3/17	10:30	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>021</i>
102598	006	MWL-MW9	497	5/3/17	10:33	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>022</i>
102599	001	MWL-MW9	497	5/3/17	10:15	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMP (SW846-8260B)	<i>023</i>
102599	002	MWL-MW9	497	5/3/17	10:17	GW	P	500 ml	HNO3	G	DU	METALS, TAL (SW846-6020/7470): Cd, Cr, Ni, U	<i>024</i>
102599	003	MWL-MW9	497	5/3/17	10:20	GW	P	1 L	HNO3	G	DU	GAMMA SPEC, SHORT LIST (EPA 901)	<i>025</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 <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
	William Gibson		<i>[Signature]</i>		<i>WJG</i>		SNL/04141/505-284-3307/505-239-7367		Return Samples By: Comments: Report specific list of VOCs (LTMMP list provided by SNL/NM SMO). If MeCl, acetone, toluene, or MEK detected > MDL, then request reanalysis.		
	Robert Lynch		<i>[Signature]</i>		<i>RL</i>		SNL/04141/505-844-4013/505-250-7090				
	Alfred Santillanes		<i>[Signature]</i>		<i>AS</i>		SNL/04141/505-284-6870/505-228-0710				
Relinquished by <i>[Signature]</i>		Org. <i>0641</i>		Date <i>5/3/17</i>		Time <i>1108</i>		Relinquished by		Org. Date Time	
Received by <i>[Signature]</i>		Org. <i>0631</i>		Date <i>5/3/17</i>		Time <i>1108</i>		Received by		Org. Date Time	
Relinquished by <i>[Signature]</i>		Org. <i>0631</i>		Date <i>5/4/17</i>		Time <i>0815</i>		Relinquished by		Org. Date Time	
Received by <i>[Signature]</i>		Org. <i>[Signature]</i>		Date <i>5-5-17</i>		Time <i>8:15</i>		Received by		Org. Date Time	

Relinquished by <i>[Signature]</i>		Org. <i>0641</i>		Date <i>5/3/17</i>		Time <i>1108</i>		Relinquished by		Org. Date Time	
Received by <i>[Signature]</i>		Org. <i>0631</i>		Date <i>5/3/17</i>		Time <i>1108</i>		Received by		Org. Date Time	
Relinquished by <i>[Signature]</i>		Org. <i>0631</i>		Date <i>5/4/17</i>		Time <i>0815</i>		Relinquished by		Org. Date Time	
Received by <i>[Signature]</i>		Org. <i>[Signature]</i>		Date <i>5-5-17</i>		Time <i>8:15</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. <i>N/A</i>		SMO Use		AR/COC 617847	
Project Name:	MWL GWM / SVM	Date Samples Shipped:	<i>5/4/17</i>	SMO Authorization:	<i>[Signature]</i>
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.:	<i>264726</i>	SMO Contact Phone:	<i>910</i>
Project/Task Number:	195122.10.11.08	Lab Contact:	Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order:	CF01-16	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	1303873	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:
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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					
102597	001	MWL-FB-3 FB-2 <i>ML 5/25/17</i>	NA	5/3/17 10:15	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	
102598	001	MWL-MW9	497	5/3/17 10:15	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	
102598	002	MWL-MW9	497	5/3/17 10:17	GW	P	500 ml	HNO3	G	SA	METALS, TAL (SW846-6020/7470): Cd, Cr, Ni, U	
102598	003	MWL-MW9	497	5/3/17 10:20	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	
102598	004	MWL-MW9	497	5/3/17 10:25	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	
102598	005	MWL-MW9	497	5/3/17 10:30	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	
102598	006	MWL-MW9	497	5/3/17 10:33	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	
102599	001	MWL-MW9	497	5/3/17 10:15	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMP (SW846-8260B)	
102599	002	MWL-MW9	497	5/3/17 10:17	GW	P	500 ml	HNO3	G	DU	METALS, TAL (SW846-6020/7470): Cd, Cr, Ni, U	
102599	003	MWL-MW9	497	5/3/17 10:20	GW	P	1 L	HNO3	G	DU	GAMMA SPEC, SHORT LIST (EPA 901)	

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 <i>5/9/17</i>		EDD <input checked="" type="checkbox"/> Yes	
Background: <input type="checkbox"/> Yes	Entered by <i>SM</i>		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 <i>ML</i>		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>[Signature]</i>	<i>WG</i>	SNL/04141/505-284-3307/505-239-7367	Return Samples By: Comments: Report specific list of VOCs (LTMMP list provided by SNL/NM SMO). If MeCl, acetone, toluene, or MEK detected > MDL, then request reanalysis.
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/04141/505-844-4013/505-250-7090	
	Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/04141/505-284-6870/505-228-0710	

Relinquished by <i>[Signature]</i> Org. 0641 Date <i>5/3/17</i> Time <i>1108</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. 0631 Date <i>5/3/17</i> Time <i>1108</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. 0631 Date <i>5/4/17</i> Time <i>0815</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. Date	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

Batch No. <i>N/A</i>	SMO Use		AR/COC	617848
Project Name: MWL GWM / SVM	Date Samples Shipped: <i>5/4/17</i>	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. <i>264119</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: CF01-17	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505.284.2553		
Tech Area:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>422295</i>		
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					
102601	001	MWL FB-3	NA	5/4/17	10:16	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	<i>037</i>
102602	001	MWL-MW7	496	5/4/17	10:16	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	<i>038</i>
102602	002	MWL-MW7	496	5/4/17	10:18	GW	P	500 ml	HNO3	G	SA	METALS, TAL (SW846-6020/7470): Cd, Cr, Ni, U	<i>039</i>
102602	003	MWL-MW7	496	5/4/17	10:19	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>040</i>
102602	004	MWL-MW7	496	5/4/17	10:21	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>041</i>
102602	005	MWL-MW7	496	5/4/17	10:23	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>042</i>
102602	006	MWL-MW7	496	5/4/17	10:24	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>043</i>
102603	001	MWL-TB4	NA	5/4/17	10:16	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<i>044</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			Lab Use
	William Gibson	<i>[Signature]</i>	<i>WJG</i>	SNL/0641/505-284-3307/505-239-7367		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/0641/505-844-4013/505-250-7090		Return Samples By:			
	Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/0641/505-284-6870/505-228-0710		Comments: Report specific list of VOCs (LTMMP list provided by SNL/NM SMO). If MeCl, acetone, toluene, or MEK detected > MDL, then request reanalysis.			

Relinquished by <i>[Signature]</i> Org. <i>0641</i> Date <i>5/4/17</i> Time <i>1059</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>5/4/17</i> Time <i>1059</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. <i>00631</i> Date <i>5/4/17</i> Time <i>1255</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. Date <i>5-5-17</i> Time <i>9:25</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		AR/COG 617849	
Batch No. <i>N/A</i>		SMO Use	
Project Name: MWL GWM / SVM	Date Samples Shipped: <i>5/4/17</i>	SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>264726</i>	SMO Contact Phone: <i>9MO</i>	
Project/Task Number: 195122.10.11.08	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF01-17	Lab Destination: GEL	Send Report to SMO:	
	Contract No.: 1303873	Stephanie Montaño/505.284.2553	

Tech Area:	Operational Site:	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>422295</i>
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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					
102604	001	MWL QC/DIW	NA	5/2/17 13:20	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMP (SW846-8260B)	<i>030</i>
102604	002	MWL QC/DIW	NA	5/2/17 13:21	DIW	P	500 ml	HNO3	G	EB	METALS, TAL (SW846-60207470): Cd, Cr, Ni, U	<i>031</i>
102604	003	MWL QC/DIW	NA	5/2/17 13:22	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	<i>032</i>
102604	004	MWL QC/DIW	NA	5/2/17 13:23	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	<i>033</i>
102604	005	MWL QC/DIW	NA	5/2/17 13:24	DIW	AG	250 ml	NONE	G	EB	TRITIUM (EPA 906)	<i>034</i>
102604	006	MWL QC/DIW	NA	5/2/17 13:25	DIW	AG	2x40 ml	NONE	G	EB	RADON (SM7500 Rn B)	<i>035</i>
102605	001	MWL-TB 5	NA	5/2/17 13:20	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<i>036</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 <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				
	William Gibson	<i>[Signature]</i>	<i>WJG</i>	SNL/0641/505-284-3307/505-239-7367		Return Samples By:				
	Gilbert Quintana	<i>[Signature]</i>	<i>GQ</i>	SNL/0641/505-844-2507/505-228-2606		Comments: Report specific list of VOCs (LTMMP list provided by SNL/NM SMO). If MeCl, acetone, toluene, or MEK detected > MDL, then request reanalysis.				
	Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/0641/505-284-6870/505-228-0710						

Relinquished by <i>Alfred Santillanes</i> Org. <i>0641</i> Date <i>5/3/17</i> Time <i>0845</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>5/3/17</i> Time <i>0845</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i> Org. <i>00631</i> Date <i>5/4/17</i> Time <i>0815</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>5-5-17</i> Time <i>8:15</i>	Received by	Org.	Date	Time

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

AR/COC NUMBERS 617850

Memorandum

Date: June 16, 2017
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL GWM
ARCO: 617850
SDG: 422628
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. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 4.

Summary

Five samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. 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

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 follows. The ICAL 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 CCV %Ds were >20% and positive for dichlorodifluoromethane, 2-hexanone and bromoform. The associated sample results were non-detect and will not be qualified.

Blanks

No target analytes were detected in any of the blanks.

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 and met QC acceptance criteria.

A TB and an FB were submitted with ARCOG 617850 and were associated with the samples on the same ARCOG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/19/17

Memorandum

Date: June 16, 2017
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL GWM
ARCO: 617850
SDG: 422628
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 ER Project AOP 00-03 Rev 4.

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 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 CRI recoveries associated with the samples met QC acceptance criteria.

It should be noted that the CRI was analyzed at the PQL and not at 2X the PQL for all target analytes.

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 Ca, Mg, Al and Fe were < those in the ICS solution.

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: 06/19/17

Memorandum

Date: June 16, 2017
To: File
From: Linda Thal
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL GWM
ARCO: 617850
SDG: 422628
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 ER Project AOP 00-03 Rev 4.

Summary

One sample was 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.

Gammascpec and tritium:

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

Radon-222:

1. The Rn-222 result for sample 422628009 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.

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. It should be noted MS/MSD analyses were performed on SNL samples of similar matrix from other SDGs. Data will not 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. Data will not be qualified.

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

All LCS and/or LCSD recoveries met QC acceptance criteria.

Detection Limits/Dilutions

The sample was not diluted. All required detection limits were met.

