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### **Submittal of Mixed Waste Landfill Annual Long-Term Monitoring & Maintenance Report, April 2019-March 2020 for Sandia National Laboratories/New Mexico, EPA ID Number NM5890110518, June 2020**

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**MIXED WASTE LANDFILL  
ANNUAL LONG-TERM MONITORING & MAINTENANCE REPORT  
APRIL 2019 – MARCH 2020**

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

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**JUNE 2020**



**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 2019 – MARCH 2020**

**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, Section 600 of the New Mexico Administrative Code (20.4.1.600 NMAC), incorporating Title 40, Code of Federal Regulations Part 264.101 (40 CFR 264.101); regulatory criteria found in the New Mexico Secretary of the Environment's Final Order *In the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill*, Number (No.) HWB 04-11(M) (NMED May 2005); the Compliance Order on Consent (NMED April 2004); and the Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, Environmental Protection Agency (EPA) Identification No. NM5890110518 (NMED January 2015, with all approved modifications).

As of March 13, 2016, the February 2016 Final Order *In the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID No. NM5890110518, to Determine Corrective Action Complete with Controls at the Mixed Waste Landfill*, No. HWB 15-18 (P) (NMED February 2016) became effective, granting the Class 3 Permit Modification to reflect that the MWL is Corrective Action Complete with Controls. The MWL Long-Term Monitoring and Maintenance Plan (LTMMP) (SNL/NM March 2012), which became effective on January 8, 2014 (Blaine January 2014), defines all monitoring, inspection, maintenance/repair, and reporting requirements for the MWL. This seventh MWL Annual Long-Term Monitoring & Maintenance Report documents monitoring, inspection, maintenance, and repair activities conducted at the MWL during the April 1, 2019 through March 31, 2020 reporting period.

Sampling activities for this reporting period included two semiannual monitoring events each for groundwater, radon, and soil vapor. Annual soil-moisture monitoring was conducted in April 2019, annual tritium surface soil sampling was conducted in August 2019, and annual biota sampling (metals and radionuclides) was conducted in September 2019. 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 and were generally completed during the inspections.

The Evapotranspirative (ET) Cover continues to meet successful revegetation criteria and is in good condition with even coverage of mature, native perennial grasses. Minor maintenance was performed during the reporting period as best practice 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 three submittals of various updated reference documents cited in the LTMMP (Harrell May and November 2019; February 2020), and the MWL Annual Long-Term Monitoring & Maintenance Report, April 2018-March 2019 (SNL/NM June 2019). There were no LTMMP modifications during this reporting period.

All LTMMP requirements have been met for the April 2019 through March 2020 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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Annex G	Mixed Waste Landfill Biology Report April 2019 – March 2020

## ACRONYMS AND ABBREVIATIONS

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

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## 1.0 INTRODUCTION

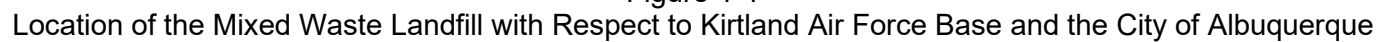
Sandia National Laboratories, New Mexico (SNL/NM) is a multimission laboratory owned by the U.S. Department of Energy (DOE)/National Nuclear Security Administration. SNL/NM is managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International 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 (LTMMP) (SNL/NM March 2012) and have been met for the April 1, 2019 through March 31, 2020 reporting period. This seventh MWL Annual Long-Term Monitoring & Maintenance (LTMMP) Report documents all activities and results as required by Section 4.8.1 of the LTMMP. 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 LTMMP requirements.

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

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



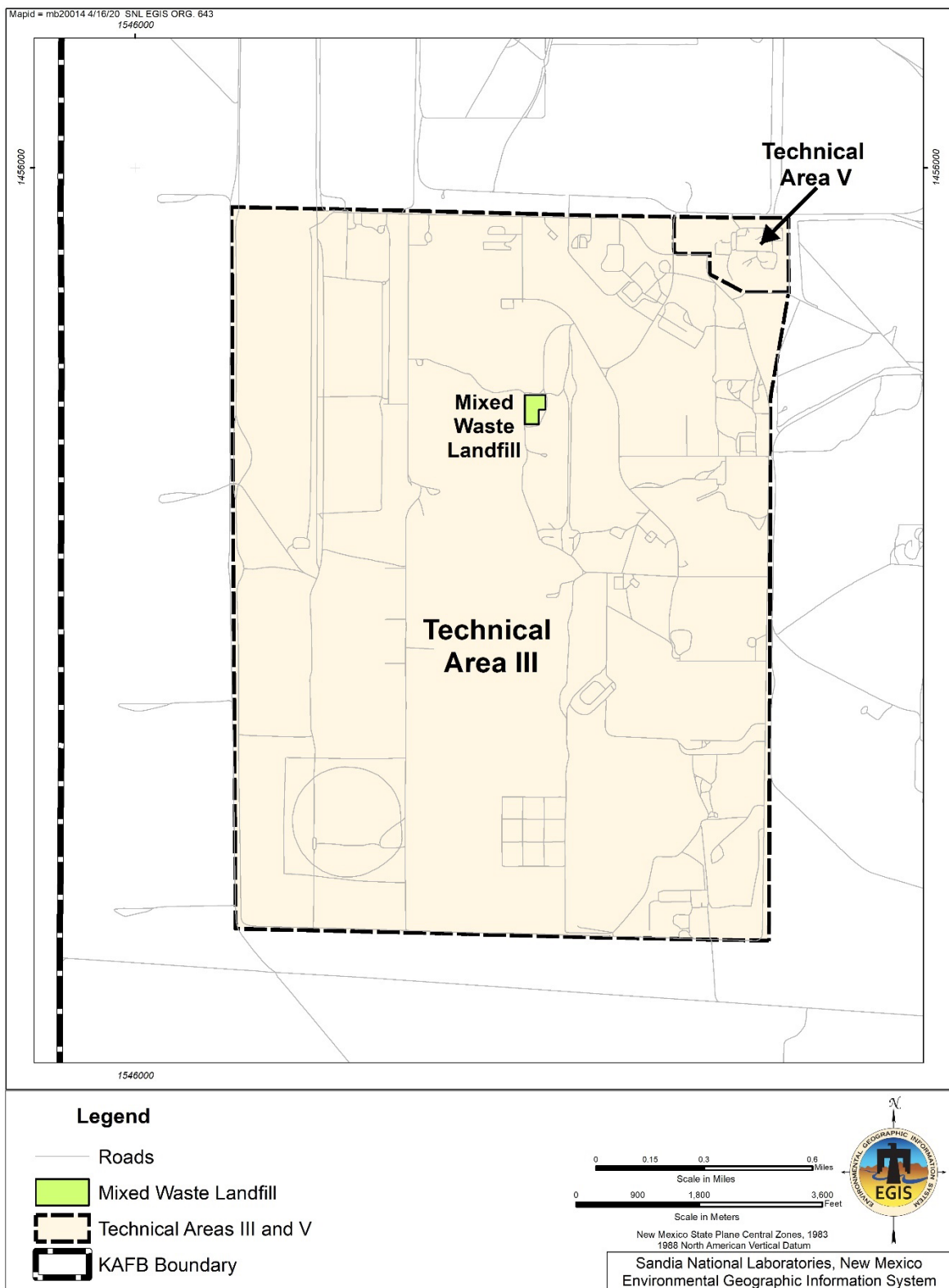


Figure 1-2  
Location of the Mixed Waste Landfill within Technical Area III



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

## 1.1 Purpose and Scope

The purpose and scope of this Annual LTMM Report is to document monitoring, inspection, maintenance, and repair activities conducted during the April 1, 2019 through March 31, 2020 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 (SNL/NM March 2012) and are briefly summarized in this chapter. Monitoring requirements are described in Section 2.1 and resulting empirical data are evaluated to assess site conditions. Inspection requirements are described in Section 2.2 and include requirements to perform maintenance and/or repairs. These activities ensure the physical controls at the MWL are maintained, perform as designed, and provide the information needed to assess ET Cover performance and site conditions.

### **2.1 Monitoring Requirements**

The primary objective of MWL monitoring activities is to ensure that the ET Cover and site conditions are protective of human health and the environment. Monitoring activities include sampling and analysis of air, surface soil, vadose zone, groundwater, and biota. The multi-media monitoring program is summarized in Table 2-1, which presents information for each monitoring activity including the sampling media, monitoring parameters, frequency, number of samples, locations, and monitoring methods. Radon monitoring is performed over two six-month periods instead of one twelve-month period due to time exposure limitations of the detectors. Based upon experience, vadose zone soil-vapor monitoring is performed at a semiannual instead of annual frequency as a best practice to help keep the sample port and tubing clear.

The data quality objective (DQO) of all monitoring activities is to produce representative, accurate, defensible, and comparable analytical results to support the monitoring objective. The DQO is accomplished through implementation of standard operating procedures and analytical procedures/methods, including quality assurance measures, quality control (QC) samples, and data evaluation protocols. Monitoring results are compared to trigger levels defined in LTMMP Section 5.2 and historical MWL monitoring results.

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

### **2.2 Inspection, Maintenance, and Repair Requirements**

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

Inspection parameters, specifications, frequency, and repair requirements are detailed in Chapter 4 of the LTMMP and summarized in Table 2-2. Repair work is initiated, as needed, based upon the results of the inspections and tracked to completion on the respective inspection forms. Long-term monitoring inspection checklists/forms are contained in the LTMMP, Annex I. Results of inspection activities conducted at the MWL during the subject

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

Sampling Media	Monitoring Parameters <sup>a</sup> / Constituents of Concern	Monitoring Frequency <sup>a</sup>	Number of Samples Per Event	Monitoring Locations	Monitoring Method <sup>b</sup>	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 <sup>a</sup> / Constituents of Concern	Monitoring Frequency <sup>a</sup>	Number of Samples Per Event	Monitoring Locations	Monitoring Method <sup>b</sup>	Comments
Groundwater	VOCs, metals <sup>c</sup> , tritium, radon, gamma-emitting radionuclides <sup>d</sup> , 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 <sup>e</sup> and gamma-emitting radionuclides <sup>f</sup>	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 <sup>f</sup> 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:

<sup>a</sup>Monitoring parameters and frequency will be reevaluated every five years in the Five-Year Report.

<sup>b</sup>Sampling and Analysis Plans and sampling requirements are provided in appendices of the MWL LTMMMP (SNL/NM March 2012).

<sup>c</sup>Required metals analyses include cadmium, chromium, nickel, and uranium (SNL/NM March 2012).

<sup>d</sup>Radionuclide results reported for groundwater include americium-241, cesium-137, and cobalt-60.

<sup>e</sup>Required metals analyses include RCRA metals plus copper, nickel, vanadium, zinc, cobalt, and beryllium (SNL/NM March 2012).

<sup>f</sup>Radionuclide 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 <sup>a</sup>
ET Cover Surface  Biology Inspection  (Cover vegetation and signs of animal activity)	Quarterly until vegetation is established, annually thereafter by a staff biologist <sup>b</sup>	Vegetation Inventory	Soil augmentations and/or reseeding	Within 60 days of discovery of needed repairs. Reseeding repairs may be delayed to wait for the appropriate growing season.
		Contiguous areas of no vegetation >200 ft <sup>2</sup>	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 wait for 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 <sup>2</sup>		
		Animal intrusion burrows in excess of 4 inches in diameter		
		Contiguous areas of no vegetation >200 ft <sup>2</sup> <sup>c</sup>	Revegetate barren areas that exceed prescribed limits <sup>c</sup>	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 <sup>®</sup> (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 <sup>a</sup>
ET Cover Physical Controls	Quarterly by a field technician	Presence of windblown plants and debris	Remove windblown plants and debris	Within 60 days of discovery of needed repairs.
		Condition of fence wires, posts, gates, gate locks, warning signs, and survey monuments in the local area	Repair broken wire sections and posts, repair/oil gates, clean/replace locks, repair/replace warning signs, clear dirt/debris from monuments	

Notes:

<sup>a</sup>Maintenance/repairs will be performed as necessary, based upon the results of inspections.

<sup>b</sup>The 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).

<sup>c</sup>Barren areas exceeding >200 ft<sup>2</sup> will not require corrective action after ET Cover vegetation is determined to have met successful revegetation criteria if they are the result of relatively short-term climate stresses (e.g., severe short-term drought), and the staff biologist determines they will naturally fill in over time. However, these areas will be noted and tracked during inspections and reviewed annually by the staff biologist to determine whether action is required based upon comparison to surrounding vegetation.

> = Greater than.

ET = Evapotranspirative.

ft<sup>2</sup> = Square feet.

MWL = Mixed Waste Landfill.



reporting period are presented in Chapter 9. The following sections provide additional background information on the MWL ET Cover, inspections, and associated maintenance/repairs.

### 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

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

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

At the end of each reporting year, the staff biologist summarizes the results of the annual inspection, presents local climate trends, and makes recommendations in a summary Biology

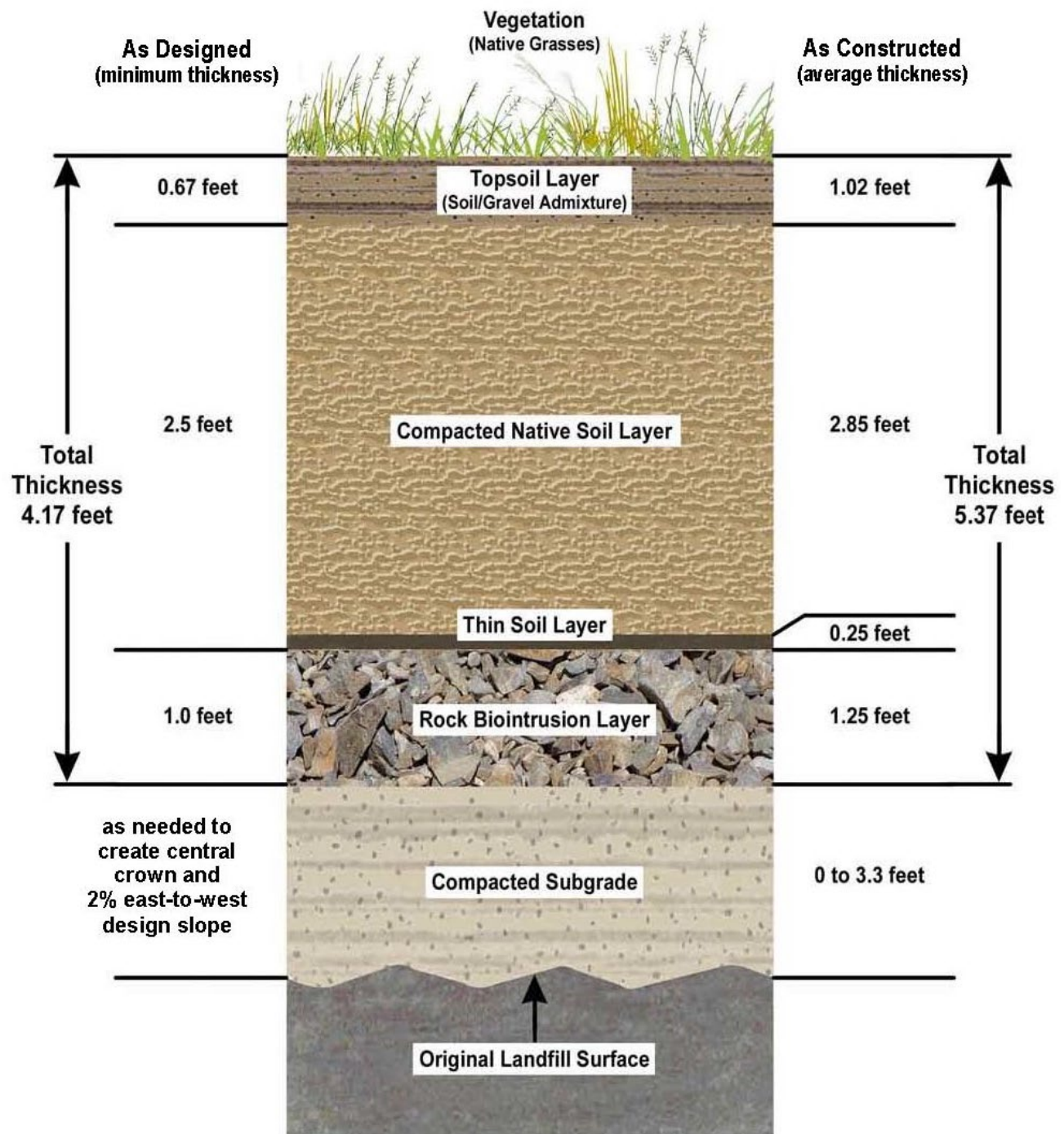


Figure 2-1  
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover Layers

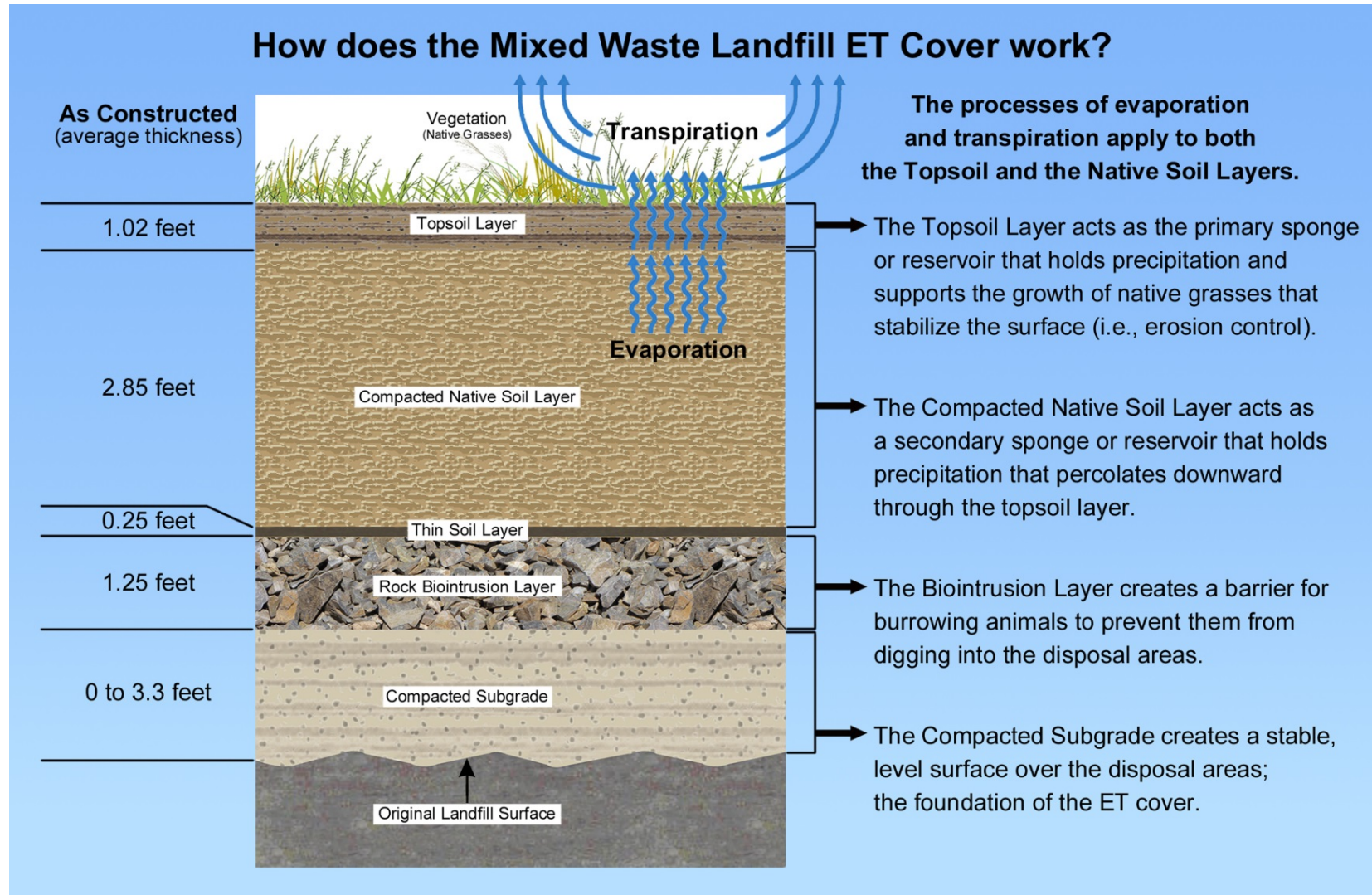


Figure 2-2  
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover and How it Works



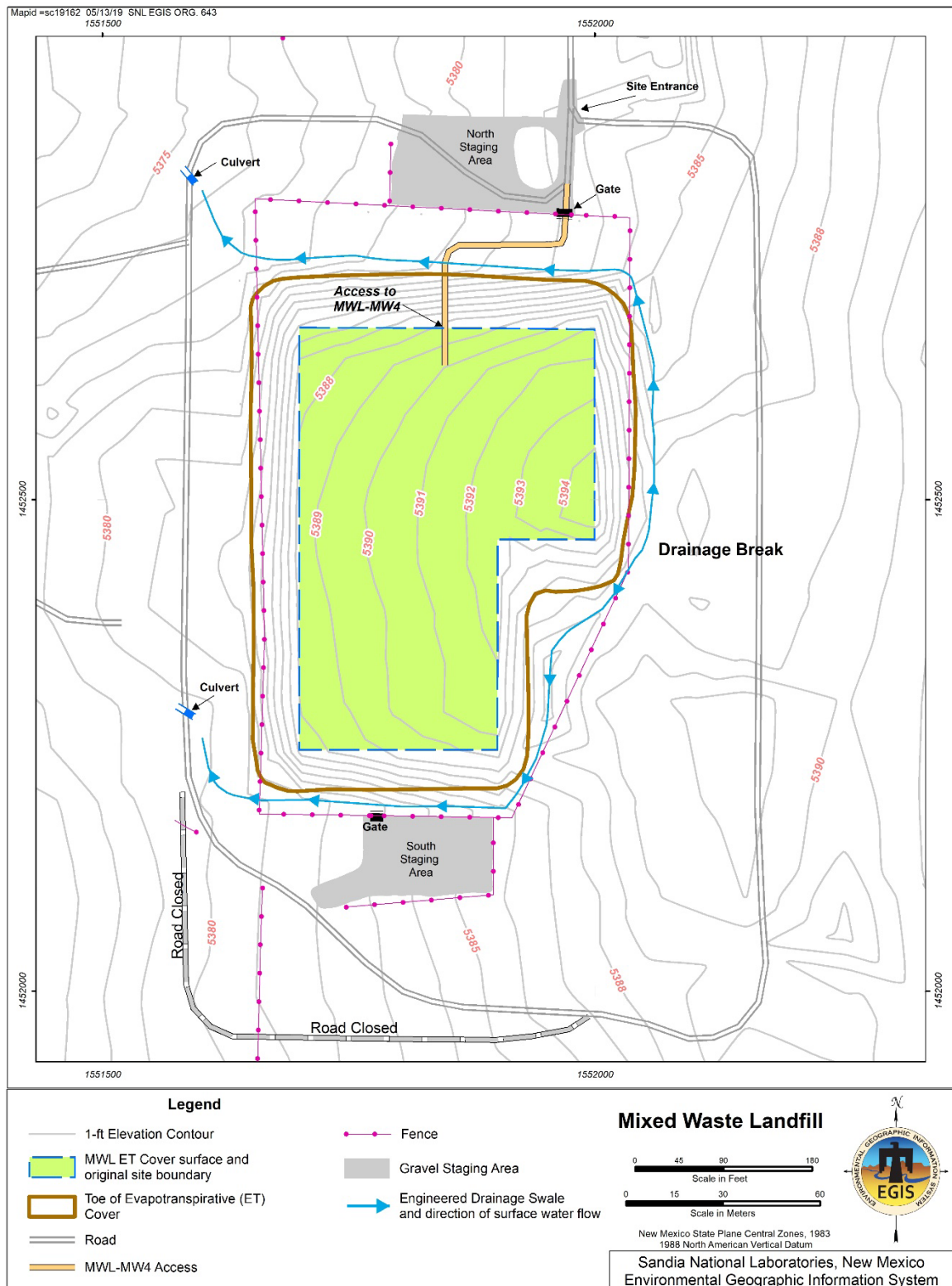


Figure 2-3  
Mixed Waste Landfill Engineered Storm-Water Drainage Swale

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).

### 2.2.3 ET Cover Surface and Physical Controls Inspection

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

### 2.2.4 Monitoring Networks and Sampling Equipment

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

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

### **3.0 RADON MONITORING RESULTS**

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

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

#### **3.1 Radon Sampling Field Activities**

Monitoring was conducted in calendar year (CY) 2019, fulfilling the LTMMP minimum requirement of annual monitoring. Radon monitoring presented for this April 1, 2019 through March 31, 2020 reporting period covers the CY 2019 period January 1, 2019 through December 31, 2019.

The radon air measurements were obtained using alpha-track radon gas detectors manufactured by Radonova (formerly Landauer® Nordic). Radtrak2® detectors were used for two six-month monitoring events during CY 2019. 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 dates of deployment and collection, location number, time-weighted average radon air concentrations in picocuries per liter (pCi/L) for each six-month period, and the CY 2019 range of radon air concentrations.

Radon monitoring results are reviewed and evaluated by an SNL/NM Health Physics subject matter expert (SME) and documented in a data evaluation memorandum. These reports are provided in Annex A and include the corresponding laboratory data sheets, Analysis Request/Chain-of-Custody forms (AR/COCs), and a map showing all monitoring locations. The results of CY 2019 radon monitoring are summarized in Section 3.2.1.

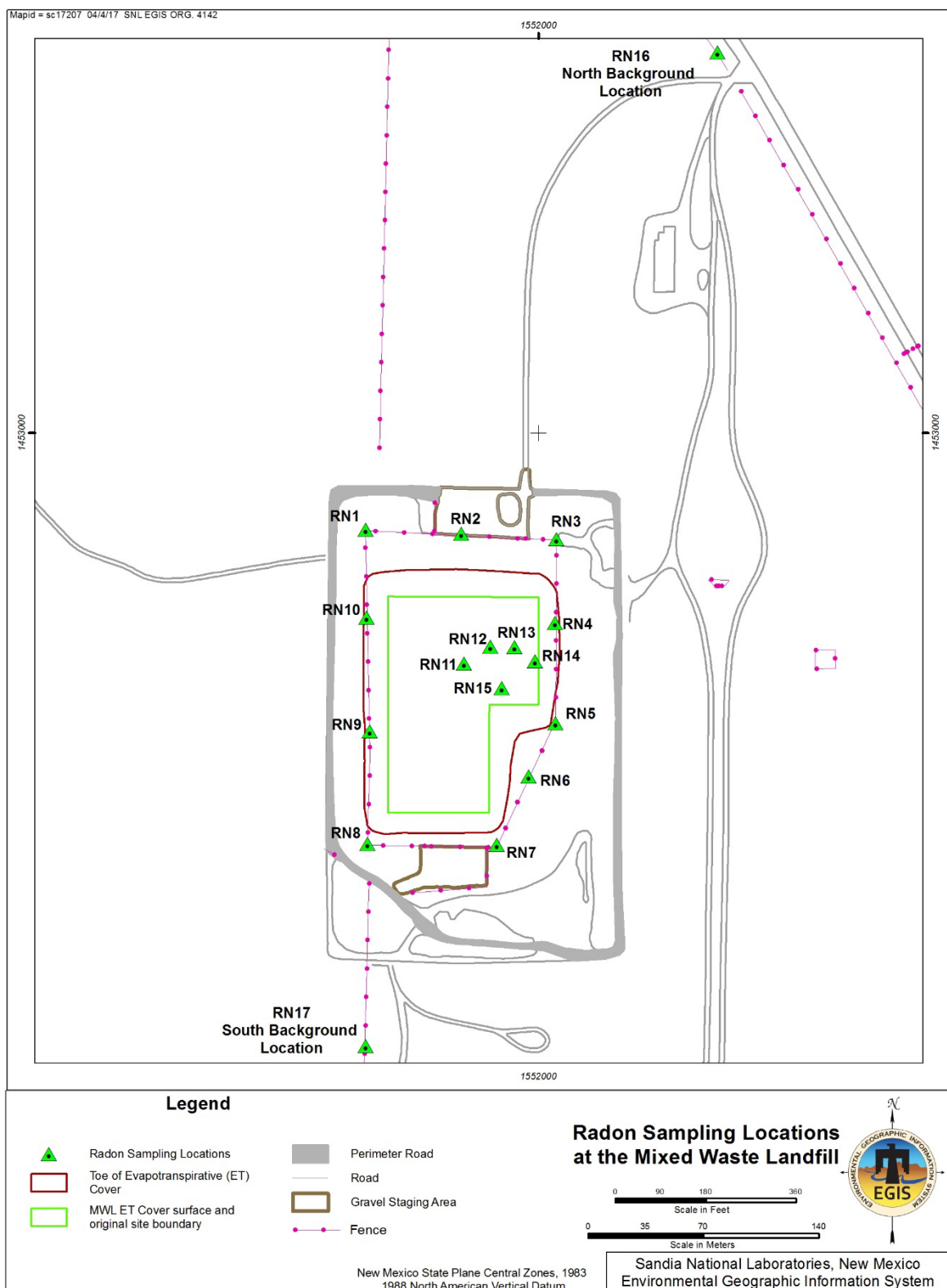


Figure 3-1  
Mixed Waste Landfill Radon Detector Locations

Table 3-1  
Summary of Radon Results  
Mixed Waste Landfill Air Monitoring  
Calendar Year 2019

Sample Location <sup>a</sup>	1 <sup>st</sup> Half CY 2019		2 <sup>nd</sup> Half CY 2019		CY 2019 Radon Air Concentration Range (pCi/L)	Trigger Level (pCi/L)
	Detector Deployment Date	Detector Collection Date	Detector Deployment Date	Detector Collection Date		
	1/4/2019	7/1/2019	7/1/2019	1/6/2020		
	Semiannual Time-Weighted Average Radon Air Concentration (pCi/L)					
RN1	<0.4 <sup>b</sup>		0.3 ± 0.2		0.3 to <0.4	4
RN2	<0.4 <sup>b</sup>		<0.2		<0.2 to <0.4	4
RN3	<0.4 <sup>b</sup>		0.2 ± 0.2		0.2 to <0.4	4
RN4	<0.4 <sup>b</sup>		0.4 ± 0.2		<0.4 to 0.4	4
RN5	<0.4 <sup>b</sup>		0.2 ± 0.2		0.2 to <0.4	4
RN6	<0.4 <sup>b</sup>		0.2 ± 0.2		0.2 to <0.4	4
RN7	<0.4 <sup>b</sup>		0.3 ± 0.2		0.3 to <0.4	4
RN8	<0.4 <sup>b</sup>		0.3 ± 0.2		0.3 to <0.4	4
RN9	<0.4 <sup>b</sup>		0.3 ± 0.2		0.3 to <0.4	4
RN10	<0.4 <sup>b</sup>		0.4 ± 0.2		<0.4 to 0.4	4
RN11	<0.4 <sup>b</sup>		0.2 ± 0.2		0.2 to <0.4	NA
RN12	<0.4 <sup>b</sup>		0.3 ± 0.2		0.3 to <0.4	NA
RN13	<0.4 <sup>b</sup>		0.2 ± 0.2		0.2 to <0.4	NA
RN14	<0.4 <sup>b</sup>		0.3 ± 0.2		0.3 to <0.4	NA
RN15	<0.4 <sup>b</sup>		0.3 ± 0.2		0.3 to <0.4	NA
RN16	0.4 ± 0.2		0.4 ± 0.2		0.4	NA
RN17	<0.4 <sup>b</sup>		0.3 ± 0.2		0.3 to <0.4	NA
RNTB	0.6 ± 0.2		<0.2		<0.2 to 0.6	NA

Notes:

<sup>a</sup>Bolded sample locations are the compliance locations where the trigger level applies.

<sup>b</sup>Not detected, result is less than the minimum detectable activity.

< = Less than.

CY = Calendar year.

NA = Not applicable.

pCi/L = Picocuries per liter.

RNTB = Trip blank.



### 3.1.1 Radon Monitoring Detector Deployment and Collection

The Radtrak2® radon detectors were deployed and collected on a semiannual schedule in CY 2019 at the 17 sampling locations, from January through June and July through December. During the months between deployment and collection, inspections were conducted to ensure the deployed detectors and associated protective housing were in good condition. All detectors were found in good condition during the monitoring period and at the times of collection. Minor maintenance to remove spider webs and maintain the protective housing at each monitoring location was performed at the time of the inspections. Deployment/collection and monthly inspection forms are included in Annex A.

### 3.1.2 Field Quality Control

Field QC measures associated with each monitoring period include two types of samples, one field control sample (trip blank) and two field background samples. 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 results from detectors located 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 2019. 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 2019 range of results for all monitoring locations was <0.2 (i.e., not detected) to 0.4 pCi/L. The range for all background location results was <0.4 to 0.4 pCi/L. No sample locations exceeded the trigger level of 4 pCi/L and all results confirm low levels of radon consistent with natural background levels and historical results.

### 3.2.2 Field Quality Control Sample Results

A trip blank (designated as RNTB in Table 3-1) was submitted with the detectors collected at the end of each semiannual sampling period. The trip blank submitted with the January through June 2019 detectors had a result of  $0.6 \pm 0.2$  pCi/L, slightly higher than the results at all the monitoring locations (RN1 through RN17) but consistent with background. The cause of this higher result is not known; however, all field monitoring results were less than or equal to 0.4 pCi/L. The trip blank result for the July through December 2019 sampling period was a non-detect ( $<0.2$  pCi/L).

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

### 3.2.3 Data Quality

There were no data quality issues associated with RN1 through RN17 results for the two semiannual monitoring periods. Since the highest reported result was for the trip blank detector, it is considered anomalous and does not indicate the other detectors were exposed during shipping and/or at the laboratory. All data were acceptable and met the DQOs. The contract verification reviews and SNL/NM Health Physics SME data evaluation memorandum for each monitoring period are included in Annex A.

### 3.2.4 Variances

There were no variances from the LTMMMP radon monitoring requirements.

## 3.3 Data Evaluation and Monitoring Trigger Level

The trigger level for radon in air is 4 pCi/L (time-weighted average), which applies to detectors RN1 through RN10 located on the perimeter fence. The trigger level of 4 pCi/L is the same as the EPA-recommended action level for radon in households. There was no exceedance of the 4 pCi/L trigger level at any of the radon sampling locations during CY 2019. These results confirm low levels of radon activity in air at the MWL consistent with natural background levels and historical results. There were no indications of releases of radon gas from the disposal areas.

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## **4.0 TRITIUM SURFACE SOIL MONITORING RESULTS**

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

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

### **4.1 Tritium Surface Soil Monitoring Field Activities**

Surface soil samples were collected at the four ET Cover corner monitoring locations on August 22, 2019 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 Health Physics SME. Annex B contains the data evaluation memorandum prepared by the Health Physics SME, contract verification and data validation reviews, and AR/COC forms. The August 2019 results are presented in the following sections.

#### **4.1.1 Field Quality Control**

A field QC sample (environmental duplicate soil sample) was collected as part of the August 22, 2019 tritium sampling event in accordance with the Tritium and Biota SAP (Appendix G, Table G-4.2-1 of the LTMMMP), which requires that one environmental and environmental duplicate sample pair be collected for every twenty environmental samples or one per sample batch sent to the laboratory. The environmental-duplicate sample pair for the August 2019 sampling event was collected at the northwest corner of the ET Cover, tritium monitoring location MWL TS-2NW (Figure 4-1).

#### **4.1.2 Waste Management**

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

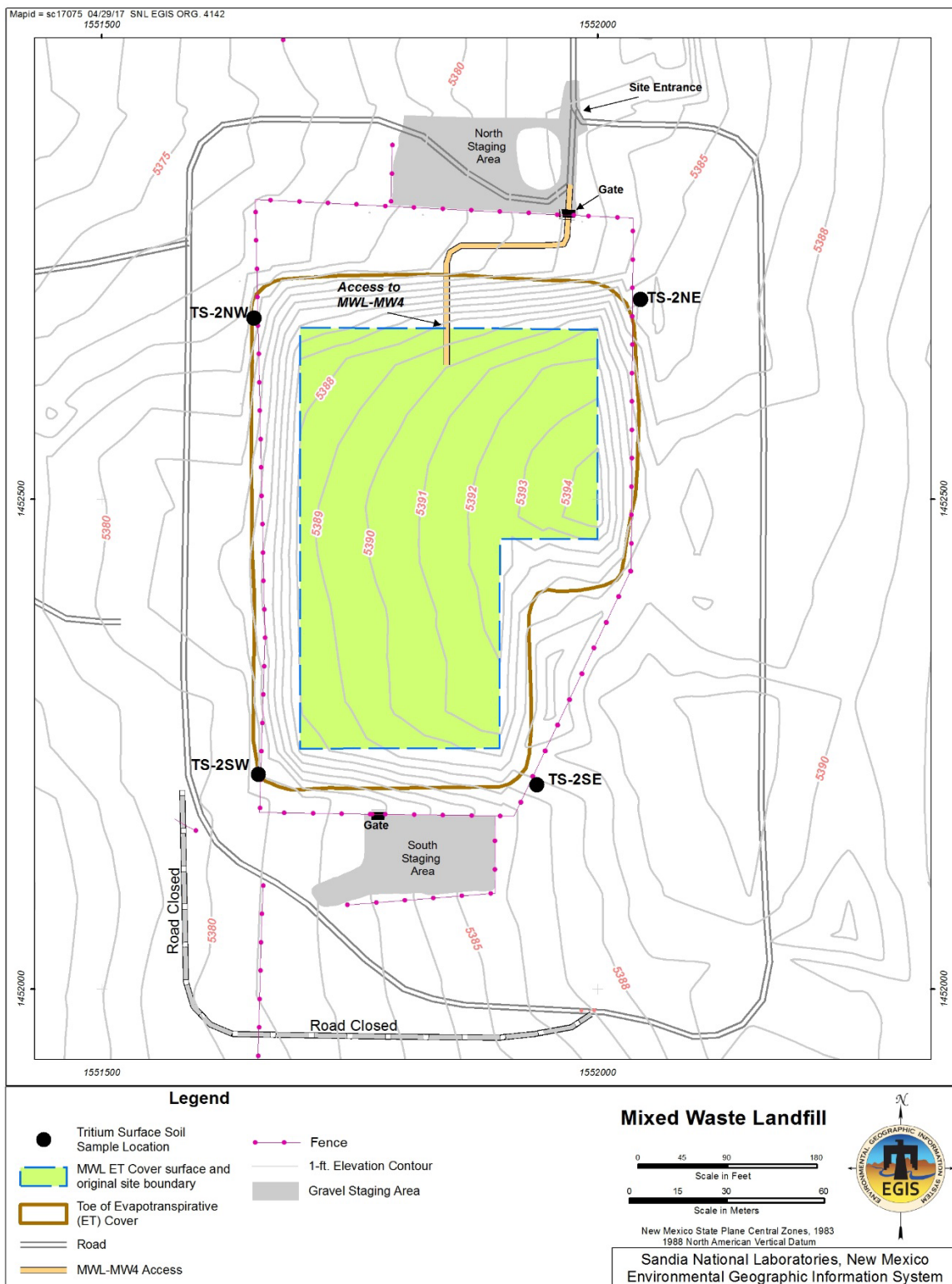


Figure 4-1  
Mixed Waste Landfill Tritium Surface Soil Sampling Locations

## 4.2 Laboratory Results

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

### 4.2.1 Environmental Sample Results

Table 4-1 summarizes the tritium surface soil results for the August 2019 sampling event. Similar to previous years, tritium was not detected in all samples. Reported activities were all below the MDA. All samples had good soil-moisture content, ranging from 4.49 to 7.63 percent by mass, and the MDA ranged from 138 pCi/L (southwest ET Cover corner location, MWL TS-2SW) to 200 pCi/L (northeast ET Cover corner location, MWL TS-2NE). The results are consistent with the August 2018 results and historical results, which are characterized by low activity detections and non-detects. All results are below the trigger level of 20,000 pCi/L.

### 4.2.2 Field Quality Control Sample Results

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

### 4.2.3 Laboratory Quality Control and Data Quality

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

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

### 4.2.4 Variances

There were no variances from the LTMMMP tritium monitoring requirements.

Table 4-1  
Summary of Tritium Results (EPA Method 906.0<sup>a</sup>)  
Mixed Waste Landfill Surface Soil Monitoring  
August 2019

Sample Location	Result (pCi/L)	Percent Soil Moisture	MDA (pCi/L)	Laboratory Qualifier <sup>b</sup>	Validation Qualifier <sup>b</sup>	Trigger Level (pCi/L)
August 2019						
MWL TS-2NW	74.8	4.49	141	U	BD, FR3	20,000
MWL TS-2NW (Duplicate)	33.5	4.56	139	U	BD, FR3	
MWL TS-2SW	50.3	5.35	138	U	BD, FR3	
MWL TS-2SE	15.4	5.56	139	U	BD, FR3	
MWL TS-2NE	48.0	7.63	200	U	BD, FR3	

Notes:

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

<sup>b</sup>Laboratory/Validation Qualifier

Laboratory Qualifier

U = Analyte activity is below the detection limit.

Validation Qualifier

BD = Result that is not statistically different from zero.

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

EPA = U.S. Environmental Protection Agency.

MDA = Minimum detectable activity.

MWL = Mixed Waste Landfill.

pCi/L = Picocuries per liter.

### 4.3 Data Evaluation and Monitoring Trigger Level

The trigger level for tritium as measured in soil moisture from surface soil samples is 20,000 pCi/L. No August 2019 sample results exceeded the trigger level.

Tritium is the primary contaminant of concern and the most mobile radionuclide at the MWL. Surface soil sampling for tritium has been conducted at the MWL since August 1985 at various locations at and around the perimeter of the MWL. The tritium sampling being performed under the LTMMMP is a continuation of this monitoring effort. The August 2019 results are consistent with historical data and reflect very low levels of tritium activity that are below the laboratory MDA. The results are consistent with the short half-life of tritium (12.30 years), indicate tritium is decaying over time, and that there are no new releases from the disposal areas.

## 5.0 SOIL-VAPOR MONITORING RESULTS

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

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

### 5.1 Soil-Vapor Monitoring Field Activities

MWL-SV01 and MWL-SV02 are single-sampling-port wells installed through the ET Cover; each has one sampling port at depths of 42.5 and 41.5 feet below ground surface (ft bgs), respectively. MWL-SV03, MWL-SV04, and MWL-SV05 are Flexible Liner Underground Technology, Ltd.<sup>TM</sup> (FLUTe<sup>TM</sup>) multi-sampling-port wells. Each has 5 sampling ports at depths of approximately 50, 100, 200, 300, and 400 ft bgs. These FLUTe<sup>TM</sup> 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, 2019 through March 31, 2020 reporting period exceeding the LTMMMP annual monitoring requirement. The semiannual frequency is being maintained based on experience; more frequent purging and sampling helps keep the sample ports and related tubing clear. Field forms and documentation that address well evacuation, purge volumes, and vacuum pressure readings for each sample container are provided in Annex C. The two soil-vapor monitoring events are described as follows.

- The first sampling event was conducted on May 2, 2019. Soil-vapor samples were collected from all monitoring well sampling ports. Duplicate samples were collected from two MWL-SV03 sampling ports (100 and 300 ft bgs).
- The second sampling event was conducted on October 18, 2019. Soil-vapor samples were collected from all monitoring well sampling ports. Duplicate samples were collected from two MWL-SV04 sampling ports (100 and 400 ft bgs).



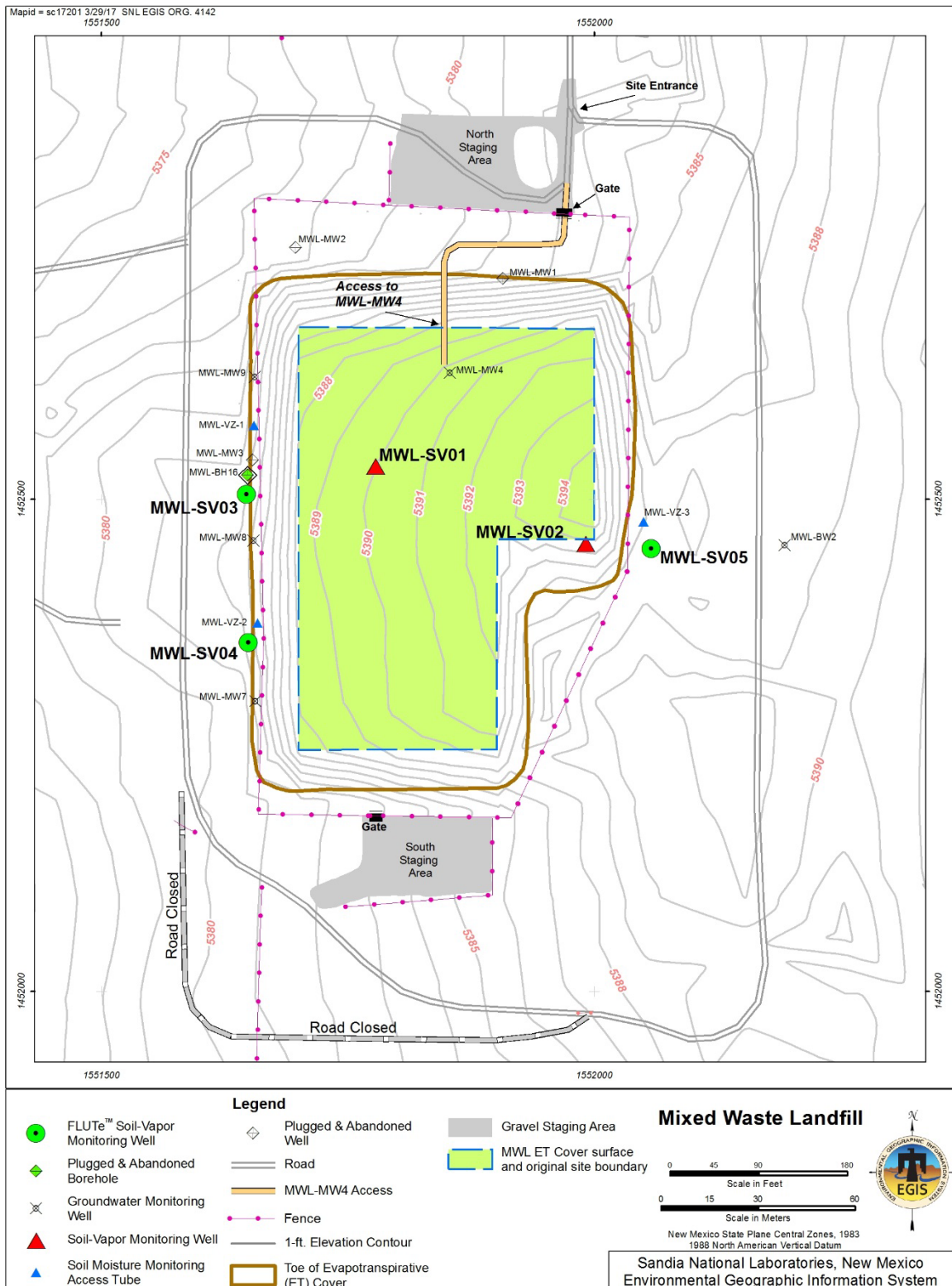


Figure 5-1  
Mixed Waste Landfill Soil-Vapor Monitoring Well Locations

### 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) FOP 08-22, "Soil-Vapor Monitoring" (SNL/NM October 2016 and October 2019) and LTMMMP 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 environmental duplicate samples (two per semiannual monitoring event) and field blank samples. Field QC samples were submitted for analysis with the environmental soil-vapor samples and analytical results are presented in Section 5.2.2 and Annex C. The environmental-duplicate sample pairs were collected simultaneously using a split-stream sampling manifold system (i.e., the duplicate samples were collected at the same time) to reduce variability caused by time and/or sampling mechanics.

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

The field QC sampling protocol for the May and October 2019 sampling events included the collection of an environmental-duplicate sample pair from the sampling ports located at 100 ft bgs and 300 ft bgs at monitoring well MWL-SV03 in May (i.e., MWL-SV03-100 and MWL-SV03-300), and the sampling ports located at 100 ft bgs and 400 ft bgs at monitoring well MWL-SV04 in October (i.e., MWL-SV04-100 and MWL-SV04-400). For both sampling events, a total of five QC field blank samples were associated with the environmental samples and submitted for analysis. 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 Eurofins TestAmerica for analyses. Samples were analyzed in accordance with EPA Method TO-15. Analytical laboratory reports, including certificates of analyses, analytical methods, method detection limits (MDLs),

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

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

All VOC concentrations for the three deepest sampling ports are below the trigger levels. The PCE maximum concentration was 0.450 ppmv from the May MWL-SV03-400 environmental sample. The TCE maximum concentration was 0.330 ppmv from the May MWL-SV03-400 environmental sample. The maximum Total VOCs concentration was 0.95564 ppmv from the May MWL-SV03-400 environmental sample. All May and October 2019 VOC soil-vapor results are presented in Tables 5-1 and 5-2 at the end of this section.

### 5.2.1 Environmental Sample Results

This section summarizes soil-vapor monitoring results for the April 1, 2019 through March 31, 2020 reporting period. A summary of compounds detected in each semiannual event is provided below, and a summary of historical data (i.e., soil-vapor results collected since implementation of the LTMMMP in January 2014) is presented in Section 5.3.

#### First Sampling Event – May 2, 2019

A total of 22 compounds were detected above MDLs in May 2019 samples. These VOCs were also detected in the October samples except for ethyl benzene, toluene, and vinyl acetate.

Benzene	Ethyl benzene
Bromodichloromethane	4-Methyl-2-pentanone
2-Butanone	Methylene Chloride
Carbon Disulfide	Tetrachloroethene
Carbon Tetrachloride	Toluene
Chlorobenzene	1,1,2-Trichloro-1,2,2-trifluoroethane
Chloroform	1,1,1-Trichloroethane
Dichlorodifluoromethane	Trichloroethene
1,1-Dichloroethane	Trichlorofluoromethane
1,1-Dichloroethene	Vinyl acetate
cis-1,2-Dichloroethene	o-Xylene

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 0.050 ppmv (MWL-SV05-50) to 0.470 ppmv (MWL-SV01-42.5). TCE concentrations ranged from 0.058 ppmv (MWL-SV05-50) to 0.330 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.25427 ppmv (MWL-SV04-50) to 0.98919 ppmv (MWL-SV01-42.5). Other VOCs detected in all monitoring wells, generally at lower concentrations include dichlorodifluoromethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,1-trichloroethane, and trichlorofluoromethane. The highest sample port VOC concentration was a PCE result of 0.470 ppmv from MWL-SV01-42.5.

For the May 2019 results from the three deepest sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05, PCE concentrations ranged from 0.100 ppmv (MWL-SV05-400) to 0.450 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.081 ppmv (MWL-SV04-400) to 0.330 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.29021 ppmv (MWL-SV05-400) to 0.95564 ppmv (MWL-SV03-400).

### Second Sampling Event – October 18, 2019

A total of 29 compounds were detected above MDLs in October 2019 samples. Nineteen of these compounds were detected in the May samples. Acetone, benzyl chloride, bromomethane, chloromethane, trans-1,2-dichloroethene, 1,2-dichloropropane, hexachlorobutadiene, 2-hexanone, styrene, and 1,1,2-trichloroethane were the 10 compounds detected in the October samples that were not detected in the May samples.

Acetone	trans-1,2-Dichloroethene
Benzene	1,2-Dichloropropane
Benzyl chloride	Hexachlorobutadiene
Bromodichloromethane	2-Hexanone
Bromomethane	Methylene Chloride
2-Butanone	4-Methyl-2-pentanone
Carbon Disulfide	Styrene
Carbon Tetrachloride	Tetrachloroethene
Chlorobenzene	1,1,2-Trichloro-1,2,2-trifluoroethane
Chloroform	1,1,1-Trichloroethane
Chloromethane	1,1,2-Trichloroethane
Dichlorodifluoromethane	Trichloroethene
1,1-Dichloroethane	Trichlorofluoromethane
1,1-Dichloroethene	o-Xylene
cis-1,2-Dichloroethene	

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 0.047 ppmv (MWL-SV05-50) to 0.230 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.045 ppmv (MWL-SV01-42.5) to 0.210 ppmv (MWL-SV05-200). Total VOCs concentrations ranged from 0.24354 ppmv (MWL-SV04-400, environmental sample) to 0.73212 ppmv (MWL-SV05-200). The highest sample port VOC concentration was a PCE result of 0.230 ppmv from MWL-SV03-400.

For the October 2019 results from the three deepest sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05, PCE concentrations ranged from 0.074 ppmv (MWL-SV04-400 environmental sample) to 0.230 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.052 ppmv (MWL-SV04-400, environmental sample) to 0.170 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.24354 ppmv (MWL-SV04-400, environmental sample) to 0.49530 ppmv (MWL-SV03-400).

Tables 5-1 and 5-2 (provided at the end of this chapter due to their length) summarize detected VOCs results for the May 2019 and October 2019 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 2019 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 2019 sample pairs. An RPD was calculated when compounds were reported in both environmental and duplicate samples at concentrations greater than or equal to five times the laboratory RL. The environmental-duplicate sample pair results and QC field blank results are summarized below.

#### First Sampling Event – May 2, 2019

The two environmental-duplicate sample pairs collected during the May 2019 sampling event were analyzed for all analytical parameters. The calculated RPDs show good agreement for the environmental-duplicate sample pairs, ranging from 2 to 14. An RPD of 50 or less demonstrates acceptable precision of the sampling and analytical processes consistent with soil-vapor monitoring protocol established at the SNL/NM Chemical Waste Landfill (NMED October 2009 and subsequent revisions).

A total of five field blank samples were submitted for analysis with the May 2019 environmental samples. VOCs detected above MDLs in field blank samples at very low concentrations include acetone (5 samples), carbon disulfide (1 sample), chlorobenzene (1 sample), chloromethane (1 sample), dichlorodifluoromethane (1 sample), PCE (4 samples), toluene (1 sample), and TCE (1 sample). No corrective action was required for chlorobenzene, chloromethane, dichlorodifluoromethane, PCE, toluene, and TCE since these compounds were not detected in associated environmental samples or detected at concentrations greater than 5 times the field blank concentration. Acetone and carbon disulfide were qualified as not detected during data validation for various environmental samples from all monitoring well sampling ports when these compounds were reported at concentrations less than the RL in both the field blank and environmental samples.

Table 5-3  
Summary of Duplicate Samples  
Mixed Waste Landfill Soil-Vapor Monitoring  
May and October 2019

Well ID/Parameter	Environmental Sample (R <sub>1</sub> )	Duplicate Sample (R <sub>2</sub> )	RPD <sup>a</sup> (%)
	(ppmv)		
May 2019 Environmental-Duplicate Sample Pair Results			
MWL-SV03-100			
Dichlorodifluoromethane	0.045	0.046	2
1,1-Dichloroethene	0.023	0.024	4
Tetrachloroethene	0.27	0.28	4
1,1,2-Trichloro-1,2,2-trifluoroethane	0.13	0.14	7
Trichloroethene	0.23	0.24	4
Trichlorofluoromethane	0.043	0.044	2
MWL-SV03-300			
Dichlorodifluoromethane	0.035	0.039	11
1,1-Dichloroethene	0.018	0.020	11
Tetrachloroethene	0.27	0.31	14
1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.12	9
Trichloroethene	0.16	0.18	12
Trichlorofluoromethane	0.015	0.016	6
October 2019 Environmental-Duplicate Sample Pair Results			
MWL-SV04-100			
Dichlorodifluoromethane	0.018	0.014	25
1,1-Dichloroethene	0.011	0.0093	17
Tetrachloroethene	0.065	0.073	12
1,1,2-Trichloro-1,2,2-trifluoroethane	0.064	0.056	13
1,1,1-Trichloroethane	0.0032	0.0027	17
Trichloroethene	0.080	0.069	15
Trichlorofluoromethane	0.028	0.024	15
MWL-SV04-400			
Dichlorodifluoromethane	0.017	0.015	13
1,1-Dichloroethene	0.0073	0.0074	1
Tetrachloroethene	0.074	0.083	11
1,1,2-Trichloro-1,2,2-trifluoroethane	0.064	0.068	6
Trichloroethene	0.052	0.055	6
Trichlorofluoromethane	0.012	0.012	< 1

Notes:

<sup>a</sup>RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

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

where:

R<sub>1</sub> = Analysis result.  
R<sub>2</sub> = Duplicate analysis result.

< = Less than.

% = Percent.

ID = Identification.

ppmv = Parts per million by volume basis.

### Second Sampling Event – October 18, 2019

The two environmental-duplicate sample pairs collected during the October 2019 sampling event were analyzed for all analytical parameters. The calculated RPDs show good agreement for the environmental-duplicate sample pairs. The RPD values ranged from less than 1 to 25.

A total of five field blank samples were submitted for analysis with the October 2019 samples. VOCs detected above MDLs in field blank samples at very low concentrations included acetone (4 samples), benzene (4 samples), 2-butanone (4 samples), carbon disulfide (3 samples), trans-1,2-dichloroethene (1 sample), dichlorodifluoromethane (1 sample), 2-hexanone (3 samples), 4-methyl-2-pentanone (1 sample), methylene chloride (5 samples), PCE (4 samples), 1,1,2-trichloro-1,2,2-trifluoroethane (4 samples), toluene (1 sample), TCE (3 samples), and trichlorofluoromethane (2 samples). No corrective action was required for trans-1,2-dichloroethene, dichlorodifluoromethane, 2-hexanone, 4-methyl-2-pentanone, PCE, 1,1,2-trichloro-1,2,2-trifluoroethane, TCE, or trichlorofluoromethane since these compounds were not detected in associated environmental samples or detected at concentrations greater than 5 times the field blank concentration. Acetone, benzene, 2-butanone, carbon disulfide, methylene chloride, and toluene were qualified as not detected during data validation for various environmental samples from all monitoring wells when these compounds were reported at concentrations less than the RL in both the field QC and environmental samples.

### 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. For the May sampling event, methylene chloride; benzyl chloride; ethylbenzene; styrene; 1,2,4-trichlorobenzene; m,p-xylene; and o-xylene were detected at concentrations less than the RL in the method blank associated with samples from MWL-SV04 (100, 200, 300, and 400 ft bgs sample ports), and MWL-SV05 (all sample ports). These compounds were qualified as not detected during data validation for associated environmental samples with reported concentrations at or less than the associated RL. The vinyl acetate result for the MWL-SV05-100 sample was greater than the RL but qualified during data validation due to inconclusive mass spectra (i.e., inconclusive mass spectrometry results causing uncertainty in the identification of the compound). For the October sampling event, methylene chloride was detected at concentrations less than the RL in the method blanks associated with samples from all MWL monitoring well sampling ports. Associated methylene chloride environmental sample results were qualified as not detected during data validation if the reported concentrations were less than the RL. Methylene chloride results greater than the RL but less than 10 times the method blank concentration were qualified as estimated with a positive bias (i.e., J+, B). Methylene chloride results greater than the RL and greater than 10 times the method blank concentration were not qualified. There were no other QC 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., percent recovery) requirement of 50 to 130 percent for detected compounds (Section 2.2 of LTMMMP

Appendix D). The compound benzyl chloride recovered outside LTMMMP limits in one laboratory control sample associated with the October samples, but the recovery was within the EPA TO-15 method requirements. In addition, this compound was not detected in the associated environmental samples. Therefore, the associated environmental sample results were not qualified and no corrective action was necessary.

All chemical data were reviewed and qualified in accordance with SNL/NM AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM June 2017b). Based upon the data validation and review criteria, all 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, AR/COC forms, contract verification reviews, and certificates of analysis are provided in Annex C.

#### 5.2.4 Variances

One variance from requirements in the LTMMMP was identified for the May and October 2019 soil-vapor monitoring activities. This variance is considered minor because it has no adverse impact on data quality. During the purging process, a PID with an 11.7 electron volts (eV) lamp was used instead of an 11.8 eV lamp as specified in Section 3.3 in Appendix D of the LTMMMP. 11.8 eV lamps are not currently available from the manufacturer or the distributors. A permit modification request is in preparation that will address this minor variance and submittal to NMED is anticipated in CY 2020.

### 5.3 Historical Data Evaluation

Tables 5-4, 5-5, and 5-6 provide results for PCE, TCE, and Total VOCs, respectively, which are graphically presented in Figures 5-2 through 5-13. Each table presents results for the 12 semiannual monitoring events conducted since implementation of the LTMMMP in 2014. Key points from the evaluation of the 2014 through 2020 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. 2014 through 2020 results for the shallow sampling port depths (41.5 to 100 ft bgs) reflect lower concentrations than were measured during earlier investigations (Peace et al. September 2002 and SNL/NM August 2008).
- Results for the three deepest sampling ports of MWL-SV03 through MWL-SV05 (400 ft bgs) are stable and below the trigger levels.



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

Well ID & Sample Port Depth <sup>a</sup>	September 2014 <sup>b</sup> (ppmv)	October 2014 <sup>b</sup> (ppmv)	April 2015 <sup>b</sup> (ppmv)	October 2015 <sup>b</sup> (ppmv)	April 2016 <sup>b</sup> (ppmv)	October 2016 <sup>b</sup> (ppmv)	May 2017 <sup>b</sup> (ppmv)	October 2017 <sup>b</sup> (ppmv)	April 2018 <sup>b</sup> (ppmv)	October 2018 <sup>b</sup> (ppmv)	May 2019 <sup>b</sup> (ppmv)	October 2019 <sup>b</sup> (ppmv)
MWL-SV01-42.5	0.560	0.400	0.460	0.470	0.410	0.450	0.300	0.420	0.370	0.370	0.470	0.210
MWL-SV02-41.5	0.086	0.067	0.075	0.068	0.068	0.070	0.071	0.072	0.059	0.059	0.090	0.062
MWL-SV03-50	0.140	0.120	0.150	0.110	0.170	0.140	0.100	0.140	0.130	0.130	0.210	0.150
MWL-SV03-100	0.210	0.230	0.240	0.220	0.240	0.240	0.160	0.220	0.210	0.170	0.280	0.210
MWL-SV03-200	0.300	0.320	0.310	0.290	0.270	0.270	0.210	0.260	0.240	0.210	0.280	0.180
MWL-SV03-300	0.290	0.320	0.290	0.370	0.310	0.300	0.220	0.280	0.270	0.200	0.310	0.190
MWL-SV03-400	0.390	0.400	0.420	0.450	0.430	0.440	0.390	0.310	0.370	0.320	0.450	0.230
MWL-SV04-50	0.072	0.076	0.076	0.074	0.078	0.077	0.052	0.063	0.062	0.060	0.076	0.073
MWL-SV04-100	0.130	0.120	0.120	0.120	0.130	0.130	0.089	0.110	0.110	0.120	0.110	0.073
MWL-SV04-200	0.180	0.180	0.170	0.150	0.180	0.150	0.110	0.130	0.120	0.120	0.130	0.094
MWL-SV04-300	0.110	0.130	0.110	0.120	0.130	0.130	0.095	0.120	0.098	0.110	0.130	0.110
MWL-SV04-400	0.110	0.140	0.120	0.140	0.150	0.130	0.100	0.110	0.120	0.120	0.130	0.083
MWL-SV05-50	0.052	0.048	0.055	0.040	0.060	0.045	0.044	0.021	0.045	0.040	0.050	0.047
MWL-SV05-100	0.092	0.096	0.100	0.077	0.099	0.095	0.089	0.070	0.085	0.075	0.091	0.082
MWL-SV05-200	0.140	0.170	0.150	0.120	0.170	0.140	0.140	0.100	0.130	0.120	0.150	0.140
MWL-SV05-300	0.090	0.120	0.097	0.110	0.100	0.110	0.110	0.091	0.098	0.091	0.099	0.099
MWL-SV05-400	0.100	0.110	0.080	0.120	0.110	0.110	0.100	0.092	0.092	0.081	0.100	0.110

Notes:

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

<sup>a</sup>Port depth is the last number in the Well ID and is in feet below ground surface.

<sup>b</sup>If an environmental duplicate sample was collected, then the maximum concentration of the environmental-duplicate sample pair is shown.

ID = Identification.

PCE = Tetrachloroethene.

ppmv = Parts per million by volume.

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

Well ID & Sample Port Depth <sup>a</sup>	September 2014 <sup>b</sup> (ppmv)	October 2014 <sup>b</sup> (ppmv)	April 2015 <sup>b</sup> (ppmv)	October 2015 <sup>b</sup> (ppmv)	April 2016 <sup>b</sup> (ppmv)	October 2016 <sup>b</sup> (ppmv)	May 2017 <sup>b</sup> (ppmv)	October 2017 <sup>b</sup> (ppmv)	April 2018 <sup>b</sup> (ppmv)	October 2018 <sup>b</sup> (ppmv)	May 2019 <sup>b</sup> (ppmv)	October 2019 <sup>b</sup> (ppmv)
MWL-SV01-42.5	0.110	0.090	0.099	0.110	0.091	0.100	0.071	0.086	0.081	0.070	0.100	0.045
MWL-SV02-41.5	0.075	0.058	0.067	0.065	0.063	0.065	0.070	0.067	0.056	0.050	0.073	0.054
MWL-SV03-50	0.100	0.082	0.097	0.080	0.140	0.110	0.098	0.120	0.110	0.100	0.170	0.120
MWL-SV03-100	0.190	0.190	0.200	0.200	0.210	0.210	0.130	0.180	0.190	0.150	0.240	0.170
MWL-SV03-200	0.300	0.300	0.290	0.310	0.250	0.270	0.250	0.230	0.240	0.190	0.260	0.180
MWL-SV03-300	0.190	0.210	0.170	0.260	0.200	0.220	0.200	0.210	0.190	0.140	0.180	0.130
MWL-SV03-400	0.290	0.280	0.260	0.350	0.300	0.320	0.250	0.230	0.270	0.230	0.330	0.170
MWL-SV04-50	0.061	0.059	0.060	0.066	0.070	0.067	0.054	0.058	0.055	0.051	0.062	0.058
MWL-SV04-100	0.130	0.120	0.120	0.130	0.140	0.150	0.120	0.120	0.110	0.110	0.110	0.080
MWL-SV04-200	0.210	0.210	0.190	0.200	0.220	0.200	0.180	0.170	0.170	0.140	0.160	0.120
MWL-SV04-300	0.076	0.091	0.064	0.093	0.081	0.097	0.087	0.094	0.067	0.076	0.091	0.075
MWL-SV04-400	0.075	0.096	0.060	0.097	0.070	0.091	0.085	0.081	0.087	0.072	0.081	0.055
MWL-SV05-50	0.067	0.061	0.064	0.052	0.074	0.058	0.049	0.042	0.055	0.051	0.058	0.059
MWL-SV05-100	0.140	0.130	0.130	0.120	0.130	0.130	0.110	0.100	0.110	0.099	0.120	0.110
MWL-SV05-200	0.200	0.240	0.210	0.200	0.210	0.200	0.190	0.150	0.190	0.170	0.210	0.210
MWL-SV05-300	0.100	0.130	0.082	0.120	0.096	0.120	0.120	0.120	0.110	0.120	0.097	0.110
MWL-SV05-400	0.094	0.100	0.066	0.120	0.089	0.100	0.087	0.097	0.089	0.077	0.089	0.100

Notes:

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

<sup>a</sup>Port depth is the last number in the Well ID and is in feet below ground surface.

<sup>b</sup>If an environmental duplicate sample was collected, then the maximum concentration of the environmental-duplicate sample pair is shown.

ID = Identification.

ppmv = Parts per million by volume.

TCE = Trichloroethene.

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

Well ID & Sample Port Depth <sup>a</sup>	September 2014 <sup>b</sup> (ppmv)	October 2014 <sup>b</sup> (ppmv)	April 2015 <sup>b</sup> (ppmv)	October 2015 <sup>b</sup> (ppmv)	April 2016 <sup>b</sup> (ppmv)	October 2016 <sup>b</sup> (ppmv)	May 2017 <sup>b</sup> (ppmv)	October 2017 <sup>b</sup> (ppmv)	April 2018 <sup>b</sup> (ppmv)	October 2018 <sup>b</sup> (ppmv)	May 2019 <sup>b</sup> (ppmv)	October 2019 <sup>b</sup> (ppmv)
MWL-SV01-42.5	1.14010	1.00870	1.11670	1.03620	0.93510	0.97570	0.740723	0.89810	0.82938	0.766173	0.98919	0.53118
MWL-SV02-41.5	0.71822	0.67880	0.76470	0.69150	0.71030	0.70780	0.62944	0.67594	0.62856	0.58550	0.73830	0.55429
MWL-SV03-50	0.36957	0.31750	0.37076	0.30743	0.48016	0.42248	0.34860	0.42918	0.37492	0.37254	0.55177	0.421459
MWL-SV03-100	0.61151	0.63820	0.69490	0.74420	0.73270	0.73682	0.53366	0.62881	0.64167	0.51641	0.79405	0.61022
MWL-SV03-200	0.91906	0.94754	0.99016	0.93230	0.84151	0.87920	0.78555	0.78590	0.75426	0.63905	0.82572	0.58767
MWL-SV03-300	0.64917	0.67835	0.59506	0.83120	0.68678	0.74430	0.61278	0.71640	0.64246	0.51890	0.69218	0.47090
MWL-SV03-400	0.87270	0.81410	0.85950	0.95920	0.8798	0.89730	0.69654	0.62930	0.77359	0.67374	0.95564	0.49530
MWL-SV04-50	0.25949	0.26359	0.28424	0.28232	0.30064	0.29728	0.232861	0.25573	0.23944	0.22375	0.25427	0.26788
MWL-SV04-100	0.45631	0.42879	0.44346	0.46616	0.50930	0.53785	0.40932	0.43340	0.42102	0.40980	0.39089	0.287837
MWL-SV04-200	0.68361	0.66935	0.64340	0.63160	0.72689	0.66068	0.56579	0.56287	0.58006	0.52679	0.53017	0.433208
MWL-SV04-300	0.26624	0.32355	0.27345	0.34519	0.32831	0.37126	0.32319	0.35562	0.31116	0.30295	0.34700	0.32013
MWL-SV04-400	0.25031	0.3246	0.26702	0.35374	0.35148	0.38251	0.31282	0.32932	0.33570	0.31229	0.32006	0.25402
MWL-SV05-50	0.36547	0.31833	0.33990	0.30406	0.37770	0.35609	0.29951	0.26189	0.32248	0.28946	0.30571	0.299856
MWL-SV05-100	0.56578	0.54556	0.57169	0.53248	0.59430	0.61891	0.54760	0.51172	0.52584	0.47217	0.52797	0.51177
MWL-SV05-200	0.70237	0.82115	0.73680	0.65830	0.80567	0.73190	0.69410	0.57349	0.68820	0.60710	0.72360	0.73212
MWL-SV05-300	0.35628	0.42371	0.33576	0.44336	0.36421	0.46092	0.47695	0.44050	0.41957	0.40427	0.35226	0.40869
MWL-SV05-400	0.54096	0.39521	0.25075	0.45245	0.30765	0.40839	0.29962	0.29543	0.29875	0.30373	0.29021	0.33322

Notes:

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

<sup>a</sup> Port depth is the last number in the Well ID and is in feet below ground surface.

<sup>b</sup> If an environmental duplicate sample was collected, then the maximum concentration of the environmental-duplicate sample pair is shown.

ID = Identification.

ppmv = Parts per million by volume.

VOC = Volatile organic compound.