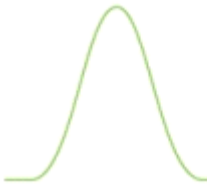
Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan

Level: I

Date: 06/19/17



Sample Findings Summary



AR/COC: 617850

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	102609-003/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	102609-003/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	102609-003/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	102609-003/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	102609-005/MWL-MW8	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	102609-006/MWL-MW8	Radon-222 (14859-67-7)	J, FR7

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

Sandia Data Validation Summary Worksheet

ARCO#(s): 617850	Site/Project: MWL GWM	Validation Date: 06/16/2017
SDG: 422628	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 10	CVR present: Yes
ARCO#(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: 05/08/2017

All 3 vials for sample 422628010 (102610-001) were received with headspace.

Validated by:

L Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCO # (s): 617850	SDG: 422628	Matrix: Aqueous
Laboratory Sample IDs: 422628001, -002, -003, -004, -010		
Method/Batch #s: 8260B /1665970	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	TB6 -010	X5	FB4 -003	X5
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
cis -1,3-Dichloropropylene	+0.51	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
trans-1,3-Dichloropropylene	+0.60	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Dichlorodifluoromethane	NA	✓	✓	+21	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
2-Hexanone	NA	✓	✓	+21/+32 ¹	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Bromoform	NA	✓	✓	+23/+23 ¹	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Acetone	NA	✓	✓	+32 ¹	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
2-Butanone	NA	✓	✓	+24 ¹	✓	NA	✓	✓	✓	✓	✓	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

Sample ID	FBZ		Chl-d5		1,4-DCB-d4							
	Area	RT	Area	RT	Area	RT						
None												

Comments: HTs OK. MS/MSD -001
ICAL VOA1.I 04/19/2017. Linear: cis and trans-1,3-dichloropropylene
Mass spectra reviewed -002 PCE
-010 had head-space > pea size
¹ associated with the MS/MSD only

Sandia Inorganic Metals Worksheet

ARCO # (s): 617850	SDG # (s): 422628	Matrix: Aqueous
Laboratory Sample IDs: 422628005 (Cd, Cr, Ni, U)		
Method/Batch #s: 3005A/6020 /1663233/1663234		

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

Analyte (outliers)	Calibration						MB mg/L	5X Blank (5X MDL) mg/L	LCS %R	MS %R	DUP RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	CRI %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: HTs OK. MS, DUP, SD performed on sample -005
Ca, Mg, Fe, Al < ICS A.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab		AR/COC		617850
Batch No. <i>NK</i>		SMO Use		
Project Name:	MWL GWM / SVM	Date Samples Shipped:	5/8/2017	
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.:	264923	
Project/Task Number:	195122.10.11.08	Lab Contact:	Edie Kent/843-769-7385	
Service Order:	CF01-17	Lab Destination:	GEL	
		Contract No.:	1303873	
		SMO Authorization:	<i>[Signature]</i> SMO	
		SMO Contact Phone:	Wendy Palencia/505-844-3132	
		Send Report to SMO:	Stephanie Montaño/505.284.2553	
		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius		
Tech Area:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>422628</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					
102606	001	MWL-MW8 (1)	497	5/8/17 08:47	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	001
102607	001	MWL-MW8 (5)	497	5/8/17 09:18	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	002
102608	001	MWL FB-4	NA	5/8/17 10:09	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	003
102609	001	MWL-MW8	497	5/8/17 10:09	GW	P	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	004
102609	002	MWL-MW8	497	5/8/17 10:11	GW	P	500 ml	HNO3	G	SA	METALS, TAL (SW846-6020/7470): Cd, Cr, Ni, U	005
102609	003	MWL-MW8	497	5/8/17 10:12	GW	AG	1 L	NONE	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	006
102609	004	MWL-MW8	497	5/8/17 10:14	GW	AG	1 L	NONE	G	SA	GROSS-ALPHA/BETA (EPA 900)	007
102609	005	MWL-MW8	497	5/8/17 10:16	GW	G	250 ml	NONE	G	SA	TRITIUM (EPA 906)	008
102609	006	MWL-MW8	497	5/8/17 10:17	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	009
102610	001	MWL TB-6	NA	5/8/17 10:09	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	010

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 inits.:				Negotiated TAT <input type="checkbox"/>		
						Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cell		Return Samples By:		Lab Use
	William Gibson	<i>[Signature]</i>	WG	SNL/0641/505-284-3307/505-239-7367		Comments: Report specific list of VOCs (LTMMP list provided by SNL/NM SMO). If MeCl, acetone, toluene, or MEK detected > MDL, then request reanalysis.		
	Robert Lynch	<i>[Signature]</i>	RL	SNL/0641/505-844-4013/505-250-7090				
	Alfred Santillanes	<i>[Signature]</i>	AS	SNL/0641/505-284-6870/505-228-0710				

Relinquished by <i>[Signature]</i>	Org. 0641	Date 5/8/17	Time 10:47	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. 0631	Date 5/8/17	Time 10:47	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. 0631	Date 5/8/17	Time 11:45	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date 5/9/17	Time 7:30	Received by	Org.	Date	Time

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

CONTRACT VERIFICATION REVIEW FORMS
GROUNDWATER MONITORING
MAY 2017

AR/COC Number	Sample Type
617845	Environmental*
617846	Field Quality Control*
617847	Environmental*
617848	Environmental*
617849	Field Quality Control*
617850	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. 617845, 617846, 617847, 617848 & 617849

Analytical Lab GEL

SDG No. 422295

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		Sample 102597-001 reported incorrectly as MWL FB-3
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	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		
	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	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)	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)	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			
	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
102597-001	VOCs	Sample location detail incorrect

Were deficiencies unresolved? Yes No

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

If no, provide nonconformance report or correction request number and date correction request was submitted: 06-06-2017

Reviewed by: Wendy Palencia Date: 06-06-2017 08:04:00

Were resolutions adequate and data package complete? Yes No

Closed by: Wendy Palencia Date: 06-08-2017 14:20:00

Contract Verification Form (CVR)

Project Leader Jackson

Project Name MWL GWM

Project/Task No. 195122_10.11.08

ARCOC No. 617850

Analytical Lab GEL

SDG No. 422628

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		All 3 vials for sample 102610-001 (trip blank) 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	X		
	a) Laboratory control sample accuracy reported and met for all samples			
	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	X		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data	X		
	a) Method or reagent blank data reported and met for all samples			

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		
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	General narrative did not discuss headspace issue for VOC trip banks
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)	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			
	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
102610-001	VOCs	Headspace in trip blanks not addressed in narrative

Were deficiencies unresolved? Yes No

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

If no, provide nonconformance report or correction request number and date correction request was submitted: 06-08-2017

Reviewed by: Wendy Palencia Date: 06-08-2017 14:28:00

Were resolutions adequate and data package complete? Yes No

Closed by: Wendy Palencia Date: 06-12-2017 07:23:00

FIELD SAMPLING FORMS
OCTOBER 2017 GROUNDWATER MONITORING

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: MWL Date: 10/16/17 Time: 1230

Activities: Pump Decon (inside 9925 High Bay)
 (Anyone has the right to cease field activities for safety concerns. The buddy system will be used when needed.)

Weather Conditions:
 Temp: NA °F Wind Speed: NA MPH Humidity: NA % 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 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
William Gibson
 Printed Name
Thomas Evans
 Printed Name
Chris Holliday
 Printed Name
ALFRED SANTILLANES
 Printed Name

 Printed Name

Attendees

Robert Lynch
 Signature
William Gibson
 Signature
Thomas Evans
 Signature
Chris Holliday
 Signature
Alfred Santillanes
 Signature

 Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: MWL-BK12 Date: 10/17/17 Time: 8:20am

Activities: Ground Water 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: 71 °F Wind Speed: 3 MPH Humidity: 21 % Wind Chill: 71 °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.

Attendees

Printed Name CHRIS HOLLAND


Printed Name ALFRED SANTILLANES

Printed Name William Gibson

Printed Name Robert Lynch

Printed Name _____

Printed Name _____

Signature 

Signature Alfred Santillanes

Signature William Gibson

Signature Robert Lynch

Signature _____

Signature _____

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: MWL-mw9 Date: 10/18/17 Time: 0816

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: 58 °F Wind Speed: ~2 MPH Humidity: 32 % 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 checked="" type="checkbox"/> Wear safety glasses	<input type="checkbox"/> Wear leather gloves	<input type="checkbox"/> Wear sunscreen
<input 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

ALFREDO SANTILLANES
 Printed Name

William Gibson
 Printed Name

CHRIS HULLNER
 Printed Name

Printed Name _____

Printed Name _____

Attendees

[Signature]
 Signature

[Signature]
 Signature

[Signature]
 Signature

[Signature]
 Signature

Signature _____

Signature _____

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: MWL-MW7 Date: 10-23-17 Time: 1818

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: 56 °F Wind Speed: 5 MPH Humidity: 31 % Wind Chill: 56 °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 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 HOLLITER
Printed Name

William Gibson
Printed Name

ALF RED SAN TILLANES
Printed Name

Thomas Evans
Printed Name

Printed Name

Printed Name

Attendees

Robert J Lynch
Signature

Chris Holliter
Signature

William Gibson
Signature

Alfred Santillanes
Signature

Thomas Evans
Signature

Signature

Signature

Notes

HEALTH & SAFETY MEETING FORM

Dept: 0641 Facility: MWL-MW8 Date: 10/24/17 Time: 0826

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: 55 °F Wind Speed: 13 MPH Humidity: 31 % Wind Chill: 51 °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 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
William Gibson
 Printed Name
ALFRED SANTILLANES
 Printed Name
CHRIS HOLLITER
 Printed Name
Thomas Evans
 Printed Name

 Printed Name

Attendees

[Signature]
 Signature
[Signature]
 Signature
[Signature]
 Signature
[Signature]
 Signature