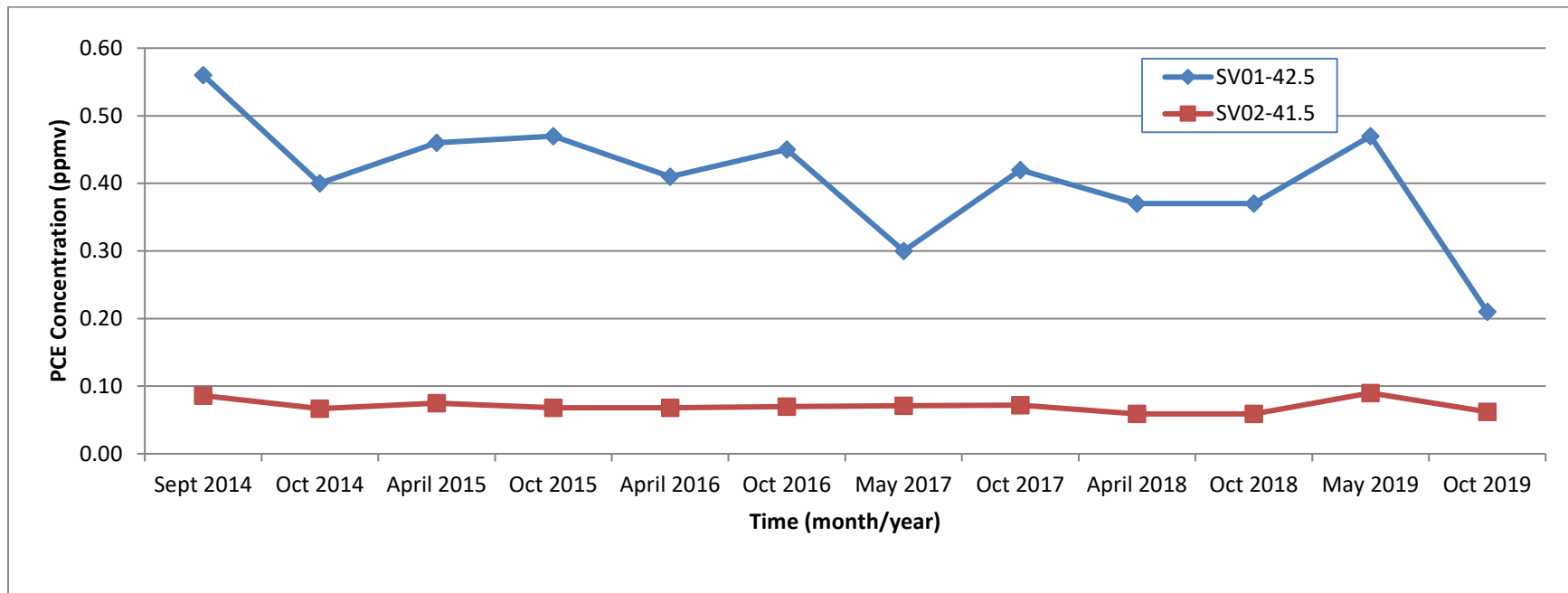


Figure 5-2  
PCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

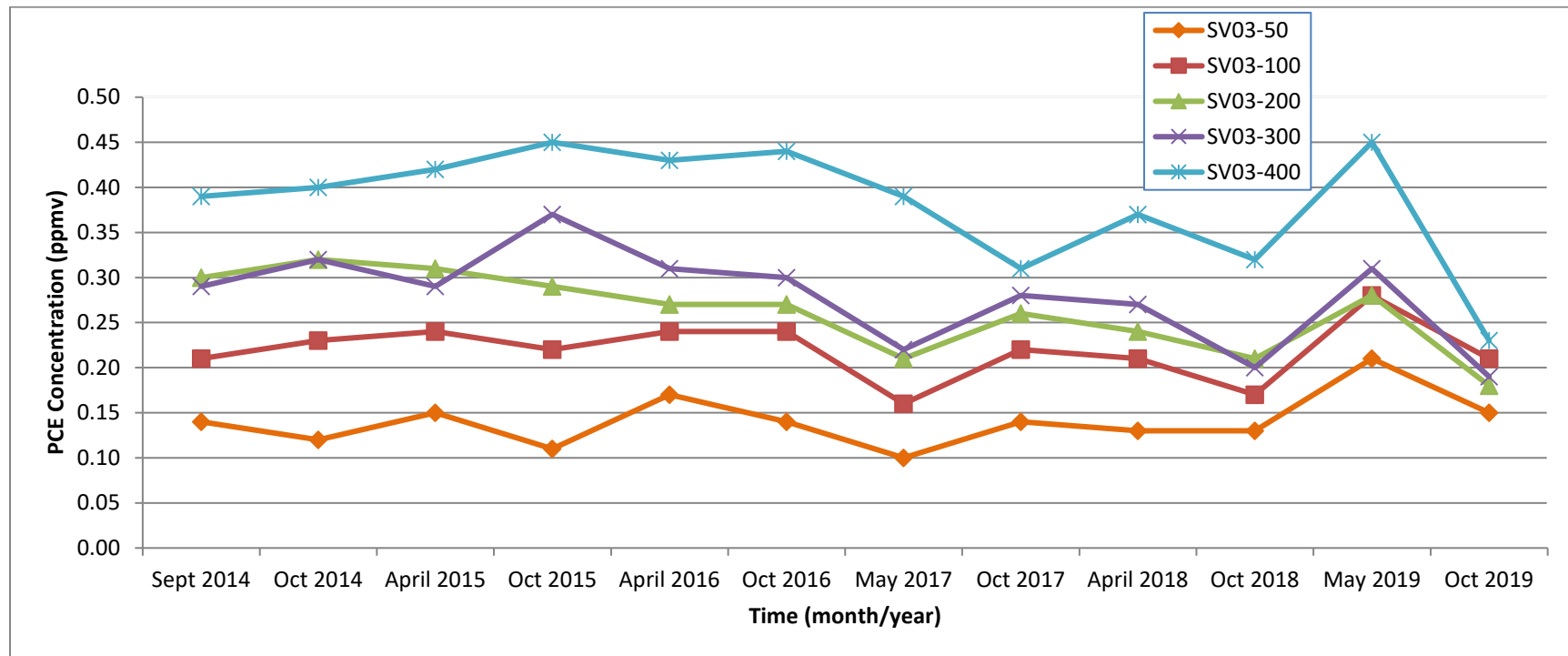


Figure 5-3  
PCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

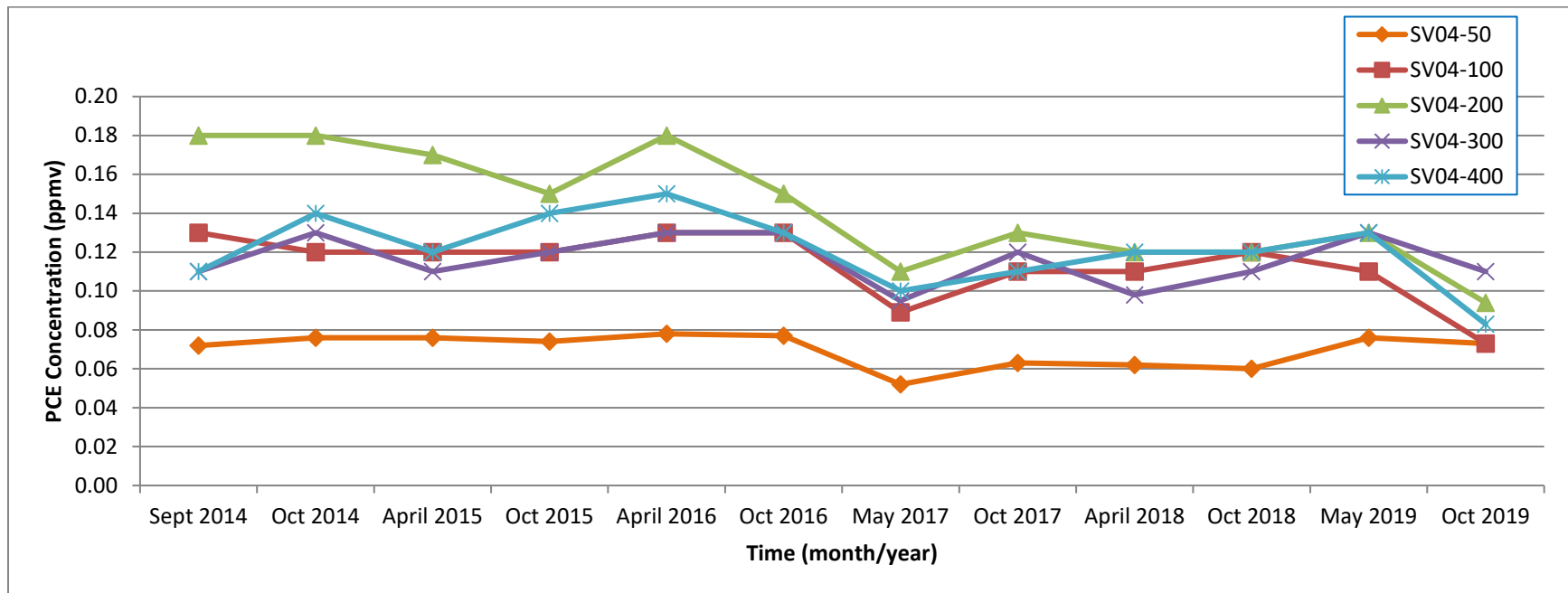


Figure 5-4  
PCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

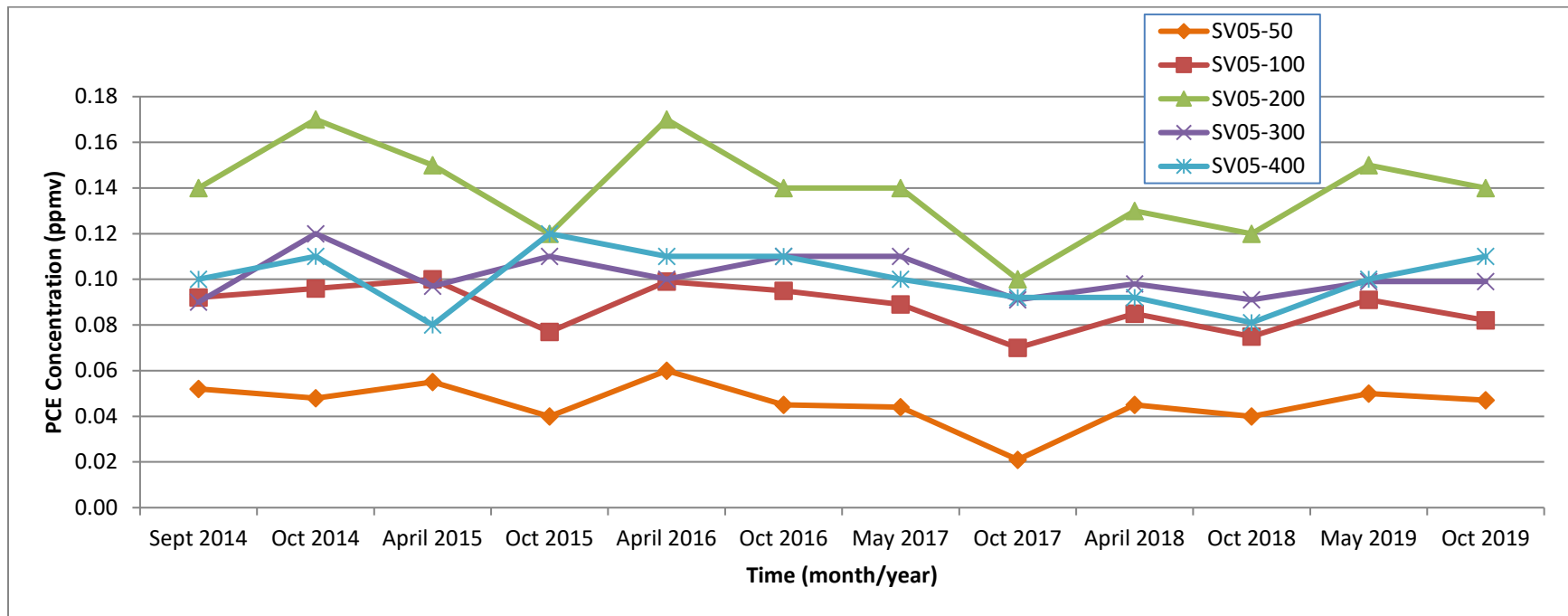


Figure 5-5  
PCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

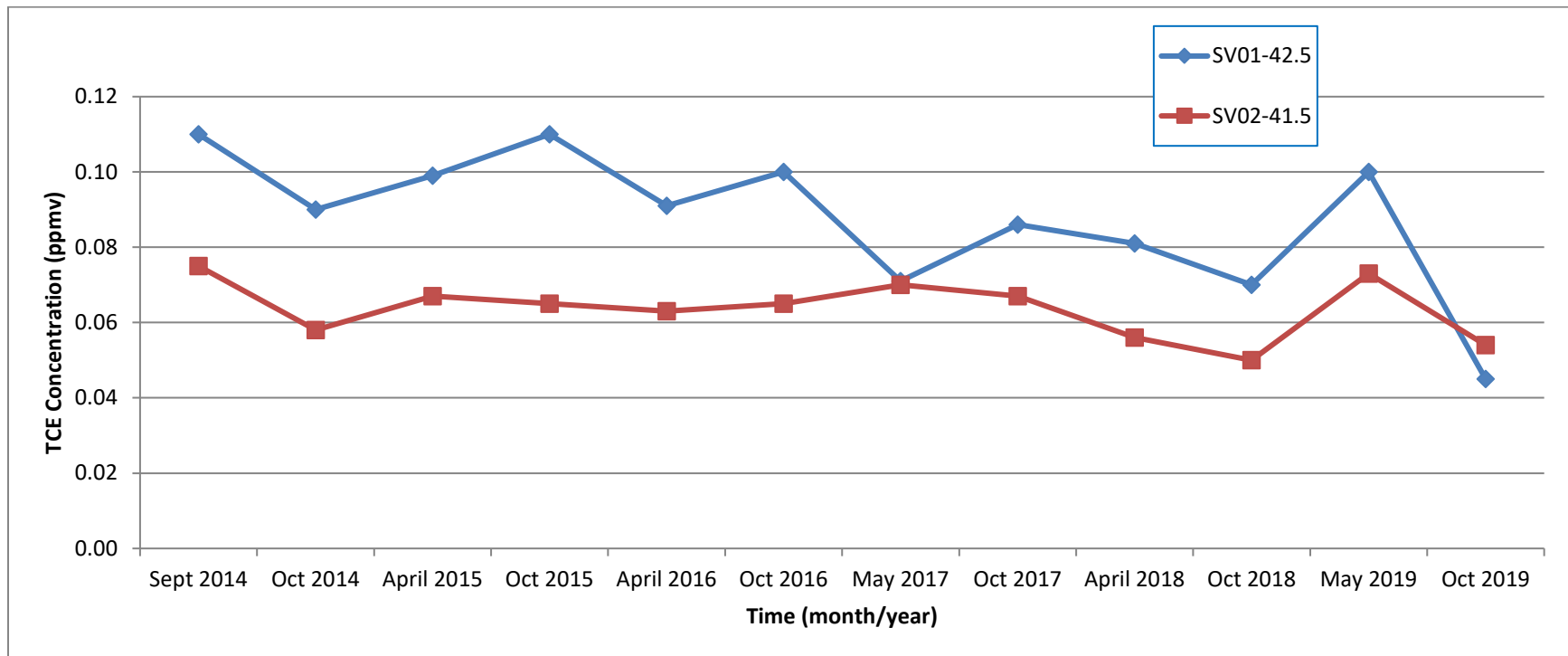


Figure 5-6  
TCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports



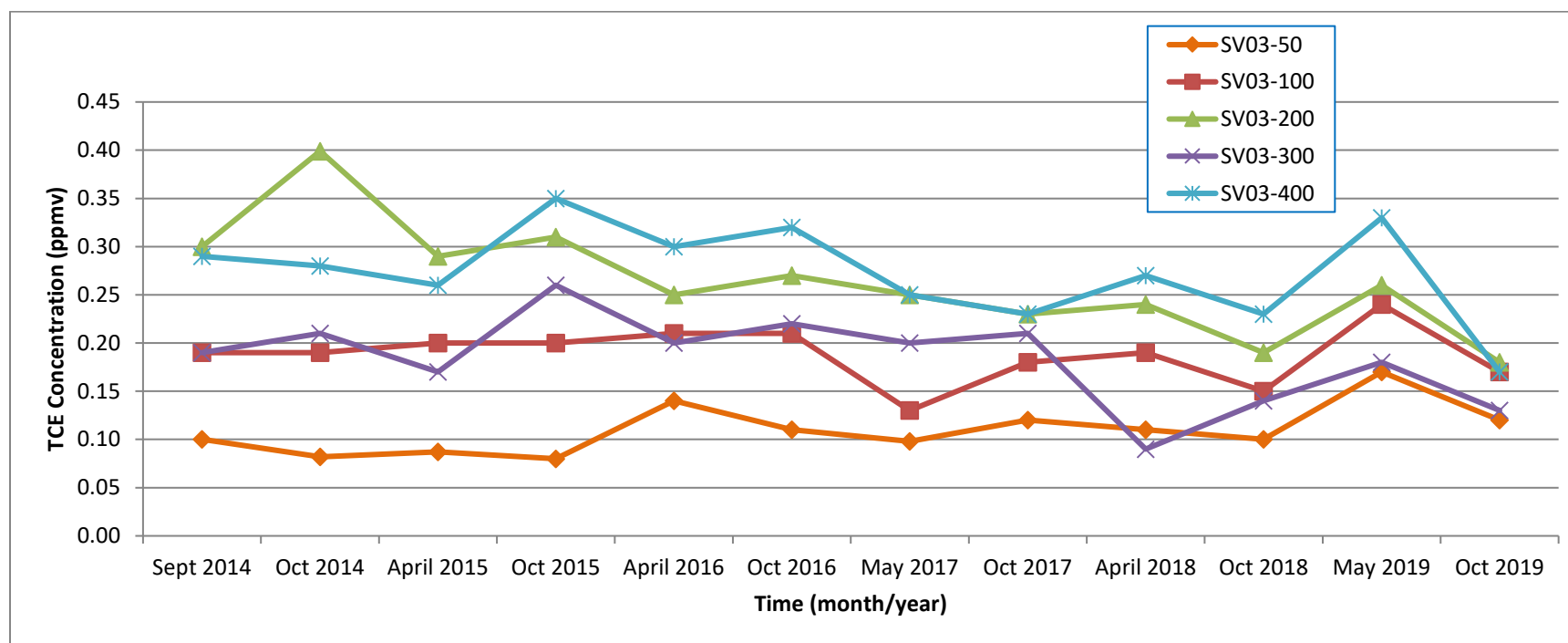


Figure 5-7  
TCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

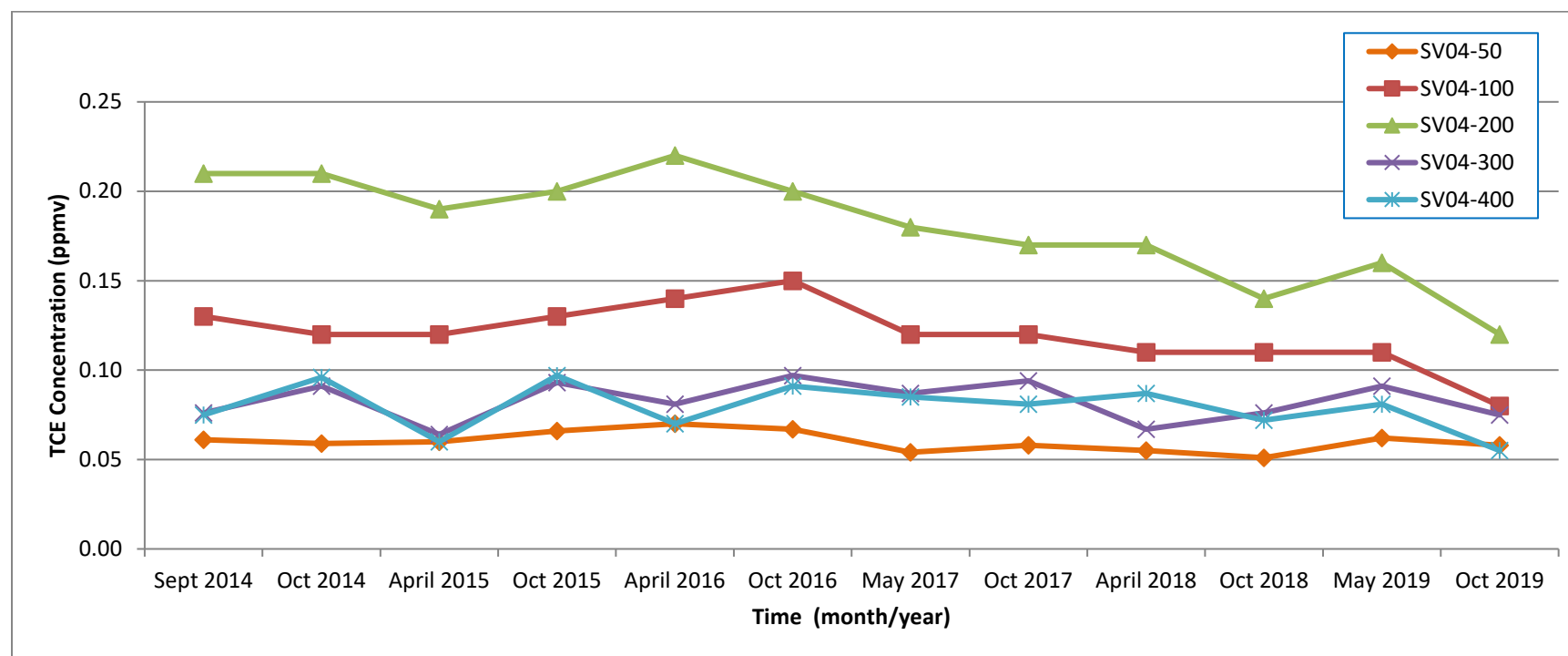


Figure 5-8  
TCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

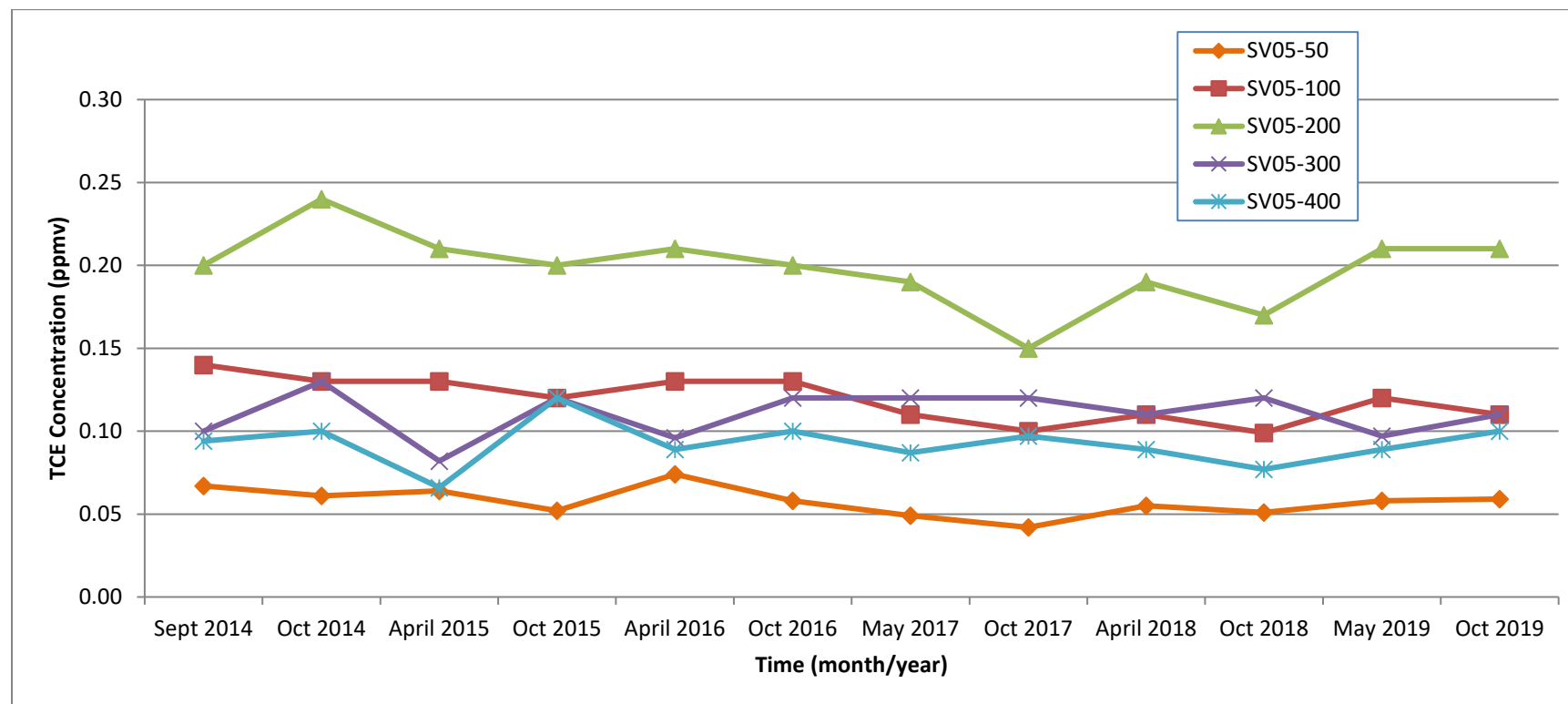


Figure 5-9  
TCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

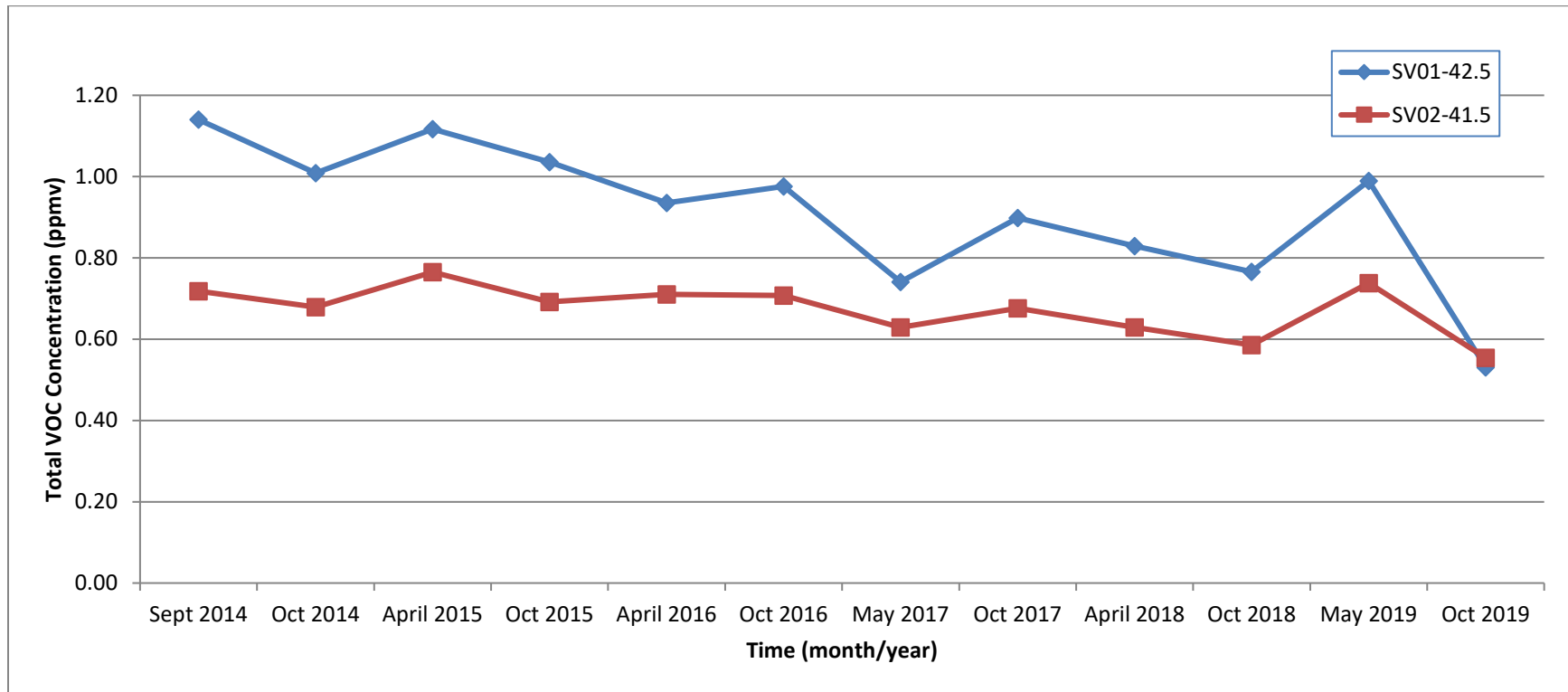


Figure 5-10  
Total VOCs Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

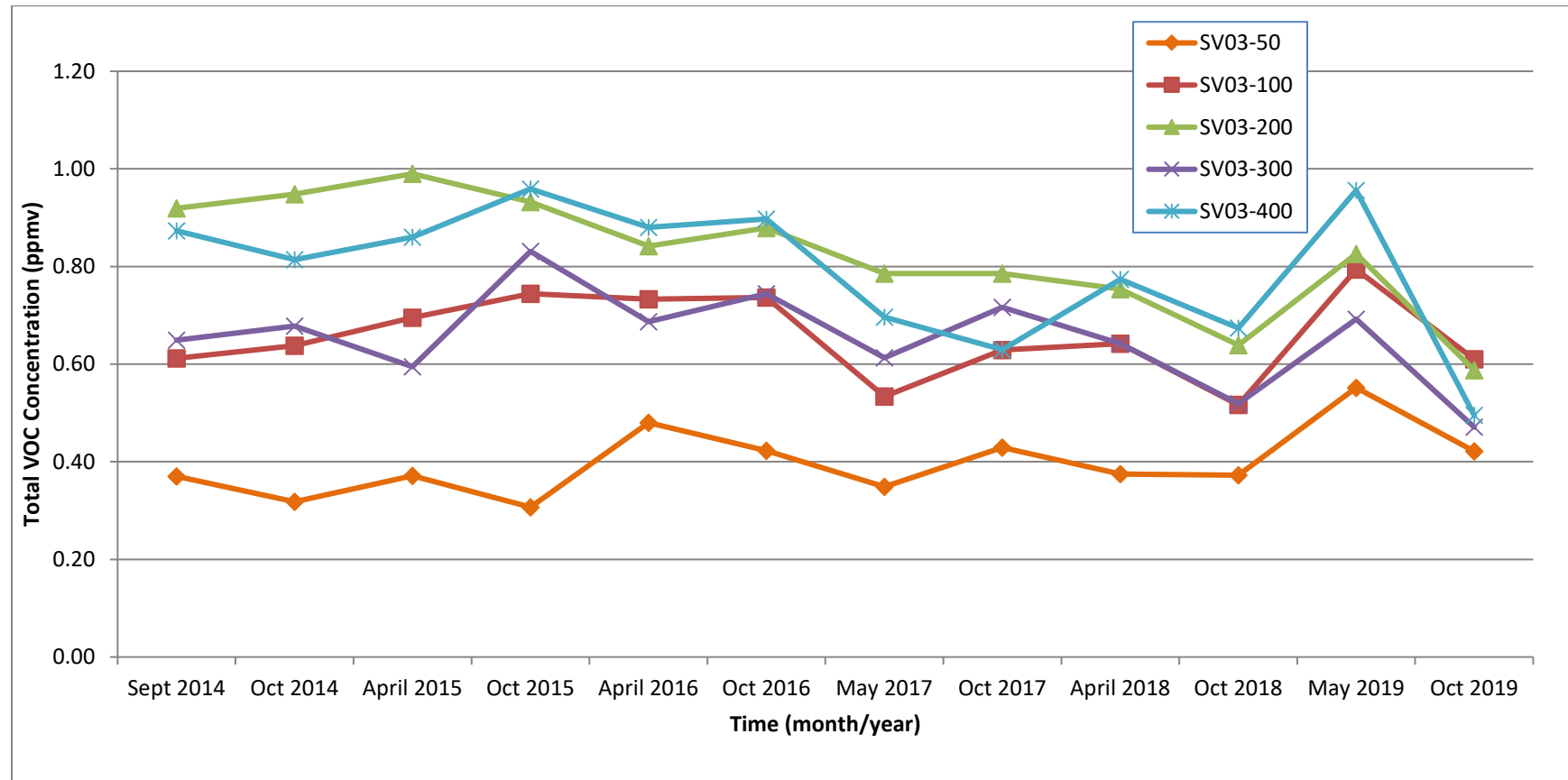


Figure 5-11  
Total VOCs Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

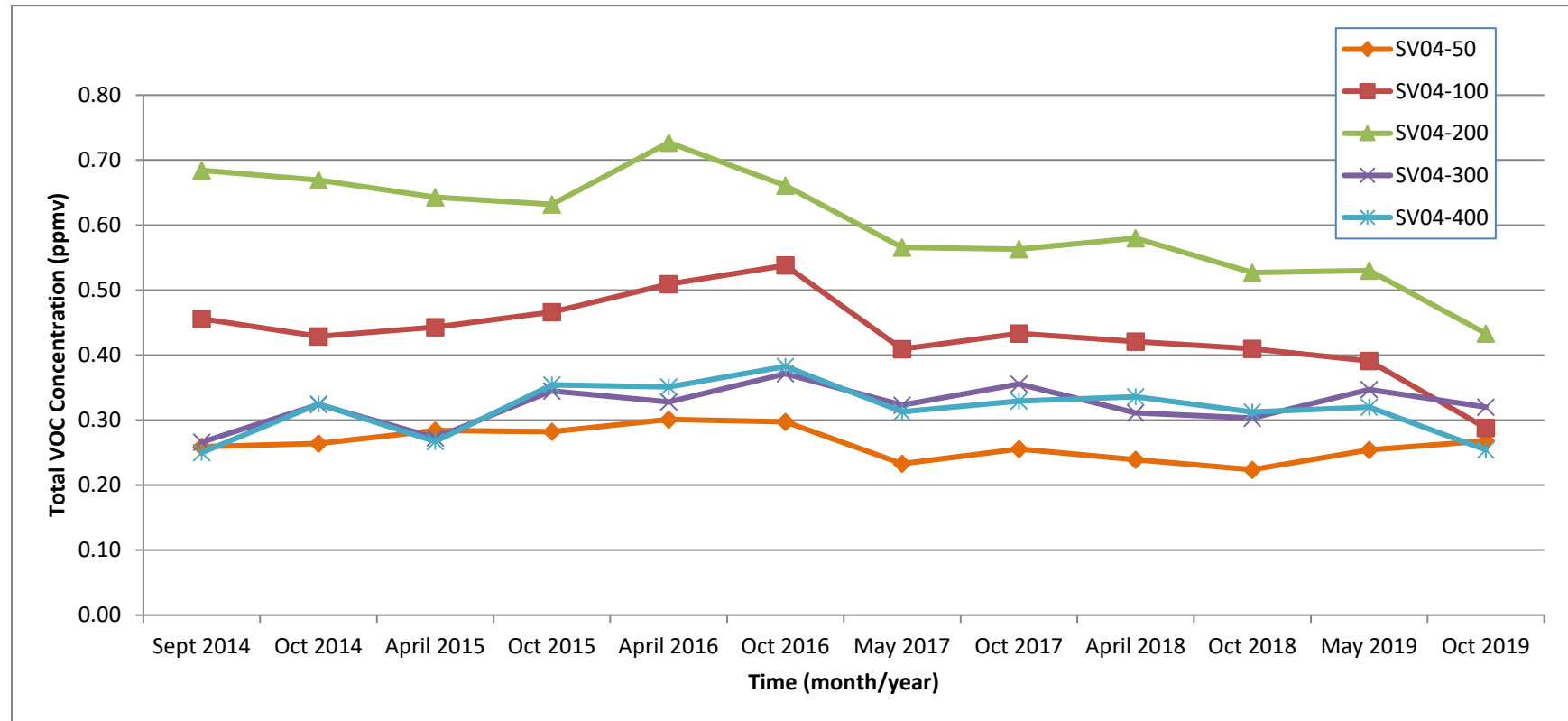


Figure 5-12  
Total VOCs Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

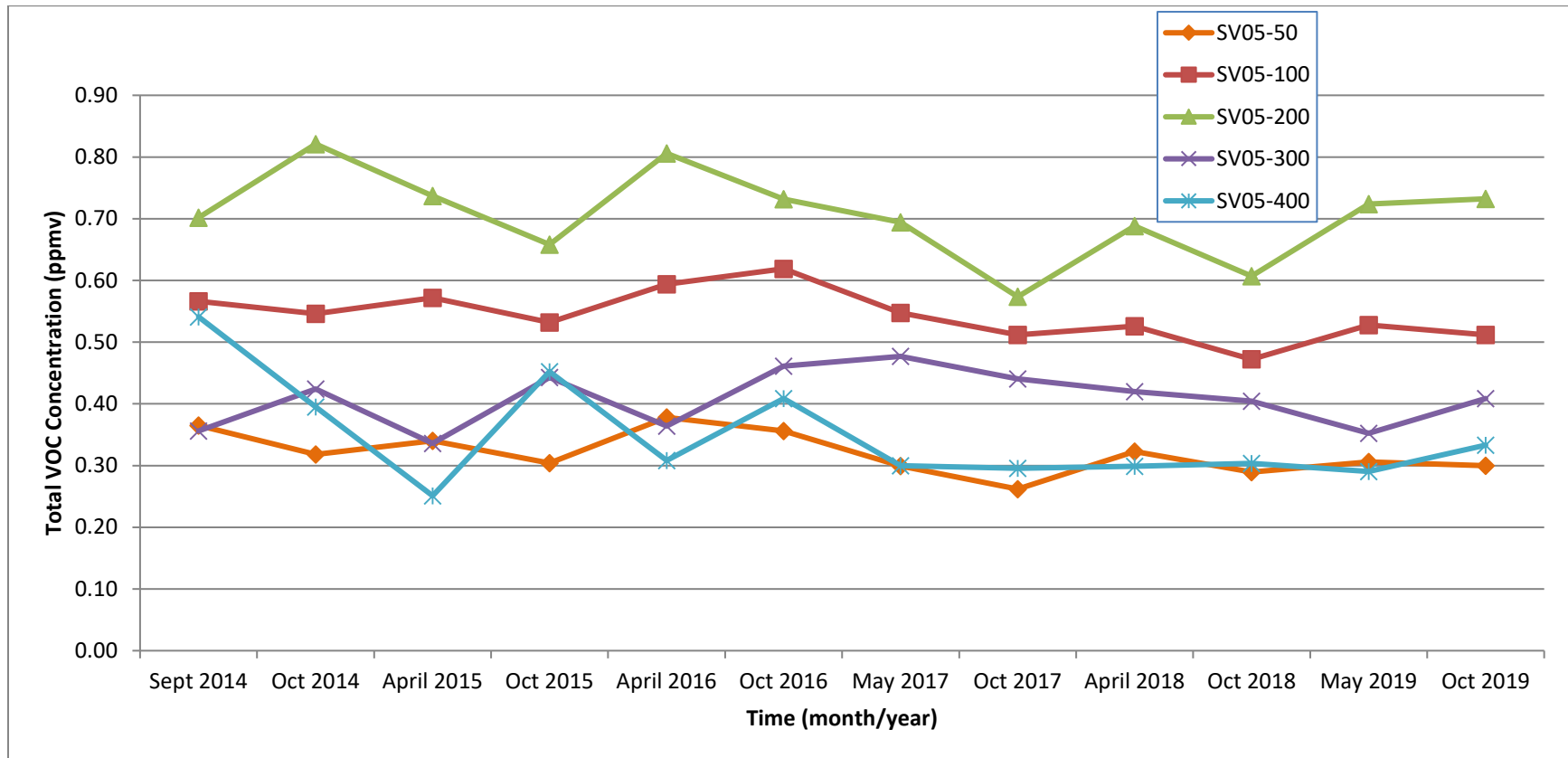


Figure 5-13  
Total VOCs Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

Table 5-1  
Summary of Detected VOCs – May 2019

Table 5-2  
Summary of Detected VOCs – October 2019



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Table 5-1  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV01-42.5 02-May-19	Acetone	0.0047	0.0012	0.034	J	0.034U
	Bromodichloromethane	0.00079	0.00044	0.0020	J	--
	2-Butanone	0.0026	0.0013	0.0054	J	--
	Chloroform	0.017	0.00064	0.0020	--	--
	Dichlorodifluoromethane	0.091	0.00098	0.0027	--	--
	1,1-Dichloroethane	0.0027	0.00049	0.0020	--	--
	1,1-Dichloroethene	0.0078	0.00087	0.0054	--	--
	cis-1,2-Dichloroethene	0.0013	0.00060	0.0027	J	--
	Tetrachloroethene	0.47	0.00034	0.0027	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.080	0.0011	0.0027	--	--
	1,1,1-Trichloroethane	0.036	0.00044	0.0020	--	--
	Trichloroethene	0.10	0.00071	0.0027	--	--
	Trichlorofluoromethane	0.18	0.0013	0.0027	--	--
MWL-SV02-41.5 02-May-19	Total Organics <sup>d</sup>	0.98919	NA	NA	NA	NA
	2-Butanone	0.0081	0.0014	0.0056	--	--
	Carbon disulfide	0.0016	0.00054	0.0056	J	--
	Chloroform	0.0032	0.00066	0.0021	--	--
	Dichlorodifluoromethane	0.095	0.0010	0.0028	--	--
	1,1-Dichloroethane	0.0023	0.00050	0.0021	--	--
	1,1-Dichloroethene	0.011	0.00090	0.0056	--	--
	cis-1,2-Dichloroethene	0.0011	0.00062	0.0028	J	--
	Tetrachloroethene	0.090	0.00036	0.0028	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.052	0.0011	0.0028	--	--
	1,1,1-Trichloroethane	0.071	0.00045	0.0021	--	--
	Trichloroethene	0.073	0.00073	0.0028	--	--
	Trichlorofluoromethane	0.33	0.0014	0.0028	--	--
	Total Organics <sup>d</sup>	0.7383	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV03-50 02-May-19	Acetone	0.0022	0.00065	0.018	J	0.018U
	Benzene	0.00044	0.00029	0.0015	J	--
	Carbon tetrachloride	0.00033	0.00023	0.0029	J	--
	Chloroform	0.0021	0.00035	0.0011	--	--
	Dichlorodifluoromethane	0.030	0.00053	0.0015	--	--
	1,1-Dichloroethane	0.0041	0.00026	0.0011	--	--
	1,1-Dichloroethene	0.015	0.00047	0.0029	--	--
	Methylene chloride	0.0011	0.00026	0.0015	J	--
	Tetrachloroethene	0.21	0.00019	0.0015	--	--
	Toluene	0.00050	0.00019	0.0015	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.086	0.00059	0.0015	--	--
	1,1,1-Trichloroethane	0.0032	0.00024	0.0011	--	--
	Trichloroethene	0.17	0.00038	0.0015	--	--
	Trichlorofluoromethane	0.029	0.00072	0.0015	--	--
	Total Organics <sup>d</sup>	0.55177	NA	NA	NA	NA
MWL-SV03-100 02-May-19	Acetone	0.0040	0.00085	0.024	J	0.024U
	Chloroform	0.0029	0.00045	0.0014	--	--
	Dichlorodifluoromethane	0.045	0.00069	0.0019	--	--
	1,1-Dichloroethane	0.0063	0.00034	0.0014	--	--
	1,1-Dichloroethene	0.023	0.00062	0.0038	--	--
	cis-1,2-Dichloroethene	0.0039	0.00042	0.0019	--	--
	Tetrachloroethene	0.27	0.00024	0.0019	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.13	0.00078	0.0019	--	--
	1,1,1-Trichloroethane	0.0042	0.00031	0.0014	--	--
	Trichloroethene	0.23	0.00050	0.0019	--	--
	Trichlorofluoromethane	0.043	0.00093	0.0019	--	--
	Total Organics <sup>d</sup>	0.7583	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV03-100 (Duplicate) 02-May-19	Acetone	0.0034	0.00082	0.023	J	0.023U
	Carbon tetrachloride	0.00045	0.00030	0.0037	J	--
	Chloroform	0.0029	0.00044	0.0014	--	--
	Dichlorodifluoromethane	0.046	0.00067	0.0018	--	--
	1,1-Dichloroethane	0.0066	0.00033	0.0014	--	--
	1,1-Dichloroethene	0.024	0.00059	0.0037	--	--
	cis-1,2-Dichloroethene	0.0040	0.00041	0.0018	--	--
	Methylene chloride	0.0017	0.00033	0.0018	J	--
	Tetrachloroethene	0.28	0.00024	0.0018	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.14	0.00075	0.0018	--	--
	1,1,1-Trichloroethane	0.0044	0.00030	0.0014	--	--
	Trichloroethene	0.24	0.00048	0.0018	--	--
	Trichlorofluoromethane	0.044	0.00090	0.0018	--	--
	Total Organics <sup>d</sup>	0.79405	NA	NA	NA	NA
MWL-SV03-200 02-May-19	Acetone	0.0055	0.00084	0.024	J	0.024U
	Carbon disulfide	0.0012	0.00037	0.0038	J	0.0038U
	Carbon tetrachloride	0.00052	0.00030	0.0038	J	--
	Chloroform	0.0026	0.00045	0.0014	--	--
	Dichlorodifluoromethane	0.049	0.00069	0.0019	--	--
	1,1-Dichloroethane	0.0075	0.00034	0.0014	--	--
	1,1-Dichloroethene	0.030	0.00061	0.0038	--	--
	cis-1,2-Dichloroethene	0.0047	0.00042	0.0019	--	--
	Methylene chloride	0.0028	0.00034	0.0019	--	--
	Tetrachloroethene	0.28	0.00024	0.0019	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.15	0.00077	0.0019	--	--
	1,1,1-Trichloroethane	0.0026	0.00031	0.0014	--	--
	Trichloroethene	0.26	0.00050	0.0019	--	--
	Trichlorofluoromethane	0.036	0.00093	0.0019	--	--
	Total Organics <sup>d</sup>	0.82572	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV03-300 02-May-19	Acetone	0.0046	0.00083	0.023	J	0.023U
	Carbon tetrachloride	0.00034	0.00030	0.0037	J	--
	Chlorobenzene	0.00046	0.00030	0.0014	J	--
	Dichlorodifluoromethane	0.035	0.00067	0.0019	--	--
	1,1-Dichloroethane	0.0023	0.00033	0.0014	--	--
	1,1-Dichloroethene	0.018	0.00060	0.0037	--	--
	cis-1,2-Dichloroethene	0.0015	0.00041	0.0019	J	--
	Methylene chloride	0.00070	0.00033	0.0019	J	--
	Tetrachloroethene	0.27	0.00024	0.0019	--	--
	Toluene	0.00035	0.00024	0.0019	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.00076	0.0019	--	--
	1,1,1-Trichloroethane	0.00063	0.00030	0.0014	J	--
	Trichloroethene	0.16	0.00049	0.0019	--	--
	Trichlorofluoromethane	0.015	0.00091	0.0019	--	--
	Total Organics <sup>d</sup>	0.61428	NA	NA	NA	NA
MWL-SV03-300 (Duplicate) 02-May-19	Acetone	0.0054	0.0011	0.031	J	0.031U
	Chloroform	0.0012	0.00059	0.0019	J	--
	Dichlorodifluoromethane	0.039	0.00091	0.0025	--	--
	1,1-Dichloroethane	0.0025	0.00045	0.0019	--	--
	1,1-Dichloroethene	0.020	0.00081	0.0050	--	--
	cis-1,2-Dichloroethene	0.0017	0.00056	0.0025	J	--
	Methylene chloride	0.00079	0.00045	0.0025	J	--
	Tetrachloroethene	0.31	0.00032	0.0025	--	--
	Toluene	0.00036	0.00032	0.0025	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.12	0.0010	0.0025	--	--
	1,1,1-Trichloroethane	0.00063	0.00041	0.0019	J	--
	Trichloroethene	0.18	0.00066	0.0025	--	--
	Trichlorofluoromethane	0.016	0.0012	0.0025	--	--
	Total Organics <sup>d</sup>	0.69218	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV03-400</b> 02-May-19  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.027	0.0018	0.050	J	0.05U
	2-Butanone	0.0022	0.0020	0.0080	J	--
	Carbon disulfide	0.010	0.00078	0.0080	--	--
	Chloroform	0.0020	0.00095	0.0030	J	--
	Dichlorodifluoromethane	0.026	0.0014	0.0040	--	--
	1,1-Dichloroethane	0.0040	0.00072	0.0030	--	--
	1,1-Dichloroethene	0.022	0.0013	0.0080	--	--
	cis-1,2-Dichloroethene	0.0029	0.00089	0.0040	J	--
	Ethylbenzene	0.00072	0.00063	0.0040	J	--
	4-Methyl-2-pentanone	0.0027	0.0013	0.0040	J	--
	Methylene chloride	0.0014	0.00072	0.0040	J	--
	Tetrachloroethene	0.45	0.00051	0.0040	--	--
	Toluene	0.00072	0.00051	0.0040	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.084	0.0016	0.0040	--	--
	1,1,1-Trichloroethane	0.0013	0.00065	0.0030	J	--
	Trichloroethene	0.33	0.0010	0.0040	--	--
	Trichlorofluoromethane	0.015	0.0020	0.0040	--	--
	o-Xylene	0.00070	0.00054	0.0040	J	--
	Total Organics <sup>d</sup>	0.95564	NA	NA	NA	NA
<b>MWL-SV04-50</b> 02-May-19	Acetone	0.0027	0.00018	0.0050	J	0.005U
	Benzene	0.00035	0.000079	0.00040	J	--
	2-Butanone	0.00053	0.00020	0.00080	J	--
	Carbon disulfide	0.0019	0.000078	0.00080	--	--
	Carbon tetrachloride	0.00024	0.000064	0.00080	J	--
	Chloroform	0.0019	0.000095	0.00030	--	--
	Dichlorodifluoromethane	0.013	0.00015	0.00040	--	--
	1,1-Dichloroethane	0.0014	0.000072	0.00030	--	--
	1,1-Dichloroethene	0.0063	0.00013	0.00080	--	--
	cis-1,2-Dichloroethene	0.00055	0.000089	0.00040	--	--
	Tetrachloroethene	0.076	0.000051	0.00040	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.057	0.00016	0.00040	--	--
	1,1,1-Trichloroethane	0.0071	0.000065	0.00030	--	--
	Trichloroethene	0.062	0.00011	0.00040	--	--
	Trichlorofluoromethane	0.026	0.00020	0.00040	--	--
	Total Organics <sup>d</sup>	0.25427	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV04-100 02-May-19	Benzene	0.00030	0.00026	0.0013	J	--
	Carbon disulfide	0.00030	0.00026	0.0026	J	--
	Carbon tetrachloride	0.00039	0.00021	0.0026	J	--
	Chloroform	0.0020	0.00031	0.00099	--	--
	Dichlorodifluoromethane	0.026	0.00048	0.0013	--	--
	1,1-Dichloroethane	0.0029	0.00024	0.00099	--	--
	1,1-Dichloroethene	0.014	0.00042	0.0026	--	--
	cis-1,2-Dichloroethene	0.0017	0.00029	0.0013	--	--
	Methylene chloride	0.00059	0.00024	0.0013	B, J	0.0013U
	Styrene	0.00022	0.00019	0.0013	B, J	0.0013U
	Tetrachloroethene	0.11	0.00017	0.0013	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.084	0.00054	0.0013	--	--
	1,2,4-Trichlorobenzene	0.0025	0.0014	0.0066	B, J	0.0066U
	1,1,1-Trichloroethane	0.0053	0.00021	0.00099	--	--
	Trichloroethene	0.11	0.00035	0.0013	--	--
	Trichlorofluoromethane	0.034	0.00064	0.0013	--	--
	m,p-Xylene	0.00052	0.00033	0.0026	B, J	0.0026U
	o-Xylene	0.00027	0.00018	0.0013	B, J	0.0013U
	Total Organics <sup>d</sup>	0.39089	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV04-200 02-May-19	Acetone	0.0047	0.00062	0.017	J	0.017U
	Benzene	0.00030	0.00028	0.0014	J	--
	Benzyl chloride	0.00083	0.00057	0.0028	B, J	0.0028UJ
	Carbon tetrachloride	0.00047	0.00022	0.0028	J	--
	Chloroform	0.0015	0.00033	0.0010	--	--
	Dichlorodifluoromethane	0.038	0.00051	0.0014	--	--
	1,1-Dichloroethane	0.0049	0.00025	0.0010	--	--
	1,1-Dichloroethene	0.027	0.00045	0.0028	--	--
	cis-1,2-Dichloroethene	0.0029	0.00031	0.0014	--	--
	Methylene chloride	0.0014	0.00025	0.0014	B	0.0014U
	Tetrachloroethene	0.13	0.00018	0.0014	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.13	0.00057	0.0014	--	--
	1,2,4-Trichlorobenzene	0.0026	0.0015	0.0070	B, J	0.007U
	1,1,1-Trichloroethane	0.0021	0.00023	0.0010	--	--
	Trichloroethene	0.16	0.00037	0.0014	--	--
	Trichlorofluoromethane	0.033	0.00068	0.0014	--	--
	m,p-Xylene	0.00035	0.00035	0.0028	B, J	0.0028U
	o-Xylene	0.00021	0.00019	0.0014	B, J	0.0014U
	Total Organics <sup>d</sup>	0.53017	NA	NA	NA	NA
MWL-SV04-300 02-May-19	Acetone	0.011	0.00065	0.018	J	0.018U
	Benzene	0.00032	0.00029	0.0015	J	--
	2-Butanone	0.0015	0.00072	0.0029	J	--
	Chloroform	0.00077	0.00034	0.0011	J	--
	Dichlorodifluoromethane	0.022	0.00053	0.0015	--	--
	1,1-Dichloroethane	0.0014	0.00026	0.0011	--	--
	1,1-Dichloroethene	0.012	0.00047	0.0029	--	--
	cis-1,2-Dichloroethene	0.00091	0.00032	0.0015	J	--
	Methylene chloride	0.00061	0.00026	0.0015	B, J	0.0015U
	Tetrachloroethene	0.13	0.00019	0.0015	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.071	0.00059	0.0015	--	--
	1,2,4-Trichlorobenzene	0.0027	0.0016	0.0073	B, J	0.0073U
	1,1,1-Trichloroethane	0.0011	0.00024	0.0011	--	--
	Trichloroethene	0.091	0.00038	0.0015	--	--
	Trichlorofluoromethane	0.015	0.00071	0.0015	--	--
	m,p-Xylene	0.00037	0.00036	0.0029	B, J	0.0029U
	o-Xylene	0.00022	0.00020	0.0015	B, J	0.0015U
	Total Organics <sup>d</sup>	0.34700	NA	NA	NA	NA

Refer to footnotes at end of table.



Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV04-400</b> 02-May-19  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0066	0.00066	0.019	J	0.019U
	Benzene	0.00056	0.00029	0.0015	J	--
	Carbon disulfide	0.0011	0.00029	0.0030	J	--
	Carbon tetrachloride	0.00026	0.00024	0.0030	J	--
	Chloroform	0.00066	0.00035	0.0011	J	--
	Dichlorodifluoromethane	0.018	0.00054	0.0015	--	--
	1,1-Dichloroethane	0.0012	0.00027	0.0011	--	--
	1,1-Dichloroethene	0.0095	0.00048	0.0030	--	--
	cis-1,2-Dichloroethene	0.00079	0.00033	0.0015	J	--
	Tetrachloroethene	0.13	0.00019	0.0015	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.063	0.00060	0.0015	--	--
	1,2,4-Trichlorobenzene	0.0027	0.0016	0.0074	B, J	0.0074U
	1,1,1-Trichloroethane	0.00099	0.00024	0.0011	J	--
	Trichloroethene	0.081	0.00039	0.0015	--	--
	Trichlorofluoromethane	0.013	0.00073	0.0015	--	--
	Total Organics <sup>d</sup>	0.32006	NA	NA	NA	NA
<b>MWL-SV05-50</b> 02-May-19	Acetone	0.0046	0.00037	0.010	J	0.010U
	Benzene	0.00018	0.00016	0.00083	J	--
	2-Butanone	0.00056	0.00041	0.0017	J	--
	Carbon disulfide	0.0014	0.00016	0.0017	J	--
	Carbon tetrachloride	0.00031	0.00013	0.0017	J	--
	Chlorobenzene	0.00022	0.00013	0.00062	J	--
	Chloroform	0.0013	0.00020	0.00062	--	--
	Dichlorodifluoromethane	0.035	0.00030	0.00083	--	--
	1,1-Dichloroethane	0.0016	0.00015	0.00062	--	--
	1,1-Dichloroethene	0.0094	0.00027	0.0017	--	--
	cis-1,2-Dichloroethene	0.00074	0.00019	0.00083	J	--
	Methylene chloride	0.00030	0.00015	0.00083	B, J	0.00083U
	Tetrachloroethene	0.050	0.00011	0.00083	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.039	0.00034	0.00083	--	--
	1,2,4-Trichlorobenzene	0.0015	0.00090	0.0042	B, J	0.0042U
	1,1,1-Trichloroethane	0.012	0.00014	0.00062	--	--
	Trichloroethene	0.058	0.00022	0.00083	--	--
	Trichlorofluoromethane	0.096	0.00041	0.00083	--	--
	Total Organics <sup>d</sup>	0.30571	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV05-100 02-May-19	Acetone	0.0056	0.00062	0.018	J	0.018U
	Carbon tetrachloride	0.00057	0.00022	0.0028	J	--
	Chloroform	0.0021	0.00033	0.0011	--	--
	Dichlorodifluoromethane	0.060	0.00051	0.0014	--	--
	1,1-Dichloroethane	0.0034	0.00025	0.0011	--	--
	1,1-Dichloroethene	0.021	0.00045	0.0028	--	--
	cis-1,2-Dichloroethene	0.0016	0.00031	0.0014	--	--
	Methylene chloride	0.00086	0.00025	0.0014	B, J	0.0014U
	Tetrachloroethene	0.091	0.00018	0.0014	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.081	0.00057	0.0014	--	--
	1,1,1-Trichloroethane	0.013	0.00023	0.0011	--	--
	Trichloroethene	0.12	0.00037	0.0014	--	--
	Trichlorofluoromethane	0.13	0.00069	0.0014	--	--
	Vinyl acetate	0.0043	0.00051	0.0028	--	N
	Total Organics <sup>d</sup>	0.52797	NA	NA	NA	NA
MWL-SV05-200 02-May-19	Acetone	0.0096	0.00075	0.021	J	0.021U
	2-Butanone	0.0011	0.00084	0.0034	J	--
	Carbon tetrachloride	0.0011	0.00027	0.0034	J	--
	Chloroform	0.0023	0.00040	0.0013	--	--
	Dichlorodifluoromethane	0.066	0.00061	0.0017	--	--
	1,1-Dichloroethane	0.0056	0.00031	0.0013	--	--
	1,1-Dichloroethene	0.041	0.00055	0.0034	--	--
	cis-1,2-Dichloroethene	0.0027	0.00038	0.0017	--	--
	Methylene chloride	0.0029	0.00031	0.0017	B	0.0017U
	Tetrachloroethene	0.15	0.00022	0.0017	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.15	0.00069	0.0017	--	--
	1,1,1-Trichloroethane	0.0038	0.00028	0.0013	--	--
	Trichloroethene	0.21	0.00045	0.0017	--	--
	Trichlorofluoromethane	0.090	0.00083	0.0017	--	--
	Total Organics <sup>d</sup>	0.7236	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV05-300</b> 02-May-19	Acetone	0.011	0.00045	0.013	J	0.013U
	Benzene	0.00025	0.00020	0.0010	J	--
	2-Butanone	0.00089	0.00050	0.0020	J	--
	Carbon disulfide	0.0030	0.00020	0.0020	--	--
	Carbon tetrachloride	0.00069	0.00016	0.0020	J	--
	Chloroform	0.00076	0.00024	0.00075	--	--
	Dichlorodifluoromethane	0.025	0.00036	0.0010	--	--
	1,1-Dichloroethane	0.0015	0.00018	0.00075	--	--
	1,1-Dichloroethene	0.020	0.00032	0.0020	--	--
	cis-1,2-Dichloroethene	0.00083	0.00022	0.0010	J	--
	Methylene chloride	0.00077	0.00018	0.0010	B, J	0.001U
	Tetrachloroethene	0.099	0.00013	0.0010	--	--
	Toluene	0.00014	0.00013	0.0010	J	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.079	0.00041	0.0010	--	--
	1,1,1-Trichloroethane	0.0012	0.00016	0.00075	--	--
	Trichloroethene	0.097	0.00026	0.0010	--	--
	Trichlorofluoromethane	0.023	0.00049	0.0010	--	--
	Total Organics <sup>d</sup>	0.35226	NA	NA	NA	NA
<b>MWL-SV05-400</b> 02-May-19  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0065	0.00046	0.013	J	0.013U
	Benzene	0.00039	0.00020	0.0010	J	--
	Carbon disulfide	0.0025	0.00020	0.0021	--	--
	Carbon tetrachloride	0.00043	0.00017	0.0021	J	--
	Chloroform	0.00072	0.00025	0.00078	J	--
	Dichlorodifluoromethane	0.016	0.00038	0.0010	--	--
	1,1-Dichloroethane	0.0015	0.00019	0.00078	--	--
	1,1-Dichloroethene	0.013	0.00033	0.0021	--	--
	cis-1,2-Dichloroethene	0.00077	0.00023	0.0010	J	--
	Methylene chloride	0.00071	0.00019	0.0010	B, J	0.001U
	Tetrachloroethene	0.10	0.00013	0.0010	--	--
	Toluene	0.0015	0.00013	0.0010	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.043	0.00042	0.0010	--	--
	1,1,1-Trichloroethane	0.0014	0.00017	0.00078	--	--
	Trichloroethene	0.089	0.00027	0.0010	--	--
	Trichlorofluoromethane	0.020	0.00051	0.0010	--	--
	Total Organics <sup>d</sup>	0.29021	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Concluded)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
May 2019

Notes:

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

<sup>b</sup>Results, MDL, and RL are reported in parts per million by volume.

<sup>c</sup>Laboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

B = Compound was found in blank and sample.

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

Validation Qualifier

N = Presumptive evidence of the presence of the material.

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 (i.e., Reporting Limit) in units of ppmv, in accordance with the data validation process.

UJ = The analyte was analyzed for but not detected. The associated value is an estimate and may be inaccurate or imprecise.

<sup>d</sup>Total Organics or Total VOCs - Sum of validated detected organic analytes (i.e., results for analytes qualified during data validation as not detected are not included in the total).

EPA = U.S. Environmental Protection Agency.

ID = Identification.

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

NA = Not applicable.

ppmv = Parts per million by volume.

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

VOC = Volatile organic compound.

Table 5-2  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV01-42.5 18-Oct-19	Chloroform	0.0089	0.00033	0.0038	--	--
	Dichlorodifluoromethane	0.089	0.00066	0.0038	--	--
	1,1-Dichloroethane	0.0012	0.00033	0.0038	J	--
	1,1-Dichloroethene	0.0045	0.00038	0.0038	--	--
	cis-1,2-Dichloroethene	0.00058	0.00047	0.0038	J	--
	Methylene chloride	0.013	0.0076	0.019	B, J	0.019U
	Tetrachloroethene	0.21	0.00033	0.0038	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.043	0.00038	0.0038	--	--
	1,1,1-Trichloroethane	0.019	0.0017	0.0038	--	--
	Trichloroethene	0.045	0.00028	0.019	--	--
	Trichlorofluoromethane	0.11	0.00052	0.0038	--	--
	Total Organics <sup>d</sup>	0.53118	NA	NA	NA	NA
MWL-SV02-41.5 18-Oct-19	2-Butanone	0.0076	0.0033	0.018	J	--
	Chloroform	0.0025	0.00031	0.0036	J	--
	Dichlorodifluoromethane	0.083	0.00063	0.0036	--	--
	1,1-Dichloroethane	0.0018	0.00031	0.0036	J	--
	1,1-Dichloroethene	0.0087	0.00036	0.0036	--	--
	cis-1,2-Dichloroethene	0.00069	0.00045	0.0036	J	--
	Methylene chloride	0.016	0.0072	0.018	B, J	0.018U
	Tetrachloroethene	0.062	0.00031	0.0036	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.042	0.00036	0.0036	--	--
	1,1,1-Trichloroethane	0.052	0.0017	0.0036	--	--
	Trichloroethene	0.054	0.00027	0.018	--	--
	Trichlorofluoromethane	0.24	0.00049	0.0036	--	--
	Total Organics <sup>d</sup>	0.55429	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV03-50 18-Oct-19	Acetone	0.0059	0.00061	0.0021	--	0.0059U
	Benzene	0.00022	0.0000085	0.000085	--	--
	Bromodichloromethane	0.000051	0.000019	0.000085	J	--
	2-Butanone	0.00080	0.000078	0.00043	--	J+
	Carbon disulfide	0.00027	0.000012	0.00021	--	--
	Carbon tetrachloride	0.00026	0.0000075	0.000085	--	--
	Chloroform	0.0019	0.0000075	0.000085	--	--
	Chloromethane	0.00015	0.000070	0.00021	J	--
	Dichlorodifluoromethane	0.013	0.000015	0.000085	--	--
	1,1-Dichloroethane	0.0038	0.0000075	0.000085	--	--
	1,1-Dichloroethene	0.015	0.0000085	0.000085	--	--
	cis-1,2-Dichloroethene	0.0024	0.000011	0.000085	--	--
	trans-1,2-Dichloroethene	0.000076	0.0000075	0.000085	J	--
	2-Hexanone	0.000083	0.000017	0.00021	J	--
	4-Methyl-2-pentanone	0.00029	0.000058	0.00021	--	--
	Methylene chloride	0.0015	0.00017	0.00043	B	0.0015UJ
	Tetrachloroethene	0.15	0.00034	0.0038	--	--
	Toluene	0.00010	0.000083	0.00013	J	0.00013U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.083	0.00038	0.0038	--	--
	1,1,1-Trichloroethane	0.0031	0.000039	0.000085	--	--
	1,1,2-Trichloroethane	0.000059	0.0000075	0.000085	J	--
	Trichloroethene	0.12	0.00029	0.0019	--	--
	Trichlorofluoromethane	0.027	0.00053	0.0038	--	--
	Total Organics <sup>d</sup>	0.421459	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV03-100</b> 18-Oct-19	Acetone	0.0077	0.0073	0.026	J	0.026U
	Benzene	0.00024	0.00010	0.0010	J	0.001U
	Carbon disulfide	0.00063	0.00014	0.0026	J	0.0026U
	Carbon tetrachloride	0.00032	0.000090	0.0010	J	--
	Chloroform	0.0022	0.000090	0.0010	--	--
	Dichlorodifluoromethane	0.047	0.00018	0.0010	--	--
	1,1-Dichloroethane	0.0053	0.000090	0.0010	--	--
	1,1-Dichloroethene	0.020	0.00010	0.0010	--	--
	cis-1,2-Dichloroethene	0.0032	0.00013	0.0010	--	--
	Methylene chloride	0.0046	0.0020	0.0051	B, J	0.0051U
	Tetrachloroethene	0.21	0.000090	0.0010	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.00010	0.0010	--	--
	1,1,1-Trichloroethane	0.0032	0.00047	0.0010	--	--
	Trichloroethene	0.17	0.000077	0.00051	--	--
	Trichlorofluoromethane	0.039	0.00014	0.0010	--	--
	Total Organics <sup>d</sup>	0.61022	NA	NA	NA	NA
<b>MWL-SV03-200</b> 18-Oct-19	Acetone	0.0038	0.0025	0.0088	J	0.0088U
	Benzene	0.00022	0.000035	0.00035	J	0.00035U
	2-Butanone	0.00034	0.00032	0.0018	J	0.0018U
	Carbon disulfide	0.00011	0.000048	0.00088	J	0.00088U
	Carbon tetrachloride	0.00037	0.000031	0.00035	--	--
	Chloroform	0.0021	0.000031	0.00035	--	--
	Dichlorodifluoromethane	0.033	0.000062	0.00035	--	--
	1,1-Dichloroethane	0.0061	0.000031	0.00035	--	--
	1,1-Dichloroethene	0.026	0.000035	0.00035	--	--
	cis-1,2-Dichloroethene	0.0040	0.000044	0.00035	--	--
	Methylene chloride	0.0030	0.00070	0.0018	B	J+
	Tetrachloroethene	0.18	0.00031	0.0035	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.12	0.00035	0.0035	--	--
	1,1,1-Trichloroethane	0.0021	0.00016	0.00035	--	--
	Trichloroethene	0.18	0.00026	0.0018	--	--
	Trichlorofluoromethane	0.031	0.000048	0.00035	--	--
	Total Organics <sup>d</sup>	0.58767	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV03-300</b> 18-Oct-19	Chloroform	0.0012	0.00031	0.0035	J	--
	Dichlorodifluoromethane	0.043	0.00062	0.0035	--	--
	1,1-Dichloroethane	0.0021	0.00031	0.0035	J	--
	1,1-Dichloroethene	0.013	0.00035	0.0035	--	--
	cis-1,2-Dichloroethene	0.0016	0.00044	0.0035	J	--
	Methylene chloride	0.011	0.0070	0.018	B, J	0.018U
	Tetrachloroethene	0.19	0.00031	0.0035	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.078	0.00035	0.0035	--	--
	Trichloroethene	0.13	0.00026	0.0018	--	--
	Trichlorofluoromethane	0.012	0.00048	0.0035	--	--
	Total Organics <sup>d</sup>	0.4709	NA	NA	NA	NA
<b>MWL-SV03-400</b> 18-Oct-19  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Chloroform	0.0013	0.00030	0.0034	J	--
	Dichlorodifluoromethane	0.022	0.00060	0.0034	--	--
	1,1-Dichloroethane	0.0022	0.00030	0.0034	J	--
	1,1-Dichloroethene	0.012	0.00034	0.0034	--	--
	cis-1,2-Dichloroethene	0.0016	0.00043	0.0034	J	--
	Methylene chloride	0.011	0.0069	0.017	B, J	0.017U
	Tetrachloroethene	0.23	0.00030	0.0034	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.047	0.00034	0.0034	--	--
	Trichloroethene	0.17	0.00026	0.0017	--	--
	Trichlorofluoromethane	0.0092	0.00047	0.0034	--	--
	Total Organics <sup>d</sup>	0.4953	NA	NA	NA	NA

Refer to footnotes at end of table.



Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV04-50 18-Oct-19	Acetone	0.0065	0.0026	0.0091	J	--
	Benzene	0.00030	0.000036	0.00036	J	0.00036U
	Bromomethane	0.00017	0.00010	0.00036	J	--
	2-Butanone	0.00073	0.00033	0.0018	J	--
	Carbon disulfide	0.00017	0.000050	0.00091	J	--
	Carbon tetrachloride	0.00023	0.000032	0.00036	J	--
	Chloroform	0.0019	0.000032	0.00036	--	--
	Dichlorodifluoromethane	0.016	0.000063	0.00036	--	--
	1,1-Dichloroethane	0.0014	0.000032	0.00036	--	--
	1,1-Dichloroethene	0.0071	0.000036	0.00036	--	--
	cis-1,2-Dichloroethene	0.00058	0.000045	0.00036	--	--
	Methylene chloride	0.0017	0.00072	0.0018	B, J	0.0018U
	Tetrachloroethene	0.073	0.000032	0.00036	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.063	0.000036	0.00036	--	--
	1,1,1-Trichloroethane	0.0071	0.00017	0.00036	--	--
	Trichloroethene	0.058	0.000027	0.00018	--	--
	Trichlorofluoromethane	0.032	0.000050	0.00036	--	--
	Total Organics <sup>d</sup>	0.26788	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV04-100 18-Oct-19	Acetone	0.0080	0.0028	0.0098	J	--
	Benzene	0.00021	0.000039	0.00039	J	0.00039U
	2-Butanone	0.0014	0.00036	0.0020	J	--
	Carbon disulfide	0.00070	0.000054	0.00098	J	--
	Carbon tetrachloride	0.00023	0.000034	0.00039	J	--
	Chloroform	0.0012	0.000034	0.00039	--	--
	Chloromethane	0.00092	0.00032	0.00098	J	--
	Dichlorodifluoromethane	0.018	0.000068	0.00039	--	--
	1,1-Dichloroethane	0.0019	0.000034	0.00039	--	--
	1,1-Dichloroethene	0.011	0.000039	0.00039	--	--
	cis-1,2-Dichloroethene	0.0011	0.000049	0.00039	--	--
	1,2-Dichloropropane	0.000057	0.000049	0.00039	J	--
	2-Hexanone	0.00013	0.000078	0.00098	J	--
	Methylene chloride	0.0030	0.00078	0.0020	B	J+
	Tetrachloroethene	0.065	0.00017	0.0020	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.064	0.000039	0.00039	--	--
	1,1,1-Trichloroethane	0.0032	0.00018	0.00039	--	--
	Trichloroethene	0.080	0.000029	0.00020	--	--
	Trichlorofluoromethane	0.028	0.000054	0.00039	--	--
	Total Organics <sup>d</sup>	0.287837	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV04-100 (Duplicate) 18-Oct-19	Acetone	0.0054	0.0025	0.0090	J	--
	Benzene	0.00019	0.000036	0.00036	J	0.00036U
	2-Butanone	0.00070	0.00033	0.0018	J	--
	Carbon disulfide	0.00014	0.000049	0.00090	J	--
	Carbon tetrachloride	0.0010	0.000031	0.00036	--	--
	Chloroform	0.0017	0.000031	0.00036	--	--
	Chloromethane	0.00039	0.00030	0.00090	J	--
	Dichlorodifluoromethane	0.014	0.000063	0.00036	--	--
	1,1-Dichloroethane	0.0016	0.000031	0.00036	--	--
	1,1-Dichloroethene	0.0093	0.000036	0.00036	--	--
	cis-1,2-Dichloroethene	0.00093	0.000045	0.00036	--	--
	Hexachlorobutadiene	0.00019	0.00014	0.0018	J	--
	4-Methyl-2-pentanone	0.00033	0.00024	0.00090	J	--
	Methylene chloride	0.0015	0.00072	0.0018	B, J	0.0018U
	Tetrachloroethene	0.073	0.000078	0.00090	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.056	0.000036	0.00036	--	--
	1,1,1-Trichloroethane	0.0027	0.00017	0.00036	--	--
	Trichloroethene	0.069	0.000027	0.00018	--	--
	Trichlorofluoromethane	0.024	0.000049	0.00036	--	--
	Total Organics <sup>d</sup>	0.26038	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV04-200</b> 18-Oct-19	Acetone	0.0086	0.0059	0.021	J	--
	Benzene	0.00029	0.000083	0.00083	J	0.00083U
	2-Butanone	0.00079	0.00075	0.0041	J	--
	Carbon disulfide	0.00015	0.00011	0.0021	J	--
	Carbon tetrachloride	0.00035	0.000072	0.00083	J	--
	Chlorobenzene	0.000078	0.000062	0.00083	J	--
	Chloroform	0.0012	0.000072	0.00083	--	--
	Chloromethane	0.00075	0.00068	0.0021	J	--
	Dichlorodifluoromethane	0.034	0.00014	0.00083	--	--
	1,1-Dichloroethane	0.0034	0.000072	0.00083	--	--
	1,1-Dichloroethene	0.021	0.000083	0.00083	--	--
	cis-1,2-Dichloroethene	0.0019	0.00010	0.00083	--	--
	Methylene chloride	0.0051	0.0017	0.0041	B	J+
	Tetrachloroethene	0.094	0.000072	0.00083	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.000083	0.00083	--	--
	1,1,1-Trichloroethane	0.0017	0.00038	0.00083	--	--
	Trichloroethene	0.12	0.000062	0.00041	--	--
	Trichlorofluoromethane	0.030	0.00011	0.00083	--	--
	o-Xylene	0.00019	0.00015	0.00083	J	--
	Total Organics <sup>d</sup>	0.433208	NA	NA	NA	NA
<b>MWL-SV04-300</b> 18-Oct-19	Acetone	0.0064	0.0063	0.022	J	--
	Benzene	0.00028	0.000089	0.00089	J	0.00089U
	Carbon disulfide	0.00043	0.00012	0.0022	J	--
	Carbon tetrachloride	0.00024	0.000078	0.00089	J	--
	Chloroform	0.00068	0.000078	0.00089	J	--
	Chloromethane	0.00083	0.00073	0.0022	J	--
	Dichlorodifluoromethane	0.025	0.00016	0.00089	--	--
	1,1-Dichloroethane	0.00099	0.000078	0.00089	--	--
	1,1-Dichloroethene	0.011	0.000089	0.00089	--	--
	cis-1,2-Dichloroethene	0.00056	0.00011	0.00089	J	--
	Methylene chloride	0.0043	0.0018	0.0045	B, J	0.0045U
	Tetrachloroethene	0.11	0.000078	0.00089	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.072	0.000089	0.00089	--	--
	1,1,1-Trichloroethane	0.0010	0.00041	0.00089	--	--
	Trichloroethene	0.075	0.000067	0.00045	--	--
	Trichlorofluoromethane	0.016	0.00012	0.00089	--	--
	Total Organics <sup>d</sup>	0.32013	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV04-400</b> 18-Oct-19  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.012	0.0026	0.0091	--	--
	Benzene	0.00055	0.000036	0.00036	--	--
	2-Butanone	0.0018	0.00033	0.0018	--	--
	Carbon disulfide	0.00047	0.000050	0.00091	J	--
	Carbon tetrachloride	0.00017	0.000032	0.00036	J	--
	Chloroform	0.00034	0.000032	0.00036	J	--
	Chloromethane	0.00040	0.00030	0.00091	J	--
	Dichlorodifluoromethane	0.017	0.000063	0.00036	--	--
	1,1-Dichloroethane	0.00055	0.000032	0.00036	--	--
	1,1-Dichloroethene	0.0073	0.000036	0.00036	--	--
	cis-1,2-Dichloroethene	0.00036	0.000045	0.00036	--	--
	Methylene chloride	0.0016	0.00072	0.0018	B, J	0.0018U
	Tetrachloroethene	0.074	0.00013	0.0014	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.064	0.000036	0.00036	--	--
	1,1,1-Trichloroethane	0.00060	0.00017	0.00036	--	--
	Trichloroethene	0.052	0.000027	0.00018	--	--
	Trichlorofluoromethane	0.012	0.000050	0.00036	--	--
	Total Organics <sup>d</sup>	0.24354	NA	NA	NA	NA
<b>MWL-SV04-400 (Duplicate)</b> 18-Oct-19  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.0094	0.0025	0.0088	--	--
	Benzene	0.00055	0.000035	0.00035	--	--
	2-Butanone	0.0010	0.00032	0.0018	J	--
	Carbon disulfide	0.00051	0.000048	0.00088	J	--
	Carbon tetrachloride	0.00016	0.000031	0.00035	J	--
	Chloroform	0.00037	0.000031	0.00035	--	--
	Dichlorodifluoromethane	0.015	0.000062	0.00035	--	--
	1,1-Dichloroethane	0.00065	0.000031	0.00035	--	--
	1,1-Dichloroethene	0.0074	0.000035	0.00035	--	--
	cis-1,2-Dichloroethene	0.00041	0.000044	0.00035	--	--
	Methylene chloride	0.0013	0.00070	0.0018	B, J	0.0018U
	Tetrachloroethene	0.083	0.00012	0.0014	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.068	0.000035	0.00035	--	--
	1,1,1-Trichloroethane	0.00057	0.00016	0.00035	--	--
	Trichloroethene	0.055	0.000026	0.00018	--	--
	Trichlorofluoromethane	0.012	0.000048	0.00035	--	--
	Total Organics <sup>d</sup>	0.25402	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV05-50 18-Oct-19	Acetone	0.0027	0.0026	0.0092	J	0.0092U
	Benzene	0.00019	0.000037	0.00037	J	--
	Carbon disulfide	0.00020	0.000050	0.00092	J	--
	Carbon tetrachloride	0.00030	0.000032	0.00037	J	--
	Chloroform	0.0012	0.000032	0.00037	--	--
	Dichlorodifluoromethane	0.034	0.000064	0.00037	--	--
	1,1-Dichloroethane	0.0015	0.000032	0.00037	--	--
	1,1-Dichloroethene	0.0097	0.000037	0.00037	--	--
	cis-1,2-Dichloroethene	0.00067	0.000046	0.00037	--	--
	1,2-Dichloropropane	0.000096	0.000046	0.00037	J	--
	Methylene chloride	0.0015	0.00073	0.0018	B, J	0.0018U
	Tetrachloroethene	0.047	0.000032	0.00037	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.042	0.000037	0.00037	--	--
	1,1,1-Trichloroethane	0.012	0.00017	0.00037	--	--
	Trichloroethene	0.059	0.000027	0.00018	--	--
	Trichlorofluoromethane	0.092	0.00020	0.0015	--	--
	Total Organics <sup>d</sup>	0.299856	NA	NA	NA	NA
MWL-SV05-100 18-Oct-19	Acetone	0.020	0.0095	0.033	J	0.033U
	Benzene	0.00033	0.00013	0.0013	J	--
	Benzyl chloride	0.0012	0.00063	0.0027	J	--
	2-Butanone	0.0041	0.0012	0.0067	J	0.0067U
	Carbon tetrachloride	0.00053	0.00012	0.0013	J	--
	Chloroform	0.0021	0.00012	0.0013	--	--
	Dichlorodifluoromethane	0.073	0.00023	0.0013	--	--
	1,1-Dichloroethane	0.0036	0.00012	0.0013	--	--
	1,1-Dichloroethene	0.021	0.00013	0.0013	--	--
	cis-1,2-Dichloroethene	0.0017	0.00017	0.0013	--	--
	1,2-Dichloropropane	0.00031	0.00017	0.0013	J	--
	Methylene chloride	0.0059	0.0027	0.0067	B, J	0.0067U
	Tetrachloroethene	0.082	0.00012	0.0013	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.083	0.00013	0.0013	--	--
	1,1,1-Trichloroethane	0.013	0.00062	0.0013	--	--
	Trichloroethene	0.11	0.00010	0.00067	--	--
	Trichlorofluoromethane	0.12	0.00018	0.0013	--	--
	Total Organics <sup>d</sup>	0.51177	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV05-200</b> 18-Oct-19	Benzene	0.00054	0.00012	0.0012	J	--
	Carbon disulfide	0.00026	0.00017	0.0031	J	--
	Carbon tetrachloride	0.0010	0.00011	0.0012	J	--
	Chloroform	0.0022	0.00011	0.0012	--	--
	Dichlorodifluoromethane	0.077	0.00021	0.0012	--	--
	1,1-Dichloroethane	0.0056	0.00011	0.0012	--	--
	1,1-Dichloroethene	0.041	0.00012	0.0012	--	--
	cis-1,2-Dichloroethene	0.0027	0.00015	0.0012	--	--
	1,2-Dichloropropane	0.00032	0.00015	0.0012	J	--
	Methylene chloride	0.0073	0.0025	0.0061	B	--
	Tetrachloroethene	0.14	0.00011	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.15	0.00012	0.0012	--	--
	1,1,1-Trichloroethane	0.0042	0.00057	0.0012	--	--
	Trichloroethene	0.21	0.000092	0.00061	--	--
	Trichlorofluoromethane	0.090	0.00017	0.0012	--	--
	Total Organics <sup>d</sup>	0.73212	NA	NA	NA	NA
<b>MWL-SV05-300</b> 18-Oct-19	Acetone	0.0093	0.0088	0.031	J	0.031U
	Benzene	0.00046	0.00012	0.0012	J	--
	2-Butanone	0.0013	0.0011	0.0062	J	0.0062U
	Carbon disulfide	0.00021	0.00017	0.0031	J	--
	Carbon tetrachloride	0.00083	0.00011	0.0012	J	--
	Chloroform	0.00099	0.00011	0.0012	J	--
	Dichlorodifluoromethane	0.037	0.00022	0.0012	--	--
	1,1-Dichloroethane	0.0022	0.00011	0.0012	--	--
	1,1-Dichloroethene	0.025	0.00012	0.0012	--	--
	cis-1,2-Dichloroethene	0.0011	0.00015	0.0012	J	--
	Methylene chloride	0.0061	0.0025	0.0062	B, J	0.0062U
	Tetrachloroethene	0.099	0.00011	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.10	0.00012	0.0012	--	--
	1,1,1-Trichloroethane	0.0019	0.00057	0.0012	--	--
	Trichloroethene	0.11	0.000093	0.00062	--	--
	Trichlorofluoromethane	0.030	0.00017	0.0012	--	--
	Total Organics <sup>d</sup>	0.40869	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-2 (Continued)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>b</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
<b>MWL-SV05-400</b> 18-Oct-19  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.013	0.0083	0.029	J	0.029U
	Benzene	0.00084	0.00012	0.0012	J	--
	2-Butanone	0.0037	0.0011	0.0059	J	0.0059U
	Carbon disulfide	0.0057	0.00016	0.0029	--	--
	Carbon tetrachloride	0.00053	0.00010	0.0012	J	--
	Chloroform	0.00084	0.00010	0.0012	J	--
	Dichlorodifluoromethane	0.020	0.00021	0.0012	--	--
	1,1-Dichloroethane	0.0018	0.00010	0.0012	--	--
	1,1-Dichloroethene	0.015	0.00012	0.0012	--	--
	cis-1,2-Dichloroethene	0.00082	0.00015	0.0012	J	--
	4-Methyl-2-pentanone	0.00087	0.00079	0.0029	J	--
	Methylene chloride	0.0055	0.0023	0.0059	B, J	0.0059U
	Styrene	0.00082	0.00035	0.0012	J	--
	Tetrachloroethene	0.11	0.00010	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.050	0.00012	0.0012	--	--
	1,1,1-Trichloroethane	0.0020	0.00054	0.0012	--	--
	Trichloroethene	0.10	0.000088	0.00059	--	--
	Trichlorofluoromethane	0.024	0.00016	0.0012	--	--
	Total Organics <sup>d</sup>	0.33322	NA	NA	NA	NA

Refer to footnotes at end of table.



Table 5-2 (Concluded)  
Summary of Detected VOCs (EPA Method TO-15<sup>a</sup>)  
Mixed Waste Landfill Soil-Vapor Monitoring  
October 2019

Notes:

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

<sup>b</sup>Results, MDL, and RL are reported in parts per million by volume.

<sup>c</sup>Laboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

B = Compound was found in blank and sample.

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

Validation Qualifier

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

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

UJ = The analyte was analyzed for but not detected. The associated value is an estimate and may be inaccurate or imprecise.

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

EPA = U.S. Environmental Protection Agency.

ID = Identification.

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

NA = Not applicable.

ppmv = Parts per million by volume.

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

VOC = Volatile organic compound.

## **6.0 SOIL-MOISTURE MONITORING RESULTS**

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

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

### **6.1 Soil-Moisture Monitoring Field Activities**

One annual soil-moisture monitoring event was conducted during the April 1, 2019 through March 31, 2020 reporting period fulfilling the LTMMMP annual monitoring requirement. The monitoring event was conducted on April 25, 2019. Figure 6-1 shows the soil-moisture monitoring locations MWL-VZ-1, MWL-VZ-2, and MWL-VZ-3, which are angled boreholes (60 degrees from the horizontal ground surface) that project beneath the MWL. Soil-moisture monitoring field forms and tables that compare soil-moisture content values to baseline values for the three access tubes are provided in Annex D.

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

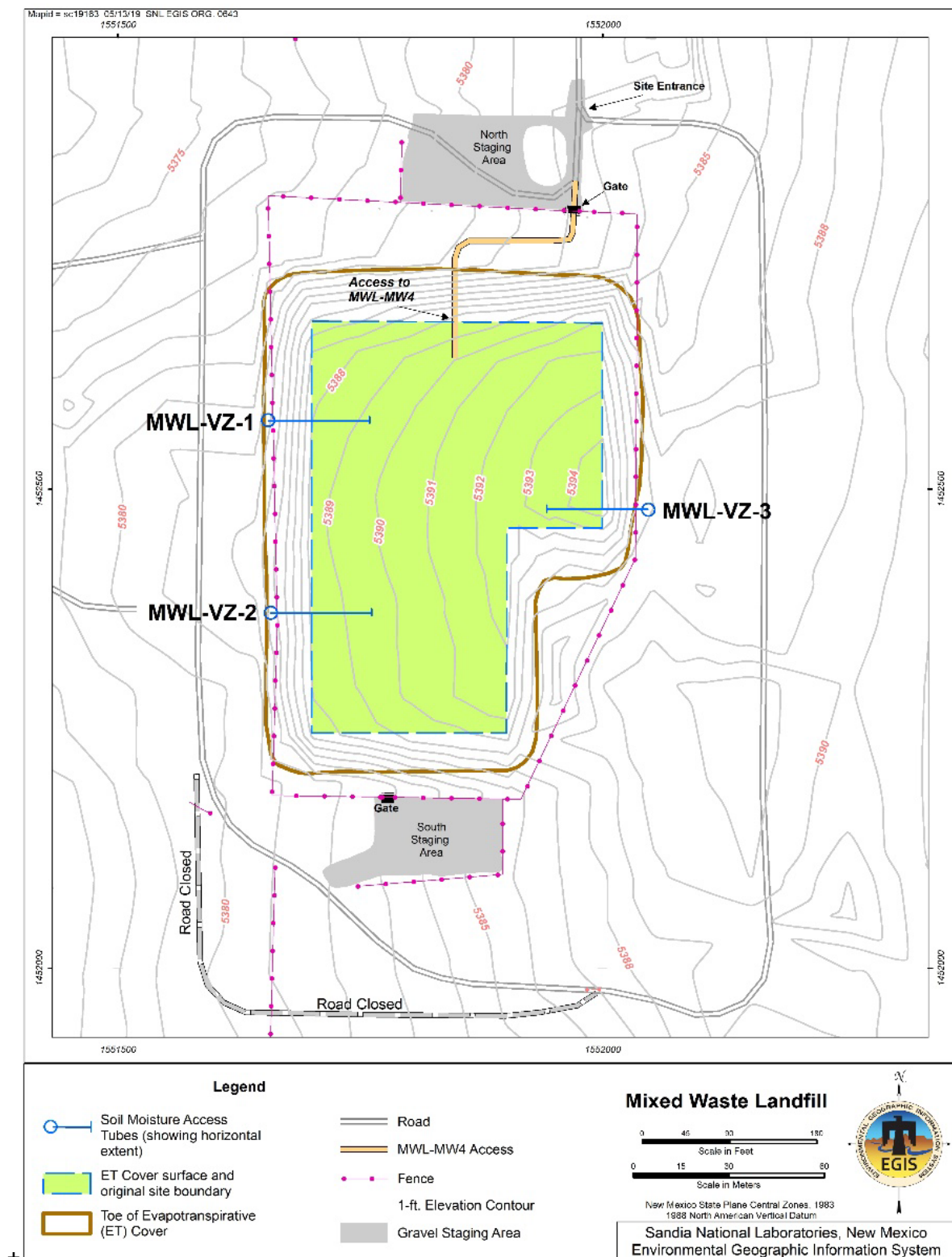


Figure 6-1  
Mixed Waste Landfill Soil-Moisture Monitoring Locations

## 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 25, 2019 annual monitoring event are plotted on these figures along with the baseline soil-moisture content and the trigger level for comparison. The April 2019 results track very closely with the established soil-moisture baseline for the three access tubes and indicate a dry vadose zone. The higher soil-moisture values for the near-surface depths (3.5 to 8 ft bgs) reflect conditions on the perimeter of the ET Cover that were impacted by considerable Spring moisture. Precipitation for the months of February, March, and April were all above normal, with April precipitation recorded at 0.71 inches above the monthly average of 0.50 inches.

### 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 did not exceed the trigger level and tracked closely to baseline soil-moisture data, indicating the ET Cover is performing as designed. The trigger level is 23 percent soil moisture by volume and applies to the depth range of 8.7 to 86.6 ft bgs beneath the ET Cover. The April 2019 soil-moisture monitoring results are shown in Figures 6-2, 6-3, and 6-4 along with the baseline soil-moisture data and trigger level for comparison.

During this reporting period, the soil-moisture content measurements for the trigger level depth interval at MWL-VZ-1 ranged from 2.0 to 5.3 percent, compared to 1.7 to 5.6 percent baseline. At MWL-VZ-2 the soil-moisture content ranged from 2.1 to 4.5 percent, compared to 2.1 to 5.5 percent baseline. At MWL-VZ-3 the soil-moisture content ranged from 1.2 to 4.4 percent, compared to 1.8 to 4.5 percent baseline.

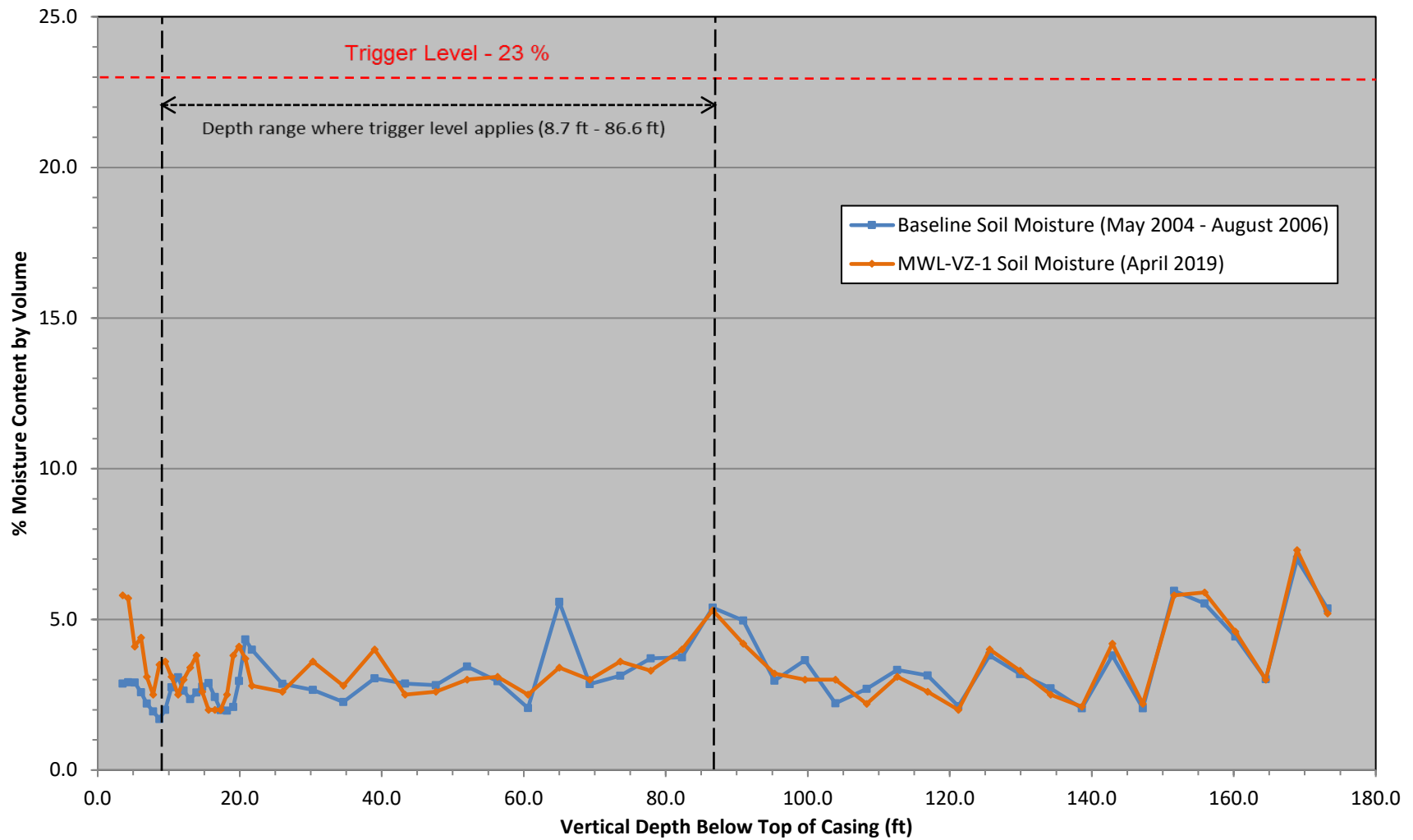


Figure 6-2  
Mixed Waste Landfill MWL-VZ-1 Soil-Moisture Monitoring Results

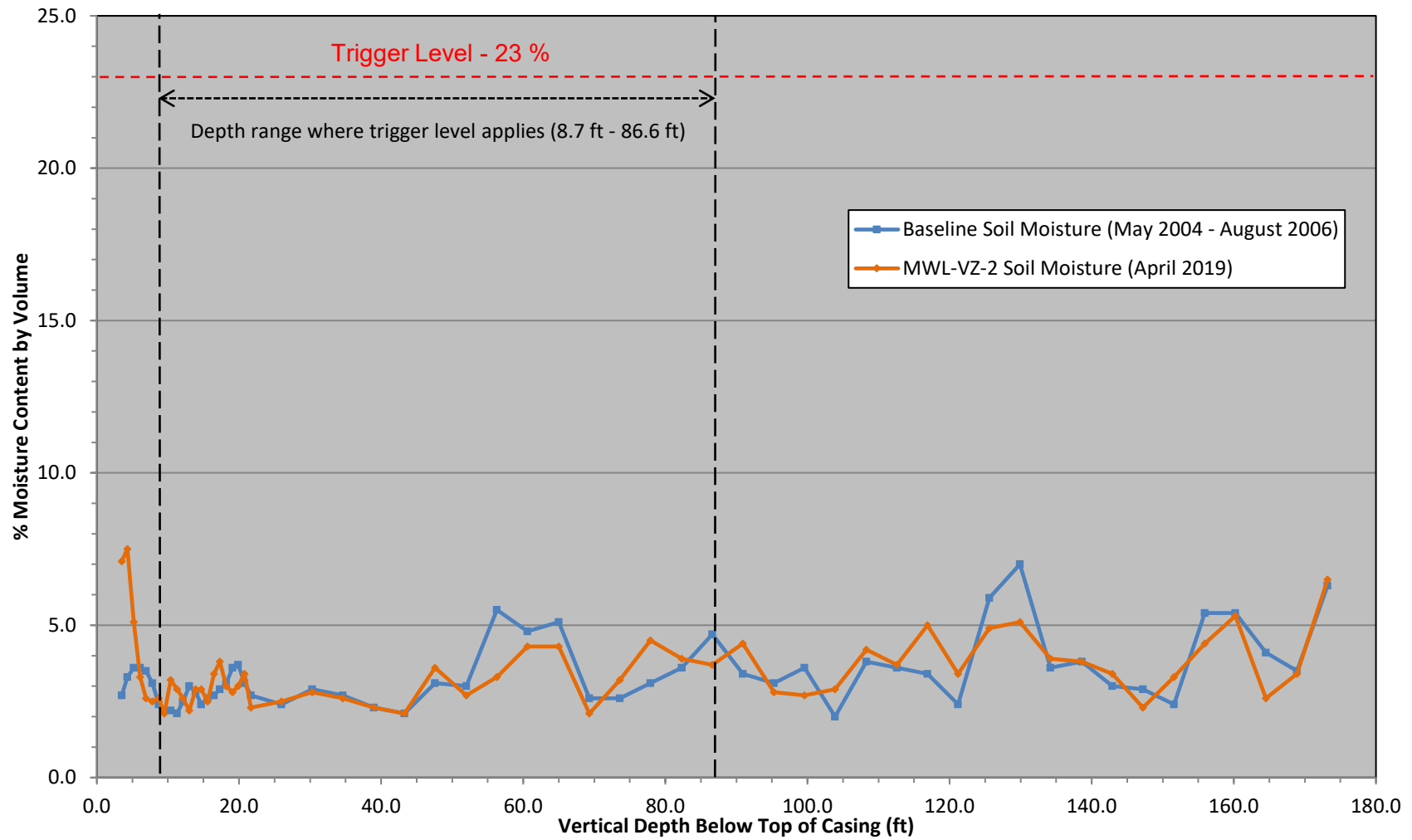


Figure 6-3  
Mixed Waste Landfill MWL-VZ-2 Soil-Moisture Monitoring Results

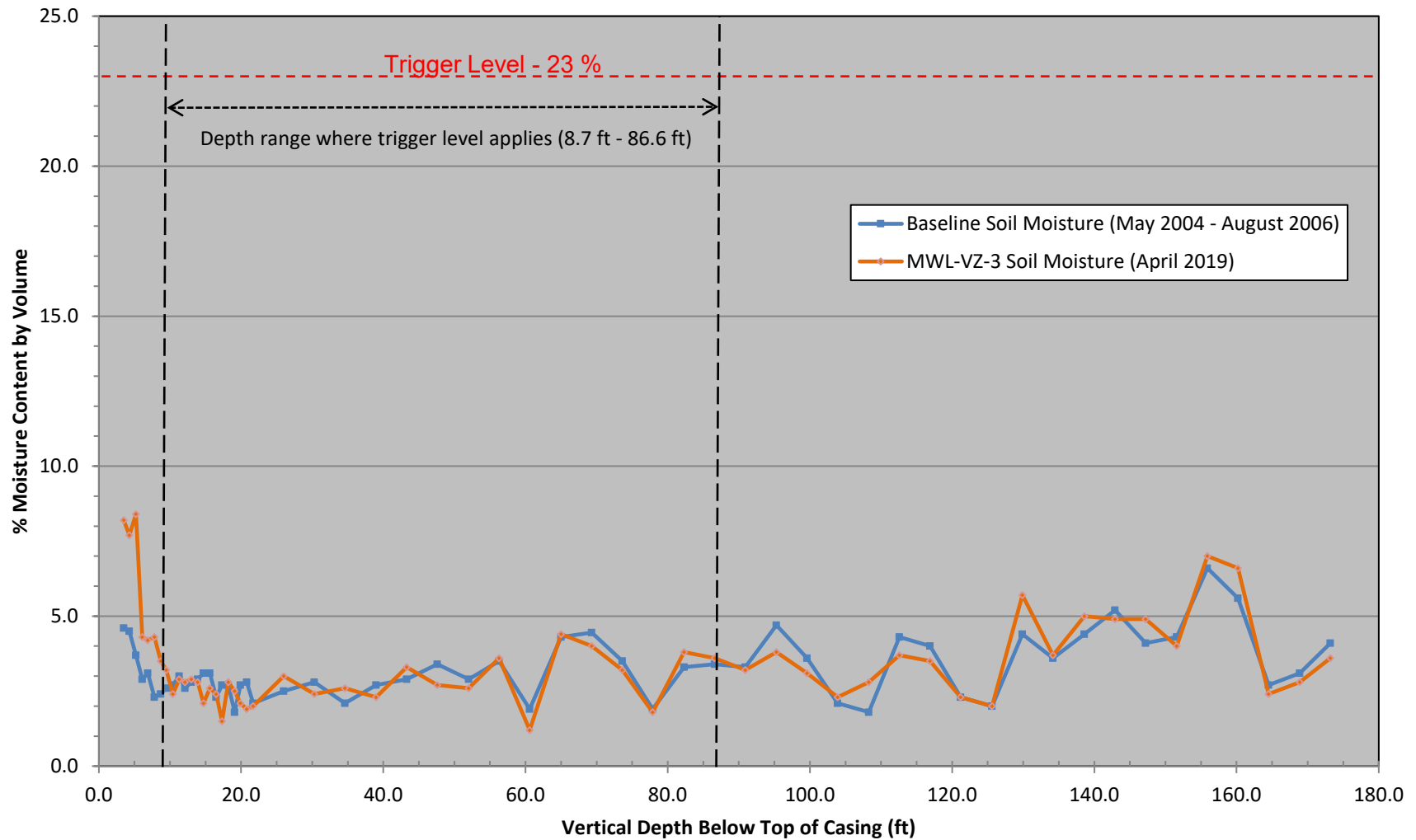


Figure 6-4  
Mixed Waste Landfill MWL-VZ-3 Soil-Moisture Monitoring Results

## **7.0 GROUNDWATER MONITORING RESULTS**

This chapter presents groundwater monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with MWL LTMMMP Section 3.5 and Appendix F (SNL/NM March 2012). The monitoring objective is to obtain groundwater analytical results representative of the uppermost part of the Regional Aquifer beneath the MWL and compare them to the trigger levels defined in Table 5.2.4-1 of the LTMMMP. 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 and data evaluation results. 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, 2019 through March 31, 2020 reporting period, fulfilling the LTMMMP semiannual monitoring requirement. Groundwater samples were collected from monitoring wells MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9. Well locations are shown in Figure 7-1. The samples were analyzed for VOCs, metals (cadmium, chromium, nickel, and uranium), specific radionuclides, gross alpha and beta, tritium, and radon-222. Field forms and documentation that address calibration of equipment, well purging and water quality measurements, and equipment decontamination activities are provided in Annex E.

The first sampling event was conducted between April 25 and May 1, 2019. An environmental-duplicate sample pair was collected from MWL-MW9.

The second sampling event was conducted between October 14 and 17, 2019. 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 LTMMMP Appendix F, the minimum purge requirement is one saturated screen volume. Purging continued beyond the minimum purge volume until four stable field measurements for temperature, specific conductivity, potential of hydrogen (i.e., pH), and turbidity were obtained. Field measurements for water quality parameters were collected using an In-Situ Incorporated Aqua TROLL® 600 Multiparameter Water Quality Sonde and a HACH™ Model 2100Q portable turbidity meter. Additional water quality measurements included oxidation-reduction potential and dissolved oxygen.



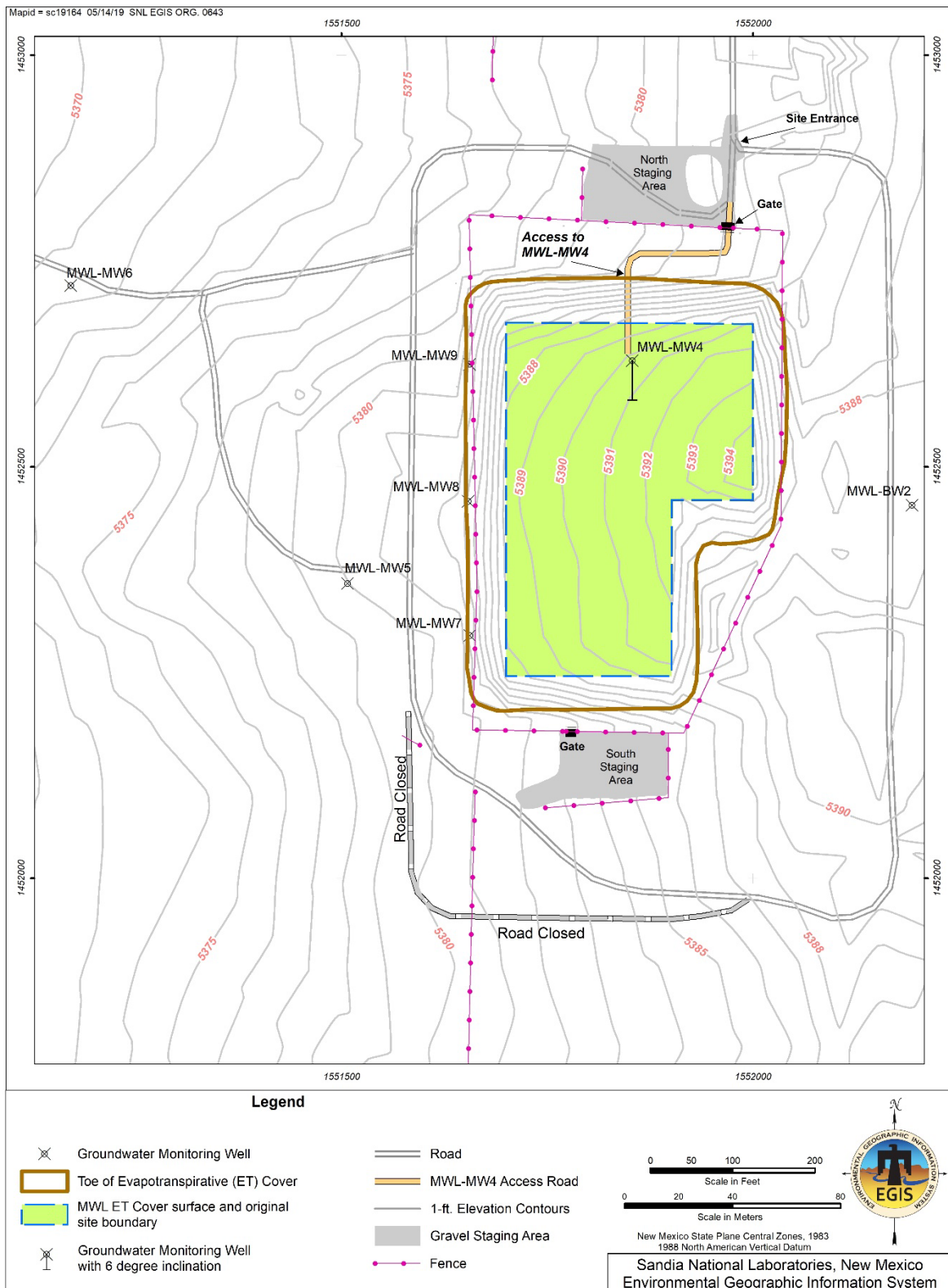


Figure 7-1  
Mixed Waste Landfill Groundwater Monitoring Well Locations

A portable Bennett™ groundwater sampling system was used to collect environmental samples from all wells. Purge requirements were satisfied at all monitoring wells. In accordance with LTMMF Appendix F requirements designed to decrease the purging flow rate as low as possible for wells that potentially purge dry, the portable Bennett™ groundwater sampling system was equipped with a flow meter valve located along the discharge line and with small diameter tubing (1/4-inch inner diameter). The average flow rates ranged from 0.13 gallons per minute (gpm) at MWL-MW8 to 0.28 gpm at MWL-BW2 for the April-May 2019 sampling event. The average flow rates ranged from 0.09 gpm at MWL-MW7 to 0.22 gpm at MWL-BW2 for the October 2019 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.

Environmental 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 environmental 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 environmental 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.

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

The field QC samples were submitted for analysis with the environmental samples. A brief explanation of the field QC sampling protocol for the April-May and October 2019 sampling events is provided below. Analytical results are presented in Section 7.2.

### *First Sampling Event – April 25-May 1, 2019*

One duplicate sample was collected at MWL-MW9. One equipment blank sample was collected prior to sampling monitoring well MWL-MW9. Four field blank samples were collected 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 14-17, 2019*

One duplicate sample was collected at MWL-MW8. One equipment blank sample was collected prior to sampling MWL-MW8. Four field blank samples were collected 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 Environmental Resources Field Office waste accumulation area. All wastewater was managed as non-hazardous waste based upon historical sample results and process knowledge of monitoring well locations. All wastewater was discharged to the sanitary sewer in accordance with Albuquerque Bernalillo County Water Utility Authority (ABCWUA) requirements after characterization data were compared to discharge limits. Approximately 237 gallons of wastewater were generated during the April-May 2019 groundwater sampling event and approximately 236 gallons were generated during the October 2019 sampling event.

PPE and other solid waste generated during April-May and October 2019 monitoring activities were managed in accordance with all applicable requirements. Analytical data from the sampling event was used to supplement the waste management process. Based on historical data and sampling results from the two monitoring events, all solid waste was managed as non-hazardous solid waste.

## **7.2 Laboratory Results**

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

### **7.2.1 Environmental Sample Results**

This section summarizes groundwater monitoring results for the reporting period. Groundwater monitoring results were compared to historical MWL groundwater monitoring results and

LTMMP trigger levels. All results were below applicable LTMMP trigger levels and were comparable to historical MWL groundwater monitoring results.

Table 7-1 summarizes detected VOCs for the April-May and October 2019 sampling events. The MDLs for all VOCs are presented in Table 7-2. The 2019 results for cadmium, chromium, nickel, and uranium are provided in Table 7-3, and the radionuclide, gross alpha, gross beta, tritium, and radon-222 results are provided in Table 7-4. Table 7-5 summarizes field water quality measurements taken prior to environmental groundwater sample collection for both 2019 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<sup>a</sup>)  
Mixed Waste Landfill Groundwater Monitoring  
April-May and October 2019

Well ID	Analyte	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	Trigger Level (µg/L)	Laboratory Qualifier <sup>b</sup>	Validation Qualifier <sup>b</sup>
<b>April-May 2019 Sampling Event</b>							
<b>MWL-MW9</b> 30-Apr-2019	Acetone	1.51	1.50	10.0	3,000	J	10U
<b>MWL-MW9</b> (Duplicate) 30-Apr-2019	Acetone	1.78	1.50	10.0	3,000	J	10U
<b>October 2019 Sampling Event</b>							
<b>MWL-BW2</b> 14-Oct-2019	Acetone	2.89	1.50	10.0	3,000	J	10U
<b>MWL-MW7</b> 15-Oct-2019	Methylene chloride	1.97	1.00	10.0	3.00	J	10U
<b>MWL-MW8</b> 17-Oct-2019	Methylene chloride	1.95	1.00	10.0	3.00	J	10U
<b>MWL-MW8</b> (Duplicate) 17-Oct-2019	Methylene chloride	1.92	1.00	10.0	3.00	J	10U

Notes:

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

<sup>b</sup>Laboratory/Validation Qualifier:

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.

ID = Identification.

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

µg/L = Micrograms per liter.

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

VOC = Volatile organic compound.

Table 7-2  
Summary of Method Detection Limits for VOCs (EPA Method 8260B<sup>a</sup>)  
Mixed Waste Landfill Groundwater Monitoring  
April-May, and October 2019

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:

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

EPA = U.S. Environmental Protection Agency.

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

µg/L = Micrograms per liter.

VOC = Volatile organic compound.

Table 7-3  
Summary of Cadmium, Chromium, Nickel, and Uranium Results (EPA Method 6020<sup>a</sup>)  
Mixed Waste Landfill Groundwater Monitoring  
April-May and October 2019

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Trigger Level (mg/L)	Laboratory Qualifier <sup>b</sup>	Validation Qualifier <sup>b</sup>
<b>April-May 2019 Sampling Event</b>							
<b>MWL-BW2</b> 25-Apr-19	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	0.00729	0.000067	0.0002	0.015	--	--
<b>MWL-MW7</b> 29-Apr-19	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	ND	0.0006	0.002	0.050	U	--
	Uranium	0.00775	0.000067	0.0002	0.015	--	--
<b>MWL-MW8</b> 01-May-19	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	0.00782	0.000067	0.0002	0.015	--	--
<b>MWL-MW9</b> 30-Apr-19	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	0.0096	0.000067	0.0002	0.015	--	--
<b>MWL-MW9</b> (Duplicate) 30-Apr-19	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	0.00955	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<sup>a</sup>)  
Mixed Waste Landfill Groundwater Monitoring  
April-May and October 2019

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Trigger Level (mg/L)	Laboratory Qualifier <sup>b</sup>	Validation Qualifier <sup>b</sup>
<b>October 2019 Sampling Event</b>							
<b>MWL-BW2</b> 14-Oct-19	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	0.00708	0.000067	0.0002	0.015	--	--
<b>MWL-MW7</b> 15-Oct-19	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	0.00766	0.000067	0.0002	0.015	--	--
<b>MWL-MW8</b> 17-Oct-19	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	0.00769	0.000067	0.0002	0.015	--	--
<b>MWL-MW8</b> (Duplicate) 17-Oct-19	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	0.00748	0.000067	0.0002	0.015	--	--
<b>MWL-MW9</b> 16-Oct-19	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	ND	0.0006	0.002	0.050	U	--
	Uranium	0.00923	0.000067	0.0002	0.015	--	--

Notes:

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

<sup>b</sup>Laboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

U = Analyte was not detected.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

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

mg/L = Milligrams per liter.

ND = Not detected (at MDL).

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



Table 7-4  
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results  
Mixed Waste Landfill Groundwater Monitoring  
April-May and October 2019

Well ID	Analyte	Result <sup>a</sup> (pCi/L)	MDA <sup>b</sup> (pCi/L)	Trigger Level	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>	Analytical Method <sup>d</sup>
<b>April-May 2019 Sampling Event</b>							
<b>MWL-BW2</b> 25-Apr-19	Americium-241	-2.36 ± 11.7	17.8	NE	U	BD	EPA 901.1
	Cesium-137	-0.317 ± 2.33	3.89	NE	U	BD	EPA 901.1
	Cobalt-60	1.49 ± 2.22	4.01	NE	U	BD	EPA 901.1
	Gross Alpha	1.38	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	0.618 ± 0.751	1.26	4 mrem/yr	U	BD	EPA 900.0
	Tritium <sup>f</sup>	-25.8 ± 90.9	167	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	425 ± 105	51.7	1,000 pCi/L	--	--	SM7500-Rn B
<b>MWL-MW7</b> 29-Apr-19	Americium-241	1.85 ± 9.11	14.6	NE	U	BD	EPA 901.1
	Cesium-137	-0.778 ± 2.43	2.89	NE	U	BD	EPA 901.1
	Cobalt-60	0.774 ± 1.69	3.20	NE	U	BD	EPA 901.1
	Gross Alpha	5.61	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.61 ± 1.54	2.36	4 mrem/yr	--	J	EPA 900.0
	Tritium <sup>f</sup>	-20.1 ± 90.3	165	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	167 ± 65.4	79.5	1,000 pCi/L	--	J	SM7500-Rn B
<b>MWL-MW8</b> 01-May-19	Americium-241	20.9 ± 19.4	24.1	NE	U	BD	EPA 901.1
	Cesium-137	-0.849 ± 2.07	3.44	NE	U	BD	EPA 901.1
	Cobalt-60	-4.86 ± 6.43	4.42	NE	U	BD	EPA 901.1
	Gross Alpha	9.06	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.92 ± 1.11	1.61	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-116 ± 80.7	162	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	149 ± 51.4	55.9	1,000 pCi/L	--	J	SM7500-Rn B
<b>MWL-MW9</b> 30-Apr-19	Americium-241	-0.549 ± 3.05	4.74	NE	U	BD	EPA 901.1
	Cesium-137	-0.0556 ± 2.07	3.53	NE	U	BD	EPA 901.1
	Cobalt-60	-0.794 ± 2.03	3.45	NE	U	BD	EPA 901.1
	Gross Alpha	12.77	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	6.09 ± 1.07	1.56	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-60.8 ± 87.4	166	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	469 ± 119	66.7	1,000 pCi/L	--	--	SM7500-Rn B
<b>MWL-MW9</b> (Duplicate) 30-Apr-19	Americium-241	0.969 ± 12.5	23.3	NE	U	BD	EPA 901.1
	Cesium-137	-0.13 ± 1.95	3.57	NE	U	BD	EPA 901.1
	Cobalt-60	-0.509 ± 2.02	3.67	NE	U	BD	EPA 901.1
	Gross Alpha	5.90	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.28 ± 1.15	1.73	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-51.2 ± 87.2	164	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	464 ± 118	66.8	1,000 pCi/L	--	--	SM7500-RnB
<b>October 2019 Sampling Event</b>							
<b>MWL-BW2</b> 14-Oct-19	Americium-241	3.83 ± 12.6	21.9	NE	U	BD	EPA 901.1
	Cesium-137	0.489 ± 2.12	3.90	NE	U	BD	EPA 901.1
	Cobalt-60	0.295 ± 2.23	4.01	NE	U	BD	EPA 901.1
	Gross Alpha	2.17	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.63 ± 1.19	1.72	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-49.6 ± 72.7	136	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	381 ± 106	81.5	1,000 pCi/L	--	--	SM7500-Rn B
<b>MWL-MW7</b> 15-Oct-19	Americium-241	-3.93 ± 8.13	13.5	NE	U	BD	EPA 901.1
	Cesium-137	0.593 ± 1.68	3.03	NE	U	BD	EPA 901.1
	Cobalt-60	-0.0356 ± 1.99	3.67	NE	U	BD	EPA 901.1
	Gross Alpha	1.88	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	9.21 ± 1.18	1.60	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-52.2 ± 70.2	132	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	140 ± 55.5	68.1	1,000 pCi/L	--	J	SM7500-Rn B

Refer to notes at end of table.

**Table 7-4 (Concluded)**  
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results**  
**Mixed Waste Landfill Groundwater Monitoring**  
**April-May and October 2019**

Well ID	Analyte	Result <sup>a</sup> (pCi/L)	MDA <sup>b</sup> (pCi/L)	Trigger Level	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>	Analytical Method <sup>d</sup>
<b>October 2019 Sampling Event (continued)</b>							
<b>MWL-MW8</b> 17-Oct-19	Americium-241	5.70 ± 14.4	23.5	NE	U	BD	EPA 901.1
	Cesium-137	-1.15 ± 3.48	3.68	NE	U	BD	EPA 901.1
	Cobalt-60	1.12 ± 2.45	4.65	NE	U	BD	EPA 901.1
	Gross Alpha	3.90	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.88 ± 0.717	0.799	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-8.04 ± 79.7	144	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	140 ± 47.2	49.5	1,000 pCi/L	--	J	SM7500-Rn B
<b>MWL-MW8</b> (Duplicate) 17-Oct-19	Americium-241	10.0 ± 18.7	29.9	NE	U	BD	EPA 901.1
	Cesium-137	0.993 ± 2.10	3.73	NE	U	BD	EPA 901.1
	Cobalt-60	-0.285 ± 1.81	3.32	NE	U	BD	EPA 901.1
	Gross Alpha	6.89	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	6.04 ± 0.792	0.952	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-49.9 ± 75.8	142	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	196 ± 57.7	49.6	1,000 pCi/L	--	--	SM7500-Rn B
<b>MWL-MW9</b> 16-Oct-19	Americium-241	2.52 ± 6.35	11.6	NE	U	BD	EPA 901.1
	Cesium-137	-2.59 ± 3.34	3.91	NE	U	BD	EPA 901.1
	Cobalt-60	0.193 ± 1.66	3.13	NE	U	BD	EPA 901.1
	Gross Alpha	0.38	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	7.58 ± 0.918	1.09	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-44.6 ± 71.3	133	4 mrem/yr	U	BD	EPA 906.0
	Radon-222	447 ± 113	59.7	1,000 pCi/L	--	--	SM7500-Rn B

**Notes:**

<sup>a</sup>Gross 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.

<sup>b</sup>MDA is the minimal detectable activity or minimum measured activity in a sample required to ensure 95 percent probability that the measured activity is accurately quantified above the critical level.

<sup>c</sup>Laboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

NA = Not applicable because the gross alpha result shown is adjusted for naturally-occurring uranium.

U = Analyte was below detection limit.

Validation Qualifier

BD = Result is not statistically different from zero.

J = Estimated value.

None = No data validation for corrected gross alpha activity.

<sup>d</sup>Analytical Methods EPA 900.0, EPA 901.1, and EPA 906.0:

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

Analytical Method SM7500-Rn B:

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

<sup>e</sup>Refer to Section 7.2.1 for an explanation of the gross beta trigger level.

<sup>f</sup>The approximate equivalent activity for the 4 mrem/yr tritium trigger level is 20,000 pCi/L.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

mrem/yr = Millirem per year.

NE = Not established.

pCi/L = Picocuries per liter.

Table 7-5  
Summary of Field Water Quality Measurements<sup>a</sup>  
Mixed Waste Landfill Groundwater Monitoring  
April-May and October 2019

Well ID	Temperature (°C)	SC (µmhos/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (% Sat)	DO (mg/L)
<b>April-May 2019 Sampling Event</b>							
MWL-BW2	21.55	741.2	57.0	7.28	2.44	25.7	1.86
MWL-MW7	22.40	685.9	174.5	7.48	0.43	83.7	6.07
MWL-MW8	21.01	662.9	167.5	7.42	0.56	36.6	2.70
MWL-MW9	20.57	668.8	11.8	7.34	1.33	18.3	1.33
<b>October 2019 Sampling Event</b>							
MWL-BW2	20.91	735.8	-14.8	7.34	2.21	43.86	3.25
MWL-MW7	21.79	607.9	123.1	7.54	0.29	92.40	6.59
MWL-MW8	20.50	606.8	114.6	7.49	0.19	50.61	3.69
MWL-MW9	21.77	619.6	116.2	7.46	0.24	23.73	1.70

Notes:

<sup>a</sup>Field measurements collected prior to sampling.

°C = Degrees Celsius.

% Sat = Percent saturation.

DO = Dissolved oxygen.

ID = Identification.

mg/L = Milligrams per liter.

µmhos/cm = Micromhos per centimeter.

mV = Millivolts.

NTU = Nephelometric turbidity units.

ORP = Oxidation-reduction potential.

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

SC = Specific conductivity.

#### First Sampling Event – April 25-May 1, 2019

VOCs were not detected in the environmental samples above MDLs or sample quantitation limits established during data validation. Acetone reported in the MWL-MW9 environmental and environmental duplicate samples was qualified as not detected during data validation due to associated equipment blank sample results (see Section 7.2.2).

Cadmium, chromium, and nickel were not detected above the associated MDLs. Uranium was detected below LTMMP trigger levels in all groundwater samples. Uranium concentrations ranged from 0.00729 milligrams per liter (mg/L) at MWL-BW2 to 0.0096 mg/L at MWL-MW9. All metals results are consistent with historical MWL groundwater monitoring results and 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). Gross alpha activity was detected in all samples ranging from 1.38 pCi/L (MWL-BW2) to 12.77 pCi/L (MWL-MW9). Gross beta activity ranged from 0.618 pCi/L (non-detect result, MWL-BW2) to 6.09 pCi/L (MWL-MW9). Radon-222 was detected in all samples, with activities ranging from 149 pCi/L (MWL-MW8) to 469 pCi/L (MWL-MW9). All radiological

results were reviewed by an SNL/NM Health Physics SME to screen for potential indications of radiological contamination; there were no indications of radiological anomalies in the groundwater sample results. Results are consistent with historical results and below LTMMMP trigger levels.

### Second Sampling Event – October 14-17, 2019

VOCs were not detected in the environmental samples above MDLs or sample quantitation limits established during data validation. Acetone in MWL-BW2, and methylene chloride in MWL-MW7 and MWL-MW8 (environmental and environmental duplicate) samples were qualified as not detected during data validation due to associated field blank and equipment blank results (see Section 7.2.2).

Cadmium, chromium, and nickel were not detected above the associated MDLs. Uranium was detected in all groundwater samples with concentrations ranging from 0.00708 mg/L at MWL-BW2 to 0.00923 mg/L at MWL-MW9. All metals results are consistent with historical MWL groundwater monitoring results and are below LTMMMP trigger levels.

MWL groundwater samples were screened for gamma-emitting radionuclides, gross alpha activity, gross beta activity, tritium, and radon-222. There were no detections of gamma-emitting radionuclides (as determined by gamma spectroscopy) or tritium (as determined by liquid scintillation counting). Gross alpha activity was detected in all samples ranging from 0.38 pCi/L (MWL-MW9) to 6.89 pCi/L (MWL-MW8, environmental duplicate sample). Gross beta activity was detected in all samples ranging from 5.63 pCi/L (MWL-BW2) to 9.21 pCi/L (MWL-MW7). Radon-222 was detected in all samples, with activities ranging from 140 pCi/L at MWL-MW7 and MWL-MW8 to 447 pCi/L at MWL-MW9. All radiological results were reviewed by an SNL/NM Health Physics SME to screen for potential indications of radiological contamination; there were no indications of radiological anomalies in the groundwater sample results. Results are consistent with historical results and below LTMMMP trigger levels.

### Nickel and Uranium Concentration and Gross Alpha Activity Plots

Concentrations or activities over time of nickel, uranium, and gross alpha are presented in Figures 7-2 through 7-4, respectively for all groundwater monitoring events conducted since implementation of the LTMMMP in 2014. Trigger levels are shown at the top of these plots and are higher than the maximum concentration or activity depicted on these figures. For non-detect results the MDL or MDA was used, and for environmental-duplicate sample pairs only the highest result was used. Variation shown in these plots reflects natural background variation in the concentration of these constituents within the Regional Aquifer. The superposition of concentration lines in Figure 7-2 reflect mostly non-detection results for nickel in the groundwater samples from all four compliance monitoring wells.

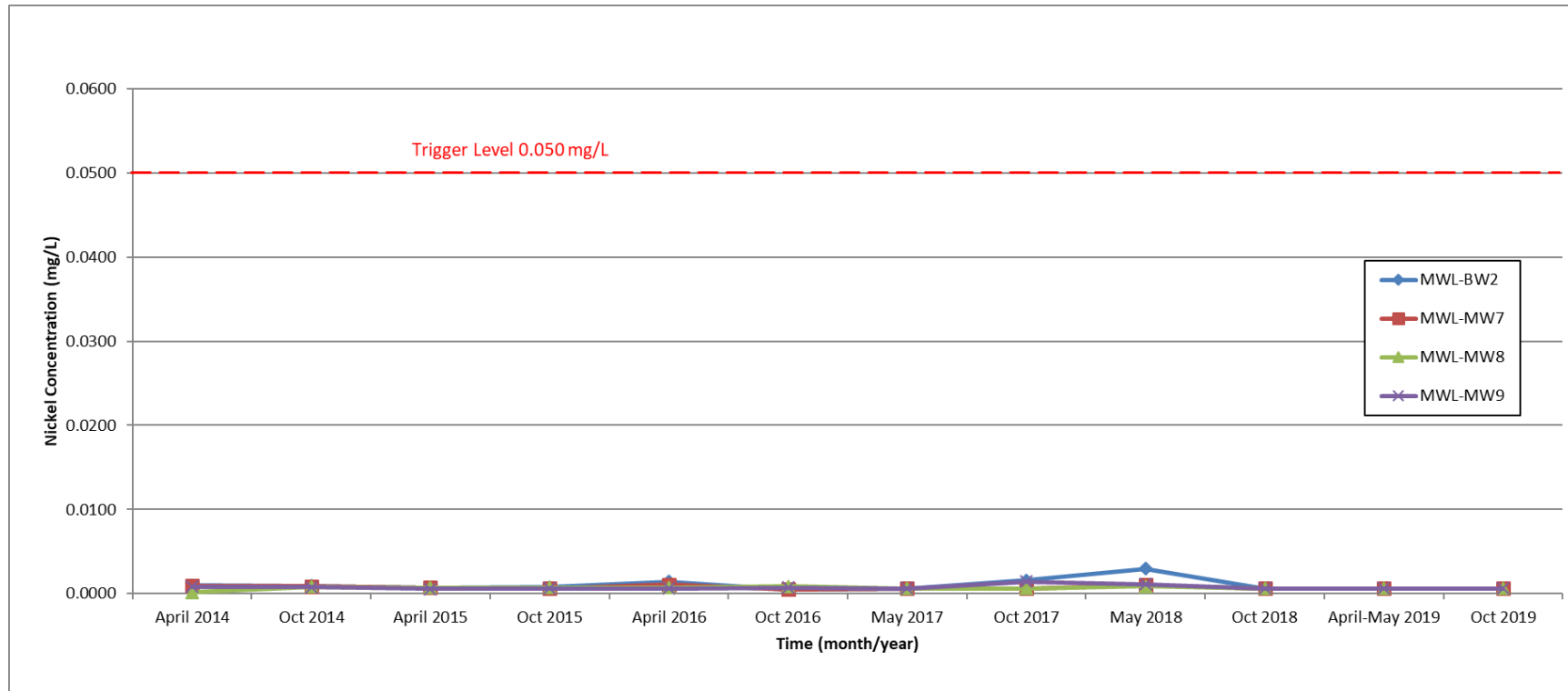


Figure 7-2  
Nickel Concentrations vs. Time  
Mixed Waste Landfill Groundwater Monitoring Wells

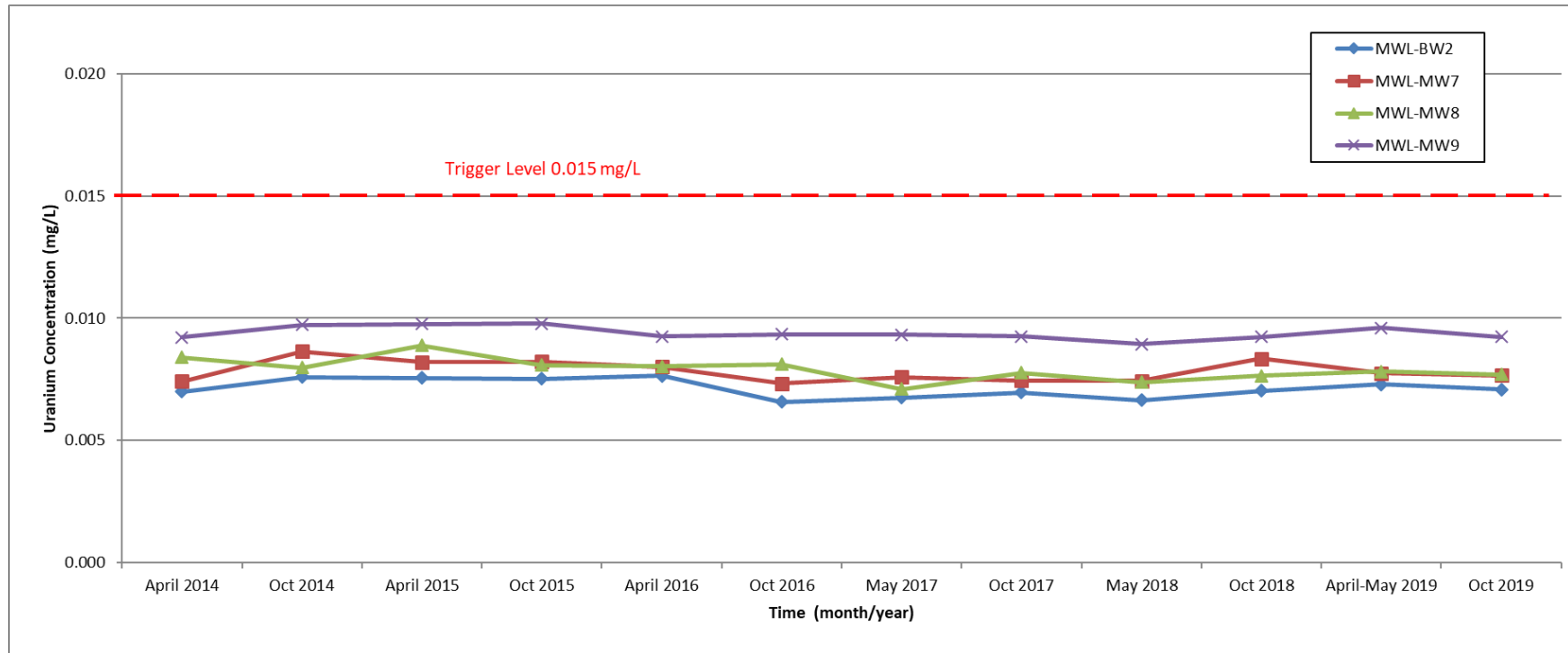


Figure 7-3  
Uranium Concentrations vs. Time  
Mixed Waste Landfill Groundwater Monitoring Wells

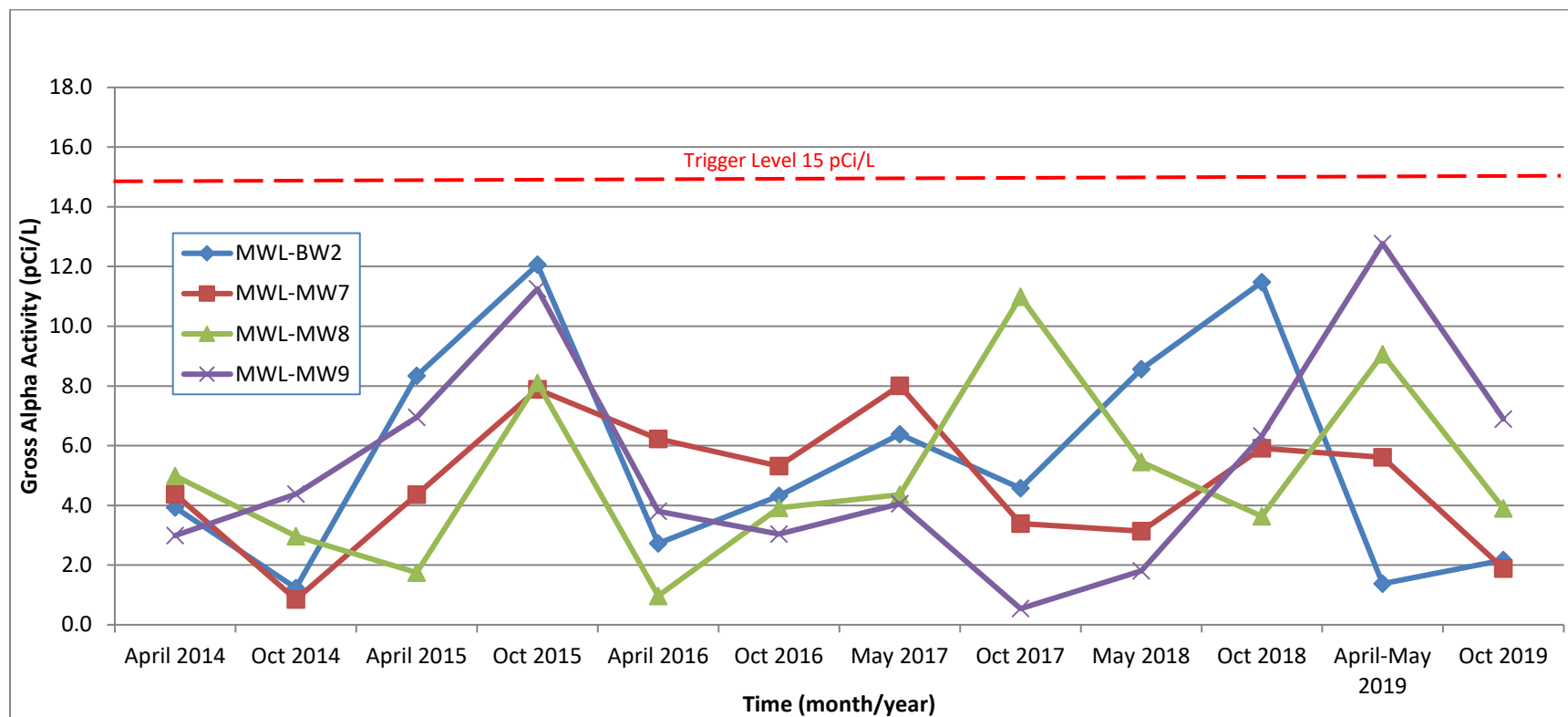


Figure 7-4  
Gross Alpha Activity vs. Time  
Mixed Waste Landfill Groundwater Monitoring Wells

## 7.2.2 Field Quality Control Sample Results

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

Table 7-6 summarizes results of environmental-duplicate sample pair results and the calculated RPD values for the April-May and October 2019 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 per LTMMF Appendix F, Section 2.2) for both sampling events, ranging from 1 to 3.

Table 7-6  
Summary of Duplicate Sample Results  
Mixed Waste Landfill Groundwater Monitoring  
April-May and October 2019

Well ID/Parameter	Environmental Sample (R <sub>1</sub> )	Duplicate Sample (R <sub>2</sub> )	RPD <sup>a</sup> (%)
<b>April-May 2019 Sampling Event</b>			
<b>MWL-MW9</b>			
Uranium (mg/L)	0.0096	0.00955	1
<b>October 2019 Sampling Event</b>			
<b>MWL-MW8</b>			
Uranium (mg/L)	0.00769	0.00748	3

Notes:

<sup>a</sup>RPD = 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: R<sub>1</sub> = Environmental sample result.  
R<sub>2</sub> = Duplicate sample result.

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

A discussion of equipment, field, and trip blank results for the April-May and October 2019 sampling events is provided below.

### First Sampling Event – April 25-May 1, 2019

The equipment blank sample for the April-May sampling event was analyzed for all constituents. Acetone was reported in the equipment blank sample at a concentration similar to the associated MWL-MW9 environmental and environmental duplicate samples. As a result, acetone was qualified as not detected during data validation in samples from MWL-MW9.



VOCs were not detected above MDLs in the four field blank samples and the five trip blank samples associated with the April-May 2019 sampling event.

### Second Sampling Event – October 14-17, 2019

The equipment blank sample for the October sampling event was analyzed for all constituents. Bromodichloromethane, chloroform, and methylene chloride were detected above the MDLs. No corrective action was required for bromodichloromethane and chloroform since they were not detected in the associated environmental samples. Methylene chloride was qualified as not detected during data validation in the equipment blank sample due to the associated trip blank results.

Acetone, bromodichloromethane, chloroform, dibromochloromethane, and methylene chloride were detected in the field blank samples. No corrective action was necessary for bromodichloromethane, chloroform, dibromochloromethane, and methylene chloride since these compounds were not detected in the associated environmental samples. Acetone was reported in both the MWL-BW2 environmental sample and associated field blank sample at low concentrations; therefore, acetone in the environmental sample was qualified as not detected during validation. The methylene chloride field blank result associated with the MWL-MW8 environmental samples was qualified as not detected during validation due to the associated trip blank results.

Methylene chloride was reported in three of the five trip blank samples at a maximum concentration of 2.10 micrograms per liter. Methylene chloride results for the MWL-MW7 and MWL-MW8 environmental samples and associated field blank and equipment blank QC samples were qualified as not detected during data validation since methylene chloride was detected in the associated trip blank samples at similar concentrations.

### 7.2.3 Laboratory Quality Control and Data Quality

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

### First Sampling Event – April 25-May 1, 2019

All laboratory control sample results met the accuracy (i.e., percent recovery) requirement of 50 to 130 percent for VOCs and 75 to 125 percent for metals (Section 2.1 of LTMMP Appendix F), except for acetone, dichlorodifluoromethane, and 2-butanone. These compounds recovered outside LTMMP limits but no corrective action was necessary because the results were within laboratory and analytical method acceptance limits.

### Second Sampling Event – October 14-17, 2019

All laboratory control sample results met the accuracy (i.e., percent recovery) requirement of 50 to 130 percent for VOCs and 75 to 125 percent for metals (Section 2.1 of LTMMP Appendix F), except for acetone. Acetone recovered outside LTMMP limits but no corrective action was necessary because the results were with laboratory and analytical method acceptance limits.

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

#### 7.2.4 Variances and Non-Conformances

Variances and non-conformances are defined in the LTMMP Appendix F, Section 6 for groundwater monitoring. There were no variances or non-conformances from LTMMP requirements for groundwater monitoring during the April-May and October 2019 sampling events.

### 7.3 Hydrogeologic Assessment

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

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

Figure 7-5 shows the rate of groundwater elevation decline at MWL groundwater monitoring wells for the time period 2000 through 2019. Since 2010, the rate of groundwater elevation decline in all wells has been relatively slow and constant, and the rate of groundwater elevation decline in the upper screen interval of MWL-MW4 has stabilized since April 2010. The overall decline in MWL-BW2 since 2009 reflects a slightly higher rate of decline than observed in the other wells. Over the past four years the rate of decline has slowed, a trend that is most likely related to a relaxation in groundwater removal from the Regional Aquifer by the ABCWUA.

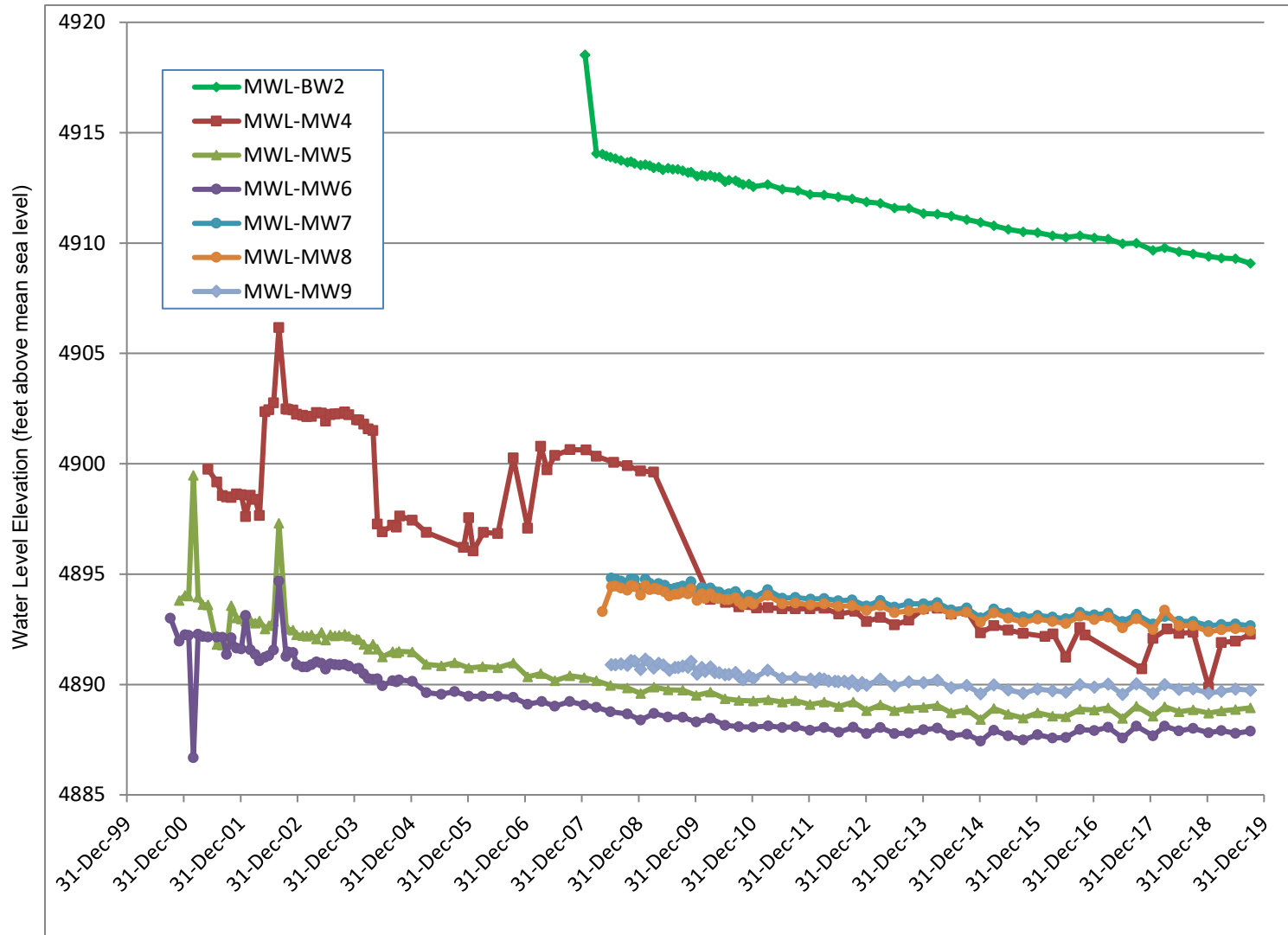


Figure 7-5  
Groundwater Level Elevations at Mixed Waste Landfill Groundwater Monitoring Wells

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 7-6 shows the October 2019 potentiometric surface of the Regional Aquifer beneath the MWL. Based on the potentiometric contours, the hydraulic gradient is to the west-northwest. Measured orthogonally from the potentiometric surface contours, the horizontal gradient for October 2019 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 2019 groundwater velocity remains consistent with previous years, and ranges from 0.02 to 0.06 feet per day; the average is 0.04 feet per day. These very low values and the general position of the groundwater elevation contours have not changed over the past five years, and are consistent with previous estimates for horizontal groundwater flow at the water table in the MWL vicinity.

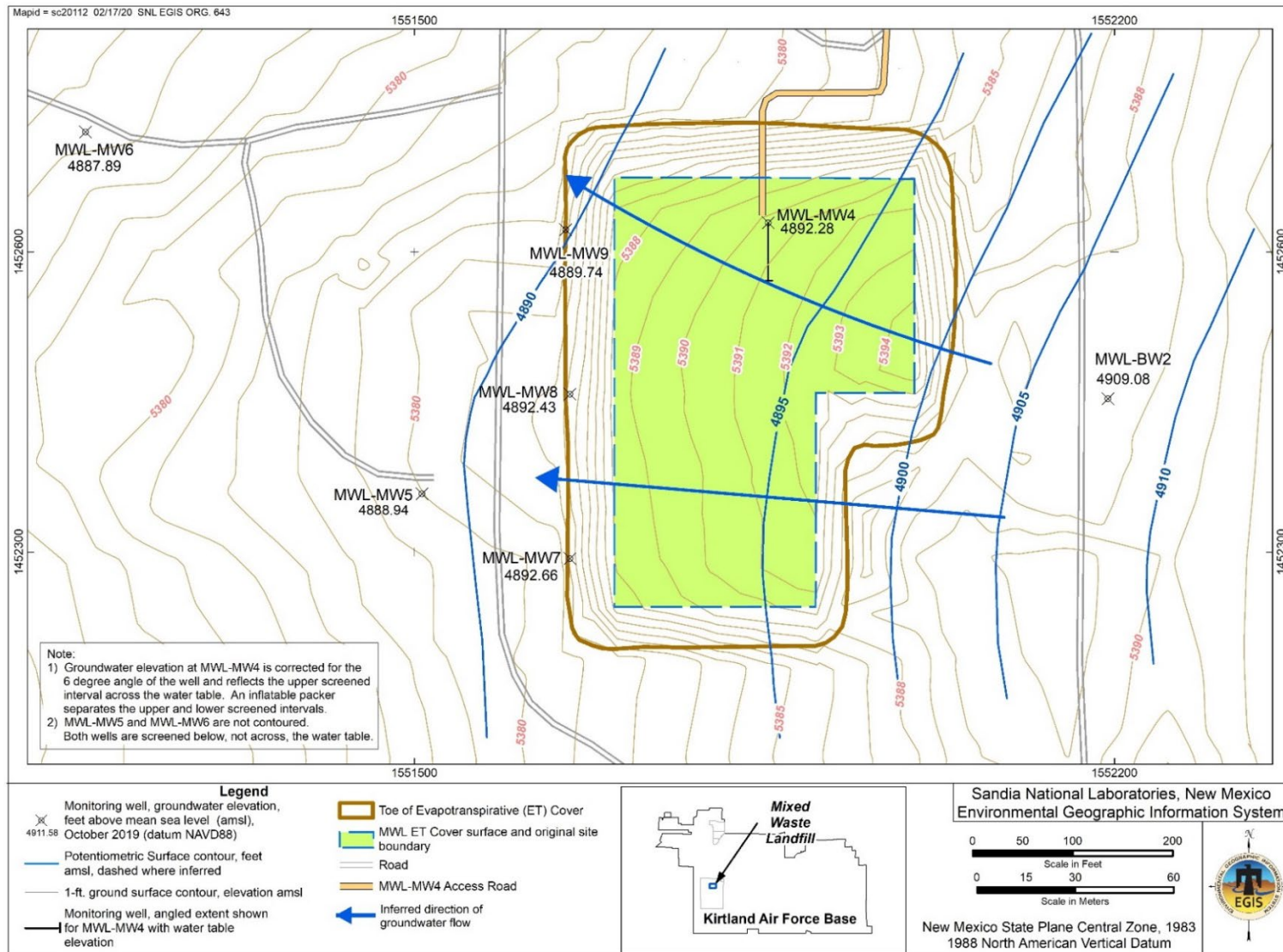


Figure 7-6  
Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2019

## **8.0 BIOTA MONITORING RESULTS**

This chapter presents biota monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with MWL LTMMMP Section 3.6 and Appendix G (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 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, 2019 through March 31, 2020 reporting period fulfilling the LTMMMP annual monitoring requirement. The biota sampling locations were identified during the annual ET Cover Biology Inspection performed on September 5, 2019. The sampling locations are shown in Figure 8-1 and consist of two ant hills (MWL AHSS-01-2019 and MWL AHSS-02-2019). There were no animal burrows or potentially deep-rooted plants identified on the ET Cover during the Biology Inspection. The two ant hill locations selected for surface soil sampling on the ET Cover side slopes were active and provided good spatial coverage relative to previous year's sample locations that were in various locations on the ET Cover surface. Surface soil samples were collected at these locations on September 9, 2019 and analyzed for metals and gamma emitting radionuclides by gamma spectroscopy.

#### **8.1.1 Field Quality Control**

In accordance with the Tritium and Biota SAP (LTMMMP Appendix G, Table G-4.2-1), one field QC sample (duplicate sample) was collected at MWL AHSS-01-2019.

#### **8.1.2 Waste Management**

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



Figure 8-1  
Mixed Waste Landfill Biota Sampling Locations

## 8.2 Laboratory Results

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

### 8.2.1 Environmental Sample Results

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

All metals results were below trigger levels. All metals results were also below the respective NMED-approved background concentrations except for selenium. The selenium concentration in all three samples ranged from 3.82 milligrams per kilogram (mg/kg) in sample AHSS-01-2019 (environmental duplicate) to 4.48 mg/kg in sample AHSS-02-2019. These values are above the NMED-approved background concentration of less than 1 mg/kg, but below the trigger level of 5,680 mg/kg. The selenium results likely reflect natural variation in background concentrations.

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

### 8.2.2 Field Quality Control Sample Results

Table 8-3 summarizes results of the environmental-duplicate sample pair and the RPD values calculated for the September 2019 biota data set. An RPD was calculated when metals concentrations greater than the RL were reported in both the environmental and duplicate sample, and when radionuclides were reported in both the environmental and duplicate sample at activities greater than the MDA. Calculated RPDs for metals and radiological constituents show good agreement, ranging from 1 to 35, except for arsenic (RPD 39), barium (RPD 38), chromium (RPD 44), and nickel (RPD 37). As defined in Section 2.3, Appendix G of the LTMMP, an RPD of less than or equal to 35 is considered acceptable for metals results, but RPD values greater than 35 are expected due to natural variation in surface soil background concentrations. Based on the other RPD values, the greater values for arsenic, barium, chromium, and nickel are likely related to natural variability in the soil matrix and not indicative of an issue with data precision.



Table 8-1  
Summary of Metals Results (EPA Method 6020/7470<sup>a</sup>)  
Mixed Waste Landfill Biota Monitoring  
September 2019

Sample Location	Parameter	Result (mg/kg)	MDL (mg/kg)	Reporting Limit (mg/kg)	NMED Background <sup>b</sup> (mg/kg)	Trigger Level (mg/kg)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL AHSS-01-2019 9-Sep-19	Arsenic	3.50	0.479	2.87	5.6	17.7	--	--
	Barium	89.8	0.0958	0.479	130	100,000	--	--
	Beryllium	0.466	0.0958	0.479	0.65	2,260	J	--
	Cadmium	ND	0.0958	0.479	<1	897	U	--
	Chromium	6.95	0.144	0.958	17.3	63.1	*	--
	Cobalt	2.83	0.144	0.479	5.2	20,500	--	--
	Copper	6.20	0.287	1.92	15.4	45,400	--	--
	Lead	6.30	0.316	1.92	21.4	800	--	--
	Mercury	0.00472	0.004	0.012	<0.25	73.6	J	--
	Nickel	5.87	0.144	0.479	11.5	22,500	--	--
	Selenium	4.40	0.479	2.87	<1	5,680	--	--
	Silver	ND	0.0958	0.479	<1	5,680	U	--
	Vanadium	16.2	0.0958	0.479	20.4	5,680	--	--
	Zinc	20.7	0.383	1.92	62	100,000	B	--
MWL AHSS-01-2019 9-Sep-19 (Duplicate)	Arsenic	2.37	0.498	2.99	5.6	17.7	J	--
	Barium	60.9	0.0996	0.498	130	100,000	--	--
	Beryllium	0.350	0.0996	0.498	0.65	2,260	J	--
	Cadmium	ND	0.0996	0.498	<1	897	U	--
	Chromium	4.44	0.149	0.996	17.3	63.1	*	--
	Cobalt	2.03	0.149	0.498	5.2	20,500	--	--
	Copper	5.82	0.299	1.99	15.4	45,400	--	--
	Lead	4.96	0.329	1.99	21.4	800	--	--
	Mercury	0.0041	0.00352	0.0105	<0.25	73.6	J	--
	Nickel	4.06	0.149	0.498	11.5	22,500	--	--
	Selenium	3.82	0.498	2.99	<1	5,680	--	--
	Silver	ND	0.0996	0.498	<1	5,680	U	--
	Vanadium	11.4	0.0996	0.498	20.4	5,680	--	--
	Zinc	17.3	0.398	1.99	62	100,000	B	--
MWL AHSS-02-2019 9-Sep-19	Arsenic	2.78	0.472	2.83	5.6	17.7	J	--
	Barium	92.2	0.0943	0.472	130	100,000	--	--
	Beryllium	0.502	0.0943	0.472	0.65	2,260	--	--
	Cadmium	ND	0.0943	0.472	<1	897	U	--
	Chromium	7.22	0.142	0.943	17.3	63.1	*	--
	Cobalt	3.10	0.142	0.472	5.2	20,500	--	--
	Copper	7.32	0.283	1.89	15.4	45,400	--	--
	Lead	7.74	0.311	1.89	21.4	800	--	--
	Mercury	0.00664	0.00397	0.0119	<0.25	73.6	J	--
	Nickel	6.18	0.142	0.472	11.5	22,500	--	--
	Selenium	4.48	0.472	2.83	<1	5,680	--	--
	Silver	ND	0.0943	0.472	<1	5,680	U	--
	Vanadium	18.2	0.0943	0.472	20.4	5,680	--	--
	Zinc	23.7	0.377	1.89	62	100,000	B	--

Refer to notes at end of table.

Table 8-1 (Concluded)  
Summary of Metals Results (EPA Method 6020/7470<sup>a</sup>)  
Mixed Waste Landfill Biota Monitoring  
September 2019

Notes:

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

<sup>b</sup>Dinwiddie 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.

<sup>c</sup>Laboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

\* = Recovery of RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate. RPD's are not applicable where the concentration falls below the effective Reporting Limit.

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

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

U = Result less than the MDL.

< = Less than.

DOE = U.S. Department of Energy.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

ND = Not detected above the MDL.

NMED = New Mexico Environment Department.

RPD = Relative percent difference.

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

Table 8-2  
Summary of Gamma Spectroscopy Results (EPA Method 901.1<sup>a</sup>)  
Mixed Waste Landfill Biota Monitoring  
September 2019

Sample Location	Parameter	Result (pCi/g)	MDA (pCi/g)	NMED Background <sup>b</sup> (pCi/g)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL AHSS-01-2019 9-Sep-19	Cesium-137	0.0565 ± 0.0336	0.0274	1.5	--	J, FR7
	Cobalt-60	0.0000405 ± 0.0161	0.0302	NA	U	BD, FR3
	Radium-226	0.579 ± 0.0904	0.0526	2.7	--	--
	Thorium-232 <sup>d</sup>	0.991 ± 0.113	0.0444	1.5	--	--
	Uranium-235	0.106 ± 0.102	0.178	0.18	U	BD, FR3
	Uranium-238	-0.049 ± 0.936	1.66	2.3	U	BD, FR3
MWL AHSS-01-2019 9-Sep-19 (Duplicate)	Cesium-137	0.0438 ± 0.0216	0.0196	1.5	--	J, FR7
	Cobalt-60	-0.0073 ± 0.0105	0.0169	NA	U	BD, FR3
	Radium-226	0.608 ± 0.0719	0.0336	2.7	--	--
	Thorium-232 <sup>d</sup>	0.976 ± 0.0919	0.0263	1.5	--	--
	Uranium-235	0.0297 ± 0.124	0.0967	0.18	U	BD, FR3
	Uranium-238	0.450 ± 0.698	0.495	2.3	U	BD, FR3
MWL AHSS-02-2019 9-Sep-19	Cesium-137	0.0733 ± 0.0247	0.0219	1.5	--	--
	Cobalt-60	-0.00293 ± 0.0131	0.0231	NA	U	BD, FR3
	Radium-226	0.666 ± 0.089	0.0384	2.7	--	--
	Thorium-232 <sup>d</sup>	0.945 ± 0.102	0.034	1.5	--	--
	Uranium-235	0.0861 ± 0.106	0.111	0.18	U	BD, FR3
	Uranium-238	1.14 ± 1.36	1.05	2.3	X	R, Z2

Notes:

Negative numbers indicate the sample count or result was less than the instrument background.

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

<sup>b</sup>Dinwiddie 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.

<sup>c</sup>Laboratory/Validation Qualifier: If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples.

Laboratory Qualifier

U = Analyte is below detection limit.

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

Validation Qualifier

BD = Result is not statistically different from zero.

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

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

J = The associated value is an estimated quantity.

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

Z2 = Minimum peak criteria not met.

<sup>d</sup>Thorium-232 activity is quantified and reported using the daughter isotope Lead-212 results.

DOE = U.S. Department of Energy.

EPA = U.S. Environmental Protection Agency.

MDA = Minimum detectable activity.

NA = Not applicable.

NMED = New Mexico Environment Department.

pCi/g = Picocuries per gram.

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

Table 8-3  
Summary of Duplicate Sample Results  
Mixed Waste Landfill Biota Monitoring  
September 2019

Sample Location	Environmental Sample (R <sub>1</sub> )	Duplicate Sample (R <sub>2</sub> )	RPD <sup>a</sup> (%)
<b>MWL AHSS-01-2019 – Metals (mg/kg)</b>			
Arsenic	3.50	2.37	39
Barium	89.8	60.9	38
Beryllium	0.466	0.350	28
Chromium	6.95	4.44	44
Cobalt	2.83	2.03	33
Copper	6.20	5.82	6
Lead	6.30	4.96	24
Mercury	0.00472	0.0041	14
Nickel	5.87	4.06	37
Selenium	4.40	3.82	12
Vanadium	16.2	11.4	35
Zinc	20.7	17.3	18
<b>MWL AHSS-01-2019 – Radionuclides (pCi/g)</b>			
Cesium-137	0.0565	0.0438	25
Radium-226	0.579	0.608	5
Thorium-232	0.991	0.976	1

Notes:

<sup>a</sup>RPD = 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: R<sub>1</sub> = Environmental sample result.  
R<sub>2</sub> = Duplicate sample result.

% = Percent.

mg/kg = Milligram(s) per kilograms(s).

pCi/g = Picocuries per gram.

### 8.2.3 Laboratory Quality Control Data Quality

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

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

#### 8.2.4 Variances

There were no variances from the LTMMMP biota monitoring requirements.

### 8.3 Data Evaluation and Monitoring Trigger Level

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

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

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

## **9.0 INSPECTION, MAINTENANCE, AND REPAIR RESULTS**

This chapter presents a summary of inspection, maintenance, and repair activities conducted in accordance with requirements in MWL LTMM Section 4.0 and Appendix I, MWL Long-Term Monitoring Inspection Checklists/Forms (SNL/NM March 2012). Inspection requirements are summarized in Table 2-2 of this Annual LTMM Report. Table 9-1 lists the date each type of inspection was performed during the April 1, 2019 through March 31, 2020 reporting period. Inspection results are presented in the following sections and documented on the inspection forms/checklists listed in Table 9-1 and provided in Annex F. A summary of inspection activities and results is provided in Section 11.2.

### **9.1 Final Cover System**

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

#### **9.1.1 Biology Inspection**

One ET Cover Biology Inspection was performed by the staff biologist on September 5, 2019 fulfilling the requirement for an annual Biology Inspection during the reporting period growing season (Table 9-1). The ET Cover vegetation continues to meet all LTMM criteria for successful revegetation. The approximate foliar coverage on the ET Cover was 44 percent, with 99 percent of this coverage composed of native vegetation. The foliar coverage is dominated by native grasses, with *Galleta* grass comprising approximately 36 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. No small animal burrows were identified on the ET Cover. Fourteen ant hills were observed evenly distributed on the side slopes and cover surface. No action or repairs were required based on the Biology Inspection.

Overall, the ET Cover vegetation and surface is in good condition. Additional information is provided on the September 5, 2019 Biology Inspection Checklist/Form (Annex F) and in the Biology Report (Annex G). The Biology Report summarizes ET Cover background information, local climate trends, and recommendations for the ET Cover based on inspections performed during the reporting period. Although only the annual Biology Inspection is required, the staff biologist performed verification inspections to support the quarterly ET Cover surface inspections performed by a field technician (Section 9.1.2) during the reporting period as a best practice. These best practice quarterly verification inspections are documented in memorandums included in Annex F with the quarterly site/cover inspection forms.

Table 9-1  
Inspection Frequency and Dates Performed  
Mixed Waste Landfill  
April 2019 – March 2020 Reporting Period

Inspection Type	Frequency	Checklist/Form <sup>a</sup>	Date Performed
ET Cover Biology Inspection	Annual <sup>b</sup>	Biology Inspection Checklist/Form	September 5, 2019
ET Cover Surface Inspection	Quarterly	Cover Inspection Checklist/Form	June 5, 2019
			September 9, 2019
			December 4, 2019
			March 3, 2020
Storm-Water Diversion Structure Inspection <sup>c</sup>	Quarterly	Cover Inspection Checklist/Form	June 5, 2019
			September 9, 2019
			December 4, 2019
			March 3, 2020
Soil-Vapor Monitoring Network Inspection	Semiannual <sup>d</sup>	Soil-Vapor Monitoring Network Checklist/Form	May 2, 2019
			October 18, 2019
Soil-Moisture Monitoring Network Inspection	Annual <sup>d</sup>	Soil-Moisture Monitoring Network Checklist/Form	April 25, 2019
Groundwater Monitoring Network Inspection	Semiannual <sup>d</sup>	Groundwater Monitoring Network Checklist/Form	April 25, 2019
			October 17, 2019
Security Fence Inspection <sup>c</sup>	Quarterly	Cover Inspection Checklist/Form	June 5, 2019
			September 9, 2019
			December 4, 2019
			March 3, 2020

Notes:

<sup>a</sup>All reporting period inspection forms are provided in Annex F.

<sup>b</sup>Transition 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.

<sup>c</sup>These inspections, conducted at the same time as the ET Cover Surface Inspection, include access controls (gates, locks, signs) and survey monuments, and are documented on the same inspection form.

<sup>d</sup>Monitoring 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 LTMMMP inspection requirement (Table 9-1). No inspection items required follow-up actions.

### **9.4 Soil-Moisture Monitoring Network Inspection**

One inspection of the soil-moisture monitoring network was performed as part of the annual monitoring event conducted during the reporting period, fulfilling the LTMMMP inspection requirement (Table 9-1). No inspection items required follow-up actions.

### **9.5 Groundwater Monitoring Well Network Inspection**

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

### **9.6 Security Fence Inspection**

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

#### **June 5, 2019 Inspection**

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

#### **September 9, 2019 Inspection**

No conditions were identified that required maintenance or repairs.

#### **December 4, 2019 Inspection**

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



March 3, 2020 Inspection

Accumulation of dead, windblown tumbleweeds were identified along the perimeter fence. The plant debris was removed by the field technicians at the time 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 minor weed control events were conducted during this reporting period as a best practice.

May 17, 2019

Live and dead weeds were removed from the ET Cover, the perimeter fence, the perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Weed removal totaled approximately 15 cubic yards.

August 8-9, 2019

Live and dead weeds were removed from the ET Cover, the perimeter fence, the perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Weed removal totaled approximately 18 cubic yards.

December 3-4, 2019

Less than 1 cubic yard of windblown tumbleweeds were removed from the perimeter fence. Weed control activities included the application of a pre-emergent herbicide to the perimeter monitoring well locations, the area between the north toe of the ET Cover and the north fence, and the 3-foot area outside the perimeter fence. The pre-emergent herbicide is approved for use at SNL/NM, was applied selectively in accordance with the manufacturer's specifications, and does not carry a bee precaution rating according to the University of California Integrated Pest Management. It was applied to help control weed growth at the site and promote the health of the existing native grasses on the ET Cover and surrounding perimeter.

## **10.0 REGULATORY ACTIVITIES**

On January 8, 2014, the NMED approved the MWL LTMM (Blaine January 2014). All MWL regulatory submittals that occurred during this April 1, 2019 through March 31, 2020 reporting period are summarized in Section 10.1, along with submittals since approval of the LTMM. There were no LTMM modification requests during the reporting period.

### **10.1 MWL Regulatory Submittals**

Regulatory submittals during this reporting period include the sixth MWL Annual LTMM Report, April 2018 – March 2019 (SNL/NM June 2019), approved by NMED in September 2019 (Kielling September 2019). There were also three submittals of various updated reference documents cited in the LTMM SAPs (Harrell May and November 2019; February 2020). These updates were made to keep the cited reference documents (operating procedures, plans, and documents related to analytical laboratory services) current and to reflect ongoing modifications and improvements to support MWL monitoring activities. The three submittals were made within 30 days of the effective date for the updated reference documents.

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

### **10.2 MWL LTMM Modifications**

There were no LTMM modification requests submitted to the NMED during the reporting period. However, a modification request, as delineated in Section 5.2.4, is in progress and submittal to NMED is anticipated in CY 2020.

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

Date of Submittal <sup>a</sup>	LTMM Requirement	Description of Submittal
January 15, 2014	Section 3.4.1	Installation Work Plan for Three Soil-Vapor Monitoring Wells at the Mixed Waste Landfill <ul style="list-style-type: none"> <li>Approved in February 2014</li> </ul>
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"> <li>Approved in September 2014</li> </ul>
March 6, 2014	Appendices C through G	Procedures, plans, and documents cited in the LTMM used by SNL/NM personnel for air, surface soil, soil vapor, soil moisture, biota, and groundwater monitoring.
June 18, 2014	Section 4.8.1	MWL Annual LTMM Report, January – March 2014 <ul style="list-style-type: none"> <li>Approved in August 2014</li> </ul>
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 five 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"> <li>Approved in October 2015</li> </ul>
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"> <li>Approved in July 2016</li> </ul>
November 9, 2016	Appendices C, D, F, and G	Updates to four documents used by SNL/NM personnel to perform monitoring activities at the MWL.
June 6, 2017	Section 4.8.1	MWL Annual LTMM Report, April 2016 – March 2017 <ul style="list-style-type: none"> <li>Approved in April 2018</li> </ul>
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 four documents used by SNL/NM personnel to conduct groundwater monitoring activities at the MWL.
June 7, 2018	Section 4.8.1	MWL Annual LTMM Report, April 2017 – March 2018 <ul style="list-style-type: none"> <li>Approved in July 2018</li> </ul>
December 14, 2018	Section 4.8.2	MWL Five-Year Report (first Five-Year Report)
January 15, 2019	Appendices D, F, and G	Update to the SNL/NM Statement of Work for Analytical Laboratories used for monitoring sample analysis.

Continued on next page

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

April 2019 through March 2020 Reporting Period Submittals		
Date of Submittal <sup>a</sup>	LTMMMP Requirement	Description of Submittal
June 21, 2019	Section 4.8.1	MWL Annual LTMM Report, April 2018 – March 2019 • Approved in September 2019
May 8, 2019	Appendix D, E, F, and G	Updates to three reference documents used by SNL/NM personnel to conduct soil-moisture monitoring, analytical data verification, and sample management activities at the MWL.
November 8, 2019	Appendix C, D, F, and G	Updates to four reference documents used by SNL/NM personnel to conduct soil-vapor monitoring activities, sample management, and contract laboratory quality control. Updates to the health and safety plan for groundwater monitoring at the MWL.
February 28, 2020	Appendices D, F, and G	Update to the SNL/NM Statement of Work for Analytical Laboratories used for monitoring sample analysis.

Notes:

<sup>a</sup>Date represents the date stamp on the DOE transmittal letter for the submittal.

DOE = U.S. Department of Energy.

LTMM = Long-Term Monitoring and Maintenance.

LTMMMP = Long-Term Monitoring and Maintenance Plan.

MWL = Mixed Waste Landfill.

SNL/NM = Sandia National Laboratories/New Mexico.

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## 11.0 SUMMARY AND CONCLUSIONS

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

### 11.1 Monitoring Activities

All monitoring activities for the April 1, 2019 through March 31, 2020 reporting period were completed in accordance with LTMMP requirements. The results for each monitoring activity are summarized as follows.

#### Radon Monitoring

The radon air monitoring minimum frequency is annual and was performed over two six-month periods covering CY 2019. The range of radon activity for all monitoring locations was <0.2 to 0.4 pCi/L, and the range for all background location results was non-detect to 0.4 pCi/L. No sample locations exceeded the trigger level of 4 pCi/L and all results confirm low levels of radon consistent with natural background levels and historical results. There were no indications of releases of radon gas from the disposal areas.

#### Tritium Surface Soil Monitoring

The tritium surface soil monitoring frequency is annual. Soil samples were collected on August 22, 2019. Reported tritium activities were all non-detections below the MDA, consistent with historical data, and below the trigger level of 20,000 pCi/L. There were no indications of new releases of tritium from the disposal areas.

#### Soil-Vapor Monitoring

The minimum vadose zone soil-vapor monitoring frequency is annual but was performed at a semiannual frequency as best practice to keep sample port tubing clear. A total of 22 VOCs were detected during the May 2019 sampling event and a total of 29 VOCs were detected during the October 2019 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 0.450 ppmv and 0.330 ppmv, respectively at well MWL-SV03. The maximum concentration for Total VOCs at the 400 ft bgs sampling ports was 0.95564 ppmv at well MWL-SV03. Soil-vapor monitoring results indicate a relatively uniform distribution of low concentration VOCs throughout the 500-foot-thick vadose zone that are not a threat to groundwater. This distribution is consistent with an old source that has dissipated throughout the vadose zone, and indicates the VOC soil-vapor plume is stable with no new releases from the disposal area.

### Soil-Moisture Monitoring

The vadose zone soil-moisture monitoring frequency is annual. The trigger level for soil moisture applies to the shallow depth interval of 8.7 to 86.6 ft bgs at the three monitoring locations. The soil-moisture content by volume for this depth interval ranged from 1.2 to 5.3 percent, below the 23 percent soil-moisture content by volume trigger level. Soil-moisture monitoring results are consistent with baseline results established prior to ET Cover construction and indicate the ET Cover is performing as designed.

### Groundwater Monitoring

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

### Biota Monitoring

Biota monitoring frequency is annual. All metals and radionuclide results were below or close to respective NMED-approved background levels, and below trigger levels. There were no indications of biotic mobilization of contaminants to the surface.

## **11.2 Inspections/Maintenance/Repairs Activities**

The annual ET Cover Biology Inspection was performed on September 5, 2019 during the reporting period growing season. The ET Cover continues to meet LTMMMP successful revegetation criteria. Efforts completed since ET Cover construction in 2009 to establish self-sustaining, native grasses on the ET Cover have been successful. As a result, minimal maintenance and no repairs or supplemental watering were needed. The ET Cover vegetation is in good condition and no issues requiring maintenance or repairs were identified.

The ET Cover System/Surface Inspections were performed quarterly and no issues requiring maintenance or repairs were identified. 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 (i.e., clearing dead, windblown weeds from the security fence).

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

Three minor weed control events were conducted as a best practice for the ET Cover vegetation during the reporting period. These events included removal of live and dead weeds from the ET Cover, removal of windblown tumbleweeds from the perimeter fence and drainage swale, and

the selective application of an approved pre-emergent herbicide to perimeter areas to limit weed growth at the site. All of these actions help promote the health of the desired native grass species by reducing competition with weedy species for limited moisture and nutrients.

### **11.3 Regulatory Activities**

Regulatory activities during the April 1, 2019 through March 31, 2020 reporting period included submittal of the sixth MWL Annual LTMM Report, April 2018 – March 2019 (SNL/NM June 2019) that was approved by NMED (Kielling September 2019). Three submittals of various updated reference documents cited in the LTMM SAPs were also made within 30 days of the document effective dates (Harrell May and November 2019; February 2020). There were no LTMM modification requests submitted to the NMED during the reporting period. A modification request, as delineated in Section 5.2.4, is in progress and submittal to the NMED is anticipated in CY 2020.

### **11.4 Conclusions**

All required LTMM monitoring, inspection, and maintenance/repair activities for the April 1, 2019 through March 31, 2020 reporting period were performed and documented in this seventh Annual LTMM Report, which meets the requirements of the LTMM, Section 4.8.1 (SNL/NM March 2012).

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 and all monitoring results are consistent with historical MWL monitoring data. Based upon monitoring and inspection results, site conditions continue to be protective of human health and the environment.



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**ANNEX A**

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

**January-December 2019**

**Data Evaluation Memos**

**Field Forms**

**Contract Verification Reviews**

**Radon Detector Inspection Forms**

**MIXED WASTE LANDFILL**

**RADON MONITORING**

**January-June 2019 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:* October 1, 2019

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

*from:* David Farrar (0628) [drfarra@sandia.gov](mailto:drfarra@sandia.gov)

A handwritten signature in black ink that reads 'David Farrar'.

*subject:* Review of MWL Radon Air Data – January through June 2019 Semiannual Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the January through June 2019 semiannual monitoring period. My review includes evaluation of the results and supporting documentation relative to the data quality objective (DQO) and monitoring objectives specified in the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (Appendix C, Air Sampling and Analysis Plan for the Mixed Waste Landfill). The DQO for this monitoring is to produce representative, accurate, defensible, and comparable analytical results to support the monitoring objective.

Radon air monitoring measurements during this semiannual period were obtained using Radtrak2<sup>®</sup> detectors. The detectors were deployed at each monitoring location (Figure 1) on January 4, 2019 and were collected on July 1, 2019. The protective casing and mounting hardware were inspected during the collection effort and repairs were made if needed. The detectors remained in the field for approximately six months and were submitted to the analytical laboratory, RADONOVA, for analysis on Analysis Request/Chain of Custody (AR/COC) #619341 along with a trip blank detector (RNTB). RNTB was received at the same time as the other deployed detectors and was stored in a hermetically sealed protective bag at the Environmental Resource Field Office.

The results for this semiannual period and associated field documentation meet the LTMMMP DQO and monitoring objectives. The results were all non-detects (less than 0.4 picocuries per liter [pCi/L]), except for location RN16 (detection at  $0.4 \pm 0.2$  pCi/L). The detection capabilities were different compared to the July-December 2018 data. RADONOVA lists detection limits of 0.2 pCi/L for detectors out in the field less than 180 days and 0.4 pCi/L for 180 days or greater. The detectors in this semiannual period were in the field 179 days and the detectors used July-December 2018 were 181 days. Even with the change in detection capabilities, the results for this semiannual period indicate very low activities of radon in the air at the MWL, consistent with historical results and background radon activity. The trigger level of 4 pCi/L was not exceeded by any of the individual sample results (note: the trigger level only applies to the results from the perimeter locations RN1 through RN10, Figure 1).



A slightly higher result,  $0.6 \pm 0.2$  pCi/L, was reported for RNTB. The purpose of the trip blank detector is to monitor for potential exposure during shipment and at the analytical laboratory. The cause of this higher result is not known; however, all field monitoring results were less than or equal to 0.4 pCi/L. Since the highest reported result was for the trip blank detector, it is considered anomalous and does not indicate the other detectors were exposed during shipping and/or at the laboratory.

Attachments:

Analysis Request/Chain of Custody #619341

RADONOVA Radon Monitoring Report 4929895:3 (analytical laboratory results for Radtrak2<sup>®</sup> detectors)

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

Review of MWL Radon-in-Air Data  
1<sup>st</sup> Semiannual CY 2019 (January – June 2019)  
October 1, 2019

SMO 2012-ARCOG (4-2012)

## CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Page 1 of 2

Batch No. <u>1107</u>		SMO Use		AR/COC		619341						
Project Name: MWL RADON MONITORING		Date Samples Shipped: <u>7/2/19</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: Robert Zlock		Carrier/Waybill No. <u>290164</u>		SMO Contact Phone: <u>smo</u>		Bill to: Sandia National Laboratories (Accounts Payable)						
Project/Task Number: 195122.10.11.08		Lab Contact: Steve Leslie/331-814-2211		Wendy Palencia/505-844-3132		P.O. Box 5800, MS-0154						
Service Order: CF378-19		Lab Destination: RADON		Send Report to SMO:		Albuquerque, NM 87185-0154						
Contract No.: 1495047		Stephanie Montaño/505.284.2553										
Tech Area:												
Building:		Operational Site:										
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
106774	001	RN1/Radtrak2 712634-5	N/A	7/1/19 <u>0924</u>	AF	N	0 NA	NONE	C	SA	RADON	
106775	001	RN2/Radtrak2 372805-2	N/A	7/1/19 <u>0927</u>	AF	N	0 NA	NONE	C	SA	RADON	
106776	001	RN3/Radtrak2 724042-7	N/A	7/1/19 <u>0900</u>	AF	N	0 NA	NONE	C	SA	RADON	
106777	001	RN4/Radtrak2 544732-1	N/A	7/1/19 <u>0902</u>	AF	N	0 NA	NONE	C	SA	RADON	
106778	001	RN5/Radtrak2 287647-2	N/A	7/1/19 <u>0905</u>	AF	N	0 NA	NONE	C	SA	RADON	
106779	001	RN6/Radtrak2 187725-7	N/A	7/1/19 <u>0907</u>	AF	N	0 NA	NONE	C	SA	RADON	
106780	001	RN7/Radtrak2 398596-7	N/A	7/1/19 <u>0909</u>	AF	N	0 NA	NONE	C	SA	RADON	
106781	001	RN8/Radtrak2 416834-0	N/A	7/1/19 <u>0913</u>	AF	N	0 NA	NONE	C	SA	RADON	
106782	001	RN9/Radtrak2 116091-0	N/A	7/1/19 <u>0917</u>	AF	N	0 NA	NONE	C	SA	RADON	
106783	001	RN10/Radtrak2 391794-5	N/A	7/1/19 <u>0922</u>	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 <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			Return Samples By:		
	Danielle Michel	<u>[Signature]</u>	<u>DM</u>	SNL/08854/505-845-7706/505-219-7143						Comments:		
	Mark Lyon	<u>[Signature]</u>	<u>ML</u>	SNL/00642/505-284-3982								
	Robert Zlock	<u>[Signature]</u>	<u>RZ</u>	SNL/08888/505-845-0485/505-238-3668								
Relinquished by <u>[Signature]</u>			Org. <u>08888</u>	Date <u>7/1/19</u>	Time <u>1207</u>	Relinquished by <u>[Signature]</u>			Org.	Date <u>7/3/19</u>	Time <u>6 pm</u>	
Received by <u>[Signature]</u>			Org. <u>0642</u>	Date <u>7/1/19</u>	Time <u>1207</u>	Received by <u>[Signature]</u>			Org.	Date <u>10/2/09</u>	Time <u>1103</u>	
Relinquished by <u>[Signature]</u>			Org. <u>0642</u>	Date <u>7/2/19</u>	Time <u>0830</u>	Relinquished by <u>[Signature]</u>			Org.	Date <u>10/2/09</u>	Time <u>1103</u>	
Received by <u>[Signature]</u>			Org.	Date <u>7/3/19</u>	Time <u>10 am</u>	Received by			Org.	Date	Time	

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



Review of MWL Radon-in-Air Data  
1<sup>st</sup> Semiannual CY 2019 (January – June 2019)  
September 22, 2019

SMO 2012-ARCOG (4-2012)

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

AOP 95-16

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AR/COC 619341

[illegible]



REPORT NUMBER 4929895:3  
REPORT DATE 07/12/2019  
REPORT PAGE 1 of 3  
PRINT DATE 07/12/2019  
OWN ID N/A  
BY NTESS, LLC  
REPORT RECEIVER(S) NTESS, LLC

## RADON MONITORING REPORT

### Description of the measurement

The measurement was performed with a closed alpha-track detector (Radtrak<sup>®</sup>) following the quality guidance in EPA 402-R-95-012.

The detector(s) arrived to Radonova Laboratories AB 07/03/2019.  
They were measured 07/08/2019.

Test data have been given by .

### Property data and address

MEASURE SITE ADDRESS  
AR/COC 619341  
AR/COC 619341

BUILDING ID

### Test results

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
712634-5	01/04/2019 – 07/01/2019	RN1		< 0.4 pCi/L
372805-2	01/04/2019 – 07/01/2019	RN2		< 0.4 pCi/L
724042-7	01/04/2019 – 07/01/2019	RN3		< 0.4 pCi/L
544732-1	01/04/2019 – 07/01/2019	RN4		< 0.4 pCi/L
287647-2	01/04/2019 – 07/01/2019	RN5		< 0.4 pCi/L
187725-7	01/04/2019 – 07/01/2019	RN6		< 0.4 pCi/L
398596-7	01/04/2019 – 07/01/2019	RN7		< 0.4 pCi/L
416834-0	01/04/2019 – 07/01/2019	RN8		< 0.4 pCi/L
116091-0	01/04/2019 – 07/01/2019	RN9		< 0.4 pCi/L
391794-5	01/04/2019 – 07/01/2019	RN10		< 0.4 pCi/L
141052-1	01/04/2019 – 07/01/2019	RN11		< 0.4 pCi/L
432672-4	01/04/2019 – 07/01/2019	RN12		< 0.4 pCi/L

### Comment to the results

This report replaces 4929895:2. Reason: new or corrected measurement information has been received.

Reported results are for detectors delivered with AR/COC #619341

US\_EN\_001\_v190618.pptcd

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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REPORT DATE 07/12/2019  
REPORT PAGE 2 of 3  
PRINT DATE 07/12/2019  
OWN ID N/A  
BY NTESS, LLC  
REPORT RECEIVER(S) NTESS, LLC

## RADON MONITORING REPORT

### Description of the measurement

The measurement was performed with a closed alpha-track detector (Radtrak<sup>2</sup>) following the quality guidance in EPA 402-R-95-012.

The detector(s) arrived to Radonova Laboratories AB 07/03/2019.  
They were measured 07/08/2019.

### Property data and address

MEASURE SITE ADDRESS  
AR/COC 619341  
AR/COC 619341  
BUILDING ID

Test data have been given by .

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
462819-4	01/04/2019 – 07/01/2019	RN13		< 0.4 pCi/L
338647-1	01/04/2019 – 07/01/2019	RN14		< 0.4 pCi/L
779891-1	01/04/2019 – 07/01/2019	RN15		< 0.4 pCi/L
142270-8	01/04/2019 – 07/01/2019	RN16		0.4 ± 0.2 pCi/L
132026-6	01/04/2019 – 07/01/2019	RN17		< 0.4 pCi/L
596175-0	01/04/2019 – 07/01/2019	RNTB		0.6 ± 0.2 pCi/L

### Comment to the results

This report replaces 4929895:2. Reason: new or corrected measurement information has been received.

Reported results are for detectors delivered with AR/COC #619341

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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Westmont IL 60559  
331.814.2200, help@radonova.com





REPORT NUMBER	REPORT DATE
4929895:3	07/12/2019
REPORT PAGE	PRINT DATE
3 of 3	07/12/2019
OWN ID	N/A

#### Measurement method: Closed alpha-track detector (Radtrak<sup>2</sup>®)

The radon measurement was performed with a closed alpha-track detector following the quality assurance guidance given in EPA 402-R-92-003, 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 provided. For each value an uncertainty associated with the measurement to a 95% confidence level is also provided. For example a measurement result of  $4.0 \pm 0.5$  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.

#### Codes on non reportable detectors

DNR	Not Reported – Detector Not Returned
VTW	Not Reported – Visibly Tampered With
FBD	Not Reported – Film Broken or Damaged
LIL	Not Reported – Lost in Lab
DTO	Not Reported – Detector To Old

#### 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-92-003, EPA 402-R-95-012 and that the demands from SWEDAC are fulfilled.

#### Certification no:

107831-AL, 107830-RT, NRSB ARL1904

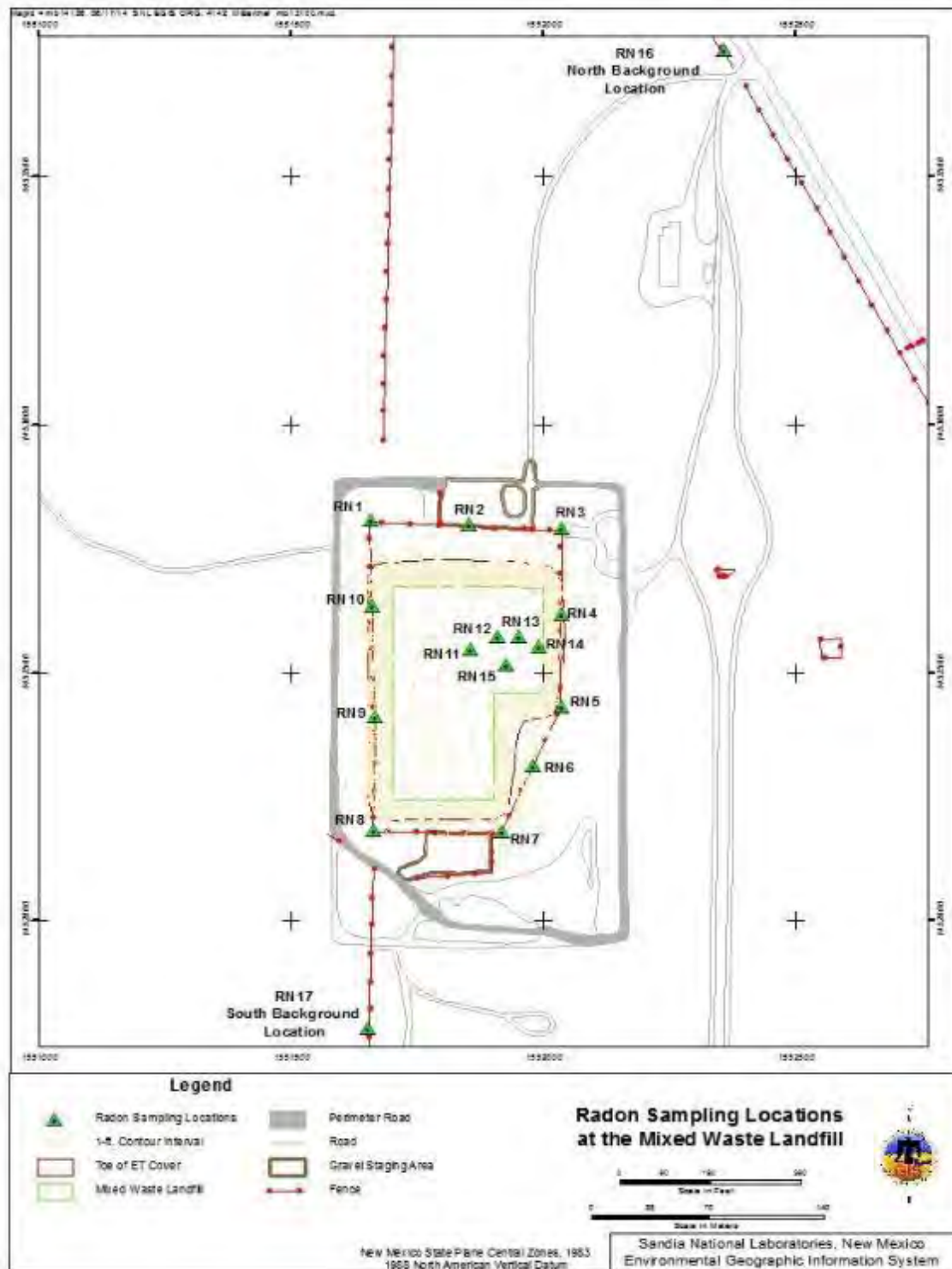


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**Figure 1. Location of Radon Detectors at the MWL**



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

Name: Danielle MichelSignature: *Danielle Michel*

Activity (check all that apply):

☒ Deployment ☐ CollectionName: Robert ZickSignature: *Robert Zick*☐ Deployment ☒ CollectionName: Mark LyonSignature: *Mark Lyon*☐ Deployment ☒ CollectionName: Mike MitchellSignature: *Mike Mitchell*☐ Deployment ☒ CollectionARCO # : 619341Detector Type: Radtrak2

Detector Serial Number	Sample Number	Sampling Location	Deployment Date	Deployment Time	Collection Date	Collection Time
712634-5	106774	RN1	1/4/19	1232	7/1/19	0924
372805-2	106775	RN2		1237		0927
724042-7	106776	RN3		1150		0900
544732-1	106777	RN4		1155		0902
287647-2	106778	RN5		1200		0905
187725-7	106779	RN6		1203		0907
398596-7	106780	RN7		1207		0909
416834-0	106781	RN8		1219		0913
116091-0	106782	RN9		1225		0919
391794-5	106783	RN10		1228		0922
141052-1	106784	RN11		1242		0932
432672-4	106785	RN12		1245		0933
462819-4	106786	RN13		1250		0938
338647-1	106787	RN14		1254		0941
779891-1	106788	RN15		1258		0937
142270-8	106789	RN16		1306		0948
132026-6	106790	RN17		1217		0916
596175-0	106791	RNTB	NA	NA		0950

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

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

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



## Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL RADON MONITORING

Project/Task No. 195122\_10.11.08

ARCOC No. 619341

Analytical Lab RADONOVA

SDG No. 4929895-1

*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		

Line No.	Item	Complete?		If no, explain
		Yes	No	
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 or 1-sigma for bioassay) 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		

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

#### 4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 and TO-15) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		

Line No.	Item	Yes	No	Comments
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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		

Line No.	Item	Yes	No	Comments
	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: 07-25-2019 09:17:00

Closed by: Wendy Palencia Date: 07-25-2019 09:17:00

**MIXED WASTE LANDFILL**

**RADON MONITORING**

**July-December 2019 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:* January 30, 2020

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

*from:* David Farrar (0628) [drfarra@sandia.gov](mailto:drfarra@sandia.gov)

A handwritten signature in blue ink that reads 'David Farrar'.

*subject:* Review of MWL Radon Air Data – July through December 2019 Semiannual Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the July through December 2019 semiannual monitoring period. 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 analytical results to support the monitoring objective.

Radon air monitoring measurements during this semiannual period were obtained using Radtrak2<sup>®</sup> detectors. The detectors were deployed at each monitoring location (Figure 1) on July 1, 2019 and were collected on January 6, 2020. The deployment period was 189 days to ensure the lowest possible detection limit (i.e., a minimum of 180 days required per the analytical laboratory). The protective casing and mounting hardware were inspected during the collection effort; maintenance and repairs were made if needed. The detectors were submitted to the analytical laboratory, RADONOVA, for analysis on Analysis Request/Chain of Custody (AR/COC) #619881 along with a trip blank detector (RNTB). RNTB was received at the same time as the other deployed detectors and was stored in a hermetically sealed protective bag at the Environmental Resource Field Office during the deployment period.

The results for this semiannual period and associated field documentation meet the LTMMP DQO and monitoring objectives. The results were detections ranging from 0.2 to  $0.4 \pm 0.2$  pCi/L, except for location RN2 (non-detect at  $<0.2$  pCi/L). The results for this semiannual period indicate very low activities of radon in the air at the MWL, consistent with historical results and background radon activity. The trigger level of 4 pCi/L, which applies only to the results from the perimeter locations RN1 through RN10, was not exceeded by any of the individual sample results. A non-detect result of  $<0.2$  pCi/L was reported for the trip blank (RNTB) indicating the other detectors were not exposed during shipping and/or at the laboratory.

DRF, 0628

Attachments:

Analysis Request/Chain of Custody #619881

RADONOVA Radon Monitoring Report 5449833:1

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

SMO 2012-ARCO (4-2012)

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Page 1 of 2

Batch No. <u>N/A</u>		SMO Use <u>1/9/2020</u>		AR/COC <b>619881</b>								
Project Name: <u>MWL RADON MONITORING</u>		Date Samples Shipped: <u>1/9/2020</u>		SMO Authorization: <u>TOC</u>								
Project/Task Manager: <u>Robert Ziolk</u>		Carrier/Waybill No. <u>308730</u>		SMO Contact Phone: <u>Wendy Palencia/505-844-3132</u>								
Project/Task Number: <u>195122.10.11.08</u>		Lab Contact: <u>Steve Leslie/331-814-2211</u>		Send Report to SMO: <u>Stephanie Montaño/505-284-2553</u>								
Service Order: <u>CF378-19</u>		Lab Destination: <u>RADON</u>		Contract No.: <u>1495047</u>								
Tech Area:		Operational Site:		<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								
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
108504	001	RN1/Radtrak2 158552-0	N/A	1/6/20 10:05	AF	N	0 NA	NONE	C	SA	RADON	
108505	001	RN2/Radtrak2 168934-8	N/A	1/6/20 10:03	AF	N	0 NA	NONE	C	SA	RADON	
108506	001	RN3/Radtrak2 167549-5	N/A	1/6/20 09:34	AF	N	0 NA	NONE	C	SA	RADON	
108507	001	RN4/Radtrak2 909493-9	N/A	1/6/20 09:36	AF	N	0 NA	NONE	C	SA	RADON	
108508	001	RN5/Radtrak2 950066-1	N/A	1/6/20 09:40	AF	N	0 NA	NONE	C	SA	RADON	
108509	001	RN6/Radtrak2 166000-0	N/A	1/6/20 09:42	AF	N	0 NA	NONE	C	SA	RADON	
108510	001	RN7/Radtrak2 910515-6	N/A	1/6/20 09:45	AF	N	0 NA	NONE	C	SA	RADON	
108511	001	RN8/Radtrak2 909728-8	N/A	1/6/20 09:50	AF	N	0 NA	NONE	C	SA	RADON	
108512	001	RN9/Radtrak2 166045-5	N/A	1/6/20 09:55	AF	N	0 NA	NONE	C	SA	RADON	
108513	001	RN10/Radtrak2 910131-2	N/A	1/6/20 09:56	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 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		
	Danielle Michel	<i>[Signature]</i>		SNL/08854/505-845-7706/505-219-7143		Return Samples By:						
	Robert Ziolk	<i>[Signature]</i>		SNL/08888/505-845-0485/505-238-3668		Comments: Detectors were deployed 7/1/2019 to 1/6/2020; 189 days. See attached field form for additional information.						
Relinquished by <i>[Signature]</i>		Org. <u>2854</u>	Date <u>1/6/2020</u>	Time <u>1103</u>	Relinquished by <u>DE Rodd</u>		Org. <u></u>	Date <u>1/10/20</u>	Time <u>5pm</u>			
Received by <i>[Signature]</i>		Org. <u>0628</u>	Date <u>1/6/2020</u>	Time <u>1103</u>	Received by <i>[Signature]</i>		Org. <u>Uapula</u>	Date <u>1/12/20</u>	Time <u>10:55</u>			
Relinquished by <i>[Signature]</i>		Org. <u>0628</u>	Date <u>1/9/2020</u>	Time <u>1100</u>	Relinquished by <i>[Signature]</i>		Org. <u></u>	Date <u></u>	Time <u></u>			
Received by <u>DE Rodd</u>		Org. <u></u>	Date <u>1/10/20</u>	Time <u>2pm</u>	Received by <i>[Signature]</i>		Org. <u></u>	Date <u></u>	Time <u></u>			

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



Review of MWL Radon-in-Air Data  
2<sup>nd</sup> Semiannual CY 2019 (July – December 2019)  
January 30, 2020

SMO 2012-ARCOG (4-2012)

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

AOP 95-16

Page 2 of 2

AR/COC 619881

[illegible]

Review of MWL Radon Air Data  
2<sup>nd</sup> Semiannual CY 2019 (July – December 2019)  
January 30, 2020



REPORT NUMBER 5449833:1  
REPORT DATE 01/20/2020  
REPORT PAGE 1 of 3  
PRINT DATE 01/20/2020  
OWN ID N/A  
BY NTESS, LLC  
REPORT RECEIVER(S) NTESS, LLC  
NTESS

NTESS

## RADON MONITORING REPORT

### Description of the measurement

The measurement was performed with a closed alpha-track detector (Radtrak<sup>2</sup>) following the quality guidance in EPA 402-R-95-012.

The detector(s) arrived to Radonova Laboratories AB 01/10/2020.  
They were measured 01/15/2020.

### Property data and address

MEASURE SITE ADDRESS  
AR/COC 619881  
AR/COC 619881

BUILDING ID

### Test results

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
158552-0	07/01/2019 – 01/06/2020	RN1		0.3 ± 0.2 pCi/L
168934-8	07/01/2019 – 01/06/2020	RN2		< 0.2 pCi/L
167549-5	07/01/2019 – 01/06/2020	RN3		0.2 ± 0.2 pCi/L
909493-9	07/01/2019 – 01/06/2020	RN4		0.4 ± 0.2 pCi/L
950066-1	07/01/2019 – 01/06/2020	RN5		0.2 ± 0.2 pCi/L
166000-0	07/01/2019 – 01/06/2020	RN6		0.2 ± 0.2 pCi/L
910515-6	07/01/2019 – 01/06/2020	RN7		0.3 ± 0.2 pCi/L
909728-8	07/01/2019 – 01/06/2020	RN8		0.3 ± 0.2 pCi/L
166045-5	07/01/2019 – 01/06/2020	RN9		0.3 ± 0.2 pCi/L
910131-2	07/01/2019 – 01/06/2020	RN10		0.4 ± 0.2 pCi/L

### Comment to the results

Reported results are for detectors delivered with AR/COC # 619881

US\_EN\_001\_v200117.pptd

Trygve Rönngvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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Review of MWL Radon Air Data  
2<sup>nd</sup> Semiannual CY 2019 (July – December 2019)  
January 30, 2020



REPORT NUMBER  
5449833;1

REPORT DATE  
01/20/2020

REPORT PAGE  
2 of 3

PRINT DATE  
01/20/2020

OWN ID  
N/A

BY  
NTES, LLC

REPORT RECEIVER(S)  
NTES, LLC

NTES

NTES

## RADON MONITORING REPORT

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The measurement was performed with a closed alpha-track detector (Radtrak<sup>2</sup>) following the quality guidance in EPA 402-R-95-012.

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### Property data and address

MEASURE SITE ADDRESS  
AR/COC 619881  
AR/COC 619881

BUILDING ID

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
168974-4	07/01/2019 – 01/06/2020	RN11		0.2 ± 0.2 pCi/L
910475-3	07/01/2019 – 01/06/2020	RN12		0.3 ± 0.2 pCi/L
156099-4	07/01/2019 – 01/06/2020	RN13		0.2 ± 0.2 pCi/L
910579-2	07/01/2019 – 01/06/2020	Rn14		0.3 ± 0.2 pCi/L
949912-0	07/01/2019 – 01/06/2020	RN15		0.3 ± 0.2 pCi/L
909860-9	07/01/2019 – 01/06/2020	RN16		0.4 ± 0.2 pCi/L
909219-8	07/01/2019 – 01/06/2020	RN17		0.3 ± 0.2 pCi/L
164225-5	07/01/2019 – 01/06/2020	RNTB		< 0.2 pCi/L

### Comment to the results

Reported results are for detectors delivered with AR/COC # 619881

US\_EN\_001\_v200117.pptd

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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Westmont IL 60559  
331.814.2200, help@radonova.com



REPORT NUMBER	REPORT DATE
5449833:1	01/20/2020
REPORT PAGE	PRINT DATE
3 of 3	01/20/2020
OWN ID	N/A

#### Measurement method: Closed alpha-track detector (Radtrak<sup>2</sup>)

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 38 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 provided. For each value an uncertainty associated with the measurement to a 95% confidence level is also provided. For example a measurement result of  $4.0 \pm 0.5$  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.

#### Codes on non-reportable detectors

DNR	Not Reported – Detector Not Returned
VTW	Not Reported – Visibly Tampered With
FBD	Not Reported – Film Broken or Damaged
LIL	Not Reported – Lost in Lab
DTO	Not Reported – Detector Too Old

#### 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.

#### Certification no:

107831-AL, 107830-RT, NRSB ARL1904



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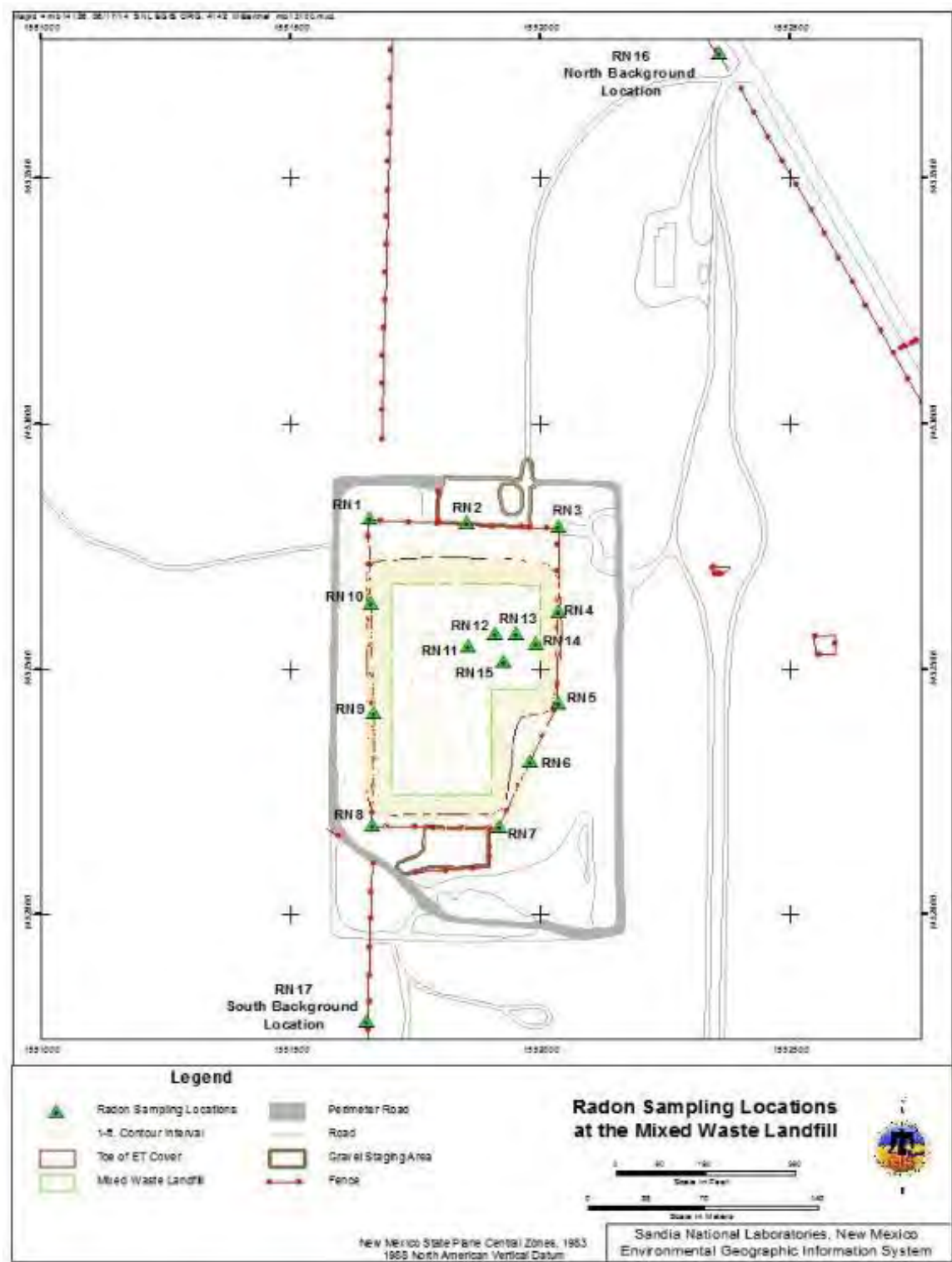


Figure 1. Location of Radon Detectors at the MWL

# Mixed Waste Landfill Radon Detector Deployment / Collection Form

Name: Danielle MichelSignature: [Signature]

Activity (check all that apply):

☒ Deployment ☒ CollectionName: Robert ZiockSignature: [Signature]☒ Deployment ☒ CollectionName: Mark Lyon (M. Mitchell)Signature: [Signature]☒ Deployment ☒ CollectionARCOC #: 619881Detector Type: Radtrak2# of Days Exposed: 189

Sampling Location	Sample Number	Detector Serial Number	Deployment Date	Deployment Time	Collection Date	Collection Time	Notes* Y/N Date(s) of Notes
RN1 ✓	108504	158552-0 ✓	7/1/19	0924	1/6/2020	1005	
RN2 ✓	108505	168934-8 ✓		0927	✓	1003	
RN3 ✓	108506	167549-5 ✓		0900	1/6/2020	0934	
RN4 ✓	108507	909493-9 ✓		0902		0936	
RN5 ✓	108508	950066-1 ✓		0905		0940	
RN6 ✓	108509	166000-0 ✓		0907		0942	
RN7 ✓	108510	910515-6 ✓		0909		0945	
RN8 ✓	108511	909728-8 ✓		0913		0950	
RN9 ✓	108512	166045-5 ✓		0919		0955	Y-7/1/19
RN10 ✓	108513	910131-2 ✓		0922		0956	Y-1/6/2020
RN11 ✓	108514	168974-4 ✓		0932		1011	
RN12 ✓	108515	910475-3 ✓		0933		1012	
RN13 ✓	108516	156099-4 ✓		0938		1017	
RN14 ✓	108517	910579-2 ✓		0941		1020	
RN15 ✓	108518	949912-0 ✓		0937		1021	
RN16 ✓	108519	909860-9 ✓		0948		1026	Y-1/6/2020
RN17 ✓	108520	909219-8 ✓		0916		0950	Y-1/6/2020
RNTB	108521	164225-5	✓	0950	1/6/2020	1030	

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

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

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

## Contract Verification Form (CVR)

Project Leader ZIOCK

Project Name MWL RADON MONITORING

Project/Task No. 195122\_10.11.08

ARCOC No. 619881

Analytical Lab RADONOVA

SDG No. 5449833-1

*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	N/A		
1.4	Preservative correct for analyses requested	N/A		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

### 2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	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		

Line No.	Item	Complete?		If no, explain
		Yes	No	
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 or 1-sigma for bioassay) 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		



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	N/A		
	c) Laboratory control sample duplicate RPD data reported and met for other analyses	N/A		
3.5	Blank data a) Method or reagent blank data reported and met for all samples	N/A		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	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 and TO-15) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		

Line No.	Item	Yes	No	Comments
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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		

Line No.	Item	Yes	No	Comments
4.6	Radiochemistry and General Chemistry a) Instrument run logs provided	N/A		

## 5.0 Data Anomaly Report

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

## 6.0 Problem Resolution

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

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

Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 01-29-2020 10:00:00

Closed by: Wendy Palencia Date: 01-29-2020 10:00:00

**MIXED WASTE LANDFILL**  
**RADON DETECTOR INSPECTION FORMS**

**January-December 2019 Monitoring Period**

**Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection Form**Name: Danielle MichelSignature: Danielle MichelDate of Inspection: 7/14/19

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

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

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

**Mixed Waste Landfill Radon Monitoring Location Supplemental Inspection Form**

Name: Danielle Mickel  
MARK LYON  
 Date of Inspection: 2/4/19

Signature: Danielle Mickel  
Mark Lyon

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

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

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

**Mixed Waste Landfill  
Radon Detector Inspection Form**

Date: 3/4/19  
 Name: Danielle Nickel  
 Name: Robert Zick

Signature: Danielle Nickel  
 Signature: Robert Zick

Are detectors being collected? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Detector Type: <u>Radtrak 2</u>	Radon Monitoring Frequency: <input type="checkbox"/> Quarterly <input checked="" type="checkbox"/> Semiannually <input type="checkbox"/> Annually

	Radon Monitoring Location Inspection Parameters (Yes or No)																
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
1b. Action Required.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2a. Radon detector condition (in enclosure or after collection).	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
2b. Action Required.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3a. Radon detector enclosure securely fastened to post (fence or free standing).	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
3b. Action Required.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4a. Radon detector enclosure and internal attachment components.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
4b. Action Required.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
5b. Action Required.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

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

**Mixed Waste Landfill  
Radon Detector 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



**Mixed Waste Landfill  
Radon Detector Inspection Form**

Date: 4/8/19Name: Danielle MichelSignature: Danielle MichelName: Robert ZöckSignature: Robert ZöckAre detectors being collected? ☐ Yes ☒ NoDetector Type: Radtrak 2

Radon Monitoring Frequency:

☐ Quarterly☒ Semiannually☐ Annually

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2a. Radon detector condition (in enclosure or after collection).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3a. Radon detector enclosure securely fastened to post (fence or free standing).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4a. Radon detector enclosure and internal attachment components.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Radon Detector Inspection Form**

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

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

Date: 5/1/19Name: Danielle MichelSignature: Name: Robert ZickSignature: Are detectors being collected? ☐ Yes ☒ NoDetector Type: Radtrak 2Radon Monitoring Frequency: ☐ Quarterly ☒ Semiannually ☐ Annually

	Radon Monitoring Location Inspection Parameters (Yes or No)																
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2a. Radon detector condition (in enclosure or after collection).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3a. Radon detector enclosure securely fastened to post (fence or free standing).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4a. Radon detector enclosure and internal attachment components.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Radon Detector 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



**Mixed Waste Landfill  
Radon Detector Inspection Form**

Date: 03-JUN-2019Name: MARK LYONSignature: *Mark Lyon*

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Are detectors being collected? ☐ Yes ☒ No
 Detector Type: Radtrak 2 Radon Monitoring Frequency: ☐ Quarterly ☒ Semiannually ☐ Annually

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
1b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2a. Radon detector condition (in enclosure or after collection).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
2b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3a. Radon detector enclosure securely fastened to post (fence or free standing).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
3b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4a. Radon detector enclosure and internal attachment components.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
4b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
5b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

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

**Mixed Waste Landfill  
Radon Detector 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

**Mixed Waste Landfill  
Radon Detector Inspection Form**

Date: 7/1/19Name: Danielle MickelSignature: Danielle MickelName: Robert ZickSignature: Robert ZickAre detectors being collected? ☒ Yes ☐ NoDetector Type: Radtrak 2Radon Monitoring Frequency: ☐ Quarterly ☒ Semiannually ☐ Annually

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17	RN18
1a. Monitoring location identification labeling.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
1b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
2a. Radon detector condition (in enclosure or after collection).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
2b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
3a. Radon detector enclosure securely fastened to post (fence or free standing).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
3b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
4a. Radon detector enclosure and internal attachment components.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
4b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
5b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Radon Detector Inspection Form**

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



**Mixed Waste Landfill  
Radon Detector Inspection Form**

Date: 8/1/19Name: Danielle MichelSignature: [Signature]Name: Robert ZieckSignature: [Signature]

Are detectors being collected? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Detector Type: <u>Radtrak2</u>	Radon Monitoring Frequency: <input type="checkbox"/> Quarterly <input checked="" type="checkbox"/> Semiannually <input type="checkbox"/> Annually	

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2a. Radon detector condition (in enclosure or after collection).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3a. Radon detector enclosure securely fastened to post (fence or free standing).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4a. Radon detector enclosure and internal attachment components.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

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

**Mixed Waste Landfill  
Radon Detector Inspection Form**

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



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

Date: 9/9/19Name: Danielle MichelSignature: Name: Robert Ziock

Signature: \_\_\_\_\_

Are detectors being collected? ☐ Yes ☒ NoDetector Type: Radtrak 2Radon Monitoring Frequency: ☐ Quarterly ☒ Semiannually ☐ Annually

## **Radon Monitoring Location Inspection Parameters (Yes or No)**

	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>1b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2a. Radon detector condition (in enclosure or after collection).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>2b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3a. Radon detector enclosure securely fastened to post (fence or free standing).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>3b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4a. Radon detector enclosure and internal attachment components.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>4b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
<b>5b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Radon Detector Inspection Form**

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



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

Date: 10/2/19Name: Danielle MichelSignature: 

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Are detectors being collected? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Detector Type: <u>Radtrak-2</u>	Radon Monitoring Frequency: <input type="checkbox"/> Quarterly <input checked="" type="checkbox"/> Semiannually <input type="checkbox"/> Annually	

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2a. Radon detector condition (in enclosure or after collection).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3a. Radon detector enclosure securely fastened to post (fence or free standing).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4a. Radon detector enclosure and internal attachment components.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5b. Action Required.	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N

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


**Mixed Waste Landfill  
Radon Detector Inspection Form**

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

RNTB is properly stored at ELFO in sealed bag.