 Signature

Notes

GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG **Page 1 of 2**

SNL/NM Project Name: MWL						
Calibrations done by: R Lynch				Date: 10/17/17		
Make & Model: EXO 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 16D101840						
Other (S/N): NA						
pH Calibration/Check						
pH Calibrated to (std): 7.00			pH sloped to (std): 10.00			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0652	3.99	21.4	7.00	21.4	9.99
2. Time:	1312	4.01	22.9	7.02	23.0	9.99
3. Time:						
4. Time:						
Standard lot no.:	6GH909		6GG018		6GF797	
Expiration date:	AUG/18		JUL/18		JUN/18	
SC Calibration/Check						
Reference Value: 1413 uS			Standard Lot No.: 7GG624			
	Value	Temp	Expiration Date: JUL/18			
1. Time:	0659	1412.9	21.7			
2. Time:	1315	1413.1	23.1			
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220 mV			Standard Lot No. 7GG707			
	Value	Temp	Expiration Date: APR/18			
1. Time:	0704	220.0	21.5			
2. Time:	1313	219.4	22.9			
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0712	82.2	24.60			
2. Time:	1322	82.3	24.56			
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: R Lynch			Date: 10/17/17	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 16040C049087	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0834	9.94	20.0	101	800
2. Time 1323	10.3	20.4	101	784
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: R Lynch				Date: 10/18/17		
Make & Model: EXO 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 16D101840						
Other (S/N): NA						
pH Calibration/Check						
pH Calibrated to (std): 7.00			pH sloped to (std): 10.00			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	0619	3.99	21.3	7.00	21.3	9.99
2. Time:	1312	4.02	23.8	7.02	23.4	9.98
3. Time:						
4. Time:						
Standard lot no.:	6GH909		6GG018		6GF797	
Expiration date:	AUG/18		JUL/18		JUN/18	
SC Calibration/Check						
Reference Value: 1309 uS @ 21 C			Standard Lot No.: 7GG624			
	Value	Temp	Expiration Date: JUL/18			
1. Time:	0621	1308.8	21.3			
2. Time:	1321	1307.9	23.8			
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220 mV			Standard Lot No. 7GG707			
	Value	Temp	Expiration Date: APR/18			
1. Time:	0625	219.8	21.3			
2. Time:	1326	219.8	22.1			
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0617	82.2	24.70			
2. Time:	1331	82.3	22.74			
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: R Lynch			Date: 10/18/17	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 16040C049087	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0658	9.85	19.8	99.9	789
2. Time 1312	9.93	19.9	100	800
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 T. Evans				Date: 10/23/17		
Make & Model: YSI Exo 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 16D101840						
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:	06:32	4.01	22.3	7.0	21.6	9.99
2. Time:	12:30	4.03	22.13	7.0	22.01	9.99
3. Time:						
4. Time:						
Standard lot no.:	6GH909		7GG488		6GF797	
Expiration date:	AUG/18		JUL/19		JUN/18	
SC Calibration/Check						
Reference Value: 1309@21c			Standard Lot No.: 7GC297			
	Value	Temp	Expiration Date: MAR/18			
1. Time:	06:43	1304.4	21.7			
2. Time:	12:35	1310.0	22.3			
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 7GG707			
	Value	Temp	Expiration Date: APR/18			
1. Time:	06:45	219.9	21.9			
2. Time:	12:37	219.2	22.2			
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	06:29¹⁵ 06:48	82.3	24.64			
2. Time:	12:41	82.2	24.64			
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: 10/23/17	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time <i>0623</i>	9.88	20.0	100	796
2. Time <i>1045</i>	<i>10.2</i>	<i>19.2</i>	<i>101</i>	<i>795</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: 10/24/17		
Make & Model: YSI Exo 1						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 16D101840						
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:	0620	4.00	21.9	7.01	21.8	9.98
2. Time:	1255	4.04	21.4	7.00	21.6	9.98
3. Time:						
4. Time:						
Standard lot no.:	6GH909		7GG488		6GF797	
Expiration date:	AUG/18		JUL/19		JUN/18	
SC Calibration/Check						
Reference Value: 1309@21c			Standard Lot No.: 7GC297			
	Value	Temp	Expiration Date: MAR/18			
1. Time:	0629	1321				
2. Time:	1304	1311				
3. Time:						
4. Time:						
ORP Calibration/Check						
Reference Value: 220mV			Standard Lot No. 7GG707			
	Value	Temp	Expiration Date: APR/18			
1. Time:	0631	218.9				
2. Time:	1305	219.7				
3. Time:						
4. Time:						
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	0635	82.7	24.44			
2. Time:	1254	82.3	24.50			
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: 10/24/17	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 10060C003035	
Reference Value	10	20	100	800
Standard Lot No.	A6055	A6056	A6064	A6104
1. Time 0752	9.72	20.0	101	804
2. Time 1250	10.8	22.3	106	794
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>10-16-17</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>
--	---------------------------------------

Personnel Performing Decontamination:

Robert Lynch

Print Name:

RL
Initial:

William Gibson

Print Name:

WJG
Initial:

Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>NA</u>

List of Decontamination Materials

<p align="center">Deionized Water</p> <p>Source: <u>1090</u></p> <p>Lot Number: <u>023,042,019,002,041,063</u></p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ACROS</u></p> <p>Lot Number: <u>A0358899</u></p>
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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>10/17/17</u>
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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>
--	---

Personnel Performing Decontamination:

Robert Lynch _____

Print Name:


Initial: _____

William Gibson _____

Print Name:


Initial: _____

Condition of Equipment

Pump: Excellent Tubing Bundle: Excellent Water Level Indicator: Good

List of Decontamination Materials

<p align="center">Deionized Water</p> <p>Source: <u>Culligan</u></p> <p>Lot Number: <u>10-11-17</u></p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ACROS</u></p> <p>Lot Number: <u>A0358899</u></p>
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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>10/18/17</u>
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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>
--	---

Personnel Performing Decontamination:

Robert Lynch Print Name: _____	 Initial: _____
Alfred Santillanes Print Name: _____	 Initial: _____

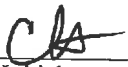

Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Good</u>

List of Decontamination Materials

<p align="center">Deionized Water</p> <p>Source: <u>Culligan Bldg. 1090</u> (with handwritten: <u>2/27, 10/10/17</u> and <u>Culligan</u>)</p> <p>Lot Number: <u>069, 058, 031, 029, 003, 052</u> (with handwritten: <u>10/14/17</u>)</p>	<p align="center">HNO₃</p> <p>Grade: <u>Reagent</u></p> <p>UN #: <u>2031</u></p> <p>Manufacturer: <u>ACROS</u></p> <p>Lot Number: <u>A0358899</u></p>
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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>10/23/17</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>		
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>Good</u>
List of Decontamination Materials		
Deionized Water	HNO₃	
Source: <u>1090 DIW</u>	Grade: <u>Reagent</u>	
Lot Number: <u>069, 058, 031, 029, 003, 052</u>	UN #: <u>2031</u>	
	Manufacturer: <u>ACROS</u>	
	Lot Number: <u>A0358899</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>10/24/17</u>
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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>
---	--

Personnel Performing Decontamination:

<u>Tom Evans</u> Print Name:	<u>TE</u> Initial:
<u>Robert Lynch</u> Print Name:	<u>RL</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	HNO ₃
Source: <u>Culligan</u>	Grade: <u>Reagent</u>
Lot Number: <u>10/11/17</u>	UN #: <u>2031</u>
	Manufacturer: <u>ACROS</u>
	Lot Number: <u>A0358899</u>

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**SUMMARY SHEET FOR
OCTOBER 2017 GROUNDWATER SAMPLES**

Sample Summary for October 2017 Mixed Waste Landfill Groundwater Monitoring

Well 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 # CF01-18								
MWL-BW2	17-Oct-17	618263	103885	Environmental	n/a	618263 / 103886	618263 / 103884	
MWL-MW7	23-Oct-17	618264	103888	Environmental	n/a	618264 / 103889	618264 / 103887	
MWL-MW8	24-Oct-17	618259	103894	Environmental	618260 / 103897	618259 / 103896	618259 / 103893	
MWL-MW8	24-Oct-17	618259	103895	Duplicate	618260 / 103897	618259 / 103896	618259 / 103893	
MWL-MW9	18-Oct-17	618258	103891	Environmental	n/a	618258 / 103892	618258 / 103890	
MWL EB-1	23-Oct-17	618260	103897	Equipment Blank	n/a	618260 / 103898	n/a	Equipment blank sample prior to MWL-MW8.
MWL QC/DIW	23-Oct-17	618261	103899	DIW QC	n/a	618261 / 103900	n/a	DIW - source water for EB-1
MWL FB-1	17-Oct-17	618263	103884	Field Blank	n/a	618263 / 103886	n/a	at MWL-BW2
MWL FB-2	23-Oct-17	618264	103887	Field Blank	n/a	618264 / 103889	n/a	at MWL-MW7
MWL FB-3	18-Oct-17	618258	103890	Field Blank	n/a	618258 / 103892	n/a	at MWL-MW9
MWL FB-4	24-Oct-17	618259	103893	Field Blank	n/a	618259 / 103896	n/a	at MWL-MW8

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES
GROUNDWATER MONITORING
OCTOBER 2017

AR/COC NUMBERS 618259, 618260, 618261, 618264

Memorandum

Date: November 30, 2017

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL GWM
ARCOG: 618259, 618260, 618261 and 618264
SDG: 436011
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

Eleven 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. Acetone was detected at \leq the PQL in EB1, sample 436011030, associated with samples -017 and -023. The acetone result for sample -023 was a detect \leq the PQL and will be **qualified 10U,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 follows. For the ICAL associated with samples -001, -002, -008, -009, -015 and -030, the intercepts were $>$ the MDL and

positive for dibromochloromethane and bromoform. 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 and toluene were detected at \leq the PQL in EB1, sample -030, associated with samples -017 and -023. All associated sample results, *except* the acetone result for sample -023, were non-detect and will not be qualified.

Acetone was detected at the PQL in FB2, sample -001 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 with the following exceptions. The MS and/or MSD recoveries were $>$ the upper acceptance limit for ten target analytes (see attached WS). The associated sample results were non-detect and will not 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.

Four TBs were submitted, one for each ARCO. FB2 and FB4 were submitted with ARCOs 618264 and 618259 and were associated with the samples on their respective ARCOs. EB1 was submitted with ARCO 618260 and was associated with the samples on ARCO 618259. A distilled water sample, the source water for EB1, was submitted with ARCO 618261 and was not associated with any field samples. A field duplicate pair was submitted with ARCO 618259. 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: 11/30/17

Memorandum

Date: November 30, 2017
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL GWM
ARCO: 618259, 618260, 618261 and 618264
SDG: 436011
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. 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 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 Ca, Mg, Al and Fe were < those in the ICS solution.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

EB1 was submitted with ARCOG 618260 and was associated with the samples on ARCOG 618259. A distilled water sample, the source water for EB1, was submitted with ARCOG 618261 and was not associated with any field samples. A field duplicate pair was submitted with ARCOG 618259. 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: 11/30/17

Memorandum

Date: November 30, 2017

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL GWM
ARCO: 618259, 618260, 618261 and 618264
SDG: 436011
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.

All analyses:

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

Radon-222:

1. The sample results which were > the MDA but $\leq 3X$ the MDA will be **qualified J,FR7**.

Gross Alpha/Beta:

1. The relative dilution factor between the parent sample and the gross alpha/beta MS/MSD QC samples was >5 and, as a result, the MS/MSD analyses were not used to evaluate gross alpha and gross beta sample data. The associated sample results that were \geq the MDA will be **qualified J,MS1** and those that were < the MDA will be **qualified BD,MS1**.

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 except as noted above in the Summary section. It should be noted that the MS/MSD analyses for gross A/B and tritium 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 gross A/B and tritium were performed on SNL samples of similar matrix from other SDGs. No data will be qualified.