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

Date: 11/4/19Name: Robert ZiockSignature: Name: Danielle MichelSignature: Are detectors being collected? ☐ Yes ☒ NoDetector Type: Radtrak 2

Radon Monitoring Frequency:

☐ Quarterly☒ Semiannually☐ Annually

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>1b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2a. Radon detector condition (in enclosure or after collection).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>2b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3a. Radon detector enclosure securely fastened to post (fence or free standing).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>3b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4a. Radon detector enclosure and internal attachment components.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>4b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>5b. Action Required.</b>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Radon Detector Inspection Form**

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



Dec

# Mixed Waste Landfill Radon Detector Inspection Form

Date: December 4, 2019Name: Robert FockSignature: [Signature]Name: Danielle MichelSignature: [Signature]

Are detectors being collected? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Detector Type: <u>Radtrak 2</u>	Radon Monitoring Frequency: <input type="checkbox"/> Quarterly <input checked="" type="checkbox"/> Semiannually <input type="checkbox"/> Annually

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
1b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
2a. Radon detector condition (in enclosure or after collection).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
2b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
3a. Radon detector enclosure securely fastened to post (fence or free standing).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
3b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
4a. Radon detector enclosure and internal attachment components.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
4b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
5b. Action Required.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Radon Detector Inspection Form**

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

New Jan

**Mixed Waste Landfill  
Radon Detector Inspection Form**

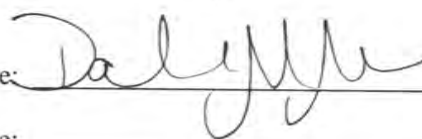
Date:

1/6/2020

Name:

Danielle Michel

Signature:



Name:

Signature:

Are detectors being collected? ☒ Yes ☐ No

Detector Type:

Radtrak 2

Radon Monitoring Frequency:

☐ Quarterly☒ Semiannually☐ Annually

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y
1b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N		N
2a. Radon detector condition (in enclosure or after collection).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y
2b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N		N
3a. Radon detector enclosure securely fastened to post (fence or free standing).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y
3b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N		N
4a. Radon detector enclosure and internal attachment components.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y
4b. Action Required.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N		N
5a. Radon detector enclosure interior clean of debris (dirt, insects, spider webs, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	N	N
5b. Action Required.	N	N	N	N	N	N	N	N	Y	N	N	N	N	Y	N	Y	Y

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Radon Detector Inspection Form**

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

**ANNEX B**

**Mixed Waste Landfill  
Surface Soil Tritium and Biota Monitoring Forms and Reports  
April 2019-March 2020**

**Data Evaluation Memo (tritium monitoring only)**

**Data Validation Reports**

**Contract Verification Reviews**

**Mixed Waste Landfill**  
**Surface Soil Tritium Monitoring**  
**August 2019 Sampling Event**



date: March 30, 2020

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

from: David Farrar (0628) [drfarra@sandia.gov](mailto:drfarra@sandia.gov) *David Farrar*

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

The purpose of this memo is to document my review of the surface soil tritium monitoring results for the August 22, 2019 sample event. My review includes evaluation of the results and supporting documentation relative to the data quality objective (DQO) and monitoring objectives specified in the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (Appendix G, *Tritium and Biota Sampling and Analysis Plan for the Mixed Waste Landfill*). All data was reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data." All data are determined as acceptable and reported quality control measures appear adequate.

Summary of Tritium Results (EPA Method 906.0<sup>a</sup>)  
Mixed Waste Landfill Surface Soil Monitoring  
August 22, 2019

Sample Location	Result (pCi/L)	MDA (pCi/L)	Percent Soil Moisture	Laboratory Qualifier	Validation Qualifier	Trigger Level (pCi/L)
MWL TS-2NW	74.8 ± 84.6	141	4.49	U	BD, FR3	20,000
MWL TS-2NW (Duplicate)	33.5 ± 79.0	139	4.56	U	BD, FR3	
MWL TS-2SW	50.3 ± 80.5	138	5.35	U	BD, FR3	
MWL TS-2SE	15.4 ± 76.6	139	5.56	U	BD, FR3	
MWL TS-2NE	48.0 ± 116	200	7.63	U	BD, FR3	

Notes:

<sup>a</sup>U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition.

BD = Result is below the MDA.

EPA = U.S. Environmental Protection Agency.

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

MDA = Minimum detectable activity.

MDL = Method detection limit.

MWL = Mixed Waste Landfill.

pCi/L = Picocuries per liter.

TPU = Total Propagated Uncertainty.

U = Analyzed for but undetected.

The August 2019 results were all non-detections below the minimum detectable activity, which is consistent with the August 2018 monitoring results (MWL Annual LTMM Report, June 2019), historical MWL surface soil tritium results, and below the trigger level of 20,000 picocuries per liter.

cc: CFRC



## Memorandum

Date: September 30, 2019

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 620157  
SDG: 488696  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: RAD

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

### Summary

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

#### Tritium:

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

### Holding Times and Preservation

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

### Quantification

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

### Calibration

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

### Blanks

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



### **Tracer/Carrier Recovery**

Tracer/Carriers were not a method requirement.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

The MS met QC acceptance criteria.

### **Laboratory Replicate**

All replicate error ratio acceptance criteria were met.

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

The LCS met QC acceptance criteria.

### **Detection Limits/Dilutions**

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

### **Other QC**

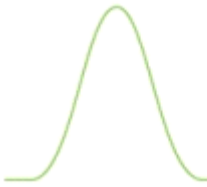
A field duplicate pair was submitted with ARCO 620157. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

**Reviewed by:** Mary Donovan

**Level:** I

**Date:** 10/01/19



## Sample Findings Summary



AR/COC: 620157

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
GL-RAD-A-002			
	108939-001/MWL TS-2NW	Tritium (10028-17-8)	BD, FR3
	108940-001/MWL TS-2SW	Tritium (10028-17-8)	BD, FR3
	108941-001/MWL TS-2SE	Tritium (10028-17-8)	BD, FR3
	108942-001/MWL TS-2NE	Tritium (10028-17-8)	BD, FR3
	108943-001/MWL TS-2NW	Tritium (10028-17-8)	BD, FR3

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 620157	Site/Project: MWL LTMMP	Validation Date: 09/30/2019
SDG #: 488696	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
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: 08/22/2019

Validated by:

*L Thal*



# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.

Page 1 of 1

Project Name: MWL LTMMMP		Date Samples Shipped: 8/26/19		SMO Use		SMO Authorization: <i>Wendy Palencia</i>		AR/COC		620157	
Project/Task Manager: Mike Mitchell		Carrier/Waybill No. 302743		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			
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Lab Destination: GEL		Contract No.: 1983530		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154			
Service Order: CF01-19								488696			
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					
108939	001	MWL TS-2NW	NA	8/22/19 0915	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	001
108940	001	MWL TS-2SW	NA	0908	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	002
108941	001	MWL TS-2SE	NA	0900	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	003
108942	001	MWL TS-2NE	NA	0850	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	004
108943	001	MWL TS-2NW	NA	0915	SOIL	P	2x1 L	None	G	DU	TRITIUM (EPA 906)	005

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT <input type="checkbox"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
Confirmatory: <input type="checkbox"/> Yes		QC initials:		Return Samples By:		Comments:		
Sample Team Members Name: Robert Ziock Signature: <i>Robert Ziock</i> Name: Danielle Michel Signature: <i>Danielle Michel</i>		Init.: <i>RS</i> Company/Organization/Phone/Cell: SNL/08888/505-845-0485/505-238-3668 SNL/08854/505-845-7706/505-219-7143						

Relinquished by: <i>Robert Ziock</i>	Org. 08888	Date 8/22/19	Time 0942	Relinquished by:	Org.	Date	Time
Received by: <i>Wendy Palencia</i>	Org. 0628	Date 8/22/19	Time 0942	Received by:	Org.	Date	Time
Relinquished by: <i>Wendy Palencia</i>	Org. 0628	Date 8/26/19	Time 0855	Relinquished by:	Org.	Date	Time
Received by: <i>Stephanie Montaño</i>	Org.	Date 8/27/19	Time 9:50	Received by:	Org.	Date	Time

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

## Contract Verification Form (CVR)

Project Leader MITCHELL

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 620157

Analytical Lab GEL

SDG No. 488696

*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		

Line No.	Item	Complete?		If no, explain
		Yes	No	
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 or 1-sigma for bioassay) 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		

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	N/A		
	c) Laboratory control sample duplicate RPD data reported and met for other analyses	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		
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 and TO-15) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		



Line No.	Item	Yes	No	Comments
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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		

Line No.	Item	Yes	No	Comments
4.6	Radiochemistry and General Chemistry a) Instrument run logs provided	X		

## 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: 09-30-2019 09:18:00

Closed by: Wendy Palencia Date: 09-30-2019 09:18:00

**Mixed Waste Landfill**

**Biota Monitoring**

**September 2019 Sampling Event**

## Memorandum

Date: October 28, 2019  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 620222  
SDG: 490227  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: Metals

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

### **Summary**

Three soil samples were prepared and analyzed with approved procedures using methods EPA 6010D (ICP-AES) and EPA 7471B (CVAA-Hg). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times and Preservation**

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

### **ICP-MS Instrument Tune**

No ICP-MS data was reported.

### **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 follows. Zn was detected at  $\leq$  the PQL in the MB. The associated sample results were detected  $\geq 5X$  the blank value and will not be qualified.

#### **ICP -MS Internal Standards**

No ICP-MS data was reported.

#### **Matrix Spike (MS)**

The MS met all QC acceptance criteria.

#### **Laboratory Replicate**

The replicates met all QC acceptance criteria, except as follows. The replicate RPDs were  $>20\%$  but  $\leq 35\%$  for Ba and Cr and both the original and replicate results were  $\geq 5X$  the PQL. The samples were soils and will not be qualified, based on professional judgment.

#### **Laboratory Control Sample (LCS)**

The LCS met all QC acceptance criteria.

#### **Detection Limits/Dilutions**

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

#### **ICP-AES**

Samples -001 and -003 were diluted 10X for Ag due to matrix interference.

#### **ICP Interference Check Sample (ICS A and AB)**

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

#### **ICP Serial Dilution**

The serial dilutions met all QC acceptance criteria.

#### **Other QC**

A field duplicate pair was submitted with ARCO 620222. 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:** 10/31/2019

## Memorandum

Date: October 28, 2019  
To: File  
From: Mary Donovan  
Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 620223  
SDG: 490227  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: RAD

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

### Summary

Three soil samples were prepared and analyzed with approved procedures using method DOE HASL 300, 4.5.2.3/Ga-01-R (gamma spec, 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 Be-7 and Ra-224 results for sample 490227004 and the Th-234 and U-238 results for sample -005 were rejected by the laboratory due to the peaks not meeting identification criteria and will be **qualified R,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**

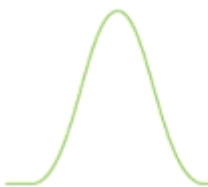
A field duplicate pair was submitted on ARCOG 620223. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 10/31/2019



## Sample Findings Summary



AR/COC: 620222, 620223

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE HASL 300, 4.5.2.3/Ga-			
	109074-001/MWL AHSS-01-2019	Americium-241 (14596-10-2)	BD, FR3
	109074-001/MWL AHSS-01-2019	Beryllium-7 (13966-02-4)	R, Z2
	109074-001/MWL AHSS-01-2019	Bismuth-212 (14913-49-6)	J, FR7
	109074-001/MWL AHSS-01-2019	Cesium-137 (10045-97-3)	J, FR7
	109074-001/MWL AHSS-01-2019	Cobalt-60 (10198-40-0)	BD, FR3
	109074-001/MWL AHSS-01-2019	Neptunium-237 (13994-20-2)	BD, FR3
	109074-001/MWL AHSS-01-2019	Radium-223 (15623-45-7)	BD, FR3
	109074-001/MWL AHSS-01-2019	Radium-224 (13233-32-4)	R, Z2
	109074-001/MWL AHSS-01-2019	Sodium-22 (13966-32-0)	BD, FR3
	109074-001/MWL AHSS-01-2019	Thorium-227 (15623-47-9)	BD, FR3
	109074-001/MWL AHSS-01-2019	Thorium-231 (14932-40-2)	BD, FR3
	109074-001/MWL AHSS-01-2019	Thorium-234 (15065-10-8)	BD, FR3
	109074-001/MWL AHSS-01-2019	Uranium-235 (15117-96-1)	BD, FR3
	109074-001/MWL AHSS-01-2019	Uranium-238 (7440-61-1)	BD, FR3
	109075-001/MWL AHSS-02-2019	Americium-241 (14596-10-2)	BD, FR3



Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	109075-001/MWL AHSS-02-2019	Beryllium-7 (13966-02-4)	J, FR7
	109075-001/MWL AHSS-02-2019	Cobalt-60 (10198-40-0)	BD, FR3
	109075-001/MWL AHSS-02-2019	Neptunium-237 (13994-20-2)	BD, FR3
	109075-001/MWL AHSS-02-2019	Radium-223 (15623-45-7)	BD, FR3
	109075-001/MWL AHSS-02-2019	Radium-224 (13233-32-4)	J, FR7
	109075-001/MWL AHSS-02-2019	Sodium-22 (13966-32-0)	BD, FR3
	109075-001/MWL AHSS-02-2019	Thorium-227 (15623-47-9)	BD, FR3
	109075-001/MWL AHSS-02-2019	Thorium-231 (14932-40-2)	BD, FR3
	109075-001/MWL AHSS-02-2019	Thorium-234 (15065-10-8)	R, Z2
	109075-001/MWL AHSS-02-2019	Uranium-235 (15117-96-1)	BD, FR3
	109075-001/MWL AHSS-02-2019	Uranium-238 (7440-61-1)	R, Z2
	109076-001/MWL AHSS-01-2019	Americium-241 (14596-10-2)	BD, FR3
	109076-001/MWL AHSS-01-2019	Beryllium-7 (13966-02-4)	J, FR7
	109076-001/MWL AHSS-01-2019	Cesium-137 (10045-97-3)	J, FR7
	109076-001/MWL AHSS-01-2019	Cobalt-60 (10198-40-0)	BD, FR3
	109076-001/MWL AHSS-01-2019	Neptunium-237 (13994-20-2)	BD, FR3
	109076-001/MWL AHSS-01-2019	Radium-223 (15623-45-7)	BD, FR3
	109076-001/MWL AHSS-01-2019	Sodium-22 (13966-32-0)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	109076-001/MWL AHSS-01-2019	Thorium-227 (15623-47-9)	BD, FR3
	109076-001/MWL AHSS-01-2019	Thorium-231 (14932-40-2)	BD, FR3
	109076-001/MWL AHSS-01-2019	Thorium-234 (15065-10-8)	BD, FR3
	109076-001/MWL AHSS-01-2019	Uranium-235 (15117-96-1)	BD, FR3
	109076-001/MWL AHSS-01-2019	Uranium-238 (7440-61-1)	BD, FR3

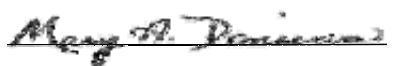
All other analyses met QC acceptance criteria; no further data should be qualified.

## Sandia Data Validation Summary Worksheet

ARCOG#: 620222 and 620223	Site/Project: MWL LTMMP	Validation Date: 10/28/2019
SDG #: 490227	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Soil	# of Samples: 6	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								

<u>Comments:</u> Collected: 09/09/2019
<u>Validated by:</u>  

## Sandia Inorganic Metals Worksheet

ARCO #s: 620222	SDG #(s): 490227	Matrix: Soil
Laboratory Sample IDs: 490227001, -002, -003		
Method/Batch #s: <b>3050B/6010D</b> :1929876(prepare)/1929877 <b>7471B</b> : 1923534(prepare)/1923539		

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

Analyte (outliers)	Calibration						MB mg/kg	5X Blank mg/kg	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R			
	Int. mg/L	R <sup>2</sup>	ICV	CCV	ICB ug/L	CCB ug/L												
Zn	NA	✓	✓	✓	✓	✓	0.434J	2.17	✓	✓	✓	✓	NA	NA	✓			
Ba	NA	✓	✓	✓	✓	✓	✓	NA	✓	✓	24.3	✓	NA	NA	✓			
Cr	NA	✓	✓	✓	✓	✓	✓	NA	✓	✓	23.4	✓	NA	NA	✓			

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

Comments: HTs OK. MS/DUP/SD on sample -001  
 Ca, Mg, Al, Fe < ICSA for all samples  
 Samples -001 and -003 diluted 10X for Ag due to matrix interference



Batch No.

**SMO Use**

AR/COC

620222

Project Name:	MWL LTMMMP
Project/Task Manager:	Michael Mitchell
Project/Task Number:	195122.10.11.08
Service Order:	CF01-10 <i>Joe</i>
	<i>20 9/11/19</i>

Date Samples Shipped:	9/13/19
Carrier/Waybill No.	303911
Lab Contact:	Edie Kent/843-769-7385
Lab Destination:	GEL
Contract No.:	1983530

SMO Authorization: [Signature]  
 SMO Contact Phone: 505-844-3132  
 Wendy Palencia/505-844-3132  
 Send Report to SMO:  
 Stephanie Montaño/505-284-2553

☐ Waste Characterization  
☐ RMA  
☐ Released by COC No.

☒ 4° Celsius

Tech Area:	
Building:	Room:

**Operational Site:**

Bill to: Sandia National Laboratories (Accounts Payable),  
P.O. Box 5800, MS-0154  
Albuquerque, NM 87185-0154

[illegible]

**Last Chain:** ☐ Yes

Validation Req'd:	<input checked="" type="checkbox"/>	Yes
-------------------	-------------------------------------	-----

Background: ☐ Yes

Confirmatory: ☐ Yes

### Sample Tracking

SMO Use

Special Instructions/QC Requirements:

EDD ☒ Yes

Turnaround Time	<input type="checkbox"/> 7-Day*	<input type="checkbox"/> 15-Day*	<input checked="" type="checkbox"/> 30-Day
-----------------	---------------------------------	----------------------------------	--



Negotiated TAT	
----------------	--

Sample Disposal	<input type="checkbox"/> Return to Client	<input checked="" type="checkbox"/> Disposal by Lab
-----------------	---	---

Return Samples By:

Comments: Include RCRA Metals and Be, Co, Cu, Ni, V, Zn
---

Conditions on  
Receipt

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
		Robert Ziock		RZ
	Danielle Michel		DMM	SNL/08854/845-7706

Relinquished by	<i>[Signature]</i>	Org.	0054	Date	9/9/19	Time	1110
Received by	<i>[Signature]</i>	Org.	0628	Date	9/9/19	Time	1110
Relinquished by	<i>[Signature]</i>	Org.	0628	Date	9/13/19	Time	0940
Received by	<i>[Signature]</i>	Org.		Date	9-13-19	Time	855

Relinquished by	Org.	Date	Time
Received by	Org.	Date	Time
Relinquished by	Org.	Date	Time
Received by	Org.	Date	Time

Lab Use

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



## Contract Verification Form (CVR)

Project Leader MITCHELL

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 620222 &amp; 620223

Analytical Lab GEL

SDG No. 490227

*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		



Line No.	Item	Complete?		If no, explain
		Yes	No	
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 or 1-sigma for bioassay) 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	RPD for barium, chromium and vanadium outside acceptance range for sample duplicate (QC1204411534)

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	N/A		
	c) Laboratory control sample duplicate RPD data reported and met for other analyses	N/A		
3.5	Blank data a) Method or reagent blank data reported and met for all samples		X	Zinc detected in method blank (QC1204411532)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met	N/A		
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 and TO-15) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		

Line No.	Item	Yes	No	Comments
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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	X		
	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		

Line No.	Item	Yes	No	Comments
4.6	Radiochemistry and General Chemistry a) Instrument run logs provided	X		

## 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: 10-28-2019 09:16:00

Closed by: Wendy Palencia Date: 10-28-2019 09:16:00

## **ANNEX C**

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

**April 2019-March 2020**

#### **Field Forms**

**Sample Summary Sheet**

**Data Validation Reports**

**Contract Verification Reviews**

**Certificates of Analysis**

**FIELD SAMPLING FORMS**  
**MIXED WASTE LANDFILL**  
**LONG-TERM MONITORING AND MAINTENANCE**  
**SOIL-VAPOR MONITORING**

<b>Form Title</b>	<b>Corresponding Procedure</b>
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 2019 SOIL-VAPOR MONITORING**







## Soil Vapor Sampling Log Form

[illegible]

**Field Notes:** PID Background = 0.1 ppm  
Elevation at ~5200 ft  
OB/NMED split Sampling  
ARCC 619663

## Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cc/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
FB4	5/2/19	1019	8449	NA	NA	-24	-8	MWL-SV04
MWL-SV04-50'	5/2/19	1021	NA	0.1	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1022	↓	↓	↓	↓	↓	
		1026	34001274	NA	NA	-25	-8	
MWL-SV04-100'		1033	NA	0.2	10	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1034	↓	↓	↓	↓	↓	
		1035	34002025	NA	NA	-25	-8	
MWL-SV04-200'		1037	NA	0.1	10	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1039	↓	↓	↓	↓	↓	
		1042	34000102	NA	NA	-26	-8	
MWL-SV04-300'		1047	NA	0.1	12	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1049	↓	↓	↓	↓	↓	
		1050	8050	NA	NA	-25	-8	
MWL-SV04-400'		1056	NA	0.2	10	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1057	↓	↓	↓	↓	↓	
		1059	34002119	NA	NA	-26	-8	

## Field Notes:

Elevation at ~ 5200 FT  
 Slow sample fill @ 50', 200'  
 PID Background = 0.2 ppm  
 OBSERVED SPLIT SAMPLING  
 ARCO 619662

## Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cc/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
FB3	5/2/19	1109	5622	NA	NA	-25	-8	MWL-SV03
MWL-SV03-50'	5/2/19	1112	NA	0.1	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1113	↓	↓	↓	↓	↓	
		1114	34000826	NA	NA	-25	-8	
MWL-SV03-100'		1118	NA	0.2	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1120	↓	↓	↓	↓	↓	
		1122	8444	NA	NA	-26	-8	
		↓	34000501	NA	NA	-26	-8	DU
MWL-SV03-200		1126	NA	0.1	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1128	↓	↓	↓	↓	↓	
		1130	34000174	NA	NA	-25	-8	
MWL-SV03-300		1134	NA	0.1	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1136	↓	↓	↓	↓	↓	
		1143	8013	NA	NA	-26	-8	
		↓	34000021	NA	NA	-26	-8	DU
MWL-SV03-400		1151	NA	0.1	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1154	↓	↓	↓	↓	↓	
		1216	34001583	NA	NA	-25	-6	

Field Notes: Slow sample fill 300', 400'  
 Elevation at ~ 5200 ft.  
 PID Background = 0.1 ppm  
 OB/NMED Split Sampling  
 ARCO 619661

**SUMMARY SHEET FOR  
MAY 2019 SOIL-VAPOR SAMPLES**

**Sample Summary for MWL Soil Vapor Monitoring**  
**May 2019**

Well ID	Sample Date	Sample ID / Port	SUMMA Number	ARCOC	Sample Number	Sample Type	Associated Field Blank (ARCOC #/Sample #)	Comments
<b>Mixed Waste Landfill Soil Vapor Monitoring: Project Task Number 195122.10.11.08 / Service Order Number CF 01-19</b>								
MWL-SV01	2-May-19	MWL-SV01-42.5	8279	619660	108092	Environmental	619660 / 108091	
		MWL-SV FB-1	34001471		108091	Field QC	n/a	Ultra Pure N2
MWL-SV02	2-May-19	MWL-SV02-41.5	34001571	619659	108094	Environmental	619659 / 108093	
		MWL-SV FB-2	34000205		108093	Field QC	n/a	Ultra Pure N2
MWL-SV03	2-May-19	MWL-SV03-50	34000826	619661	108097	Environmental	619661 / 108096	
		MWL-SV03-100	8444		108098	Environmental		
		MWL-SV03-100	34000501		108099	Duplicate		
		MWL-SV03-200	34000174		108100	Environmental		
		MWL-SV03-300	8013		108101	Environmental		
		MWL-SV03-300	34000021		108102	Duplicate		
		MWL-SV03-400	34001583		108103	Environmental		
		MWL-SV FB-3	5622		108096	Field QC	n/a	Ultra Pure N2
MWL-SV04	2-May-19	MWL-SV04-50	34001274	619662	108105	Environmental	619662 / 108104	
		MWL-SV04-100	34002025		108106	Environmental		
		MWL-SV04-200	34000102		108107	Environmental		
		MWL-SV04-300	8050		108108	Environmental		
		MWL-SV04-400	34002119		108109	Environmental		
		MWL-SV FB-4	8449		108104	Field QC	n/a	Ultra Pure N2
MWL-SV05	2-May-19	MWL-SV05-50	34000564	619663	108117	Environmental	619663 / 108116	
		MWL-SV05-100	34000610		108118	Environmental		
		MWL-SV05-200	7527		108119	Environmental		
		MWL-SV05-300	34000542		108120	Environmental		
		MWL-SV05-400	34001443		108121	Environmental		
		MWL-SV FB-5	34001211		108116	Field QC	n/a	Ultra Pure N2

**DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES**

**MIXED WASTE LANDFILL**

**SOIL-VAPOR MONITORING**

**MAY 2019**

**AR/COC NUMBERS 619659, 619660, 619661, 619662, 619663**



## Memorandum

Date: June 25, 2019

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 619659, 619660, 619661, 619662 and 619663  
SDG: 320-50040  
Laboratory: Eurofins TestAmerica, 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. For the initial calibration associated with samples 320-50040-15 through -24, the intercept was negative with an absolute value  $>$  the MDL but  $\leq 3X$  the MDL for benzyl chloride. The associated result for sample -16 was a detect  $\leq 3X$  the value of the intercept and will be **qualified J-,I5**. The remaining associated sample results were non-detect and will be **qualified UJ,I5**.
2. Methylene chloride; benzyl chloride; ethylbenzene; styrene; 1,2,4-trichlorobenzene; m,p-xylene and o-xylene were detected at  $\leq$  the PQL in the method blank associated with samples -15 through -24. The benzyl chloride result for sample -16; the methylene chloride results for samples -15, -17, -19, -20, -21, -22, -23 and -24; the styrene result for sample -15; the 1,2,4-trichlorobenzene results for samples -15, -16, -17, -18 and -20 and the m,p-xylene and o-xylene results for samples -15, -16 and -17 were detects  $\leq$  the PQL and will be **qualified U,B**; non-detect at their respective PQLs. The methylene chloride result for sample -16 was reported as a detect at the PQL; however, the on-column result was  $< 10X$  the method blank result and will be **qualified 0.0014U,B**; non-detect at the PQL.
3. Acetone was detected at  $\leq$  the PQL in FB-1, sample -3 associated with sample -4. The associated sample result was a detect  $\leq$  the PQL and will be **qualified 0.034U,B2**; non-detect at the PQL.

4. Acetone and carbon disulfide were detected at  $\leq$  the PQL in FB-3, sample -5 associated with samples -6 through -12. The associated sample results for acetone were detects  $\leq$  the PQL and will be **qualified U,B2**; non-detect at their respective PQLs. The carbon disulfide result for sample -9 was a detect  $\leq$  the PQL and will be **qualified 0.0038U,B2**; non-detect at the PQL.
5. Acetone was detected at  $\leq$  the PQL in FB-4, sample -13 associated with samples -14 through -18. The acetone results for samples -14, -16, -17 and -18 were detects  $\leq$  the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.
6. Acetone was detected at  $\leq$  the PQL in FB-5, sample -19 associated with samples -20 through -24. All associated sample results were detects  $\leq$  the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.
7. The vinyl acetate result for sample -21 was  $>$  the PQL but since the mass spectra were inconclusive, the result will be **qualified N,Z1**.

Data are acceptable except as noted above 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.

### **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.

### **Blanks**

No target analytes were detected in the blanks except as noted above in the Summary section and as follows.

Methylene chloride, benzyl chloride, ethylbenzene, styrene; 1,2,4-trichlorobenzene; m,p-xylene and o-xylene were detected at  $\leq$  the PQL in the method blank associated with samples -15 through -24. All associated sample results *except* sample -16 for benzyl chloride; all associated sample results for ethylbenzene; the methylene chloride result for sample -18; the styrene results for all samples *except* sample -15; the 1,2,4-trichlorobenzene results for samples -19, -21, -22, -23 and -24 and the m,p-xylene and o-xylene results for samples -18 through -24 were non-detect and will not be qualified.

Tetrachloroethene was detected at  $\leq$  the PQL in FB-1, sample -3 associated with sample -4. The associated sample result was a detect  $>5X$  the FB value and will not be qualified.

Trichloroethene was detected at  $>$  the PQL and acetone and chlorobenzene were detected at  $\leq$  the PQL in FB-2, sample -1 associated with sample -2. The associated sample results for acetone and chlorobenzene were non-detect and will not be qualified. The associated sample result for trichloroethene was a detect  $>5X$  the FB value and will not be qualified.

Tetrachloroethene and carbon disulfide were detected at  $\leq$  the PQL in FB-3, sample -5 associated with samples -6 through -12. All associated sample results for tetrachloroethene were detects  $>5X$  the FB value and will not be qualified. The carbon disulfide result for sample -12 was a detect  $>5X$  the FB value and will not be qualified. All remaining associated sample results for carbon disulfide *except* sample -9 were non-detect and will not be qualified.

Acetone, tetrachloroethene and toluene were detected at  $\leq$  the PQL in FB-4, sample -13 associated with samples -14 through -18. The acetone result for sample -15 and the toluene results for all samples were non-detect and should not be qualified. The tetrachloroethene result for all samples were detects  $>5X$  the FB value and will not be qualified.

Chloromethane, methylene chloride, dichlorodifluoromethane and tetrachloroethene were detected at  $\leq$  the PQL in FB-5, sample -19 associated with samples -20 through -24. The chloromethane result for all samples were non-detect and will not be qualified. The dichlorodifluoromethane and tetrachloroethene results for all samples were detects  $>5X$  the FB values and will not be qualified. The methylene chloride result for FB-5, sample -19, was qualified non-detect due to method blank contamination and will not be applied to the associated sample results.

It should be noted that, according to the canister sample reports, several target analytes including acetone and methylene chloride were present in the certified canisters at  $<$  the PQL.

### **Surrogates**

All surrogate acceptance criteria were met.

### **Internal Standards**

All internal standards met QC acceptance criteria.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

An MS/MSD was not performed.

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

The LCS/LCSD met all QC acceptance criteria for accuracy and precision.

### **Detection Limits/Dilutions**

All detection limits were properly reported and correctly adjusted for dilutions. The following samples were diluted for all target analytes .

Sample -2 (6.98X); -4 (6.74X); -6 (3.65X); -7 (4.77X); -8 (4.61X); -9 (4.73X); -10 (4.64X); -11 (6.26X); -12 (9.99X); -15 (3.29X); -16 (3.49X); -17 (3.63X); -18 (3.7X); -20 (2.08X); -21 (3.51X); -22 (4.24X); -23 (2.51X) and -24 (2.59X).

### **Tentatively Identified Compounds (TICs)**

TIC reports were not required.

### **Other QC**

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

FBs were submitted with each ARCOC and were associated with the samples on the same ARCOC. Two field duplicate pairs were submitted with ARCOC 619661. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

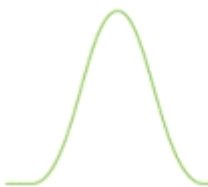
No other specific issues that affect data quality were identified.

**Reviewed by:** Mary Donovan

**Level:** I

**Date:** 06/25/19

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## Sample Findings Summary



AR/COC: 619659, 619660, 619661, 619662, 619663

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15			
	MWL-SV FB-5	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV FB-5	METHYLENE CHLORIDE (75-09-2)	0.0004U, B
	MWL-SV01-42.5	ACETONE (67-64-1)	0.034U, B2
	MWL-SV03-100	ACETONE (67-64-1)	0.024U, B2
	MWL-SV03-100	ACETONE (67-64-1)	0.023U, B2
	MWL-SV03-200	ACETONE (67-64-1)	0.024U, B2
	MWL-SV03-200	CARBON DISULFIDE (75-15-0)	0.0038U, B2
	MWL-SV03-300	ACETONE (67-64-1)	0.023U, B2
	MWL-SV03-300	ACETONE (67-64-1)	0.031U, B2
	MWL-SV03-400	ACETONE (67-64-1)	0.05U, B2
	MWL-SV03-50	ACETONE (67-64-1)	0.018U, B2
	MWL-SV04-100	1,2,4-TRICHLOROBENZENE (120-82-1)	0.0066U, B
	MWL-SV04-100	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV04-100	M,P-XYLENE (179601-23-1)	0.0026U, B
	MWL-SV04-100	METHYLENE CHLORIDE (75-09-2)	0.0013U, B
	MWL-SV04-100	O-XYLENE (95-47-6)	0.0013U, B
	MWL-SV04-100	STYRENE (100-42-5)	0.0013U, B
	MWL-SV04-200	1,2,4-TRICHLOROBENZENE (120-82-1)	0.007U, B
	MWL-SV04-200	ACETONE (67-64-1)	0.017U, B2
	MWL-SV04-200	BENZYL CHLORIDE (100-44-7)	0.0028UJ, B,I5
	MWL-SV04-200	M,P-XYLENE (179601-23-1)	0.0028U, B
	MWL-SV04-200	METHYLENE CHLORIDE (75-09-2)	0.0014U, B
	MWL-SV04-200	O-XYLENE (95-47-6)	0.0014U, B

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	MWL-SV04-300	1,2,4-TRICHLOROBENZENE (120-82-1)	0.0073U, B
	MWL-SV04-300	ACETONE (67-64-1)	0.018U, B2
	MWL-SV04-300	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV04-300	M,P-XYLENE (179601-23-1)	0.0029U, B
	MWL-SV04-300	METHYLENE CHLORIDE (75-09-2)	0.0015U, B
	MWL-SV04-300	O-XYLENE (95-47-6)	0.0015U, B
	MWL-SV04-400	1,2,4-TRICHLOROBENZENE (120-82-1)	0.0074U, B
	MWL-SV04-400	ACETONE (67-64-1)	0.019U, B2
	MWL-SV04-400	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV04-50	ACETONE (67-64-1)	0.005U, B2
	MWL-SV05-100	ACETONE (67-64-1)	0.018U, B2
	MWL-SV05-100	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV05-100	METHYLENE CHLORIDE (75-09-2)	0.0014U, B
	MWL-SV05-100	VINYL ACETATE (108-05-4)	N, Z1
	MWL-SV05-200	ACETONE (67-64-1)	0.021U, B2
	MWL-SV05-200	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV05-200	METHYLENE CHLORIDE (75-09-2)	0.0017U, B
	MWL-SV05-300	ACETONE (67-64-1)	0.013U, B2
	MWL-SV05-300	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV05-300	METHYLENE CHLORIDE (75-09-2)	0.001U, B
	MWL-SV05-400	ACETONE (67-64-1)	0.013U, B2
	MWL-SV05-400	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV05-400	METHYLENE CHLORIDE (75-09-2)	0.001U, B
	MWL-SV05-50	1,2,4-TRICHLOROBENZENE (120-82-1)	0.0042U, B
	MWL-SV05-50	ACETONE (67-64-1)	0.01U, B2
	MWL-SV05-50	BENZYL CHLORIDE (100-44-7)	UJ, I5
	MWL-SV05-50	METHYLENE CHLORIDE (75-09-2)	0.00083U, B

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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
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All other analyses met QC acceptance criteria; no further data should be qualified.

## Sandia Data Validation Summary Worksheet

ARCOC#: 619659, 619660, 619661, 619662 and 619663	Site/Project: MWL LTMMP	Validation Date: 06/24/2019
SDG #:320-50040	Laboratory: Eurofins TestAmerica, Sacramento	Validator: Linda Thal
Matrix: Air	# of Samples: 24	CVR present: Yes
ARCOC(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

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

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

Comments: Collected 05/02/2019

Received by signature on the Relinquished by line

Validated by:





# Sandia Organic Worksheet (GC/MS VOC)

ARCOC #:619659, 619660, 619661, 619662 and 619663	SDG: 320-50040	Matrix: Air
Laboratory Sample IDs: 320-50040-1 through -24		
Method/Batch #s: TO-15/298072 (-1 thru -14); 298308 (-15 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	FB-1 -3	FB-2 -1	FB-3 -5	FB-4 -13
	Int.	RF/ Slope	RSD/r 2	(ICV)/ CCV %D									
298072 (-1 thru -14) ATMS 7 ICAL 05/24/2019. Linear:1,2,4-TCB													
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00019J	.00027J	.00031J	.00053J
Chlorobenzene	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	.00015J	✓	✓
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	.0008	✓	✓
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.000078J	✓	.00015J	.00019J
Carbon disulfide	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	.00016J	✓
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	.00025J
298308 (-15 thru -24) ATMS 9 ICAL 05/30/2019. Linear: Benzyl chloride, 1,2,4-Trichlorobenzene													
Benzyl chloride	-.232	✓	✓	✓	.000242J	.00121	✓	✓	✓	✓	NA		
Ethylbenzene	NA	✓	✓	✓	.0000723J	.000362	✓	✓	✓	✓	NA		
Methylene Chloride	NA	✓	✓	✓	.0000790J	(.00079)	✓	✓	✓	.00010J	(.0010)		
Styrene	NA	✓	✓	✓	.0000748J	.00037	✓	✓	✓	✓	NA		
1,2,4-Trichlorobenzene	✓	✓	✓	✓	.000753J	.00377	✓	✓	✓	✓	NA		
m,p-Xylene	NA	✓	✓	✓	.000189J	.00095	✓	✓	✓	✓	NA		
o-Xylene	NA	✓	✓	✓	.000103J	.00052	✓	✓	✓	✓	NA		
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	.0032J	(.032)		
Chloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00030J	.0015		
Dichlorodifluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	.00018J	.0009		
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	.000056J	.00028		
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 (MWL – 70-130%). RSDs and CCVs  $\leq$ 30%.

Samples missing ions that were “J” Qualified by the lab were not further qualified during DV. The vinyl acetate result for sample -21 was reported as > the RL but was missing m/z 86.

Canister certification batches indicated trace amounts of acetone, methylene chloride and other target analytes including carbon disulfide and 2-butanone



320-50040 Chain of Custody

Internal Lab

Page 1 of 1

Batch No. *MA*

SMO Use

AR/COC	619659
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Project Name:	MWL LTMMMP	Date Samples Shipped:	5/6/19
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.	247641
Project/Task Number:	195122.10.11.08	Lab Contact:	Lee Ann Heathcote/916-373-5600
Service Order:	CF01-19	Lab Destination:	TAL-WS
		Contract No.:	1636780

SMO Authorization:	<i>[Signature]</i>
SMO Contact Phone:	Wendy Palencia/505-844-3132
Send Report to SMO:	Stephanie Montaño/505-284-2553

☐ Waste Characterization  
☐ RMA  
☐ Released by COC No.

Bill to: Sandia National Laboratories (Accounts Payable),  
P.O. Box 5800, MS-0154  
Albuquerque, NM 87185-0154

Tech Area:		Operational Site:
Building:	Room:	

[illegible]

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 ☐

Conditions on  
Receipt

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	William Gibson		WG	SNL/08888/505-284-3307/505-239-7367
	Robert Lynch		RL	SNL/08888/505-844-4013/505-250-7090
	Zachary Tenorio		ZT	SNL/08888/505-845-8636/505-259-5765
	Denisha Sanchez		DS	SNL/08888/505-845-7829/505-208-1375
	Tim Jackson		TJ	SNL/08888/505-284-2547/505-263-6639

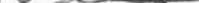
Sample Disposal ☐ Return to Client ☒ Disposal by Lab

<b>Return Samples By:</b>
Comments: Elevation and ambient pressure information on attached forms.

Lab Use

Relinquished by 2 Org. 8888 Date 5/3/19 Time 1055

Received by Ad E. L. M. gms Org. 00642 Date 5/3/19 Time 1055

Relinquished by  Org. 00642 Date 5/6/19 Time 0900

Received by	Org.	Date	Time
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Relinquished by	Org.	Date	Time
-----------------	------	------	------

Received by	Org.	Date	Time
-------------	------	------	------

Relinquished by Gabriela Tiev Org. TA-SAC Date 05-9-19 Time 9:10

Received by	Org.	Date	Time
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\*Prior confirmation with SMO required for 7 and 15 day TAT

Page 1 of 1

619660

[illegible]

Page 2001 of 2010

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

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <u>114</u>		SMO Use		AR/COC <b>619661</b>																																																																																																																																		
Project Name: MWL LTMMF		Date Samples Shipped: <u>5/6/19</u>		SMO Authorization: <u>[Signature]</u>																																																																																																																																		
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <u>297641</u>		SMO Contact Phone: <u>Wendy Palencia/505-844-3132</u>																																																																																																																																		
Project/Task Number: 195122.10.11.08		Lab Contact: Lee Ann Heathcote/916-373-5600		Send Report to SMO: <u>Stephanie Montaño/505-284-2553</u>																																																																																																																																		
Service Order: CF01-19		Lab Destination: TAL-WS		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> <b>4° Celsius</b>																																																																																																																																		
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 Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID																																																																																																																										
108096	001	MWL-SV FB-3 <u>5622</u>	NA	5/2/19 <u>11:09</u>	UPN	S	6 L	None	G	FB	VOC (TO-15)																																																																																																																											
108097	001	MWL-SV03-50 <u>34000826</u>	50	5/2/19 <u>11:14</u>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																											
108098	001	MWL-SV03-100 <u>8444</u>	100	5/2/19 <u>11:22</u>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																											
108099	001	MWL-SV03-100 <u>34000501</u>	100	5/2/19 <u>11:22</u>	SG	S	6 L	None	G	DU	VOC (TO-15)																																																																																																																											
108100	001	MWL-SV03-200 <u>34000174</u>	200	5/2/19 <u>11:30</u>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																											
108101	001	MWL-SV03-300 <u>8013</u>	300	5/2/19 <u>11:43</u>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																											
108102	001	MWL-SV03-300 <u>34000021</u>	300	5/2/19 <u>11:43</u>	SG	S	6 L	None	G	DU	VOC (TO-15)																																																																																																																											
108103	001	MWL-SV03-400 <u>34001583</u>	400	5/2/19 <u>12:10</u>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																											
<table border="1"> <tr> <td colspan="3">Last Chain: <input type="checkbox"/> Yes</td> <td colspan="3">Sample Tracking</td> <td colspan="3">SMO Use</td> <td colspan="3">Special Instructions/QC Requirements:</td> <td rowspan="4">Conditions on Receipt</td> </tr> <tr> <td colspan="3">Validation Req'd: <input checked="" type="checkbox"/> Yes</td> <td colspan="3">Date Entered:</td> <td colspan="3">EDD <input checked="" type="checkbox"/> Yes</td> <td colspan="3">Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day</td> </tr> <tr> <td colspan="3">Background: <input type="checkbox"/> Yes</td> <td colspan="3">Entered by:</td> <td colspan="3">Negotiated TAT <input type="checkbox"/></td> <td colspan="3">Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab</td> </tr> <tr> <td colspan="3">Confirmatory: <input type="checkbox"/> Yes</td> <td colspan="3">QC initials:</td> <td colspan="3">Return Samples By:</td> <td colspan="3">Comments: Elevation and ambient pressure information on attached forms.</td> </tr> <tr> <td rowspan="5">Sample Team Members</td> <td>Name</td> <td>Signature</td> <td>Init.</td> <td colspan="3">Company/Organization/Phone/Cell</td> <td colspan="3">Lab Use</td> <td colspan="3"></td> </tr> <tr> <td>William Gibson</td> <td><u>[Signature]</u></td> <td><u>WG</u></td> <td colspan="3">SNL/08888/505-284-3307/505-239-7367</td> <td colspan="3"></td> <td colspan="3"></td> </tr> <tr> <td>Robert Lynch</td> <td><u>[Signature]</u></td> <td><u>RL</u></td> <td colspan="3">SNL/08888/505-844-4013/505-250-7090</td> <td colspan="3"></td> <td colspan="3"></td> </tr> <tr> <td>Zachary Tenorio</td> <td><u>[Signature]</u></td> <td><u>ZT</u></td> <td colspan="3">SNL/08888/505-845-8636/505-259-5765</td> <td colspan="3"></td> <td colspan="3"></td> </tr> <tr> <td>Denisha Sanchez</td> <td><u>[Signature]</u></td> <td><u>DS</u></td> <td colspan="3">SNL/08888/505-845-7829/505-208-1375</td> <td colspan="3"></td> <td colspan="3"></td> </tr> <tr> <td>Tim Jackson</td> <td><u>[Signature]</u></td> <td><u>TJ</u></td> <td colspan="3">SNL/08888/505-284-2547/505-263-6639</td> <td colspan="3"></td> <td colspan="3"></td> </tr> </table>													Last Chain: <input type="checkbox"/> Yes			Sample Tracking			SMO Use			Special Instructions/QC Requirements:			Conditions on Receipt	Validation Req'd: <input checked="" type="checkbox"/> Yes			Date Entered:			EDD <input checked="" type="checkbox"/> Yes			Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day			Background: <input type="checkbox"/> Yes			Entered by:			Negotiated TAT <input type="checkbox"/>			Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			Confirmatory: <input type="checkbox"/> Yes			QC initials:			Return Samples By:			Comments: Elevation and ambient pressure information on attached forms.			Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell			Lab Use						William Gibson	<u>[Signature]</u>	<u>WG</u>	SNL/08888/505-284-3307/505-239-7367									Robert Lynch	<u>[Signature]</u>	<u>RL</u>	SNL/08888/505-844-4013/505-250-7090									Zachary Tenorio	<u>[Signature]</u>	<u>ZT</u>	SNL/08888/505-845-8636/505-259-5765									Denisha Sanchez	<u>[Signature]</u>	<u>DS</u>	SNL/08888/505-845-7829/505-208-1375									Tim Jackson	<u>[Signature]</u>	<u>TJ</u>	SNL/08888/505-284-2547/505-263-6639								
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	Robert Lynch	<u>[Signature]</u>	<u>RL</u>	SNL/08888/505-844-4013/505-250-7090																																																																																																																																		
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Relinquished by <u>[Signature]</u> Org. <u>8888</u> Date <u>5/3/19</u> Time <u>1050</u>			Relinquished by <u>[Signature]</u> Org. <u>00642</u> Date <u>5/3/19</u> Time <u>1050</u>			Relinquished by <u>[Signature]</u> Org. <u>00642</u> Date <u>5/6/19</u> Time <u>0900</u>			Relinquished by <u>Gabriela Ilier</u> Org. <u>TPA-SAC</u> Date <u>5-9-19</u> Time <u>9:10</u>																																																																																																																													
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\*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. *NA*

SMO Use

AR/COC **619662**

Project Name: MWL LTMMF	Date Samples Shipped: <i>5/6/19</i>	SMO Authorization: <i>[Signature]</i>	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>297641</i>	SMO Contact Phone: <i>[Signature]</i>	<input type="checkbox"/> RMA
Project/Task Number: 195122.10.11.08	Lab Contact: Lee Ann Heathcote/916-373-5600	Wendy Palencia/505-844-3132	<input type="checkbox"/> Released by COC No.
Service Order: CF01-19	Lab Destination: TAL-WS	Send Report to SMO:	<input checked="" type="checkbox"/> 4° Celsius
	Contract No.: 1636780	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		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
108104	001	MWL-SV FB-4 <i>8449</i>	NA	5/2/19 <i>10:19</i>	UPN	S	6 L	None	G	FB	VOC (TO-15)	
108105	001	MWL-SV04-50 <i>34001274</i>	50	5/2/19 <i>10:26</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
108106	001	MWL-SV04-100 <i>34002025</i>	100	5/2/19 <i>10:35</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
108107	001	MWL-SV04-200 <i>34000102</i>	200	5/2/19 <i>10:42</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
108108	001	MWL-SV04-300 <i>8650</i>	300	5/2/19 <i>10:50</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	
108109	001	MWL-SV04-400 <i>34002119</i>	400	5/2/19 <i>10:59</i>	SG	S	6 L	None	G	SA	VOC (TO-15)	

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			Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				
Name		Signature	Init.	Company/Organization/Phone/Cell	Return Samples By:		
William Gibson		<i>[Signature]</i>	<i>WG</i>	SNL/08888/505-284-3307/505-239-7367	Comments: Elevation and ambient pressure information on attached forms.		
Robert Lynch		<i>[Signature]</i>	<i>RL</i>	SNL/08888/505-844-4013/505-250-7090			
Zachary Tenorio		<i>[Signature]</i>	<i>ZT</i>	SNL/08888/505-845-8636/505-259-5765			
Denisha Sanchez		<i>[Signature]</i>	<i>DS</i>	SNL/08888/505-845-7829/505-208-1375			
Tim Jackson		<i>[Signature]</i>	<i>TJ</i>	SNL/08888/505-284-2547/505-263-6639			
Relinquished by <i>[Signature]</i>	Org. <i>8888</i>	Date <i>5/3/19</i>	Time <i>1055</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00642</i>	Date <i>5/3/19</i>	Time <i>1055</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00642</i>	Date <i>5/6/19</i>	Time <i>0900</i>	Relinquished by <i>Gabriela Ixer</i>	Org. <i>TA-SAC</i>	Date <i>5/9/19</i>	Time <i>9:10</i>
Received by	Org.	Date	Time	Received by	Org.	Date	Time

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



## ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1 5/12/19

Batch No. <u>NA</u>		SMO Use		AR/COC <b>619663</b>	
Project Name: MWL LTMP		Date Samples Shipped: <u>5/6/19</u>		SMO Authorization: <u>[Signature]</u>	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <u>297641</u>		SMO Contact Phone: <u>[Signature]</u>	
Project/Task Number: 195122.10.11.08		Lab Contact: Lee Ann Heathcote/916-373-5600		Wendy Palencia/505-844-3132	
Service Order: CF01-19		Lab Destination: TAL-WS		Send Report to SMO: <u>[Signature]</u>	
		Contract No.: 1636780		Stephanie Montaño/505-284-2553	
Tech Area:				<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Building:		Room:		Operational Site:	
				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	

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					
108116	001	MWL-SV FB-5 <u>34001211</u>	NA	5/2/19 <u>9:24</u>	UPN	S	6 L	None	G	FB	VOC (TO-15)	
108117	001	MWL-SV05-50 <u>34000564</u>	50	5/2/19 <u>9:33</u>	SG	S	6 L	None	G	SA	VOC (TO-15)	
108118	001	MWL-SV05-100 <u>34006610</u>	100	5/2/19 <u>9:41</u>	SG	S	6 L	None	G	SA	VOC (TO-15)	
108119	001	MWL-SV05-200 <u>7527</u>	200	5/2/19 <u>9:49</u>	SG	S	6 L	None	G	SA	VOC (TO-15)	
108120	001	MWL-SV05-300 <u>34006642</u>	300	5/2/19 <u>9:56</u>	SG	S	6 L	None	G	SA	VOC (TO-15)	
108121	001	MWL-SV05-400 <u>34001443</u>	400	5/2/19 <u>10:03</u>	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		Lab Use
	William Gibson	<u>[Signature]</u>	<u>WG</u>	SNL/08888/505-284-3307/505-239-7367		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		
	Robert Lynch	<u>[Signature]</u>	<u>RL</u>	SNL/08888/505-844-4013/505-250-7090		Return Samples By:		
	Zachary Tenorio	<u>[Signature]</u>	<u>ZT</u>	SNL/08888/505-845-8636/505-259-5765		Comments: Elevation and ambient pressure information on attached forms.		
	Denisha Sanchez	<u>[Signature]</u>	<u>DS</u>	SNL/08888/505-845-7829/505-208-1375				
	Tim Jackson	<u>[Signature]</u>	<u>TJ</u>	SNL/08888/505-284-2547/505-263-6639				

Relinquished by <u>3</u>	Org. <u>8888</u>	Date <u>5/3/19</u>	Time <u>1055</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>642</u>	Date <u>5/3/19</u>	Time <u>1055</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>00642</u>	Date <u>5/6/19</u>	Time <u>0900</u>	Relinquished by <u>Gabriele Dier</u>	Org. <u>TA-SAC</u>	Date <u>5-9-19</u>	Time <u>9:10</u>
Received by	Org.	Date	Time	Received by	Org.	Date	Time

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

**CONTRACT VERIFICATION REVIEW FORMS**  
**Mixed Waste Landfill Soil-Vapor Monitoring**  
**May 2019**

<b>AR/COC Number</b>	<b>Sample Type</b>
619659	Environmental*
619660	Environmental*
619661	Environmental*
619662	Environmental*
619663	Environmental*

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



## Contract Verification Form (CVR)

Project Leader Jackson

Project Name MWL LTMMF

Project/Task No. 195122\_10.11.08

ARCOG No. 619659, 619660, 619661, 619662 &amp; 619663

Analytical Lab TAL-WS

SDG No. 320-50040-1

*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		Lab receipt signature on wrong line for all ARCOGs
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		

Line No.	Item	Complete?		If no, explain
		Yes	No	
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 or 1-sigma for bioassay) 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		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
	b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
	c) Laboratory control sample duplicate RPD data reported and met for other analyses	X		
3.5	Blank data a) Method or reagent blank data reported and met for all samples		X	Benzyl chloride, ethylbenzene, methylene chloride, styrene, 1,2,4-trichlorobenzene, m,p-xylene and o-xylene detected in method blank (batch 298308)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, chlorobenzene and trichloroethene detected in MWL-SV FB-2. Acetone and tetrachloroethene detected in MWL-SV FB-1. Acetone, carbon disulfide and tetrachloroethene detected in MWL-SV FB-3. Acetone, tetrachloroethene and toluene detected in MWL-SV FB-4. Acetone, chloromethane, dichlorodifluoromethane, methylene chloride and tetrachloroethene detected in MWL-SV FB-5.
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 and TO-15) 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) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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		

Line No.	Item	Yes	No	Comments
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
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Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 06-18-2019 08:19:00

Closed by: Wendy Palencia Date: 06-18-2019 08:19:00

ARCOC No. 619659, 619660, 619661, 619662 & 619663

**CERTIFICATES OF ANALYSIS**

**Mixed Waste Landfill**

**May 2019 Soil-Vapor Samples**

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SVFB-2**

**Lab Sample ID: 320-50040-1**

**Date Collected: 05/02/19 09:09**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.00027</b>	<b>J</b>	0.0050	0.00018	ppm v/v			05/30/19 19:52	1
Benzene	ND		0.00040	0.000079	ppm v/v			05/30/19 19:52	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/30/19 19:52	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/30/19 19:52	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/30/19 19:52	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/30/19 19:52	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/30/19 19:52	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/30/19 19:52	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/30/19 19:52	1
<b>Chlorobenzene</b>	<b>0.00015</b>	<b>J</b>	0.00030	0.000064	ppm v/v			05/30/19 19:52	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/30/19 19:52	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/30/19 19:52	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/30/19 19:52	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/30/19 19:52	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/30/19 19:52	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/30/19 19:52	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/30/19 19:52	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/30/19 19:52	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/30/19 19:52	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			05/30/19 19:52	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/30/19 19:52	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/30/19 19:52	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/30/19 19:52	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/30/19 19:52	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/30/19 19:52	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/30/19 19:52	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/30/19 19:52	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/30/19 19:52	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/30/19 19:52	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/30/19 19:52	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/30/19 19:52	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/30/19 19:52	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/30/19 19:52	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			05/30/19 19:52	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/30/19 19:52	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/30/19 19:52	1
Tetrachloroethene	ND		0.00040	0.000051	ppm v/v			05/30/19 19:52	1
Toluene	ND		0.00040	0.000051	ppm v/v			05/30/19 19:52	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/30/19 19:52	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/30/19 19:52	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/30/19 19:52	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/30/19 19:52	1
<b>Trichloroethene</b>	<b>0.00080</b>		0.00040	0.00011	ppm v/v			05/30/19 19:52	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/30/19 19:52	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/30/19 19:52	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/30/19 19:52	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/30/19 19:52	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/30/19 19:52	1

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SVFB-2**

**Lab Sample ID: 320-50040-1**

**Date Collected: 05/02/19 09:09**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/30/19 19:52	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/30/19 19:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/30/19 19:52	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					05/30/19 19:52	1
Toluene-d8 (Surr)	96		70 - 130					05/30/19 19:52	1

**Client Sample ID: MWL-SV02-41.5**

**Lab Sample ID: 320-50040-2**

**Date Collected: 05/02/19 09:16**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.035	0.0012	ppm v/v			05/30/19 20:49	6.98
Benzene	ND		0.0028	0.00055	ppm v/v			05/30/19 20:49	6.98
Benzyl chloride	ND		0.0056	0.0011	ppm v/v			05/30/19 20:49	6.98
Bromodichloromethane	ND		0.0021	0.00046	ppm v/v			05/30/19 20:49	6.98
Bromoform	ND		0.0028	0.00049	ppm v/v			05/30/19 20:49	6.98
Bromomethane	ND		0.0056	0.0023	ppm v/v			05/30/19 20:49	6.98
2-Butanone (MEK)	0.0081		0.0056	0.0014	ppm v/v			05/30/19 20:49	6.98
Carbon disulfide	0.0016	J	0.0056	0.00054	ppm v/v			05/30/19 20:49	6.98
Carbon tetrachloride	ND		0.0056	0.00045	ppm v/v			05/30/19 20:49	6.98
Chlorobenzene	ND		0.0021	0.00045	ppm v/v			05/30/19 20:49	6.98
Chloroethane	ND		0.0056	0.0021	ppm v/v			05/30/19 20:49	6.98
Chloroform	0.0032		0.0021	0.00066	ppm v/v			05/30/19 20:49	6.98
Chloromethane	ND		0.0056	0.0014	ppm v/v			05/30/19 20:49	6.98
Dibromochloromethane	ND		0.0028	0.00055	ppm v/v			05/30/19 20:49	6.98
1,2-Dibromoethane (EDB)	ND		0.0056	0.00052	ppm v/v			05/30/19 20:49	6.98
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0028	0.0011	ppm v/v			05/30/19 20:49	6.98
1,2-Dichlorobenzene	ND		0.0028	0.00091	ppm v/v			05/30/19 20:49	6.98
1,3-Dichlorobenzene	ND		0.0028	0.00077	ppm v/v			05/30/19 20:49	6.98
1,4-Dichlorobenzene	ND		0.0028	0.0010	ppm v/v			05/30/19 20:49	6.98
Dichlorodifluoromethane	0.095		0.0028	0.0010	ppm v/v			05/30/19 20:49	6.98
1,1-Dichloroethane	0.0023		0.0021	0.00050	ppm v/v			05/30/19 20:49	6.98
1,2-Dichloroethane	ND		0.0056	0.00061	ppm v/v			05/30/19 20:49	6.98
1,1-Dichloroethene	0.011		0.0056	0.00090	ppm v/v			05/30/19 20:49	6.98
cis-1,2-Dichloroethene	0.0011	J	0.0028	0.00062	ppm v/v			05/30/19 20:49	6.98
trans-1,2-Dichloroethene	ND		0.0028	0.00070	ppm v/v			05/30/19 20:49	6.98
1,2-Dichloropropane	ND		0.0028	0.0017	ppm v/v			05/30/19 20:49	6.98
cis-1,3-Dichloropropene	ND		0.0028	0.00073	ppm v/v			05/30/19 20:49	6.98
trans-1,3-Dichloropropene	ND		0.0028	0.00061	ppm v/v			05/30/19 20:49	6.98
Ethylbenzene	ND		0.0028	0.00044	ppm v/v			05/30/19 20:49	6.98
4-Ethyltoluene	ND		0.0028	0.0013	ppm v/v			05/30/19 20:49	6.98
Hexachlorobutadiene	ND		0.014	0.0030	ppm v/v			05/30/19 20:49	6.98
2-Hexanone	ND		0.0028	0.00061	ppm v/v			05/30/19 20:49	6.98
4-Methyl-2-pentanone (MIBK)	ND		0.0028	0.00094	ppm v/v			05/30/19 20:49	6.98
Methylene Chloride	ND		0.0028	0.00050	ppm v/v			05/30/19 20:49	6.98

Eurofins TestAmerica, Sacramento



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV02-41.5**

**Lab Sample ID: 320-50040-2**

**Date Collected: 05/02/19 09:16**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.0028	0.00041	ppm v/v			05/30/19 20:49	6.98
1,1,2,2-Tetrachloroethane	ND		0.0028	0.00048	ppm v/v			05/30/19 20:49	6.98
<b>Tetrachloroethene</b>	<b>0.090</b>		0.0028	0.00036	ppm v/v			05/30/19 20:49	6.98
Toluene	ND		0.0028	0.00036	ppm v/v			05/30/19 20:49	6.98
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.052</b>		0.0028	0.0011	ppm v/v			05/30/19 20:49	6.98
1,2,4-Trichlorobenzene	ND		0.014	0.0030	ppm v/v			05/30/19 20:49	6.98
<b>1,1,1-Trichloroethane</b>	<b>0.071</b>		0.0021	0.00045	ppm v/v			05/30/19 20:49	6.98
1,1,2-Trichloroethane	ND		0.0028	0.00047	ppm v/v			05/30/19 20:49	6.98
<b>Trichloroethene</b>	<b>0.073</b>		0.0028	0.00073	ppm v/v			05/30/19 20:49	6.98
<b>Trichlorofluoromethane</b>	<b>0.33</b>		0.0028	0.0014	ppm v/v			05/30/19 20:49	6.98
1,2,4-Trimethylbenzene	ND		0.0056	0.0011	ppm v/v			05/30/19 20:49	6.98
1,3,5-Trimethylbenzene	ND		0.0028	0.00087	ppm v/v			05/30/19 20:49	6.98
Vinyl acetate	ND		0.0056	0.0010	ppm v/v			05/30/19 20:49	6.98
Vinyl chloride	ND		0.0028	0.00084	ppm v/v			05/30/19 20:49	6.98
m,p-Xylene	ND		0.0056	0.00070	ppm v/v			05/30/19 20:49	6.98
o-Xylene	ND		0.0028	0.00038	ppm v/v			05/30/19 20:49	6.98
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/30/19 20:49	6.98
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					05/30/19 20:49	6.98
Toluene-d8 (Surr)	93		70 - 130					05/30/19 20:49	6.98

**Client Sample ID: MWL-SVFB-1**

**Lab Sample ID: 320-50040-3**

**Date Collected: 05/02/19 08:38**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.00019</b>	<b>J</b>	0.0050	0.00018	ppm v/v			05/30/19 21:55	1
Benzene	ND		0.00040	0.000079	ppm v/v			05/30/19 21:55	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/30/19 21:55	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/30/19 21:55	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/30/19 21:55	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/30/19 21:55	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/30/19 21:55	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/30/19 21:55	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/30/19 21:55	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/30/19 21:55	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/30/19 21:55	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/30/19 21:55	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/30/19 21:55	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/30/19 21:55	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/30/19 21:55	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/30/19 21:55	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/30/19 21:55	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/30/19 21:55	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/30/19 21:55	1

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SVFB-1**

**Lab Sample ID: 320-50040-3**

**Date Collected: 05/02/19 08:38**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			05/30/19 21:55	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/30/19 21:55	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/30/19 21:55	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/30/19 21:55	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/30/19 21:55	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/30/19 21:55	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/30/19 21:55	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/30/19 21:55	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/30/19 21:55	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/30/19 21:55	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/30/19 21:55	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/30/19 21:55	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/30/19 21:55	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/30/19 21:55	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			05/30/19 21:55	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/30/19 21:55	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/30/19 21:55	1
<b>Tetrachloroethene</b>	<b>0.000078</b>	<b>J</b>	0.00040	0.000051	ppm v/v			05/30/19 21:55	1
Toluene	ND		0.00040	0.000051	ppm v/v			05/30/19 21:55	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/30/19 21:55	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/30/19 21:55	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/30/19 21:55	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/30/19 21:55	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			05/30/19 21:55	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/30/19 21:55	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/30/19 21:55	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/30/19 21:55	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/30/19 21:55	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/30/19 21:55	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/30/19 21:55	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/30/19 21:55	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		05/30/19 21:55	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 130		05/30/19 21:55	1
Toluene-d8 (Surr)	95		70 - 130		05/30/19 21:55	1

**Client Sample ID: MWL-SV01-42.5**

**Lab Sample ID: 320-50040-4**

**Date Collected: 05/02/19 08:47**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0047</b>	<b>J</b>	0.034	0.0012	ppm v/v			05/30/19 22:53	6.74
Benzene	ND		0.0027	0.00053	ppm v/v			05/30/19 22:53	6.74
Benzyl chloride	ND		0.0054	0.0011	ppm v/v			05/30/19 22:53	6.74
<b>Bromodichloromethane</b>	<b>0.00079</b>	<b>J</b>	0.0020	0.00044	ppm v/v			05/30/19 22:53	6.74
Bromoform	ND		0.0027	0.00047	ppm v/v			05/30/19 22:53	6.74

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV01-42.5**

**Lab Sample ID: 320-50040-4**

**Date Collected: 05/02/19 08:47**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromomethane	ND		0.0054	0.0023	ppm v/v			05/30/19 22:53	6.74
<b>2-Butanone (MEK)</b>	<b>0.0026</b>	<b>J</b>	0.0054	0.0013	ppm v/v			05/30/19 22:53	6.74
Carbon disulfide	ND		0.0054	0.00053	ppm v/v			05/30/19 22:53	6.74
Carbon tetrachloride	ND		0.0054	0.00043	ppm v/v			05/30/19 22:53	6.74
Chlorobenzene	ND		0.0020	0.00043	ppm v/v			05/30/19 22:53	6.74
Chloroethane	ND		0.0054	0.0021	ppm v/v			05/30/19 22:53	6.74
<b>Chloroform</b>	<b>0.017</b>		0.0020	0.00064	ppm v/v			05/30/19 22:53	6.74
Chloromethane	ND		0.0054	0.0013	ppm v/v			05/30/19 22:53	6.74
Dibromochloromethane	ND		0.0027	0.00053	ppm v/v			05/30/19 22:53	6.74
1,2-Dibromoethane (EDB)	ND		0.0054	0.00051	ppm v/v			05/30/19 22:53	6.74
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0027	0.0010	ppm v/v			05/30/19 22:53	6.74
1,2-Dichlorobenzene	ND		0.0027	0.00088	ppm v/v			05/30/19 22:53	6.74
1,3-Dichlorobenzene	ND		0.0027	0.00074	ppm v/v			05/30/19 22:53	6.74
1,4-Dichlorobenzene	ND		0.0027	0.0010	ppm v/v			05/30/19 22:53	6.74
<b>Dichlorodifluoromethane</b>	<b>0.091</b>		0.0027	0.00098	ppm v/v			05/30/19 22:53	6.74
<b>1,1-Dichloroethane</b>	<b>0.0027</b>		0.0020	0.00049	ppm v/v			05/30/19 22:53	6.74
1,2-Dichloroethane	ND		0.0054	0.00059	ppm v/v			05/30/19 22:53	6.74
<b>1,1-Dichloroethene</b>	<b>0.0078</b>		0.0054	0.00087	ppm v/v			05/30/19 22:53	6.74
<b>cis-1,2-Dichloroethene</b>	<b>0.0013</b>	<b>J</b>	0.0027	0.00060	ppm v/v			05/30/19 22:53	6.74
trans-1,2-Dichloroethene	ND		0.0027	0.00067	ppm v/v			05/30/19 22:53	6.74
1,2-Dichloropropane	ND		0.0027	0.0016	ppm v/v			05/30/19 22:53	6.74
cis-1,3-Dichloropropene	ND		0.0027	0.00070	ppm v/v			05/30/19 22:53	6.74
trans-1,3-Dichloropropene	ND		0.0027	0.00059	ppm v/v			05/30/19 22:53	6.74
Ethylbenzene	ND		0.0027	0.00042	ppm v/v			05/30/19 22:53	6.74
4-Ethyltoluene	ND		0.0027	0.0013	ppm v/v			05/30/19 22:53	6.74
Hexachlorobutadiene	ND		0.013	0.0029	ppm v/v			05/30/19 22:53	6.74
2-Hexanone	ND		0.0027	0.00059	ppm v/v			05/30/19 22:53	6.74
4-Methyl-2-pentanone (MIBK)	ND		0.0027	0.00091	ppm v/v			05/30/19 22:53	6.74
Methylene Chloride	ND		0.0027	0.00049	ppm v/v			05/30/19 22:53	6.74
Styrene	ND		0.0027	0.00040	ppm v/v			05/30/19 22:53	6.74
1,1,2,2-Tetrachloroethane	ND		0.0027	0.00047	ppm v/v			05/30/19 22:53	6.74
<b>Tetrachloroethene</b>	<b>0.47</b>		0.0027	0.00034	ppm v/v			05/30/19 22:53	6.74
Toluene	ND		0.0027	0.00034	ppm v/v			05/30/19 22:53	6.74
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.080</b>		0.0027	0.0011	ppm v/v			05/30/19 22:53	6.74
1,2,4-Trichlorobenzene	ND		0.013	0.0029	ppm v/v			05/30/19 22:53	6.74
<b>1,1,1-Trichloroethane</b>	<b>0.036</b>		0.0020	0.00044	ppm v/v			05/30/19 22:53	6.74
1,1,2-Trichloroethane	ND		0.0027	0.00045	ppm v/v			05/30/19 22:53	6.74
<b>Trichloroethene</b>	<b>0.10</b>		0.0027	0.00071	ppm v/v			05/30/19 22:53	6.74
<b>Trichlorofluoromethane</b>	<b>0.18</b>		0.0027	0.0013	ppm v/v			05/30/19 22:53	6.74
1,2,4-Trimethylbenzene	ND		0.0054	0.0011	ppm v/v			05/30/19 22:53	6.74
1,3,5-Trimethylbenzene	ND		0.0027	0.00084	ppm v/v			05/30/19 22:53	6.74
Vinyl acetate	ND		0.0054	0.00098	ppm v/v			05/30/19 22:53	6.74
Vinyl chloride	ND		0.0027	0.00081	ppm v/v			05/30/19 22:53	6.74
m,p-Xylene	ND		0.0054	0.00067	ppm v/v			05/30/19 22:53	6.74
o-Xylene	ND		0.0027	0.00036	ppm v/v			05/30/19 22:53	6.74

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		05/30/19 22:53	6.74

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV01-42.5**

**Lab Sample ID: 320-50040-4**

**Date Collected: 05/02/19 08:47**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		05/30/19 22:53	6.74
Toluene-d8 (Surr)	95		70 - 130		05/30/19 22:53	6.74

**Client Sample ID: MWL-SVFB-3**

**Lab Sample ID: 320-50040-5**

**Date Collected: 05/02/19 11:09**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.00031</b>	<b>J</b>	0.0050	0.00018	ppm v/v			05/30/19 23:57	1
Benzene	ND		0.00040	0.000079	ppm v/v			05/30/19 23:57	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/30/19 23:57	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/30/19 23:57	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/30/19 23:57	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/30/19 23:57	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/30/19 23:57	1
<b>Carbon disulfide</b>	<b>0.00016</b>	<b>J</b>	0.00080	0.000078	ppm v/v			05/30/19 23:57	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/30/19 23:57	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/30/19 23:57	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/30/19 23:57	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/30/19 23:57	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/30/19 23:57	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/30/19 23:57	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/30/19 23:57	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/30/19 23:57	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/30/19 23:57	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/30/19 23:57	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/30/19 23:57	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			05/30/19 23:57	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/30/19 23:57	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/30/19 23:57	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/30/19 23:57	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/30/19 23:57	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/30/19 23:57	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/30/19 23:57	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/30/19 23:57	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/30/19 23:57	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/30/19 23:57	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/30/19 23:57	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/30/19 23:57	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/30/19 23:57	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/30/19 23:57	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			05/30/19 23:57	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/30/19 23:57	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/30/19 23:57	1
<b>Tetrachloroethene</b>	<b>0.00015</b>	<b>J</b>	0.00040	0.000051	ppm v/v			05/30/19 23:57	1
Toluene	ND		0.00040	0.000051	ppm v/v			05/30/19 23:57	1

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SVFB-3**

**Lab Sample ID: 320-50040-5**

**Date Collected: 05/02/19 11:09**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/30/19 23:57	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/30/19 23:57	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/30/19 23:57	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/30/19 23:57	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			05/30/19 23:57	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/30/19 23:57	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/30/19 23:57	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/30/19 23:57	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/30/19 23:57	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/30/19 23:57	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/30/19 23:57	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/30/19 23:57	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130					05/30/19 23:57	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					05/30/19 23:57	1
Toluene-d8 (Surr)	94		70 - 130					05/30/19 23:57	1

**Client Sample ID: MWL-SV03-50**

**Lab Sample ID: 320-50040-6**

**Date Collected: 05/02/19 11:14**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0022	J	0.018	0.00065	ppm v/v			05/31/19 00:55	3.65
Benzene	0.00044	J	0.0015	0.00029	ppm v/v			05/31/19 00:55	3.65
Benzyl chloride	ND		0.0029	0.00059	ppm v/v			05/31/19 00:55	3.65
Bromodichloromethane	ND		0.0011	0.00024	ppm v/v			05/31/19 00:55	3.65
Bromoform	ND		0.0015	0.00026	ppm v/v			05/31/19 00:55	3.65
Bromomethane	ND		0.0029	0.0012	ppm v/v			05/31/19 00:55	3.65
2-Butanone (MEK)	ND		0.0029	0.00073	ppm v/v			05/31/19 00:55	3.65
Carbon disulfide	ND		0.0029	0.00028	ppm v/v			05/31/19 00:55	3.65
Carbon tetrachloride	0.00033	J	0.0029	0.00023	ppm v/v			05/31/19 00:55	3.65
Chlorobenzene	ND		0.0011	0.00023	ppm v/v			05/31/19 00:55	3.65
Chloroethane	ND		0.0029	0.0011	ppm v/v			05/31/19 00:55	3.65
Chloroform	0.0021		0.0011	0.00035	ppm v/v			05/31/19 00:55	3.65
Chloromethane	ND		0.0029	0.00072	ppm v/v			05/31/19 00:55	3.65
Dibromochloromethane	ND		0.0015	0.00029	ppm v/v			05/31/19 00:55	3.65
1,2-Dibromoethane (EDB)	ND		0.0029	0.00027	ppm v/v			05/31/19 00:55	3.65
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0015	0.00057	ppm v/v			05/31/19 00:55	3.65
1,2-Dichlorobenzene	ND		0.0015	0.00047	ppm v/v			05/31/19 00:55	3.65
1,3-Dichlorobenzene	ND		0.0015	0.00040	ppm v/v			05/31/19 00:55	3.65
1,4-Dichlorobenzene	ND		0.0015	0.00054	ppm v/v			05/31/19 00:55	3.65
Dichlorodifluoromethane	0.030		0.0015	0.00053	ppm v/v			05/31/19 00:55	3.65
1,1-Dichloroethane	0.0041		0.0011	0.00026	ppm v/v			05/31/19 00:55	3.65
1,2-Dichloroethane	ND		0.0029	0.00032	ppm v/v			05/31/19 00:55	3.65
1,1-Dichloroethene	0.015		0.0029	0.00047	ppm v/v			05/31/19 00:55	3.65
cis-1,2-Dichloroethene	ND		0.0015	0.00032	ppm v/v			05/31/19 00:55	3.65

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV03-50**

**Lab Sample ID: 320-50040-6**

**Date Collected: 05/02/19 11:14**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
trans-1,2-Dichloroethene	ND		0.0015	0.00037	ppm v/v			05/31/19 00:55	3.65
1,2-Dichloropropane	ND		0.0015	0.00088	ppm v/v			05/31/19 00:55	3.65
cis-1,3-Dichloropropene	ND		0.0015	0.00038	ppm v/v			05/31/19 00:55	3.65
trans-1,3-Dichloropropene	ND		0.0015	0.00032	ppm v/v			05/31/19 00:55	3.65
Ethylbenzene	ND		0.0015	0.00023	ppm v/v			05/31/19 00:55	3.65
4-Ethyltoluene	ND		0.0015	0.00068	ppm v/v			05/31/19 00:55	3.65
Hexachlorobutadiene	ND		0.0073	0.0016	ppm v/v			05/31/19 00:55	3.65
2-Hexanone	ND		0.0015	0.00032	ppm v/v			05/31/19 00:55	3.65
4-Methyl-2-pentanone (MIBK)	ND		0.0015	0.00049	ppm v/v			05/31/19 00:55	3.65
<b>Methylene Chloride</b>	<b>0.0011</b>	<b>J</b>	0.0015	0.00026	ppm v/v			05/31/19 00:55	3.65
Styrene	ND		0.0015	0.00022	ppm v/v			05/31/19 00:55	3.65
1,1,2,2-Tetrachloroethane	ND		0.0015	0.00025	ppm v/v			05/31/19 00:55	3.65
<b>Tetrachloroethene</b>	<b>0.21</b>		0.0015	0.00019	ppm v/v			05/31/19 00:55	3.65
<b>Toluene</b>	<b>0.00050</b>	<b>J</b>	0.0015	0.00019	ppm v/v			05/31/19 00:55	3.65
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.086</b>		0.0015	0.00059	ppm v/v			05/31/19 00:55	3.65
1,2,4-Trichlorobenzene	ND		0.0073	0.0016	ppm v/v			05/31/19 00:55	3.65
<b>1,1,1-Trichloroethane</b>	<b>0.0032</b>		0.0011	0.00024	ppm v/v			05/31/19 00:55	3.65
1,1,2-Trichloroethane	ND		0.0015	0.00024	ppm v/v			05/31/19 00:55	3.65
<b>Trichloroethene</b>	<b>0.17</b>		0.0015	0.00038	ppm v/v			05/31/19 00:55	3.65
<b>Trichlorofluoromethane</b>	<b>0.029</b>		0.0015	0.00072	ppm v/v			05/31/19 00:55	3.65
1,2,4-Trimethylbenzene	ND		0.0029	0.00059	ppm v/v			05/31/19 00:55	3.65
1,3,5-Trimethylbenzene	ND		0.0015	0.00046	ppm v/v			05/31/19 00:55	3.65
Vinyl acetate	ND		0.0029	0.00053	ppm v/v			05/31/19 00:55	3.65
Vinyl chloride	ND		0.0015	0.00044	ppm v/v			05/31/19 00:55	3.65
m,p-Xylene	ND		0.0029	0.00037	ppm v/v			05/31/19 00:55	3.65
o-Xylene	ND		0.0015	0.00020	ppm v/v			05/31/19 00:55	3.65
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		70 - 130					05/31/19 00:55	3.65
1,2-Dichloroethane-d4 (Surr)	106		70 - 130					05/31/19 00:55	3.65
Toluene-d8 (Surr)	95		70 - 130					05/31/19 00:55	3.65

**Client Sample ID: MWL-SV03-100**

**Lab Sample ID: 320-50040-7**

**Date Collected: 05/02/19 11:22**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0040</b>	<b>J</b>	0.024	0.00085	ppm v/v			05/31/19 02:50	4.77
Benzene	ND		0.0019	0.00038	ppm v/v			05/31/19 02:50	4.77
Benzyl chloride	ND		0.0038	0.00078	ppm v/v			05/31/19 02:50	4.77
Bromodichloromethane	ND		0.0014	0.00031	ppm v/v			05/31/19 02:50	4.77
Bromoform	ND		0.0019	0.00033	ppm v/v			05/31/19 02:50	4.77
Bromomethane	ND		0.0038	0.0016	ppm v/v			05/31/19 02:50	4.77
2-Butanone (MEK)	ND		0.0038	0.00095	ppm v/v			05/31/19 02:50	4.77
Carbon disulfide	ND		0.0038	0.00037	ppm v/v			05/31/19 02:50	4.77
Carbon tetrachloride	ND		0.0038	0.00031	ppm v/v			05/31/19 02:50	4.77

Eurofins TestAmerica, Sacramento



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV03-100**

**Lab Sample ID: 320-50040-7**

**Date Collected: 05/02/19 11:22**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlorobenzene	ND		0.0014	0.00031	ppm v/v			05/31/19 02:50	4.77
Chloroethane	ND		0.0038	0.0015	ppm v/v			05/31/19 02:50	4.77
<b>Chloroform</b>	<b>0.0029</b>		0.0014	0.00045	ppm v/v			05/31/19 02:50	4.77
Chloromethane	ND		0.0038	0.00094	ppm v/v			05/31/19 02:50	4.77
Dibromochloromethane	ND		0.0019	0.00038	ppm v/v			05/31/19 02:50	4.77
1,2-Dibromoethane (EDB)	ND		0.0038	0.00036	ppm v/v			05/31/19 02:50	4.77
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00074	ppm v/v			05/31/19 02:50	4.77
1,2-Dichlorobenzene	ND		0.0019	0.00062	ppm v/v			05/31/19 02:50	4.77
1,3-Dichlorobenzene	ND		0.0019	0.00052	ppm v/v			05/31/19 02:50	4.77
1,4-Dichlorobenzene	ND		0.0019	0.00071	ppm v/v			05/31/19 02:50	4.77
<b>Dichlorodifluoromethane</b>	<b>0.045</b>		0.0019	0.00069	ppm v/v			05/31/19 02:50	4.77
<b>1,1-Dichloroethane</b>	<b>0.0063</b>		0.0014	0.00034	ppm v/v			05/31/19 02:50	4.77
1,2-Dichloroethane	ND		0.0038	0.00042	ppm v/v			05/31/19 02:50	4.77
<b>1,1-Dichloroethene</b>	<b>0.023</b>		0.0038	0.00062	ppm v/v			05/31/19 02:50	4.77
<b>cis-1,2-Dichloroethene</b>	<b>0.0039</b>		0.0019	0.00042	ppm v/v			05/31/19 02:50	4.77
trans-1,2-Dichloroethene	ND		0.0019	0.00048	ppm v/v			05/31/19 02:50	4.77
1,2-Dichloropropane	ND		0.0019	0.0011	ppm v/v			05/31/19 02:50	4.77
cis-1,3-Dichloropropene	ND		0.0019	0.00050	ppm v/v			05/31/19 02:50	4.77
trans-1,3-Dichloropropene	ND		0.0019	0.00042	ppm v/v			05/31/19 02:50	4.77
Ethylbenzene	ND		0.0019	0.00030	ppm v/v			05/31/19 02:50	4.77
4-Ethyltoluene	ND		0.0019	0.00089	ppm v/v			05/31/19 02:50	4.77
Hexachlorobutadiene	ND		0.0095	0.0021	ppm v/v			05/31/19 02:50	4.77
2-Hexanone	ND		0.0019	0.00041	ppm v/v			05/31/19 02:50	4.77
4-Methyl-2-pentanone (MIBK)	ND		0.0019	0.00064	ppm v/v			05/31/19 02:50	4.77
Methylene Chloride	ND		0.0019	0.00034	ppm v/v			05/31/19 02:50	4.77
Styrene	ND		0.0019	0.00028	ppm v/v			05/31/19 02:50	4.77
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00033	ppm v/v			05/31/19 02:50	4.77
<b>Tetrachloroethene</b>	<b>0.27</b>		0.0019	0.00024	ppm v/v			05/31/19 02:50	4.77
Toluene	ND		0.0019	0.00024	ppm v/v			05/31/19 02:50	4.77
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.13</b>		0.0019	0.00078	ppm v/v			05/31/19 02:50	4.77
1,2,4-Trichlorobenzene	ND		0.0095	0.0021	ppm v/v			05/31/19 02:50	4.77
<b>1,1,1-Trichloroethane</b>	<b>0.0042</b>		0.0014	0.00031	ppm v/v			05/31/19 02:50	4.77
1,1,2-Trichloroethane	ND		0.0019	0.00032	ppm v/v			05/31/19 02:50	4.77
<b>Trichloroethene</b>	<b>0.23</b>		0.0019	0.00050	ppm v/v			05/31/19 02:50	4.77
<b>Trichlorofluoromethane</b>	<b>0.043</b>		0.0019	0.00093	ppm v/v			05/31/19 02:50	4.77
1,2,4-Trimethylbenzene	ND		0.0038	0.00077	ppm v/v			05/31/19 02:50	4.77
1,3,5-Trimethylbenzene	ND		0.0019	0.00060	ppm v/v			05/31/19 02:50	4.77
Vinyl acetate	ND		0.0038	0.00069	ppm v/v			05/31/19 02:50	4.77
Vinyl chloride	ND		0.0019	0.00057	ppm v/v			05/31/19 02:50	4.77
m,p-Xylene	ND		0.0038	0.00048	ppm v/v			05/31/19 02:50	4.77
o-Xylene	ND		0.0019	0.00026	ppm v/v			05/31/19 02:50	4.77
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/31/19 02:50	4.77
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					05/31/19 02:50	4.77
Toluene-d8 (Surr)	96		70 - 130					05/31/19 02:50	4.77

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV03-100**

**Lab Sample ID: 320-50040-8**

**Date Collected: 05/02/19 11:22**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0034</b>	<b>J</b>	0.023	0.00082	ppm v/v			05/31/19 01:53	4.61
Benzene	ND		0.0018	0.00036	ppm v/v			05/31/19 01:53	4.61
Benzyl chloride	ND		0.0037	0.00075	ppm v/v			05/31/19 01:53	4.61
Bromodichloromethane	ND		0.0014	0.00030	ppm v/v			05/31/19 01:53	4.61
Bromoform	ND		0.0018	0.00032	ppm v/v			05/31/19 01:53	4.61
Bromomethane	ND		0.0037	0.0015	ppm v/v			05/31/19 01:53	4.61
2-Butanone (MEK)	ND		0.0037	0.00092	ppm v/v			05/31/19 01:53	4.61
Carbon disulfide	ND		0.0037	0.00036	ppm v/v			05/31/19 01:53	4.61
<b>Carbon tetrachloride</b>	<b>0.00045</b>	<b>J</b>	0.0037	0.00030	ppm v/v			05/31/19 01:53	4.61
Chlorobenzene	ND		0.0014	0.00030	ppm v/v			05/31/19 01:53	4.61
Chloroethane	ND		0.0037	0.0014	ppm v/v			05/31/19 01:53	4.61
<b>Chloroform</b>	<b>0.0029</b>		0.0014	0.00044	ppm v/v			05/31/19 01:53	4.61
Chloromethane	ND		0.0037	0.00091	ppm v/v			05/31/19 01:53	4.61
Dibromochloromethane	ND		0.0018	0.00036	ppm v/v			05/31/19 01:53	4.61
1,2-Dibromoethane (EDB)	ND		0.0037	0.00035	ppm v/v			05/31/19 01:53	4.61
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0018	0.00071	ppm v/v			05/31/19 01:53	4.61
1,2-Dichlorobenzene	ND		0.0018	0.00060	ppm v/v			05/31/19 01:53	4.61
1,3-Dichlorobenzene	ND		0.0018	0.00051	ppm v/v			05/31/19 01:53	4.61
1,4-Dichlorobenzene	ND		0.0018	0.00069	ppm v/v			05/31/19 01:53	4.61
<b>Dichlorodifluoromethane</b>	<b>0.046</b>		0.0018	0.00067	ppm v/v			05/31/19 01:53	4.61
<b>1,1-Dichloroethane</b>	<b>0.0066</b>		0.0014	0.00033	ppm v/v			05/31/19 01:53	4.61
1,2-Dichloroethane	ND		0.0037	0.00041	ppm v/v			05/31/19 01:53	4.61
<b>1,1-Dichloroethene</b>	<b>0.024</b>		0.0037	0.00059	ppm v/v			05/31/19 01:53	4.61
<b>cis-1,2-Dichloroethene</b>	<b>0.0040</b>		0.0018	0.00041	ppm v/v			05/31/19 01:53	4.61
trans-1,2-Dichloroethene	ND		0.0018	0.00046	ppm v/v			05/31/19 01:53	4.61
1,2-Dichloropropane	ND		0.0018	0.0011	ppm v/v			05/31/19 01:53	4.61
cis-1,3-Dichloropropene	ND		0.0018	0.00048	ppm v/v			05/31/19 01:53	4.61
trans-1,3-Dichloropropene	ND		0.0018	0.00041	ppm v/v			05/31/19 01:53	4.61
Ethylbenzene	ND		0.0018	0.00029	ppm v/v			05/31/19 01:53	4.61
4-Ethyltoluene	ND		0.0018	0.00086	ppm v/v			05/31/19 01:53	4.61
Hexachlorobutadiene	ND		0.0092	0.0020	ppm v/v			05/31/19 01:53	4.61
2-Hexanone	ND		0.0018	0.00040	ppm v/v			05/31/19 01:53	4.61
4-Methyl-2-pentanone (MIBK)	ND		0.0018	0.00062	ppm v/v			05/31/19 01:53	4.61
<b>Methylene Chloride</b>	<b>0.0017</b>	<b>J</b>	0.0018	0.00033	ppm v/v			05/31/19 01:53	4.61
Styrene	ND		0.0018	0.00027	ppm v/v			05/31/19 01:53	4.61
1,1,2,2-Tetrachloroethane	ND		0.0018	0.00032	ppm v/v			05/31/19 01:53	4.61
<b>Tetrachloroethene</b>	<b>0.28</b>		0.0018	0.00024	ppm v/v			05/31/19 01:53	4.61
Toluene	ND		0.0018	0.00024	ppm v/v			05/31/19 01:53	4.61
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.14</b>		0.0018	0.00075	ppm v/v			05/31/19 01:53	4.61
1,2,4-Trichlorobenzene	ND		0.0092	0.0020	ppm v/v			05/31/19 01:53	4.61
<b>1,1,1-Trichloroethane</b>	<b>0.0044</b>		0.0014	0.00030	ppm v/v			05/31/19 01:53	4.61
1,1,2-Trichloroethane	ND		0.0018	0.00031	ppm v/v			05/31/19 01:53	4.61
<b>Trichloroethene</b>	<b>0.24</b>		0.0018	0.00048	ppm v/v			05/31/19 01:53	4.61
<b>Trichlorofluoromethane</b>	<b>0.044</b>		0.0018	0.00090	ppm v/v			05/31/19 01:53	4.61
1,2,4-Trimethylbenzene	ND		0.0037	0.00075	ppm v/v			05/31/19 01:53	4.61
1,3,5-Trimethylbenzene	ND		0.0018	0.00058	ppm v/v			05/31/19 01:53	4.61
Vinyl acetate	ND		0.0037	0.00067	ppm v/v			05/31/19 01:53	4.61
Vinyl chloride	ND		0.0018	0.00055	ppm v/v			05/31/19 01:53	4.61

Eurofins TestAmerica, Sacramento



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV03-100**

**Lab Sample ID: 320-50040-8**

**Date Collected: 05/02/19 11:22**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.0037	0.00046	ppm v/v			05/31/19 01:53	4.61
o-Xylene	ND		0.0018	0.00025	ppm v/v			05/31/19 01:53	4.61
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130					05/31/19 01:53	4.61
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					05/31/19 01:53	4.61
Toluene-d8 (Surr)	95		70 - 130					05/31/19 01:53	4.61

**Client Sample ID: MWL-SV03-200**

**Lab Sample ID: 320-50040-9**

**Date Collected: 05/02/19 11:30**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 3L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0055	J	0.024	0.00084	ppm v/v			05/31/19 03:46	4.73
Benzene	ND		0.0019	0.00037	ppm v/v			05/31/19 03:46	4.73
Benzyl chloride	ND		0.0038	0.00077	ppm v/v			05/31/19 03:46	4.73
Bromodichloromethane	ND		0.0014	0.00031	ppm v/v			05/31/19 03:46	4.73
Bromoform	ND		0.0019	0.00033	ppm v/v			05/31/19 03:46	4.73
Bromomethane	ND		0.0038	0.0016	ppm v/v			05/31/19 03:46	4.73
2-Butanone (MEK)	ND		0.0038	0.00094	ppm v/v			05/31/19 03:46	4.73
Carbon disulfide	0.0012	J	0.0038	0.00037	ppm v/v			05/31/19 03:46	4.73
Carbon tetrachloride	0.00052	J	0.0038	0.00030	ppm v/v			05/31/19 03:46	4.73
Chlorobenzene	ND		0.0014	0.00030	ppm v/v			05/31/19 03:46	4.73
Chloroethane	ND		0.0038	0.0015	ppm v/v			05/31/19 03:46	4.73
Chloroform	0.0026		0.0014	0.00045	ppm v/v			05/31/19 03:46	4.73
Chloromethane	ND		0.0038	0.00093	ppm v/v			05/31/19 03:46	4.73
Dibromochloromethane	ND		0.0019	0.00037	ppm v/v			05/31/19 03:46	4.73
1,2-Dibromoethane (EDB)	ND		0.0038	0.00035	ppm v/v			05/31/19 03:46	4.73
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00073	ppm v/v			05/31/19 03:46	4.73
1,2-Dichlorobenzene	ND		0.0019	0.00061	ppm v/v			05/31/19 03:46	4.73
1,3-Dichlorobenzene	ND		0.0019	0.00052	ppm v/v			05/31/19 03:46	4.73
1,4-Dichlorobenzene	ND		0.0019	0.00070	ppm v/v			05/31/19 03:46	4.73
Dichlorodifluoromethane	0.049		0.0019	0.00069	ppm v/v			05/31/19 03:46	4.73
1,1-Dichloroethane	0.0075		0.0014	0.00034	ppm v/v			05/31/19 03:46	4.73
1,2-Dichloroethane	ND		0.0038	0.00042	ppm v/v			05/31/19 03:46	4.73
1,1-Dichloroethene	0.030		0.0038	0.00061	ppm v/v			05/31/19 03:46	4.73
cis-1,2-Dichloroethene	0.0047		0.0019	0.00042	ppm v/v			05/31/19 03:46	4.73
trans-1,2-Dichloroethene	ND		0.0019	0.00047	ppm v/v			05/31/19 03:46	4.73
1,2-Dichloropropane	ND		0.0019	0.0011	ppm v/v			05/31/19 03:46	4.73
cis-1,3-Dichloropropene	ND		0.0019	0.00049	ppm v/v			05/31/19 03:46	4.73
trans-1,3-Dichloropropene	ND		0.0019	0.00042	ppm v/v			05/31/19 03:46	4.73
Ethylbenzene	ND		0.0019	0.00030	ppm v/v			05/31/19 03:46	4.73
4-Ethyltoluene	ND		0.0019	0.00088	ppm v/v			05/31/19 03:46	4.73
Hexachlorobutadiene	ND		0.0095	0.0020	ppm v/v			05/31/19 03:46	4.73
2-Hexanone	ND		0.0019	0.00041	ppm v/v			05/31/19 03:46	4.73
4-Methyl-2-pentanone (MIBK)	ND		0.0019	0.00064	ppm v/v			05/31/19 03:46	4.73
Methylene Chloride	0.0028		0.0019	0.00034	ppm v/v			05/31/19 03:46	4.73

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV03-200**

**Lab Sample ID: 320-50040-9**

**Date Collected: 05/02/19 11:30**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 3L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.0019	0.00028	ppm v/v			05/31/19 03:46	4.73
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00033	ppm v/v			05/31/19 03:46	4.73
<b>Tetrachloroethene</b>	<b>0.28</b>		0.0019	0.00024	ppm v/v			05/31/19 03:46	4.73
Toluene	ND		0.0019	0.00024	ppm v/v			05/31/19 03:46	4.73
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.15</b>		0.0019	0.00077	ppm v/v			05/31/19 03:46	4.73
1,2,4-Trichlorobenzene	ND		0.0095	0.0020	ppm v/v			05/31/19 03:46	4.73
<b>1,1,1-Trichloroethane</b>	<b>0.0026</b>		0.0014	0.00031	ppm v/v			05/31/19 03:46	4.73
1,1,2-Trichloroethane	ND		0.0019	0.00032	ppm v/v			05/31/19 03:46	4.73
<b>Trichloroethene</b>	<b>0.26</b>		0.0019	0.00050	ppm v/v			05/31/19 03:46	4.73
<b>Trichlorofluoromethane</b>	<b>0.036</b>		0.0019	0.00093	ppm v/v			05/31/19 03:46	4.73
1,2,4-Trimethylbenzene	ND		0.0038	0.00077	ppm v/v			05/31/19 03:46	4.73
1,3,5-Trimethylbenzene	ND		0.0019	0.00059	ppm v/v			05/31/19 03:46	4.73
Vinyl acetate	ND		0.0038	0.00069	ppm v/v			05/31/19 03:46	4.73
Vinyl chloride	ND		0.0019	0.00057	ppm v/v			05/31/19 03:46	4.73
m,p-Xylene	ND		0.0038	0.00047	ppm v/v			05/31/19 03:46	4.73
o-Xylene	ND		0.0019	0.00026	ppm v/v			05/31/19 03:46	4.73
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130					05/31/19 03:46	4.73
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					05/31/19 03:46	4.73
Toluene-d8 (Surr)	97		70 - 130					05/31/19 03:46	4.73

**Client Sample ID: MWL-SV03-300**

**Lab Sample ID: 320-50040-10**

**Date Collected: 05/02/19 11:43**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0046</b>	<b>J</b>	0.023	0.00083	ppm v/v			05/31/19 04:43	4.64
Benzene	ND		0.0019	0.00037	ppm v/v			05/31/19 04:43	4.64
Benzyl chloride	ND		0.0037	0.00076	ppm v/v			05/31/19 04:43	4.64
Bromodichloromethane	ND		0.0014	0.00031	ppm v/v			05/31/19 04:43	4.64
Bromoform	ND		0.0019	0.00032	ppm v/v			05/31/19 04:43	4.64
Bromomethane	ND		0.0037	0.0016	ppm v/v			05/31/19 04:43	4.64
2-Butanone (MEK)	ND		0.0037	0.00092	ppm v/v			05/31/19 04:43	4.64
Carbon disulfide	ND		0.0037	0.00036	ppm v/v			05/31/19 04:43	4.64
<b>Carbon tetrachloride</b>	<b>0.00034</b>	<b>J</b>	0.0037	0.00030	ppm v/v			05/31/19 04:43	4.64
<b>Chlorobenzene</b>	<b>0.00046</b>	<b>J</b>	0.0014	0.00030	ppm v/v			05/31/19 04:43	4.64
Chloroethane	ND		0.0037	0.0014	ppm v/v			05/31/19 04:43	4.64
Chloroform	ND		0.0014	0.00044	ppm v/v			05/31/19 04:43	4.64
Chloromethane	ND		0.0037	0.00091	ppm v/v			05/31/19 04:43	4.64
Dibromochloromethane	ND		0.0019	0.00037	ppm v/v			05/31/19 04:43	4.64
1,2-Dibromoethane (EDB)	ND		0.0037	0.00035	ppm v/v			05/31/19 04:43	4.64
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00072	ppm v/v			05/31/19 04:43	4.64
1,2-Dichlorobenzene	ND		0.0019	0.00060	ppm v/v			05/31/19 04:43	4.64
1,3-Dichlorobenzene	ND		0.0019	0.00051	ppm v/v			05/31/19 04:43	4.64
1,4-Dichlorobenzene	ND		0.0019	0.00069	ppm v/v			05/31/19 04:43	4.64

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

Client Sample ID: MWL-SV03-300

Lab Sample ID: 320-50040-10

Date Collected: 05/02/19 11:43

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	0.035		0.0019	0.00067	ppm v/v			05/31/19 04:43	4.64
1,1-Dichloroethane	0.0023		0.0014	0.00033	ppm v/v			05/31/19 04:43	4.64
1,2-Dichloroethane	ND		0.0037	0.00041	ppm v/v			05/31/19 04:43	4.64
1,1-Dichloroethene	0.018		0.0037	0.00060	ppm v/v			05/31/19 04:43	4.64
cis-1,2-Dichloroethene	0.0015	J	0.0019	0.00041	ppm v/v			05/31/19 04:43	4.64
trans-1,2-Dichloroethene	ND		0.0019	0.00046	ppm v/v			05/31/19 04:43	4.64
1,2-Dichloropropane	ND		0.0019	0.0011	ppm v/v			05/31/19 04:43	4.64
cis-1,3-Dichloropropene	ND		0.0019	0.00048	ppm v/v			05/31/19 04:43	4.64
trans-1,3-Dichloropropene	ND		0.0019	0.00041	ppm v/v			05/31/19 04:43	4.64
Ethylbenzene	ND		0.0019	0.00029	ppm v/v			05/31/19 04:43	4.64
4-Ethyltoluene	ND		0.0019	0.00087	ppm v/v			05/31/19 04:43	4.64
Hexachlorobutadiene	ND		0.0093	0.0020	ppm v/v			05/31/19 04:43	4.64
2-Hexanone	ND		0.0019	0.00040	ppm v/v			05/31/19 04:43	4.64
4-Methyl-2-pentanone (MIBK)	ND		0.0019	0.00063	ppm v/v			05/31/19 04:43	4.64
Methylene Chloride	0.00070	J	0.0019	0.00033	ppm v/v			05/31/19 04:43	4.64
Styrene	ND		0.0019	0.00027	ppm v/v			05/31/19 04:43	4.64
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00032	ppm v/v			05/31/19 04:43	4.64
Tetrachloroethene	0.27		0.0019	0.00024	ppm v/v			05/31/19 04:43	4.64
Toluene	0.00035	J	0.0019	0.00024	ppm v/v			05/31/19 04:43	4.64
1,1,2-Trichloro-1,2,2-trifluoroethane	0.11		0.0019	0.00076	ppm v/v			05/31/19 04:43	4.64
1,2,4-Trichlorobenzene	ND		0.0093	0.0020	ppm v/v			05/31/19 04:43	4.64
1,1,1-Trichloroethane	0.00063	J	0.0014	0.00030	ppm v/v			05/31/19 04:43	4.64
1,1,2-Trichloroethane	ND		0.0019	0.00031	ppm v/v			05/31/19 04:43	4.64
Trichloroethene	0.16		0.0019	0.00049	ppm v/v			05/31/19 04:43	4.64
Trichlorofluoromethane	0.015		0.0019	0.00091	ppm v/v			05/31/19 04:43	4.64
1,2,4-Trimethylbenzene	ND		0.0037	0.00075	ppm v/v			05/31/19 04:43	4.64
1,3,5-Trimethylbenzene	ND		0.0019	0.00058	ppm v/v			05/31/19 04:43	4.64
Vinyl acetate	ND		0.0037	0.00067	ppm v/v			05/31/19 04:43	4.64
Vinyl chloride	ND		0.0019	0.00056	ppm v/v			05/31/19 04:43	4.64
m,p-Xylene	ND		0.0037	0.00046	ppm v/v			05/31/19 04:43	4.64
o-Xylene	ND		0.0019	0.00025	ppm v/v			05/31/19 04:43	4.64
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130					05/31/19 04:43	4.64
1,2-Dichloroethane-d4 (Surr)	103		70 - 130					05/31/19 04:43	4.64
Toluene-d8 (Surr)	95		70 - 130					05/31/19 04:43	4.64

Client Sample ID: MWL-SV03-300

Lab Sample ID: 320-50040-11

Date Collected: 05/02/19 11:43

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0054	J	0.031	0.0011	ppm v/v			05/31/19 05:40	6.26
Benzene	ND		0.0025	0.00049	ppm v/v			05/31/19 05:40	6.26
Benzyl chloride	ND		0.0050	0.0010	ppm v/v			05/31/19 05:40	6.26
Bromodichloromethane	ND		0.0019	0.00041	ppm v/v			05/31/19 05:40	6.26

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV03-300**

**Lab Sample ID: 320-50040-11**

**Date Collected: 05/02/19 11:43**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	ND		0.0025	0.00044	ppm v/v			05/31/19 05:40	6.26
Bromomethane	ND		0.0050	0.0021	ppm v/v			05/31/19 05:40	6.26
2-Butanone (MEK)	ND		0.0050	0.0012	ppm v/v			05/31/19 05:40	6.26
Carbon disulfide	ND		0.0050	0.00049	ppm v/v			05/31/19 05:40	6.26
Carbon tetrachloride	ND		0.0050	0.00040	ppm v/v			05/31/19 05:40	6.26
Chlorobenzene	ND		0.0019	0.00040	ppm v/v			05/31/19 05:40	6.26
Chloroethane	ND		0.0050	0.0019	ppm v/v			05/31/19 05:40	6.26
<b>Chloroform</b>	<b>0.0012</b>	<b>J</b>	0.0019	0.00059	ppm v/v			05/31/19 05:40	6.26
Chloromethane	ND		0.0050	0.0012	ppm v/v			05/31/19 05:40	6.26
Dibromochloromethane	ND		0.0025	0.00049	ppm v/v			05/31/19 05:40	6.26
1,2-Dibromoethane (EDB)	ND		0.0050	0.00047	ppm v/v			05/31/19 05:40	6.26
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0025	0.00097	ppm v/v			05/31/19 05:40	6.26
1,2-Dichlorobenzene	ND		0.0025	0.00081	ppm v/v			05/31/19 05:40	6.26
1,3-Dichlorobenzene	ND		0.0025	0.00069	ppm v/v			05/31/19 05:40	6.26
1,4-Dichlorobenzene	ND		0.0025	0.00093	ppm v/v			05/31/19 05:40	6.26
<b>Dichlorodifluoromethane</b>	<b>0.039</b>		0.0025	0.00091	ppm v/v			05/31/19 05:40	6.26
<b>1,1-Dichloroethane</b>	<b>0.0025</b>		0.0019	0.00045	ppm v/v			05/31/19 05:40	6.26
1,2-Dichloroethane	ND		0.0050	0.00055	ppm v/v			05/31/19 05:40	6.26
<b>1,1-Dichloroethene</b>	<b>0.020</b>		0.0050	0.00081	ppm v/v			05/31/19 05:40	6.26
<b>cis-1,2-Dichloroethene</b>	<b>0.0017</b>	<b>J</b>	0.0025	0.00056	ppm v/v			05/31/19 05:40	6.26
trans-1,2-Dichloroethene	ND		0.0025	0.00063	ppm v/v			05/31/19 05:40	6.26
1,2-Dichloropropane	ND		0.0025	0.0015	ppm v/v			05/31/19 05:40	6.26
cis-1,3-Dichloropropene	ND		0.0025	0.00065	ppm v/v			05/31/19 05:40	6.26
trans-1,3-Dichloropropene	ND		0.0025	0.00055	ppm v/v			05/31/19 05:40	6.26
Ethylbenzene	ND		0.0025	0.00039	ppm v/v			05/31/19 05:40	6.26
4-Ethyltoluene	ND		0.0025	0.0012	ppm v/v			05/31/19 05:40	6.26
Hexachlorobutadiene	ND		0.013	0.0027	ppm v/v			05/31/19 05:40	6.26
2-Hexanone	ND		0.0025	0.00054	ppm v/v			05/31/19 05:40	6.26
4-Methyl-2-pentanone (MIBK)	ND		0.0025	0.00085	ppm v/v			05/31/19 05:40	6.26
<b>Methylene Chloride</b>	<b>0.00079</b>	<b>J</b>	0.0025	0.00045	ppm v/v			05/31/19 05:40	6.26
Styrene	ND		0.0025	0.00037	ppm v/v			05/31/19 05:40	6.26
1,1,2,2-Tetrachloroethane	ND		0.0025	0.00043	ppm v/v			05/31/19 05:40	6.26
<b>Tetrachloroethene</b>	<b>0.31</b>		0.0025	0.00032	ppm v/v			05/31/19 05:40	6.26
<b>Toluene</b>	<b>0.00036</b>	<b>J</b>	0.0025	0.00032	ppm v/v			05/31/19 05:40	6.26
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.12</b>		0.0025	0.0010	ppm v/v			05/31/19 05:40	6.26
1,2,4-Trichlorobenzene	ND		0.013	0.0027	ppm v/v			05/31/19 05:40	6.26
<b>1,1,1-Trichloroethane</b>	<b>0.00063</b>	<b>J</b>	0.0019	0.00041	ppm v/v			05/31/19 05:40	6.26
1,1,2-Trichloroethane	ND		0.0025	0.00042	ppm v/v			05/31/19 05:40	6.26
<b>Trichloroethene</b>	<b>0.18</b>		0.0025	0.00066	ppm v/v			05/31/19 05:40	6.26
<b>Trichlorofluoromethane</b>	<b>0.016</b>		0.0025	0.0012	ppm v/v			05/31/19 05:40	6.26
1,2,4-Trimethylbenzene	ND		0.0050	0.0010	ppm v/v			05/31/19 05:40	6.26
1,3,5-Trimethylbenzene	ND		0.0025	0.00078	ppm v/v			05/31/19 05:40	6.26
Vinyl acetate	ND		0.0050	0.00091	ppm v/v			05/31/19 05:40	6.26
Vinyl chloride	ND		0.0025	0.00075	ppm v/v			05/31/19 05:40	6.26
m,p-Xylene	ND		0.0050	0.00063	ppm v/v			05/31/19 05:40	6.26
o-Xylene	ND		0.0025	0.00034	ppm v/v			05/31/19 05:40	6.26

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV03-300**

**Lab Sample ID: 320-50040-11**

**Date Collected: 05/02/19 11:43**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		05/31/19 05:40	6.26
1,2-Dichloroethane-d4 (Surr)	105		70 - 130		05/31/19 05:40	6.26
Toluene-d8 (Surr)	95		70 - 130		05/31/19 05:40	6.26

**Client Sample ID: MWL-SV03-400**

**Lab Sample ID: 320-50040-12**

**Date Collected: 05/02/19 12:10**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.027</b>	<b>J</b>	0.050	0.0018	ppm v/v			05/31/19 06:38	9.99
Benzene	ND		0.0040	0.00079	ppm v/v			05/31/19 06:38	9.99
Benzyl chloride	ND		0.0080	0.0016	ppm v/v			05/31/19 06:38	9.99
Bromodichloromethane	ND		0.0030	0.00066	ppm v/v			05/31/19 06:38	9.99
Bromoform	ND		0.0040	0.00070	ppm v/v			05/31/19 06:38	9.99
Bromomethane	ND		0.0080	0.0033	ppm v/v			05/31/19 06:38	9.99
<b>2-Butanone (MEK)</b>	<b>0.0022</b>	<b>J</b>	0.0080	0.0020	ppm v/v			05/31/19 06:38	9.99
<b>Carbon disulfide</b>	<b>0.010</b>		0.0080	0.00078	ppm v/v			05/31/19 06:38	9.99
Carbon tetrachloride	ND		0.0080	0.00064	ppm v/v			05/31/19 06:38	9.99
Chlorobenzene	ND		0.0030	0.00064	ppm v/v			05/31/19 06:38	9.99
Chloroethane	ND		0.0080	0.0031	ppm v/v			05/31/19 06:38	9.99
<b>Chloroform</b>	<b>0.0020</b>	<b>J</b>	0.0030	0.00095	ppm v/v			05/31/19 06:38	9.99
Chloromethane	ND		0.0080	0.0020	ppm v/v			05/31/19 06:38	9.99
Dibromochloromethane	ND		0.0040	0.00079	ppm v/v			05/31/19 06:38	9.99
1,2-Dibromoethane (EDB)	ND		0.0080	0.00075	ppm v/v			05/31/19 06:38	9.99
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0040	0.0015	ppm v/v			05/31/19 06:38	9.99
1,2-Dichlorobenzene	ND		0.0040	0.0013	ppm v/v			05/31/19 06:38	9.99
1,3-Dichlorobenzene	ND		0.0040	0.0011	ppm v/v			05/31/19 06:38	9.99
1,4-Dichlorobenzene	ND		0.0040	0.0015	ppm v/v			05/31/19 06:38	9.99
<b>Dichlorodifluoromethane</b>	<b>0.026</b>		0.0040	0.0014	ppm v/v			05/31/19 06:38	9.99
<b>1,1-Dichloroethane</b>	<b>0.0040</b>		0.0030	0.00072	ppm v/v			05/31/19 06:38	9.99
1,2-Dichloroethane	ND		0.0080	0.00088	ppm v/v			05/31/19 06:38	9.99
<b>1,1-Dichloroethene</b>	<b>0.022</b>		0.0080	0.0013	ppm v/v			05/31/19 06:38	9.99
<b>cis-1,2-Dichloroethene</b>	<b>0.0029</b>	<b>J</b>	0.0040	0.00089	ppm v/v			05/31/19 06:38	9.99
trans-1,2-Dichloroethene	ND		0.0040	0.0010	ppm v/v			05/31/19 06:38	9.99
1,2-Dichloropropane	ND		0.0040	0.0024	ppm v/v			05/31/19 06:38	9.99
cis-1,3-Dichloropropene	ND		0.0040	0.0010	ppm v/v			05/31/19 06:38	9.99
trans-1,3-Dichloropropene	ND		0.0040	0.00088	ppm v/v			05/31/19 06:38	9.99
<b>Ethylbenzene</b>	<b>0.00072</b>	<b>J</b>	0.0040	0.00063	ppm v/v			05/31/19 06:38	9.99
4-Ethyltoluene	ND		0.0040	0.0019	ppm v/v			05/31/19 06:38	9.99
Hexachlorobutadiene	ND		0.020	0.0043	ppm v/v			05/31/19 06:38	9.99
2-Hexanone	ND		0.0040	0.00087	ppm v/v			05/31/19 06:38	9.99
<b>4-Methyl-2-pentanone (MIBK)</b>	<b>0.0027</b>	<b>J</b>	0.0040	0.0013	ppm v/v			05/31/19 06:38	9.99
<b>Methylene Chloride</b>	<b>0.0014</b>	<b>J</b>	0.0040	0.00072	ppm v/v			05/31/19 06:38	9.99
Styrene	ND		0.0040	0.00059	ppm v/v			05/31/19 06:38	9.99
1,1,2,2-Tetrachloroethane	ND		0.0040	0.00069	ppm v/v			05/31/19 06:38	9.99
<b>Tetrachloroethene</b>	<b>0.45</b>		0.0040	0.00051	ppm v/v			05/31/19 06:38	9.99
<b>Toluene</b>	<b>0.00072</b>	<b>J</b>	0.0040	0.00051	ppm v/v			05/31/19 06:38	9.99

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV03-400**

**Lab Sample ID: 320-50040-12**

Date Collected: 05/02/19 12:10

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.084</b>		0.0040	0.0016	ppm v/v			05/31/19 06:38	9.99
1,2,4-Trichlorobenzene	ND		0.0020	0.0043	ppm v/v			05/31/19 06:38	9.99
<b>1,1,1-Trichloroethane</b>	<b>0.0013</b>	<b>J</b>	0.0030	0.00065	ppm v/v			05/31/19 06:38	9.99
1,1,2-Trichloroethane	ND		0.0040	0.00067	ppm v/v			05/31/19 06:38	9.99
<b>Trichloroethene</b>	<b>0.33</b>		0.0040	0.0010	ppm v/v			05/31/19 06:38	9.99
<b>Trichlorofluoromethane</b>	<b>0.015</b>		0.0040	0.0020	ppm v/v			05/31/19 06:38	9.99
1,2,4-Trimethylbenzene	ND		0.0080	0.0016	ppm v/v			05/31/19 06:38	9.99
1,3,5-Trimethylbenzene	ND		0.0040	0.0012	ppm v/v			05/31/19 06:38	9.99
Vinyl acetate	ND		0.0080	0.0014	ppm v/v			05/31/19 06:38	9.99
Vinyl chloride	ND		0.0040	0.0012	ppm v/v			05/31/19 06:38	9.99
m,p-Xylene	ND		0.0080	0.0010	ppm v/v			05/31/19 06:38	9.99
<b>o-Xylene</b>	<b>0.00070</b>	<b>J</b>	0.0040	0.00054	ppm v/v			05/31/19 06:38	9.99
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		70 - 130					05/31/19 06:38	9.99
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					05/31/19 06:38	9.99
Toluene-d8 (Surr)	99		70 - 130					05/31/19 06:38	9.99

**Client Sample ID: MWL-SVFB-4**

**Lab Sample ID: 320-50040-13**

Date Collected: 05/02/19 10:19

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.00053</b>	<b>J</b>	0.0050	0.00018	ppm v/v			05/31/19 07:44	1
Benzene	ND		0.00040	0.000079	ppm v/v			05/31/19 07:44	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/31/19 07:44	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/31/19 07:44	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/31/19 07:44	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/31/19 07:44	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/31/19 07:44	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/31/19 07:44	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/31/19 07:44	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/31/19 07:44	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/31/19 07:44	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/31/19 07:44	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/31/19 07:44	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/31/19 07:44	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/31/19 07:44	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/31/19 07:44	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/31/19 07:44	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/31/19 07:44	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/31/19 07:44	1
Dichlorodifluoromethane	ND		0.00040	0.00015	ppm v/v			05/31/19 07:44	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/31/19 07:44	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/31/19 07:44	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/31/19 07:44	1

Eurofins TestAmerica, Sacramento



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SVFB-4**

**Lab Sample ID: 320-50040-13**

**Date Collected: 05/02/19 10:19**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/31/19 07:44	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/31/19 07:44	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/31/19 07:44	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/31/19 07:44	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/31/19 07:44	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/31/19 07:44	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/31/19 07:44	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/31/19 07:44	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/31/19 07:44	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/31/19 07:44	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			05/31/19 07:44	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/31/19 07:44	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/31/19 07:44	1
<b>Tetrachloroethene</b>	<b>0.00019</b>	<b>J</b>	0.00040	0.000051	ppm v/v			05/31/19 07:44	1
<b>Toluene</b>	<b>0.00025</b>	<b>J</b>	0.00040	0.000051	ppm v/v			05/31/19 07:44	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/31/19 07:44	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/31/19 07:44	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/31/19 07:44	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/31/19 07:44	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			05/31/19 07:44	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/31/19 07:44	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/31/19 07:44	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/31/19 07:44	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/31/19 07:44	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/31/19 07:44	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/31/19 07:44	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/31/19 07:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130					05/31/19 07:44	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 130					05/31/19 07:44	1
Toluene-d8 (Surr)	95		70 - 130					05/31/19 07:44	1

**Client Sample ID: MWL-SV04-50**

**Lab Sample ID: 320-50040-14**

**Date Collected: 05/02/19 10:26**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0027</b>	<b>J</b>	0.0050	0.00018	ppm v/v			05/31/19 08:48	1
<b>Benzene</b>	<b>0.00035</b>	<b>J</b>	0.00040	0.000079	ppm v/v			05/31/19 08:48	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/31/19 08:48	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/31/19 08:48	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/31/19 08:48	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/31/19 08:48	1
<b>2-Butanone (MEK)</b>	<b>0.00053</b>	<b>J</b>	0.00080	0.00020	ppm v/v			05/31/19 08:48	1
<b>Carbon disulfide</b>	<b>0.0019</b>		0.00080	0.000078	ppm v/v			05/31/19 08:48	1
<b>Carbon tetrachloride</b>	<b>0.00024</b>	<b>J</b>	0.00080	0.000064	ppm v/v			05/31/19 08:48	1

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV04-50**

**Lab Sample ID: 320-50040-14**

**Date Collected: 05/02/19 10:26**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/31/19 08:48	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/31/19 08:48	1
<b>Chloroform</b>	<b>0.0019</b>		0.00030	0.000095	ppm v/v			05/31/19 08:48	1
Chloromethane	ND		0.00080	0.00020	ppm v/v			05/31/19 08:48	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/31/19 08:48	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/31/19 08:48	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/31/19 08:48	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/31/19 08:48	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/31/19 08:48	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/31/19 08:48	1
<b>Dichlorodifluoromethane</b>	<b>0.013</b>		0.00040	0.00015	ppm v/v			05/31/19 08:48	1
<b>1,1-Dichloroethane</b>	<b>0.0014</b>		0.00030	0.000072	ppm v/v			05/31/19 08:48	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/31/19 08:48	1
<b>1,1-Dichloroethene</b>	<b>0.0063</b>		0.00080	0.00013	ppm v/v			05/31/19 08:48	1
<b>cis-1,2-Dichloroethene</b>	<b>0.00055</b>		0.00040	0.000089	ppm v/v			05/31/19 08:48	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/31/19 08:48	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/31/19 08:48	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/31/19 08:48	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/31/19 08:48	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/31/19 08:48	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/31/19 08:48	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/31/19 08:48	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/31/19 08:48	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/31/19 08:48	1
Methylene Chloride	ND		0.00040	0.000072	ppm v/v			05/31/19 08:48	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/31/19 08:48	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/31/19 08:48	1
<b>Tetrachloroethene</b>	<b>0.076</b>		0.00040	0.000051	ppm v/v			05/31/19 08:48	1
Toluene	ND		0.00040	0.000051	ppm v/v			05/31/19 08:48	1
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.057</b>		0.00040	0.00016	ppm v/v			05/31/19 08:48	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/31/19 08:48	1
<b>1,1,1-Trichloroethane</b>	<b>0.0071</b>		0.00030	0.000065	ppm v/v			05/31/19 08:48	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/31/19 08:48	1
<b>Trichloroethene</b>	<b>0.062</b>		0.00040	0.00011	ppm v/v			05/31/19 08:48	1
<b>Trichlorofluoromethane</b>	<b>0.026</b>		0.00040	0.00020	ppm v/v			05/31/19 08:48	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/31/19 08:48	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/31/19 08:48	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/31/19 08:48	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/31/19 08:48	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/31/19 08:48	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/31/19 08:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		70 - 130					05/31/19 08:48	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 130					05/31/19 08:48	1
Toluene-d8 (Surr)	97		70 - 130					05/31/19 08:48	1



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV04-100**

**Lab Sample ID: 320-50040-15**

**Date Collected: 05/02/19 10:35**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.016	0.00059	ppm v/v			05/31/19 18:26	3.29
<b>Benzene</b>	<b>0.00030</b>	<b>J</b>	0.0013	0.00026	ppm v/v			05/31/19 18:26	3.29
Benzyl chloride	ND		0.0026	0.00054	ppm v/v			05/31/19 18:26	3.29
Bromodichloromethane	ND		0.00099	0.00022	ppm v/v			05/31/19 18:26	3.29
Bromoform	ND		0.0013	0.00023	ppm v/v			05/31/19 18:26	3.29
Bromomethane	ND		0.0026	0.0011	ppm v/v			05/31/19 18:26	3.29
2-Butanone (MEK)	ND		0.0026	0.00065	ppm v/v			05/31/19 18:26	3.29
<b>Carbon disulfide</b>	<b>0.00030</b>	<b>J</b>	0.0026	0.00026	ppm v/v			05/31/19 18:26	3.29
<b>Carbon tetrachloride</b>	<b>0.00039</b>	<b>J</b>	0.0026	0.00021	ppm v/v			05/31/19 18:26	3.29
Chlorobenzene	ND		0.00099	0.00021	ppm v/v			05/31/19 18:26	3.29
Chloroethane	ND		0.0026	0.0010	ppm v/v			05/31/19 18:26	3.29
<b>Chloroform</b>	<b>0.0020</b>		0.00099	0.00031	ppm v/v			05/31/19 18:26	3.29
Chloromethane	ND		0.0026	0.00065	ppm v/v			05/31/19 18:26	3.29
Dibromochloromethane	ND		0.0013	0.00026	ppm v/v			05/31/19 18:26	3.29
1,2-Dibromoethane (EDB)	ND		0.0026	0.00025	ppm v/v			05/31/19 18:26	3.29
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0013	0.00051	ppm v/v			05/31/19 18:26	3.29
1,2-Dichlorobenzene	ND		0.0013	0.00043	ppm v/v			05/31/19 18:26	3.29
1,3-Dichlorobenzene	ND		0.0013	0.00036	ppm v/v			05/31/19 18:26	3.29
1,4-Dichlorobenzene	ND		0.0013	0.00049	ppm v/v			05/31/19 18:26	3.29
<b>Dichlorodifluoromethane</b>	<b>0.026</b>		0.0013	0.00048	ppm v/v			05/31/19 18:26	3.29
<b>1,1-Dichloroethane</b>	<b>0.0029</b>		0.00099	0.00024	ppm v/v			05/31/19 18:26	3.29
1,2-Dichloroethane	ND		0.0026	0.00029	ppm v/v			05/31/19 18:26	3.29
<b>1,1-Dichloroethene</b>	<b>0.014</b>		0.0026	0.00042	ppm v/v			05/31/19 18:26	3.29
<b>cis-1,2-Dichloroethene</b>	<b>0.0017</b>		0.0013	0.00029	ppm v/v			05/31/19 18:26	3.29
trans-1,2-Dichloroethene	ND		0.0013	0.00033	ppm v/v			05/31/19 18:26	3.29
1,2-Dichloropropane	ND		0.0013	0.00079	ppm v/v			05/31/19 18:26	3.29
cis-1,3-Dichloropropene	ND		0.0013	0.00034	ppm v/v			05/31/19 18:26	3.29
trans-1,3-Dichloropropene	ND		0.0013	0.00029	ppm v/v			05/31/19 18:26	3.29
Ethylbenzene	ND		0.0013	0.00021	ppm v/v			05/31/19 18:26	3.29
4-Ethyltoluene	ND		0.0013	0.00062	ppm v/v			05/31/19 18:26	3.29
Hexachlorobutadiene	ND		0.0066	0.0014	ppm v/v			05/31/19 18:26	3.29
2-Hexanone	ND		0.0013	0.00029	ppm v/v			05/31/19 18:26	3.29
4-Methyl-2-pentanone (MIBK)	ND		0.0013	0.00044	ppm v/v			05/31/19 18:26	3.29
<b>Methylene Chloride</b>	<b>0.00059</b>	<b>J B</b>	0.0013	0.00024	ppm v/v			05/31/19 18:26	3.29
<b>Styrene</b>	<b>0.00022</b>	<b>J B</b>	0.0013	0.00019	ppm v/v			05/31/19 18:26	3.29
1,1,2,2-Tetrachloroethane	ND		0.0013	0.00023	ppm v/v			05/31/19 18:26	3.29
<b>Tetrachloroethene</b>	<b>0.11</b>		0.0013	0.00017	ppm v/v			05/31/19 18:26	3.29
Toluene	ND		0.0013	0.00017	ppm v/v			05/31/19 18:26	3.29
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.084</b>		0.0013	0.00054	ppm v/v			05/31/19 18:26	3.29
<b>1,2,4-Trichlorobenzene</b>	<b>0.0025</b>	<b>J B</b>	0.0066	0.0014	ppm v/v			05/31/19 18:26	3.29
<b>1,1,1-Trichloroethane</b>	<b>0.0053</b>		0.00099	0.00021	ppm v/v			05/31/19 18:26	3.29
1,1,2-Trichloroethane	ND		0.0013	0.00022	ppm v/v			05/31/19 18:26	3.29
<b>Trichloroethene</b>	<b>0.11</b>		0.0013	0.00035	ppm v/v			05/31/19 18:26	3.29
<b>Trichlorofluoromethane</b>	<b>0.034</b>		0.0013	0.00064	ppm v/v			05/31/19 18:26	3.29
1,2,4-Trimethylbenzene	ND		0.0026	0.00053	ppm v/v			05/31/19 18:26	3.29
1,3,5-Trimethylbenzene	ND		0.0013	0.00041	ppm v/v			05/31/19 18:26	3.29
Vinyl acetate	ND		0.0026	0.00048	ppm v/v			05/31/19 18:26	3.29
Vinyl chloride	ND		0.0013	0.00039	ppm v/v			05/31/19 18:26	3.29

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV04-100**

**Lab Sample ID: 320-50040-15**

**Date Collected: 05/02/19 10:35**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	0.00052	J B	0.0026	0.00033	ppm v/v			05/31/19 18:26	3.29
o-Xylene	0.00027	J B	0.0013	0.00018	ppm v/v			05/31/19 18:26	3.29
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130					05/31/19 18:26	3.29
1,2-Dichloroethane-d4 (Surr)	97		70 - 130					05/31/19 18:26	3.29
Toluene-d8 (Surr)	100		70 - 130					05/31/19 18:26	3.29

**Client Sample ID: MWL-SV04-200**

**Lab Sample ID: 320-50040-16**

**Date Collected: 05/02/19 10:42**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0047	J	0.017	0.00062	ppm v/v			05/31/19 19:20	3.49
Benzene	0.00030	J	0.0014	0.00028	ppm v/v			05/31/19 19:20	3.49
Benzyl chloride	0.00083	J B	0.0028	0.00057	ppm v/v			05/31/19 19:20	3.49
Bromodichloromethane	ND		0.0010	0.00023	ppm v/v			05/31/19 19:20	3.49
Bromoform	ND		0.0014	0.00024	ppm v/v			05/31/19 19:20	3.49
Bromomethane	ND		0.0028	0.0012	ppm v/v			05/31/19 19:20	3.49
2-Butanone (MEK)	ND		0.0028	0.00069	ppm v/v			05/31/19 19:20	3.49
Carbon disulfide	ND		0.0028	0.00027	ppm v/v			05/31/19 19:20	3.49
Carbon tetrachloride	0.00047	J	0.0028	0.00022	ppm v/v			05/31/19 19:20	3.49
Chlorobenzene	ND		0.0010	0.00022	ppm v/v			05/31/19 19:20	3.49
Chloroethane	ND		0.0028	0.0011	ppm v/v			05/31/19 19:20	3.49
Chloroform	0.0015		0.0010	0.00033	ppm v/v			05/31/19 19:20	3.49
Chloromethane	ND		0.0028	0.00069	ppm v/v			05/31/19 19:20	3.49
Dibromochloromethane	ND		0.0014	0.00028	ppm v/v			05/31/19 19:20	3.49
1,2-Dibromoethane (EDB)	ND		0.0028	0.00026	ppm v/v			05/31/19 19:20	3.49
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00054	ppm v/v			05/31/19 19:20	3.49
1,2-Dichlorobenzene	ND		0.0014	0.00045	ppm v/v			05/31/19 19:20	3.49
1,3-Dichlorobenzene	ND		0.0014	0.00038	ppm v/v			05/31/19 19:20	3.49
1,4-Dichlorobenzene	ND		0.0014	0.00052	ppm v/v			05/31/19 19:20	3.49
Dichlorodifluoromethane	0.038		0.0014	0.00051	ppm v/v			05/31/19 19:20	3.49
1,1-Dichloroethane	0.0049		0.0010	0.00025	ppm v/v			05/31/19 19:20	3.49
1,2-Dichloroethane	ND		0.0028	0.00031	ppm v/v			05/31/19 19:20	3.49
1,1-Dichloroethene	0.027		0.0028	0.00045	ppm v/v			05/31/19 19:20	3.49
cis-1,2-Dichloroethene	0.0029		0.0014	0.00031	ppm v/v			05/31/19 19:20	3.49
trans-1,2-Dichloroethene	ND		0.0014	0.00035	ppm v/v			05/31/19 19:20	3.49
1,2-Dichloropropane	ND		0.0014	0.00084	ppm v/v			05/31/19 19:20	3.49
cis-1,3-Dichloropropene	ND		0.0014	0.00036	ppm v/v			05/31/19 19:20	3.49
trans-1,3-Dichloropropene	ND		0.0014	0.00031	ppm v/v			05/31/19 19:20	3.49
Ethylbenzene	ND		0.0014	0.00022	ppm v/v			05/31/19 19:20	3.49
4-Ethyltoluene	ND		0.0014	0.00065	ppm v/v			05/31/19 19:20	3.49
Hexachlorobutadiene	ND		0.0070	0.0015	ppm v/v			05/31/19 19:20	3.49
2-Hexanone	ND		0.0014	0.00030	ppm v/v			05/31/19 19:20	3.49
4-Methyl-2-pentanone (MIBK)	ND		0.0014	0.00047	ppm v/v			05/31/19 19:20	3.49
Methylene Chloride	0.0014	B	0.0014	0.00025	ppm v/v			05/31/19 19:20	3.49

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV04-200**

**Lab Sample ID: 320-50040-16**

**Date Collected: 05/02/19 10:42**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.0014	0.00021	ppm v/v			05/31/19 19:20	3.49
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00024	ppm v/v			05/31/19 19:20	3.49
<b>Tetrachloroethene</b>	<b>0.13</b>		0.0014	0.00018	ppm v/v			05/31/19 19:20	3.49
Toluene	ND		0.0014	0.00018	ppm v/v			05/31/19 19:20	3.49
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.13</b>		0.0014	0.00057	ppm v/v			05/31/19 19:20	3.49
<b>1,2,4-Trichlorobenzene</b>	<b>0.0026</b>	<b>J B</b>	0.0070	0.0015	ppm v/v			05/31/19 19:20	3.49
<b>1,1,1-Trichloroethane</b>	<b>0.0021</b>		0.0010	0.00023	ppm v/v			05/31/19 19:20	3.49
1,1,2-Trichloroethane	ND		0.0014	0.00023	ppm v/v			05/31/19 19:20	3.49
<b>Trichloroethene</b>	<b>0.16</b>		0.0014	0.00037	ppm v/v			05/31/19 19:20	3.49
<b>Trichlorofluoromethane</b>	<b>0.033</b>		0.0014	0.00068	ppm v/v			05/31/19 19:20	3.49
1,2,4-Trimethylbenzene	ND		0.0028	0.00057	ppm v/v			05/31/19 19:20	3.49
1,3,5-Trimethylbenzene	ND		0.0014	0.00044	ppm v/v			05/31/19 19:20	3.49
Vinyl acetate	ND		0.0028	0.00051	ppm v/v			05/31/19 19:20	3.49
Vinyl chloride	ND		0.0014	0.00042	ppm v/v			05/31/19 19:20	3.49
<b>m,p-Xylene</b>	<b>0.00035</b>	<b>J B</b>	0.0028	0.00035	ppm v/v			05/31/19 19:20	3.49
<b>o-Xylene</b>	<b>0.00021</b>	<b>J B</b>	0.0014	0.00019	ppm v/v			05/31/19 19:20	3.49
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130					05/31/19 19:20	3.49
1,2-Dichloroethane-d4 (Surr)	99		70 - 130					05/31/19 19:20	3.49
Toluene-d8 (Surr)	100		70 - 130					05/31/19 19:20	3.49

**Client Sample ID: MWL-SV04-300**

**Lab Sample ID: 320-50040-17**

**Date Collected: 05/02/19 10:50**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.011</b>	<b>J</b>	0.018	0.00065	ppm v/v			05/31/19 20:14	3.63
<b>Benzene</b>	<b>0.00032</b>	<b>J</b>	0.0015	0.00029	ppm v/v			05/31/19 20:14	3.63
Benzyl chloride	ND		0.0029	0.00059	ppm v/v			05/31/19 20:14	3.63
Bromodichloromethane	ND		0.0011	0.00024	ppm v/v			05/31/19 20:14	3.63
Bromoform	ND		0.0015	0.00025	ppm v/v			05/31/19 20:14	3.63
Bromomethane	ND		0.0029	0.0012	ppm v/v			05/31/19 20:14	3.63
<b>2-Butanone (MEK)</b>	<b>0.0015</b>	<b>J</b>	0.0029	0.00072	ppm v/v			05/31/19 20:14	3.63
Carbon disulfide	ND		0.0029	0.00028	ppm v/v			05/31/19 20:14	3.63
Carbon tetrachloride	ND		0.0029	0.00023	ppm v/v			05/31/19 20:14	3.63
Chlorobenzene	ND		0.0011	0.00023	ppm v/v			05/31/19 20:14	3.63
Chloroethane	ND		0.0029	0.0011	ppm v/v			05/31/19 20:14	3.63
<b>Chloroform</b>	<b>0.00077</b>	<b>J</b>	0.0011	0.00034	ppm v/v			05/31/19 20:14	3.63
Chloromethane	ND		0.0029	0.00072	ppm v/v			05/31/19 20:14	3.63
Dibromochloromethane	ND		0.0015	0.00029	ppm v/v			05/31/19 20:14	3.63
1,2-Dibromoethane (EDB)	ND		0.0029	0.00027	ppm v/v			05/31/19 20:14	3.63
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0015	0.00056	ppm v/v			05/31/19 20:14	3.63
1,2-Dichlorobenzene	ND		0.0015	0.00047	ppm v/v			05/31/19 20:14	3.63
1,3-Dichlorobenzene	ND		0.0015	0.00040	ppm v/v			05/31/19 20:14	3.63
1,4-Dichlorobenzene	ND		0.0015	0.00054	ppm v/v			05/31/19 20:14	3.63

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

Client Sample ID: MWL-SV04-300

Lab Sample ID: 320-50040-17

Date Collected: 05/02/19 10:50

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	0.022		0.0015	0.00053	ppm v/v			05/31/19 20:14	3.63
1,1-Dichloroethane	0.0014		0.0011	0.00026	ppm v/v			05/31/19 20:14	3.63
1,2-Dichloroethane	ND		0.0029	0.00032	ppm v/v			05/31/19 20:14	3.63
1,1-Dichloroethene	0.012		0.0029	0.00047	ppm v/v			05/31/19 20:14	3.63
cis-1,2-Dichloroethene	0.00091	J	0.0015	0.00032	ppm v/v			05/31/19 20:14	3.63
trans-1,2-Dichloroethene	ND		0.0015	0.00036	ppm v/v			05/31/19 20:14	3.63
1,2-Dichloropropane	ND		0.0015	0.00087	ppm v/v			05/31/19 20:14	3.63
cis-1,3-Dichloropropene	ND		0.0015	0.00038	ppm v/v			05/31/19 20:14	3.63
trans-1,3-Dichloropropene	ND		0.0015	0.00032	ppm v/v			05/31/19 20:14	3.63
Ethylbenzene	ND		0.0015	0.00023	ppm v/v			05/31/19 20:14	3.63
4-Ethyltoluene	ND		0.0015	0.00068	ppm v/v			05/31/19 20:14	3.63
Hexachlorobutadiene	ND		0.0073	0.0016	ppm v/v			05/31/19 20:14	3.63
2-Hexanone	ND		0.0015	0.00032	ppm v/v			05/31/19 20:14	3.63
4-Methyl-2-pentanone (MIBK)	ND		0.0015	0.00049	ppm v/v			05/31/19 20:14	3.63
Methylene Chloride	0.00061	J B	0.0015	0.00026	ppm v/v			05/31/19 20:14	3.63
Styrene	ND		0.0015	0.00021	ppm v/v			05/31/19 20:14	3.63
1,1,2,2-Tetrachloroethane	ND		0.0015	0.00025	ppm v/v			05/31/19 20:14	3.63
Tetrachloroethene	0.13		0.0015	0.00019	ppm v/v			05/31/19 20:14	3.63
Toluene	ND		0.0015	0.00019	ppm v/v			05/31/19 20:14	3.63
1,1,2-Trichloro-1,2,2-trifluoroethane	0.071		0.0015	0.00059	ppm v/v			05/31/19 20:14	3.63
1,2,4-Trichlorobenzene	0.0027	J B	0.0073	0.0016	ppm v/v			05/31/19 20:14	3.63
1,1,1-Trichloroethane	0.0011		0.0011	0.00024	ppm v/v			05/31/19 20:14	3.63
1,1,2-Trichloroethane	ND		0.0015	0.00024	ppm v/v			05/31/19 20:14	3.63
Trichloroethene	0.091		0.0015	0.00038	ppm v/v			05/31/19 20:14	3.63
Trichlorofluoromethane	0.015		0.0015	0.00071	ppm v/v			05/31/19 20:14	3.63
1,2,4-Trimethylbenzene	ND		0.0029	0.00059	ppm v/v			05/31/19 20:14	3.63
1,3,5-Trimethylbenzene	ND		0.0015	0.00045	ppm v/v			05/31/19 20:14	3.63
Vinyl acetate	ND		0.0029	0.00053	ppm v/v			05/31/19 20:14	3.63
Vinyl chloride	ND		0.0015	0.00044	ppm v/v			05/31/19 20:14	3.63
m,p-Xylene	0.00037	J B	0.0029	0.00036	ppm v/v			05/31/19 20:14	3.63
o-Xylene	0.00022	J B	0.0015	0.00020	ppm v/v			05/31/19 20:14	3.63
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130					05/31/19 20:14	3.63
1,2-Dichloroethane-d4 (Surr)	98		70 - 130					05/31/19 20:14	3.63
Toluene-d8 (Surr)	100		70 - 130					05/31/19 20:14	3.63

Client Sample ID: MWL-SV04-400

Lab Sample ID: 320-50040-18

Date Collected: 05/02/19 10:59

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0066	J	0.019	0.00066	ppm v/v			05/31/19 21:06	3.7
Benzene	0.00056	J	0.0015	0.00029	ppm v/v			05/31/19 21:06	3.7
Benzyl chloride	ND		0.0030	0.00060	ppm v/v			05/31/19 21:06	3.7
Bromodichloromethane	ND		0.0011	0.00024	ppm v/v			05/31/19 21:06	3.7

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

Client Sample ID: MWL-SV04-400

Lab Sample ID: 320-50040-18

Date Collected: 05/02/19 10:59

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	ND		0.0015	0.00026	ppm v/v			05/31/19 21:06	3.7
Bromomethane	ND		0.0030	0.0012	ppm v/v			05/31/19 21:06	3.7
2-Butanone (MEK)	ND		0.0030	0.00074	ppm v/v			05/31/19 21:06	3.7
Carbon disulfide	0.0011	J	0.0030	0.00029	ppm v/v			05/31/19 21:06	3.7
Carbon tetrachloride	0.00026	J	0.0030	0.00024	ppm v/v			05/31/19 21:06	3.7
Chlorobenzene	ND		0.0011	0.00024	ppm v/v			05/31/19 21:06	3.7
Chloroethane	ND		0.0030	0.0011	ppm v/v			05/31/19 21:06	3.7
Chloroform	0.00066	J	0.0011	0.00035	ppm v/v			05/31/19 21:06	3.7
Chloromethane	ND		0.0030	0.00073	ppm v/v			05/31/19 21:06	3.7
Dibromochloromethane	ND		0.0015	0.00029	ppm v/v			05/31/19 21:06	3.7
1,2-Dibromoethane (EDB)	ND		0.0030	0.00028	ppm v/v			05/31/19 21:06	3.7
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0015	0.00057	ppm v/v			05/31/19 21:06	3.7
1,2-Dichlorobenzene	ND		0.0015	0.00048	ppm v/v			05/31/19 21:06	3.7
1,3-Dichlorobenzene	ND		0.0015	0.00041	ppm v/v			05/31/19 21:06	3.7
1,4-Dichlorobenzene	ND		0.0015	0.00055	ppm v/v			05/31/19 21:06	3.7
Dichlorodifluoromethane	0.018		0.0015	0.00054	ppm v/v			05/31/19 21:06	3.7
1,1-Dichloroethane	0.0012		0.0011	0.00027	ppm v/v			05/31/19 21:06	3.7
1,2-Dichloroethane	ND		0.0030	0.00033	ppm v/v			05/31/19 21:06	3.7
1,1-Dichloroethene	0.0095		0.0030	0.00048	ppm v/v			05/31/19 21:06	3.7
cis-1,2-Dichloroethene	0.00079	J	0.0015	0.00033	ppm v/v			05/31/19 21:06	3.7
trans-1,2-Dichloroethene	ND		0.0015	0.00037	ppm v/v			05/31/19 21:06	3.7
1,2-Dichloropropane	ND		0.0015	0.00089	ppm v/v			05/31/19 21:06	3.7
cis-1,3-Dichloropropene	ND		0.0015	0.00038	ppm v/v			05/31/19 21:06	3.7
trans-1,3-Dichloropropene	ND		0.0015	0.00033	ppm v/v			05/31/19 21:06	3.7
Ethylbenzene	ND		0.0015	0.00023	ppm v/v			05/31/19 21:06	3.7
4-Ethyltoluene	ND		0.0015	0.00069	ppm v/v			05/31/19 21:06	3.7
Hexachlorobutadiene	ND		0.0074	0.0016	ppm v/v			05/31/19 21:06	3.7
2-Hexanone	ND		0.0015	0.00032	ppm v/v			05/31/19 21:06	3.7
4-Methyl-2-pentanone (MIBK)	ND		0.0015	0.00050	ppm v/v			05/31/19 21:06	3.7
Methylene Chloride	ND		0.0015	0.00027	ppm v/v			05/31/19 21:06	3.7
Styrene	ND		0.0015	0.00022	ppm v/v			05/31/19 21:06	3.7
1,1,2,2-Tetrachloroethane	ND		0.0015	0.00026	ppm v/v			05/31/19 21:06	3.7
Tetrachloroethene	0.13		0.0015	0.00019	ppm v/v			05/31/19 21:06	3.7
Toluene	ND		0.0015	0.00019	ppm v/v			05/31/19 21:06	3.7
1,1,2-Trichloro-1,2,2-trifluoroethane	0.063		0.0015	0.00060	ppm v/v			05/31/19 21:06	3.7
1,2,4-Trichlorobenzene	0.0027	J B	0.0074	0.0016	ppm v/v			05/31/19 21:06	3.7
1,1,1-Trichloroethane	0.00099	J	0.0011	0.00024	ppm v/v			05/31/19 21:06	3.7
1,1,2-Trichloroethane	ND		0.0015	0.00025	ppm v/v			05/31/19 21:06	3.7
Trichloroethene	0.081		0.0015	0.00039	ppm v/v			05/31/19 21:06	3.7
Trichlorofluoromethane	0.013		0.0015	0.00073	ppm v/v			05/31/19 21:06	3.7
1,2,4-Trimethylbenzene	ND		0.0030	0.00060	ppm v/v			05/31/19 21:06	3.7
1,3,5-Trimethylbenzene	ND		0.0015	0.00046	ppm v/v			05/31/19 21:06	3.7
Vinyl acetate	ND		0.0030	0.00054	ppm v/v			05/31/19 21:06	3.7
Vinyl chloride	ND		0.0015	0.00044	ppm v/v			05/31/19 21:06	3.7
m,p-Xylene	ND		0.0030	0.00037	ppm v/v			05/31/19 21:06	3.7
o-Xylene	ND		0.0015	0.00020	ppm v/v			05/31/19 21:06	3.7

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV04-400**

**Lab Sample ID: 320-50040-18**

**Date Collected: 05/02/19 10:59**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		05/31/19 21:06	3.7
1,2-Dichloroethane-d4 (Surr)	99		70 - 130		05/31/19 21:06	3.7
Toluene-d8 (Surr)	100		70 - 130		05/31/19 21:06	3.7

**Client Sample ID: MWL-SVFB-5**

**Lab Sample ID: 320-50040-19**

**Date Collected: 05/02/19 09:24**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0032</b>	<b>J</b>	0.0050	0.00018	ppm v/v			05/31/19 22:06	1
Benzene	ND		0.00040	0.000079	ppm v/v			05/31/19 22:06	1
Benzyl chloride	ND		0.00080	0.00016	ppm v/v			05/31/19 22:06	1
Bromodichloromethane	ND		0.00030	0.000066	ppm v/v			05/31/19 22:06	1
Bromoform	ND		0.00040	0.000070	ppm v/v			05/31/19 22:06	1
Bromomethane	ND		0.00080	0.00034	ppm v/v			05/31/19 22:06	1
2-Butanone (MEK)	ND		0.00080	0.00020	ppm v/v			05/31/19 22:06	1
Carbon disulfide	ND		0.00080	0.000078	ppm v/v			05/31/19 22:06	1
Carbon tetrachloride	ND		0.00080	0.000064	ppm v/v			05/31/19 22:06	1
Chlorobenzene	ND		0.00030	0.000064	ppm v/v			05/31/19 22:06	1
Chloroethane	ND		0.00080	0.00031	ppm v/v			05/31/19 22:06	1
Chloroform	ND		0.00030	0.000095	ppm v/v			05/31/19 22:06	1
<b>Chloromethane</b>	<b>0.00030</b>	<b>J</b>	0.00080	0.00020	ppm v/v			05/31/19 22:06	1
Dibromochloromethane	ND		0.00040	0.000079	ppm v/v			05/31/19 22:06	1
1,2-Dibromoethane (EDB)	ND		0.00080	0.000075	ppm v/v			05/31/19 22:06	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.00016	ppm v/v			05/31/19 22:06	1
1,2-Dichlorobenzene	ND		0.00040	0.00013	ppm v/v			05/31/19 22:06	1
1,3-Dichlorobenzene	ND		0.00040	0.00011	ppm v/v			05/31/19 22:06	1
1,4-Dichlorobenzene	ND		0.00040	0.00015	ppm v/v			05/31/19 22:06	1
<b>Dichlorodifluoromethane</b>	<b>0.00018</b>	<b>J</b>	0.00040	0.00015	ppm v/v			05/31/19 22:06	1
1,1-Dichloroethane	ND		0.00030	0.000072	ppm v/v			05/31/19 22:06	1
1,2-Dichloroethane	ND		0.00080	0.000088	ppm v/v			05/31/19 22:06	1
1,1-Dichloroethene	ND		0.00080	0.00013	ppm v/v			05/31/19 22:06	1
cis-1,2-Dichloroethene	ND		0.00040	0.000089	ppm v/v			05/31/19 22:06	1
trans-1,2-Dichloroethene	ND		0.00040	0.00010	ppm v/v			05/31/19 22:06	1
1,2-Dichloropropane	ND		0.00040	0.00024	ppm v/v			05/31/19 22:06	1
cis-1,3-Dichloropropene	ND		0.00040	0.00010	ppm v/v			05/31/19 22:06	1
trans-1,3-Dichloropropene	ND		0.00040	0.000088	ppm v/v			05/31/19 22:06	1
Ethylbenzene	ND		0.00040	0.000063	ppm v/v			05/31/19 22:06	1
4-Ethyltoluene	ND		0.00040	0.00019	ppm v/v			05/31/19 22:06	1
Hexachlorobutadiene	ND		0.0020	0.00043	ppm v/v			05/31/19 22:06	1
2-Hexanone	ND		0.00040	0.000087	ppm v/v			05/31/19 22:06	1
4-Methyl-2-pentanone (MIBK)	ND		0.00040	0.00014	ppm v/v			05/31/19 22:06	1
<b>Methylene Chloride</b>	<b>0.00010</b>	<b>J B</b>	0.00040	0.000072	ppm v/v			05/31/19 22:06	1
Styrene	ND		0.00040	0.000059	ppm v/v			05/31/19 22:06	1
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000069	ppm v/v			05/31/19 22:06	1
<b>Tetrachloroethene</b>	<b>0.000056</b>	<b>J</b>	0.00040	0.000051	ppm v/v			05/31/19 22:06	1
Toluene	ND		0.00040	0.000051	ppm v/v			05/31/19 22:06	1

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SVFB-5**

**Lab Sample ID: 320-50040-19**

**Date Collected: 05/02/19 09:24**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.00040	0.00016	ppm v/v			05/31/19 22:06	1
1,2,4-Trichlorobenzene	ND		0.0020	0.00043	ppm v/v			05/31/19 22:06	1
1,1,1-Trichloroethane	ND		0.00030	0.000065	ppm v/v			05/31/19 22:06	1
1,1,2-Trichloroethane	ND		0.00040	0.000067	ppm v/v			05/31/19 22:06	1
Trichloroethene	ND		0.00040	0.00011	ppm v/v			05/31/19 22:06	1
Trichlorofluoromethane	ND		0.00040	0.00020	ppm v/v			05/31/19 22:06	1
1,2,4-Trimethylbenzene	ND		0.00080	0.00016	ppm v/v			05/31/19 22:06	1
1,3,5-Trimethylbenzene	ND		0.00040	0.00013	ppm v/v			05/31/19 22:06	1
Vinyl acetate	ND		0.00080	0.00015	ppm v/v			05/31/19 22:06	1
Vinyl chloride	ND		0.00040	0.00012	ppm v/v			05/31/19 22:06	1
m,p-Xylene	ND		0.00080	0.00010	ppm v/v			05/31/19 22:06	1
o-Xylene	ND		0.00040	0.000054	ppm v/v			05/31/19 22:06	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130					05/31/19 22:06	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					05/31/19 22:06	1
Toluene-d8 (Surr)	100		70 - 130					05/31/19 22:06	1

**Client Sample ID: MWL-SV05-50**

**Lab Sample ID: 320-50040-20**

**Date Collected: 05/02/19 09:33**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0046	J	0.010	0.00037	ppm v/v			05/31/19 23:02	2.08
Benzene	0.00018	J	0.00083	0.00016	ppm v/v			05/31/19 23:02	2.08
Benzyl chloride	ND		0.0017	0.00034	ppm v/v			05/31/19 23:02	2.08
Bromodichloromethane	ND		0.00062	0.00014	ppm v/v			05/31/19 23:02	2.08
Bromoform	ND		0.00083	0.00015	ppm v/v			05/31/19 23:02	2.08
Bromomethane	ND		0.0017	0.00070	ppm v/v			05/31/19 23:02	2.08
2-Butanone (MEK)	0.00056	J	0.0017	0.00041	ppm v/v			05/31/19 23:02	2.08
Carbon disulfide	0.0014	J	0.0017	0.00016	ppm v/v			05/31/19 23:02	2.08
Carbon tetrachloride	0.00031	J	0.0017	0.00013	ppm v/v			05/31/19 23:02	2.08
Chlorobenzene	0.00022	J	0.00062	0.00013	ppm v/v			05/31/19 23:02	2.08
Chloroethane	ND		0.0017	0.00064	ppm v/v			05/31/19 23:02	2.08
Chloroform	0.0013		0.00062	0.00020	ppm v/v			05/31/19 23:02	2.08
Chloromethane	ND		0.0017	0.00041	ppm v/v			05/31/19 23:02	2.08
Dibromochloromethane	ND		0.00083	0.00016	ppm v/v			05/31/19 23:02	2.08
1,2-Dibromoethane (EDB)	ND		0.0017	0.00016	ppm v/v			05/31/19 23:02	2.08
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00083	0.00032	ppm v/v			05/31/19 23:02	2.08
1,2-Dichlorobenzene	ND		0.00083	0.00027	ppm v/v			05/31/19 23:02	2.08
1,3-Dichlorobenzene	ND		0.00083	0.00023	ppm v/v			05/31/19 23:02	2.08
1,4-Dichlorobenzene	ND		0.00083	0.00031	ppm v/v			05/31/19 23:02	2.08
Dichlorodifluoromethane	0.035		0.00083	0.00030	ppm v/v			05/31/19 23:02	2.08
1,1-Dichloroethane	0.0016		0.00062	0.00015	ppm v/v			05/31/19 23:02	2.08
1,2-Dichloroethane	ND		0.0017	0.00018	ppm v/v			05/31/19 23:02	2.08
1,1-Dichloroethene	0.0094		0.0017	0.00027	ppm v/v			05/31/19 23:02	2.08
cis-1,2-Dichloroethene	0.00074	J	0.00083	0.00019	ppm v/v			05/31/19 23:02	2.08

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV05-50**

**Lab Sample ID: 320-50040-20**

**Date Collected: 05/02/19 09:33**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
trans-1,2-Dichloroethene	ND		0.00083	0.00021	ppm v/v			05/31/19 23:02	2.08
1,2-Dichloropropane	ND		0.00083	0.00050	ppm v/v			05/31/19 23:02	2.08
cis-1,3-Dichloropropene	ND		0.00083	0.00022	ppm v/v			05/31/19 23:02	2.08
trans-1,3-Dichloropropene	ND		0.00083	0.00018	ppm v/v			05/31/19 23:02	2.08
Ethylbenzene	ND		0.00083	0.00013	ppm v/v			05/31/19 23:02	2.08
4-Ethyltoluene	ND		0.00083	0.00039	ppm v/v			05/31/19 23:02	2.08
Hexachlorobutadiene	ND		0.0042	0.00090	ppm v/v			05/31/19 23:02	2.08
2-Hexanone	ND		0.00083	0.00018	ppm v/v			05/31/19 23:02	2.08
4-Methyl-2-pentanone (MIBK)	ND		0.00083	0.00028	ppm v/v			05/31/19 23:02	2.08
<b>Methylene Chloride</b>	<b>0.00030</b>	<b>J B</b>	0.00083	0.00015	ppm v/v			05/31/19 23:02	2.08
Styrene	ND		0.00083	0.00012	ppm v/v			05/31/19 23:02	2.08
1,1,2,2-Tetrachloroethane	ND		0.00083	0.00014	ppm v/v			05/31/19 23:02	2.08
<b>Tetrachloroethene</b>	<b>0.050</b>		0.00083	0.00011	ppm v/v			05/31/19 23:02	2.08
Toluene	ND		0.00083	0.00011	ppm v/v			05/31/19 23:02	2.08
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.039</b>		0.00083	0.00034	ppm v/v			05/31/19 23:02	2.08
<b>1,2,4-Trichlorobenzene</b>	<b>0.0015</b>	<b>J B</b>	0.0042	0.00090	ppm v/v			05/31/19 23:02	2.08
<b>1,1,1-Trichloroethane</b>	<b>0.012</b>		0.00062	0.00014	ppm v/v			05/31/19 23:02	2.08
1,1,2-Trichloroethane	ND		0.00083	0.00014	ppm v/v			05/31/19 23:02	2.08
<b>Trichloroethene</b>	<b>0.058</b>		0.00083	0.00022	ppm v/v			05/31/19 23:02	2.08
<b>Trichlorofluoromethane</b>	<b>0.096</b>		0.00083	0.00041	ppm v/v			05/31/19 23:02	2.08
1,2,4-Trimethylbenzene	ND		0.0017	0.00034	ppm v/v			05/31/19 23:02	2.08
1,3,5-Trimethylbenzene	ND		0.00083	0.00026	ppm v/v			05/31/19 23:02	2.08
Vinyl acetate	ND		0.0017	0.00030	ppm v/v			05/31/19 23:02	2.08
Vinyl chloride	ND		0.00083	0.00025	ppm v/v			05/31/19 23:02	2.08
m,p-Xylene	ND		0.0017	0.00021	ppm v/v			05/31/19 23:02	2.08
o-Xylene	ND		0.00083	0.00011	ppm v/v			05/31/19 23:02	2.08
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130					05/31/19 23:02	2.08
1,2-Dichloroethane-d4 (Surr)	99		70 - 130					05/31/19 23:02	2.08
Toluene-d8 (Surr)	100		70 - 130					05/31/19 23:02	2.08

**Client Sample ID: MWL-SV05-100**

**Lab Sample ID: 320-50040-21**

**Date Collected: 05/02/19 09:41**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0056</b>	<b>J</b>	0.018	0.00062	ppm v/v			05/31/19 23:55	3.51
Benzene	ND		0.0014	0.00028	ppm v/v			05/31/19 23:55	3.51
Benzyl chloride	ND		0.0028	0.00057	ppm v/v			05/31/19 23:55	3.51
Bromodichloromethane	ND		0.0011	0.00023	ppm v/v			05/31/19 23:55	3.51
Bromoform	ND		0.0014	0.00025	ppm v/v			05/31/19 23:55	3.51
Bromomethane	ND		0.0028	0.0012	ppm v/v			05/31/19 23:55	3.51
2-Butanone (MEK)	ND		0.0028	0.00070	ppm v/v			05/31/19 23:55	3.51
Carbon disulfide	ND		0.0028	0.00027	ppm v/v			05/31/19 23:55	3.51
<b>Carbon tetrachloride</b>	<b>0.00057</b>	<b>J</b>	0.0028	0.00022	ppm v/v			05/31/19 23:55	3.51

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV05-100**

**Lab Sample ID: 320-50040-21**

**Date Collected: 05/02/19 09:41**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlorobenzene	ND		0.0011	0.00022	ppm v/v			05/31/19 23:55	3.51
Chloroethane	ND		0.0028	0.0011	ppm v/v			05/31/19 23:55	3.51
<b>Chloroform</b>	<b>0.0021</b>		0.0011	0.00033	ppm v/v			05/31/19 23:55	3.51
Chloromethane	ND		0.0028	0.00069	ppm v/v			05/31/19 23:55	3.51
Dibromochloromethane	ND		0.0014	0.00028	ppm v/v			05/31/19 23:55	3.51
1,2-Dibromoethane (EDB)	ND		0.0028	0.00026	ppm v/v			05/31/19 23:55	3.51
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00054	ppm v/v			05/31/19 23:55	3.51
1,2-Dichlorobenzene	ND		0.0014	0.00046	ppm v/v			05/31/19 23:55	3.51
1,3-Dichlorobenzene	ND		0.0014	0.00039	ppm v/v			05/31/19 23:55	3.51
1,4-Dichlorobenzene	ND		0.0014	0.00052	ppm v/v			05/31/19 23:55	3.51
<b>Dichlorodifluoromethane</b>	<b>0.060</b>		0.0014	0.00051	ppm v/v			05/31/19 23:55	3.51
<b>1,1-Dichloroethane</b>	<b>0.0034</b>		0.0011	0.00025	ppm v/v			05/31/19 23:55	3.51
1,2-Dichloroethane	ND		0.0028	0.00031	ppm v/v			05/31/19 23:55	3.51
<b>1,1-Dichloroethene</b>	<b>0.021</b>		0.0028	0.00045	ppm v/v			05/31/19 23:55	3.51
<b>cis-1,2-Dichloroethene</b>	<b>0.0016</b>		0.0014	0.00031	ppm v/v			05/31/19 23:55	3.51
trans-1,2-Dichloroethene	ND		0.0014	0.00035	ppm v/v			05/31/19 23:55	3.51
1,2-Dichloropropane	ND		0.0014	0.00084	ppm v/v			05/31/19 23:55	3.51
cis-1,3-Dichloropropene	ND		0.0014	0.00037	ppm v/v			05/31/19 23:55	3.51
trans-1,3-Dichloropropene	ND		0.0014	0.00031	ppm v/v			05/31/19 23:55	3.51
Ethylbenzene	ND		0.0014	0.00022	ppm v/v			05/31/19 23:55	3.51
4-Ethyltoluene	ND		0.0014	0.00066	ppm v/v			05/31/19 23:55	3.51
Hexachlorobutadiene	ND		0.0070	0.0015	ppm v/v			05/31/19 23:55	3.51
2-Hexanone	ND		0.0014	0.00031	ppm v/v			05/31/19 23:55	3.51
4-Methyl-2-pentanone (MIBK)	ND		0.0014	0.00047	ppm v/v			05/31/19 23:55	3.51
<b>Methylene Chloride</b>	<b>0.00086</b>	<b>J B</b>	0.0014	0.00025	ppm v/v			05/31/19 23:55	3.51
Styrene	ND		0.0014	0.00021	ppm v/v			05/31/19 23:55	3.51
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00024	ppm v/v			05/31/19 23:55	3.51
<b>Tetrachloroethene</b>	<b>0.091</b>		0.0014	0.00018	ppm v/v			05/31/19 23:55	3.51
Toluene	ND		0.0014	0.00018	ppm v/v			05/31/19 23:55	3.51
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.081</b>		0.0014	0.00057	ppm v/v			05/31/19 23:55	3.51
1,2,4-Trichlorobenzene	ND		0.0070	0.0015	ppm v/v			05/31/19 23:55	3.51
<b>1,1,1-Trichloroethane</b>	<b>0.013</b>		0.0011	0.00023	ppm v/v			05/31/19 23:55	3.51
1,1,2-Trichloroethane	ND		0.0014	0.00024	ppm v/v			05/31/19 23:55	3.51
<b>Trichloroethene</b>	<b>0.12</b>		0.0014	0.00037	ppm v/v			05/31/19 23:55	3.51
<b>Trichlorofluoromethane</b>	<b>0.13</b>		0.0014	0.00069	ppm v/v			05/31/19 23:55	3.51
1,2,4-Trimethylbenzene	ND		0.0028	0.00057	ppm v/v			05/31/19 23:55	3.51
1,3,5-Trimethylbenzene	ND		0.0014	0.00044	ppm v/v			05/31/19 23:55	3.51
<b>Vinyl acetate</b>	<b>0.0043</b>		0.0028	0.00051	ppm v/v			05/31/19 23:55	3.51
Vinyl chloride	ND		0.0014	0.00042	ppm v/v			05/31/19 23:55	3.51
m,p-Xylene	ND		0.0028	0.00035	ppm v/v			05/31/19 23:55	3.51
o-Xylene	ND		0.0014	0.00019	ppm v/v			05/31/19 23:55	3.51
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		70 - 130					05/31/19 23:55	3.51
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					05/31/19 23:55	3.51
Toluene-d8 (Surr)	100		70 - 130					05/31/19 23:55	3.51

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

Client Sample ID: MWL-SV05-200

Lab Sample ID: 320-50040-22

Date Collected: 05/02/19 09:49

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0096</b>	<b>J</b>	0.021	0.00075	ppm v/v			06/01/19 00:48	4.24
Benzene	ND		0.0017	0.00033	ppm v/v			06/01/19 00:48	4.24
Benzyl chloride	ND		0.0034	0.00069	ppm v/v			06/01/19 00:48	4.24
Bromodichloromethane	ND		0.0013	0.00028	ppm v/v			06/01/19 00:48	4.24
Bromoform	ND		0.0017	0.00030	ppm v/v			06/01/19 00:48	4.24
Bromomethane	ND		0.0034	0.0014	ppm v/v			06/01/19 00:48	4.24
<b>2-Butanone (MEK)</b>	<b>0.0011</b>	<b>J</b>	0.0034	0.00084	ppm v/v			06/01/19 00:48	4.24
Carbon disulfide	ND		0.0034	0.00033	ppm v/v			06/01/19 00:48	4.24
<b>Carbon tetrachloride</b>	<b>0.0011</b>	<b>J</b>	0.0034	0.00027	ppm v/v			06/01/19 00:48	4.24
Chlorobenzene	ND		0.0013	0.00027	ppm v/v			06/01/19 00:48	4.24
Chloroethane	ND		0.0034	0.0013	ppm v/v			06/01/19 00:48	4.24
<b>Chloroform</b>	<b>0.0023</b>		0.0013	0.00040	ppm v/v			06/01/19 00:48	4.24
Chloromethane	ND		0.0034	0.00084	ppm v/v			06/01/19 00:48	4.24
Dibromochloromethane	ND		0.0017	0.00033	ppm v/v			06/01/19 00:48	4.24
1,2-Dibromoethane (EDB)	ND		0.0034	0.00032	ppm v/v			06/01/19 00:48	4.24
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0017	0.00066	ppm v/v			06/01/19 00:48	4.24
1,2-Dichlorobenzene	ND		0.0017	0.00055	ppm v/v			06/01/19 00:48	4.24
1,3-Dichlorobenzene	ND		0.0017	0.00047	ppm v/v			06/01/19 00:48	4.24
1,4-Dichlorobenzene	ND		0.0017	0.00063	ppm v/v			06/01/19 00:48	4.24
<b>Dichlorodifluoromethane</b>	<b>0.066</b>		0.0017	0.00061	ppm v/v			06/01/19 00:48	4.24
<b>1,1-Dichloroethane</b>	<b>0.0056</b>		0.0013	0.00031	ppm v/v			06/01/19 00:48	4.24
1,2-Dichloroethane	ND		0.0034	0.00037	ppm v/v			06/01/19 00:48	4.24
<b>1,1-Dichloroethene</b>	<b>0.041</b>		0.0034	0.00055	ppm v/v			06/01/19 00:48	4.24
<b>cis-1,2-Dichloroethene</b>	<b>0.0027</b>		0.0017	0.00038	ppm v/v			06/01/19 00:48	4.24
trans-1,2-Dichloroethene	ND		0.0017	0.00042	ppm v/v			06/01/19 00:48	4.24
1,2-Dichloropropane	ND		0.0017	0.0010	ppm v/v			06/01/19 00:48	4.24
cis-1,3-Dichloropropene	ND		0.0017	0.00044	ppm v/v			06/01/19 00:48	4.24
trans-1,3-Dichloropropene	ND		0.0017	0.00037	ppm v/v			06/01/19 00:48	4.24
Ethylbenzene	ND		0.0017	0.00027	ppm v/v			06/01/19 00:48	4.24
4-Ethyltoluene	ND		0.0017	0.00079	ppm v/v			06/01/19 00:48	4.24
Hexachlorobutadiene	ND		0.0085	0.0018	ppm v/v			06/01/19 00:48	4.24
2-Hexanone	ND		0.0017	0.00037	ppm v/v			06/01/19 00:48	4.24
4-Methyl-2-pentanone (MIBK)	ND		0.0017	0.00057	ppm v/v			06/01/19 00:48	4.24
<b>Methylene Chloride</b>	<b>0.0029</b>	<b>B</b>	0.0017	0.00031	ppm v/v			06/01/19 00:48	4.24
Styrene	ND		0.0017	0.00025	ppm v/v			06/01/19 00:48	4.24
1,1,2,2-Tetrachloroethane	ND		0.0017	0.00029	ppm v/v			06/01/19 00:48	4.24
<b>Tetrachloroethene</b>	<b>0.15</b>		0.0017	0.00022	ppm v/v			06/01/19 00:48	4.24
Toluene	ND		0.0017	0.00022	ppm v/v			06/01/19 00:48	4.24
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.15</b>		0.0017	0.00069	ppm v/v			06/01/19 00:48	4.24
1,2,4-Trichlorobenzene	ND		0.0085	0.0018	ppm v/v			06/01/19 00:48	4.24
<b>1,1,1-Trichloroethane</b>	<b>0.0038</b>		0.0013	0.00028	ppm v/v			06/01/19 00:48	4.24
1,1,2-Trichloroethane	ND		0.0017	0.00028	ppm v/v			06/01/19 00:48	4.24
<b>Trichloroethene</b>	<b>0.21</b>		0.0017	0.00045	ppm v/v			06/01/19 00:48	4.24
<b>Trichlorofluoromethane</b>	<b>0.090</b>		0.0017	0.00083	ppm v/v			06/01/19 00:48	4.24
1,2,4-Trimethylbenzene	ND		0.0034	0.00069	ppm v/v			06/01/19 00:48	4.24
1,3,5-Trimethylbenzene	ND		0.0017	0.00053	ppm v/v			06/01/19 00:48	4.24
Vinyl acetate	ND		0.0034	0.00061	ppm v/v			06/01/19 00:48	4.24
Vinyl chloride	ND		0.0017	0.00051	ppm v/v			06/01/19 00:48	4.24

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV05-200**

**Lab Sample ID: 320-50040-22**

**Date Collected: 05/02/19 09:49**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.0034	0.00042	ppm v/v			06/01/19 00:48	4.24
o-Xylene	ND		0.0017	0.00023	ppm v/v			06/01/19 00:48	4.24
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130					06/01/19 00:48	4.24
1,2-Dichloroethane-d4 (Surr)	100		70 - 130					06/01/19 00:48	4.24
Toluene-d8 (Surr)	100		70 - 130					06/01/19 00:48	4.24

**Client Sample ID: MWL-SV05-300**

**Lab Sample ID: 320-50040-23**

**Date Collected: 05/02/19 09:56**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.011	J	0.013	0.00045	ppm v/v			06/01/19 01:42	2.51
Benzene	0.00025	J	0.0010	0.00020	ppm v/v			06/01/19 01:42	2.51
Benzyl chloride	ND		0.0020	0.00041	ppm v/v			06/01/19 01:42	2.51
Bromodichloromethane	ND		0.00075	0.00017	ppm v/v			06/01/19 01:42	2.51
Bromoform	ND		0.0010	0.00018	ppm v/v			06/01/19 01:42	2.51
Bromomethane	ND		0.0020	0.00084	ppm v/v			06/01/19 01:42	2.51
2-Butanone (MEK)	0.00089	J	0.0020	0.00050	ppm v/v			06/01/19 01:42	2.51
Carbon disulfide	0.0030		0.0020	0.00020	ppm v/v			06/01/19 01:42	2.51
Carbon tetrachloride	0.00069	J	0.0020	0.00016	ppm v/v			06/01/19 01:42	2.51
Chlorobenzene	ND		0.00075	0.00016	ppm v/v			06/01/19 01:42	2.51
Chloroethane	ND		0.0020	0.00077	ppm v/v			06/01/19 01:42	2.51
Chloroform	0.00076		0.00075	0.00024	ppm v/v			06/01/19 01:42	2.51
Chloromethane	ND		0.0020	0.00049	ppm v/v			06/01/19 01:42	2.51
Dibromochloromethane	ND		0.0010	0.00020	ppm v/v			06/01/19 01:42	2.51
1,2-Dibromoethane (EDB)	ND		0.0020	0.00019	ppm v/v			06/01/19 01:42	2.51
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0010	0.00039	ppm v/v			06/01/19 01:42	2.51
1,2-Dichlorobenzene	ND		0.0010	0.00033	ppm v/v			06/01/19 01:42	2.51
1,3-Dichlorobenzene	ND		0.0010	0.00028	ppm v/v			06/01/19 01:42	2.51
1,4-Dichlorobenzene	ND		0.0010	0.00037	ppm v/v			06/01/19 01:42	2.51
Dichlorodifluoromethane	0.025		0.0010	0.00036	ppm v/v			06/01/19 01:42	2.51
1,1-Dichloroethane	0.0015		0.00075	0.00018	ppm v/v			06/01/19 01:42	2.51
1,2-Dichloroethane	ND		0.0020	0.00022	ppm v/v			06/01/19 01:42	2.51
1,1-Dichloroethene	0.020		0.0020	0.00032	ppm v/v			06/01/19 01:42	2.51
cis-1,2-Dichloroethene	0.00083	J	0.0010	0.00022	ppm v/v			06/01/19 01:42	2.51
trans-1,2-Dichloroethene	ND		0.0010	0.00025	ppm v/v			06/01/19 01:42	2.51
1,2-Dichloropropane	ND		0.0010	0.00060	ppm v/v			06/01/19 01:42	2.51
cis-1,3-Dichloropropene	ND		0.0010	0.00026	ppm v/v			06/01/19 01:42	2.51
trans-1,3-Dichloropropene	ND		0.0010	0.00022	ppm v/v			06/01/19 01:42	2.51
Ethylbenzene	ND		0.0010	0.00016	ppm v/v			06/01/19 01:42	2.51
4-Ethyltoluene	ND		0.0010	0.00047	ppm v/v			06/01/19 01:42	2.51
Hexachlorobutadiene	ND		0.0050	0.0011	ppm v/v			06/01/19 01:42	2.51
2-Hexanone	ND		0.0010	0.00022	ppm v/v			06/01/19 01:42	2.51
4-Methyl-2-pentanone (MIBK)	ND		0.0010	0.00034	ppm v/v			06/01/19 01:42	2.51
Methylene Chloride	0.00077	J B	0.0010	0.00018	ppm v/v			06/01/19 01:42	2.51

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV05-300**

**Lab Sample ID: 320-50040-23**

**Date Collected: 05/02/19 09:56**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		0.0010	0.00015	ppm v/v			06/01/19 01:42	2.51
1,1,2,2-Tetrachloroethane	ND		0.0010	0.00017	ppm v/v			06/01/19 01:42	2.51
<b>Tetrachloroethene</b>	<b>0.099</b>		0.0010	0.00013	ppm v/v			06/01/19 01:42	2.51
<b>Toluene</b>	<b>0.00014</b>	<b>J</b>	0.0010	0.00013	ppm v/v			06/01/19 01:42	2.51
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.079</b>		0.0010	0.00041	ppm v/v			06/01/19 01:42	2.51
1,2,4-Trichlorobenzene	ND		0.0050	0.0011	ppm v/v			06/01/19 01:42	2.51
<b>1,1,1-Trichloroethane</b>	<b>0.0012</b>		0.00075	0.00016	ppm v/v			06/01/19 01:42	2.51
1,1,2-Trichloroethane	ND		0.0010	0.00017	ppm v/v			06/01/19 01:42	2.51
<b>Trichloroethene</b>	<b>0.097</b>		0.0010	0.00026	ppm v/v			06/01/19 01:42	2.51
<b>Trichlorofluoromethane</b>	<b>0.023</b>		0.0010	0.00049	ppm v/v			06/01/19 01:42	2.51
1,2,4-Trimethylbenzene	ND		0.0020	0.00041	ppm v/v			06/01/19 01:42	2.51
1,3,5-Trimethylbenzene	ND		0.0010	0.00031	ppm v/v			06/01/19 01:42	2.51
Vinyl acetate	ND		0.0020	0.00036	ppm v/v			06/01/19 01:42	2.51
Vinyl chloride	ND		0.0010	0.00030	ppm v/v			06/01/19 01:42	2.51
m,p-Xylene	ND		0.0020	0.00025	ppm v/v			06/01/19 01:42	2.51
o-Xylene	ND		0.0010	0.00014	ppm v/v			06/01/19 01:42	2.51
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		70 - 130					06/01/19 01:42	2.51
1,2-Dichloroethane-d4 (Surr)	101		70 - 130					06/01/19 01:42	2.51
Toluene-d8 (Surr)	101		70 - 130					06/01/19 01:42	2.51

**Client Sample ID: MWL-SV05-400**

**Lab Sample ID: 320-50040-24**

**Date Collected: 05/02/19 10:03**

**Matrix: Air**

**Date Received: 05/09/19 09:10**

**Sample Container: Summa Canister 6L**

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0065</b>	<b>J</b>	0.013	0.00046	ppm v/v			06/01/19 02:36	2.59
<b>Benzene</b>	<b>0.00039</b>	<b>J</b>	0.0010	0.00020	ppm v/v			06/01/19 02:36	2.59
Benzyl chloride	ND		0.0021	0.00042	ppm v/v			06/01/19 02:36	2.59
Bromodichloromethane	ND		0.00078	0.00017	ppm v/v			06/01/19 02:36	2.59
Bromoform	ND		0.0010	0.00018	ppm v/v			06/01/19 02:36	2.59
Bromomethane	ND		0.0021	0.00087	ppm v/v			06/01/19 02:36	2.59
2-Butanone (MEK)	ND		0.0021	0.00052	ppm v/v			06/01/19 02:36	2.59
<b>Carbon disulfide</b>	<b>0.0025</b>		0.0021	0.00020	ppm v/v			06/01/19 02:36	2.59
<b>Carbon tetrachloride</b>	<b>0.00043</b>	<b>J</b>	0.0021	0.00017	ppm v/v			06/01/19 02:36	2.59
Chlorobenzene	ND		0.00078	0.00017	ppm v/v			06/01/19 02:36	2.59
Chloroethane	ND		0.0021	0.00080	ppm v/v			06/01/19 02:36	2.59
<b>Chloroform</b>	<b>0.00072</b>	<b>J</b>	0.00078	0.00025	ppm v/v			06/01/19 02:36	2.59
Chloromethane	ND		0.0021	0.00051	ppm v/v			06/01/19 02:36	2.59
Dibromochloromethane	ND		0.0010	0.00020	ppm v/v			06/01/19 02:36	2.59
1,2-Dibromoethane (EDB)	ND		0.0021	0.00019	ppm v/v			06/01/19 02:36	2.59
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0010	0.00040	ppm v/v			06/01/19 02:36	2.59
1,2-Dichlorobenzene	ND		0.0010	0.00034	ppm v/v			06/01/19 02:36	2.59
1,3-Dichlorobenzene	ND		0.0010	0.00028	ppm v/v			06/01/19 02:36	2.59
1,4-Dichlorobenzene	ND		0.0010	0.00039	ppm v/v			06/01/19 02:36	2.59

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 320-50040-1

**Client Sample ID: MWL-SV05-400**

**Lab Sample ID: 320-50040-24**

Date Collected: 05/02/19 10:03

Matrix: Air

Date Received: 05/09/19 09:10

Sample Container: Summa Canister 6L

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	0.016		0.0010	0.00038	ppm v/v			06/01/19 02:36	2.59
1,1-Dichloroethane	0.0015		0.00078	0.00019	ppm v/v			06/01/19 02:36	2.59
1,2-Dichloroethane	ND		0.0021	0.00023	ppm v/v			06/01/19 02:36	2.59
1,1-Dichloroethene	0.013		0.0021	0.00033	ppm v/v			06/01/19 02:36	2.59
cis-1,2-Dichloroethene	0.00077	J	0.0010	0.00023	ppm v/v			06/01/19 02:36	2.59
trans-1,2-Dichloroethene	ND		0.0010	0.00026	ppm v/v			06/01/19 02:36	2.59
1,2-Dichloropropane	ND		0.0010	0.00062	ppm v/v			06/01/19 02:36	2.59
cis-1,3-Dichloropropene	ND		0.0010	0.00027	ppm v/v			06/01/19 02:36	2.59
trans-1,3-Dichloropropene	ND		0.0010	0.00023	ppm v/v			06/01/19 02:36	2.59
Ethylbenzene	ND		0.0010	0.00016	ppm v/v			06/01/19 02:36	2.59
4-Ethyltoluene	ND		0.0010	0.00048	ppm v/v			06/01/19 02:36	2.59
Hexachlorobutadiene	ND		0.0052	0.0011	ppm v/v			06/01/19 02:36	2.59
2-Hexanone	ND		0.0010	0.00023	ppm v/v			06/01/19 02:36	2.59
4-Methyl-2-pentanone (MIBK)	ND		0.0010	0.00035	ppm v/v			06/01/19 02:36	2.59
Methylene Chloride	0.00071	J B	0.0010	0.00019	ppm v/v			06/01/19 02:36	2.59
Styrene	ND		0.0010	0.00015	ppm v/v			06/01/19 02:36	2.59
1,1,2,2-Tetrachloroethane	ND		0.0010	0.00018	ppm v/v			06/01/19 02:36	2.59
Tetrachloroethene	0.10		0.0010	0.00013	ppm v/v			06/01/19 02:36	2.59
Toluene	0.0015		0.0010	0.00013	ppm v/v			06/01/19 02:36	2.59
1,1,2-Trichloro-1,2,2-trifluoroethane	0.043		0.0010	0.00042	ppm v/v			06/01/19 02:36	2.59
1,2,4-Trichlorobenzene	ND		0.0052	0.0011	ppm v/v			06/01/19 02:36	2.59
1,1,1-Trichloroethane	0.0014		0.00078	0.00017	ppm v/v			06/01/19 02:36	2.59
1,1,2-Trichloroethane	ND		0.0010	0.00017	ppm v/v			06/01/19 02:36	2.59
Trichloroethene	0.089		0.0010	0.00027	ppm v/v			06/01/19 02:36	2.59
Trichlorofluoromethane	0.020		0.0010	0.00051	ppm v/v			06/01/19 02:36	2.59
1,2,4-Trimethylbenzene	ND		0.0021	0.00042	ppm v/v			06/01/19 02:36	2.59
1,3,5-Trimethylbenzene	ND		0.0010	0.00032	ppm v/v			06/01/19 02:36	2.59
Vinyl acetate	ND		0.0021	0.00038	ppm v/v			06/01/19 02:36	2.59
Vinyl chloride	ND		0.0010	0.00031	ppm v/v			06/01/19 02:36	2.59
m,p-Xylene	ND		0.0021	0.00026	ppm v/v			06/01/19 02:36	2.59
o-Xylene	ND		0.0010	0.00014	ppm v/v			06/01/19 02:36	2.59
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130					06/01/19 02:36	2.59
1,2-Dichloroethane-d4 (Surr)	102		70 - 130					06/01/19 02:36	2.59
Toluene-d8 (Surr)	101		70 - 130					06/01/19 02:36	2.59

**FIELD SAMPLING FORMS**  
**OCTOBER 2019 SOIL-VAPOR MONITORING**

## 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-SV-FB3	10/10/19	0846	09719	NA	NA	-25	-8	
MWL-SV03-50	10/10/19	0855	NA	0.0	8	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
		0856	↓	↓	↓	↓	↓	
		0857	09974	NA	NA	-25	-8	
MWL-SV03-700		0858	NA	0.0	8	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
		0859	↓	↓	↓	↓	↓	
		0900	09926	NA	NA	-25	-8	
MWL-SV03-200		0901	NA	0.0	8	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
		0902	↓	↓	↓	↓	↓	
		0903	10212	NA	NA	-26	-8	
MWL-SV03-300		0905	NA	0.0	15	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
		0906	↓	↓	↓	↓	↓	
		0908	11691	NA	NA	-25	-8	
MWL-SV03-400		0918	NA	0.0	15	NA	NA	
↓	↓	↓	↓	↓	↓	↓	↓	
		0919	↓	↓	↓	↓	↓	
		0930	10223	NA	NA	-26	-8	Slow Sample fill

## Field Notes:

Elevation ~ 5400 fmsgl

SV03

0.0 = PID Background → continuous PID readings during purge.