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

EB1 was submitted with ARCOG 618260 and was associated with the samples on ARCOG 618259. A distilled water sample, the source water for EB1, was submitted with ARCOG 618261 and was not associated with any field samples. A field duplicate pair was submitted with ARCOG 618259. 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: 11/30/17



Sample Findings Summary



AR/COC: 618259, 618260, 618261, 618264

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	103888-004/MWL-MW7	ALPHA (12587-46-1)	J, MS1
	103888-004/MWL-MW7	BETA (12587-47-2)	J, MS1
	103894-004/MWL-MW8	ALPHA (12587-46-1)	J, MS1
	103894-004/MWL-MW8	BETA (12587-47-2)	J, MS1
	103895-004/MWL-MW8	ALPHA (12587-46-1)	J, MS1
	103895-004/MWL-MW8	BETA (12587-47-2)	J, MS1
	103897-004/MWL EB-1	ALPHA (12587-46-1)	BD, FR3,MS1
	103897-004/MWL EB-1	BETA (12587-47-2)	BD, FR3,MS1
	103899-004/MWL QC/DIW	ALPHA (12587-46-1)	BD, FR3,MS1
	103899-004/MWL QC/DIW	BETA (12587-47-2)	BD, FR3,MS1
EPA 901.1			
	103888-003/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	103888-003/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	103888-003/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	103888-003/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
	103894-003/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	103894-003/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	103894-003/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	103894-003/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
	103895-003/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	103895-003/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	103895-003/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	103895-003/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
	103897-003/MWL EB-1	Americium-241 (14596-10-2)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	103897-003/MWL EB-1	Cesium-137 (10045-97-3)	BD, FR3
	103897-003/MWL EB-1	Cobalt-60 (10198-40-0)	BD, FR3
	103897-003/MWL EB-1	Potassium-40 (13966-00-2)	BD, FR3
	103899-003/MWL QC/DIW	Americium-241 (14596-10-2)	BD, FR3
	103899-003/MWL QC/DIW	Cesium-137 (10045-97-3)	BD, FR3
	103899-003/MWL QC/DIW	Cobalt-60 (10198-40-0)	BD, FR3
	103899-003/MWL QC/DIW	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	103888-005/MWL-MW7	Tritium (10028-17-8)	BD, FR3
	103894-005/MWL-MW8	Tritium (10028-17-8)	BD, FR3
	103895-005/MWL-MW8	Tritium (10028-17-8)	BD, FR3
	103897-005/MWL EB-1	Tritium (10028-17-8)	BD, FR3
	103899-005/MWL QC/DIW	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	103888-006/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
	103894-006/MWL-MW8	Radon-222 (14859-67-7)	J, FR7
	103897-006/MWL EB-1	Radon-222 (14859-67-7)	BD, FR3
	103899-006/MWL QC/DIW	Radon-222 (14859-67-7)	BD, FR3
SW846 8260B DOE-AL			
	103895-001/MWL-MW8	Acetone (67-64-1)	10U, B2

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

Sandia Data Validation Summary Worksheet

ARCO#(s): 618259, 618260, 618261 and 618264	Site/Project: MWL GWM	Validation Date: 11/30/2017
SDG: 436011	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 36	CVR present: Yes
ARCO#(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 and 10/24/2017

According to the case narrative and emails: Samples 436011008(103889-001) and 436011029(103896-001) were received with two of three vials with headspace and samples 436011015(103900-001) and 436011036(103898-001) were received with all three vials with headspace.

According to the sample receipt form: Sample 436011015(103900-001) was received with headspace in two of three vials

Validated by:

L Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCO # (s): 618259, 618260, 618261 and 618264	SDG: 436011	Matrix: Aqueous
Laboratory Sample IDs: 436011001, -002, -008, -009, -015, -016, -017, -023, -029, -030, -036		
Method/Batch #s: 8260B /1715347	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	FB2 -001	TB2 -008 TB6 -015	DIW QC -009	EB1 -030
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
VOA6.I 10/19/2017	-001, -002, -008, -009, -015, -030, MS/MSD													
Dibromochloromethane	+ .69	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Bromoform	+ .88	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	.32J
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	2.57J	✓	✓	3.74J
1,1,1-Trichloroethane	NA	✓	✓	✓	✓	NA	✓	144	✓	✓	✓	✓	✓	✓
1,1-Dichloroethane	NA	✓	✓	✓	✓	NA	✓	130	✓	✓	✓	✓	✓	✓
1, 1-Dichloroethylene	NA	✓	✓	✓	✓	NA	✓	138	136	✓	✓	✓	✓	✓
1, 2-Dichloroethane	NA	✓	✓	✓	✓	NA	✓	144	136	✓	✓	✓	✓	✓
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	145	139	✓	✓	✓	✓	✓
Carbon tetrachloride	NA	✓	✓	✓	✓	NA	✓	153	148	✓	✓	✓	✓	✓
Chloroform	NA	✓	✓	✓	✓	NA	✓	134	✓	✓	✓	✓	✓	✓
Methylene chloride	✓	✓	✓	✓	✓	NA	✓	126	124	✓	✓	✓	✓	✓
cis-1, 2-Dichloroethylene	NA	✓	✓	✓	✓	NA	✓	132	128	✓	✓	✓	✓	✓
trans-1, 2-Dichloroethylene	NA	✓	✓	✓	✓	NA	✓	133	131	✓	✓	✓	✓	✓
											FB4 -016	TB4 -029	TB5 -036	
VOA4.I 10/29/2017	-016, -017(MS/MSD Parent), -023, -029, -036													
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

Sample ID	FBZ		Chl-d5		1,4-DCB-d4							
	Area	RT	Area	RT	Area	RT						
None												

Comments: HTs OK. MS/MSD -017. Mass spectra validated

ICAL VOA6.I 10/19/2017. Linear: MeCl₂, dibromochloromethane, bromomethane. ICAL VOA4.I 10/29/2017 All avg RF

Sandia Radiochemistry Worksheet

ARCOC #(s): 618259, 618260, 618261 and 618264	SDG #:436011	Matrix: Aqueous
Laboratory Sample IDs:436011 – see below		
Method/Batch#: EPA 901.1 (gammasepec)/1717928 Samples -004, -011, -019, -025, -032		
Method/Batch#: EPA 900.0/SW846 9310 (gross A/B)/1714195 Samples -005, -012, -020, -026, -033		
Method/Batch#: SM 7500 Rn B (Rn-222)/1712415 Samples -007, -014, -022, -028, -035		
Method/Batch#: EPA 906.0 Modified (tritium)/1713790 Samples -006, -013, -021, -027, -034		

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	EB1	X5	DIW QC	X5
None													

Tracer/Carrier Recovery Outliers

Sample ID	Tracer/Carrier	%R	Sample ID	Tracer/Carrier	%R	Sample ID	Tracer/Carrier	%R
NA								

Comments: HTs OK. Matrix QC on this SDG for all except A/B and tritium

Tritium: Parent and dup sample 50ml; MS 25ml; 2X dilution – no data qualified.

Gross A/B: Parent and dup sample 150ml; MS/MSD 25ml; 6X dilution –data qualified.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.		SMO Use		AR/COG		618259
Project Name:	MWL GWM / SVM	Date Samples Shipped:	10-24-17	SMO Authorization:	<i>[Signature]</i>	
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.:	273514	SMO Contact Phone:		
Project/Task Number:	195122.10.11.08	Lab Contact:	Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No.	
Service Order:	CF01-18	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), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	

Tech Area:		Operational Site:		436011
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					
103893	001	MWL FB-4	NA	10/24/17 10:18	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	016
103894	001	MWL-MW8	497	10/24/17 10:18	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	017
103894	002	MWL-MW8	497	10/24/17 10:20	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	018
103894	003	MWL-MW8	497	10/24/17 10:24	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	019
103894	004	MWL-MW8	497	10/24/17 10:28	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	020
103894	005	MWL-MW8	497	10/24/17 10:32	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	021
103894	006	MWL-MW8	497	10/24/17 10:34	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	022
103895	001	MWL-MW8	497	10/24/17 10:18	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMP (SW846-8260B)	023
103895	002	MWL-MW8	497	10/24/17 10:20	GW	P	500 ml	HNO3	G	DU	METALS, LTMMP - Cd, Cr, Ni, U	024
103895	003	MWL-MW8	497	10/24/17 10:24	GW	P	1 L	HNO3	G	DU	GAMMA SPEC, SHORT LIST (EPA 901)	025

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 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
	Robert Lynch	<i>[Signature]</i>	RL	SNL/00641/505-844-4013/505-250-7090		Return Samples By:		
	William Gibson	<i>[Signature]</i>	WG	SNL/00641/505-239-7367/505-239-7367		Comments:		
	Alfred Santillanes	<i>[Signature]</i>	AS	SNL/00641/505-284-6870/505-228-0710				
	Thomas Evans	<i>[Signature]</i>	TE	AIS/00641/505-284-0804				
Chris Hulliger	<i>[Signature]</i>	CH	AIS/00641/505-284-3309/505-382-0353					

Relinquished by <i>[Signature]</i>	Org. 0641	Date 10/24/17	Time 11:03	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. 631	Date 10-24-17	Time 11:03	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. 0631	Date 10-24-17	Time 13:00	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date 10-25-17	Time 7:50	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

Batch No. *n/a*

SMO Use

AR/COC **618260**

Project Name: MWL GWM / SVM	Date Samples Shipped: <i>10/24/17</i>	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. <i>273514</i>	SMO Contact Phone: <i>9MO</i>	
Project/Task Number: 195122.10.11.08	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF01-18	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 *436011*

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					
103897	001	MWL EB-1	NA	10/23/17 13:13	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMP (SW846-8260B)	<i>030</i>
103897	002	MWL EB-1	NA	10/23/17 13:14	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMP - Cd, Cr, Ni, U	<i>031</i>
103897	003	MWL EB-1	NA	10/23/17 13:15	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	<i>032</i>
103897	004	MWL EB-1	NA	10/23/17 13:17	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	<i>033</i>
103897	005	MWL EB-1	NA	10/23/17 13:19	DIW	AG	250 ml	NONE	G	EB	TRITIUM (EPA 906)	<i>034</i>
103897	006	MWL EB-1	NA	10/23/17 13:20	DIW	G	2x40 ml	NONE	G	EB	RADON (SM7500 Rn B)	<i>035</i>
103898	001	MWL TB-5	NA	10/23/17 13:13	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<i>036</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 <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090	Return Samples By: Comments:
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367	
	Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/00641/505-284-6870/505-228-0710	
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284-0804	
Chris Hulliger	<i>[Signature]</i>	<i>CH</i>	AIS/00641/505-284-3309/505-382-0353		

Relinquished by <i>[Signature]</i> Org. <i>0641</i> Date <i>10/23/17</i> Time <i>1410</i>	Relinquished by <i>[Signature]</i> Org. <i>0631</i> Date <i>10-24-17</i> Time <i>1300</i>
Received by <i>[Signature]</i> Org. <i>0631</i> Date <i>10/23/17</i> Time <i>1410</i>	Received by <i>[Signature]</i> Org. Date <i>10-25-17</i> Time <i>750</i>
Relinquished by <i>[Signature]</i> Org. <i>0631</i> Date <i>10/23/17</i> Time <i>1515</i>	Relinquished by Org. Date Time
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>10/23/17</i> Time <i>1515</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