NMED OB splits @ 300, 400 fbg's sample ports



## 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-FB 4	10/18/19	1004	09998	NA	NA	-25	-8	
MWL-SV04-50		1010	NA	0.0	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
↓		1011	↓	↓	↓	↓	↓	
↓		1015	09930	NA	NA	-25	-8	slow sampler fill
MWL-SV04-100		1016	NA	0.0	12	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
↓		1017	↓	↓	↓	↓	↓	
↓		1019	10984	NA	NA	-20	-8	SA
↓		↓	10318	↓	↓	-20	-8	Dup
MWL-SV04-200		1020	NA	0.0	12	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
↓		1021	↓	↓	↓	↓	↓	
↓		1023	10967	NA	NA	-25	-8	
MWL-SV04-300		1024	NA	0.1	15	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
↓		1025	↓	↓	↓	↓	↓	
↓		1026	09921	NA	NA	-25	-8	
MWL-SV04-400		1031	NA	0.1	8	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
↓		1033	↓	↓	↓	↓	↓	
↓		1035	10377	NA	NA	-26	-8	
↓		↓	11685	↓	↓	-26	-8	

## Field Notes: SV04

Elevation ~ 5400 ftmsl  
 NMED OB - split samples @ 300 + 400 FBGS sample ports  
 continuous PID readings during purge.



## 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-SV05-FB S	10/13/19	1055	11209	NA	NA	-25	-8	
MWL-SV05-50		1058	NA	0.0	18	NA	NA	
↓		1058	↓	↓	↓	↓	↓	
		1100	10191	NA	NA	-25	-8	
MWL-SV05-100		1101	NA	0.0	20	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1101	↓	↓	↓	↓	↓	
		1102	11679	NA	NA	-25	-8	
MWL-SV05-200		1103	NA	0.1	15	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1104	↓	↓	↓	↓	↓	
		1105	11247	NA	NA	-26	-8	
MWL-SV05-300		1106	NA	0.1	15	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1107	↓	↓	↓	↓	↓	
		1108	10821	NA	NA	-25	-8	
MWL-SV05-400		1113	NA	0.0	15	NA	NA	
↓		↓	↓	↓	↓	↓	↓	
		1114	↓	↓	↓	↓	↓	
		1115	09769	NA	NA	-26	-8	

Field Notes: 5605

Elevation ~ 5400 famsl  
continuous PID readings during purge.  
NMED OB sample splits @ 300 + 400 fbs sample ports.

## Soil Vapor Sampling Log Form

[illegible]**Field Notes:**

SV01 + SV02  
Elevation ~ 5400 famsl  
continuous PID readings during purg.  
NMEDOB split sample @ SV01 and SV02

**SUMMARY SHEET FOR  
OCTOBER 2019 SOIL-VAPOR SAMPLES**

**Sample Summary for MWL Soil Vapor Monitoring**  
**October 2019**

Well ID	Sample Date	Sample ID / Port	SUMMA Number	ARCOC	Sample Number	Sample Type	Associated Field Blank (ARCOC #/Sample #)	Comments
<b>Mixed Waste Landfill Soil Vapor Monitoring: Project Task Number 195122.10.11.08 / Service Order Number CF 01-20</b>								
MWL-SV01	18-Oct-19	MWL-SV01-42.5	11300	620457	110594	Environmental	620457 / 110593	
		MWL-SV-FB 1	11177		110593	Field QC	n/a	Ultra Pure N2
MWL-SV02	18-Oct-19	MWL-SV02-41.5	10425	620458	110596	Environmental	620458 / 110595	
		MWL-SV-FB 2	11635		110595	Field QC	n/a	Ultra Pure N2
MWL-SV03	18-Oct-19	MWL-SV03-50	09974	620459	110598	Environmental	620459 / 110597	
		MWL-SV03-100	09926		110599	Environmental		
		MWL-SV03-200	10212		110600	Environmental		
		MWL-SV03-300	11691		110601	Environmental		
		MWL-SV03-400	10223		110602	Environmental		
		MWL-SV-FB 3	09719		110597	Field QC	n/a	Ultra Pure N2
MWL-SV04	18-Oct-19	MWL-SV04-50	09930	620460	110604	Environmental	620460 / 110603	
		MWL-SV04-100	10984		110605	Environmental		
		MWL-SV04-100	10318		110606	Duplicate		
		MWL-SV04-200	10967		110607	Environmental		
		MWL-SV04-300	09921		110608	Environmental		
		MWL-SV04-400	10377		110609	Environmental		
		MWL-SV04-400	11685		110610	Duplicate		
		MWL-SV-FB 4	09998		110603	Field QC	n/a	Ultra Pure N2
MWL-SV05	18-Oct-19	MWL-SV05-50	10191	620461	110612	Environmental	620461 / 110611	
		MWL-SV05-100	11679		110613	Environmental		
		MWL-SV05-200	11247		110614	Environmental		
		MWL-SV05-300	10821		110615	Environmental		
		MWL-SV05-400	09769		110616	Environmental		
		MWL-SV-FB 5	11209		110611	Field QC	n/a	Ultra Pure N2

**DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES**

**MIXED WASTE LANDFILL**

**SOIL-VAPOR MONITORING**

**OCTOBER 2019**

**AR/COC NUMBERS 620457, 620458, 620459, 620460, 620461**

## Memorandum

Date: November 12, 2019

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 620457, 620458, 620459, 620460 and 620461  
SDG: 140-17136  
Laboratory: Eurofins TestAmerica, Knoxville  
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. For the initial calibration associated with all samples *except* samples 140-17136-4 and -21 through -24, the %RSD was  $>15\%$  but  $\leq 40\%$  for methylene chloride. The associated sample results were detects and will be **qualified J,I3**.
2. Methylene chloride was detected at  $\leq$  the PQL in both method blanks. The associated results for samples 140-17136-2, -4, -7, -9, -10, -12, -14, -16, -17, -18, -20, -21, -23 and -24 were detects  $\leq$  the PQL and will be **qualified U,B** at the PQL. The associated results for samples -1, -3, -5, -6, -11 and -19 were detects  $>$  the PQL but  $\leq 10X$  the blank value and will be **qualified J+,B**.
3. Methylene chloride was detected at  $>$  the PQL in FB 1, sample -1, associated with sample -2. The associated sample result was a detect  $<$  the PQL and will be **qualified 0.019U,B2**; non-detect at the PQL.
4. Methylene chloride was detected at  $>$  the PQL in FB 2, sample -3, associated with sample -4. The associated sample result was a detect  $<$  the PQL and will be **qualified 0.018U,B2**; non-detect at the PQL.
5. Acetone was detected at  $>$  the PQL in FB 3, sample -5, associated with samples -6, -7, -8, -9 and -10. The associated result for sample -6 was a detect  $>$  the PQL but  $\leq 2X$  the blank value and will

be **qualified 0.0059U,B2** non-detect at the sample result. The associated results for samples -7 and -8 were detects  $\leq$ PQL and will be **qualified 0.026U,B2 and 0.0088U,B2**; non-detect at their respective PQLs.

6. Benzene was detected at  $\leq$  the PQL in FB 3, sample -5, associated with samples -6, -7, -8, -9 and -10. The associated results for samples -7 and -8 were detects  $\leq$ PQL and will be **qualified 0.0010U,B2 and 0.00035U,B2**; non-detect at their respective PQLs.
7. 2-Butanone was detected at  $\leq$  the PQL in FB 3, sample -5, associated with samples -6, -7, -8, -9 and -10. The associated result for sample -6 was a detect  $>$  the PQL but  $\leq$  10X the blank value and will be **qualified J+,B2**. The associated result for sample -8 was a detect  $\leq$ PQL and will be **qualified 0.0018U,B2**, non-detect at the PQL.
8. Carbon disulfide was detected at  $\leq$  the PQL in FB 3, sample -5, associated with samples -6, -7, -8, -9 and -10. The associated results for samples -7 and -8 were detects  $\leq$ PQL and will be **qualified 0.0026U,B2 and 0.00088U,B2**; non-detect at their respective PQLs.
9. Methylene chloride was detected at  $>$  the PQL in FB 3, sample -5, associated with samples -6, -7, -8, -9 and -10. The associated result for sample -6 was a detect  $>$  the PQL but  $\leq$  2X the blank value and will be **qualified 0.0015U,B2** non-detect at the sample result. The associated result for sample -8 was a detect  $>$  the PQL and  $>$ 2X but  $\leq$ 10X the blank value and will be **qualified J+,B2**. The associated results for samples -7, -9 and -10 were detects  $<$  the PQL and will be **qualified 0.0051U,B2; 0.018U,B2 and 0.017U,B2**; non-detect at their respective PQLs.
10. Toluene was detected at  $>$  the PQL in FB 3, sample -5, associated with samples -6, -7, -8, -9 and -10. The associated result for sample -6 was a detect  $\leq$ PQL and will be **qualified 0.00013U,B2** non-detect at the PQL.
11. Benzene was detected at  $\leq$  the PQL in FB 4, sample -11, associated with samples -12, -13, -14, -15, -16, -17 and -18. The associated results for samples -12, -13, -14, -15 and -16 were detects  $\leq$ PQL and will be **qualified 0.00036U,B2; 0.00039U,B2; 0.00036U,B2; 0.00083U,B2 and 0.00089U,B2** at their respective PQLs.
12. Methylene chloride was detected at  $>$  the PQL in FB 4, sample -11, associated with samples -12, -13, -14, -15, -16, -17 and -18. The associated results for samples -13 and -15 were detects  $>$  the PQL and  $>$ 2X but  $\leq$ 10X the blank value and will be **qualified J+,B2**. The associated results for samples -12, -14, -16, -17 and -18 were detects  $<$  the PQL and will be **qualified 0.0018U,B2, 0.0018U,B2, 0.0045U,B2, 0.0018U,B2 and 0.0018U,B2**; non-detect at their respective PQLs.
13. Acetone was detected at  $>$  the PQL in FB 5, sample -19, associated with samples -20, -21, -22, -23 and -24. The associated results for samples -20, -21, -23 and -24 were detects  $\leq$ PQL and will be **qualified 0.0092U,B2; 0.033U,B2; 0.031U,B2 and 0.029U,B2**; non-detect at their respective PQLs.
14. 2-Butanone was detected at  $\leq$  the PQL in FB 5, sample -19, associated with samples -20, -21, -22, -23 and -24. The associated results for samples -21, -23 and -24 were detects  $\leq$ PQL and will be **qualified 0.0067U,B2; 0.0062U,B2 and 0.0059U,B2**; non-detect at their respective PQLs.
15. Methylene chloride was detected at  $>$  the PQL in FB 5, sample -19, associated with samples -20, -21, -22, -23 and -24. The associated result for sample -20 was a detect  $<$  the PQL and will be **qualified 0.0018U,B2**; non-detect at the PQL.



Data are acceptable except and noted above 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.

### **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 CCV associated with all samples *except* samples -4 and -21 through -24, the %Ds were positive and >30% for benzyl chloride and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The associated sample results were non-detect and will not be qualified.

For the ICAL associated with samples -4 and -21 through -24, the intercepts were positive and > the MDL for cis-1,3-dichloropropene; benzyl chloride; styrene and 1,3,5-trimethylbenzene. The associated sample results were either detects  $\geq 3X$  the intercept or 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.

Methylene chloride was detected at  $\leq$  the PQL in both method blanks. The associated results for samples -8, -13, -15 and -22 were detects >10X the blank value and will not be qualified.

Acetone, benzene, 2-butanone, carbon disulfide, 2-hexanone and 4-methyl-2-pentanone were detected at  $\leq$  the PQL in FB 1, sample -1, associated with sample -2. The associated sample results were non-detect and will not be qualified.

Acetone, benzene, 2-butanone, carbon disulfide, 2-hexanone, tetrachloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane; trichloroethene and trichlorofluoromethane were detected at  $\leq$  the PQL in FB 2, sample -3, associated with sample -4. The associated sample results were either non-detect or detects >5X the blank value (>10X for 2-butanone) and will not be qualified.

Benzene, 2-butanone, carbon disulfide, dichlorodifluoromethane, tetrachloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane and trichloroethene were detected at  $\leq$  the PQL in FB 3, sample -5, associated with samples -6, -7, -8, -9 and -10. The remaining associated sample results were either non-detect or detects >5X the blank value (10X for 2-butanone) and will not be qualified. Acetone, toluene and trichlorofluoromethane were also detected at > the PQL in FB 3. The remaining associated sample results were either non-detect or detects >5X the blank value and will not be qualified.

Benzene, tetrachloroethene and 1,1,2-trichloro-1,2,2-trifluoroethane were detected at  $\leq$  the PQL in FB 4, sample -11, associated with samples -12, -13, -14, -15, -16, -17 and -18. The remaining associated sample results were detects >5X the blank values and will not be qualified. Trichloroethene was also detected at > the PQL in FB 4. The associated sample results were detects >5X the blank value and will not be qualified.

2-Butanone, trans-1,2-dichloroethene, 2-hexanone, tetrachloroethene and 1,1,2-trichloro-1,2,2-trifluoroethane were detected at  $\leq$  the PQL in FB 5, sample -19, associated with samples -20, -21, -22, -23 and -24. The remaining associated sample results were either non-detect or detects  $>5X$  the blank values and will not be qualified. Methylene chloride was detected at  $>$  the PQL in FB 5, sample -19, associated with samples -20, -21, -22, -23 and -24. The associated methylene chloride results for samples -21, -22, -23 and -24 were detects  $>10X$  the blank value and will not be qualified. Acetone was also detected at  $>$  the PQL in FB 5. The associated result for sample -22 was non-detect and will not be qualified.

It should be noted that, according to the canister sample reports, several target analytes including methylene chloride were present in the certified canisters at  $<$  the PQL.

### **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 Replicate**

The replicate analyses met all QC acceptance criteria except as follows. The laboratory performed replicate analyses on field samples -15 and -20. For sample -15, the RPD was  $>30\%$  for chlorobenzene. Both the sample and replicate results were  $<5X$  the PQL and the difference between the two results was  $<$  the PQL. No sample data will be qualified as a result.

### **Laboratory Control Sample (LCS)**

The LCS met all QC acceptance criteria for accuracy and precision except as noted. For the LCS associated with samples -1, -2, -3 and -5 through -20, the recovery for benzyl chloride was  $>130\%$ . All associated sample results were non-detects. Up to three LCS recovery infractions are allowed since 50 LCS analytes were reported. Therefore, the associated sample results will not be qualified.

### **Detection Limits/Dilutions**

All detection limits were properly reported and correctly adjusted for dilutions and the sample volumes used for analysis.

The following samples were diluted for all target analytes: Sample -1 (1.09X), -2 (47.3X), -3 (1.02X), -4 (44.8X), -5 (1.02X), -7 (12.8X), -9 (44X), -10 (43X), -11 (1.03X), -12 (4.53X), -15 (10.3X), -16 (11.1X), -19 (1.04X), -21 (16.7X), -22 (15.3X), -23 (15.4X) and -24 (14.7X).

Sample -6 was diluted 48X for tetrachloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane; trichloroethene and trichlorofluoromethane and 1.07X for all remaining target analytes.

Sample -8 was diluted 44X for tetrachloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane and trichloroethene and 4.4X for all remaining target analytes.

Sample -13 was diluted 24.4X for tetrachloroethene and 4.88X for all remaining target analytes.

Sample -14 was diluted 11.2X for tetrachloroethene and 4.48X for all remaining target analytes.

Sample -17 was diluted 18.1X for tetrachloroethene and 4.53X for all remaining target analytes.  
Sample -18 was diluted 17.6X for tetrachloroethene and 4.4X for all remaining target analytes.  
Sample -20 was diluted 18.3X for trichlorofluoromethane and 4.58X for all remaining target analytes.

#### **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.

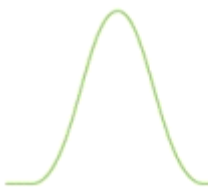
FBs were submitted with each ARCOC. Two field duplicate pairs were submitted with ARCOC 620460. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 11/17/2019



## Sample Findings Summary



AR/COC: 620457, 620458, 620459, 620460, 620461

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15_LL_PF			
	110593-001/MWL-SV-FB 1	METHYLENE CHLORIDE (75-09-2)	J+, B,I3
	110594-001/MWL-SV01-42.5	METHYLENE CHLORIDE (75-09-2)	0.019U, B,B2,I3
	110595-001/MWL-SV-FB 2	METHYLENE CHLORIDE (75-09-2)	J+, B,I3
	110596-001/MWL-SV02-41.5	METHYLENE CHLORIDE (75-09-2)	0.018U, B,B2
	110597-001/MWL-SV-FB 3	METHYLENE CHLORIDE (75-09-2)	J+, B,I3
	110598-001/MWL-SV03-50	2-BUTANONE (MEK) (78-93-3)	J+, B2
	110598-001/MWL-SV03-50	ACETONE (67-64-1)	0.0059U, B2
	110598-001/MWL-SV03-50	METHYLENE CHLORIDE (75-09-2)	0.0015UJ, B,B2,I3
	110598-001/MWL-SV03-50	TOLUENE (108-88-3)	0.00013U, B2
	110599-001/MWL-SV03-100	ACETONE (67-64-1)	0.026U, B2
	110599-001/MWL-SV03-100	BENZENE (71-43-2)	0.001U, B2
	110599-001/MWL-SV03-100	CARBON DISULFIDE (75-15-0)	0.0026U, B2
	110599-001/MWL-SV03-100	METHYLENE CHLORIDE (75-09-2)	0.0051U, B,B2,I3
	110600-001/MWL-SV03-200	2-BUTANONE (MEK) (78-93-3)	0.0018U, B2
	110600-001/MWL-SV03-200	ACETONE (67-64-1)	0.0088U, B2
	110600-001/MWL-SV03-200	BENZENE (71-43-2)	0.00035U, B2
	110600-001/MWL-SV03-200	CARBON DISULFIDE (75-15-0)	0.00088U, B2
	110600-001/MWL-SV03-200	METHYLENE CHLORIDE (75-09-2)	J+, B2,I3
	110601-001/MWL-SV03-300	METHYLENE CHLORIDE (75-09-2)	0.018U, B,B2,I3
	110602-001/MWL-SV03-400	METHYLENE CHLORIDE (75-09-2)	0.017U, B,B2,I3
	110603-001/MWL-SV-FB 4	METHYLENE CHLORIDE (75-09-2)	J+, B,I3
	110604-001/MWL-SV04-50	BENZENE (71-43-2)	0.00036U, B2
	110604-001/MWL-SV04-50	METHYLENE CHLORIDE (75-09-2)	0.0018U, B,B2,I3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	110605-001/MWL-SV04-100	BENZENE (71-43-2)	0.00039U, B2
	110605-001/MWL-SV04-100	METHYLENE CHLORIDE (75-09-2)	J+, B2,I3
	110606-001/MWL-SV04-100	BENZENE (71-43-2)	0.00036U, B2
	110606-001/MWL-SV04-100	METHYLENE CHLORIDE (75-09-2)	0.0018U, B,B2,I3
	110607-001/MWL-SV04-200	BENZENE (71-43-2)	0.00083U, B2
	110607-001/MWL-SV04-200	METHYLENE CHLORIDE (75-09-2)	J+, B2,I3
	110608-001/MWL-SV04-300	BENZENE (71-43-2)	0.00089U, B2
	110608-001/MWL-SV04-300	METHYLENE CHLORIDE (75-09-2)	0.0045U, B,B2,I3
	110609-001/MWL-SV04-400	METHYLENE CHLORIDE (75-09-2)	0.0018U, B,B2,I3
	110610-001/MWL-SV04-400	METHYLENE CHLORIDE (75-09-2)	0.0018U, B,B2,I3
	110611-001/MWL-SV-FB 5	METHYLENE CHLORIDE (75-09-2)	J+, B,I3
	110612-001/MWL-SV05-50	ACETONE (67-64-1)	0.0092U, B2
	110612-001/MWL-SV05-50	METHYLENE CHLORIDE (75-09-2)	0.0018U, B,B2,I3
	110613-001/MWL-SV05-100	2-BUTANONE (MEK) (78-93-3)	0.0067U, B2
	110613-001/MWL-SV05-100	ACETONE (67-64-1)	0.033U, B2
	110613-001/MWL-SV05-100	METHYLENE CHLORIDE (75-09-2)	0.0067U, B
	110615-001/MWL-SV05-300	2-BUTANONE (MEK) (78-93-3)	0.0062U, B2
	110615-001/MWL-SV05-300	ACETONE (67-64-1)	0.031U, B2
	110615-001/MWL-SV05-300	METHYLENE CHLORIDE (75-09-2)	0.0062U, B
	110616-001/MWL-SV05-400	2-BUTANONE (MEK) (78-93-3)	0.0059U, B2
	110616-001/MWL-SV05-400	ACETONE (67-64-1)	0.029U, B2
	110616-001/MWL-SV05-400	METHYLENE CHLORIDE (75-09-2)	0.0059U, B

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

## Sandia Data Validation Summary Worksheet

ARCOC#: 620457, 620458, 620459, 620460 and 620461	Site/Project: MWL LTMMP	Validation Date: 11/12/2019
SDG #:140-17136	Laboratory: Eurofins TestAmerica, Knoxville	Validator: Mary Donovan
Matrix: Air	# of Samples: 24	CVR present: Yes
ARCOC(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

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

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

<u>Comments:</u> Collected 10/18/2019
<u>Validated by:</u> <i>Mary A. Donovan</i>

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #:620457, 620458, 620459, 620460 and 620461	SDG: 140-17136	Matrix: Air
Laboratory Sample IDs: 140-17136-1 through -24		
Method/Batch #s: TO-15/34903 (17136-1, 2, -3, -5 through -20) and 34901(17136-4, 6-DL, -8-DL, -13-DL, -14-DL, -17-DL, -18-DL, -20-DL, -21 through -24)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	DUP RPD		FB 1 -1	FB 2 -3	FB 3 -5	FB 4 -11
	Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D									
Batch 34903 ICAL MR													
Methylene chloride	NA	✓	39	✓	0.000263J	(.00263)	✓	✓		0.00054	0.00044	0.0010	0.00053
Benzyl chloride	NA	✓	✓	33	✓	NA	133	✓		✓	✓	✓	✓
Chlorobenzene	NA	✓	✓	✓	✓	NA	✓	40*		✓	✓	✓	✓
Acetone	NA	✓	✓	✓	✓	NA	✓	✓		0.0018J	0.0012J	0.0030	✓
Benzene	NA	✓	✓	✓	✓	NA	✓	✓		0.000017J	0.0000081J	0.000020J	0.000028J
2-Butanone	NA	✓	✓	✓	✓	NA	✓	✓		0.00020J	0.00026J	0.00011J	✓
Carbon disulfide	NA	✓	✓	✓	✓	NA	✓	✓		0.000036J	0.000017J	0.000016J	✓
2-Hexanone	NA	✓	✓	✓	✓	NA	✓	✓		0.000026J	0.000033J	✓	✓
4-Methyl-2-pentanone	NA	✓	✓	✓	✓	NA	✓	✓		0.00015J	✓	✓	✓
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓		✓	0.000037J	0.000043J	0.000072J
1,1,2-trichloro-1,2,2-trifluoroethane	NA	✓	✓	✓	✓	NA	✓	✓		✓	0.000011J	0.000017J	0.000016J
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓		✓	0.000011J	0.000039J	0.000073
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	✓		✓	0.000027J	0.000093	✓
Dichlorodifluoromethane	NA	✓	✓	✓	✓	NA	✓	✓		✓	✓	0.000015J	✓
Toluene	NA	✓	✓	✓	✓	NA	✓	✓		✓	✓	0.00025	✓
1,2-Dichloro-1,1,2,2-tetrafluoroethane	NA	✓	✓	40	✓	NA	✓	✓		✓	✓	✓	✓
Surrogate Recovery Outliers													
Sample ID	4-BFB %R					Sample ID	4-BFB %R						
none													
IS Outliers													
	CBM		DFBZ		CBZ-d5								
Sample ID	Area	RT	Area	RT	Area	RT							
none													

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	DUP RPD		FB 5 -19			
	Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D									
Batch 34903 ICAL MR													
Methylene chloride	NA	✓	✓	✓	0.000263J	(.00263)	✓	✓		0.00052			
Benzyl chloride	NA	✓	✓	33	✓	NA	133	✓		✓			
Chlorobenzene	NA	✓	✓	✓	✓	NA	✓	40*		✓			
Acetone	NA	✓	✓	✓	✓	NA	✓	✓		0.0036			
2-Butanone	NA	✓	✓	✓	✓	NA	✓	✓		0.00040J			
trans-1,2-Dichloroethene	NA	✓	✓	✓	✓	NA	✓	✓		0.000050J			
2-Hexanone	NA	✓	✓	✓	✓	NA	✓	✓		0.000025J			
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓		0.000062J			
1,1,2-trichloro-1,2,2-trifluoroethane	NA	✓	✓	✓	✓	NA	✓	✓		0.0000090J			
1,2-Dichloro-1,1,2,2-tetrafluoroethane	NA	✓	✓	40	✓	NA	✓	✓		✓			
Surrogate Recovery Outliers													
Sample ID	4-BFB %R					Sample ID	4-BFB %R						
none													
IS Outliers													
	CBM		DFBZ		CBZ-d5								
Sample ID	Area	RT	Area	RT	Area	RT							
none													
Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	DUP RPD					
	Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D									
Batch 34901 ICAL MG													
Methylene chloride	NA	✓	✓	✓	0.000348J	(0.00348)	✓	✓					
Benzyl chloride	0.000068	✓	✓	✓	✓	NA	✓	✓					
Styrene	0.000054	✓	✓	✓	✓	NA	✓	✓					
1,3,5-Trimethylbenzene	0.000025	✓	✓	✓	✓	NA	✓	✓					
cis-1,3-Dichloropropene	0.000016	✓	✓	✓	✓	NA	✓	✓					



Surrogate Recovery Outliers												
Sample ID	4-BFB %R					Sample ID	4-BFB %R					
none												
IS Outliers												
	CBM		DFBZ		CBZ-d5							
Sample ID	Area	RT	Area	RT	Area	RT						
none												
										#	#	#

Comments: HTs OK. LCS (MWL 70-130%). RSDs and CCVs  $\leq$ 30%.

Batch 34903 DUP -15 ICAL MR 09/03/19 All avg RF

Batch 34901 DUP -20 ICAL MG 10/27,28/19 Linear: Styrene; 1,3,5-Trimethylbenzene; Benzyl chloride; cis-1,3-Dichloropropene

\* Both the sample and replicate results were  $<5X$  the PQL and the difference between the two results was  $<$  the PQL. RPD not applicable, results not qualified.

Samples missing ions that were "J" Qualified by the lab were not further qualified during DV


Internal Lab

Page 1 of 1

Batch No. \_\_\_\_\_

**SMO Use**

AR/COC 620457

Project Name:	MWVL LTMMMP	Date Samples Shipped:	10/21/19	SMO Authorization:		<input type="checkbox"/> Waste Characterization
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.	305650	SMO Contact Phone:	950	<input type="checkbox"/> RMA
Project/Task Number:	195122.10.11.08	Lab Contact:	Ryan Henry/865-291-3006	Wendy Palencia/505-844-3132		<input type="checkbox"/> Released by COC No.
Service Order:	CF01-20	Lab Destination:	TAKX	Send Report to SMO:		<input checked="" type="checkbox"/> 4° Celsius
		Contract No.:	1636780	Stephanie Montaño/505-284-2553		Bill to: Sandia National Laboratories (Accounts Payable),

Tech Area:

Building:	Room:	Operational Site:
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[illegible]

140-17136 Chain of Custody





NO CUSTODY SEALS

RECEIVED AMBIENT

BKD 10-25-19

7 ROKS FFO# 444234525090 in G

28 CANS / 0 FLOWS / 1 GAMES

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes				
Background: <input type="checkbox"/> Yes		Entered by:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day				
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Negotiated TAT <input type="checkbox"/>				
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Lab Use
	William Gibson		WG	SNL/08888/505-284-3307/505-239-7367		Return Samples By:		
	Tim Jackson		TJ	SNL/08888/505-284-2547/505-263-6639		Comments: Elevation and ambient pressure information on attached forms.		
	Zachary Tenorio		ZT	SNL/08888/505-845-8636/505-259-5765				
	Dehisha Sanchez		DS	SNL/08888/505-845-7829/505-2081375				

Relinquished by <u>T-119</u>	Org. <u>00668</u> Date <u>10/18/19</u> Time <u>1255</u>	Relinquished by	Org.	Date	Time
Received by <u>Dr. J. L. ...</u>	Org. <u>00628</u> Date <u>10/18/19</u> Time <u>1255</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>00628</u> Date <u>10/21/19</u> Time <u>1205</u>	Relinquished by	Org.	Date	Time
Received by <u>Dr. J. L. ...</u>	Org. <u>ETA WX</u> Date <u>10-25-19</u> Time <u>14:00</u>	Received by	Org.	Date	Time

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

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

11/07/2019

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.

SMO Use

AR/COC

620459

Page 1 of 1

Project Name: MWL LTMMP	Date Samples Shipped: 10-21-19	SMO Authorization: [Signature]	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson	Carrier/Waybill No: 305650	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08	Lab Contact: Ryan Henry/865-291-3006	Send Report to SMO: Stephanie Montañó/505-284-2553	
Service Order: CF01-20	Lab Destination: TAKX		
Contract No.: 1636780		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	

Tech Area:										P.O. Box 5800, MS-0154			
Building:		Room:		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						
110597	001	MWL-SV-FB 3	NA	10/18/19 08:46	SG	S	6 L	None	G	FB	VOC (TO-15)		
110598	001	MWL-SV03-50	50	10/18/19 08:57	SG	S	6 L	None	G	SA	VOC (TO-15)		
110599	001	MWL-SV03-100	100	10/18/19 09:00	SG	S	6 L	None	G	SA	VOC (TO-15)		
110600	001	MWL-SV03-200	200	10/18/19 09:03	SG	S	6 L	None	G	SA	VOC (TO-15)		
110601	001	MWL-SV03-300	300	10/18/19 09:08	SG	S	6 L	None	G	SA	VOC (TO-15)		
110602	001	MWL-SV03-400	400	10/18/19 09:30	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				Return Samples By: Comments: Elevation and ambient pressure information on attached forms.	
	William Gibson	[Signature]	WJG	SNL/08888/505-284-3307/505-239-7367		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab					
	Tim Jackson	[Signature]	TJ	SNL/08888/505-284-2547/505-263-6639							
	Zachary Tenorio	[Signature]	ZT	SNL/08888/505-845-8636/505-259-5765							
	Denisha Sanchez	[Signature]	DS	SNL/08888/505-845-7829/505-208-1375							
Relinquished by: [Signature]		Org. 08888		Date 10/15/19		Time 1250		Relinquished by:		Org. Date Time	
Received by: [Signature]		Org. 00628		Date 10/18/19		Time 1250		Received by:		Org. Date Time	
Relinquished by: [Signature]		Org. 00628		Date 10/21/19		Time 1205		Relinquished by:		Org. Date Time	
Received by: [Signature]		Org. FTA Kx2		Date 10-25-19		Time 1400		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. *W/4*

SMO Use

AR/COC **620460**

Project Name: MWL LTMMP	Date Samples Shipped: <i>10/21/19</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"/> <b>4° Celsius</b>
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>305650</i>	SMO Contact Phone: <i>[Signature]</i>	
Project/Task Number: 195122.10.11.08	Lab Contact: Ryan Henry/865-291-3006	Wendy Palencia/505-844-3132	
Service Order: CF01-20	Lab Destination: TAKX	Send Report to SMO: Stephanie Montaño/505-284-2553	
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:
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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					
110603	001	MWL-SV-FB 4	NA	10/18/19 10:04	SG	S	6 L	None	G	FB	VOC (TO-15)	
110604	001	MWL-SV04-50	50	10/18/19 10:15	SG	S	6 L	None	G	SA	VOC (TO-15)	
110605	001	MWL-SV04-100	100	10/18/19 10:19	SG	S	6 L	None	G	SA	VOC (TO-15)	
110606	001	MWL-SV04-100	100	10/18/19 10:19	SG	S	6 L	None	G	DU	VOC (TO-15)	
110607	001	MWL-SV04-200	200	10/18/19 10:23	SG	S	6 L	None	G	SA	VOC (TO-15)	
110608	001	MWL-SV04-300	300	10/18/19 10:26	SG	S	6 L	None	G	SA	VOC (TO-15)	
110609	001	MWL-SV04-400	400	10/18/19 10:35	SG	S	6 L	None	G	SA	VOC (TO-15)	
110610	001	MWL-SV04-400	400	10/18/19 10:35	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		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day																								
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT <input type="checkbox"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab																								
Confirmatory: <input type="checkbox"/> Yes		QC inits:		Return Samples By:		Comments: Elevation and ambient pressure information on attached forms.																								
<table border="1"> <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>William Gibson</td> <td><i>[Signature]</i></td> <td><i>WG</i></td> <td>SNL/08888/505-284-3307/505-239-7367</td> </tr> <tr> <td></td> <td>Tim Jackson</td> <td><i>[Signature]</i></td> <td><i>TJ</i></td> <td>SNL/08888/505-284-2547/505-263-6639</td> </tr> <tr> <td></td> <td>Zachary Tenorio</td> <td><i>[Signature]</i></td> <td><i>ZT</i></td> <td>SNL/08888/505-845-8636/505-259-5765</td> </tr> <tr> <td></td> <td>Denisha Sanchez</td> <td><i>[Signature]</i></td> <td><i>DS</i></td> <td>SNL/08888/505-845-7829/505-208-1375</td> </tr> </table>		Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell			William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/08888/505-284-3307/505-239-7367		Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/08888/505-284-2547/505-263-6639		Zachary Tenorio	<i>[Signature]</i>	<i>ZT</i>	SNL/08888/505-845-8636/505-259-5765		Denisha Sanchez	<i>[Signature]</i>	<i>DS</i>	SNL/08888/505-845-7829/505-208-1375			
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell																										
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/08888/505-284-3307/505-239-7367																										
	Tim Jackson	<i>[Signature]</i>	<i>TJ</i>	SNL/08888/505-284-2547/505-263-6639																										
	Zachary Tenorio	<i>[Signature]</i>	<i>ZT</i>	SNL/08888/505-845-8636/505-259-5765																										
	Denisha Sanchez	<i>[Signature]</i>	<i>DS</i>	SNL/08888/505-845-7829/505-208-1375																										

Relinquished by <i>[Signature]</i>	Org. <i>08888</i>	Date <i>10/28/19</i>	Time <i>1251</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>0628</i>	Date <i>10/18/19</i>	Time <i>1251</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>0628</i>	Date <i>10/21/2019</i>	Time <i>1205</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>ETA WX</i>	Date <i>10/23/19</i>	Time <i>14:00</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 1

Batch No. *N/A*

SMO Use

AR/COC

620461

Project Name: MWL LTMMP	Date Samples Shipped: 10/21/19	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. 305650	SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08	Lab Contact: Ryan Henry/865-291-3006	Send Report to SMO: Stephanie Montaño/505-284-2553	
Service Order: CF01-20	Lab Destination: TAKX		
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					
110611	001	MWL-SV-FB 5	NA	10/18/19 10:55	SG	S	6 L	None	G	FB	VOC (TO-15)	
110612	001	MWL-SV05-50	50	10/18/19 11:00	SG	S	6 L	None	G	SA	VOC (TO-15)	
110613	001	MWL-SV05-100	100	10/18/19 11:02	SG	S	6 L	None	G	SA	VOC (TO-15)	
110614	001	MWL-SV05-200	200	10/18/19 11:05	SG	S	6 L	None	G	SA	VOC (TO-15)	
110615	001	MWL-SV05-300	300	10/18/19 11:08	SG	S	6 L	None	G	SA	VOC (TO-15)	
110616	001	MWL-SV05-400	400	10/18/19 11:15	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		Init.		Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab					
Name		Signature		Return Samples By:		Comments: Elevation and ambient pressure information on attached forms.		Lab Use			
William Gibson		<i>[Signature]</i>		SNL/08888/505-284-3307/505-239-7367							
Tim Jackson		<i>[Signature]</i>		SNL/08888/505-284-2547/505-263-6639							
Zachary Tenorio		<i>[Signature]</i>		SNL/08888/505-845-8636/505-259-5765							
Denisha Sanchez		<i>[Signature]</i>		SNL/08888/505-845-7829/505-2081375							
Relinquished by <i>[Signature]</i>		Org. 08888		Date 10/18/19		Time 1250		Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>		Org. 00628		Date 10/18/19		Time 1250		Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>		Org. 00628		Date 10/21/19		Time 1055		Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>		Org. 00628		Date 10/25/19		Time 1400		Received by	Org.	Date	Time

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

## **CONTRACT VERIFICATION REVIEW FORMS**

### **Mixed Waste Landfill Soil-Vapor Monitoring**

**October 2019**

<b>AR/COC Number</b>	<b>Sample Type</b>
620457	Environmental*
620458	Environmental*
620459	Environmental*
620460	Environmental*
620461	Environmental*

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

## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 620457, 620458, 620459, 620460 &amp; 620461

Analytical Lab TAKX

SDG No. 140-17136-1

*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		



Line No.	Item	Complete?		If no, explain
		Yes	No	
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 or 1-sigma for bioassay) 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	Benzyl chloride outside recovery limits for LCS (batch 140-34903)
	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		X	RPD for 2-butanone, carbon disulfide and chlorobenzene outside acceptance range for MWL-SV04-200 sample duplicate

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	N/A		
	c) Laboratory control sample duplicate RPD data reported and met for other analyses	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		X	Several analytes detected in FBs
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 and TO-15) 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		

Line No.	Item	Yes	No	Comments
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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		

Line No.	Item	Yes	No	Comments
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: 11-12-2019 07:50:00

Closed by: Wendy Palencia Date: 11-12-2019 07:50:00

**CERTIFICATES OF ANALYSIS**

**Mixed Waste Landfill**

**October 2019 Soil-Vapor Samples**

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110593-001/MWL-SV FB 1**

**Lab Sample ID: 140-17136-1**

**Date Collected: 10/18/19 11:34**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0018	J	0.0022	0.00062	ppm v/v			11/01/19 12:07	1.96
Benzene	0.000017	J	0.000087	0.0000087	ppm v/v			11/01/19 12:07	1.96
Benzyl chloride	ND	*	0.00017	0.000041	ppm v/v			11/01/19 12:07	1.96
Bromodichloromethane	ND		0.000087	0.000020	ppm v/v			11/01/19 12:07	1.96
Bromoform	ND		0.000087	0.0000098	ppm v/v			11/01/19 12:07	1.96
Bromomethane	ND		0.000087	0.000024	ppm v/v			11/01/19 12:07	1.96
2-Butanone (MEK)	0.00020	J	0.00044	0.000079	ppm v/v			11/01/19 12:07	1.96
Carbon disulfide	0.000036	J	0.00022	0.000012	ppm v/v			11/01/19 12:07	1.96
Carbon tetrachloride	ND		0.000087	0.0000076	ppm v/v			11/01/19 12:07	1.96
Chlorobenzene	ND		0.000087	0.0000065	ppm v/v			11/01/19 12:07	1.96
Chloroethane	ND		0.000087	0.000032	ppm v/v			11/01/19 12:07	1.96
Chloroform	ND		0.000087	0.0000076	ppm v/v			11/01/19 12:07	1.96
Chloromethane	ND		0.00022	0.000072	ppm v/v			11/01/19 12:07	1.96
Dibromochloromethane	ND		0.000087	0.0000076	ppm v/v			11/01/19 12:07	1.96
1,2-Dibromoethane (EDB)	ND		0.000087	0.0000076	ppm v/v			11/01/19 12:07	1.96
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000087	0.000013	ppm v/v			11/01/19 12:07	1.96
1,2-Dichlorobenzene	ND		0.000087	0.000034	ppm v/v			11/01/19 12:07	1.96
1,3-Dichlorobenzene	ND		0.000087	0.000017	ppm v/v			11/01/19 12:07	1.96
1,4-Dichlorobenzene	ND		0.000087	0.000017	ppm v/v			11/01/19 12:07	1.96
Dichlorodifluoromethane	ND		0.000087	0.000015	ppm v/v			11/01/19 12:07	1.96
1,1-Dichloroethane	ND		0.000087	0.0000076	ppm v/v			11/01/19 12:07	1.96
1,2-Dichloroethane	ND		0.000087	0.000011	ppm v/v			11/01/19 12:07	1.96
1,1-Dichloroethene	ND		0.000087	0.0000087	ppm v/v			11/01/19 12:07	1.96
cis-1,2-Dichloroethene	ND		0.000087	0.000011	ppm v/v			11/01/19 12:07	1.96
trans-1,2-Dichloroethene	ND		0.000087	0.0000076	ppm v/v			11/01/19 12:07	1.96
1,2-Dichloropropane	ND		0.000087	0.000011	ppm v/v			11/01/19 12:07	1.96
cis-1,3-Dichloropropene	ND		0.000087	0.000017	ppm v/v			11/01/19 12:07	1.96
trans-1,3-Dichloropropene	ND		0.000087	0.0000098	ppm v/v			11/01/19 12:07	1.96
Ethylbenzene	ND		0.000087	0.000014	ppm v/v			11/01/19 12:07	1.96
4-Ethyltoluene	ND		0.00017	0.000023	ppm v/v			11/01/19 12:07	1.96
Hexachlorobutadiene	ND		0.00044	0.000035	ppm v/v			11/01/19 12:07	1.96
2-Hexanone	0.000026	J	0.00022	0.000017	ppm v/v			11/01/19 12:07	1.96
4-Methyl-2-pentanone (MIBK)	0.00015	J	0.00022	0.000059	ppm v/v			11/01/19 12:07	1.96
Methylene Chloride	0.00054	B	0.00044	0.00017	ppm v/v			11/01/19 12:07	1.96
Styrene	ND		0.000087	0.000026	ppm v/v			11/01/19 12:07	1.96
1,1,2,2-Tetrachloroethane	ND		0.000087	0.000015	ppm v/v			11/01/19 12:07	1.96
Tetrachloroethene	ND		0.000087	0.0000076	ppm v/v			11/01/19 12:07	1.96
Toluene	ND		0.00013	0.000085	ppm v/v			11/01/19 12:07	1.96
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000087	0.0000087	ppm v/v			11/01/19 12:07	1.96
1,2,4-Trichlorobenzene	ND		0.00044	0.000070	ppm v/v			11/01/19 12:07	1.96
1,1,1-Trichloroethane	ND		0.000087	0.000040	ppm v/v			11/01/19 12:07	1.96
1,1,2-Trichloroethane	ND		0.000087	0.0000076	ppm v/v			11/01/19 12:07	1.96
Trichloroethene	ND		0.000044	0.0000065	ppm v/v			11/01/19 12:07	1.96
Trichlorofluoromethane	ND		0.000087	0.000012	ppm v/v			11/01/19 12:07	1.96
1,2,4-Trimethylbenzene	ND		0.000087	0.000022	ppm v/v			11/01/19 12:07	1.96
1,3,5-Trimethylbenzene	ND		0.000087	0.000024	ppm v/v			11/01/19 12:07	1.96
Vinyl acetate	ND		0.00044	0.000030	ppm v/v			11/01/19 12:07	1.96
Vinyl chloride	ND		0.000044	0.000028	ppm v/v			11/01/19 12:07	1.96

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110593-001/MWL-SV FB 1**

**Lab Sample ID: 140-17136-1**

**Date Collected: 10/18/19 11:34**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.000087	0.000032	ppm v/v			11/01/19 12:07	1.96
o-Xylene	ND		0.000087	0.000016	ppm v/v			11/01/19 12:07	1.96
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140					11/01/19 12:07	1.96

**Client Sample ID: 110594-001/MWL-SV01-42.5**

**Lab Sample ID: 140-17136-2**

**Date Collected: 10/18/19 11:44**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.095	0.027	ppm v/v			11/01/19 12:55	1.89
Benzene	ND		0.0038	0.00038	ppm v/v			11/01/19 12:55	1.89
Benzyl chloride	ND	*	0.0076	0.0018	ppm v/v			11/01/19 12:55	1.89
Bromodichloromethane	ND		0.0038	0.00085	ppm v/v			11/01/19 12:55	1.89
Bromoform	ND		0.0038	0.00043	ppm v/v			11/01/19 12:55	1.89
Bromomethane	ND		0.0038	0.0010	ppm v/v			11/01/19 12:55	1.89
2-Butanone (MEK)	ND		0.019	0.0034	ppm v/v			11/01/19 12:55	1.89
Carbon disulfide	ND		0.0095	0.00052	ppm v/v			11/01/19 12:55	1.89
Carbon tetrachloride	ND		0.0038	0.00033	ppm v/v			11/01/19 12:55	1.89
Chlorobenzene	ND		0.0038	0.00028	ppm v/v			11/01/19 12:55	1.89
Chloroethane	ND		0.0038	0.0014	ppm v/v			11/01/19 12:55	1.89
<b>Chloroform</b>	<b>0.0089</b>		0.0038	0.00033	ppm v/v			11/01/19 12:55	1.89
Chloromethane	ND		0.0095	0.0031	ppm v/v			11/01/19 12:55	1.89
Dibromochloromethane	ND		0.0038	0.00033	ppm v/v			11/01/19 12:55	1.89
1,2-Dibromoethane (EDB)	ND		0.0038	0.00033	ppm v/v			11/01/19 12:55	1.89
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0038	0.00057	ppm v/v			11/01/19 12:55	1.89
1,2-Dichlorobenzene	ND		0.0038	0.0015	ppm v/v			11/01/19 12:55	1.89
1,3-Dichlorobenzene	ND		0.0038	0.00076	ppm v/v			11/01/19 12:55	1.89
1,4-Dichlorobenzene	ND		0.0038	0.00076	ppm v/v			11/01/19 12:55	1.89
<b>Dichlorodifluoromethane</b>	<b>0.089</b>		0.0038	0.00066	ppm v/v			11/01/19 12:55	1.89
<b>1,1-Dichloroethane</b>	<b>0.0012</b>	<b>J</b>	0.0038	0.00033	ppm v/v			11/01/19 12:55	1.89
1,2-Dichloroethane	ND		0.0038	0.00047	ppm v/v			11/01/19 12:55	1.89
<b>1,1-Dichloroethene</b>	<b>0.0045</b>		0.0038	0.00038	ppm v/v			11/01/19 12:55	1.89
<b>cis-1,2-Dichloroethene</b>	<b>0.00058</b>	<b>J</b>	0.0038	0.00047	ppm v/v			11/01/19 12:55	1.89
trans-1,2-Dichloroethene	ND		0.0038	0.00033	ppm v/v			11/01/19 12:55	1.89
1,2-Dichloropropane	ND		0.0038	0.00047	ppm v/v			11/01/19 12:55	1.89
cis-1,3-Dichloropropene	ND		0.0038	0.00076	ppm v/v			11/01/19 12:55	1.89
trans-1,3-Dichloropropene	ND		0.0038	0.00043	ppm v/v			11/01/19 12:55	1.89
Ethylbenzene	ND		0.0038	0.00061	ppm v/v			11/01/19 12:55	1.89
4-Ethyltoluene	ND		0.0076	0.00099	ppm v/v			11/01/19 12:55	1.89
Hexachlorobutadiene	ND		0.019	0.0015	ppm v/v			11/01/19 12:55	1.89
2-Hexanone	ND		0.0095	0.00076	ppm v/v			11/01/19 12:55	1.89
4-Methyl-2-pentanone (MIBK)	ND		0.0095	0.0026	ppm v/v			11/01/19 12:55	1.89
<b>Methylene Chloride</b>	<b>0.013</b>	<b>J B</b>	0.019	0.0076	ppm v/v			11/01/19 12:55	1.89
Styrene	ND		0.0038	0.0011	ppm v/v			11/01/19 12:55	1.89
1,1,2,2-Tetrachloroethane	ND		0.0038	0.00066	ppm v/v			11/01/19 12:55	1.89

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110594-001/MWL-SV01-42.5**

**Lab Sample ID: 140-17136-2**

Date Collected: 10/18/19 11:44

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Tetrachloroethene</b>	<b>0.21</b>		0.0038	0.00033	ppm v/v			11/01/19 12:55	1.89
Toluene	ND		0.0057	0.0037	ppm v/v			11/01/19 12:55	1.89
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.043</b>		0.0038	0.00038	ppm v/v			11/01/19 12:55	1.89
1,2,4-Trichlorobenzene	ND		0.019	0.0030	ppm v/v			11/01/19 12:55	1.89
<b>1,1,1-Trichloroethane</b>	<b>0.019</b>		0.0038	0.0017	ppm v/v			11/01/19 12:55	1.89
1,1,2-Trichloroethane	ND		0.0038	0.00033	ppm v/v			11/01/19 12:55	1.89
<b>Trichloroethene</b>	<b>0.045</b>		0.0019	0.00028	ppm v/v			11/01/19 12:55	1.89
<b>Trichlorofluoromethane</b>	<b>0.11</b>		0.0038	0.00052	ppm v/v			11/01/19 12:55	1.89
1,2,4-Trimethylbenzene	ND		0.0038	0.00095	ppm v/v			11/01/19 12:55	1.89
1,3,5-Trimethylbenzene	ND		0.0038	0.0010	ppm v/v			11/01/19 12:55	1.89
Vinyl acetate	ND		0.019	0.0013	ppm v/v			11/01/19 12:55	1.89
Vinyl chloride	ND		0.0019	0.0012	ppm v/v			11/01/19 12:55	1.89
m,p-Xylene	ND		0.0038	0.0014	ppm v/v			11/01/19 12:55	1.89
o-Xylene	ND		0.0038	0.00071	ppm v/v			11/01/19 12:55	1.89
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
4-Bromofluorobenzene (Surr)	94		60 - 140					11/01/19 12:55	1.89

**Client Sample ID: 110595-001/MWL-SV-FB 2**

**Lab Sample ID: 140-17136-3**

Date Collected: 10/18/19 11:38

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0012</b>	<b>J</b>	0.0020	0.00058	ppm v/v			11/01/19 13:52	1.83
<b>Benzene</b>	<b>0.000081</b>	<b>J</b>	0.000081	0.0000081	ppm v/v			11/01/19 13:52	1.83
Benzyl chloride	ND	*	0.00016	0.000039	ppm v/v			11/01/19 13:52	1.83
Bromodichloromethane	ND		0.000081	0.000018	ppm v/v			11/01/19 13:52	1.83
Bromoform	ND		0.000081	0.0000092	ppm v/v			11/01/19 13:52	1.83
Bromomethane	ND		0.000081	0.000022	ppm v/v			11/01/19 13:52	1.83
<b>2-Butanone (MEK)</b>	<b>0.00026</b>	<b>J</b>	0.00041	0.000074	ppm v/v			11/01/19 13:52	1.83
<b>Carbon disulfide</b>	<b>0.000017</b>	<b>J</b>	0.00020	0.000011	ppm v/v			11/01/19 13:52	1.83
Carbon tetrachloride	ND		0.000081	0.0000071	ppm v/v			11/01/19 13:52	1.83
Chlorobenzene	ND		0.000081	0.0000061	ppm v/v			11/01/19 13:52	1.83
Chloroethane	ND		0.000081	0.000029	ppm v/v			11/01/19 13:52	1.83
Chloroform	ND		0.000081	0.0000071	ppm v/v			11/01/19 13:52	1.83
Chloromethane	ND		0.00020	0.000067	ppm v/v			11/01/19 13:52	1.83
Dibromochloromethane	ND		0.000081	0.0000071	ppm v/v			11/01/19 13:52	1.83
1,2-Dibromoethane (EDB)	ND		0.000081	0.0000071	ppm v/v			11/01/19 13:52	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000081	0.000012	ppm v/v			11/01/19 13:52	1.83
1,2-Dichlorobenzene	ND		0.000081	0.000032	ppm v/v			11/01/19 13:52	1.83
1,3-Dichlorobenzene	ND		0.000081	0.000016	ppm v/v			11/01/19 13:52	1.83
1,4-Dichlorobenzene	ND		0.000081	0.000016	ppm v/v			11/01/19 13:52	1.83
Dichlorodifluoromethane	ND		0.000081	0.000014	ppm v/v			11/01/19 13:52	1.83
1,1-Dichloroethane	ND		0.000081	0.0000071	ppm v/v			11/01/19 13:52	1.83
1,2-Dichloroethane	ND		0.000081	0.000010	ppm v/v			11/01/19 13:52	1.83
1,1-Dichloroethene	ND		0.000081	0.0000081	ppm v/v			11/01/19 13:52	1.83

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110595-001/MWL-SV-FB 2**

**Lab Sample ID: 140-17136-3**

**Date Collected: 10/18/19 11:38**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.000081	0.000010	ppm v/v			11/01/19 13:52	1.83
trans-1,2-Dichloroethene	ND		0.000081	0.0000071	ppm v/v			11/01/19 13:52	1.83
1,2-Dichloropropane	ND		0.000081	0.000010	ppm v/v			11/01/19 13:52	1.83
cis-1,3-Dichloropropene	ND		0.000081	0.000016	ppm v/v			11/01/19 13:52	1.83
trans-1,3-Dichloropropene	ND		0.000081	0.0000092	ppm v/v			11/01/19 13:52	1.83
Ethylbenzene	ND		0.000081	0.000013	ppm v/v			11/01/19 13:52	1.83
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/01/19 13:52	1.83
Hexachlorobutadiene	ND		0.00041	0.000033	ppm v/v			11/01/19 13:52	1.83
<b>2-Hexanone</b>	<b>0.000033</b>	<b>J</b>	0.00020	0.000016	ppm v/v			11/01/19 13:52	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000055	ppm v/v			11/01/19 13:52	1.83
<b>Methylene Chloride</b>	<b>0.00044</b>	<b>B</b>	0.00041	0.00016	ppm v/v			11/01/19 13:52	1.83
Styrene	ND		0.000081	0.000024	ppm v/v			11/01/19 13:52	1.83
1,1,2,2-Tetrachloroethane	ND		0.000081	0.000014	ppm v/v			11/01/19 13:52	1.83
<b>Tetrachloroethene</b>	<b>0.000037</b>	<b>J</b>	0.000081	0.0000071	ppm v/v			11/01/19 13:52	1.83
Toluene	ND		0.00012	0.000079	ppm v/v			11/01/19 13:52	1.83
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.000011</b>	<b>J</b>	0.000081	0.0000081	ppm v/v			11/01/19 13:52	1.83
1,2,4-Trichlorobenzene	ND		0.00041	0.000065	ppm v/v			11/01/19 13:52	1.83
1,1,1-Trichloroethane	ND		0.000081	0.000038	ppm v/v			11/01/19 13:52	1.83
1,1,2-Trichloroethane	ND		0.000081	0.0000071	ppm v/v			11/01/19 13:52	1.83
<b>Trichloroethene</b>	<b>0.000011</b>	<b>J</b>	0.000041	0.0000061	ppm v/v			11/01/19 13:52	1.83
<b>Trichlorofluoromethane</b>	<b>0.000027</b>	<b>J</b>	0.000081	0.000011	ppm v/v			11/01/19 13:52	1.83
1,2,4-Trimethylbenzene	ND		0.000081	0.000020	ppm v/v			11/01/19 13:52	1.83
1,3,5-Trimethylbenzene	ND		0.000081	0.000022	ppm v/v			11/01/19 13:52	1.83
Vinyl acetate	ND		0.00041	0.000028	ppm v/v			11/01/19 13:52	1.83
Vinyl chloride	ND		0.000041	0.000026	ppm v/v			11/01/19 13:52	1.83
m,p-Xylene	ND		0.000081	0.000029	ppm v/v			11/01/19 13:52	1.83
o-Xylene	ND		0.000081	0.000015	ppm v/v			11/01/19 13:52	1.83
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
4-Bromofluorobenzene (Surr)	95		60 - 140					11/01/19 13:52	1.83

**Client Sample ID: 110596-001/MWL-SV02-41.5**

**Lab Sample ID: 140-17136-4**

**Date Collected: 10/18/19 11:51**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.090	0.025	ppm v/v			11/04/19 14:53	1.79
Benzene	ND		0.0036	0.00036	ppm v/v			11/04/19 14:53	1.79
Benzyl chloride	ND		0.0072	0.0017	ppm v/v			11/04/19 14:53	1.79
Bromodichloromethane	ND		0.0036	0.00081	ppm v/v			11/04/19 14:53	1.79
Bromoform	ND		0.0036	0.00040	ppm v/v			11/04/19 14:53	1.79
Bromomethane	ND		0.0036	0.00098	ppm v/v			11/04/19 14:53	1.79
<b>2-Butanone (MEK)</b>	<b>0.0076</b>	<b>J</b>	0.018	0.0033	ppm v/v			11/04/19 14:53	1.79
Carbon disulfide	ND		0.0090	0.00049	ppm v/v			11/04/19 14:53	1.79
Carbon tetrachloride	ND		0.0036	0.00031	ppm v/v			11/04/19 14:53	1.79
Chlorobenzene	ND		0.0036	0.00027	ppm v/v			11/04/19 14:53	1.79

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110596-001/MWL-SV02-41.5

Lab Sample ID: 140-17136-4

Date Collected: 10/18/19 11:51

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroethane	ND		0.0036	0.0013	ppm v/v			11/04/19 14:53	1.79
<b>Chloroform</b>	<b>0.0025</b>	<b>J</b>	0.0036	0.00031	ppm v/v			11/04/19 14:53	1.79
Chloromethane	ND		0.0090	0.0030	ppm v/v			11/04/19 14:53	1.79
Dibromochloromethane	ND		0.0036	0.00031	ppm v/v			11/04/19 14:53	1.79
1,2-Dibromoethane (EDB)	ND		0.0036	0.00031	ppm v/v			11/04/19 14:53	1.79
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0036	0.00054	ppm v/v			11/04/19 14:53	1.79
1,2-Dichlorobenzene	ND		0.0036	0.0014	ppm v/v			11/04/19 14:53	1.79
1,3-Dichlorobenzene	ND		0.0036	0.00072	ppm v/v			11/04/19 14:53	1.79
1,4-Dichlorobenzene	ND		0.0036	0.00072	ppm v/v			11/04/19 14:53	1.79
<b>Dichlorodifluoromethane</b>	<b>0.083</b>		0.0036	0.00063	ppm v/v			11/04/19 14:53	1.79
<b>1,1-Dichloroethane</b>	<b>0.0018</b>	<b>J</b>	0.0036	0.00031	ppm v/v			11/04/19 14:53	1.79
1,2-Dichloroethane	ND		0.0036	0.00045	ppm v/v			11/04/19 14:53	1.79
<b>1,1-Dichloroethene</b>	<b>0.0087</b>		0.0036	0.00036	ppm v/v			11/04/19 14:53	1.79
<b>cis-1,2-Dichloroethene</b>	<b>0.00069</b>	<b>J</b>	0.0036	0.00045	ppm v/v			11/04/19 14:53	1.79
trans-1,2-Dichloroethene	ND		0.0036	0.00031	ppm v/v			11/04/19 14:53	1.79
1,2-Dichloropropane	ND		0.0036	0.00045	ppm v/v			11/04/19 14:53	1.79
cis-1,3-Dichloropropene	ND		0.0036	0.00072	ppm v/v			11/04/19 14:53	1.79
trans-1,3-Dichloropropene	ND		0.0036	0.00040	ppm v/v			11/04/19 14:53	1.79
Ethylbenzene	ND		0.0036	0.00058	ppm v/v			11/04/19 14:53	1.79
4-Ethyltoluene	ND		0.0072	0.00094	ppm v/v			11/04/19 14:53	1.79
Hexachlorobutadiene	ND		0.018	0.0014	ppm v/v			11/04/19 14:53	1.79
2-Hexanone	ND		0.0090	0.00072	ppm v/v			11/04/19 14:53	1.79
4-Methyl-2-pentanone (MIBK)	ND		0.0090	0.0024	ppm v/v			11/04/19 14:53	1.79
<b>Methylene Chloride</b>	<b>0.016</b>	<b>J B</b>	0.018	0.0072	ppm v/v			11/04/19 14:53	1.79
Styrene	ND		0.0036	0.0011	ppm v/v			11/04/19 14:53	1.79
1,1,2,2-Tetrachloroethane	ND		0.0036	0.00063	ppm v/v			11/04/19 14:53	1.79
<b>Tetrachloroethene</b>	<b>0.062</b>		0.0036	0.00031	ppm v/v			11/04/19 14:53	1.79
Toluene	ND		0.0054	0.0035	ppm v/v			11/04/19 14:53	1.79
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.042</b>		0.0036	0.00036	ppm v/v			11/04/19 14:53	1.79
1,2,4-Trichlorobenzene	ND		0.018	0.0029	ppm v/v			11/04/19 14:53	1.79
<b>1,1,1-Trichloroethane</b>	<b>0.052</b>		0.0036	0.0017	ppm v/v			11/04/19 14:53	1.79
1,1,2-Trichloroethane	ND		0.0036	0.00031	ppm v/v			11/04/19 14:53	1.79
<b>Trichloroethene</b>	<b>0.054</b>		0.0018	0.00027	ppm v/v			11/04/19 14:53	1.79
<b>Trichlorofluoromethane</b>	<b>0.24</b>		0.0036	0.00049	ppm v/v			11/04/19 14:53	1.79
1,2,4-Trimethylbenzene	ND		0.0036	0.00090	ppm v/v			11/04/19 14:53	1.79
1,3,5-Trimethylbenzene	ND		0.0036	0.00098	ppm v/v			11/04/19 14:53	1.79
Vinyl acetate	ND		0.018	0.0013	ppm v/v			11/04/19 14:53	1.79
Vinyl chloride	ND		0.0018	0.0012	ppm v/v			11/04/19 14:53	1.79
m,p-Xylene	ND		0.0036	0.0013	ppm v/v			11/04/19 14:53	1.79
o-Xylene	ND		0.0036	0.00067	ppm v/v			11/04/19 14:53	1.79

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		60 - 140		11/04/19 14:53	1.79

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110597-001/MWL-SV-FB 3

Lab Sample ID: 140-17136-5

Date Collected: 10/18/19 08:46

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0030		0.0020	0.00058	ppm v/v			11/01/19 15:47	1.83
Benzene	0.000020	J	0.000081	0.0000081	ppm v/v			11/01/19 15:47	1.83
Benzyl chloride	ND	*	0.00016	0.000039	ppm v/v			11/01/19 15:47	1.83
Bromodichloromethane	ND		0.000081	0.000018	ppm v/v			11/01/19 15:47	1.83
Bromoform	ND		0.000081	0.0000092	ppm v/v			11/01/19 15:47	1.83
Bromomethane	ND		0.000081	0.000022	ppm v/v			11/01/19 15:47	1.83
2-Butanone (MEK)	0.00011	J	0.00041	0.000074	ppm v/v			11/01/19 15:47	1.83
Carbon disulfide	0.000016	J	0.00020	0.000011	ppm v/v			11/01/19 15:47	1.83
Carbon tetrachloride	ND		0.000081	0.0000071	ppm v/v			11/01/19 15:47	1.83
Chlorobenzene	ND		0.000081	0.0000061	ppm v/v			11/01/19 15:47	1.83
Chloroethane	ND		0.000081	0.000029	ppm v/v			11/01/19 15:47	1.83
Chloroform	ND		0.000081	0.0000071	ppm v/v			11/01/19 15:47	1.83
Chloromethane	ND		0.00020	0.000067	ppm v/v			11/01/19 15:47	1.83
Dibromochloromethane	ND		0.000081	0.0000071	ppm v/v			11/01/19 15:47	1.83
1,2-Dibromoethane (EDB)	ND		0.000081	0.0000071	ppm v/v			11/01/19 15:47	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000081	0.000012	ppm v/v			11/01/19 15:47	1.83
1,2-Dichlorobenzene	ND		0.000081	0.000032	ppm v/v			11/01/19 15:47	1.83
1,3-Dichlorobenzene	ND		0.000081	0.000016	ppm v/v			11/01/19 15:47	1.83
1,4-Dichlorobenzene	ND		0.000081	0.000016	ppm v/v			11/01/19 15:47	1.83
Dichlorodifluoromethane	0.000015	J	0.000081	0.000014	ppm v/v			11/01/19 15:47	1.83
1,1-Dichloroethane	ND		0.000081	0.0000071	ppm v/v			11/01/19 15:47	1.83
1,2-Dichloroethane	ND		0.000081	0.000010	ppm v/v			11/01/19 15:47	1.83
1,1-Dichloroethene	ND		0.000081	0.0000081	ppm v/v			11/01/19 15:47	1.83
cis-1,2-Dichloroethene	ND		0.000081	0.000010	ppm v/v			11/01/19 15:47	1.83
trans-1,2-Dichloroethene	ND		0.000081	0.0000071	ppm v/v			11/01/19 15:47	1.83
1,2-Dichloropropane	ND		0.000081	0.000010	ppm v/v			11/01/19 15:47	1.83
cis-1,3-Dichloropropene	ND		0.000081	0.000016	ppm v/v			11/01/19 15:47	1.83
trans-1,3-Dichloropropene	ND		0.000081	0.0000092	ppm v/v			11/01/19 15:47	1.83
Ethylbenzene	ND		0.000081	0.000013	ppm v/v			11/01/19 15:47	1.83
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/01/19 15:47	1.83
Hexachlorobutadiene	ND		0.00041	0.000033	ppm v/v			11/01/19 15:47	1.83
2-Hexanone	ND		0.00020	0.000016	ppm v/v			11/01/19 15:47	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000055	ppm v/v			11/01/19 15:47	1.83
Methylene Chloride	0.0010	B	0.00041	0.00016	ppm v/v			11/01/19 15:47	1.83
Styrene	ND		0.000081	0.000024	ppm v/v			11/01/19 15:47	1.83
1,1,2,2-Tetrachloroethane	ND		0.000081	0.000014	ppm v/v			11/01/19 15:47	1.83
Tetrachloroethene	0.000043	J	0.000081	0.0000071	ppm v/v			11/01/19 15:47	1.83
Toluene	0.00025		0.00012	0.000079	ppm v/v			11/01/19 15:47	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	0.000017	J	0.000081	0.0000081	ppm v/v			11/01/19 15:47	1.83
1,2,4-Trichlorobenzene	ND		0.00041	0.000065	ppm v/v			11/01/19 15:47	1.83
1,1,1-Trichloroethane	ND		0.000081	0.000038	ppm v/v			11/01/19 15:47	1.83
1,1,2-Trichloroethane	ND		0.000081	0.0000071	ppm v/v			11/01/19 15:47	1.83
Trichloroethene	0.000039	J	0.000041	0.0000061	ppm v/v			11/01/19 15:47	1.83
Trichlorofluoromethane	0.000093		0.000081	0.000011	ppm v/v			11/01/19 15:47	1.83
1,2,4-Trimethylbenzene	ND		0.000081	0.000020	ppm v/v			11/01/19 15:47	1.83
1,3,5-Trimethylbenzene	ND		0.000081	0.000022	ppm v/v			11/01/19 15:47	1.83
Vinyl acetate	ND		0.00041	0.000028	ppm v/v			11/01/19 15:47	1.83
Vinyl chloride	ND		0.000041	0.000026	ppm v/v			11/01/19 15:47	1.83

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110597-001/MWL-SV-FB 3**

**Lab Sample ID: 140-17136-5**

Date Collected: 10/18/19 08:46

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.000081	0.000029	ppm v/v			11/01/19 15:47	1.83
o-Xylene	ND		0.000081	0.000015	ppm v/v			11/01/19 15:47	1.83
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140					11/01/19 15:47	1.83

**Client Sample ID: 110598-001/MWL-SV03-50**

**Lab Sample ID: 140-17136-6**

Date Collected: 10/18/19 08:57

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0059		0.0021	0.00061	ppm v/v			11/01/19 16:45	1.92
Benzene	0.00022		0.000085	0.0000085	ppm v/v			11/01/19 16:45	1.92
Benzyl chloride	ND	*	0.00017	0.000041	ppm v/v			11/01/19 16:45	1.92
Bromodichloromethane	0.000051	J	0.000085	0.000019	ppm v/v			11/01/19 16:45	1.92
Bromoform	ND		0.000085	0.0000096	ppm v/v			11/01/19 16:45	1.92
Bromomethane	ND		0.000085	0.000023	ppm v/v			11/01/19 16:45	1.92
2-Butanone (MEK)	0.00080		0.00043	0.000078	ppm v/v			11/01/19 16:45	1.92
Carbon disulfide	0.00027		0.00021	0.000012	ppm v/v			11/01/19 16:45	1.92
Carbon tetrachloride	0.00026		0.000085	0.0000075	ppm v/v			11/01/19 16:45	1.92
Chlorobenzene	ND		0.000085	0.0000064	ppm v/v			11/01/19 16:45	1.92
Chloroethane	ND		0.000085	0.000031	ppm v/v			11/01/19 16:45	1.92
Chloroform	0.0019		0.000085	0.0000075	ppm v/v			11/01/19 16:45	1.92
Chloromethane	0.00015	J	0.00021	0.000070	ppm v/v			11/01/19 16:45	1.92
Dibromochloromethane	ND		0.000085	0.0000075	ppm v/v			11/01/19 16:45	1.92
1,2-Dibromoethane (EDB)	ND		0.000085	0.0000075	ppm v/v			11/01/19 16:45	1.92
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000085	0.000013	ppm v/v			11/01/19 16:45	1.92
1,2-Dichlorobenzene	ND		0.000085	0.000033	ppm v/v			11/01/19 16:45	1.92
1,3-Dichlorobenzene	ND		0.000085	0.000017	ppm v/v			11/01/19 16:45	1.92
1,4-Dichlorobenzene	ND		0.000085	0.000017	ppm v/v			11/01/19 16:45	1.92
Dichlorodifluoromethane	0.013		0.000085	0.000015	ppm v/v			11/01/19 16:45	1.92
1,1-Dichloroethane	0.0038		0.000085	0.0000075	ppm v/v			11/01/19 16:45	1.92
1,2-Dichloroethane	ND		0.000085	0.000011	ppm v/v			11/01/19 16:45	1.92
1,1-Dichloroethene	0.015		0.000085	0.0000085	ppm v/v			11/01/19 16:45	1.92
cis-1,2-Dichloroethene	0.0024		0.000085	0.000011	ppm v/v			11/01/19 16:45	1.92
trans-1,2-Dichloroethene	0.000076	J	0.000085	0.0000075	ppm v/v			11/01/19 16:45	1.92
1,2-Dichloropropane	ND		0.000085	0.000011	ppm v/v			11/01/19 16:45	1.92
cis-1,3-Dichloropropene	ND		0.000085	0.000017	ppm v/v			11/01/19 16:45	1.92
trans-1,3-Dichloropropene	ND		0.000085	0.0000096	ppm v/v			11/01/19 16:45	1.92
Ethylbenzene	ND		0.000085	0.000014	ppm v/v			11/01/19 16:45	1.92
4-Ethyltoluene	ND		0.00017	0.000022	ppm v/v			11/01/19 16:45	1.92
Hexachlorobutadiene	ND		0.00043	0.000034	ppm v/v			11/01/19 16:45	1.92
2-Hexanone	0.000083	J	0.00021	0.000017	ppm v/v			11/01/19 16:45	1.92
4-Methyl-2-pentanone (MIBK)	0.00029		0.00021	0.000058	ppm v/v			11/01/19 16:45	1.92
Methylene Chloride	0.0015	B	0.00043	0.00017	ppm v/v			11/01/19 16:45	1.92
Styrene	ND		0.000085	0.000026	ppm v/v			11/01/19 16:45	1.92
1,1,2,2-Tetrachloroethane	ND		0.000085	0.000015	ppm v/v			11/01/19 16:45	1.92

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110598-001/MWL-SV03-50**

**Lab Sample ID: 140-17136-6**

**Date Collected: 10/18/19 08:57**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Toluene</b>	<b>0.00010</b>	<b>J</b>	0.00013	0.000083	ppm v/v			11/01/19 16:45	1.92
1,2,4-Trichlorobenzene	ND		0.00043	0.000068	ppm v/v			11/01/19 16:45	1.92
<b>1,1,1-Trichloroethane</b>	<b>0.0031</b>		0.000085	0.000039	ppm v/v			11/01/19 16:45	1.92
<b>1,1,2-Trichloroethane</b>	<b>0.000059</b>	<b>J</b>	0.000085	0.0000075	ppm v/v			11/01/19 16:45	1.92
1,2,4-Trimethylbenzene	ND		0.000085	0.000021	ppm v/v			11/01/19 16:45	1.92
1,3,5-Trimethylbenzene	ND		0.000085	0.000023	ppm v/v			11/01/19 16:45	1.92
Vinyl acetate	ND		0.00043	0.000030	ppm v/v			11/01/19 16:45	1.92
Vinyl chloride	ND		0.000043	0.000028	ppm v/v			11/01/19 16:45	1.92
m,p-Xylene	ND		0.000085	0.000031	ppm v/v			11/01/19 16:45	1.92
o-Xylene	ND		0.000085	0.000016	ppm v/v			11/01/19 16:45	1.92

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140		11/01/19 16:45	1.92

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Tetrachloroethene</b>	<b>0.15</b>		0.0038	0.00034	ppm v/v			11/04/19 16:27	1.92
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.083</b>		0.0038	0.00038	ppm v/v			11/04/19 16:27	1.92
<b>Trichloroethene</b>	<b>0.12</b>		0.0019	0.00029	ppm v/v			11/04/19 16:27	1.92
<b>Trichlorofluoromethane</b>	<b>0.027</b>		0.0038	0.00053	ppm v/v			11/04/19 16:27	1.92

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140		11/04/19 16:27	1.92

**Client Sample ID: 110599-001/MWL-SV03-100**

**Lab Sample ID: 140-17136-7**

**Date Collected: 10/18/19 09:00**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0077</b>	<b>J</b>	0.026	0.0073	ppm v/v			11/01/19 17:33	1.79
<b>Benzene</b>	<b>0.00024</b>	<b>J</b>	0.0010	0.00010	ppm v/v			11/01/19 17:33	1.79
Benzyl chloride	ND	*	0.0020	0.00049	ppm v/v			11/01/19 17:33	1.79
Bromodichloromethane	ND		0.0010	0.00023	ppm v/v			11/01/19 17:33	1.79
Bromoform	ND		0.0010	0.00012	ppm v/v			11/01/19 17:33	1.79
Bromomethane	ND		0.0010	0.00028	ppm v/v			11/01/19 17:33	1.79
2-Butanone (MEK)	ND		0.0051	0.00093	ppm v/v			11/01/19 17:33	1.79
<b>Carbon disulfide</b>	<b>0.00063</b>	<b>J</b>	0.0026	0.00014	ppm v/v			11/01/19 17:33	1.79
<b>Carbon tetrachloride</b>	<b>0.00032</b>	<b>J</b>	0.0010	0.000090	ppm v/v			11/01/19 17:33	1.79
Chlorobenzene	ND		0.0010	0.000077	ppm v/v			11/01/19 17:33	1.79
Chloroethane	ND		0.0010	0.00037	ppm v/v			11/01/19 17:33	1.79
<b>Chloroform</b>	<b>0.0022</b>		0.0010	0.000090	ppm v/v			11/01/19 17:33	1.79
Chloromethane	ND		0.0026	0.00084	ppm v/v			11/01/19 17:33	1.79
Dibromochloromethane	ND		0.0010	0.000090	ppm v/v			11/01/19 17:33	1.79
1,2-Dibromoethane (EDB)	ND		0.0010	0.000090	ppm v/v			11/01/19 17:33	1.79
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0010	0.00015	ppm v/v			11/01/19 17:33	1.79
1,2-Dichlorobenzene	ND		0.0010	0.00040	ppm v/v			11/01/19 17:33	1.79
1,3-Dichlorobenzene	ND		0.0010	0.00020	ppm v/v			11/01/19 17:33	1.79

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110599-001/MWL-SV03-100

Lab Sample ID: 140-17136-7

Date Collected: 10/18/19 09:00

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	ND		0.0010	0.00020	ppm v/v			11/01/19 17:33	1.79
Dichlorodifluoromethane	0.047		0.0010	0.00018	ppm v/v			11/01/19 17:33	1.79
1,1-Dichloroethane	0.0053		0.0010	0.000090	ppm v/v			11/01/19 17:33	1.79
1,2-Dichloroethane	ND		0.0010	0.00013	ppm v/v			11/01/19 17:33	1.79
1,1-Dichloroethene	0.020		0.0010	0.00010	ppm v/v			11/01/19 17:33	1.79
cis-1,2-Dichloroethene	0.0032		0.0010	0.00013	ppm v/v			11/01/19 17:33	1.79
trans-1,2-Dichloroethene	ND		0.0010	0.000090	ppm v/v			11/01/19 17:33	1.79
1,2-Dichloropropane	ND		0.0010	0.00013	ppm v/v			11/01/19 17:33	1.79
cis-1,3-Dichloropropene	ND		0.0010	0.00020	ppm v/v			11/01/19 17:33	1.79
trans-1,3-Dichloropropene	ND		0.0010	0.00012	ppm v/v			11/01/19 17:33	1.79
Ethylbenzene	ND		0.0010	0.00017	ppm v/v			11/01/19 17:33	1.79
4-Ethyltoluene	ND		0.0020	0.00027	ppm v/v			11/01/19 17:33	1.79
Hexachlorobutadiene	ND		0.0051	0.00041	ppm v/v			11/01/19 17:33	1.79
2-Hexanone	ND		0.0026	0.00020	ppm v/v			11/01/19 17:33	1.79
4-Methyl-2-pentanone (MIBK)	ND		0.0026	0.00069	ppm v/v			11/01/19 17:33	1.79
Methylene Chloride	0.0046	J B	0.0051	0.0020	ppm v/v			11/01/19 17:33	1.79
Styrene	ND		0.0010	0.00031	ppm v/v			11/01/19 17:33	1.79
1,1,2,2-Tetrachloroethane	ND		0.0010	0.00018	ppm v/v			11/01/19 17:33	1.79
Tetrachloroethene	0.21		0.0010	0.000090	ppm v/v			11/01/19 17:33	1.79
Toluene	ND		0.0015	0.0010	ppm v/v			11/01/19 17:33	1.79
1,1,2-Trichloro-1,2,2-trifluoroethane	0.11		0.0010	0.00010	ppm v/v			11/01/19 17:33	1.79
1,2,4-Trichlorobenzene	ND		0.0051	0.00082	ppm v/v			11/01/19 17:33	1.79
1,1,1-Trichloroethane	0.0032		0.0010	0.00047	ppm v/v			11/01/19 17:33	1.79
1,1,2-Trichloroethane	ND		0.0010	0.000090	ppm v/v			11/01/19 17:33	1.79
Trichloroethene	0.17		0.00051	0.000077	ppm v/v			11/01/19 17:33	1.79
Trichlorofluoromethane	0.039		0.0010	0.00014	ppm v/v			11/01/19 17:33	1.79
1,2,4-Trimethylbenzene	ND		0.0010	0.00026	ppm v/v			11/01/19 17:33	1.79
1,3,5-Trimethylbenzene	ND		0.0010	0.00028	ppm v/v			11/01/19 17:33	1.79
Vinyl acetate	ND		0.0051	0.00036	ppm v/v			11/01/19 17:33	1.79
Vinyl chloride	ND		0.00051	0.00033	ppm v/v			11/01/19 17:33	1.79
m,p-Xylene	ND		0.0010	0.00037	ppm v/v			11/01/19 17:33	1.79
o-Xylene	ND		0.0010	0.00019	ppm v/v			11/01/19 17:33	1.79
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
4-Bromofluorobenzene (Surr)	97		60 - 140					11/01/19 17:33	1.79

Client Sample ID: 110600-001/MWL-SV03-200

Lab Sample ID: 140-17136-8

Date Collected: 10/18/19 09:03

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0038	J	0.0088	0.0025	ppm v/v			11/01/19 18:21	1.76
Benzene	0.00022	J	0.00035	0.000035	ppm v/v			11/01/19 18:21	1.76
Benzyl chloride	ND	*	0.00070	0.00017	ppm v/v			11/01/19 18:21	1.76
Bromodichloromethane	ND		0.00035	0.000079	ppm v/v			11/01/19 18:21	1.76
Bromoform	ND		0.00035	0.000040	ppm v/v			11/01/19 18:21	1.76

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110600-001/MWL-SV03-200

Lab Sample ID: 140-17136-8

Date Collected: 10/18/19 09:03

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromomethane	ND		0.00035	0.000097	ppm v/v			11/01/19 18:21	1.76
2-Butanone (MEK)	0.00034	J	0.0018	0.00032	ppm v/v			11/01/19 18:21	1.76
Carbon disulfide	0.00011	J	0.00088	0.000048	ppm v/v			11/01/19 18:21	1.76
Carbon tetrachloride	0.00037		0.00035	0.000031	ppm v/v			11/01/19 18:21	1.76
Chlorobenzene	ND		0.00035	0.000026	ppm v/v			11/01/19 18:21	1.76
Chloroethane	ND		0.00035	0.00013	ppm v/v			11/01/19 18:21	1.76
Chloroform	0.0021		0.00035	0.000031	ppm v/v			11/01/19 18:21	1.76
Chloromethane	ND		0.00088	0.00029	ppm v/v			11/01/19 18:21	1.76
Dibromochloromethane	ND		0.00035	0.000031	ppm v/v			11/01/19 18:21	1.76
1,2-Dibromoethane (EDB)	ND		0.00035	0.000031	ppm v/v			11/01/19 18:21	1.76
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00035	0.000053	ppm v/v			11/01/19 18:21	1.76
1,2-Dichlorobenzene	ND		0.00035	0.00014	ppm v/v			11/01/19 18:21	1.76
1,3-Dichlorobenzene	ND		0.00035	0.000070	ppm v/v			11/01/19 18:21	1.76
1,4-Dichlorobenzene	ND		0.00035	0.000070	ppm v/v			11/01/19 18:21	1.76
Dichlorodifluoromethane	0.033		0.00035	0.000062	ppm v/v			11/01/19 18:21	1.76
1,1-Dichloroethane	0.0061		0.00035	0.000031	ppm v/v			11/01/19 18:21	1.76
1,2-Dichloroethane	ND		0.00035	0.000044	ppm v/v			11/01/19 18:21	1.76
1,1-Dichloroethene	0.026		0.00035	0.000035	ppm v/v			11/01/19 18:21	1.76
cis-1,2-Dichloroethene	0.0040		0.00035	0.000044	ppm v/v			11/01/19 18:21	1.76
trans-1,2-Dichloroethene	ND		0.00035	0.000031	ppm v/v			11/01/19 18:21	1.76
1,2-Dichloropropane	ND		0.00035	0.000044	ppm v/v			11/01/19 18:21	1.76
cis-1,3-Dichloropropene	ND		0.00035	0.000070	ppm v/v			11/01/19 18:21	1.76
trans-1,3-Dichloropropene	ND		0.00035	0.000040	ppm v/v			11/01/19 18:21	1.76
Ethylbenzene	ND		0.00035	0.000057	ppm v/v			11/01/19 18:21	1.76
4-Ethyltoluene	ND		0.00070	0.000092	ppm v/v			11/01/19 18:21	1.76
Hexachlorobutadiene	ND		0.0018	0.00014	ppm v/v			11/01/19 18:21	1.76
2-Hexanone	ND		0.00088	0.000070	ppm v/v			11/01/19 18:21	1.76
4-Methyl-2-pentanone (MIBK)	ND		0.00088	0.00024	ppm v/v			11/01/19 18:21	1.76
Methylene Chloride	0.0030	B	0.0018	0.00070	ppm v/v			11/01/19 18:21	1.76
Styrene	ND		0.00035	0.00011	ppm v/v			11/01/19 18:21	1.76
1,1,2,2-Tetrachloroethane	ND		0.00035	0.000062	ppm v/v			11/01/19 18:21	1.76
Toluene	ND		0.00053	0.00034	ppm v/v			11/01/19 18:21	1.76
1,2,4-Trichlorobenzene	ND		0.0018	0.00028	ppm v/v			11/01/19 18:21	1.76
1,1,1-Trichloroethane	0.0021		0.00035	0.00016	ppm v/v			11/01/19 18:21	1.76
1,1,2-Trichloroethane	ND		0.00035	0.000031	ppm v/v			11/01/19 18:21	1.76
Trichlorofluoromethane	0.031		0.00035	0.000048	ppm v/v			11/01/19 18:21	1.76
1,2,4-Trimethylbenzene	ND		0.00035	0.000088	ppm v/v			11/01/19 18:21	1.76
1,3,5-Trimethylbenzene	ND		0.00035	0.000097	ppm v/v			11/01/19 18:21	1.76
Vinyl acetate	ND		0.0018	0.00012	ppm v/v			11/01/19 18:21	1.76
Vinyl chloride	ND		0.00018	0.00011	ppm v/v			11/01/19 18:21	1.76
m,p-Xylene	ND		0.00035	0.00013	ppm v/v			11/01/19 18:21	1.76
o-Xylene	ND		0.00035	0.000066	ppm v/v			11/01/19 18:21	1.76

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140		11/01/19 18:21	1.76

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.18		0.0035	0.00031	ppm v/v			11/04/19 17:09	1.76

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110600-001/MWL-SV03-200**

**Lab Sample ID: 140-17136-8**

**Date Collected: 10/18/19 09:03**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) - DL (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloro-1,2,2-trifluoroethane	0.12		0.0035	0.00035	ppm v/v			11/04/19 17:09	1.76
Trichloroethene	0.18		0.0018	0.00026	ppm v/v			11/04/19 17:09	1.76
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140					11/04/19 17:09	1.76

**Client Sample ID: 110601-001/MWL-SV03-300**

**Lab Sample ID: 140-17136-9**

**Date Collected: 10/18/19 09:08**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.088	0.025	ppm v/v			11/01/19 19:08	1.76
Benzene	ND		0.0035	0.00035	ppm v/v			11/01/19 19:08	1.76
Benzyl chloride	ND	*	0.0070	0.0017	ppm v/v			11/01/19 19:08	1.76
Bromodichloromethane	ND		0.0035	0.00079	ppm v/v			11/01/19 19:08	1.76
Bromoform	ND		0.0035	0.00040	ppm v/v			11/01/19 19:08	1.76
Bromomethane	ND		0.0035	0.00097	ppm v/v			11/01/19 19:08	1.76
2-Butanone (MEK)	ND		0.018	0.0032	ppm v/v			11/01/19 19:08	1.76
Carbon disulfide	ND		0.0088	0.00048	ppm v/v			11/01/19 19:08	1.76
Carbon tetrachloride	ND		0.0035	0.00031	ppm v/v			11/01/19 19:08	1.76
Chlorobenzene	ND		0.0035	0.00026	ppm v/v			11/01/19 19:08	1.76
Chloroethane	ND		0.0035	0.0013	ppm v/v			11/01/19 19:08	1.76
Chloroform	0.0012	J	0.0035	0.00031	ppm v/v			11/01/19 19:08	1.76
Chloromethane	ND		0.0088	0.0029	ppm v/v			11/01/19 19:08	1.76
Dibromochloromethane	ND		0.0035	0.00031	ppm v/v			11/01/19 19:08	1.76
1,2-Dibromoethane (EDB)	ND		0.0035	0.00031	ppm v/v			11/01/19 19:08	1.76
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0035	0.00053	ppm v/v			11/01/19 19:08	1.76
1,2-Dichlorobenzene	ND		0.0035	0.0014	ppm v/v			11/01/19 19:08	1.76
1,3-Dichlorobenzene	ND		0.0035	0.00070	ppm v/v			11/01/19 19:08	1.76
1,4-Dichlorobenzene	ND		0.0035	0.00070	ppm v/v			11/01/19 19:08	1.76
Dichlorodifluoromethane	0.043		0.0035	0.00062	ppm v/v			11/01/19 19:08	1.76
1,1-Dichloroethane	0.0021	J	0.0035	0.00031	ppm v/v			11/01/19 19:08	1.76
1,2-Dichloroethane	ND		0.0035	0.00044	ppm v/v			11/01/19 19:08	1.76
1,1-Dichloroethene	0.013		0.0035	0.00035	ppm v/v			11/01/19 19:08	1.76
cis-1,2-Dichloroethene	0.0016	J	0.0035	0.00044	ppm v/v			11/01/19 19:08	1.76
trans-1,2-Dichloroethene	ND		0.0035	0.00031	ppm v/v			11/01/19 19:08	1.76
1,2-Dichloropropane	ND		0.0035	0.00044	ppm v/v			11/01/19 19:08	1.76
cis-1,3-Dichloropropene	ND		0.0035	0.00070	ppm v/v			11/01/19 19:08	1.76
trans-1,3-Dichloropropene	ND		0.0035	0.00040	ppm v/v			11/01/19 19:08	1.76
Ethylbenzene	ND		0.0035	0.00057	ppm v/v			11/01/19 19:08	1.76
4-Ethyltoluene	ND		0.0070	0.00092	ppm v/v			11/01/19 19:08	1.76
Hexachlorobutadiene	ND		0.018	0.0014	ppm v/v			11/01/19 19:08	1.76
2-Hexanone	ND		0.0088	0.00070	ppm v/v			11/01/19 19:08	1.76
4-Methyl-2-pentanone (MIBK)	ND		0.0088	0.0024	ppm v/v			11/01/19 19:08	1.76
Methylene Chloride	0.011	J B	0.018	0.0070	ppm v/v			11/01/19 19:08	1.76
Styrene	ND		0.0035	0.0011	ppm v/v			11/01/19 19:08	1.76

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110601-001/MWL-SV03-300

Lab Sample ID: 140-17136-9

Date Collected: 10/18/19 09:08

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.0035	0.00062	ppm v/v			11/01/19 19:08	1.76
<b>Tetrachloroethene</b>	<b>0.19</b>		0.0035	0.00031	ppm v/v			11/01/19 19:08	1.76
Toluene	ND		0.0053	0.0034	ppm v/v			11/01/19 19:08	1.76
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.078</b>		0.0035	0.00035	ppm v/v			11/01/19 19:08	1.76
1,2,4-Trichlorobenzene	ND		0.018	0.0028	ppm v/v			11/01/19 19:08	1.76
1,1,1-Trichloroethane	ND		0.0035	0.0016	ppm v/v			11/01/19 19:08	1.76
1,1,2-Trichloroethane	ND		0.0035	0.00031	ppm v/v			11/01/19 19:08	1.76
<b>Trichloroethene</b>	<b>0.13</b>		0.0018	0.00026	ppm v/v			11/01/19 19:08	1.76
<b>Trichlorofluoromethane</b>	<b>0.012</b>		0.0035	0.00048	ppm v/v			11/01/19 19:08	1.76
1,2,4-Trimethylbenzene	ND		0.0035	0.00088	ppm v/v			11/01/19 19:08	1.76
1,3,5-Trimethylbenzene	ND		0.0035	0.00097	ppm v/v			11/01/19 19:08	1.76
Vinyl acetate	ND		0.018	0.0012	ppm v/v			11/01/19 19:08	1.76
Vinyl chloride	ND		0.0018	0.0011	ppm v/v			11/01/19 19:08	1.76
m,p-Xylene	ND		0.0035	0.0013	ppm v/v			11/01/19 19:08	1.76
o-Xylene	ND		0.0035	0.00066	ppm v/v			11/01/19 19:08	1.76
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		60 - 140					11/01/19 19:08	1.76

Client Sample ID: 110602-001/MWL-SV03-400

Lab Sample ID: 140-17136-10

Date Collected: 10/18/19 09:30

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.086	0.024	ppm v/v			11/01/19 19:56	1.72
Benzene	ND		0.0034	0.00034	ppm v/v			11/01/19 19:56	1.72
Benzyl chloride	ND	*	0.0069	0.0016	ppm v/v			11/01/19 19:56	1.72
Bromodichloromethane	ND		0.0034	0.00077	ppm v/v			11/01/19 19:56	1.72
Bromoform	ND		0.0034	0.00039	ppm v/v			11/01/19 19:56	1.72
Bromomethane	ND		0.0034	0.00095	ppm v/v			11/01/19 19:56	1.72
2-Butanone (MEK)	ND		0.017	0.0031	ppm v/v			11/01/19 19:56	1.72
Carbon disulfide	ND		0.0086	0.00047	ppm v/v			11/01/19 19:56	1.72
Carbon tetrachloride	ND		0.0034	0.00030	ppm v/v			11/01/19 19:56	1.72
Chlorobenzene	ND		0.0034	0.00026	ppm v/v			11/01/19 19:56	1.72
Chloroethane	ND		0.0034	0.0012	ppm v/v			11/01/19 19:56	1.72
<b>Chloroform</b>	<b>0.0013</b>	<b>J</b>	0.0034	0.00030	ppm v/v			11/01/19 19:56	1.72
Chloromethane	ND		0.0086	0.0028	ppm v/v			11/01/19 19:56	1.72
Dibromochloromethane	ND		0.0034	0.00030	ppm v/v			11/01/19 19:56	1.72
1,2-Dibromoethane (EDB)	ND		0.0034	0.00030	ppm v/v			11/01/19 19:56	1.72
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0034	0.00052	ppm v/v			11/01/19 19:56	1.72
1,2-Dichlorobenzene	ND		0.0034	0.0013	ppm v/v			11/01/19 19:56	1.72
1,3-Dichlorobenzene	ND		0.0034	0.00069	ppm v/v			11/01/19 19:56	1.72
1,4-Dichlorobenzene	ND		0.0034	0.00069	ppm v/v			11/01/19 19:56	1.72
<b>Dichlorodifluoromethane</b>	<b>0.022</b>		0.0034	0.00060	ppm v/v			11/01/19 19:56	1.72
<b>1,1-Dichloroethane</b>	<b>0.0022</b>	<b>J</b>	0.0034	0.00030	ppm v/v			11/01/19 19:56	1.72
1,2-Dichloroethane	ND		0.0034	0.00043	ppm v/v			11/01/19 19:56	1.72