Batch No. *N/A*

SMO Use

AR/COC **618261**

Project Name: MWL GWM / SVM	Date Samples Shipped: <i>10/23/17</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>273372</i>	SMO Contact Phone: <i>SMO</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: CF01-18	Lab Destination: GEL	Send Report to SMO:	<input checked="" type="checkbox"/> 4° Celsius
	Contract No.: 1303873	Stephanie Montaño/505.284.2553	

Tech Area: _____
 Building: _____ Room: _____ Operational Site: _____
 Bill to: Sandia National Laboratories (Accounts Payable),
 P.O. Box 5800, MS-0154
 Albuquerque, NM 87185-0154 *43601*

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					
103899	001	MWL QC/DIW	NA	10/23/17 10:12	DIW	G	3x40 ml	HCl	G	FB EB	VOC-LTMMP (SW846-8260B)	<i>009</i>
103899	002	MWL QC/DIW	NA	10/23/17 10:13	DIW	P	500 ml	HNO3	G	FB EB	METALS, LTMMP - Cd, Cr, Ni, U	<i>010</i>
103899	003	MWL QC/DIW	NA	10/23/17 10:14	DIW	P	1 L	HNO3	G	FB EB	GAMMA SPEC, SHORT LIST (EPA 901)	<i>011</i>
103899	004	MWL QC/DIW	NA	10/23/17 10:15	DIW	P	1 L	HNO3	G	FB EB	GROSS-ALPHA/BETA (EPA 900)	<i>012</i>
103899	005	MWL QC/DIW	NA	10/23/17 10:16	DIW	AG	250 ml	NONE	G	FB EB	TRITIUM (EPA 906)	<i>013</i>
103899	006	MWL QC/DIW	NA	10/23/17 10:17	DIW	G	2x40 ml	NONE	G	FB EB	RADON (SM7500 Rn B)	<i>014</i>
103900	001	MWL TB-6	NA	10/23/17 10:12	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<i>015</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 <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090	Return Samples By: Comments:
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367	
	Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/00641/505-284-6870/505-228-0710	
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284-0804	
Chris Hulliger	<i>[Signature]</i>	<i>CH</i>	AIS/00641/505-284-3309/505-382-0353		

Relinquished by <i>[Signature]</i> Org. <i>00691</i> Date <i>10/23/17</i> Time <i>1050</i>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <i>[Signature]</i> Org. <i>00631</i> Date <i>10/23/17</i> Time <i>1050</i>	Received by _____ Org. _____ Date _____ Time _____
Relinquished by <i>[Signature]</i> Org. <i>00631</i> Date <i>10/23/17</i> Time <i>1240</i>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <i>[Signature]</i> Org. _____ Date <i>10/24/17</i> Time <i>7:30</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

Batch No. <i>N/A</i>		SMO Use		AR/COC 618264	
Project Name:	MWL GWM / SVM	Date Samples Shipped:	<i>10/23/17</i>	SMO Authorization:	<i>[Signature]</i>
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.	<i>273372</i>	SMO Contact Phone:	<i>[Signature]</i> <i>gmo</i>
Project/Task Number:	195122.10.11.08	Lab Contact:	Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order:	CF01-18	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	1303873	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 *436011*

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					
103887	001	MWL FB-2	NA	10/23/17 10:27	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	<i>001</i>
103888	001	MWL-MW7	496	10/23/17 10:27	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	<i>002</i>
103888	002	MWL-MW7	496	10/23/17 10:29	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	<i>003</i>
103888	003	MWL-MW7	496	10/23/17 10:30	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>004</i>
103888	004	MWL-MW7	496	10/23/17 10:32	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>005</i>
103888	005	MWL-MW7	496	10/23/17 10:34	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>006</i>
103888	006	MWL-MW7	496	10/23/17 10:35	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>007</i>
103889	001	MWL TB-2	NA	10/23/17 10:27	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<i>008</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 <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090		Return Samples By:			
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367		Comments:			
	Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/00641/505-284-6870/505-228-0710					
	Thomas Evans	<i>[Signature]</i>	<i>TE</i>	AIS/00641/505-284-0804					
Chris Hujliger	<i>[Signature]</i>	<i>CH</i>	AIS/00641/505-284-3309/505-382-0353						

Relinquished by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>10/23/17</i>	Time <i>11:00</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>10/23/17</i>	Time <i>11:00</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00641</i>	Date <i>10/23/17</i>	Time <i>12:40</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date <i>10/24/17</i>	Time <i>7:30</i>	Received by	Org.	Date	Time

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

AR/COC NUMBERS 618258, 618263

AR/COC NUMBERS 618258, 618263

Memorandum

Date: November 20, 2017
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL GWM
ARCO: 618258 and 618263
SDG: 435369
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. 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

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 follows. The ICAL intercepts were > the MDL and positive for dibromochloromethane and bromoform. The associated sample results were non-detect and will not be qualified.

For the CCV associated with sample 435369009, the %D was >20% and positive for dichlorodifluoromethane. The associated sample result was non-detect and will not be qualified.

For the CCV associated with sample -009, the %Ds were >20% but ≤40% with negative bias for acetone and 2-butanone. The associated sample results were non-detect, and since no other calibration infractions occurred, will not be qualified.

Blanks

No target analytes were detected in any of the blanks.

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 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

All associated sample results were non-detect and, therefore, mass spectra were not verified during data validation.

A TB and an FB were submitted with ARCOCs 618258 and 618263 and were associated with the samples on the same ARCOc.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan

Level: I

Date: 11/20/17

Memorandum

Date: November 20, 2017
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL GWM
ARCOG: 618258 and 618263
SDG: 435369
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 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 Ca, Mg, Al and Fe were < those in the ICS solution.

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: 11/20/17

Memorandum

Date: November 20, 2017

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL GWM
ARCOG: 618258 and 618263
SDG: 435369
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 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. The sample results which were either < the associated 2-sigma TPU or < the associated MDA will be **qualified BD,FR3**.

Gross Alpha/Beta:

1. The relative dilution factor between the parent sample and the gross alpha/beta MS/MSD QC samples was >5 and, as a result, the MS/MSD analyses were not used to evaluate gross alpha and gross beta sample data. The associated sample results were > the MDA and will be **qualified J,MS1**.

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 except as noted above in the Summary section.

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.

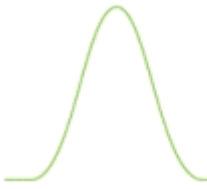
Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 11/20/17



Sample Findings Summary



AR/COC: 618258, 618263

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	103885-004/MWL-BW2	ALPHA (12587-46-1)	J, MS1
	103885-004/MWL-BW2	BETA (12587-47-2)	J, MS1
	103891-004/MWL-MW9	ALPHA (12587-46-1)	J, MS1
	103891-004/MWL-MW9	BETA (12587-47-2)	J, MS1
EPA 901.1			
	103885-003/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	103885-003/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3
	103885-003/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	103885-003/MWL-BW2	Potassium-40 (13966-00-2)	BD, FR3
	103891-003/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	103891-003/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3
	103891-003/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	103891-003/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	103885-005/MWL-BW2	Tritium (10028-17-8)	BD, FR3
	103891-005/MWL-MW9	Tritium (10028-17-8)	BD, FR3

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

Sandia Data Validation Summary Worksheet

ARCO#(s): 618258 and 618263	Site/Project: MWL GWM	Validation Date: 11/20/2017
SDG: 435369	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 16	CVR present: Yes
ARCO#(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: 10/17 and 10/18/2017

One vial from sample 435369010(103891-001) and all three vials from sample 435369016(103892-001) contained headspace.

Validated by:

L. Thal

Sandia Organic Worksheet (GC/MS VOC)

ARCO # (s): 618258 and 618263	SDG: 435369	Matrix: Aqueous
Laboratory Sample IDs: 435369001, -002, -008, -009, -010, -016		
Method/Batch #s: 8260B /1713937	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	FB1 -001	TB1 -008	FB3 -009	TB3 -016
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
Dibromochloromethane	+0.69	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Bromoform	+0.88	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Acetone	NA	✓	✓	-25 ¹	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
2-Butanone	NA	✓	✓	-21 ¹	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Dichlorodifluoromethane	NA	✓	✓	+33 ¹	✓	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

Sample ID	FBZ		Chl-d5		1,4-DCB-d4						
	Area	RT	Area	RT	Area	RT					
None											

Comments: HTs OK. MS/MSD on SNL sample from another SDG
ICAL VOA6.I 10/19/2017. Linear: MeCl₂, dibromochloromethane, bromomethane
¹associated with sample -009 only

Sandia Radiochemistry Worksheet

ARCOC #(s): 618258 and 618263	SDG #:435369	Matrix: Aqueous
Laboratory Sample IDs:435369 – see below		
Method/Batch#: EPA 901.1 (gammasepec)/1711864 Samples -004, -012		
Method/Batch#: EPA 900.0/SW846 9310 (gross A/B)/1714195 Samples -005, -013		
Method/Batch#: SM 7500 Rn B (Rn-222)/1710602 Samples -007, -015		
Method/Batch#: EPA 906.0 Modified (tritium)/1713790 Samples -006, -014		

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
NA								

Comments: HTs OK. Matrix QC on this SDG for all

Tritium: Parent and dup sample 50ml; MS 25ml; 2X dilution – no data qualified.

Gross A/B: Parent and dup sample 150ml; MS/MSD 25ml; 6X dilution –data qualified.

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC **618258**

Project Name: MWL GWM / SVM	Date Samples Shipped: <i>10/18/17</i>	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: <i>273203</i>	SMO Contact Phone: Wendy Palencia/505-844-3132	
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: CF01-18	Lab Destination: GEL	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 *435369*

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					
103890	001	MWL FB-3	NA	10/18/17 10:53	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	<i>009</i>
103891	001	MWL-MW9	497	10/18/17 10:53	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	<i>010</i>
103891	002	MWL-MW9	497	10/18/17 10:55	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	<i>011</i>
103891	003	MWL-MW9	497	10/18/17 10:56	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>012</i>
103891	004	MWL-MW9	497	10/18/17 10:58	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>013</i>
103891	005	MWL-MW9	497	10/18/17 11:00	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>014</i>
103891	006	MWL-MW9	497	10/18/17 11:01	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>015</i>
103892	001	MWL TB-3	NA	10/18/17 10:53	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<i>016</i>

Last Chain: <input type="checkbox"/> Yes	Sample Tracking	SMO Use	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: Comments:
Validation Req'd: <input checked="" type="checkbox"/> Yes	Date Entered:	Entered by:	
Background: <input type="checkbox"/> Yes	QC inits.:		
Confirmatory: <input type="checkbox"/> Yes			
Sample Team Members: Name: Robert Lynch, William Gibson, Alfred Santillanes Signature: <i>[Signatures]</i> Init.: <i>[Initials]</i> Company/Organization/Phone/Cell: SNL/00641/505-844-4013/505-250-7090 SNL/00641/505-239-7367/505-239-7367 SNL/00641/505-284-6870/505-228-0710			