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110602-001/MWL-SV03-400

Lab Sample ID: 140-17136-10

Date Collected: 10/18/19 09:30

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	0.012		0.0034	0.00034	ppm v/v			11/01/19 19:56	1.72
cis-1,2-Dichloroethene	0.0016	J	0.0034	0.00043	ppm v/v			11/01/19 19:56	1.72
trans-1,2-Dichloroethene	ND		0.0034	0.00030	ppm v/v			11/01/19 19:56	1.72
1,2-Dichloropropane	ND		0.0034	0.00043	ppm v/v			11/01/19 19:56	1.72
cis-1,3-Dichloropropene	ND		0.0034	0.00069	ppm v/v			11/01/19 19:56	1.72
trans-1,3-Dichloropropene	ND		0.0034	0.00039	ppm v/v			11/01/19 19:56	1.72
Ethylbenzene	ND		0.0034	0.00056	ppm v/v			11/01/19 19:56	1.72
4-Ethyltoluene	ND		0.0069	0.00090	ppm v/v			11/01/19 19:56	1.72
Hexachlorobutadiene	ND		0.017	0.0014	ppm v/v			11/01/19 19:56	1.72
2-Hexanone	ND		0.0086	0.00069	ppm v/v			11/01/19 19:56	1.72
4-Methyl-2-pentanone (MIBK)	ND		0.0086	0.0023	ppm v/v			11/01/19 19:56	1.72
Methylene Chloride	0.011	J B	0.017	0.0069	ppm v/v			11/01/19 19:56	1.72
Styrene	ND		0.0034	0.0010	ppm v/v			11/01/19 19:56	1.72
1,1,2,2-Tetrachloroethane	ND		0.0034	0.00060	ppm v/v			11/01/19 19:56	1.72
Tetrachloroethene	0.23		0.0034	0.00030	ppm v/v			11/01/19 19:56	1.72
Toluene	ND		0.0052	0.0034	ppm v/v			11/01/19 19:56	1.72
1,1,2-Trichloro-1,2,2-trifluoroethane	0.047		0.0034	0.00034	ppm v/v			11/01/19 19:56	1.72
1,2,4-Trichlorobenzene	ND		0.017	0.0028	ppm v/v			11/01/19 19:56	1.72
1,1,1-Trichloroethane	ND		0.0034	0.0016	ppm v/v			11/01/19 19:56	1.72
1,1,2-Trichloroethane	ND		0.0034	0.00030	ppm v/v			11/01/19 19:56	1.72
Trichloroethene	0.17		0.0017	0.00026	ppm v/v			11/01/19 19:56	1.72
Trichlorofluoromethane	0.0092		0.0034	0.00047	ppm v/v			11/01/19 19:56	1.72
1,2,4-Trimethylbenzene	ND		0.0034	0.00086	ppm v/v			11/01/19 19:56	1.72
1,3,5-Trimethylbenzene	ND		0.0034	0.00095	ppm v/v			11/01/19 19:56	1.72
Vinyl acetate	ND		0.017	0.0012	ppm v/v			11/01/19 19:56	1.72
Vinyl chloride	ND		0.0017	0.0011	ppm v/v			11/01/19 19:56	1.72
m,p-Xylene	ND		0.0034	0.0012	ppm v/v			11/01/19 19:56	1.72
o-Xylene	ND		0.0034	0.00065	ppm v/v			11/01/19 19:56	1.72
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
4-Bromofluorobenzene (Surr)	97		60 - 140					11/01/19 19:56	1.72

Client Sample ID: 110603-001/MWL-SV-FB 4

Lab Sample ID: 140-17136-11

Date Collected: 10/18/19 10:04

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.0021	0.00058	ppm v/v			11/01/19 20:54	1.85
Benzene	0.000028	J	0.000082	0.0000082	ppm v/v			11/01/19 20:54	1.85
Benzyl chloride	ND	*	0.00016	0.000039	ppm v/v			11/01/19 20:54	1.85
Bromodichloromethane	ND		0.000082	0.000019	ppm v/v			11/01/19 20:54	1.85
Bromoform	ND		0.000082	0.0000093	ppm v/v			11/01/19 20:54	1.85
Bromomethane	ND		0.000082	0.000023	ppm v/v			11/01/19 20:54	1.85
2-Butanone (MEK)	ND		0.00041	0.000075	ppm v/v			11/01/19 20:54	1.85
Carbon disulfide	ND		0.00021	0.000011	ppm v/v			11/01/19 20:54	1.85
Carbon tetrachloride	ND		0.000082	0.0000072	ppm v/v			11/01/19 20:54	1.85

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110603-001/MWL-SV-FB 4

Lab Sample ID: 140-17136-11

Date Collected: 10/18/19 10:04

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlorobenzene	ND		0.000082	0.0000062	ppm v/v			11/01/19 20:54	1.85
Chloroethane	ND		0.000082	0.000030	ppm v/v			11/01/19 20:54	1.85
Chloroform	ND		0.000082	0.0000072	ppm v/v			11/01/19 20:54	1.85
Chloromethane	ND		0.00021	0.000068	ppm v/v			11/01/19 20:54	1.85
Dibromochloromethane	ND		0.000082	0.0000072	ppm v/v			11/01/19 20:54	1.85
1,2-Dibromoethane (EDB)	ND		0.000082	0.0000072	ppm v/v			11/01/19 20:54	1.85
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000082	0.000012	ppm v/v			11/01/19 20:54	1.85
1,2-Dichlorobenzene	ND		0.000082	0.000032	ppm v/v			11/01/19 20:54	1.85
1,3-Dichlorobenzene	ND		0.000082	0.000016	ppm v/v			11/01/19 20:54	1.85
1,4-Dichlorobenzene	ND		0.000082	0.000016	ppm v/v			11/01/19 20:54	1.85
Dichlorodifluoromethane	ND		0.000082	0.000014	ppm v/v			11/01/19 20:54	1.85
1,1-Dichloroethane	ND		0.000082	0.0000072	ppm v/v			11/01/19 20:54	1.85
1,2-Dichloroethane	ND		0.000082	0.000010	ppm v/v			11/01/19 20:54	1.85
1,1-Dichloroethene	ND		0.000082	0.0000082	ppm v/v			11/01/19 20:54	1.85
cis-1,2-Dichloroethene	ND		0.000082	0.000010	ppm v/v			11/01/19 20:54	1.85
trans-1,2-Dichloroethene	ND		0.000082	0.0000072	ppm v/v			11/01/19 20:54	1.85
1,2-Dichloropropane	ND		0.000082	0.000010	ppm v/v			11/01/19 20:54	1.85
cis-1,3-Dichloropropene	ND		0.000082	0.000016	ppm v/v			11/01/19 20:54	1.85
trans-1,3-Dichloropropene	ND		0.000082	0.0000093	ppm v/v			11/01/19 20:54	1.85
Ethylbenzene	ND		0.000082	0.000013	ppm v/v			11/01/19 20:54	1.85
4-Ethyltoluene	ND		0.00016	0.000022	ppm v/v			11/01/19 20:54	1.85
Hexachlorobutadiene	ND		0.00041	0.000033	ppm v/v			11/01/19 20:54	1.85
2-Hexanone	ND		0.00021	0.000016	ppm v/v			11/01/19 20:54	1.85
4-Methyl-2-pentanone (MIBK)	ND		0.00021	0.000056	ppm v/v			11/01/19 20:54	1.85
Methylene Chloride	0.00053	B	0.00041	0.00016	ppm v/v			11/01/19 20:54	1.85
Styrene	ND		0.000082	0.000025	ppm v/v			11/01/19 20:54	1.85
1,1,2,2-Tetrachloroethane	ND		0.000082	0.000014	ppm v/v			11/01/19 20:54	1.85
Tetrachloroethene	0.000072	J	0.000082	0.0000072	ppm v/v			11/01/19 20:54	1.85
Toluene	ND		0.00012	0.000080	ppm v/v			11/01/19 20:54	1.85
1,1,2-Trichloro-1,2,2-trifluoroethane	0.000016	J	0.000082	0.0000082	ppm v/v			11/01/19 20:54	1.85
1,2,4-Trichlorobenzene	ND		0.00041	0.000066	ppm v/v			11/01/19 20:54	1.85
1,1,1-Trichloroethane	ND		0.000082	0.000038	ppm v/v			11/01/19 20:54	1.85
1,1,2-Trichloroethane	ND		0.000082	0.0000072	ppm v/v			11/01/19 20:54	1.85
Trichloroethene	0.000073		0.000041	0.0000062	ppm v/v			11/01/19 20:54	1.85
Trichlorofluoromethane	ND		0.000082	0.000011	ppm v/v			11/01/19 20:54	1.85
1,2,4-Trimethylbenzene	ND		0.000082	0.000021	ppm v/v			11/01/19 20:54	1.85
1,3,5-Trimethylbenzene	ND		0.000082	0.000023	ppm v/v			11/01/19 20:54	1.85
Vinyl acetate	ND		0.00041	0.000029	ppm v/v			11/01/19 20:54	1.85
Vinyl chloride	ND		0.000041	0.000027	ppm v/v			11/01/19 20:54	1.85
m,p-Xylene	ND		0.000082	0.000030	ppm v/v			11/01/19 20:54	1.85
o-Xylene	ND		0.000082	0.000015	ppm v/v			11/01/19 20:54	1.85
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140					11/01/19 20:54	1.85

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110604-001/MWL-SV04-50

Lab Sample ID: 140-17136-12

Date Collected: 10/18/19 10:15

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0065	J	0.0091	0.0026	ppm v/v			11/01/19 21:42	1.81
Benzene	0.00030	J	0.00036	0.000036	ppm v/v			11/01/19 21:42	1.81
Benzyl chloride	ND	*	0.00072	0.00017	ppm v/v			11/01/19 21:42	1.81
Bromodichloromethane	ND		0.00036	0.000081	ppm v/v			11/01/19 21:42	1.81
Bromoform	ND		0.00036	0.000041	ppm v/v			11/01/19 21:42	1.81
Bromomethane	0.00017	J	0.00036	0.00010	ppm v/v			11/01/19 21:42	1.81
2-Butanone (MEK)	0.00073	J	0.0018	0.00033	ppm v/v			11/01/19 21:42	1.81
Carbon disulfide	0.00017	J	0.00091	0.000050	ppm v/v			11/01/19 21:42	1.81
Carbon tetrachloride	0.00023	J	0.00036	0.000032	ppm v/v			11/01/19 21:42	1.81
Chlorobenzene	ND		0.00036	0.000027	ppm v/v			11/01/19 21:42	1.81
Chloroethane	ND		0.00036	0.00013	ppm v/v			11/01/19 21:42	1.81
Chloroform	0.0019		0.00036	0.000032	ppm v/v			11/01/19 21:42	1.81
Chloromethane	ND		0.00091	0.00030	ppm v/v			11/01/19 21:42	1.81
Dibromochloromethane	ND		0.00036	0.000032	ppm v/v			11/01/19 21:42	1.81
1,2-Dibromoethane (EDB)	ND		0.00036	0.000032	ppm v/v			11/01/19 21:42	1.81
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00036	0.000054	ppm v/v			11/01/19 21:42	1.81
1,2-Dichlorobenzene	ND		0.00036	0.00014	ppm v/v			11/01/19 21:42	1.81
1,3-Dichlorobenzene	ND		0.00036	0.000072	ppm v/v			11/01/19 21:42	1.81
1,4-Dichlorobenzene	ND		0.00036	0.000072	ppm v/v			11/01/19 21:42	1.81
Dichlorodifluoromethane	0.016		0.00036	0.000063	ppm v/v			11/01/19 21:42	1.81
1,1-Dichloroethane	0.0014		0.00036	0.000032	ppm v/v			11/01/19 21:42	1.81
1,2-Dichloroethane	ND		0.00036	0.000045	ppm v/v			11/01/19 21:42	1.81
1,1-Dichloroethene	0.0071		0.00036	0.000036	ppm v/v			11/01/19 21:42	1.81
cis-1,2-Dichloroethene	0.00058		0.00036	0.000045	ppm v/v			11/01/19 21:42	1.81
trans-1,2-Dichloroethene	ND		0.00036	0.000032	ppm v/v			11/01/19 21:42	1.81
1,2-Dichloropropane	ND		0.00036	0.000045	ppm v/v			11/01/19 21:42	1.81
cis-1,3-Dichloropropene	ND		0.00036	0.000072	ppm v/v			11/01/19 21:42	1.81
trans-1,3-Dichloropropene	ND		0.00036	0.000041	ppm v/v			11/01/19 21:42	1.81
Ethylbenzene	ND		0.00036	0.000059	ppm v/v			11/01/19 21:42	1.81
4-Ethyltoluene	ND		0.00072	0.000095	ppm v/v			11/01/19 21:42	1.81
Hexachlorobutadiene	ND		0.0018	0.00014	ppm v/v			11/01/19 21:42	1.81
2-Hexanone	ND		0.00091	0.000072	ppm v/v			11/01/19 21:42	1.81
4-Methyl-2-pentanone (MIBK)	ND		0.00091	0.00024	ppm v/v			11/01/19 21:42	1.81
Methylene Chloride	0.0017	J B	0.0018	0.00072	ppm v/v			11/01/19 21:42	1.81
Styrene	ND		0.00036	0.00011	ppm v/v			11/01/19 21:42	1.81
1,1,2,2-Tetrachloroethane	ND		0.00036	0.000063	ppm v/v			11/01/19 21:42	1.81
Tetrachloroethene	0.073		0.00036	0.000032	ppm v/v			11/01/19 21:42	1.81
Toluene	ND		0.00054	0.00035	ppm v/v			11/01/19 21:42	1.81
1,1,2-Trichloro-1,2,2-trifluoroethane	0.063		0.00036	0.000036	ppm v/v			11/01/19 21:42	1.81
1,2,4-Trichlorobenzene	ND		0.0018	0.00029	ppm v/v			11/01/19 21:42	1.81
1,1,1-Trichloroethane	0.0071		0.00036	0.00017	ppm v/v			11/01/19 21:42	1.81
1,1,2-Trichloroethane	ND		0.00036	0.000032	ppm v/v			11/01/19 21:42	1.81
Trichloroethene	0.058		0.00018	0.000027	ppm v/v			11/01/19 21:42	1.81
Trichlorofluoromethane	0.032		0.00036	0.000050	ppm v/v			11/01/19 21:42	1.81
1,2,4-Trimethylbenzene	ND		0.00036	0.000091	ppm v/v			11/01/19 21:42	1.81
1,3,5-Trimethylbenzene	ND		0.00036	0.00010	ppm v/v			11/01/19 21:42	1.81
Vinyl acetate	ND		0.0018	0.00013	ppm v/v			11/01/19 21:42	1.81
Vinyl chloride	ND		0.00018	0.00012	ppm v/v			11/01/19 21:42	1.81

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110604-001/MWL-SV04-50**

**Lab Sample ID: 140-17136-12**

**Date Collected: 10/18/19 10:15**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.00036	0.00013	ppm v/v			11/01/19 21:42	1.81
o-Xylene	ND		0.00036	0.000068	ppm v/v			11/01/19 21:42	1.81
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140					11/01/19 21:42	1.81

**Client Sample ID: 110605-001/MWL-SV04-100**

**Lab Sample ID: 140-17136-13**

**Date Collected: 10/18/19 10:19**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0080	J	0.0098	0.0028	ppm v/v			11/01/19 22:31	1.95
Benzene	0.00021	J	0.00039	0.000039	ppm v/v			11/01/19 22:31	1.95
Benzyl chloride	ND	*	0.00078	0.00019	ppm v/v			11/01/19 22:31	1.95
Bromodichloromethane	ND		0.00039	0.000088	ppm v/v			11/01/19 22:31	1.95
Bromoform	ND		0.00039	0.000044	ppm v/v			11/01/19 22:31	1.95
Bromomethane	ND		0.00039	0.00011	ppm v/v			11/01/19 22:31	1.95
2-Butanone (MEK)	0.0014	J	0.0020	0.00036	ppm v/v			11/01/19 22:31	1.95
Carbon disulfide	0.00070	J	0.00098	0.000054	ppm v/v			11/01/19 22:31	1.95
Carbon tetrachloride	0.00023	J	0.00039	0.000034	ppm v/v			11/01/19 22:31	1.95
Chlorobenzene	ND		0.00039	0.000029	ppm v/v			11/01/19 22:31	1.95
Chloroethane	ND		0.00039	0.00014	ppm v/v			11/01/19 22:31	1.95
Chloroform	0.0012		0.00039	0.000034	ppm v/v			11/01/19 22:31	1.95
Chloromethane	0.00092	J	0.00098	0.00032	ppm v/v			11/01/19 22:31	1.95
Dibromochloromethane	ND		0.00039	0.000034	ppm v/v			11/01/19 22:31	1.95
1,2-Dibromoethane (EDB)	ND		0.00039	0.000034	ppm v/v			11/01/19 22:31	1.95
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00039	0.000059	ppm v/v			11/01/19 22:31	1.95
1,2-Dichlorobenzene	ND		0.00039	0.00015	ppm v/v			11/01/19 22:31	1.95
1,3-Dichlorobenzene	ND		0.00039	0.000078	ppm v/v			11/01/19 22:31	1.95
1,4-Dichlorobenzene	ND		0.00039	0.000078	ppm v/v			11/01/19 22:31	1.95
Dichlorodifluoromethane	0.018		0.00039	0.000068	ppm v/v			11/01/19 22:31	1.95
1,1-Dichloroethane	0.0019		0.00039	0.000034	ppm v/v			11/01/19 22:31	1.95
1,2-Dichloroethane	ND		0.00039	0.000049	ppm v/v			11/01/19 22:31	1.95
1,1-Dichloroethene	0.011		0.00039	0.000039	ppm v/v			11/01/19 22:31	1.95
cis-1,2-Dichloroethene	0.0011		0.00039	0.000049	ppm v/v			11/01/19 22:31	1.95
trans-1,2-Dichloroethene	ND		0.00039	0.000034	ppm v/v			11/01/19 22:31	1.95
1,2-Dichloropropane	0.000057	J	0.00039	0.000049	ppm v/v			11/01/19 22:31	1.95
cis-1,3-Dichloropropene	ND		0.00039	0.000078	ppm v/v			11/01/19 22:31	1.95
trans-1,3-Dichloropropene	ND		0.00039	0.000044	ppm v/v			11/01/19 22:31	1.95
Ethylbenzene	ND		0.00039	0.000063	ppm v/v			11/01/19 22:31	1.95
4-Ethyltoluene	ND		0.00078	0.00010	ppm v/v			11/01/19 22:31	1.95
Hexachlorobutadiene	ND		0.0020	0.00016	ppm v/v			11/01/19 22:31	1.95
2-Hexanone	0.00013	J	0.00098	0.000078	ppm v/v			11/01/19 22:31	1.95
4-Methyl-2-pentanone (MIBK)	ND		0.00098	0.00026	ppm v/v			11/01/19 22:31	1.95
Methylene Chloride	0.0030	B	0.0020	0.00078	ppm v/v			11/01/19 22:31	1.95
Styrene	ND		0.00039	0.00012	ppm v/v			11/01/19 22:31	1.95
1,1,2,2-Tetrachloroethane	ND		0.00039	0.000068	ppm v/v			11/01/19 22:31	1.95

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110605-001/MWL-SV04-100

Lab Sample ID: 140-17136-13

Date Collected: 10/18/19 10:19

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Toluene	ND		0.00059	0.00038	ppm v/v			11/01/19 22:31	1.95
1,1,2-Trichloro-1,2,2-trifluoroethane	0.064		0.00039	0.000039	ppm v/v			11/01/19 22:31	1.95
1,2,4-Trichlorobenzene	ND		0.0020	0.00031	ppm v/v			11/01/19 22:31	1.95
1,1,1-Trichloroethane	0.0032		0.00039	0.00018	ppm v/v			11/01/19 22:31	1.95
1,1,2-Trichloroethane	ND		0.00039	0.000034	ppm v/v			11/01/19 22:31	1.95
Trichloroethene	0.080		0.00020	0.000029	ppm v/v			11/01/19 22:31	1.95
Trichlorofluoromethane	0.028		0.00039	0.000054	ppm v/v			11/01/19 22:31	1.95
1,2,4-Trimethylbenzene	ND		0.00039	0.000098	ppm v/v			11/01/19 22:31	1.95
1,3,5-Trimethylbenzene	ND		0.00039	0.00011	ppm v/v			11/01/19 22:31	1.95
Vinyl acetate	ND		0.0020	0.00014	ppm v/v			11/01/19 22:31	1.95
Vinyl chloride	ND		0.00020	0.00013	ppm v/v			11/01/19 22:31	1.95
m,p-Xylene	ND		0.00039	0.00014	ppm v/v			11/01/19 22:31	1.95
o-Xylene	ND		0.00039	0.000073	ppm v/v			11/01/19 22:31	1.95
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140					11/01/19 22:31	1.95

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.065		0.0020	0.00017	ppm v/v			11/04/19 17:52	1.95
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140					11/04/19 17:52	1.95

Client Sample ID: 110606-001/MWL-SV04-100

Lab Sample ID: 140-17136-14

Date Collected: 10/18/19 10:19

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0054	J	0.0090	0.0025	ppm v/v			11/01/19 23:19	1.79
Benzene	0.00019	J	0.00036	0.000036	ppm v/v			11/01/19 23:19	1.79
Benzyl chloride	ND	*	0.00072	0.00017	ppm v/v			11/01/19 23:19	1.79
Bromodichloromethane	ND		0.00036	0.000081	ppm v/v			11/01/19 23:19	1.79
Bromoform	ND		0.00036	0.000040	ppm v/v			11/01/19 23:19	1.79
Bromomethane	ND		0.00036	0.000098	ppm v/v			11/01/19 23:19	1.79
2-Butanone (MEK)	0.00070	J	0.0018	0.00033	ppm v/v			11/01/19 23:19	1.79
Carbon disulfide	0.00014	J	0.00090	0.000049	ppm v/v			11/01/19 23:19	1.79
Carbon tetrachloride	0.0010		0.00036	0.000031	ppm v/v			11/01/19 23:19	1.79
Chlorobenzene	ND		0.00036	0.000027	ppm v/v			11/01/19 23:19	1.79
Chloroethane	ND		0.00036	0.00013	ppm v/v			11/01/19 23:19	1.79
Chloroform	0.0017		0.00036	0.000031	ppm v/v			11/01/19 23:19	1.79
Chloromethane	0.00039	J	0.00090	0.00030	ppm v/v			11/01/19 23:19	1.79
Dibromochloromethane	ND		0.00036	0.000031	ppm v/v			11/01/19 23:19	1.79
1,2-Dibromoethane (EDB)	ND		0.00036	0.000031	ppm v/v			11/01/19 23:19	1.79
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00036	0.000054	ppm v/v			11/01/19 23:19	1.79
1,2-Dichlorobenzene	ND		0.00036	0.00014	ppm v/v			11/01/19 23:19	1.79
1,3-Dichlorobenzene	ND		0.00036	0.000072	ppm v/v			11/01/19 23:19	1.79

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110606-001/MWL-SV04-100

Lab Sample ID: 140-17136-14

Date Collected: 10/18/19 10:19

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	ND		0.00036	0.000072	ppm v/v			11/01/19 23:19	1.79
Dichlorodifluoromethane	0.014		0.00036	0.000063	ppm v/v			11/01/19 23:19	1.79
1,1-Dichloroethane	0.0016		0.00036	0.000031	ppm v/v			11/01/19 23:19	1.79
1,2-Dichloroethane	ND		0.00036	0.000045	ppm v/v			11/01/19 23:19	1.79
1,1-Dichloroethene	0.0093		0.00036	0.000036	ppm v/v			11/01/19 23:19	1.79
cis-1,2-Dichloroethene	0.00093		0.00036	0.000045	ppm v/v			11/01/19 23:19	1.79
trans-1,2-Dichloroethene	ND		0.00036	0.000031	ppm v/v			11/01/19 23:19	1.79
1,2-Dichloropropane	ND		0.00036	0.000045	ppm v/v			11/01/19 23:19	1.79
cis-1,3-Dichloropropene	ND		0.00036	0.000072	ppm v/v			11/01/19 23:19	1.79
trans-1,3-Dichloropropene	ND		0.00036	0.000040	ppm v/v			11/01/19 23:19	1.79
Ethylbenzene	ND		0.00036	0.000058	ppm v/v			11/01/19 23:19	1.79
4-Ethyltoluene	ND		0.00072	0.000094	ppm v/v			11/01/19 23:19	1.79
Hexachlorobutadiene	0.00019	J	0.0018	0.00014	ppm v/v			11/01/19 23:19	1.79
2-Hexanone	ND		0.00090	0.000072	ppm v/v			11/01/19 23:19	1.79
4-Methyl-2-pentanone (MIBK)	0.00033	J	0.00090	0.00024	ppm v/v			11/01/19 23:19	1.79
Methylene Chloride	0.0015	J B	0.0018	0.00072	ppm v/v			11/01/19 23:19	1.79
Styrene	ND		0.00036	0.00011	ppm v/v			11/01/19 23:19	1.79
1,1,2,2-Tetrachloroethane	ND		0.00036	0.000063	ppm v/v			11/01/19 23:19	1.79
Toluene	ND		0.00054	0.00035	ppm v/v			11/01/19 23:19	1.79
1,1,2-Trichloro-1,2,2-trifluoroethane	0.056		0.00036	0.000036	ppm v/v			11/01/19 23:19	1.79
1,2,4-Trichlorobenzene	ND		0.0018	0.00029	ppm v/v			11/01/19 23:19	1.79
1,1,1-Trichloroethane	0.0027		0.00036	0.00017	ppm v/v			11/01/19 23:19	1.79
1,1,2-Trichloroethane	ND		0.00036	0.000031	ppm v/v			11/01/19 23:19	1.79
Trichloroethene	0.069		0.00018	0.000027	ppm v/v			11/01/19 23:19	1.79
Trichlorofluoromethane	0.024		0.00036	0.000049	ppm v/v			11/01/19 23:19	1.79
1,2,4-Trimethylbenzene	ND		0.00036	0.000090	ppm v/v			11/01/19 23:19	1.79
1,3,5-Trimethylbenzene	ND		0.00036	0.000098	ppm v/v			11/01/19 23:19	1.79
Vinyl acetate	ND		0.0018	0.00013	ppm v/v			11/01/19 23:19	1.79
Vinyl chloride	ND		0.00018	0.00012	ppm v/v			11/01/19 23:19	1.79
m,p-Xylene	ND		0.00036	0.00013	ppm v/v			11/01/19 23:19	1.79
o-Xylene	ND		0.00036	0.000067	ppm v/v			11/01/19 23:19	1.79

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140		11/01/19 23:19	1.79

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.073		0.00090	0.000078	ppm v/v			11/04/19 18:34	1.79

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140		11/04/19 18:34	1.79

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110607-001/MWL-SV04-200

Lab Sample ID: 140-17136-15

Date Collected: 10/18/19 10:23

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0086	J	0.021	0.0059	ppm v/v			11/02/19 00:06	1.65
Benzene	0.00029	J	0.00083	0.00083	ppm v/v			11/02/19 00:06	1.65
Benzyl chloride	ND	*	0.0017	0.00039	ppm v/v			11/02/19 00:06	1.65
Bromodichloromethane	ND		0.00083	0.00019	ppm v/v			11/02/19 00:06	1.65
Bromoform	ND		0.00083	0.000093	ppm v/v			11/02/19 00:06	1.65
Bromomethane	ND		0.00083	0.00023	ppm v/v			11/02/19 00:06	1.65
2-Butanone (MEK)	0.00079	J	0.0041	0.00075	ppm v/v			11/02/19 00:06	1.65
Carbon disulfide	0.00015	J	0.0021	0.00011	ppm v/v			11/02/19 00:06	1.65
Carbon tetrachloride	0.00035	J	0.00083	0.000072	ppm v/v			11/02/19 00:06	1.65
Chlorobenzene	0.000078	J	0.00083	0.000062	ppm v/v			11/02/19 00:06	1.65
Chloroethane	ND		0.00083	0.00030	ppm v/v			11/02/19 00:06	1.65
Chloroform	0.0012		0.00083	0.000072	ppm v/v			11/02/19 00:06	1.65
Chloromethane	0.00075	J	0.0021	0.00068	ppm v/v			11/02/19 00:06	1.65
Dibromochloromethane	ND		0.00083	0.000072	ppm v/v			11/02/19 00:06	1.65
1,2-Dibromoethane (EDB)	ND		0.00083	0.000072	ppm v/v			11/02/19 00:06	1.65
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00083	0.00012	ppm v/v			11/02/19 00:06	1.65
1,2-Dichlorobenzene	ND		0.00083	0.00032	ppm v/v			11/02/19 00:06	1.65
1,3-Dichlorobenzene	ND		0.00083	0.00017	ppm v/v			11/02/19 00:06	1.65
1,4-Dichlorobenzene	ND		0.00083	0.00017	ppm v/v			11/02/19 00:06	1.65
Dichlorodifluoromethane	0.034		0.00083	0.00014	ppm v/v			11/02/19 00:06	1.65
1,1-Dichloroethane	0.0034		0.00083	0.000072	ppm v/v			11/02/19 00:06	1.65
1,2-Dichloroethane	ND		0.00083	0.00010	ppm v/v			11/02/19 00:06	1.65
1,1-Dichloroethene	0.021		0.00083	0.000083	ppm v/v			11/02/19 00:06	1.65
cis-1,2-Dichloroethene	0.0019		0.00083	0.00010	ppm v/v			11/02/19 00:06	1.65
trans-1,2-Dichloroethene	ND		0.00083	0.000072	ppm v/v			11/02/19 00:06	1.65
1,2-Dichloropropane	ND		0.00083	0.00010	ppm v/v			11/02/19 00:06	1.65
cis-1,3-Dichloropropene	ND		0.00083	0.00017	ppm v/v			11/02/19 00:06	1.65
trans-1,3-Dichloropropene	ND		0.00083	0.000093	ppm v/v			11/02/19 00:06	1.65
Ethylbenzene	ND		0.00083	0.00013	ppm v/v			11/02/19 00:06	1.65
4-Ethyltoluene	ND		0.0017	0.00022	ppm v/v			11/02/19 00:06	1.65
Hexachlorobutadiene	ND		0.0041	0.00033	ppm v/v			11/02/19 00:06	1.65
2-Hexanone	ND		0.0021	0.00017	ppm v/v			11/02/19 00:06	1.65
4-Methyl-2-pentanone (MIBK)	ND		0.0021	0.00056	ppm v/v			11/02/19 00:06	1.65
Methylene Chloride	0.0051	B	0.0041	0.0017	ppm v/v			11/02/19 00:06	1.65
Styrene	ND		0.00083	0.00025	ppm v/v			11/02/19 00:06	1.65
1,1,2,2-Tetrachloroethane	ND		0.00083	0.00014	ppm v/v			11/02/19 00:06	1.65
Tetrachloroethene	0.094		0.00083	0.000072	ppm v/v			11/02/19 00:06	1.65
Toluene	ND		0.0012	0.00080	ppm v/v			11/02/19 00:06	1.65
1,1,2-Trichloro-1,2,2-trifluoroethane	0.11		0.00083	0.000083	ppm v/v			11/02/19 00:06	1.65
1,2,4-Trichlorobenzene	ND		0.0041	0.00066	ppm v/v			11/02/19 00:06	1.65
1,1,1-Trichloroethane	0.0017		0.00083	0.00038	ppm v/v			11/02/19 00:06	1.65
1,1,2-Trichloroethane	ND		0.00083	0.000072	ppm v/v			11/02/19 00:06	1.65
Trichloroethene	0.12		0.00041	0.000062	ppm v/v			11/02/19 00:06	1.65
Trichlorofluoromethane	0.030		0.00083	0.00011	ppm v/v			11/02/19 00:06	1.65
1,2,4-Trimethylbenzene	ND		0.00083	0.00021	ppm v/v			11/02/19 00:06	1.65
1,3,5-Trimethylbenzene	ND		0.00083	0.00023	ppm v/v			11/02/19 00:06	1.65
Vinyl acetate	ND		0.0041	0.00029	ppm v/v			11/02/19 00:06	1.65
Vinyl chloride	ND		0.00041	0.00027	ppm v/v			11/02/19 00:06	1.65

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110607-001/MWL-SV04-200**

**Lab Sample ID: 140-17136-15**

Date Collected: 10/18/19 10:23

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.00083	0.00030	ppm v/v			11/02/19 00:06	1.65
<b>o-Xylene</b>	<b>0.00019</b>	<b>J</b>	0.00083	0.00015	ppm v/v			11/02/19 00:06	1.65
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		60 - 140					11/02/19 00:06	1.65

**Client Sample ID: 110608-001/MWL-SV04-300**

**Lab Sample ID: 140-17136-16**

Date Collected: 10/18/19 10:26

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Acetone</b>	<b>0.0064</b>	<b>J</b>	0.022	0.0063	ppm v/v			11/02/19 01:41	1.78
<b>Benzene</b>	<b>0.00028</b>	<b>J</b>	0.00089	0.000089	ppm v/v			11/02/19 01:41	1.78
Benzyl chloride	ND	*	0.0018	0.00042	ppm v/v			11/02/19 01:41	1.78
Bromodichloromethane	ND		0.00089	0.00020	ppm v/v			11/02/19 01:41	1.78
Bromoform	ND		0.00089	0.00010	ppm v/v			11/02/19 01:41	1.78
Bromomethane	ND		0.00089	0.00024	ppm v/v			11/02/19 01:41	1.78
2-Butanone (MEK)	ND		0.0045	0.00081	ppm v/v			11/02/19 01:41	1.78
<b>Carbon disulfide</b>	<b>0.00043</b>	<b>J</b>	0.0022	0.00012	ppm v/v			11/02/19 01:41	1.78
<b>Carbon tetrachloride</b>	<b>0.00024</b>	<b>J</b>	0.00089	0.000078	ppm v/v			11/02/19 01:41	1.78
Chlorobenzene	ND		0.00089	0.000067	ppm v/v			11/02/19 01:41	1.78
Chloroethane	ND		0.00089	0.00032	ppm v/v			11/02/19 01:41	1.78
<b>Chloroform</b>	<b>0.00068</b>	<b>J</b>	0.00089	0.000078	ppm v/v			11/02/19 01:41	1.78
<b>Chloromethane</b>	<b>0.00083</b>	<b>J</b>	0.0022	0.00073	ppm v/v			11/02/19 01:41	1.78
Dibromochloromethane	ND		0.00089	0.000078	ppm v/v			11/02/19 01:41	1.78
1,2-Dibromoethane (EDB)	ND		0.00089	0.000078	ppm v/v			11/02/19 01:41	1.78
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00089	0.00013	ppm v/v			11/02/19 01:41	1.78
1,2-Dichlorobenzene	ND		0.00089	0.00034	ppm v/v			11/02/19 01:41	1.78
1,3-Dichlorobenzene	ND		0.00089	0.00018	ppm v/v			11/02/19 01:41	1.78
1,4-Dichlorobenzene	ND		0.00089	0.00018	ppm v/v			11/02/19 01:41	1.78
<b>Dichlorodifluoromethane</b>	<b>0.025</b>		0.00089	0.00016	ppm v/v			11/02/19 01:41	1.78
<b>1,1-Dichloroethane</b>	<b>0.00099</b>		0.00089	0.000078	ppm v/v			11/02/19 01:41	1.78
1,2-Dichloroethane	ND		0.00089	0.00011	ppm v/v			11/02/19 01:41	1.78
<b>1,1-Dichloroethene</b>	<b>0.011</b>		0.00089	0.000089	ppm v/v			11/02/19 01:41	1.78
<b>cis-1,2-Dichloroethene</b>	<b>0.00056</b>	<b>J</b>	0.00089	0.00011	ppm v/v			11/02/19 01:41	1.78
trans-1,2-Dichloroethene	ND		0.00089	0.000078	ppm v/v			11/02/19 01:41	1.78
1,2-Dichloropropane	ND		0.00089	0.00011	ppm v/v			11/02/19 01:41	1.78
cis-1,3-Dichloropropene	ND		0.00089	0.00018	ppm v/v			11/02/19 01:41	1.78
trans-1,3-Dichloropropene	ND		0.00089	0.00010	ppm v/v			11/02/19 01:41	1.78
Ethylbenzene	ND		0.00089	0.00014	ppm v/v			11/02/19 01:41	1.78
4-Ethyltoluene	ND		0.0018	0.00023	ppm v/v			11/02/19 01:41	1.78
Hexachlorobutadiene	ND		0.0045	0.00036	ppm v/v			11/02/19 01:41	1.78
2-Hexanone	ND		0.0022	0.00018	ppm v/v			11/02/19 01:41	1.78
4-Methyl-2-pentanone (MIBK)	ND		0.0022	0.00060	ppm v/v			11/02/19 01:41	1.78
<b>Methylene Chloride</b>	<b>0.0043</b>	<b>J B</b>	0.0045	0.0018	ppm v/v			11/02/19 01:41	1.78
Styrene	ND		0.00089	0.00027	ppm v/v			11/02/19 01:41	1.78
1,1,2,2-Tetrachloroethane	ND		0.00089	0.00016	ppm v/v			11/02/19 01:41	1.78

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110608-001/MWL-SV04-300

Lab Sample ID: 140-17136-16

Date Collected: 10/18/19 10:26

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.11		0.00089	0.000078	ppm v/v			11/02/19 01:41	1.78
Toluene	ND		0.0013	0.00087	ppm v/v			11/02/19 01:41	1.78
1,1,2-Trichloro-1,2,2-trifluoroethane	0.072		0.00089	0.000089	ppm v/v			11/02/19 01:41	1.78
1,2,4-Trichlorobenzene	ND		0.0045	0.00071	ppm v/v			11/02/19 01:41	1.78
1,1,1-Trichloroethane	0.0010		0.00089	0.00041	ppm v/v			11/02/19 01:41	1.78
1,1,2-Trichloroethane	ND		0.00089	0.000078	ppm v/v			11/02/19 01:41	1.78
Trichloroethene	0.075		0.00045	0.000067	ppm v/v			11/02/19 01:41	1.78
Trichlorofluoromethane	0.016		0.00089	0.00012	ppm v/v			11/02/19 01:41	1.78
1,2,4-Trimethylbenzene	ND		0.00089	0.00022	ppm v/v			11/02/19 01:41	1.78
1,3,5-Trimethylbenzene	ND		0.00089	0.00024	ppm v/v			11/02/19 01:41	1.78
Vinyl acetate	ND		0.0045	0.00031	ppm v/v			11/02/19 01:41	1.78
Vinyl chloride	ND		0.00045	0.00029	ppm v/v			11/02/19 01:41	1.78
m,p-Xylene	ND		0.00089	0.00032	ppm v/v			11/02/19 01:41	1.78
o-Xylene	ND		0.00089	0.00017	ppm v/v			11/02/19 01:41	1.78
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		60 - 140					11/02/19 01:41	1.78

Client Sample ID: 110609-001/MWL-SV04-400

Lab Sample ID: 140-17136-17

Date Collected: 10/18/19 10:35

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.012		0.0091	0.0026	ppm v/v			11/02/19 02:29	1.81
Benzene	0.00055		0.00036	0.000036	ppm v/v			11/02/19 02:29	1.81
Benzyl chloride	ND	*	0.00072	0.00017	ppm v/v			11/02/19 02:29	1.81
Bromodichloromethane	ND		0.00036	0.000081	ppm v/v			11/02/19 02:29	1.81
Bromoform	ND		0.00036	0.000041	ppm v/v			11/02/19 02:29	1.81
Bromomethane	ND		0.00036	0.00010	ppm v/v			11/02/19 02:29	1.81
2-Butanone (MEK)	0.0018		0.0018	0.00033	ppm v/v			11/02/19 02:29	1.81
Carbon disulfide	0.00047	J	0.00091	0.000050	ppm v/v			11/02/19 02:29	1.81
Carbon tetrachloride	0.00017	J	0.00036	0.000032	ppm v/v			11/02/19 02:29	1.81
Chlorobenzene	ND		0.00036	0.000027	ppm v/v			11/02/19 02:29	1.81
Chloroethane	ND		0.00036	0.00013	ppm v/v			11/02/19 02:29	1.81
Chloroform	0.00034	J	0.00036	0.000032	ppm v/v			11/02/19 02:29	1.81
Chloromethane	0.00040	J	0.00091	0.00030	ppm v/v			11/02/19 02:29	1.81
Dibromochloromethane	ND		0.00036	0.000032	ppm v/v			11/02/19 02:29	1.81
1,2-Dibromoethane (EDB)	ND		0.00036	0.000032	ppm v/v			11/02/19 02:29	1.81
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00036	0.000054	ppm v/v			11/02/19 02:29	1.81
1,2-Dichlorobenzene	ND		0.00036	0.00014	ppm v/v			11/02/19 02:29	1.81
1,3-Dichlorobenzene	ND		0.00036	0.000072	ppm v/v			11/02/19 02:29	1.81
1,4-Dichlorobenzene	ND		0.00036	0.000072	ppm v/v			11/02/19 02:29	1.81
Dichlorodifluoromethane	0.017		0.00036	0.000063	ppm v/v			11/02/19 02:29	1.81
1,1-Dichloroethane	0.00055		0.00036	0.000032	ppm v/v			11/02/19 02:29	1.81
1,2-Dichloroethane	ND		0.00036	0.000045	ppm v/v			11/02/19 02:29	1.81
1,1-Dichloroethene	0.0073		0.00036	0.000036	ppm v/v			11/02/19 02:29	1.81

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110609-001/MWL-SV04-400

Lab Sample ID: 140-17136-17

Date Collected: 10/18/19 10:35

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	0.00036		0.00036	0.000045	ppm v/v			11/02/19 02:29	1.81
trans-1,2-Dichloroethene	ND		0.00036	0.000032	ppm v/v			11/02/19 02:29	1.81
1,2-Dichloropropane	ND		0.00036	0.000045	ppm v/v			11/02/19 02:29	1.81
cis-1,3-Dichloropropene	ND		0.00036	0.000072	ppm v/v			11/02/19 02:29	1.81
trans-1,3-Dichloropropene	ND		0.00036	0.000041	ppm v/v			11/02/19 02:29	1.81
Ethylbenzene	ND		0.00036	0.000059	ppm v/v			11/02/19 02:29	1.81
4-Ethyltoluene	ND		0.00072	0.000095	ppm v/v			11/02/19 02:29	1.81
Hexachlorobutadiene	ND		0.0018	0.00014	ppm v/v			11/02/19 02:29	1.81
2-Hexanone	ND		0.00091	0.000072	ppm v/v			11/02/19 02:29	1.81
4-Methyl-2-pentanone (MIBK)	ND		0.00091	0.00024	ppm v/v			11/02/19 02:29	1.81
Methylene Chloride	0.0016	J B	0.0018	0.00072	ppm v/v			11/02/19 02:29	1.81
Styrene	ND		0.00036	0.00011	ppm v/v			11/02/19 02:29	1.81
1,1,2,2-Tetrachloroethane	ND		0.00036	0.000063	ppm v/v			11/02/19 02:29	1.81
Toluene	ND		0.00054	0.00035	ppm v/v			11/02/19 02:29	1.81
1,1,2-Trichloro-1,2,2-trifluoroethane	0.064		0.00036	0.000036	ppm v/v			11/02/19 02:29	1.81
1,2,4-Trichlorobenzene	ND		0.0018	0.00029	ppm v/v			11/02/19 02:29	1.81
1,1,1-Trichloroethane	0.00060		0.00036	0.00017	ppm v/v			11/02/19 02:29	1.81
1,1,2-Trichloroethane	ND		0.00036	0.000032	ppm v/v			11/02/19 02:29	1.81
Trichloroethene	0.052		0.00018	0.000027	ppm v/v			11/02/19 02:29	1.81
Trichlorofluoromethane	0.012		0.00036	0.000050	ppm v/v			11/02/19 02:29	1.81
1,2,4-Trimethylbenzene	ND		0.00036	0.000091	ppm v/v			11/02/19 02:29	1.81
1,3,5-Trimethylbenzene	ND		0.00036	0.00010	ppm v/v			11/02/19 02:29	1.81
Vinyl acetate	ND		0.0018	0.00013	ppm v/v			11/02/19 02:29	1.81
Vinyl chloride	ND		0.00018	0.00012	ppm v/v			11/02/19 02:29	1.81
m,p-Xylene	ND		0.00036	0.00013	ppm v/v			11/02/19 02:29	1.81
o-Xylene	ND		0.00036	0.000068	ppm v/v			11/02/19 02:29	1.81

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140		11/02/19 02:29	1.81

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.074		0.0014	0.00013	ppm v/v			11/04/19 19:16	1.81

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140		11/04/19 19:16	1.81

Client Sample ID: 110610-001/MWL-SV04-400

Lab Sample ID: 140-17136-18

Date Collected: 10/18/19 10:35

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0094		0.0088	0.0025	ppm v/v			11/02/19 03:18	1.76
Benzene	0.00055		0.00035	0.000035	ppm v/v			11/02/19 03:18	1.76
Benzyl chloride	ND	*	0.00070	0.00017	ppm v/v			11/02/19 03:18	1.76
Bromodichloromethane	ND		0.00035	0.000079	ppm v/v			11/02/19 03:18	1.76
Bromoform	ND		0.00035	0.000040	ppm v/v			11/02/19 03:18	1.76

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110610-001/MWL-SV04-400

Lab Sample ID: 140-17136-18

Date Collected: 10/18/19 10:35

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromomethane	ND		0.00035	0.000097	ppm v/v			11/02/19 03:18	1.76
2-Butanone (MEK)	0.0010	J	0.0018	0.00032	ppm v/v			11/02/19 03:18	1.76
Carbon disulfide	0.00051	J	0.00088	0.000048	ppm v/v			11/02/19 03:18	1.76
Carbon tetrachloride	0.00016	J	0.00035	0.000031	ppm v/v			11/02/19 03:18	1.76
Chlorobenzene	ND		0.00035	0.000026	ppm v/v			11/02/19 03:18	1.76
Chloroethane	ND		0.00035	0.00013	ppm v/v			11/02/19 03:18	1.76
Chloroform	0.00037		0.00035	0.000031	ppm v/v			11/02/19 03:18	1.76
Chloromethane	ND		0.00088	0.00029	ppm v/v			11/02/19 03:18	1.76
Dibromochloromethane	ND		0.00035	0.000031	ppm v/v			11/02/19 03:18	1.76
1,2-Dibromoethane (EDB)	ND		0.00035	0.000031	ppm v/v			11/02/19 03:18	1.76
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00035	0.000053	ppm v/v			11/02/19 03:18	1.76
1,2-Dichlorobenzene	ND		0.00035	0.00014	ppm v/v			11/02/19 03:18	1.76
1,3-Dichlorobenzene	ND		0.00035	0.000070	ppm v/v			11/02/19 03:18	1.76
1,4-Dichlorobenzene	ND		0.00035	0.000070	ppm v/v			11/02/19 03:18	1.76
Dichlorodifluoromethane	0.015		0.00035	0.000062	ppm v/v			11/02/19 03:18	1.76
1,1-Dichloroethane	0.00065		0.00035	0.000031	ppm v/v			11/02/19 03:18	1.76
1,2-Dichloroethane	ND		0.00035	0.000044	ppm v/v			11/02/19 03:18	1.76
1,1-Dichloroethene	0.0074		0.00035	0.000035	ppm v/v			11/02/19 03:18	1.76
cis-1,2-Dichloroethene	0.00041		0.00035	0.000044	ppm v/v			11/02/19 03:18	1.76
trans-1,2-Dichloroethene	ND		0.00035	0.000031	ppm v/v			11/02/19 03:18	1.76
1,2-Dichloropropane	ND		0.00035	0.000044	ppm v/v			11/02/19 03:18	1.76
cis-1,3-Dichloropropene	ND		0.00035	0.000070	ppm v/v			11/02/19 03:18	1.76
trans-1,3-Dichloropropene	ND		0.00035	0.000040	ppm v/v			11/02/19 03:18	1.76
Ethylbenzene	ND		0.00035	0.000057	ppm v/v			11/02/19 03:18	1.76
4-Ethyltoluene	ND		0.00070	0.000092	ppm v/v			11/02/19 03:18	1.76
Hexachlorobutadiene	ND		0.0018	0.00014	ppm v/v			11/02/19 03:18	1.76
2-Hexanone	ND		0.00088	0.000070	ppm v/v			11/02/19 03:18	1.76
4-Methyl-2-pentanone (MIBK)	ND		0.00088	0.00024	ppm v/v			11/02/19 03:18	1.76
Methylene Chloride	0.0013	J B	0.0018	0.00070	ppm v/v			11/02/19 03:18	1.76
Styrene	ND		0.00035	0.00011	ppm v/v			11/02/19 03:18	1.76
1,1,2,2-Tetrachloroethane	ND		0.00035	0.000062	ppm v/v			11/02/19 03:18	1.76
Toluene	ND		0.00053	0.00034	ppm v/v			11/02/19 03:18	1.76
1,1,2-Trichloro-1,2,2-trifluoroethane	0.068		0.00035	0.000035	ppm v/v			11/02/19 03:18	1.76
1,2,4-Trichlorobenzene	ND		0.0018	0.00028	ppm v/v			11/02/19 03:18	1.76
1,1,1-Trichloroethane	0.00057		0.00035	0.00016	ppm v/v			11/02/19 03:18	1.76
1,1,2-Trichloroethane	ND		0.00035	0.000031	ppm v/v			11/02/19 03:18	1.76
Trichloroethene	0.055		0.00018	0.000026	ppm v/v			11/02/19 03:18	1.76
Trichlorofluoromethane	0.012		0.00035	0.000048	ppm v/v			11/02/19 03:18	1.76
1,2,4-Trimethylbenzene	ND		0.00035	0.000088	ppm v/v			11/02/19 03:18	1.76
1,3,5-Trimethylbenzene	ND		0.00035	0.000097	ppm v/v			11/02/19 03:18	1.76
Vinyl acetate	ND		0.0018	0.00012	ppm v/v			11/02/19 03:18	1.76
Vinyl chloride	ND		0.00018	0.00011	ppm v/v			11/02/19 03:18	1.76
m,p-Xylene	ND		0.00035	0.00013	ppm v/v			11/02/19 03:18	1.76
o-Xylene	ND		0.00035	0.000066	ppm v/v			11/02/19 03:18	1.76

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140		11/02/19 03:18	1.76

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110610-001/MWL-SV04-400**

**Lab Sample ID: 140-17136-18**

**Date Collected: 10/18/19 10:35**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) - DL**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.083		0.0014	0.00012	ppm v/v			11/04/19 19:58	1.76
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140					11/04/19 19:58	1.76

**Client Sample ID: 110611-001/MWL-SV-FB 5**

**Lab Sample ID: 140-17136-19**

**Date Collected: 10/18/19 10:55**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0036		0.0021	0.00059	ppm v/v			11/02/19 04:15	1.87
Benzene	ND		0.000083	0.0000083	ppm v/v			11/02/19 04:15	1.87
Benzyl chloride	ND	*	0.00017	0.000039	ppm v/v			11/02/19 04:15	1.87
Bromodichloromethane	ND		0.000083	0.000019	ppm v/v			11/02/19 04:15	1.87
Bromoform	ND		0.000083	0.0000094	ppm v/v			11/02/19 04:15	1.87
Bromomethane	ND		0.000083	0.000023	ppm v/v			11/02/19 04:15	1.87
2-Butanone (MEK)	0.00040	J	0.00042	0.000076	ppm v/v			11/02/19 04:15	1.87
Carbon disulfide	ND		0.00021	0.000011	ppm v/v			11/02/19 04:15	1.87
Carbon tetrachloride	ND		0.000083	0.0000073	ppm v/v			11/02/19 04:15	1.87
Chlorobenzene	ND		0.000083	0.0000062	ppm v/v			11/02/19 04:15	1.87
Chloroethane	ND		0.000083	0.000030	ppm v/v			11/02/19 04:15	1.87
Chloroform	ND		0.000083	0.0000073	ppm v/v			11/02/19 04:15	1.87
Chloromethane	ND		0.00021	0.000069	ppm v/v			11/02/19 04:15	1.87
Dibromochloromethane	ND		0.000083	0.0000073	ppm v/v			11/02/19 04:15	1.87
1,2-Dibromoethane (EDB)	ND		0.000083	0.0000073	ppm v/v			11/02/19 04:15	1.87
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000083	0.000012	ppm v/v			11/02/19 04:15	1.87
1,2-Dichlorobenzene	ND		0.000083	0.000032	ppm v/v			11/02/19 04:15	1.87
1,3-Dichlorobenzene	ND		0.000083	0.000017	ppm v/v			11/02/19 04:15	1.87
1,4-Dichlorobenzene	ND		0.000083	0.000017	ppm v/v			11/02/19 04:15	1.87
Dichlorodifluoromethane	ND		0.000083	0.000015	ppm v/v			11/02/19 04:15	1.87
1,1-Dichloroethane	ND		0.000083	0.0000073	ppm v/v			11/02/19 04:15	1.87
1,2-Dichloroethane	ND		0.000083	0.000010	ppm v/v			11/02/19 04:15	1.87
1,1-Dichloroethene	ND		0.000083	0.0000083	ppm v/v			11/02/19 04:15	1.87
cis-1,2-Dichloroethene	ND		0.000083	0.000010	ppm v/v			11/02/19 04:15	1.87
trans-1,2-Dichloroethene	0.000050	J	0.000083	0.0000073	ppm v/v			11/02/19 04:15	1.87
1,2-Dichloropropane	ND		0.000083	0.000010	ppm v/v			11/02/19 04:15	1.87
cis-1,3-Dichloropropene	ND		0.000083	0.000017	ppm v/v			11/02/19 04:15	1.87
trans-1,3-Dichloropropene	ND		0.000083	0.0000094	ppm v/v			11/02/19 04:15	1.87
Ethylbenzene	ND		0.000083	0.000014	ppm v/v			11/02/19 04:15	1.87
4-Ethyltoluene	ND		0.00017	0.000022	ppm v/v			11/02/19 04:15	1.87
Hexachlorobutadiene	ND		0.00042	0.000033	ppm v/v			11/02/19 04:15	1.87
2-Hexanone	0.000025	J	0.00021	0.000017	ppm v/v			11/02/19 04:15	1.87
4-Methyl-2-pentanone (MIBK)	ND		0.00021	0.000056	ppm v/v			11/02/19 04:15	1.87
Methylene Chloride	0.00052	B	0.00042	0.00017	ppm v/v			11/02/19 04:15	1.87
Styrene	ND		0.000083	0.000025	ppm v/v			11/02/19 04:15	1.87
1,1,2,2-Tetrachloroethane	ND		0.000083	0.000015	ppm v/v			11/02/19 04:15	1.87
Tetrachloroethene	0.000062	J	0.000083	0.0000073	ppm v/v			11/02/19 04:15	1.87

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110611-001/MWL-SV-FB 5

Lab Sample ID: 140-17136-19

Date Collected: 10/18/19 10:55

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Toluene	ND		0.00012	0.000081	ppm v/v			11/02/19 04:15	1.87
1,1,2-Trichloro-1,2,2-trifluoroethane	0.000090	J	0.000083	0.0000083	ppm v/v			11/02/19 04:15	1.87
1,2,4-Trichlorobenzene	ND		0.00042	0.000066	ppm v/v			11/02/19 04:15	1.87
1,1,1-Trichloroethane	ND		0.000083	0.000038	ppm v/v			11/02/19 04:15	1.87
1,1,2-Trichloroethane	ND		0.000083	0.0000073	ppm v/v			11/02/19 04:15	1.87
Trichloroethene	ND		0.000042	0.0000062	ppm v/v			11/02/19 04:15	1.87
Trichlorofluoromethane	ND		0.000083	0.000011	ppm v/v			11/02/19 04:15	1.87
1,2,4-Trimethylbenzene	ND		0.000083	0.000021	ppm v/v			11/02/19 04:15	1.87
1,3,5-Trimethylbenzene	ND		0.000083	0.000023	ppm v/v			11/02/19 04:15	1.87
Vinyl acetate	ND		0.00042	0.000029	ppm v/v			11/02/19 04:15	1.87
Vinyl chloride	ND		0.000042	0.000027	ppm v/v			11/02/19 04:15	1.87
m,p-Xylene	ND		0.000083	0.000030	ppm v/v			11/02/19 04:15	1.87
o-Xylene	ND		0.000083	0.000016	ppm v/v			11/02/19 04:15	1.87
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140					11/02/19 04:15	1.87

Client Sample ID: 110612-001/MWL-SV05-50

Lab Sample ID: 140-17136-20

Date Collected: 10/18/19 11:00

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0027	J	0.0092	0.0026	ppm v/v			11/02/19 05:04	1.83
Benzene	0.00019	J	0.00037	0.000037	ppm v/v			11/02/19 05:04	1.83
Benzyl chloride	ND	*	0.00073	0.00017	ppm v/v			11/02/19 05:04	1.83
Bromodichloromethane	ND		0.00037	0.000082	ppm v/v			11/02/19 05:04	1.83
Bromoform	ND		0.00037	0.000041	ppm v/v			11/02/19 05:04	1.83
Bromomethane	ND		0.00037	0.00010	ppm v/v			11/02/19 05:04	1.83
2-Butanone (MEK)	ND		0.0018	0.00033	ppm v/v			11/02/19 05:04	1.83
Carbon disulfide	0.00020	J	0.00092	0.000050	ppm v/v			11/02/19 05:04	1.83
Carbon tetrachloride	0.00030	J	0.00037	0.000032	ppm v/v			11/02/19 05:04	1.83
Chlorobenzene	ND		0.00037	0.000027	ppm v/v			11/02/19 05:04	1.83
Chloroethane	ND		0.00037	0.00013	ppm v/v			11/02/19 05:04	1.83
Chloroform	0.0012		0.00037	0.000032	ppm v/v			11/02/19 05:04	1.83
Chloromethane	ND		0.00092	0.00030	ppm v/v			11/02/19 05:04	1.83
Dibromochloromethane	ND		0.00037	0.000032	ppm v/v			11/02/19 05:04	1.83
1,2-Dibromoethane (EDB)	ND		0.00037	0.000032	ppm v/v			11/02/19 05:04	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00037	0.000055	ppm v/v			11/02/19 05:04	1.83
1,2-Dichlorobenzene	ND		0.00037	0.00014	ppm v/v			11/02/19 05:04	1.83
1,3-Dichlorobenzene	ND		0.00037	0.000073	ppm v/v			11/02/19 05:04	1.83
1,4-Dichlorobenzene	ND		0.00037	0.000073	ppm v/v			11/02/19 05:04	1.83
Dichlorodifluoromethane	0.034		0.00037	0.000064	ppm v/v			11/02/19 05:04	1.83
1,1-Dichloroethane	0.0015		0.00037	0.000032	ppm v/v			11/02/19 05:04	1.83
1,2-Dichloroethane	ND		0.00037	0.000046	ppm v/v			11/02/19 05:04	1.83
1,1-Dichloroethene	0.0097		0.00037	0.000037	ppm v/v			11/02/19 05:04	1.83
cis-1,2-Dichloroethene	0.00067		0.00037	0.000046	ppm v/v			11/02/19 05:04	1.83

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110612-001/MWL-SV05-50

Lab Sample ID: 140-17136-20

Date Collected: 10/18/19 11:00

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
trans-1,2-Dichloroethene	ND		0.00037	0.000032	ppm v/v			11/02/19 05:04	1.83
1,2-Dichloropropane	0.000096	J	0.00037	0.000046	ppm v/v			11/02/19 05:04	1.83
cis-1,3-Dichloropropene	ND		0.00037	0.000073	ppm v/v			11/02/19 05:04	1.83
trans-1,3-Dichloropropene	ND		0.00037	0.000041	ppm v/v			11/02/19 05:04	1.83
Ethylbenzene	ND		0.00037	0.000059	ppm v/v			11/02/19 05:04	1.83
4-Ethyltoluene	ND		0.00073	0.000096	ppm v/v			11/02/19 05:04	1.83
Hexachlorobutadiene	ND		0.0018	0.00015	ppm v/v			11/02/19 05:04	1.83
2-Hexanone	ND		0.00092	0.000073	ppm v/v			11/02/19 05:04	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.00092	0.00025	ppm v/v			11/02/19 05:04	1.83
Methylene Chloride	0.0015	J B	0.0018	0.00073	ppm v/v			11/02/19 05:04	1.83
Styrene	ND		0.00037	0.00011	ppm v/v			11/02/19 05:04	1.83
1,1,2,2-Tetrachloroethane	ND		0.00037	0.000064	ppm v/v			11/02/19 05:04	1.83
Tetrachloroethene	0.047		0.00037	0.000032	ppm v/v			11/02/19 05:04	1.83
Toluene	ND		0.00055	0.00036	ppm v/v			11/02/19 05:04	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	0.042		0.00037	0.000037	ppm v/v			11/02/19 05:04	1.83
1,2,4-Trichlorobenzene	ND		0.0018	0.00029	ppm v/v			11/02/19 05:04	1.83
1,1,1-Trichloroethane	0.012		0.00037	0.00017	ppm v/v			11/02/19 05:04	1.83
1,1,2-Trichloroethane	ND		0.00037	0.000032	ppm v/v			11/02/19 05:04	1.83
Trichloroethene	0.059		0.00018	0.000027	ppm v/v			11/02/19 05:04	1.83
1,2,4-Trimethylbenzene	ND		0.00037	0.000092	ppm v/v			11/02/19 05:04	1.83
1,3,5-Trimethylbenzene	ND		0.00037	0.00010	ppm v/v			11/02/19 05:04	1.83
Vinyl acetate	ND		0.0018	0.00013	ppm v/v			11/02/19 05:04	1.83
Vinyl chloride	ND		0.00018	0.00012	ppm v/v			11/02/19 05:04	1.83
m,p-Xylene	ND		0.00037	0.00013	ppm v/v			11/02/19 05:04	1.83
o-Xylene	ND		0.00037	0.000069	ppm v/v			11/02/19 05:04	1.83

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140		11/02/19 05:04	1.83

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	0.092		0.0015	0.00020	ppm v/v			11/04/19 20:41	1.83

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140		11/04/19 20:41	1.83

Client Sample ID: 110613-001/MWL-SV05-100

Lab Sample ID: 140-17136-21

Date Collected: 10/18/19 11:02

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.020	J	0.033	0.0095	ppm v/v			11/04/19 12:05	2
Benzene	0.00033	J	0.0013	0.00013	ppm v/v			11/04/19 12:05	2
Benzyl chloride	0.0012	J	0.0027	0.00063	ppm v/v			11/04/19 12:05	2
Bromodichloromethane	ND		0.0013	0.00030	ppm v/v			11/04/19 12:05	2
Bromoform	ND		0.0013	0.00015	ppm v/v			11/04/19 12:05	2
Bromomethane	ND		0.0013	0.00037	ppm v/v			11/04/19 12:05	2

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110613-001/MWL-SV05-100

Lab Sample ID: 140-17136-21

Date Collected: 10/18/19 11:02

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>2-Butanone (MEK)</b>	<b>0.0041</b>	<b>J</b>	0.0067	0.0012	ppm v/v			11/04/19 12:05	2
Carbon disulfide	ND		0.0033	0.00018	ppm v/v			11/04/19 12:05	2
<b>Carbon tetrachloride</b>	<b>0.00053</b>	<b>J</b>	0.0013	0.00012	ppm v/v			11/04/19 12:05	2
Chlorobenzene	ND		0.0013	0.00010	ppm v/v			11/04/19 12:05	2
Chloroethane	ND		0.0013	0.00048	ppm v/v			11/04/19 12:05	2
<b>Chloroform</b>	<b>0.0021</b>		0.0013	0.00012	ppm v/v			11/04/19 12:05	2
Chloromethane	ND		0.0033	0.0011	ppm v/v			11/04/19 12:05	2
Dibromochloromethane	ND		0.0013	0.00012	ppm v/v			11/04/19 12:05	2
1,2-Dibromoethane (EDB)	ND		0.0013	0.00012	ppm v/v			11/04/19 12:05	2
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0013	0.00020	ppm v/v			11/04/19 12:05	2
1,2-Dichlorobenzene	ND		0.0013	0.00052	ppm v/v			11/04/19 12:05	2
1,3-Dichlorobenzene	ND		0.0013	0.00027	ppm v/v			11/04/19 12:05	2
1,4-Dichlorobenzene	ND		0.0013	0.00027	ppm v/v			11/04/19 12:05	2
<b>Dichlorodifluoromethane</b>	<b>0.073</b>		0.0013	0.00023	ppm v/v			11/04/19 12:05	2
<b>1,1-Dichloroethane</b>	<b>0.0036</b>		0.0013	0.00012	ppm v/v			11/04/19 12:05	2
1,2-Dichloroethane	ND		0.0013	0.00017	ppm v/v			11/04/19 12:05	2
<b>1,1-Dichloroethene</b>	<b>0.021</b>		0.0013	0.00013	ppm v/v			11/04/19 12:05	2
<b>cis-1,2-Dichloroethene</b>	<b>0.0017</b>		0.0013	0.00017	ppm v/v			11/04/19 12:05	2
trans-1,2-Dichloroethene	ND		0.0013	0.00012	ppm v/v			11/04/19 12:05	2
<b>1,2-Dichloropropane</b>	<b>0.00031</b>	<b>J</b>	0.0013	0.00017	ppm v/v			11/04/19 12:05	2
cis-1,3-Dichloropropene	ND		0.0013	0.00027	ppm v/v			11/04/19 12:05	2
trans-1,3-Dichloropropene	ND		0.0013	0.00015	ppm v/v			11/04/19 12:05	2
Ethylbenzene	ND		0.0013	0.00022	ppm v/v			11/04/19 12:05	2
4-Ethyltoluene	ND		0.0027	0.00035	ppm v/v			11/04/19 12:05	2
Hexachlorobutadiene	ND		0.0067	0.00053	ppm v/v			11/04/19 12:05	2
2-Hexanone	ND		0.0033	0.00027	ppm v/v			11/04/19 12:05	2
4-Methyl-2-pentanone (MIBK)	ND		0.0033	0.00090	ppm v/v			11/04/19 12:05	2
<b>Methylene Chloride</b>	<b>0.0059</b>	<b>J B</b>	0.0067	0.0027	ppm v/v			11/04/19 12:05	2
Styrene	ND		0.0013	0.00040	ppm v/v			11/04/19 12:05	2
1,1,2,2-Tetrachloroethane	ND		0.0013	0.00023	ppm v/v			11/04/19 12:05	2
<b>Tetrachloroethene</b>	<b>0.082</b>		0.0013	0.00012	ppm v/v			11/04/19 12:05	2
Toluene	ND		0.0020	0.0013	ppm v/v			11/04/19 12:05	2
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.083</b>		0.0013	0.00013	ppm v/v			11/04/19 12:05	2
1,2,4-Trichlorobenzene	ND		0.0067	0.0011	ppm v/v			11/04/19 12:05	2
<b>1,1,1-Trichloroethane</b>	<b>0.013</b>		0.0013	0.00062	ppm v/v			11/04/19 12:05	2
1,1,2-Trichloroethane	ND		0.0013	0.00012	ppm v/v			11/04/19 12:05	2
<b>Trichloroethene</b>	<b>0.11</b>		0.00067	0.00010	ppm v/v			11/04/19 12:05	2
<b>Trichlorofluoromethane</b>	<b>0.12</b>		0.0013	0.00018	ppm v/v			11/04/19 12:05	2
1,2,4-Trimethylbenzene	ND		0.0013	0.00033	ppm v/v			11/04/19 12:05	2
1,3,5-Trimethylbenzene	ND		0.0013	0.00037	ppm v/v			11/04/19 12:05	2
Vinyl acetate	ND		0.0067	0.00047	ppm v/v			11/04/19 12:05	2
Vinyl chloride	ND		0.00067	0.00043	ppm v/v			11/04/19 12:05	2
m,p-Xylene	ND		0.0013	0.00048	ppm v/v			11/04/19 12:05	2
o-Xylene	ND		0.0013	0.00025	ppm v/v			11/04/19 12:05	2

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		60 - 140		11/04/19 12:05	2

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110614-001/MWL-SV05-200

Lab Sample ID: 140-17136-22

Date Collected: 10/18/19 11:05

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		0.031	0.0087	ppm v/v			11/04/19 12:47	1.84
<b>Benzene</b>	<b>0.00054</b>	<b>J</b>	0.0012	0.00012	ppm v/v			11/04/19 12:47	1.84
Benzyl chloride	ND		0.0025	0.00058	ppm v/v			11/04/19 12:47	1.84
Bromodichloromethane	ND		0.0012	0.00028	ppm v/v			11/04/19 12:47	1.84
Bromoform	ND		0.0012	0.00014	ppm v/v			11/04/19 12:47	1.84
Bromomethane	ND		0.0012	0.00034	ppm v/v			11/04/19 12:47	1.84
2-Butanone (MEK)	ND		0.0061	0.0011	ppm v/v			11/04/19 12:47	1.84
<b>Carbon disulfide</b>	<b>0.00026</b>	<b>J</b>	0.0031	0.00017	ppm v/v			11/04/19 12:47	1.84
<b>Carbon tetrachloride</b>	<b>0.0010</b>	<b>J</b>	0.0012	0.00011	ppm v/v			11/04/19 12:47	1.84
Chlorobenzene	ND		0.0012	0.000092	ppm v/v			11/04/19 12:47	1.84
Chloroethane	ND		0.0012	0.00044	ppm v/v			11/04/19 12:47	1.84
<b>Chloroform</b>	<b>0.0022</b>		0.0012	0.00011	ppm v/v			11/04/19 12:47	1.84
Chloromethane	ND		0.0031	0.0010	ppm v/v			11/04/19 12:47	1.84
Dibromochloromethane	ND		0.0012	0.00011	ppm v/v			11/04/19 12:47	1.84
1,2-Dibromoethane (EDB)	ND		0.0012	0.00011	ppm v/v			11/04/19 12:47	1.84
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0012	0.00018	ppm v/v			11/04/19 12:47	1.84
1,2-Dichlorobenzene	ND		0.0012	0.00048	ppm v/v			11/04/19 12:47	1.84
1,3-Dichlorobenzene	ND		0.0012	0.00025	ppm v/v			11/04/19 12:47	1.84
1,4-Dichlorobenzene	ND		0.0012	0.00025	ppm v/v			11/04/19 12:47	1.84
<b>Dichlorodifluoromethane</b>	<b>0.077</b>		0.0012	0.00021	ppm v/v			11/04/19 12:47	1.84
<b>1,1-Dichloroethane</b>	<b>0.0056</b>		0.0012	0.00011	ppm v/v			11/04/19 12:47	1.84
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/04/19 12:47	1.84
<b>1,1-Dichloroethene</b>	<b>0.041</b>		0.0012	0.00012	ppm v/v			11/04/19 12:47	1.84
<b>cis-1,2-Dichloroethene</b>	<b>0.0027</b>		0.0012	0.00015	ppm v/v			11/04/19 12:47	1.84
trans-1,2-Dichloroethene	ND		0.0012	0.00011	ppm v/v			11/04/19 12:47	1.84
<b>1,2-Dichloropropane</b>	<b>0.00032</b>	<b>J</b>	0.0012	0.00015	ppm v/v			11/04/19 12:47	1.84
cis-1,3-Dichloropropene	ND		0.0012	0.00025	ppm v/v			11/04/19 12:47	1.84
trans-1,3-Dichloropropene	ND		0.0012	0.00014	ppm v/v			11/04/19 12:47	1.84
Ethylbenzene	ND		0.0012	0.00020	ppm v/v			11/04/19 12:47	1.84
4-Ethyltoluene	ND		0.0025	0.00032	ppm v/v			11/04/19 12:47	1.84
Hexachlorobutadiene	ND		0.0061	0.00049	ppm v/v			11/04/19 12:47	1.84
2-Hexanone	ND		0.0031	0.00025	ppm v/v			11/04/19 12:47	1.84
4-Methyl-2-pentanone (MIBK)	ND		0.0031	0.00083	ppm v/v			11/04/19 12:47	1.84
<b>Methylene Chloride</b>	<b>0.0073</b>	<b>B</b>	0.0061	0.0025	ppm v/v			11/04/19 12:47	1.84
Styrene	ND		0.0012	0.00037	ppm v/v			11/04/19 12:47	1.84
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00021	ppm v/v			11/04/19 12:47	1.84
<b>Tetrachloroethene</b>	<b>0.14</b>		0.0012	0.00011	ppm v/v			11/04/19 12:47	1.84
Toluene	ND		0.0018	0.0012	ppm v/v			11/04/19 12:47	1.84
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.15</b>		0.0012	0.00012	ppm v/v			11/04/19 12:47	1.84
1,2,4-Trichlorobenzene	ND		0.0061	0.00098	ppm v/v			11/04/19 12:47	1.84
<b>1,1,1-Trichloroethane</b>	<b>0.0042</b>		0.0012	0.00057	ppm v/v			11/04/19 12:47	1.84
1,1,2-Trichloroethane	ND		0.0012	0.00011	ppm v/v			11/04/19 12:47	1.84
<b>Trichloroethene</b>	<b>0.21</b>		0.00061	0.000092	ppm v/v			11/04/19 12:47	1.84
<b>Trichlorofluoromethane</b>	<b>0.090</b>		0.0012	0.00017	ppm v/v			11/04/19 12:47	1.84
1,2,4-Trimethylbenzene	ND		0.0012	0.00031	ppm v/v			11/04/19 12:47	1.84
1,3,5-Trimethylbenzene	ND		0.0012	0.00034	ppm v/v			11/04/19 12:47	1.84
Vinyl acetate	ND		0.0061	0.00043	ppm v/v			11/04/19 12:47	1.84
Vinyl chloride	ND		0.00061	0.00040	ppm v/v			11/04/19 12:47	1.84

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

**Client Sample ID: 110614-001/MWL-SV05-200**

**Lab Sample ID: 140-17136-22**

**Date Collected: 10/18/19 11:05**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.0012	0.00044	ppm v/v			11/04/19 12:47	1.84
o-Xylene	ND		0.0012	0.00023	ppm v/v			11/04/19 12:47	1.84
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140					11/04/19 12:47	1.84

**Client Sample ID: 110615-001/MWL-SV05-300**

**Lab Sample ID: 140-17136-23**

**Date Collected: 10/18/19 11:08**

**Matrix: Air**

**Date Received: 10/25/19 14:00**

**Sample Container: Summa Canister 6L**

**Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0093	J	0.031	0.0088	ppm v/v			11/04/19 13:29	1.85
Benzene	0.00046	J	0.0012	0.00012	ppm v/v			11/04/19 13:29	1.85
Benzyl chloride	ND		0.0025	0.00059	ppm v/v			11/04/19 13:29	1.85
Bromodichloromethane	ND		0.0012	0.00028	ppm v/v			11/04/19 13:29	1.85
Bromoform	ND		0.0012	0.00014	ppm v/v			11/04/19 13:29	1.85
Bromomethane	ND		0.0012	0.00034	ppm v/v			11/04/19 13:29	1.85
2-Butanone (MEK)	0.0013	J	0.0062	0.0011	ppm v/v			11/04/19 13:29	1.85
Carbon disulfide	0.00021	J	0.0031	0.00017	ppm v/v			11/04/19 13:29	1.85
Carbon tetrachloride	0.00083	J	0.0012	0.00011	ppm v/v			11/04/19 13:29	1.85
Chlorobenzene	ND		0.0012	0.000093	ppm v/v			11/04/19 13:29	1.85
Chloroethane	ND		0.0012	0.00045	ppm v/v			11/04/19 13:29	1.85
Chloroform	0.00099	J	0.0012	0.00011	ppm v/v			11/04/19 13:29	1.85
Chloromethane	ND		0.0031	0.0010	ppm v/v			11/04/19 13:29	1.85
Dibromochloromethane	ND		0.0012	0.00011	ppm v/v			11/04/19 13:29	1.85
1,2-Dibromoethane (EDB)	ND		0.0012	0.00011	ppm v/v			11/04/19 13:29	1.85
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0012	0.00019	ppm v/v			11/04/19 13:29	1.85
1,2-Dichlorobenzene	ND		0.0012	0.00048	ppm v/v			11/04/19 13:29	1.85
1,3-Dichlorobenzene	ND		0.0012	0.00025	ppm v/v			11/04/19 13:29	1.85
1,4-Dichlorobenzene	ND		0.0012	0.00025	ppm v/v			11/04/19 13:29	1.85
Dichlorodifluoromethane	0.037		0.0012	0.00022	ppm v/v			11/04/19 13:29	1.85
1,1-Dichloroethane	0.0022		0.0012	0.00011	ppm v/v			11/04/19 13:29	1.85
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/04/19 13:29	1.85
1,1-Dichloroethene	0.025		0.0012	0.00012	ppm v/v			11/04/19 13:29	1.85
cis-1,2-Dichloroethene	0.0011	J	0.0012	0.00015	ppm v/v			11/04/19 13:29	1.85
trans-1,2-Dichloroethene	ND		0.0012	0.00011	ppm v/v			11/04/19 13:29	1.85
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/04/19 13:29	1.85
cis-1,3-Dichloropropene	ND		0.0012	0.00025	ppm v/v			11/04/19 13:29	1.85
trans-1,3-Dichloropropene	ND		0.0012	0.00014	ppm v/v			11/04/19 13:29	1.85
Ethylbenzene	ND		0.0012	0.00020	ppm v/v			11/04/19 13:29	1.85
4-Ethyltoluene	ND		0.0025	0.00032	ppm v/v			11/04/19 13:29	1.85
Hexachlorobutadiene	ND		0.0062	0.00049	ppm v/v			11/04/19 13:29	1.85
2-Hexanone	ND		0.0031	0.00025	ppm v/v			11/04/19 13:29	1.85
4-Methyl-2-pentanone (MIBK)	ND		0.0031	0.00083	ppm v/v			11/04/19 13:29	1.85
Methylene Chloride	0.0061	J B	0.0062	0.0025	ppm v/v			11/04/19 13:29	1.85
Styrene	ND		0.0012	0.00037	ppm v/v			11/04/19 13:29	1.85
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00022	ppm v/v			11/04/19 13:29	1.85

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110615-001/MWL-SV05-300

Lab Sample ID: 140-17136-23

Date Collected: 10/18/19 11:08

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.099		0.0012	0.00011	ppm v/v			11/04/19 13:29	1.85
Toluene	ND		0.0019	0.0012	ppm v/v			11/04/19 13:29	1.85
1,1,2-Trichloro-1,2,2-trifluoroethane	0.10		0.0012	0.00012	ppm v/v			11/04/19 13:29	1.85
1,2,4-Trichlorobenzene	ND		0.0062	0.00099	ppm v/v			11/04/19 13:29	1.85
1,1,1-Trichloroethane	0.0019		0.0012	0.00057	ppm v/v			11/04/19 13:29	1.85
1,1,2-Trichloroethane	ND		0.0012	0.00011	ppm v/v			11/04/19 13:29	1.85
Trichloroethene	0.11		0.00062	0.000093	ppm v/v			11/04/19 13:29	1.85
Trichlorofluoromethane	0.030		0.0012	0.00017	ppm v/v			11/04/19 13:29	1.85
1,2,4-Trimethylbenzene	ND		0.0012	0.00031	ppm v/v			11/04/19 13:29	1.85
1,3,5-Trimethylbenzene	ND		0.0012	0.00034	ppm v/v			11/04/19 13:29	1.85
Vinyl acetate	ND		0.0062	0.00043	ppm v/v			11/04/19 13:29	1.85
Vinyl chloride	ND		0.00062	0.00040	ppm v/v			11/04/19 13:29	1.85
m,p-Xylene	ND		0.0012	0.00045	ppm v/v			11/04/19 13:29	1.85
o-Xylene	ND		0.0012	0.00023	ppm v/v			11/04/19 13:29	1.85
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140					11/04/19 13:29	1.85

Client Sample ID: 110616-001/MWL-SV05-400

Lab Sample ID: 140-17136-24

Date Collected: 10/18/19 11:15

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.013	J	0.029	0.0083	ppm v/v			11/04/19 14:11	1.76
Benzene	0.00084	J	0.0012	0.00012	ppm v/v			11/04/19 14:11	1.76
Benzyl chloride	ND		0.0023	0.00056	ppm v/v			11/04/19 14:11	1.76
Bromodichloromethane	ND		0.0012	0.00026	ppm v/v			11/04/19 14:11	1.76
Bromoform	ND		0.0012	0.00013	ppm v/v			11/04/19 14:11	1.76
Bromomethane	ND		0.0012	0.00032	ppm v/v			11/04/19 14:11	1.76
2-Butanone (MEK)	0.0037	J	0.0059	0.0011	ppm v/v			11/04/19 14:11	1.76
Carbon disulfide	0.0057		0.0029	0.00016	ppm v/v			11/04/19 14:11	1.76
Carbon tetrachloride	0.00053	J	0.0012	0.00010	ppm v/v			11/04/19 14:11	1.76
Chlorobenzene	ND		0.0012	0.00088	ppm v/v			11/04/19 14:11	1.76
Chloroethane	ND		0.0012	0.00043	ppm v/v			11/04/19 14:11	1.76
Chloroform	0.00084	J	0.0012	0.00010	ppm v/v			11/04/19 14:11	1.76
Chloromethane	ND		0.0029	0.00097	ppm v/v			11/04/19 14:11	1.76
Dibromochloromethane	ND		0.0012	0.00010	ppm v/v			11/04/19 14:11	1.76
1,2-Dibromoethane (EDB)	ND		0.0012	0.00010	ppm v/v			11/04/19 14:11	1.76
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0012	0.00018	ppm v/v			11/04/19 14:11	1.76
1,2-Dichlorobenzene	ND		0.0012	0.00045	ppm v/v			11/04/19 14:11	1.76
1,3-Dichlorobenzene	ND		0.0012	0.00023	ppm v/v			11/04/19 14:11	1.76
1,4-Dichlorobenzene	ND		0.0012	0.00023	ppm v/v			11/04/19 14:11	1.76
Dichlorodifluoromethane	0.020		0.0012	0.00021	ppm v/v			11/04/19 14:11	1.76
1,1-Dichloroethane	0.0018		0.0012	0.00010	ppm v/v			11/04/19 14:11	1.76
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/04/19 14:11	1.76
1,1-Dichloroethene	0.015		0.0012	0.00012	ppm v/v			11/04/19 14:11	1.76

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-17136-1

Client Sample ID: 110616-001/MWL-SV05-400

Lab Sample ID: 140-17136-24

Date Collected: 10/18/19 11:15

Matrix: Air

Date Received: 10/25/19 14:00

Sample Container: Summa Canister 6L

## Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	0.00082	J	0.0012	0.00015	ppm v/v			11/04/19 14:11	1.76
trans-1,2-Dichloroethene	ND		0.0012	0.00010	ppm v/v			11/04/19 14:11	1.76
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/04/19 14:11	1.76
cis-1,3-Dichloropropene	ND		0.0012	0.00023	ppm v/v			11/04/19 14:11	1.76
trans-1,3-Dichloropropene	ND		0.0012	0.00013	ppm v/v			11/04/19 14:11	1.76
Ethylbenzene	ND		0.0012	0.00019	ppm v/v			11/04/19 14:11	1.76
4-Ethyltoluene	ND		0.0023	0.00031	ppm v/v			11/04/19 14:11	1.76
Hexachlorobutadiene	ND		0.0059	0.00047	ppm v/v			11/04/19 14:11	1.76
2-Hexanone	ND		0.0029	0.00023	ppm v/v			11/04/19 14:11	1.76
4-Methyl-2-pentanone (MIBK)	0.00087	J	0.0029	0.00079	ppm v/v			11/04/19 14:11	1.76
Methylene Chloride	0.0055	J B	0.0059	0.0023	ppm v/v			11/04/19 14:11	1.76
Styrene	0.00082	J	0.0012	0.00035	ppm v/v			11/04/19 14:11	1.76
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00021	ppm v/v			11/04/19 14:11	1.76
Tetrachloroethene	0.11		0.0012	0.00010	ppm v/v			11/04/19 14:11	1.76
Toluene	ND		0.0018	0.0011	ppm v/v			11/04/19 14:11	1.76
1,1,2-Trichloro-1,2,2-trifluoroethane	0.050		0.0012	0.00012	ppm v/v			11/04/19 14:11	1.76
1,2,4-Trichlorobenzene	ND		0.0059	0.00094	ppm v/v			11/04/19 14:11	1.76
1,1,1-Trichloroethane	0.0020		0.0012	0.00054	ppm v/v			11/04/19 14:11	1.76
1,1,2-Trichloroethane	ND		0.0012	0.00010	ppm v/v			11/04/19 14:11	1.76
Trichloroethene	0.10		0.00059	0.000088	ppm v/v			11/04/19 14:11	1.76
Trichlorofluoromethane	0.024		0.0012	0.00016	ppm v/v			11/04/19 14:11	1.76
1,2,4-Trimethylbenzene	ND		0.0012	0.00029	ppm v/v			11/04/19 14:11	1.76
1,3,5-Trimethylbenzene	ND		0.0012	0.00032	ppm v/v			11/04/19 14:11	1.76
Vinyl acetate	ND		0.0059	0.00041	ppm v/v			11/04/19 14:11	1.76
Vinyl chloride	ND		0.00059	0.00038	ppm v/v			11/04/19 14:11	1.76
m,p-Xylene	ND		0.0012	0.00043	ppm v/v			11/04/19 14:11	1.76
o-Xylene	ND		0.0012	0.00022	ppm v/v			11/04/19 14:11	1.76
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140					11/04/19 14:11	1.76

**ANNEX D**

**Mixed Waste Landfill  
Soil-Moisture Monitoring Forms**

**April 2019-March 2020**

**Field Forms and Tables**

## Mixed Waste Landfill Neutron Logging Data Field Form

Name: <u>Danielle Michel</u>	Standard Count: <u>6591</u>	Chi: <u>0.91</u>
Name: <u>Robert Zlock</u>	Previous Count: <u>6741</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 <u>4/25/19-12:35</u>	Date/Time <u>4/25/19/1344</u>	Date/Time <u>4/25/19/1440</u>
0.0	0	0	<u>732</u>	<u>589</u>	<u>1369</u>
0.9	1	9999	<u>3621</u>	<u>2692</u>	<u>3540</u>
1.7	2	9998	<u>4574</u>	<u>3709</u>	<u>3303</u>
2.6	3	9997	<u>4085</u>	<u>3629</u>	<u>2930</u>
3.5	4	9996	<u>3801</u>	<u>3384</u>	<u>2914</u>
4.3	5	9995	<u>3616</u>	<u>3569</u>	<u>2889</u>
5.2	6	9994	<u>3885</u>	<u>2664</u>	<u>2305</u>
6.1	7	9993	<u>2371</u>	<u>2011</u>	<u>2397</u>
6.9	8	9992	<u>2337</u>	<u>1746</u>	<u>1934</u>
7.8	9	9991	<u>2383</u>	<u>1709</u>	<u>1688</u>
8.7	10	9990	<u>2072</u>	<u>1737</u>	<u>2096</u> <u>20%</u>
9.5	11	9989	<u>1950</u>	<u>1552</u>	<u>2101</u>
10.4	12	9988	<u>1659</u>	<u>1945</u>	<u>1912</u>
11.3	13	9987	<u>1837</u>	<u>1834</u>	<u>1704</u>
12.1	14	9986	<u>1819</u>	<u>1737</u>	<u>1869</u>
13.0	15	9985	<u>1829</u>	<u>1575</u>	<u>2038</u>
13.9	16	9984	<u>1814</u>	<u>1845</u>	<u>2175</u>
14.7	17	9983	<u>1541</u>	<u>1853</u>	<u>1748</u>
15.6	18	9982	<u>1739</u>	<u>1715</u>	<u>1528</u>
16.5	19	9981	<u>1739</u> <u>1678</u>	<u>2049</u>	<u>1525</u>
17.3	20	9980	<u>1331</u>	<u>2172</u>	<u>1522</u>
18.2	21	9979	<u>1801</u>	<u>1871</u>	<u>1682</u>
19.1	22	9978	<u>1684</u>	<u>1798</u>	<u>2164</u>
19.9	23	9977	<u>1566</u>	<u>1890</u>	<u>2282</u>
20.8	24	9976	<u>1462</u>	<u>2048</u>	<u>2158</u>
21.7	25	9975	<u>1513</u>	<u>1612</u>	<u>1799</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	1898	<del>1712</del> 5354	1736
30.3	35	9965	1673	1817	2116
34.6	40	9960	1729	1737	1792
39.0	45	9955	1615	1623	2243
43.3	50	9950	1994	1551	1689
47.6	55	9945	1772	2121	1747
52.0	60	9940	1725	1783	1896
56.3	65	9935	2114	1981	1930
60.6	70	9930	1234	2381	1705
65.0	75	9925	2400	2351	2044
69.3	80	9920	2067	1566	1883
73.6	85	9915	1954	1965	2088
77.9	90	9910	1422	2444	1984
82.3	95	9905	2173	2228	2271
86.6	100	9900	2095	2152	2717
90.9	105	9895	1964	2400	2339
95.3	110	9890	2174	1816	1969
99.6	115	9885	1936	1767	1876
103.9	120	9880	1637	1861	1874
108.3	125	9875	1794	2310	1570
112.6	130	9870	2144	2145	1903
116.9	135	9865	2076	2616	1728
121.2	140	9860	1640	2017	1512
125.6	145	9855	1527	2570	2259
129.9	150	9850	2872	2672	2003
134.2	155	9845	2147	2233	1711
138.6	160	9840	2633	2182	1567
142.9	165	9835	2591	2018	2311
147.2	170	9830	2585	1627	1598
151.6	175	9825	2267	2002	2905
155.9	180	9820	3382	2404	2970
160.2	185	9815	3199	2752	2463
164.5	190	9810	1676	1726	1874
168.9	195	9805	1814	2031	3459
173.2	200	9800	2118	3184	2707

**MIXED WASTE LANDFILL**  
**SOIL MOISTURE MONITORING**

**Soil Moisture Monitoring Results Tables**



Table D-1  
VZ-1 Soil-Moisture Monitoring Results  
April 2019

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2019	Baseline Average (2004-2006)	Difference between Baseline Average & April 2019	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	5.8	2.9	2.9	NA
4.3	5	5.7	2.9	2.8	NA
5.2	6	4.1	2.9	1.2	NA
6.1	7	4.4	2.6	1.8	NA
6.9	8	3.1	2.2	0.9	NA
7.8	9	2.5	1.9	0.6	NA
8.7	10	3.5	1.7	1.8	23
9.5	11	3.6	2.0	1.6	23
10.4	12	3.1	2.7	0.4	23
11.3	13	2.5	3.1	-0.6	23
12.1	14	3.0	2.6	0.4	23
13.0	15	3.4	2.4	1.0	23
13.9	16	3.8	2.6	1.2	23
14.7	17	2.6	2.8	-0.2	23
15.6	18	2.0	2.9	-0.9	23
16.5	19	2.0	2.4	-0.4	23
17.3	20	2.0	2.0	0.0	23
18.2	21	2.5	2.0	0.5	23
19.1	22	3.8	2.1	1.7	23
19.9	23	4.1	3.0	1.1	23
20.8	24	3.7	4.3	-0.6	23
21.7	25	2.8	4.0	-1.2	23
26.0	30	2.6	2.9	-0.3	23
30.3	35	3.6	2.7	0.9	23
34.6	40	2.8	2.3	0.5	23
39.0	45	4.0	3.0	1.0	23
43.3	50	2.5	2.9	-0.4	23
47.6	55	2.6	2.8	-0.2	23
52.0	60	3.0	3.4	-0.4	23
56.3	65	3.1	2.9	0.2	23

Table D-1 (Concluded)  
VZ-1 Soil-Moisture Monitoring Results  
April 2019

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2019	Baseline Average (2004-2006)	Difference between Baseline Average & April 2019	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	2.5	2.1	0.4	23
65.0	75	3.4	5.6	-2.2	23
69.3	80	3.0	2.8	0.2	23
73.6	85	3.6	3.1	0.5	23
77.9	90	3.3	3.7	-0.4	23
82.3	95	4.0	3.7	0.3	23
86.6	100	5.3	5.4	-0.1	23
90.9	105	4.2	5.0	-0.8	NA
95.3	110	3.2	3.0	0.2	NA
99.6	115	3.0	3.6	-0.6	NA
103.9	120	3.0	2.2	0.8	NA
108.3	125	2.2	2.7	-0.5	NA
112.6	130	3.1	3.3	-0.2	NA
116.9	135	2.6	3.1	-0.5	NA
121.2	140	2.0	2.1	-0.1	NA
125.6	145	4.0	3.8	0.2	NA
129.9	150	3.3	3.2	0.1	NA
134.2	155	2.5	2.7	-0.2	NA
138.6	160	2.1	2.1	0.0	NA
142.9	165	4.2	3.8	0.4	NA
147.2	170	2.2	2.0	0.2	NA
151.6	175	5.8	6.0	-0.2	NA
155.9	180	5.9	5.5	0.4	NA
160.2	185	4.6	4.4	0.2	NA
164.5	190	3.0	3.0	0.0	NA
168.9	195	7.3	7.0	0.3	NA
173.2	200	5.2	5.4	-0.2	NA
	Average	3.5	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 2019

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2019	Baseline Average (2004-2006)	Difference between Baseline Average & April 2019	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	7.1	2.7	4.4	NA
4.3	5	7.5	3.3	4.2	NA
5.2	6	5.1	3.6	1.5	NA
6.1	7	3.3	3.6	-0.3	NA
6.9	8	2.6	3.5	-0.9	NA
7.8	9	2.5	3.1	-0.6	NA
8.7	10	2.6	2.4	0.2	23
9.5	11	2.1	2.2	-0.1	23
10.4	12	3.2	2.2	1.0	23
11.3	13	2.9	2.1	0.8	23
12.1	14	2.6	2.5	0.1	23
13.0	15	2.2	3.0	-0.8	23
13.9	16	2.9	2.8	0.1	23
14.7	17	2.9	2.4	0.5	23
15.6	18	2.5	2.6	-0.1	23
16.5	19	3.4	2.7	0.7	23
17.3	20	3.8	2.9	0.9	23
18.2	21	3.0	3.1	-0.1	23
19.1	22	2.8	3.6	-0.8	23
19.9	23	3.0	3.7	-0.7	23
20.8	24	3.4	3.1	0.3	23
21.7	25	2.3	2.7	-0.4	23
26.0	30	2.5	2.4	0.1	23
30.3	35	2.8	2.9	-0.1	23
34.6	40	2.6	2.7	-0.1	23
39.0	45	2.3	2.3	0.0	23
43.3	50	2.1	2.1	0.0	23
47.6	55	3.6	3.1	0.5	23
52.0	60	2.7	3.0	-0.3	23
56.3	65	3.3	5.5	-2.2	23