Relinquished by <i>Alfred Santillanes</i> Org. 00641 Date <i>10/18/17</i> Time <i>11:30</i>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <i>[Signature]</i> Org. 00631 Date <i>10/18/17</i> Time <i>11:30</i>	Received by _____ Org. _____ Date _____ Time _____
Relinquished by <i>[Signature]</i> Org. 00631 Date <i>10/18/17</i> Time <i>12:07</i>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <i>[Signature]</i> Org. _____ Date <i>10/19/17</i> Time <i>7:40</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

Batch No. *N/A*

Project Name: MWL GWM / SVM		Date Samples Shipped: <i>10/17/17</i>		SMO Authorization: <i>[Signature]</i>		AR/COC 618263	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>273096</i>		SMO Contact Phone: <i>SMO</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		Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>435369</i>	
Service Order: CF01-18		Lab Destination: GEL		Send Report to SMO: Stephanie Montaño/505.284.2553			
Tech Area:		Contract No.: 1303873					
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					
103884	001	MWL FB-1	NA	10/17/17 10:57	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	<i>001</i>
103885	001	MWL-BW2	496	10/17/17 10:57	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	<i>002</i>
103885	002	MWL-BW2	496	10/17/17 10:59	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	<i>003</i>
103885	003	MWL-BW2	496	10/17/17 11:00	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>004</i>
103885	004	MWL-BW2	496	10/17/17 11:02	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>005</i>
103885	005	MWL-BW2	496	10/17/17 11:04	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>006</i>
103885	006	MWL-BW2	496	10/17/17 11:05	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>007</i>
103886	001	MWL TB-1	NA	10/17/17 10:57	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	<i>008</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"/>																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Sample Team Members</th> <th>Name</th> <th>Signature</th> <th>Init.</th> <th>Company/Organization/Phone/Cell</th> </tr> <tr> <td></td> <td>Robert Lynch</td> <td><i>[Signature]</i></td> <td><i>RL</i></td> <td>SNL/00641/505-844-4013/505-250-7090</td> </tr> <tr> <td></td> <td>William Gibson</td> <td><i>[Signature]</i></td> <td><i>WG</i></td> <td>SNL/00641/505-239-7367/505-239-7367</td> </tr> <tr> <td></td> <td>Alfred Santillanes</td> <td><i>[Signature]</i></td> <td><i>AS</i></td> <td>SNL/00641/505-284-6870/505-228-0710</td> </tr> <tr> <td></td> <td>Chris Hulliger</td> <td><i>[Signature]</i></td> <td><i>CH</i></td> <td>AIS/00641/505-284-3309/505-382-0353</td> </tr> </table>		Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Robert Lynch	<i>[Signature]</i>		<i>RL</i>	SNL/00641/505-844-4013/505-250-7090		William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367		Alfred Santillanes	<i>[Signature]</i>	<i>AS</i>	SNL/00641/505-284-6870/505-228-0710		Chris Hulliger	<i>[Signature]</i>	<i>CH</i>	AIS/00641/505-284-3309/505-382-0353	Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Return Samples By:		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell																												
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/00641/505-844-4013/505-250-7090																												
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/00641/505-239-7367/505-239-7367																												
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	Chris Hulliger	<i>[Signature]</i>	<i>CH</i>	AIS/00641/505-284-3309/505-382-0353																												
						Comments:																										
Relinquished by <i>[Signature]</i>		Org. <i>00641</i> Date <i>10/17/17</i> Time <i>1120</i>		Relinquished by		Org.		Date		Time																						
Received by <i>[Signature]</i>		Org. <i>00631</i> Date <i>10/17/17</i> Time <i>1120</i>		Received by		Org.		Date		Time																						
Relinquished by <i>[Signature]</i>		Org. <i>00631</i> Date <i>10/17/17</i> Time <i>1220</i>		Relinquished by		Org.		Date		Time																						
Received by <i>[Signature]</i>		Org. Date <i>10-18-17</i> Time <i>8:00</i>		Received by		Org.		Date		Time																						

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

CONTRACT VERIFICATION REVIEW FORMS
GROUNDWATER MONITORING
OCTOBER 2017

AR/COC Number	Sample Type
618258	Environmental*
618259	Environmental*
618260	Field Quality Control*
618261	Field Quality Control*
618263	Environmental*
618264	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. 618259, 618260, 618261 & 618264

Analytical Lab GEL

SDG No. 436011

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		Samples 103889-001 and 103896-001 were received with two of three vials with headspace and samples 103900-001 and 103898-001 were received with all three vials 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	1, 1, 1-Trichloroethane, 1,1-Dichloroethane, 1,1,1-Dichloroethylene, 1,2-Dichloroethane, Bromodichloromethane, Carbon tetrachloride, Chloroform, Methylene chloride, cis-1,2-Dichloroethylene and trans-1, 2-Dichloroethylene failed recovery limits for PS (QC1203910910). 1, 1-Dichloroethylene, 1, 2-Dichloroethane, Bromodichloromethane, Carbon tetrachloride, Methylene chloride, cis-1, 2-Dichloroethylene and trans-1, 2-Dichloroethylene failed recovery limits for PSD (QC1203910912).
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
	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		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone detected in MWL FB-2. Acetone and toluene detected in MWL EB-1.
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)	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		
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010)	N/A		
	a) Initial calibration provided	N/A		
	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	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		

Line No.	Item	Yes	No	Comments
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850)	N/A		
	a) Initial calibration provided			
	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)	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
---------------------	----------	-------------------------------

Were deficiencies unresolved? Yes No

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

Reviewed by: Wendy Palencia Date: 11-29-2017 01:10:00

Closed by: Wendy Palencia Date: 11-29-2017 01:10:00

Contract Verification Form (CVR)

Project Leader Jackson

Project Name MWL GWM

Project/Task No. 195122_10.11.08

ARCOC No. 618258 & 618263

Analytical Lab GEL

SDG No. 435369

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 from sample 103891-001 and all three vials from sample 103892-001 contained 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	X		
	a) Laboratory control sample accuracy reported and met for all samples			
	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	X		
	a) Replicate sample precision reported and met for all inorganic and radiochemistry samples			
	b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5	Blank data	X		
	a) Method or reagent blank data reported and met for all samples			

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		
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)	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			
	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: 11-17-2017 10:35:00

Closed by: Wendy Palencia Date: 11-17-2017 10:35:00

ANNEX F

Mixed Waste Landfill Inspection Forms

April 2017-March 2018

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 05/30/17
2. Time of Inspection 0800
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.	N/A	N/A	

**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 *Peltguch*
 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 10/26/17
2. Time of Inspection 0804
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.	N/A	N/A	

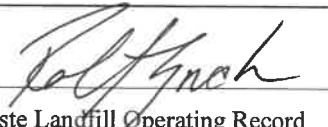
**Mixed Waste Landfill
Soil-Vapor Monitoring Network Checklist/Form (Continued)**

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-Moisture Monitoring Network Checklist/Form**

1. Date of Inspection April 17, 2017
2. Time of Inspection 09:25
3. Name of Inspector Robert Ziöck

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>
F. Concrete pads, bollards, and protective casings in need of repair/maintenance.	yes	No	
G. Access tube cover caps in need of repair/maintenance.	yes	No	
H. Access tube casing in need of repair/maintenance.	yes	No	
I. Monitoring location properly labeled.	yes	No	
J. 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	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-Moisture 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
Groundwater Monitoring Network Checklist/Form**

1. Date of Inspection 05/02/17
 2. Time of Inspection 0808
 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 assembly 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 *Robert G. ...*
 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 10-17-17
 2. Time of Inspection 1028
 3. Name of Inspector William Gibson

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	Baro ball assembly 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 William J. Kelly
 Original to: Mixed Waste Landfill Operating Record
 Copy to: SNL/NM Records Center

**Mixed Waste Landfill
Cover Inspection Checklist/Form**

1. Date of Inspection 6/14/17
2. Time of Inspection 0920 - 0953
3. Name of Inspector Robert Zick, Bruce Leavis

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 yes Revised 6/14/17	1
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	No	
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)**

Action (Note Number) 1 assigned to ^{Robert Ziöck}
Aryce Reavis Date action completed 6/14/17

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. Eleven snakeweed plants were identified and pulled at time of the inspection RM
6/14/17
as a best management practice
as recommended by the staff biologist.

Inspector's Signature Robert Ziöck, Aryce Reavis

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



date: June 27, 2017

to: Mike Mitchell (08854)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **June 2017 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".

Nesting Birds Biological Survey: I did not observe any nesting birds on any of the three ET Covers. ET Cover work activities, including driving, needs to begin by July 3rd. If the work begins after July 3rd, you will need contact me prior to beginning work.

Post-emergent herbicides: emphasize to Sequoia that any post-emergent must NOT harm grasses. Last month Sequoia originally suggested using Glyphosate for post-emergent weed control at the CWL, but Glyphosate is a non-selective herbicide and it will kill the grasses.

Prodiamine 4L is a broad-leaf selective post-emergent that should not harm the grasses and does not have a bee precaution, according to the University of California Integrated Pest Management bee precaution pesticide ratings. Sequoia should have this herbicide available.

Only a selective broadleaf post-emergent should be used anywhere near the covers due to possible wind drift carrying the herbicide to the covers.

Pre-emergent herbicides: the pre-emergent herbicide Surflan seems to have worked well so far and does not have a bee precaution, according to the University of California Integrated Pest Management bee precaution pesticide ratings.

ET Covers Observations and Recommendations

CAMU

- The two 4 inch holes on the north slope are as you describe. I will need to check the possibly active burrow with our downhole camera. Although the entrance is in good shape, today it didn't show any sign of recent activity.
- I also saw two approximately 4-inch burrow entrances on the west slope. They both appear to be abandoned. I will check them again when I return with the camera. I will fill in all inactive burrows.
- For your maintenance scope: the entire south slope up to the southernmost part of the top of the ET Cover has a moderately dense amount of small Russian thistle plants. They should either be pulled or sprayed with a broad-leaf post-emergent. Spraying might be a better choice to avoid excessive foot traffic on the steep graveled slope. The post-emergent would need to be very safe for grasses. A pre-emergent in this area would help to prevent more Russian thistle.

CWL

- The grasses are generally not robust. Supplemental water will give them a boost as soon it's available.
- Very few weeds on the ET Cover.
- I like the strategy of two rounds of vehicle-mounted water sprayed across the cover after the pre-emergent herbicide. Although we wouldn't want the cover driven over regularly, the two rounds of water spray will be helpful until either we can use the Big Sprinkler or the monsoons arrive.
- Two rounds of sprayed water after the pre-emergent should be enough water to settle the herbicide down through the litter (dead vegetation) that is across the cover and down through the gravel. Something to consider based on time availability: if Sequoia is limited on time for this maintenance event, we could postpone the litter raking until a later maintenance event.
- Surflan is a good pre-emergent herbicide for the CWL. There are many weedy grasses that need to be controlled, so a non-selective pre-emergent is currently preferable.
- My herbicide recommendation is the same as last month that we should only use the pre-emergent in this herbicide application on the CWL ET Cover.

This due to:

- o 1. The grasses are generally not robust.
- o 2. there is a relatively low weed presence at the moment.

If we had supplemental water or guaranteed rain in the near future to bolster the health of the grasses, then I would like to use the pre/post combination. Without a guaranteed boost, I am more concerned with anything that might unintentionally weaken the native grasses on the CWL. I think the trade-off of allowing the current weeds to grow without a post-emergent is okay. I think the native grasses will most benefit from decreased future weed competition.

When the native grasses are more robust I will feel more comfortable using the pre-/post-emergent herbicide combination.

- Off the cover (outside the fence line) a pre-/post-emergent combination is fine. I think the small amount of post-emergent broadleaf-selective herbicide drift that reaches the cover should be okay. I would just like to be extra-cautious inside the fence line.

MWL

- Very few weeds on the ET Cover. Overall things look very good.
- South of the previous dirt pile area there is quite a bit of silverleaf nightshade (*Solanum*



elaeagnifolium) scattered throughout the grass.

Although it's not a terrible weed, it should be removed due to its tendency to spread more widely. This is the primary weed that I think should currently be removed.

- All of the Russian thistle (large and small) should be removed from the 10 perimeter monitoring well locations.
- Other observations: two large ant colonies at the toe of the north slope, one toward the eastern corner and the other toward the western corner. Evidence of small mammal seed eating activity on the top of the ET Cover.

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
Don Schofield
Rick Dotson

**Mixed Waste Landfill
Cover Inspection Checklist/Form**

1. Date of Inspection 9/13/17
2. Time of Inspection 0939-1002
3. Name of Inspector Robert Zick, Bruce Reavis

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	No	
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

1. Date of Inspection 12/1/17
2. Time of Inspection 0959 - 10:26
3. Name of Inspector Robert Ziock

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	No	
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	



date: December 21, 2017

to: Mike Mitchell (08854)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **December 2017 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

CAMU

Observations:

- The December 18th inspection found the CAMU Cover to be in excellent condition. The native clump grasses have good spacing with a diverse age and species community structure. In the upcoming year the CAMU does not need additional native grass recruitment from on-site seed.
- No animal holes of concern.
- A low amount of snakeweed shrubs are present on the side slopes.
- A low amount of dried annual weedy plant species are present as litter on the cover; these are mostly tumbleweed.
- Very few tumbleweeds observed in the fenceline.
- The area in between the toe of the cover and the fenceline is clear of weeds with few native clump grasses.
- Two four-wing saltbush shrubs were observed on the cover, both at the top of the slope at the north end. The one located at the NE corner of the cover is flagged. The other shrub is located just to the SW of the uppermost sampling/monitoring tube and is not flagged.

Maintenance Planning Recommendations:

- A minimum of two pre-emergent herbicide applications should be made across the cover in 2018. This will control all weedy annual species without harming the existing native clump grasses. The pre-emergent herbicide Surflan, applied in liquid form, has worked well so far on the covers and does not have a bee precaution, according to the University of California Integrated Pest Management bee precaution pesticide ratings.
 - o The first application should be as early as possible in the Jan-March timeframe.
 - o The second application should be approximately 3 months after the first application.
 - o A third application should be made approximately 3 months after the second application.
- A weed-removal sweep should be made across the cover during each maintenance event to remove any weedy annuals and shrubs. Of note is that the four-wing saltbush shrub is much easier to see during the winter months because its foliage stands out against the dried grass blades, it is much harder to observe during the summer months.

CWL**Observations:**

- The CWL Cover looked great on the December 18th inspection. The native clump grasses made good progress maturing in 2017. In the upcoming year the CWL does not need additional native grass recruitment from on-site seed.
- Blue grama grass appears extremely dominant during this inspection. This native grass species has retained many more seedheads than any of the other native grasses on the CWL and during the growing season its total foliar area covered per plant is much less than other species.
- Very few tumbleweeds observed on the ET Cover and a few along the east fenceline.
- Very few dried weedy plants observed on the ET Cover.

Maintenance Planning Recommendations:

- A minimum of two pre-emergent herbicide applications should be made across the cover in 2018. This will control all weedy annual species without harming the existing native clump grasses. The pre-emergent herbicide Surflan, applied in liquid form, has worked well so far on the covers and does not have a bee precaution, according to the University of California Integrated Pest Management bee precaution pesticide ratings.
 - o The first application should be as early as possible in the Jan-March timeframe.
 - o The second application should be approximately 3 months after the first application.
 - o A third application should be made approximately 3 months after the second application.
- A weed-removal sweep should be made across the cover during each maintenance event to remove any weedy annuals and shrubs. Of note is that the four-wing saltbush shrub is much easier to see during the winter months because its foliage stands out against the dried grass blades, it is much harder to observe during the summer months.
- Off the cover (outside the fence line) a pre-/post-emergent combination is fine as deemed necessary. I think the small amount of post-emergent broadleaf-selective herbicide drift that reaches the cover should be okay. I would just like to be extra-cautious inside the fence line.

MWL**Observations:**

- The Cover is really in excellent condition. The native clump grasses have good spacing with a diverse age and species community structure. In the upcoming year the MWL does not need additional native grass recruitment from on-site seed.
- The fencelines were all clear of tumbleweeds during my December 19th inspection.
- Very few tumbleweeds or other weeds present on the ET Cover.

Maintenance Planning Recommendations:

- A minimum of two pre-emergent herbicide applications should be made across the cover in 2018. This will control all weedy annual species without harming the existing native clump grasses. The pre-emergent herbicide Surflan, applied in liquid form, has worked well so far on the covers and does not have a bee precaution, according to the University of California Integrated Pest Management bee precaution pesticide ratings.
 - o The first application should be as early as possible in the Jan-March timeframe.
 - o The second application should be approximately 3 months after the first application.
 - o A third application should be made approximately 3 months after the second application.
- A weed-removal sweep should be made across the cover during each maintenance event to remove any weedy annuals and shrubs. The MWL should require very low weed removal efforts.

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
Don Schofield
Rick Dotson
Stephanie Salinas

Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection March 9, 2018
2. Time of Inspection 09:27 to 09:55
3. Name of Inspector Robert Zick, Bruce Reavis

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	

- 2 -

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1 assigned to Mike Mitchell Date action completed 4/27/2018

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:

1. Wind blown plant debris was removed from the site security fence by the landscaping/maintenance contractor on 4/27/2018. Ryz

Inspector's Signature Albert Spock, Bruce Reavis

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



date: March 20, 2018

to: Mike Mitchell (08854)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **March 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 March 19, 2018.

CAMU

- The ET Cover is in excellent condition. The mature perennial grasses still mostly dormant; some individual grass clumps and scattered other perennial native vegetation are in an early seasonal growth stage, evidenced by a limited amount of green vegetation on the cover.
- Few tumbleweeds or partial tumbleweeds observed on the ET Cover and along the fence lines.

CWL

- Overall the ET Cover is in very good condition.
- The base of most native grass clumps are beginning to green up, showing early seasonal growth.
- The native grass clumps are more mature than they were in March 2017. 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. The current spacing is still slightly tighter than what typically occurs across a natural landscape of these grass species. Due to this, additional recruitment (seed germination and growth of new individuals) is not recommended in 2018. The CWL ET cover should be actively managed in 2018 to discourage the establishment of additional native grass clumps. This will allow the current individuals appropriate growth and development opportunities.

- Very few other perennial or annual plants were observed on the ET Cover.
- Few tumbleweeds or partial tumbleweeds observed on the ET Cover and along the fence lines.

MWL

- The ET Cover is in excellent condition. The mature perennial grasses still mostly dormant; some individual grass clumps and scattered other perennial native vegetation are in an early seasonal growth stage, evidenced by a limited amount of green vegetation on the cover.
- Few tumbleweeds or partial tumbleweeds observed on the ET Cover and along the fence lines.

ET Covers Recommendations

- The 2017 annual inspection recommendation of a pre-emergent herbicide application during the first quarter of 2018 to control the annual winter weeds was not implemented due to extremely dry meteorological conditions since October 2017. This recommendation 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. When fall and winter moisture was far below normal, the biologist’s maintenance recommendation changed to no early 2018 pre-emergent herbicide application. This was discussed and agreed upon with the ET Cover Project Lead. Avoiding unnecessary herbicide application benefits the environment, and supports the SNL Environment, Safety, and Health Corporate Policy of ESH100.
- An early summer pre-emergent application is anticipated to be needed to control the development of Russian thistle, particularly before the monsoon rains begin. Early in the May-June 2018 timeframe is ideal.

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
Don Schofield
Rick Dotson

**Mixed Waste Landfill
Biology Inspection Checklist/Form for the MWL Cover**

Approximate vegetative coverage (actively photosynthesizing*): 51 %

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>4 %</u>
<u>Bouteloua eriopoda</u>	<u>Black grama</u>	<u>2 %</u>
<u>Sporobolus cryptandrus</u>	<u>Sand dropseed</u>	<u>3 %</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>Agropyron cristatum</u>	<u>Crested wheatgrass</u>	<u>< 0.5%</u>
<u>Sphaeralcea hastulata</u>	<u>Wrinkled 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>Achnatherum hymenoides</u>	<u>Indian ricegrass</u>	<u>< 0.5%</u>

Notes:

* Living plants per Section 4.1 of the MWL LTMMP.

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? Yes

Do any of the burrows appear to be active? Possibly

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: Four very small diameter (less than 1.5 inch) entrance diggings were observed. None of the burrow entrances showed signs of recent activity; the burrow entrances were not well-maintained and none had foot or tail prints near the digging. All were shallow, the deepest less than 3 inches in depth. Two burrow locations were selected, flagged for biota sampling, and surveyed using a GPS unit; sampling locations are shown in the biological inspection map. No follow-up action is recommended.

Sixteen ant hills were observed on the cover, occurring evenly on the side-slopes and top. 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 close to that of the surrounding area vegetation. Many young, healthy juvenile native grass clumps were observed throughout the Cover.

- Low weed presence on the MWL Cover. The native clump grasses have formed ideal spacing; currently no additional native plant recruitment is needed onsite from seed.

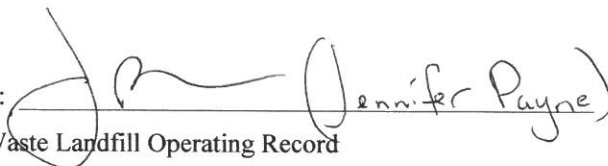
- A few whiptail lizards were observed across the cover.

- The grass seedheads are not as abundant this year as in some previous years, making the exact species identifications more challenging. Galleta has by far the most seedheads; it has also retained a high quantity of seedheads on stems from previous years. Blue grama and the dropseed species have particularly limited seedheads present. The thick green grass blades appear healthy; the annual inspection timing may be ahead of 2017 seed production.

- Recommendations for best practices designed to enhance ET Cover vegetation health and sustainability are provided in the Annual Biology Report.

Biological Aspects Map -- [note: sketch map to locate specific features described above will be attached as appropriate]

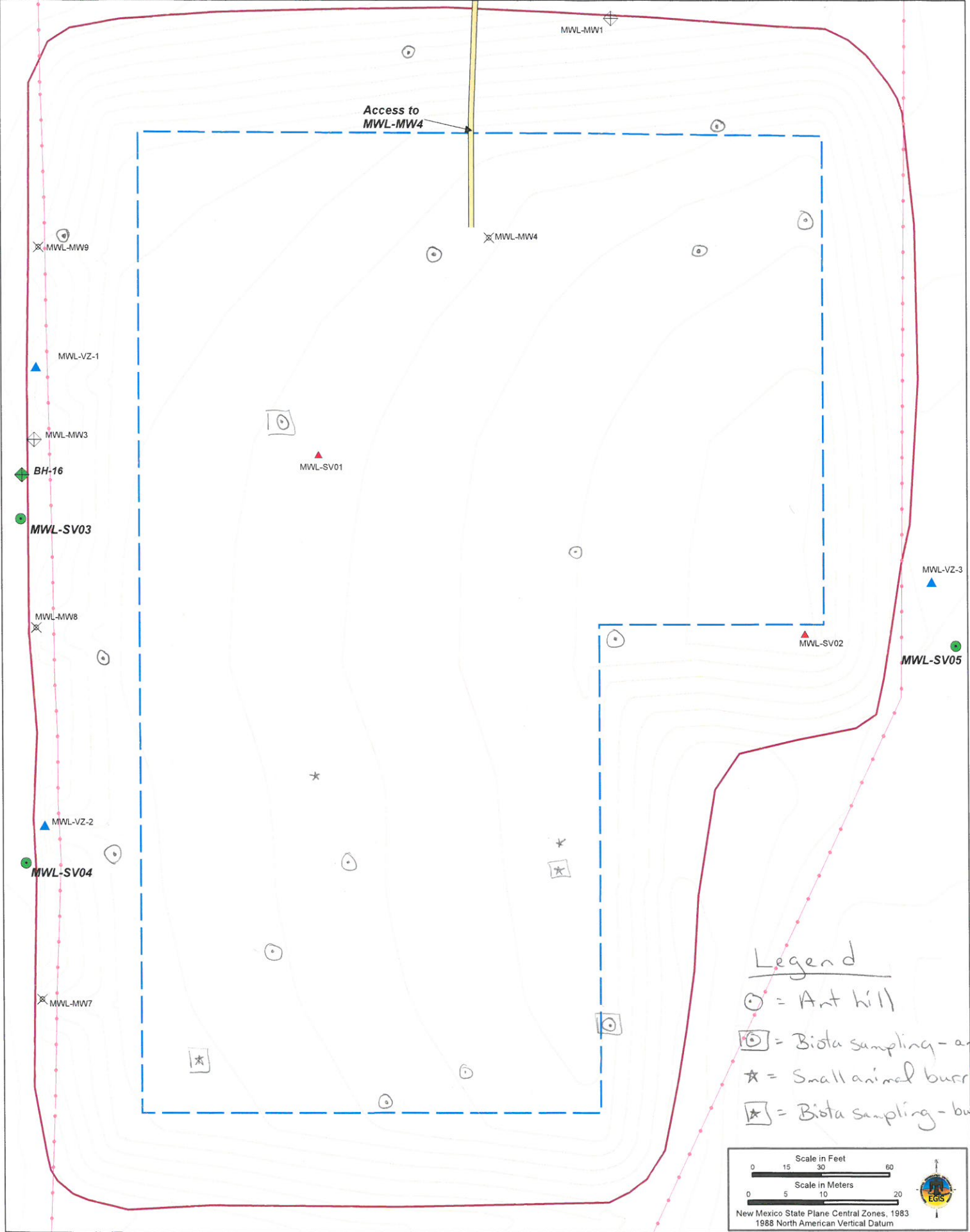
Inspector's Signature:

 (Jennifer Payne)

Date: August 21, 2017

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



MWL Biological Inspection map - August 21, 2017

ANNEX G

Mixed Waste Landfill Biology Report

April 2017-March 2018

2017-2018 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, 2017-March 31, 2018) 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 2017 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 August 21, 2017. 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 2017, and March 2018) 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

2017-2018 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 2017 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.

October through December 2016 meteorological conditions assisted the 2017 growing season with above average precipitation, providing good soil moisture and aiding vegetative root health. The remaining winter and spring months preceding the 2017 growing season experienced slightly above average precipitation, initiating the growing season with above normal soil moisture.

Table 1 provides meteorological data for CY 2017. Table 2 provides meteorological data for the first 3-month period of CY 2018. A 20-year data set (1995-2014) provides the reference mean monthly meteorological data and will be the reference mean data set until 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 trend in the MWL area since 2008. Total annual precipitation for 2017 was 6.79 inches, 22% below the 20-year annual precipitation mean of 8.71 inches. As of March 22, 2018, the area was categorized as "Severe Drought" according to the U.S. Drought Monitor (U.S. Drought Monitor March 2018).

Soil moisture received during the months of October 2016 through January 2017 benefitted the vegetation during the very dry months of February and March 2017, which

2017-2018 Mixed Waste Landfill Biology Report

Table 1
Summary of 2017 Meteorological Data at the Mixed Waste Landfill^a

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature (°F)													Annual ^b
Monthly Mean	38.4	46.1	54.3	55.9	63.7	76.3	76.1	72.1	68.9	57.9	54.1	42.8	58.9
20-year Temp Means	37	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	1.18	0.14	0.10	1.07	0.27	.06	0.94	1.39	1.57	0.07	0.00	0.00	6.79
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	57.4	45.7	28.7	33.5	28.8	24.2	41.1	47.3	38.6	40.5	35.5	35.6	38.1
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	7.5	8.3	8.6	9.6	9.8	9.6	8.8	8.1	8.9	8.2	6.6	6.3	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.

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Table 2
Summary of January-March 2018 Meteorological Data at the Mixed Waste Landfill^a

Month	January	February	March
Temperature (°F)			
Monthly Mean	40.6	45.3	50.5
20-year Temp Means	37.7	41.7	48.8
Precipitation (Inches)			
Monthly Total	0.05	0.71	0.28
20-year Precip Means	0.34	0.45	0.56
Relative Humidity (%)			
Monthly Mean	38.8	38.1	31.6
20-year RH Means	49.9	44.9	36.4
Wind (Miles/hour)			
Monthly Mean	7.5	8.3	8.6
20-year Wind Means	6.9	8.1	9.1

^aInformation Source: SNL/NM Meteorological Monitoring Network.

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barely received any measurable precipitation. April 2017 received twice the monthly average, providing timely soil moisture before warm season active vegetative growth. June through August 2017 received 2.39 inches of precipitation, 35% below the growing season historical mean of 3.70 inches. The total annual precipitation for the 2017 growing season and preceding winter-to-spring timeframe (October 2016-September 2017) was 9.58 inches, above the 20-year mean of 8.72 inches. After the warm growing season, the final quarter of 2017 was extremely dry, receiving only 0.07 inches of precipitation. The first quarter of 2018 was 23% drier than normal, receiving a total of 1.04 inches of rain for the period.

Relative humidity was near normal for CY 2017 at 38.1%, slightly below the 20-year annual mean of 40.6%.

Winds were very close to average for CY 2017. All months recorded average wind speeds that were within 1.0 mile per hour of the respective historical monthly mean.

Temperature

In CY 2017 the MWL experienced 91 degrees of temperature variability, with a low of 11.5°F in January 2017 and a high of 102.7°F in June 2017. The annual mean temperature was 58.9°F, which is 1.6°F above the historical mean of 57.3°F. The monthly temperature means were near normal, except for February, March, November, and December 2017 which were 4.4°F, 5.5°F, 7.7°F, and 5.8°F above their respective historical mean temperatures. November 2017 was the warmest November on record since meteorological data collection began more than 100 years ago at the ABQ Sunport, followed by an abnormally warm December. Warmer than normal temperatures continued in the first quarter of 2018 with the mean temperature 3.0°F above the 20-year mean for the quarter.

4.0 August 2017 Inspection Results

The August 21, 2017 MWL ET Cover Biology Inspection occurred during 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 August 2017 MWL ET Cover Biology Inspection results confirmed the ET Cover continues to meet the successful revegetation criteria defined in the MWL LTMMP, Section 4.1 (SNL/NM March 2012). The approximate foliar coverage of living plants was 51%, with 99% of the foliar coverage comprised of native perennial species. There were no contiguous bare areas that exceeded 200 square feet.

Galleta grass was the dominant grass species, and along with other native grasses comprised nearly all of the MWL ET Cover vegetation (Figures 1 and 2). The vegetative community was observed to be very healthy overall, with native species spaced evenly

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across the cover, with many young, juvenile native grass clumps also occurring across the ET Cover. The overall appearance of the mature native grass community was very similar to the surrounding vegetation in Technical Area III. The native bunch grasses in 2017 appeared healthy with thick green grass blades. Very few weeds were present on the MWL ET Cover.

No burrows with an entrance diameter of 4 inches or greater were observed on the MWL ET Cover during the August 2017 Biology Inspection. Four very small diameter (less than 1 inch) and shallow burrow entrance diggings were observed, where the soil was excavated approximately 1.5 inches deep, or less, by a small animal. There was no obvious sign of recent activity at any of the very small burrow entrance diggings. Sixteen ant hills were observed across the ET Cover on both the side-slopes and top.

Biota sampling locations were identified for anthills and the very small burrow entrance diggings during the August 2017 Biology Inspection. Two anthills and two animal diggings were marked in the field and surveyed. The anthill 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 2017. Biota sampling activities and results are presented in Chapter 8 of this MWL Annual LTMM Report.

5.0 Cover Maintenance

Maintenance activities performed on the MWL ET Cover during the 2017 – 2018 reporting period are summarized in Section 9.7 of this MWL Annual LTMM Report. Three routine weed control events were conducted in May, July and September as a best practice during the 2017 growing season. These events included removal of 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. An invasive shrub was also removed along the western perimeter area during the May maintenance work. A pre-/post-emergent herbicide mix was applied to North and South Staging Areas (May and July) and a 3-foot area outside the perimeter fence (September). 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.

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 2018 – 2019 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- and/or post-emergent herbicides should be applied as needed to the graveled staging areas and along the perimeter fence, which is prone to weed growth

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due to the unavoidable accumulation of windblown weeds and their seeds. Application of pre-emergent herbicides on the ET Cover will also be evaluated. If present, other annual weedy species on the MWL ET Cover should also be removed during the growing season weed removal events. 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 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 2018)

Accessed March 2018.

<http://droughtmonitor.unl.edu/>

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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 August 21, 2017 MWL ET Cover Photographs - Main Cover Surface

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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 August 21, 2017 MWL ET Cover Photographs – Cover Side Slopes