Table D-2 (Concluded)  
VZ-2 Soil-Moisture Monitoring Results  
April 2019

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2019	Baseline Average (2004-2006)	Difference between Baseline Average & April 2019	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	4.3	4.8	-0.5	23
65.0	75	4.3	5.1	-0.8	23
69.3	80	2.1	2.6	-0.5	23
73.6	85	3.2	2.6	0.6	23
77.9	90	4.5	3.1	1.4	23
82.3	95	3.9	3.6	0.3	23
86.6	100	3.7	4.7	-1.0	23
90.9	105	4.4	3.4	1.0	NA
95.3	110	2.8	3.1	-0.3	NA
99.6	115	2.7	3.6	-0.9	NA
103.9	120	2.9	2.0	0.9	NA
108.3	125	4.2	3.8	0.4	NA
112.6	130	3.7	3.6	0.1	NA
116.9	135	5.0	3.4	1.6	NA
121.2	140	3.4	2.4	1.0	NA
125.6	145	4.9	5.9	-1.0	NA
129.9	150	5.1	7.0	-1.9	NA
134.2	155	3.9	3.6	0.3	NA
138.6	160	3.8	3.8	0.0	NA
142.9	165	3.4	3.0	0.4	NA
147.2	170	2.3	2.9	-0.6	NA
151.6	175	3.3	2.4	0.9	NA
155.9	180	4.4	5.4	-1.0	NA
160.2	185	5.3	5.4	-0.1	NA
164.5	190	2.6	4.1	-1.5	NA
168.9	195	3.4	3.5	-0.1	NA
173.2	200	6.5	6.3	0.2	NA
	Average	3.5	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 2019

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2019	Baseline Average (2004-2006)	Difference between Baseline Average & April 2019	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	8.2	4.6	3.6	NA
4.3	5	7.7	4.5	3.2	NA
5.2	6	8.4	3.7	4.7	NA
6.1	7	4.3	2.9	1.4	NA
6.9	8	4.2	3.1	1.1	NA
7.8	9	4.3	2.3	2.0	NA
8.7	10	3.5	2.4	1.1	23
9.5	11	3.2	2.6	0.6	23
10.4	12	2.4	2.7	-0.3	23
11.3	13	2.9	3.0	-0.1	23
12.1	14	2.8	2.6	0.2	23
13.0	15	2.9	2.8	0.1	23
13.9	16	2.8	2.9	-0.1	23
14.7	17	2.1	3.1	-1.0	23
15.6	18	2.6	3.1	-0.5	23
16.5	19	2.4	2.3	0.1	23
17.3	20	1.5	2.7	-1.2	23
18.2	21	2.8	2.7	0.1	23
19.1	22	2.5	1.8	0.7	23
19.9	23	2.1	2.7	-0.6	23
20.8	24	1.9	2.8	-0.9	23
21.7	25	2.0	2.1	-0.1	23
26.0	30	3.0	2.5	0.5	23
30.3	35	2.4	2.8	-0.4	23
34.6	40	2.6	2.1	0.5	23
39.0	45	2.3	2.7	-0.4	23
43.3	50	3.3	2.9	0.4	23
47.6	55	2.7	3.4	-0.7	23
52.0	60	2.6	2.9	-0.3	23
56.3	65	3.6	3.5	0.1	23

Table D-3 (Concluded)  
VZ-3 Soil-Moisture Monitoring Results  
April 2019

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Collection Period April 2019	Baseline Average (2004-2006)	Difference between Baseline Average & April 2019	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	1.2	1.9	-0.7	23
65.0	75	4.4	4.3	0.1	23
69.3	80	4.0	4.5	-0.5	23
73.6	85	3.2	3.5	-0.3	23
77.9	90	1.8	1.9	-0.1	23
82.3	95	3.8	3.3	0.5	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	3.1	3.6	-0.5	NA
103.9	120	2.3	2.1	0.2	NA
108.3	125	2.8	1.8	1.0	NA
112.6	130	3.7	4.3	-0.6	NA
116.9	135	3.5	4.0	-0.5	NA
121.2	140	2.3	2.3	0.0	NA
125.6	145	2.0	2.0	0.0	NA
129.9	150	5.7	4.4	1.3	NA
134.2	155	3.7	3.6	0.1	NA
138.6	160	5.0	4.4	0.6	NA
142.9	165	4.9	5.2	-0.3	NA
147.2	170	4.9	4.1	0.8	NA
151.6	175	4.0	4.3	-0.3	NA
155.9	180	7.0	6.6	0.4	NA
160.2	185	6.6	5.6	1.0	NA
164.5	190	2.4	2.7	-0.3	NA
168.9	195	2.8	3.1	-0.3	NA
173.2	200	3.6	4.1	-0.5	NA
	Average	3.5	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 2019-March 2020**

**Field Forms**

**Sample Summary Sheet**

**Data Validation Reports**

**Contract Verification Reviews**

**FIELD SAMPLING FORMS**  
**MIXED WASTE LANDFILL**  
**LONG-TERM MONITORING AND MAINTENANCE**  
**GROUNDWATER MONITORING**

<b>Form Title</b>	<b>Corresponding Procedure</b>
Groundwater Sample Collection Field Equipment Check Log	FOP 05-02
Portable Pump and Tubing/Water Level Indicator Decontamination Log Form	FOP 05-03
Field Measurement Log For Groundwater Sample Collection	FOP 05-01
Analysis Request and Chain of Custody*	LOP 94-03

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



**FIELD SAMPLING FORMS**  
**APRIL-MAY 2019 GROUNDWATER MONITORING**



Project Name: MWL	
Well I.D.: MWL-MW-7	Date: 04/29/19
Method: Portable pump <input checked="" type="checkbox"/> Dedicated pump <input type="checkbox"/> Pump depth: 496'	

[illegible]

DIW QC Lot # 159

Project Name: MWL		
Well I.D.: MWL-MW-9	Date: 04/30/19	
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input type="checkbox"/>	Pump depth: 497'

[illegible]

Comments: ~1.5 gals purged from tubing 0842

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL	
Well I.D.: MWL-MW-8	Date: 05/01/19
Method: Portable pump <input checked="" type="checkbox"/> Dedicated pump <input type="checkbox"/> Pump depth: 497'	

## PURGE MEASUREMENTS

[illegible]

Comments: ~ 1.5 gals purged from tubing 0842

## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: <b>MWL</b>						
Calibrations done by: <b>R Lynch</b>				Date: <b>4/25/19</b>		
Make & Model: <b>Insitu 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>536303</b>						
Other (S/N): <b>NA</b>						
<b>pH Calibration/Check</b>						
pH Calibrated to (std): <b>7.00</b>				pH sloped to (std): <b>10.00</b>		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	<b>0642</b>	<b>4.00</b>	<b>20.7</b>	<b>7.00</b>	<b>20.8</b>	<b>10.04</b>
2. Time:	<b>1337</b>	<b>4.00</b>	<b>22.8</b>	<b>6.99</b>	<b>22.9</b>	<b>9.98</b>
3. Time:						
4. Time:						
Standard lot no.:	<b>8GL515</b>		<b>9GB038</b>		<b>9GA009</b>	
Expiration date:	<b>DEC/20</b>		<b>FEB/21</b>		<b>JAN/21</b>	
<b>SC Calibration/Check</b>						
Reference Value: <b>1413 uS</b>				Standard Lot No.: <b>8GJ1019</b>		
	Value	Temp	Expiration Date: <b>OCT/19</b>			
1. Time:	<b>0644</b>	<b>1283</b>	<b>20.6</b>			
2. Time:	<b>1335</b>	<b>1267</b>	<b>23.3</b>			
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: <b>220 mV</b>				Standard Lot No. <b>9GC752</b>		
	Value	Temp	Expiration Date: <b>DEC/19</b>			
1. Time:	<b>0646</b>	<b>218.1</b>	<b>20.6</b>			
2. Time:	<b>1337</b>	<b>213.6</b>	<b>24.1</b>			
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	<b>0638</b>	<b>93.9</b>	<b>24.88</b>			
2. Time:	<b>1330</b>	<b>89.87</b>	<b>25.10</b>			
3. Time:						
4. Time:						

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**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

SNL/NM Project Name: <b>MWL</b>				
Calibration done by: <b>R Lynch</b>			Date: <b>4/25/19</b>	
TURBIDIMETER				
Make & Model: <b>HACH 2100Q</b>			Serial No. S/N <b>14060C033238</b>	
Reference Value	<b>10</b>	<b>20</b>	<b>100</b>	<b>800</b>
Standard Lot No.	<b>A8320</b>	<b>A8330</b>	<b>A8324</b>	<b>A8334</b>
1. Time <b>0630</b>	<b>10.2</b>	<b>20.0</b>	<b>99.8</b>	<b>802</b>
2. Time <b>1322</b>	<b>10.6</b>	<b>21.0</b>	<b>108</b>	<b>806</b>
3. Time				
4. Time				
Comments:				

## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: <b>MWL</b>						
Calibrations done by: <b>R Lynch</b>				Date: <b>04/29/19</b>		
Make & Model: <b>Insitu 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>536303</b>						
Other (S/N): <b>NA</b>						
<b>pH Calibration/Check</b>						
pH Calibrated to (std): <b>7.00</b>			pH sloped to (std): <b>10.00</b>			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	<b>0635</b>	<b>4.03</b>	<b>22.1</b>	<b>7.01</b>	<b>21.5</b>	<b>10.03</b>
2. Time:	<b>1312</b>	<b>4.02</b>	<b>22.7</b>	<b>7.01</b>	<b>22.8</b>	<b>10.04</b>
3. Time:						
4. Time:						
Standard lot no.:	<b>8GL515</b>		<b>9GB038</b>		<b>9GA009</b>	
Expiration date:	<b>DEC/20</b>		<b>FEB/21</b>		<b>JAN/21</b>	
<b>SC Calibration/Check</b>						
Reference Value: <b>1413 uS</b>			Standard Lot No.: <b>8GJ1019</b>			
	Value	Temp	Expiration Date: <b>OCT/19</b>			
1. Time:	<b>0644</b>	<b>1320</b>	<b>21.5</b>			
2. Time:	<b>1320</b>	<b>1331</b>	<b>22.7</b>			
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: <b>220 mV</b>			Standard Lot No. <b>9GC752</b>			
	Value	Temp	Expiration Date: <b>DEC/19</b>			
1. Time:	<b>0646</b>	<b>219.1</b>	<b>21.4</b>			
2. Time:	<b>1316</b>	<b>220.4</b>	<b>22.6</b>			
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	<b>0629</b>	<b>92.0</b>	<b>25.19</b>			
2. Time:	<b>1311</b>	<b>90.9</b>	<b>25.33</b>			
3. Time:						
4. Time:						

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## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: <b>MWL</b>				
Calibration done by: <b>R Lynch</b>			Date: <b>04/29/19</b>	
TURBIDIMETER				
Make & Model: <b>HACH 2100Q</b>			Serial No. S/N <b>14060C033238</b>	
Reference Value	<b>10</b>	<b>20</b>	<b>100</b>	<b>800</b>
Standard Lot No.	<b>A8297</b>	<b>A8313</b>	<b>A8304</b>	<b>A8313</b>
1. Time <b>0630</b>	<b>10.4</b>	<b>21.0</b>	<b>102</b>	<b>809</b>
2. Time <b>1310</b>	<b>10.2</b>	<b>20.8</b>	<b>104</b>	<b>805</b>
3. Time				
4. Time				
Comments:				

## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: <b>MWL</b>						
Calibrations done by: <b>R Lynch</b>				Date: <b>04/30/19</b>		
Make & Model: <b>Insitu 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>536303</b>						
Other (S/N): <b>NA</b>						
<b>pH Calibration/Check</b>						
pH Calibrated to (std): <b>7.00</b>				pH sloped to (std): <b>10.00</b>		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	<b>0645</b>	<b>3.98</b>	<b>20.9</b>	<b>6.99</b>	<b>20.8</b>	<b>10.00</b>
2. Time:	<b>1319</b>	<b>3.99</b>	<b>21.4</b>	<b>7.00</b>	<b>21.4</b>	<b>10.02</b>
3. Time:						
4. Time:						
Standard lot no.:	<b>8GL515</b>		<b>9GB038</b>		<b>9GA009</b>	
Expiration date:	<b>DEC/20</b>		<b>FEB/21</b>		<b>JAN/21</b>	
<b>SC Calibration/Check</b>						
Reference Value: <b>1413 uS</b>				Standard Lot No.: <b>8GJ1019</b>		
	Value	Temp	Expiration Date: <b>OCT/19</b>			
1. Time:	<b>0635</b>	<b>1306</b>	<b>20.9</b>			
2. Time:	<b>1326</b>	<b>1341</b>	<b>21.6</b>			
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: <b>220 mV</b>				Standard Lot No. <b>9GC752</b>		
	Value	Temp	Expiration Date: <b>DEC/19</b>			
1. Time:	<b>0641</b>	<b>222.0</b>	<b>20.9</b>			
2. Time:	<b>1321</b>	<b>218.6</b>	<b>21.7</b>			
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	<b>0630</b>	<b>89.9</b>	<b>24.99</b>			
2. Time:	<b>1318</b>	<b>90.6</b>	<b>25.15</b>			
3. Time:						
4. Time:						

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**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

SNL/NM Project Name: <b>MWL</b>				
Calibration done by: <b>R Lynch</b>			Date: <b>04/30/19</b>	
TURBIDIMETER				
Make & Model: <b>HACH 2100Q</b>			Serial No. S/N <b>14060C033238</b>	
Reference Value	<b>10</b>	<b>20</b>	<b>100</b>	<b>800</b>
Standard Lot No.	<b>A8297</b>	<b>A8313</b>	<b>A8304</b>	<b>A8313</b>
1. Time <b>6630</b>	<b>10.2</b>	<b>20.4</b>	<b>102</b>	<b>805</b>
2. Time <b>1316</b>	<b>10.4</b>	<b>20.1</b>	<b>103</b>	<b>807</b>
3. Time				
4. Time				
Comments:				

## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: <b>MWL</b>						
Calibrations done by: <b>R Lynch</b>				Date: <b>05/01/19</b>		
Make & Model: <b>Insitu 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>536303</b>						
Other (S/N): <b>NA</b>						
<b>pH Calibration/Check</b>						
pH Calibrated to (std): <b>7.00</b>				pH sloped to (std): <b>10.00</b>		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time:	<b>0646</b>	<b>3.99</b>	<b>20.9</b>	<b>6.99</b>	<b>21.0</b>	<b>10.03</b>
2. Time:	<b>1047</b>	<b>4.00</b>	<b>21.4</b>	<b>7.02</b>	<b>21.4</b>	<b>10.04</b>
3. Time:						
4. Time:						
Standard lot no.:	<b>8GL515</b>		<b>9GB038</b>		<b>9GA009</b>	
Expiration date:	<b>DEC/20</b>		<b>FEB/21</b>		<b>JAN/21</b>	
<b>SC Calibration/Check</b>						
Reference Value: <b>1413 uS</b>				Standard Lot No.: <b>8GJ1019</b>		
	Value	Temp	Expiration Date: <b>OCT/19</b>			
1. Time:	<b>0641</b>	<b>1303</b>	<b>20.9</b>			
2. Time:	<b>1054</b>	<b>1313</b>	<b>21.3</b>			
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: <b>220 mV</b>				Standard Lot No. <b>9GC752</b>		
	Value	Temp	Expiration Date: <b>DEC/19</b>			
1. Time:	<b>0636</b>	<b>219.2</b>	<b>21.5</b>			
2. Time:	<b>1049</b>	<b>220.1</b>	<b>21.3</b>			
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	<b>0628</b>	<b>91.6</b>	<b>24.97</b>			
2. Time:	<b>1046</b>	<b>91.8</b>	<b>25.05</b>			
3. Time:						
4. Time:						



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**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**



SNL/NM Project Name: <b>MWL</b>				
Calibration done by: <b>R Lynch</b>			Date: <b>05/01/19</b>	
TURBIDIMETER				
Make & Model: <b>HACH 2100Q</b>			Serial No. S/N <b>14060C033238</b>	
Reference Value	<b>10</b>	<b>20</b>	<b>100</b>	<b>800</b>
Standard Lot No.	<b>A8297</b>	<b>A8313</b>	<b>A8304</b>	<b>A8313</b>
1. Time <b>0630</b>	<b>10.3</b>	<b>20.1</b>	<b>101</b>	<b>805</b>
2. Time <b>1050</b>	<b>10.4</b>	<b>20.3</b>	<b>104</b>	<b>807</b>
3. Time				
4. Time				
Comments:				

**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

<b>Project Name:</b> <u>MWL</u>	<b>Monitoring Well ID #:</b> <u>Pre-Decon</u>	<b>Date:</b> <u>04/24/19</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1806-814</u>	<b>Water Level Indicator ID #:</b> <u>NA</u>	
<b>Personnel Performing Decontamination:</b>		
<b>Denisha Sanchez</b> Print Name:	 Initial:	
<b>Zachary Tenorio</b> Print Name:	 Initial:	
<b>Condition of Equipment</b>		
<b>Pump:</b> <u>Good</u>	<b>Tubing Bundle:</b> <u>Excellent</u>	<b>Water Level Indicator:</b> <u>Good</u>
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b>  <b>Source:</b> <u>1090</u> <b>Lot Number:</b> <u>132,116,113,107,119,111,104,130,103,122</u>	<b>HNO<sub>3</sub></b>  <b>Grade:</b> <u>Reagent</u> <b>UN #:</b> <u>2031</u> <b>Manufacturer:</b> <u>ACROS</u> <b>Lot Number:</b> <u>A0385545</u>	



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**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

<b>Project Name:</b> <u>MWL</u>	<b>Monitoring Well ID #:</b> <u>MWL-BW2</u>	<b>Date:</b> <u>4/25/2019</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1806-814</u>	<b>Water Level Indicator ID #:</b> <u>280208</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Zachary Tenorio</b> Print Name: _____		 Initial: _____
<b>Denisha Sanchez</b> Print Name: _____		 Initial: _____
<b>Condition of Equipment</b>		
<b>Pump:</b> <u>Excellent</u>	<b>Tubing Bundle:</b> <u>Excellent</u>	<b>Water Level Indicator:</b> <u>Excellent</u>
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b>  <b>Source:</b> <u>1090</u>  <b>Lot Number:</b> <u>109, 100, 122, 129, 106, 125, 121, 123, 131, 112, 114</u>	<b>HNO<sub>3</sub></b>  <b>Grade:</b> <u>Reagent</u>  <b>UN #:</b> <u>2031</u>  <b>Manufacturer:</b> <u>ACROS</u>  <b>Lot Number:</b> <u>A0385545</u>	

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**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

<b>Project Name:</b> <u>MWL</u>	<b>Monitoring Well ID #:</b> <u>MWL-MW7</u>	<b>Date:</b> <u>4/29/2019</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1806-814</u>	<b>Water Level Indicator ID #:</b> <u>280208</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Zachary Tenorio</b>		
Print Name:		Initial:
<b>Denisha Sanchez</b>		
Print Name:		Initial:
<b>Condition of Equipment</b>		
<b>Pump:</b> <u>Excellent</u>	<b>Tubing Bundle:</b> <u>Excellent</u>	<b>Water Level Indicator:</b> <u>Excellent</u>
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b>	<b>HNO<sub>3</sub></b>	
<b>Source:</b> <u>1090</u>	<b>Grade:</b> <u>Reagent</u>	
<b>Lot Number:</b> <u>175, 174, 102, 172, 177, 128, 113, 155, 158, 178</u>	<b>UN #:</b> <u>2031</u>	
	<b>Manufacturer:</b> <u>ACROS</u>	
	<b>Lot Number:</b> <u>A0385545</u>	

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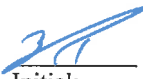



**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

<b>Project Name:</b> <u>MWL</u>	<b>Monitoring Well ID #:</b> <u>MWL-MW9</u>	<b>Date:</b> <u>04-30-19</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1806-814</u>	<b>Water Level Indicator ID #:</b> <u>280208</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Robert Lynch</b> Print Name: _____		 Initial: _____
<b>William Gibson</b> Print Name: _____		
<b><u>Condition of Equipment</u></b>		
<b>Pump:</b> <u>Excellent</u>	<b>Tubing Bundle:</b> <u>Excellent</u>	<b>Water Level Indicator:</b> <u>Good</u>
<b><u>List of Decontamination Materials</u></b>		
<b>Deionized Water</b>  <b>Source:</b> <u>1090</u>  <b>Lot Number:</b> <u>160,142,143,134,136,162,178,149,163,124,139</u>	<b>HNO<sub>3</sub></b>  <b>Grade:</b> <u>Reagent</u>  <b>UN #:</b> <u>2031</u>  <b>Manufacturer:</b> <u>ACROS</u>  <b>Lot Number:</b> <u>A0385545</u>	

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**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

<b>Project Name:</b> <u>MWL</u>	<b>Monitoring Well ID #:</b> <u>MWL-MW8</u>	<b>Date:</b> <u>5/1/2019</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1806-814</u>	<b>Water Level Indicator ID #:</b> <u>280208</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Zachary Tenorio</b> Print Name: _____		 Initial: _____
<b>Denisha Sanchez</b> Print Name: _____		 Initial: _____
<b>Condition of Equipment</b>		
<b>Pump:</b> <u>Excellent</u>	<b>Tubing Bundle:</b> <u>Excellent</u>	<b>Water Level Indicator:</b> <u>Excellent</u>
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b>	<b>HNO<sub>3</sub></b>	
<b>Source:</b> <u>1090</u>	<b>Grade:</b> <u>Reagent</u>	
<b>Lot Number:</b> <u>158, 147, 161, 166, 157, 168, 165, 145, 167, 140</u>	<b>UN #:</b> <u>2031</u>	
	<b>Manufacturer:</b> <u>ACROS</u>	
	<b>Lot Number:</b> <u>A0385545</u>	

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**SUMMARY SHEET FOR**  
**APRIL-MAY 2019 GROUNDWATER SAMPLES**

**Sample Summary for Mixed Waste Landfill Groundwater Monitoring  
April-May 2019**

<b>Well / Sample ID</b>	<b>Sample Date</b>	<b>ARCOC</b>	<b>Sample Number</b>	<b>Sample Type</b>	<b>Associated Equipment Blank (ARCOC #/Sample #)</b>	<b>Associated Trip Blank (ARCOC #/ Sample #)</b>	<b>Associated Field Blank (ARCOC #/ Sample #)</b>	<b>Comments</b>
<b>GEL Analytical Data: Project Task # 195122.10.11.08, Service Order # CF01-19</b>								
MWL-BW2	25-Apr-19	619667	108125	Environmental	n/a	619667 / 108126	619667 / 108124	
MWL-MW7	29-Apr-19	619670	108132	Environmental	n/a	619670 / 108133	619670 / 108131	
MWL-MW8	1-May-19	619674	108150	Environmental	n/a	619674 / 108151	619674 / 108149	
MWL-MW9	30-Apr-19	619673	108146	Environmental	619672 / 108136	619673 / 108148	619673 / 108145	
MWL-MW9	30-Apr-19	619673	108147	Duplicate	619672 / 108136	619673 / 108148	619673 / 108145	
MWL-EB1	29-Apr-19	619672	108136	Equipment Blank	n/a	619672 / 108137	n/a	Equipment blank sample prior to MWL-MW9.
DIW/QC	29-Apr-19	619671	108134	DIW QC	n/a	619671 / 108135	n/a	DIW - source water for EB1.
MWL-FB1	25-Apr-19	619667	108124	Field Blank	n/a	619667 / 108126	n/a	at MWL-BW2
MWL-FB2	29-Apr-19	619670	108131	Field Blank	n/a	619670 / 108133	n/a	at MWL-MW7
MWL-FB3	30-Apr-19	619573	108145	Field Blank	n/a	619673 / 108148	n/a	at MWL-MW9
MWL-FB4	1-May-19	619674	108149	Field Blank	n/a	619674 / 108151	n/a	at MWL-MW8

**DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES**  
**GROUNDWATER MONITORING**  
**APRIL-MAY 2019**

**AR/COC NUMBER 619667**

## Memorandum

Date: June 6, 2019

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 619667  
SDG: 477558  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: VOCs

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

### Summary

Three samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercepts were negative with absolute values  $>$  the MDL but  $\leq 3X$  the MDL for acetone and vinyl chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. The MS/MSD relative percent differences (RPDs) did not meet laboratory acceptance criteria for 4-methyl-2-pentanone; bromoform; 1,1,2,2-tetrachloroethane; tetrachloroethylene and 2-hexanone. The associated sample results were non-detect and will be **qualified UJ,MS5** due to the poor precision.

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 analyzed within the prescribed holding time and were properly preserved.

### Instrument Tune

All instrument tune requirements were met.

### **Calibration**

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows. The initial calibration intercepts were positive and > the MDL for dibromochloromethane; styrene; bromoform 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 acetone and 2-hexanone. 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 recoveries and RPDs met QC acceptance criteria except as noted above in the Summary section.

### **Laboratory Control Sample (LCS)**

All LCS acceptance criteria were met.

### **Detection Limits/Dilutions**

All detection limits were properly reported. The samples were not diluted.

### **Tentatively Identified Compounds (TICs)**

TIC reports were not required.

### **Other QC**

Mass spectra acceptability were verified during data validation and met QC acceptance criteria.

A TB and a FB were submitted with ARCO 619667 and were associated with the sample on the same ARCO.

No other specific issues that affect data quality were identified.

**Reviewed by:** Mary Donovan

**Level:** I

**Date:** 06/07/19



## Memorandum

Date: June 6, 2019  
To: File  
From: Linda Thal  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 619667  
SDG: 477558  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: Metals

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

### **Summary**

One sample was prepared and analyzed with approved procedures using method EPA 6020B (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times and Preservation**

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

### **ICP-MS Instrument Tune**

The ICP-MS tune met QC acceptance criteria.

### **Calibration**

All initial and continuing calibration criteria met QC acceptance criteria.

### **Reporting Limit Verification**

All LLCCV recoveries met QC acceptance criteria.

### **Blanks**

No target analytes were detected in any of the blanks.

**ICP -MS Internal Standards**

The ICP-MS internal standards met QC acceptance criteria.

**Matrix Spike (MS)**

The MS met all QC acceptance criteria.

**Laboratory Replicate**

The replicate met all QC acceptance criteria.

**Laboratory Control Sample (LCS)**

The LCS met all QC acceptance criteria.

**Detection Limits/Dilutions**

All detection limits were properly reported. The sample was not diluted.

**ICP Interference Check Sample (ICS A and AB)**

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

**ICP Serial Dilution**

The serial dilution met all QC acceptance criteria.

**Other QC**

No other specific issues that affect data quality were identified.

**Reviewed by:** Mary Donovan

**Level:** I

**Date:** 06/07/19

## Memorandum

Date: June 6, 2019  
To: File  
From: Linda Thal  
Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 619667  
SDG: 477558  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: RAD

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

### Summary

One sample was prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec - short list), EPA 900.0 (gross alpha/beta), SM 7500 Rn B (Rn-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

#### All analyses except Rn-222:

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

#### Gamma Spec:

1. The K-40 result for sample 477558004 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  $\geq$  the MDA and 2-sigma TPU.

### **Tracer/Carrier Recovery**

Tracer/Carriers were not a method requirement.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS/MSD analyses for gross alpha/beta were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

### **Laboratory Replicate**

All replicate error ratio acceptance criteria were met. It should be noted that the replicate analysis for gross alpha/beta was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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

The LCS and/or LCSD met QC acceptance criteria for accuracy and/or precision.

### **Detection Limits/Dilutions**

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

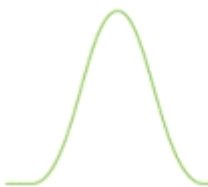
### **Other QC**

No other specific issues that affect data quality were identified.

**Reviewed by:** Mary Donovan

**Level:** I

**Date:** 06/07/19



## Sample Findings Summary



AR/COC: 619667

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	108125-004/MWL-BW2	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	108125-003/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	108125-003/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3
	108125-003/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	108125-003/MWL-BW2	Potassium-40 (13966-00-2)	J, FR7
EPA 906.0 Modified			
	108125-005/MWL-BW2	Tritium (10028-17-8)	BD, FR3
SW846 8260B DOE-AL			
	108124-001/MWL-FB1	1,1,2,2-Tetrachloroethane (79-34-5)	UJ, MS5
	108124-001/MWL-FB1	2-Hexanone (591-78-6)	UJ, MS5
	108124-001/MWL-FB1	4-Methyl-2-pentanone (108-10-1)	UJ, MS5
	108124-001/MWL-FB1	Acetone (67-64-1)	UJ, I5
	108124-001/MWL-FB1	Bromoform (75-25-2)	UJ, MS5
	108124-001/MWL-FB1	Tetrachloroethylene (127-18-4)	UJ, MS5
	108124-001/MWL-FB1	Vinyl chloride (75-01-4)	UJ, I5
	108125-001/MWL-BW2	1,1,2,2-Tetrachloroethane (79-34-5)	UJ, MS5
	108125-001/MWL-BW2	2-Hexanone (591-78-6)	UJ, MS5
	108125-001/MWL-BW2	4-Methyl-2-pentanone (108-10-1)	UJ, MS5
	108125-001/MWL-BW2	Acetone (67-64-1)	UJ, I5
	108125-001/MWL-BW2	Bromoform (75-25-2)	UJ, MS5
	108125-001/MWL-BW2	Tetrachloroethylene (127-18-4)	UJ, MS5
	108125-001/MWL-BW2	Vinyl chloride (75-01-4)	UJ, I5
	108126-001/MWL-TB1	1,1,2,2-Tetrachloroethane (79-34-5)	UJ, MS5
	108126-001/MWL-TB1	2-Hexanone (591-78-6)	UJ, MS5

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	108126-001/MWL-TB1	4-Methyl-2-pentanone (108-10-1)	UJ, MS5
	108126-001/MWL-TB1	Acetone (67-64-1)	UJ, I5
	108126-001/MWL-TB1	Bromoform (75-25-2)	UJ, MS5
	108126-001/MWL-TB1	Tetrachloroethylene (127-18-4)	UJ, MS5
	108126-001/MWL-TB1	Vinyl chloride (75-01-4)	UJ, I5

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 619667	Site/Project: MWL LTMMP	Validation Date: 06/06/2019
SDG #: 477558	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 8	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

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

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

Comments: Collected: 04/25/2019

The ARCOG noted that the trip blanks were received from the lab with headspace.

The corrected ARCOG is missing the received by signature, date and time.

Validated by:

*L. Thal*

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 619667	SDG: 477558	Matrix: Aqueous
Laboratory Sample IDs: 477558001, -002, -008		
Method/Batch #s: <b>8260B</b> 1872273	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	X5	TB1 -008	X5
	Int.	RF/ Slope	RSD/ r <sup>2</sup>	(ICV)/CCV %D										
Acetone	-4.4	✓	✓	+22	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
2-Butanone	NA	✓	✓	<sup>1</sup> -23	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Vinyl chloride	-0.398	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
trans-1,3-Dichloropropylene	+0.57	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
4-Methyl-2-pentanone	NA	✓	✓	✓	✓	NA	✓	✓	✓	26	✓	NA	✓	NA
Styrene	+0.58	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Dibromochloromethane	+0.80	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Bromoform	+0.92	✓	✓	✓	✓	NA	✓	✓	✓	34	✓	NA	✓	NA
1,1,2,2-Tetrachloroethane	NA	✓	✓	<sup>1</sup> -23	✓	NA	✓	✓	✓	38	✓	NA	✓	NA
Tetrachloroethylene	NA	✓	✓	✓	✓	NA	✓	✓	✓	21	✓	NA	✓	NA
2-Hexanone	NA	✓	✓	+22	✓	NA	✓	✓	✓	28	✓	NA	✓	NA
Surrogate Recovery Outliers														
Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R						
None														
IS Outliers														
FBZ			Chl-d5		1,4-DCB-d4									
Sample ID	Area	RT	Area	RT	Area	RT								
None														

Comments: HTs OK. <sup>1</sup> associated with the MS/MSD on sample -002

ICAL: VOA6.I 05/02/2019 Linear: Vinyl chloride; Acetone; Methylene chloride; trans-1,3-Dichloropropylene; Dibromochloromethane; Styrene; Bromoform.

Mass spectra checked



## Sandia Inorganic Metals Worksheet

ARCOG #(s): 619667	SDG #(s): 477558	Matrix: Aqueous
Laboratory Sample IDs: 477558003		
Method/Batch #s: <b>3005A/6020B</b> :1871822/1871823		

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

Analyte (outliers)	Calibration						MB mg/L	5X Blank mg/L	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R			
	Int. mg/L	R <sup>2</sup>	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 -003.  
ICS NA



# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>N/A</i>		SMO Use		AR/COC <b>619667</b>								
Project Name: MWL LTMMMP		Date Samples Shipped: <i>4/25/19</i>		SMO Authorization: <i>[Signature]</i>								
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>297189</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: CF01-19		Lab Destination: GEL		Send Report to SMO:								
		Contract No.: 1983530		Stephanie Montaño/505-284-2553								
Tech Area:				<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius								
Building:		Room:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 <i>477558</i>								
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
108124	001	MWL-FB1	NA	4/25/19 10:30	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	<i>001</i>
108125	001	MWL-B2	496	4/25/19 10:30	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	<i>002</i>
108125	002	MWL-B2	496	4/25/19 10:31	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	<i>003</i>
108125	003	MWL-B2	496	4/25/19 10:32	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>004</i>
108125	004	MWL-B2	496	4/25/19 10:33	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>005</i>
108125	005	MWL-B2	496	4/25/19 10:34	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>006</i>
108125	006	MWL-B2	496	4/25/19 10:35	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>007</i>
108126	001	MWL-TB1	NA	4/25/19 10:30	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (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						
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/08888/505-284-3307/505-239-7367		Return Samples By:						
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/08888/505-844-4013/505-250-7090		Comments: Received trip blanks from lab with head space. MUST						
	Zachary Tenorio	<i>[Signature]</i>	<i>ZT</i>	SNL/08888/505-845-8636/505-259-5765		PERFORM ORGANIC ANALYSES WITHIN HOLD TIME						
	Denisha Sanchez	<i>[Signature]</i>	<i>DS</i>	SNL/08888/505-845-7829/505-208-1375		REQUIREMENTS.						
Relinquished by <i>[Signature]</i>		Org. <i>08888</i>	Date <i>4/25/19</i>	Time <i>1104</i>	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org. <i>00642</i>	Date <i>4/25/19</i>	Time <i>1104</i>	Received by		Org.	Date	Time			
Relinquished by <i>[Signature]</i>		Org. <i>00642</i>	Date <i>4/25/19</i>	Time <i>1210</i>	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org.	Date <i>4/26/19</i>	Time <i>715</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

Page 1 of 1

AR/COC **619667**

Project Name: MWL LTMMMP	Date Samples Shipped: <u>4/25/19</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"/> <b>4° Celsius</b>
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <u>297189</u>	SMO Contact Phone: <u>9MO</u>	
Project/Task Number: 195122.10.11.08	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF01-19	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505-284-2553	
Tech Area:		Contract No. 1983530	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154
Building:	Room:	Operational Site:	

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
108124	001	MWL-FB1	NA	4/25/19 10:30	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	
108125	001	MWL-B2 <u>BW2</u>	496	4/25/19 10:30	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	
108125	002	MWL-B2 <u>T1</u>	496	4/25/19 10:31	GW	P	500 ml	HNO3	G	SA	METALS: LTMMMP - Cd, Cr, Ni, U	
108125	003	MWL-B2 <u>4/26/19</u>	496	4/25/19 10:32	GW	P	1 L	HNO3	G	SA	GAMMA SPEC. SHORT LIST (EPA 901)	
108125	004	MWL-B2	496	4/25/19 10:33	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	
108125	005	MWL-B2	496	4/25/19 10:34	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	
108125	006	MWL-B2	496	4/25/19 10:35	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	
108126	001	MWL-TB1	NA	4/25/19 10:30	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	

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		Comments: Received trip blanks from lab with head space. MUST PERFORM ORGANIC ANALYSES WITHIN HOLD TIME REQUIREMENTS.	
	William Gibson	<u>[Signature]</u>	<u>WG</u>	SNL/08888/505-284-3307/505-239-7367		Return Samples By:			
	Robert Lynch	<u>[Signature]</u>	<u>RL</u>	SNL/08888/505-844-4013/505-250-7090					
	Zachary Tenorio	<u>[Signature]</u>	<u>ZT</u>	SNL/08888/505-845-8636/505-259-5765					
	Denisha Sanchez	<u>[Signature]</u>	<u>DS</u>	SNL/08888/505-845-7829/505-208-1375					
Relinquished by <u>[Signature]</u>		Org <u>08888</u>	Date <u>4/25/19</u>	Time <u>1104</u>	Relinquished by		Org	Date	Time
Received by <u>[Signature]</u>		Org <u>00642</u>	Date <u>4/25/19</u>	Time <u>1104</u>	Received by		Org	Date	Time
Relinquished by <u>[Signature]</u>		Org <u>00642</u>	Date <u>4/25/19</u>	Time <u>1210</u>	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

**AR/COC NUMBERS 619670, 619671, 619672, 619673, 619674**

## Memorandum

Date: June 7, 2019  
To: File  
From: Linda Thal  
Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 619670, 619671, 619672, 619673 and 619674  
SDG: 477729  
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

Fourteen 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 477729016 associated with samples -024 and -030. The associated sample results were detects  $\leq$  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 and Preservation

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

### Instrument Tune

All instrument tune requirements were met.

### Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows. The initial calibration %RSD was  $>15\%$  but  $\leq 40\%$  for carbon



disulfide. The associated sample results were non-detect and since no other calibration infractions occurred, will not be qualified.

The CCV %Ds were >20% and positive for dichlorodifluoromethane. 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 except as noted above in the Summary section.

### **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 recoveries and RPDs met QC acceptance criteria.

### **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 acceptability were verified during data validation and met QC acceptance criteria.

Five TBs were submitted, one for each ARCOC. FB2 was submitted with ARCOC 619670; FB3 was submitted with ARCOC 619673 and FB4 was submitted with ARCOC 619674; the FBs were associated with the samples on the same ARCOCs. EB1 was submitted with ARCOC 619672 and was associated with the samples on ARCOC 619673. A deionized water sample, the source water for EB1, was submitted with ARCOC 619671 and was not associated with any field samples. A field duplicate pair was submitted with ARCOC 619673. 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:** 06/10/19

## Memorandum

Date: June 10, 2019  
To: File  
From: Linda Thal  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 619670, 619671, 619672, 619673 and 619674  
SDG: 477729  
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**

Six samples were prepared and analyzed with approved procedures using method EPA 6020B (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times and Preservation**

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

### **ICP-MS Instrument Tune**

The ICP-MS tune met QC acceptance criteria.

### **Calibration**

All initial and continuing calibration criteria met QC acceptance criteria.

### **Reporting Limit Verification**

All LLCCV recoveries met QC acceptance criteria.



### **Blanks**

No target analytes were detected in any of the blanks.

### **ICP -MS Internal Standards**

The ICP-MS internal standards met QC acceptance criteria.

### **Matrix Spike (MS)**

The MS met all QC acceptance criteria.

### **Laboratory Replicate**

The replicate met all QC acceptance criteria.

### **Laboratory Control Sample (LCS)**

The LCS met all QC acceptance criteria.

### **Detection Limits/Dilutions**

All detection limits were properly reported. The samples were not diluted.

### **ICP Interference Check Sample (ICS A and AB)**

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

### **ICP Serial Dilution**

The serial dilution met all QC acceptance criteria.

### **Other QC**

EB1 was submitted with ARCO 619672 and was associated with the samples on ARCO 619673. A deionized water sample, the source water for EB1, was submitted with ARCO 619671 and was not associated with any field samples. A field duplicate pair was submitted with ARCO 619673. 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:** 06/10/19

## Memorandum

Date: June 10, 2019

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 619670, 619671, 619672, 619673 and 619674  
SDG: 477729  
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

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 (Rn-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 Alpha/Beta and Rn-222:

1. The sample results that were > the MDA but  $\leq 3X$  the MDA will be **qualified J,FR7**.

### Holding Times and Preservation

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

### Quantification

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

### **Calibration**

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

### **Blanks**

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

### **Tracer/Carrier Recovery**

Tracer/Carriers were not a method requirement.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS analysis for tritium was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

### **Laboratory Replicate**

All replicate error ratio acceptance criteria were met. It should be noted that the replicate analysis for tritium was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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

The LCS and/or LCSD met QC acceptance criteria for accuracy and/or precision.

### **Detection Limits/Dilutions**

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

### **Other QC**

EB1 was submitted with ARCOG 619672 and was associated with the samples on ARCOG 619673. A deionized water sample, the source water for EB1, was submitted with ARCOG 619671 and was not associated with any field samples. A field duplicate pair was submitted with ARCOG 619673. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

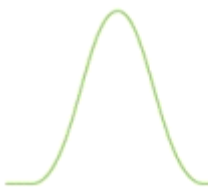
No other specific issues that affect data quality were identified.

**Reviewed by:** Mary Donovan

**Level:** I

**Date:** 06/10/19

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## Sample Findings Summary



AR/COC: 619670, 619671, 619672, 619673, 619674

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	108132-004/MWL-MW7	BETA (12587-47-2)	J, FR7
	108134-004/DIW/QC	ALPHA (12587-46-1)	BD, FR3
	108134-004/DIW/QC	BETA (12587-47-2)	BD, FR3
	108136-004/MWL- EB1	ALPHA (12587-46-1)	BD, FR3
	108136-004/MWL- EB1	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	108132-003/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	108132-003/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	108132-003/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	108132-003/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
	108134-003/DIW/QC	Americium-241 (14596-10-2)	BD, FR3
	108134-003/DIW/QC	Cesium-137 (10045-97-3)	BD, FR3
	108134-003/DIW/QC	Cobalt-60 (10198-40-0)	BD, FR3
	108134-003/DIW/QC	Potassium-40 (13966-00-2)	BD, FR3
	108136-003/MWL- EB1	Americium-241 (14596-10-2)	BD, FR3
	108136-003/MWL- EB1	Cesium-137 (10045-97-3)	BD, FR3
	108136-003/MWL- EB1	Cobalt-60 (10198-40-0)	BD, FR3
	108136-003/MWL- EB1	Potassium-40 (13966-00-2)	BD, FR3
	108146-003/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	108146-003/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3
	108146-003/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	108146-003/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
	108147-003/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	108147-003/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	108147-003/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	108147-003/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
	108150-003/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	108150-003/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	108150-003/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	108150-003/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
<b>EPA 906.0 Modified</b>			
	108132-005/MWL-MW7	Tritium (10028-17-8)	BD, FR3
	108134-005/DIW/QC	Tritium (10028-17-8)	BD, FR3
	108136-005/MWL- EB1	Tritium (10028-17-8)	BD, FR3
	108146-005/MWL-MW9	Tritium (10028-17-8)	BD, FR3
	108147-005/MWL-MW9	Tritium (10028-17-8)	BD, FR3
	108150-005/MWL-MW8	Tritium (10028-17-8)	BD, FR3
<b>SM 7500 Rn B</b>			
	108132-006/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
	108134-006/DIW/QC	Radon-222 (14859-67-7)	BD, FR3
	108136-006/MWL- EB1	Radon-222 (14859-67-7)	BD, FR3
	108150-006/MWL-MW8	Radon-222 (14859-67-7)	J, FR7
<b>SW846 8260B DOE-AL</b>			
	108146-001/MWL-MW9	Acetone (67-64-1)	10U, B2
	108147-001/MWL-MW9	Acetone (67-64-1)	10U, B2

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

## Sandia Data Validation Summary Worksheet

ARCOC#: 619670, 619671, 619672, 619673 and 619674	Site/Project: MWL LTMMP	Validation Date: 06/07/2019
SDG #: 477729	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 44	CVR present: Yes
ARCOC(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: 04/29 through 05/01/2019

The ARCOCs noted that the trip blanks were received from the lab with headspace.

ARCOC 619673 is missing the recipient initials on the 2<sup>nd</sup> page

One of three vials was received with headspace for samples -015 and -044; two of three vials were received with headspace for sample -022 and all three vials were received with headspace for sample -036.

Validated by:

*L. Thal*

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 619670, 619671, 619672, 619673 and 619674	SDG: 477729	Matrix: Aqueous
Laboratory Sample IDs: 477729001, -002, -008, -009, -015, -016, -022, -023, -024, -030, -036, -037, -038, -044		
Method/Batch #s: <b>8260B</b> 1875632	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 FB3 -023 FB4 -037	TB3 -008 TB2 -015 TB4 -022	TB5 -036 TB6 -044	DIW/QC -009 EB1 -016 <sup>a</sup>
	Int.	RF/ Slope	RSD/ r <sup>2</sup>	(ICV %D) CCV %D										
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	1.74J <sup>a</sup>
Dichlorodifluoromethane	NA	✓	✓	<sup>1</sup> +21, <sup>2</sup> 32	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Carbon disulfide	NA	✓	16	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓

### Surrogate Recovery Outliers

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

### IS Outliers

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

Comments: HTs OK. MS/MSD on sample -002. Mass spectra for detects checked.  
ICAL: VOA4.I 03/21/2019 Linear: Methylene chloride  
<sup>1</sup>associated with samples -001 and -002 only. <sup>2</sup>associated with all remaining samples.

## Sandia Inorganic Metals Worksheet

ARCOG #(s): 619670, 619671, 619672, 619673 and 619674	SDG #(s): 477729	Matrix: Aqueous
Laboratory Sample IDs: 477729003, -010, -017, -025, -031, -039		
Method/Batch #s: <b>3005A/6020B</b> :1873305/1873306		

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

Analyte (outliers)	Calibration						MB mg/L	5X Blank mg/L	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R	DIW/ QC -010	EB1 -017	
	Int. mg/L	R <sup>2</sup>	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 -003.  
ICS NA



# Sandia Radiochemistry Worksheet

ARCO #s: 619670, 619671, 619672, 619673 and 619674	SDG #:477729	Matrix: Aqueous
Laboratory Sample IDs:477729 – see below		
Method/Batch#s: EPA 901.1 (gammascpec)/1873140 Samples -004, -011, -018, -026, -032, -040		
Method/Batch#s: EPA 900.0/SW846 9310 (gross A/B)/1875696 Samples -005, -012, -019, -027, -033, -041		
Method/Batch#s: SM 7500 Rn B (Rn-222)/1873111 Samples -007, -014, -021, -029, -035, -043		
Method/Batch#s: EPA 906.0 Modified (tritium)/1876034 Samples -006, -013, -020, -028, -034, -042		

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDC	LCS/D %R	MS %R	MSD %R	MS/ MSD RER	Lab Rep. RER	DIW/QC	EB1		
none													
Tracer/Carrier Recovery Outliers													
Sample ID	Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	
NA													

Comments: HTs OK. Note: No precision criteria applies to sample results < the MDA including where one result is > the MDA and the other <.

Tritium DUP and MS on SNL sample 477558006

Gross A/B: DUP, MS/MSD on sample -005. Sample and DUP 100ml; MS/MSD 50ml; 2.0X dilution.  
-005 aliquot reduced due to limited sample volume. Samples-027, -033 and -041 aliquots reduced to the sample matrix.

Rn-222: sample dup -007. LCS/LCSD

GS: DUP on -004

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

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Batch No. <i>NA</i>		SMO Use		AR/COC <b>619670</b>								
Project Name: MWL LTMMP		Date Samples Shipped: <i>4/29/19</i>		SMO Authorization: <i>[Signature]</i>								
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>297322</i>		SMO Contact Phone: <i>940</i>								
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132								
Service Order: CF01-19		Lab Destination: GEL		Send Report to SMO: <input checked="" type="checkbox"/> 4° Celsius								
		Contract No.: 1983530		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>477729</i>								
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
108131	001	MWL -FB2	NA	4/29/19 09:57	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	<i>001</i>
108132	001	MWL -MW7	496	4/29/19 09:57	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	<i>002</i>
108132	002	MWL -MW7	496	4/29/19 09:58	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	<i>003</i>
108132	003	MWL -MW7	496	4/29/19 09:59	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>004</i>
108132	004	MWL -MW7	496	4/29/19 10:00	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>005</i>
108132	005	MWL -MW7	496	4/29/19 10:01	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>006</i>
108132	006	MWL -MW7	496	4/29/19 10:02	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>007</i>
108133	001	MWL-TB3	NA	4/29/19 09:57	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"/>						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal		Return Samples By:		Comments: Received trip blanks from lab with head space. MUST PERFORM ORGANIC ANALYSES WITHIN HOLD TIME REQUIREMENTS.		
	William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/08888/505-284-3307/505-239-7367		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab						
	Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/08888/505-844-4013/505-250-7090								
	Zachary Tenorio	<i>[Signature]</i>	<i>ZT</i>	SNL/08888/505-845-8636/505-259-5765								
	Denisha Sanchez	<i>[Signature]</i>	<i>DS</i>	SNL/08888/505-845-7829/505-208-1375								
Relinquished by <i>[Signature]</i>		Org. <i>8888</i>	Date <i>4/29/19</i>	Time <i>1150</i>	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org. <i>0042</i>	Date <i>4/29/19</i>	Time <i>1150</i>	Received by		Org.	Date	Time			
Relinquished by <i>[Signature]</i>		Org. <i>0042</i>	Date <i>4/29/19</i>	Time <i>1240</i>	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org.	Date <i>4-30-19</i>	Time <i>735</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

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Batch No. *N/A*

SMO Use

AR/COC

619671

Project Name: MWL LTMMMP	Date Samples Shipped: <i>4/29/19</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>297322</i>	SMO Contact Phone: <i>SMO</i>	
Project/Task Number: 195122.10.11.08	Lab Contact: Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	
Service Order: CF01-19	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505-284-2553	
Contract No.: 1983530		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	
Tech Area:			
Building:	Room:	Operational Site:	

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
108134	001	DIW/QC	NA	4/29/19 09:35	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	<i>009</i>
108134	002	DIW/QC	NA	4/29/19 09:36	DIW	P	500 ml	HNO3	G	FB	METALS, LTMMMP - Cd, Cr, Ni, U	<i>010</i>
108134	003	DIW/QC	NA	4/29/19 09:37	DIW	P	1 L	HNO3	G	FB	GAMMA SPEC, SHORT LIST (EPA 901)	<i>011</i>
108134	004	DIW/QC	NA	4/29/19 09:38	DIW	P	1 L	HNO3	G	FB	GROSS-ALPHA/BETA (EPA 900)	<i>012</i>
108134	005	DIW/QC	NA	4/29/19 09:39	DIW	AG	250 ml	NONE	G	FB	TRITIUM (EPA 906)	<i>013</i>
108134	006	DIW/QC	NA	4/29/19 09:40	DIW	AG	2x40 ml	NONE	G	FB	RADON (SM7500 Rn B)	<i>014</i>
108135	001	DIW/QC- TB2	NA	4/29/19 09:35	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (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		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day			
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT <input type="checkbox"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			
Confirmatory: <input type="checkbox"/> Yes		QC inits: <i>[Initials]</i>		Return Samples By:		Comments: Received trip blanks from lab with head space. MUST PERFORM ORGANIC ANALYSES WITHIN HOLD TIME REQUIREMENTS.			
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Lab Use			
	William Gibson	<i>[Signature]</i>	<i>[Initials]</i>	SNL/08888/505-284-3307/505-239-7367					
	Robert Lynch	<i>[Signature]</i>	<i>[Initials]</i>	SNL/08888/505-844-4013/505-250-7090					
	Zachary Tenorio	<i>[Signature]</i>	<i>[Initials]</i>	SNL/08888/505-845-8636/505-259-5765					
	Denisha Sanchez	<i>[Signature]</i>	<i>[Initials]</i>	SNL/08888/505-845-7829/505-208-1375					
Relinquished by <i>[Signature]</i>		Org. <i>8888</i>	Date <i>4-29-19</i>	Time <i>1150</i>	Relinquished by		Org.	Date	Time
Received by <i>[Signature]</i>		Org. <i>00642</i>	Date <i>4-29-19</i>	Time <i>1150</i>	Received by		Org.	Date	Time
Relinquished by <i>[Signature]</i>		Org. <i>00642</i>	Date <i>4/29/19</i>	Time <i>1235</i>	Relinquished by		Org.	Date	Time
Received by <i>[Signature]</i>		Org.	Date <i>4/30/19</i>	Time <i>735</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

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Batch No. <u>NA</u>		SMO Use		AR/COC <b>619672</b>								
Project Name: MWL LTMMP		Date Samples Shipped: <u>4/29/19</u>		SMO Authorization: <u>[Signature]</u>								
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <u>297322</u>		SMO Contact Phone: <u>5mo</u>								
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132								
Service Order: CF01-19		Lab Destination: GEL		Send Report to SMO:								
		Contract No.: 1983530		Stephanie Montaño/505-284-2553								
Tech Area:				<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius								
Building:		Room:		Operational Site:								
				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154								
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
108136	001	MWL- EB1	NA	4/29/19 11:31	GW	G	3x40 ml	HCl	G	EB	VOC-LTMMP (SW846-8260B)	016
108136	002	MWL- EB1	NA	4/29/19 11:32	GW	P	500 ml	HNO3	G	EB	METALS, LTMMP - Cd, Cr, Ni, U	017
108136	003	MWL- EB1	NA	4/29/19 11:33	GW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	018
108136	004	MWL- EB1	NA	4/29/19 11:34	GW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	019
108136	005	MWL- EB1	NA	4/29/19 11:35	GW	AG	250 ml	NONE	G	EB	TRITIUM (EPA 906)	020
108136	006	MWL- EB1	NA	4/29/19 11:36	GW	AG	2x40 ml	NONE	G	EB	RADON (SM7500 Rn B)	021
108137	001	MWL-TB4	NA	4/29/19 11:31	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	022
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			Return Samples By: Comments: Received trip blanks from lab with head space. MUST PERFORM ORGANIC ANALYSES WITHIN HOLD TIME REQUIREMENTS.			
	William Gibson	<u>[Signature]</u>	<u>WG</u>	SNL/08888/505-284-3307/505-239-7367								
	Robert Lynch	<u>[Signature]</u>	<u>RL</u>	SNL/08888/505-844-4013/505-250-7090								
	Zachary Tenorio	<u>[Signature]</u>	<u>ZT</u>	SNL/08888/505-845-8636/505-259-5765								
	Denisha Sanchez	<u>[Signature]</u>	<u>DS</u>	SNL/08888/505-845-7829/505-208-1375								
Relinquished by <u>[Signature]</u>		Org. <u>8888</u>	Date <u>4/29/19</u>	Time <u>1150</u>	Relinquished by		Org.	Date	Time	Lab Use		
Received by <u>[Signature]</u>		Org. <u>00642</u>	Date <u>4/29/19</u>	Time <u>1150</u>	Received by		Org.	Date	Time			
Relinquished by <u>[Signature]</u>		Org. <u>00642</u>	Date <u>4/29/19</u>	Time <u>1235</u>	Relinquished by		Org.	Date	Time			
Received by <u>[Signature]</u>		Org.	Date <u>4/30/19</u>	Time <u>735</u>	Received by		Org.	Date	Time			

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

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 2

Batch No.		SMO Use		AR/COC		619673						
Project Name: MWL LTMMMP		Date Samples Shipped: 4/30/19		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No.						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No: 297381		SMO Contact Phone: Wendy Palencia/505-844-3132		<input checked="" type="checkbox"/> 4° Celsius						
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Send Report to SMO: Stephanie Montaño/505-284-2553		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 477729						
Service Order: CF01-19		Lab Destination: GEL		Contract No.: 1983530								
Tech Area:		Operational Site:										
Building:		Room:										
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
108145	001	MWL-FB3	NA	4/30/19 10:02	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	023
108146	001	MWL-MW9	497	4/30/19 10:02	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	024
108146	002	MWL-MW9	497	4/30/19 10:03	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	025
108146	003	MWL-MW9	497	4/30/19 10:04	GW	P	1 L	HNO3	G	SA	GAMMA SPEC. SHORT LIST (EPA 901)	026
108146	004	MWL-MW9	497	4/30/19 10:05	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	027
108146	005	MWL-MW9	497	4/30/19 10:06	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	028
108146	006	MWL-MW9	497	4/30/19 10:07	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	029
108147	001	MWL-MW9	497	4/30/19 10:02	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMMP (SW846-8260B)	030
108147	002	MWL-MW9	497	4/30/19 10:03	GW	P	500 ml	HNO3	G	DU	METALS, LTMMMP - Cd, Cr, Ni, U	031
108147	003	MWL-MW9	497	4/30/19 10:04	GW	P	1 L	HNO3	G	DU	GAMMA SPEC. SHORT LIST (EPA 901)	032
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 Negotiated TAT <input type="checkbox"/>						
Background: <input type="checkbox"/> Yes		QC inits.:				Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab Return Samples By:						
Confirmatory: <input type="checkbox"/> Yes						Comments: Received trip blanks from lab with head space. MUST PERFORM ORGANIC ANALYSES WITHIN HOLD TIME REQUIREMENTS.						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell								
	Robert Lynch	[Signature]	RL	SNL/08888/505-844-4013/505-250-7090								
	Zachary Tenorio	[Signature]	ZT	SNL/08888/505-845-8636/505-259-5765								
	Denisha Sanchez	[Signature]	DS	SNL/08888/505-845-7829/505-208-1375								
Relinquished by [Signature]		Org. 8888	Date 4/30/19	Time 10:58	Relinquished by		Org.	Date	Time			
Received by [Signature]		Org. 00642	Date 4/30/19	Time 10:58	Received by		Org.	Date	Time			
Relinquished by [Signature]		Org. 00642	Date 4/30/19	Time 1:30	Relinquished by		Org.	Date	Time			
Received by [Signature]		Org.	Date 5-1-19	Time 10:35	Received by		Org.	Date	Time			

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

## Page 2 of 2

477720

[illegible]

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>N/A</i>		SMO Use		AR/COC <b>619674</b>																																																																																																					
Project Name: MWL LTMMMP		Date Samples Shipped: <i>5/1/19</i>		SMO Authorization: <i>[Signature]</i>																																																																																																					
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>297501</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																																																																																																					
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108149	001	MWL-FB4	NA	5/1/19 09:55	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	<i>037</i>																																																																																													
108150	001	MWL-MW8	497	5/1/19 09:55	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	<i>038</i>																																																																																													
108150	002	MWL-MW8	497	5/1/19 09:56	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	<i>039</i>																																																																																													
108150	003	MWL-MW8	497	5/1/19 09:57	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<i>040</i>																																																																																													
108150	004	MWL-MW8	497	5/1/19 09:58	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<i>041</i>																																																																																													
108150	005	MWL-MW8	497	5/1/19 09:59	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	<i>042</i>																																																																																													
108150	006	MWL-MW8	497	5/1/19 10:00	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	<i>043</i>																																																																																													
108151	001	MWL-TB6	NA	5/1/19 09:55	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	<i>044</i>																																																																																													
<table border="1"> <tr> <td colspan="3">Last Chain: <input checked="" type="checkbox"/> Yes</td> <td colspan="3">Sample Tracking</td> <td colspan="3">SMO Use</td> <td colspan="3">Special Instructions/QC Requirements:</td> <td rowspan="4">Conditions on Receipt</td> </tr> <tr> <td colspan="3">Validation Req'd: <input checked="" type="checkbox"/> Yes</td> <td colspan="3">Date Entered:</td> <td colspan="3"></td> <td colspan="3">EDD <input checked="" type="checkbox"/> Yes</td> </tr> <tr> <td colspan="3">Background: <input type="checkbox"/> Yes</td> <td colspan="3">Entered by:</td> <td colspan="3"></td> <td colspan="3">Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day</td> </tr> <tr> <td colspan="3">Confirmatory: <input type="checkbox"/> Yes</td> <td colspan="3">QC inits.:</td> <td colspan="3"></td> <td colspan="3">Negotiated TAT <input type="checkbox"/></td> </tr> <tr> <td rowspan="4">Sample Team Members</td> <td>Name</td> <td>Signature</td> <td>Init.</td> <td colspan="3">Company/Organization/Phone/Cell</td> <td colspan="3">Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab</td> <td colspan="3" rowspan="4">Return Samples By: Comments: Received trip blanks from lab with head space. MUST PERFORM ORGANIC ANALYSES WITHIN HOLD TIME REQUIREMENTS.</td> </tr> <tr> <td>William Gibson</td> <td><i>[Signature]</i></td> <td><i>WG</i></td> <td colspan="3">SNL/08888/505-284-3307/505-239-7367</td> </tr> <tr> <td>Robert Lynch</td> <td><i>[Signature]</i></td> <td><i>RL</i></td> <td colspan="3">SNL/08888/505-844-4013/505-250-7090</td> </tr> <tr> <td>Zachary Tenorio</td> <td><i>[Signature]</i></td> <td><i>ZT</i></td> <td colspan="3">SNL/08888/505-845-8636/505-259-5765</td> </tr> <tr> <td></td> <td>Denisha Sanchez</td> <td><i>[Signature]</i></td> <td><i>DS</i></td> <td colspan="3">SNL/08888/505-845-7829/505-208-1375</td> <td colspan="3"></td> <td colspan="3"></td> </tr> </table>													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			Return Samples By: Comments: Received trip blanks from lab with head space. MUST PERFORM ORGANIC ANALYSES WITHIN HOLD TIME REQUIREMENTS.			William Gibson	<i>[Signature]</i>	<i>WG</i>	SNL/08888/505-284-3307/505-239-7367			Robert Lynch	<i>[Signature]</i>	<i>RL</i>	SNL/08888/505-844-4013/505-250-7090			Zachary Tenorio	<i>[Signature]</i>	<i>ZT</i>	SNL/08888/505-845-8636/505-259-5765				Denisha Sanchez	<i>[Signature]</i>	<i>DS</i>	SNL/08888/505-845-7829/505-208-1375								
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<table border="1"> <tr> <td>Relinquished by <i>[Signature]</i></td> <td>Org. <i>5883</i></td> <td>Date <i>5/1/19</i></td> <td>Time <i>1050</i></td> <td>Relinquished by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Received by <i>[Signature]</i></td> <td>Org. <i>00612</i></td> <td>Date <i>5/1/19</i></td> <td>Time <i>1050</i></td> <td>Received by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Relinquished by <i>[Signature]</i></td> <td>Org. <i>00612</i></td> <td>Date <i>5/1/19</i></td> <td>Time <i>1300</i></td> <td>Relinquished by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Received by <i>[Signature]</i></td> <td>Org.</td> <td>Date <i>5/2/19</i></td> <td>Time <i>730</i></td> <td>Received by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> </table>													Relinquished by <i>[Signature]</i>	Org. <i>5883</i>	Date <i>5/1/19</i>	Time <i>1050</i>	Relinquished by	Org.	Date	Time	Received by <i>[Signature]</i>	Org. <i>00612</i>	Date <i>5/1/19</i>	Time <i>1050</i>	Received by	Org.	Date	Time	Relinquished by <i>[Signature]</i>	Org. <i>00612</i>	Date <i>5/1/19</i>	Time <i>1300</i>	Relinquished by	Org.	Date	Time	Received by <i>[Signature]</i>	Org.	Date <i>5/2/19</i>	Time <i>730</i>	Received by	Org.	Date	Time																																																													
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\*Prior confirmation with SMO required for 7 and 15 day TAT



## Memorandum

Date: July 23, 2019  
To: File  
From: Linda Thal  
Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 619673  
SDG: 482771  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: RAD

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

### **Summary**

One sample was re-prepared and re-analyzed with approved procedures using method EPA 900.0 (gross alpha). No problems were identified with the data package that resulted in the qualification of data.

### **Holding Times and Preservation**

The sample was re-prepared and analyzed within the prescribed holding times.

### **Quantification**

All quantification criteria were met.

### **Calibration**

The case narratives stated that the instrument used was properly calibrated.

### **Blanks**

No target analyte was detected in the blanks at concentrations  $\geq$  the MDA and 2-sigma TPU.

### **Tracer/Carrier Recovery**

Tracer/Carriers were not a method requirement.



**Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

The MS/ MSD met QC acceptance criteria.

**Laboratory Replicate**

All replicate error ratio acceptance criteria were met.

**Laboratory Control Sample (LCS)**

The LCS met QC acceptance criteria.

**Detection Limits/Dilutions**

The sample was not diluted. All required detection limits were met.

**Other QC**

The sample was originally analyzed for gross alpha/beta in SDG 477729. At the clients request the sample was relogged and reanalyzed for gross alpha in this SDG. The original sample result was slightly higher than historical values and was greater than the associated field duplicate sample result.

No other specific issues that affect data quality were identified.

**Reviewed by:** Mary Donovan

**Level:** I

**Date:** 07/26/19



## Sample Findings Summary



AR/COC: 619673

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC

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

## Sandia Data Validation Summary Worksheet

ARCOC#: 619673	Site/Project: MWL LTMMP	Validation Date: 07/23/2019
SDG #: 482771 relog of 477729027	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 1	CVR present: For original analysis only
ARCOC(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input type="checkbox"/> Organic <input type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

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

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

Comments: Collected: 04/30/2019

ARCOC 619673 is missing the recipient initials on the 2<sup>nd</sup> page

Validated by:

*L Thal*

# Sandia Radiochemistry Worksheet

ARCOC #(s): 619673	SDG #:482771	Matrix: Aqueous
Laboratory Sample IDs:482771– see below ( relog of 477729027)		
Method/Batch#s: EPA 900.0/SW846 9310 (gross alpha)/1890701 Sample -001		

[illegible][illegible]

Comments: HTs OK. Note: No precision criteria applies to sample results < the MDA including where one result is > the MDA and the other <.

Gross alpha: DUP, MS/MSD on sample -001. Sample and DUP 100ml; MS/MSD 25ml; 4.0X dilution.

CONTRACT LABORATORY  
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 2

Batch No.

SMO Use

AR/COC

619673

Project Name: MWL LTMMMP		Date Samples Shipped: 4/30/19		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 297381		SMO Contact Phone: Wendy Palencia/505-844-3132		<input type="checkbox"/> RMA						
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Send Report to SMO: Stephanie Montaño/505-284-2553		<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius						
Service Order: CF01-19		Lab Destination: GEL										
Contract No.: 1983530												
Tech Area:		Operational Site:		Bill to: Sandia National Laboratories (Accounts Payable),								
Building:		Room:		P.O. Box 5800, MS-0154								
				Albuquerque, NM 87185-0154		477729						
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					
108145	001	MWL-FB3	NA	4/30/19 10:02	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SWB46-8260B)	023
108146	001	MWL-MW9	497	4/30/19 10:02	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SWB46-8260B)	024
108146	002	MWL-MW9	497	4/30/19 10:03	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	025
108146	003	MWL-MW9	497	4/30/19 10:04	GW	P	1 L	HNO3	G	SA	GAMMA SPEC. SHORT LIST (EPA 901)	026
108146	004	MWL-MW9	497	4/30/19 10:05	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	027
108146	005	MWL-MW9	497	4/30/19 10:06	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	028
108146	006	MWL-MW9	497	4/30/19 10:07	GW	AG	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	029
108147	001	MWL-MW9	497	4/30/19 10:02	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMMP (SWB46-8260B)	030
108147	002	MWL-MW9	497	4/30/19 10:03	GW	P	500 ml	HNO3	G	DU	METALS, LTMMMP - Cd, Cr, Ni, U	031
108147	003	MWL-MW9	497	4/30/19 10:04	GW	P	1 L	HNO3	G	DU	GAMMA SPEC. SHORT LIST (EPA 901)	032
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:						Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes						
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Confirmatory: <input type="checkbox"/> Yes		QC initials:				Negotiated TAT <input type="checkbox"/>						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab						Lab Use
	Robert Lynch	[Signature]	RL	SNL/Q8888/505-844-4013/505-250-7090		Return Samples By:						
	Zachary Tenorio	[Signature]	ZT	SNL/Q8888/505-845-8636/505-259-5765		Comments: Received trip blanks from lab with head space. MUST PERFORM ORGANIC ANALYSES WITHIN HOLD TIME REQUIREMENTS.						
	Denisha Sanchez	[Signature]	DS	SNL/Q8888/505-845-7829/505-208-1375								
Relinquished by [Signature]		Org. 8838	Date 4/30/19	Time 10:58	Relinquished by		Org.	Date	Time			
Received by [Signature]		Org. 00642	Date 4/30/19	Time 1058	Received by		Org.	Date	Time			
Relinquished by [Signature]		Org. 00642	Date 4/30/19	Time 1330	Relinquished by		Org.	Date	Time			
Received by [Signature]		Org.	Date 5-1-19	Time 1035	Received by		Org.	Date	Time			

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

AOP 95-16

AR/COC 619673

[illegible]

**CONTRACT VERIFICATION REVIEW FORMS**  
**Mixed Waste Landfill Groundwater Monitoring**  
**April-May 2019**

<b>AR/COC Number</b>	<b>Sample Type</b>
619667	Environmental*
619670	Environmental*
619673	Environmental*
619674	Environmental*

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

## Contract Verification Form (CVR)

Project Leader Jackson

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 619667

Analytical Lab Gel

SDG No. 477558

*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		



Line No.	Item	Complete?		If no, explain
		Yes	No	
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		RDL not met for beta sample 108125-004
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 or 1-sigma for bioassay) 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		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.4	Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
	b) Matrix spike duplicate RPD data reported and met for all organic samples		X	Several VOC RPDs outside acceptance limits for ps/psd (QC1204272209/211). Alpha RPD outside acceptance limits for ms/msd (QC1204271723/724).
	c) Laboratory control sample duplicate RPD data reported and met for other analyses	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		
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 and TO-15) 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) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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	X		

Line No.	Item	Yes	No	Comments
	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 a) Instrument run logs provided	X		

## 5.0 Data Anomaly Report

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

## 6.0 Problem Resolution

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

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

Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 06-05-2019 12:13:00

Closed by: Wendy Palencia Date: 06-05-2019 12:13:00

## Contract Verification Form (CVR)

Project Leader Jackson

Project Name MWL LTMMF

Project/Task No. 195122\_10.11.08

ARCOC No. 619670, 619671, 619672, 619673 &amp; 619674

Analytical Lab GEL

SDG No. 477729

*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 of three vials for samples 108135-001 and 108151-001 received with headspace. Two of three vials for sample 108137-001 received with headspace. All three vials for sample 108148-001 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		

ARCOC No. 619670, 619671, 619672, 619673 &amp; 619674

Line No.	Item	Complete?		If no, explain
		Yes	No	
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 or 1-sigma for bioassay) 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		

Line No.	Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
	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		
	c) Laboratory control sample duplicate RPD data reported and met for other analyses	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-EB1
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 and TO-15) 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) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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		



Line No.	Item	Yes	No	Comments
4.5	Inorganics (metals) a) Initial calibration provided	X		
	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 a) Instrument run logs provided	X		

## 5.0 Data Anomaly Report

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

## 6.0 Problem Resolution

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

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

Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 06-06-2019 10:51:00

Closed by: Wendy Palencia Date: 06-06-2019 10:51:00

ARCOC No. 619670, 619671, 619672, 619673 & 619674

**FIELD SAMPLING FORMS**  
**OCTOBER 2019 GROUNDWATER MONITORING**

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name:	MWL-BW2 71 10/29/19		
Well I.D.:	MWL-BW2	Date:	10-14-19
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)
481.80	0818		Start						→
484.30	0858	5	20.44	725.05	45.4	7.28	0.34	16.91	1.26
485.12	0918	10	20.90	730.2	8.3	7.29	0.40	13.99	1.04
485.77	0940	15	21.20	741.3	-19.0	7.30	0.36	12.74	0.94
486.44	0957	19	21.36	745.6	-31.9	7.31	0.53	13.34	0.98
486.88	1007	21	21.32	711.90	-34.3	7.31	0.97	12.74	1.30
487.24	1015	23	21.10	742.12	-32.0	7.32	1.75	13.51	1.74
487.61	1024	25	21.04	740.9	-28.5	7.32	2.63	28.01	2.07
487.95	1034	27	20.95	738.25	-24.9	7.33	2.30	30.73	2.28
488.35	1044	29	20.93	737.3	-20.1	7.34	2.10	38.71	2.87
488.70	1054	31	20.91	735.8	-14.8	7.34	2.21	43.86	3.25
	1055	Sample							→

Comments: 1.6 gal. purge 0834

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL	
Well I.D.: MWL-MW7	Date: 10/15/19
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input checked="" type="checkbox"/> <del>TA 10/21/19</del> Pump depth: 496'

## PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
490.55	0853	—	—	—	—	—	—	—	—
491.53	0914	1	18.40	558.3	158.9	7.53	0.34	92.59	6.06
491.62	0922	2	18.62	563.40	149.0	7.55	0.35	90.50	6.87
491.65	0933	3	18.87	567.6	143.1	7.56	0.30	89.82	6.79
491.61	0946	4	19.42	576.3	138.0	7.56	0.34	90.31	6.74
491.50	1000	5	20.16	587.04	132.9	7.55	0.22	91.07	6.71
491.55	1012	6	20.82	596.7	129.4	7.55	0.36	91.77	6.67
491.65	1023	7	21.21	601.6	127.1	7.54	0.34	92.02	6.63
491.68	1033	8	21.25	601.6	125.3	7.54	0.21	91.90	6.62
491.72	1044	9	21.46	604.4	124.2	7.54	0.25	92.12	6.60
491.76	1053	10	21.79	607.9	123.1	7.54	0.29	92.4	6.59
—	1054	SAMPLING	—	—	—	—	—	—	—

Comments: 1.6 gals purged 0905  
 FB done with #6 Decon jug 10/21/19

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL	
Well I.D.: MWL-MW9	Date: 10/16/19
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input checked="" type="checkbox"/> <sup>10/16/19</sup> 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)
492.16	0857	—	—	—	—	—	—	—	—
494.00	0915	1	18.66	422.9	169.5	7.48	0.22	46.45	3.57
494.40	0922	2	19.77	575.8	160.1	7.48	0.35	43.52	3.28
494.76	0932	3	20.55	591.6	153.5	7.47	0.37	36.12	2.68
495.07	0943	4	20.40	593.9	148.2	7.47	0.53	29.99	2.23
495.23	0955	5	20.48	596.7	142.7	7.47	0.62	27.65	2.04
495.22	1007	6	20.64	601.5	136.6	7.47	0.38	26.32	1.93
495.21	1018	7	21.26	611.8	131.1	7.46	0.67	25.34	1.84
495.17	1030	8	21.24	611.8	126.1	7.46	0.25	24.35	1.77
495.11	1042	9	21.10	609.7	120.9	7.46	0.29	23.77	1.73
495.07	1054	10	21.77	619.6	116.2	7.46	0.24	23.73	1.70
—	1055	SAMPLING	—	—	—	—	—	—	—

Comments: 1.6 gal 0907  
 Lot # for QC 10/15 Lot # for FTS 10/15 1052

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL	
Well I.D.: MWL-MW8	Date: 10/17/19
Method: Portable pump <input checked="" type="checkbox"/>	Dedicated pump <input checked="" type="checkbox"/> 10/21/19 Pump depth: 497'

## PURGE MEASUREMENTS

[illegible]

Comments: Purge 1.6 gal. 0859

FB-4 Lulligan 10-15-19



Blue Truck

## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: <del>B86</del> MWL 278 10-14-19						
Calibrations done by: R Lynch				Date: 10/14/19		
Make & Model: INSITU AT 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 536303						
Other (S/N): NA						
<b>pH Calibration/Check</b>						
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: 0625	4.08	20.1	6.99	20.4	10.02	20.2
2. Time: 1305	4.09	22.2	7.01	22.0	10.01	21.9
3. Time:						
4. Time:						
Standard lot no.:	9GB303		9GB038		9GB459	
Expiration date:	FEB/21		FEB/21		FEB/21	
<b>SC Calibration/Check</b>						
Reference Value: 1413 uS/cm @ 25C			Standard Lot No.: 9GB450			
	Value	Temp	Expiration Date: FEB/20			
1. Time: 0621	1281.2	20.4				
2. Time: 1309	1351	21.9				
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: 220 mV			Standard Lot No. 9GC752			
	Value	Temp	Expiration Date: DEC/19			
1. Time: 0623	219.8	20.6				
2. Time: 1310	220.4	21.6				
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value: 100%	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: 0620	94.7		25.18			
2. Time: 1302	95.40		22.41			
3. Time:						
4. Time:						

**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

SNL/NM Project Name: <del>BSG</del> MWL WFA 10-14-19				
Calibration done by: R Lynch			Date: 10/14/19	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C76299	
Reference Value	10	20	100	800
Standard Lot No.	A8297	A8313	A834B	A8313
1. Time 0618	10.2	19.9	102	807
2. Time 1300	10.4	20.9	101	804
3. Time				
4. Time				
Comments:				



White Truck

**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG** Page 1 of 2

SNL/NM Project Name: <b>MWL</b>						
Calibrations done by: <b>D. Sanchez</b>				Date: <b>10/15/19</b>		
Make & Model: <b>INSITU AT 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>506777</b>						
Other (S/N): <b>NA</b>						
<b>pH Calibration/Check</b>						
pH Calibrated to (std): <b>7.00</b>			pH sloped to (std): <b>10.00</b>			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: <b>0431</b>	<b>4.09</b>	<b>20.9</b>	<b>7.03</b>	<b>20.8</b>	<b>10.04</b>	<b>20.7</b>
2. Time: <b>0700</b>	<b>4.10</b>	<b>21.3</b>	<b>7.04</b>	<b>21.0</b>	<b>10.04</b>	<b>21.1</b>
3. Time:						
4. Time:						
Standard lot no.:	<b>9GB303</b>		<b>9GB038</b>		<b>9GB459</b>	
Expiration date:	<b>FEB/21</b>		<b>FEB/21</b>		<b>FEB/21</b>	
<b>SC Calibration/Check</b>						
Reference Value: <b>1413 uS/cm @ 25C</b>			Standard Lot No.: <b>9GB450</b>			
	Value	Temp	Expiration Date: <b>FEB/20</b>			
1. Time: <b>0637</b>	<b>1308.8</b>	<b>20.8</b>				
2. Time: <b>0705</b>	<b>1367.8</b>	<b>21.0</b>				
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: <b>220 mV</b>			Standard Lot No. <b>9GC752</b>			
	Value	Temp	Expiration Date: <b>DEC/19</b>			
1. Time: <b>0639</b>	<b>219.1</b>	<b>21.0</b>				
2. Time: <b>0706</b>	<b>218.6</b>	<b>21.2</b>				
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value: <b>100%</b>	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: <b>0630</b>	<b>99.76</b>	<b>20.9</b>				
2. Time: <b>0655</b>	<b>99.45</b>	<b>21.58</b>				
3. Time:						
4. Time:						

**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

SNL/NM Project Name: MWL				
Calibration done by: D. Sanchez			Date: 10/15/19	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C076301	
Reference Value	10	20	100	800
Standard Lot No.	A8297	A8313	A834B	A8313
1. Time	10.0	20.7	99.6	810
2. Time	10.1	20.6	102	806
3. Time				
4. Time				
Comments:				

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White Truck

## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: <b>MWL</b>							
Calibrations done by: <b>D. Sanchez</b>				Date: <b>10/16/19</b>			
Make & Model: <b>INSITU AT 600</b>							
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>506777</b>							
Other (S/N): <b>NA</b>							
<b>pH Calibration/Check</b>							
pH Calibrated to (std): <b>7.00</b>			pH sloped to (std): <b>10.00</b>				
Reference value:		4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp	
1. Time:	<b>0700</b>	<b>4.16</b>	<b>21.3</b>	<b>7.04</b>	<b>21.0</b>	<b>10.04</b>	<b>21.1</b>
2. Time:	<b>0633</b>	<b>4.09</b>	<b>19.1</b>	<b>7.07</b>	<b>19.7</b>	<b>10.03</b>	<b>20.3</b>
3. Time:							
4. Time:							
Standard lot no.: <b>9GB303</b>		<b>9GB038</b>		<b>9GB459</b>			
Expiration date: <b>FEB/21</b>		<b>FEB/21</b>		<b>FEB/21</b>			
<b>SC Calibration/Check</b>							
Reference Value: <b>1413 uS/cm @ 25C</b>			Standard Lot No.: <b>9GB450</b>				
	Value	Temp	Expiration Date: <b>FEB/20</b>				
1. Time:	<b>0705</b>	<b>1367.8</b>	<b>21.0</b>				
2. Time:	<b>0641</b>	<b>1363.7</b>	<b>20.5</b>				
3. Time:							
4. Time:							
<b>ORP Calibration/Check</b>							
Reference Value: <b>220 mV</b>			Standard Lot No. <b>9GC752</b>				
	Value	Temp	Expiration Date: <b>DEC/19</b>				
1. Time:	<b>0706</b>	<b>218.6</b>	<b>21.2</b>				
2. Time:	<b>0642</b>	<b>221.1</b>	<b>20.6</b>				
3. Time:							
4. Time:							
<b>DO Calibration/Check</b>							
Calibration Value: <b>100%</b>		81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	<b>0658</b>	<b>99.45</b>	<b>21.58</b>				
2. Time:	<b>0632</b>	<b>104.12</b>	<b>15.01</b>				
3. Time:							
4. Time:							

**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

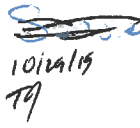
SNL/NM Project Name: MWL				
Calibration done by: D. Sanchez			Date: 10/16/19	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C076301	
Reference Value	10	20	100	800
Standard Lot No.	A8297	A8313	A834B	A8313
1. Time 0655	10.1	20.6	102	806
2. Time 0630	10.2	21.1	103	806
3. Time				
4. Time				
Comments:				

White Truck

**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG** Page 1 of 2

SNL/NM Project Name: <b>MWL</b>							
Calibrations done by: <b>D. Sanchez</b>				Date: <b>10/17/19</b>			
Make & Model: <b>INSITU AT 600</b>							
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>506777</b>							
Other (S/N): <b>NA</b>							
<b>pH Calibration/Check</b>							
pH Calibrated to (std): <b>7.00</b>			pH sloped to (std): <b>10.00</b>				
Reference value:		4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp	
1. Time:	<b>06:33</b>	<b>4.09</b>	<b>19.1</b>	<b>7.07</b>	<b>19.7</b>	<b>10.03</b>	<b>20.2</b>
2. Time:							
3. Time:							
4. Time:							
Standard lot no.:		9GB303		9GB038		9GB459	
Expiration date:		FEB/21		FEB/21		FEB/21	
<b>SC Calibration/Check</b>							
Reference Value: <b>1413 uS/cm @ 25C</b>			Standard Lot No.: <b>9GB450</b>				
	Value	Temp	Expiration Date: <b>FEB/20</b>				
1. Time:	<b>06:41</b>	<b>1303.7</b>					
2. Time:							
3. Time:							
4. Time:							
<b>ORP Calibration/Check</b>							
Reference Value: <b>220 mV</b>			Standard Lot No. <b>9GC752</b>				
	Value	Temp	Expiration Date: <b>DEC/19</b>				
1. Time:	<b>06:42</b>	<b>221.1</b>					
2. Time:							
3. Time:							
4. Time:							
<b>DO Calibration/Check</b>							
Calibration Value: <b>100%</b>		81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time:	<b>06:32</b>	<b>104.12</b>		<b>5.01</b>			
2. Time:							
3. Time:							
4. Time:							



**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

SNL/NM Project Name: MWL				
Calibration done by: D. Sanchez			Date: 10/17/19	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C076301	
Reference Value	10	20	100	800
Standard Lot No.	A8297	A8313	A834B	A8313
1. Time	0630	21.1	103	806
2. Time	1543	20.2	102	800
3. Time				
4. Time				
Comments:  Sonde S06777 would not connect for final QC on 10/17/19 - needs to be sent back to in-situ				

**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

<b>Project Name:</b> <u>MWL LTMMP</u>	<b>Monitoring Well ID #:</b> <u>NA</u>	<b>Date:</b> <u>10-11-19</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1806-814</u>	<b>Water Level Indicator ID #:</b> <u>NA</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Print Name:</b> <u>William Gibson</u>	<u>WJG</u> Initial:	
<b>Print Name:</b> <u>Zachary Tenorio</u>	<u>ZT</u> Initial:	
<b>Condition of Equipment</b>		
<b>Pump:</b> <u>Good</u>	<b>Tubing Bundle:</b> <u>Excellent</u>	<b>Water Level Indicator:</b> <u>NA</u>
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b>	<b>HNO<sub>3</sub></b>	
<b>Source:</b> <u>Culligan</u>	<b>Grade:</b> <u>Reagent</u>	
<b>Lot Number:</b> <u>10-02-19</u>	<b>UN #:</b> <u>2031</u>	
	<b>Manufacturer:</b> <u>ACROS</u>	
	<b>Lot Number:</b> <u>A0400317</u>	

**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

<b>Project Name:</b> <u>FY20Q1 MWL GWM</u>	<b>Monitoring Well ID #:</b> <u>MWL-BW2</u>	<b>Date:</b> <u>10/14/19</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1806-814</u>	<b>Water Level Indicator ID #:</b> <u>280208</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Bill Gibson</b> Print Name: _____	 Initial: _____	
<b>Tim Jackson</b> Print Name: _____	 Initial: _____	
<b>Condition of Equipment</b>		
<b>Pump:</b> <u>Good</u>	<b>Tubing Bundle:</b> <u>Good</u>	<b>Water Level Indicator:</b> <u>Good</u>
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b>	<b>HNO<sub>3</sub></b>	
<b>Source:</b> <u>Culligan</u>	<b>Grade:</b> <u>Reagent</u>	
<b>Lot Number:</b> <u>100219</u>	<b>UN #:</b> <u>2031</u>	
	<b>Manufacturer:</b> <u>ACROS</u>	
	<b>Lot Number:</b> <u>A0400317</u>	

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**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

<b>Project Name:</b> <u>MWL LTMMP</u>	<b>Monitoring Well ID #:</b> <u>MWL-MW7</u>	<b>Date:</b> <u>10-15-19</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1806-814</u>	<b>Water Level Indicator ID #:</b> <u>280208</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Print Name:</b> <u>William Gibson</u>		<u>WJG</u> <b>Initial:</b>
<b>Print Name:</b> <u>Zachary Tenorio</u>		<u>ZT</u> <b>Initial:</b>
<b>Condition of Equipment</b>		
<b>Pump:</b> <u>Good</u>	<b>Tubing Bundle:</b> <u>Excellent</u>	<b>Water Level Indicator:</b> <u>Good</u>
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b>	<b>HNO<sub>3</sub></b>	
<b>Source:</b> <u>Culligan</u>	<b>Grade:</b> <u>Reagent</u>	
<b>Lot Number:</b> <u>10-02-19</u>	<b>UN #:</b> <u>2031</u>	
	<b>Manufacturer:</b> <u>ACROS</u>	
	<b>Lot Number:</b> <u>A0400317</u>	

## Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

<b>SNL/NM</b> <b>Project Name:</b> MWL	<b>Monitoring Well ID #:</b> MWL-MW9	<b>Date:</b> 10/16/2019
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
<b>Pump and Tubing Bundle ID #:</b> 1806-814	<b>Water Level Indicator ID #:</b> 280208	
<b>Personnel Performing Decontamination:</b> Zach Tenorio Print Name: _____ Initial: <u>ZT</u> William Gibson Print Name: _____ Initial: <u>WG</u>		
<b>Condition of Equipment</b> <b>Pump:</b> ___ Excellent <b>Tubing Bundle:</b> ___ Excellent <b>Water Level Indicator:</b> ___ Good ___		
List of Decontamination Materials		
<b>Deionized Water</b> <b>Source:</b> Culligan <b>Lot Number:</b> 10/15/19 _____ _____	<b>HNO<sub>3</sub></b> <b>Grade:</b> Reagent <b>UN #:</b> 2031 <b>Manufacturer:</b> ACROS <b>Lot Number:</b> A0400317	<b>Detergent</b> <b>Manufacturer:</b> Alconox <b>Lot Number:</b> L2G7 <b>Expiration Date:</b> 06/21

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## Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

<b>SNL/NM</b> <b>Project Name:</b> MWL	<b>Monitoring Well ID #:</b> MWL-MW8	<b>Date:</b> 10/17/2019
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
<b>Pump and Tubing Bundle ID #:</b> 1806-640	<b>Water Level Indicator ID #:</b> 280208	
<b>Personnel Performing Decontamination:</b>		
Zach Tenorio Print Name:	Initial: <u>  ZT  </u>	
William Gibson Print Name:	Initial: <u>  WG  </u>	
<b>Condition of Equipment</b>		
<b>Pump:</b> <u>  </u> Excellent	<b>Tubing Bundle:</b> <u>  </u> Excellent	<b>Water Level Indicator:</b> <u>  </u> Good <u>  </u>
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b> <b>Source:</b> Culligan <b>Lot Number:</b> 10/15/19	<b>HNO<sub>3</sub></b> <b>Grade:</b> Reagent <b>UN #:</b> 2031 <b>Manufacturer:</b> ACROS <b>Lot Number:</b> A0400317	<b>Detergent</b> <b>Manufacturer:</b> Alconox <b>Lot Number:</b> L2G7 <b>Expiration Date:</b> 06/21

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**SUMMARY SHEET FOR  
OCTOBER 2019 GROUNDWATER SAMPLES**

**Sample Summary for Mixed Waste Landfill Groundwater Monitoring  
October 2019**

<b>Well ID</b>	<b>Sample Date</b>	<b>ARCOC</b>	<b>Sample Number</b>	<b>Sample Type</b>	<b>Associated Equipment Blank (ARCOC #/Sample #)</b>	<b>Associated Trip Blank (ARCOC #/ Sample #)</b>	<b>Associated Field Blank (ARCOC #/ Sample #)</b>	<b>Comments</b>
<b>GEL Analytical Data: Project Task # 195122.10.11.08, Service Order # CF01-20</b>								
MWL-BW2	14-Oct-19	620397	110505	Environmental	n/a	620397 / 110506	620397 / 110504	
MWL-MW7	15-Oct-19	620398	110508	Environmental	n/a	620398 / 110509	620398 / 110507	
MWL-MW8	17-Oct-19	620402	110521	Environmental	620400 / 110516	620402 / 110523	620402 / 110520	
MWL-MW8	17-Oct-19	620402	110522	Duplicate	620400 / 110516	620402 / 110523	620402 / 110520	
MWL-MW9	16-Oct-19	620399	110514	Environmental	n/a	620399 / 110515	620399 / 110513	
MWL-EB1	16-Oct-19	620400	110516	Equipment Blank	n/a	620400 / 110517	n/a	Equipment blank sample prior to MWL-MW8.
MWL-QC1	16-Oct-19	620401	110518	DIW QC	n/a	620401 / 110519	n/a	DIW source water for EB.
MWL-FB1	14-Oct-19	620397	110504	Field Blank	n/a	620397 / 110506	n/a	at MWL-BW2
MWL-FB2	15-Oct-19	620398	110507	Field Blank	n/a	620398 / 110509	n/a	at MWL-MW7
MWL-FB3	16-Oct-19	620399	110513	Field Blank	n/a	620399 / 110515	n/a	at MWL-MW9
MWL-FB4	17-Oct-19	620402	110520	Field Blank	n/a	620402 / 110523	n/a	at MWL-MW8

**DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES**  
**GROUNDWATER MONITORING**  
**OCTOBER 2019**

**AR/COC NUMBERS 620397, 620398, 620399, 620400, 620401, 620402**

## Memorandum

Date: December 4, 2019

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 620397, 620398, 620399, 620400, 620401 and 620402  
SDG: 492949  
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

Seventeen 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 FB1, sample 492949001 associated with sample -002. The associated sample result was a detect  $\leq$  the PQL and will be **qualified 10.0U,B2**; non-detect at the PQL.
2. Methylene chloride was detected at  $\leq$  the PQL in TB2, sample -016 associated with samples -009 (FB2) and -010. The associated sample results were detects  $\leq$  the PQL and will be **qualified 10.0U,B1**; non-detect at the PQL.
3. Methylene chloride was detected at  $\leq$  the PQL in TB4, sample -023 associated with sample -017 (EB1). The associated sample result was a detect  $\leq$  the PQL and will be **qualified 10.0U,B1**; non-detect at the PQL.
4. Methylene chloride was detected at  $\leq$  the PQL in TB5, sample -030 associated with sample -024 (MWL-QC1). The associated sample result was a detect  $\leq$  the PQL and will be **qualified 10.0U,B1**; non-detect at the PQL.
5. Methylene chloride was detected at  $\leq$  the PQL in TB6, sample -044 associated with samples -031, -032 and -038. The associated results for samples -032 and -038 were detects  $\leq$  the PQL and will be **qualified 10.0U,B1**; non-detect at the PQL.



6. For the initial calibration associated with sample -001, the %RSD was  $>15\%$  but  $\leq 40\%$  and the CCV %D was  $>20\%$  and positive for dibromochloromethane. The associated sample result was a detect and will be **qualified J+,I3,C2**.

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 analyzed within the prescribed holding time and were properly preserved.

### **Instrument Tune**

All instrument tune requirements were met.

### **Calibration**

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows. For the initial calibration associated with samples -001, -002 and -008, the intercept was positive and  $>$  the MDL for 1,1-dichloroethylene. The associated sample results were non-detect and will not be qualified.

For the initial calibration associated with samples -001, -002 and -008, the %RSD was  $>15\%$  but  $\leq 40\%$  for dibromochloromethane; carbon disulfide; trans-1,3-dichloropropylene; styrene and bromoform. All associated sample results, *except* the dibromochloromethane result for sample -001, were non-detect, and since positive CCVs are not considered another calibration infraction (see comment below), will not be qualified.

For the CCV associated with samples -001, -002 and -008, the %Ds were  $>20\%$  and positive for dibromochloromethane; carbon disulfide; bromoform; carbon tetrachloride and cis-1,3-dichloropropylene. All associated sample results, *except* the dibromochloromethane result for sample -001, were non-detect, and will not be qualified.

For the CCV associated with samples -009, -010, -016, -017, -023, -024, -030, -031, -032, -038 and -044, the %Ds were  $>20\%$  but  $\leq 40\%$  with negative bias for acetone, 2-butanone and 2-hexanone. The associated sample results were non-detect and since no other calibration infractions occurred, will not be qualified.

For the CCV associated with samples -045, -046 and -052, the %Ds were  $>20\%$  and positive for dichlorodifluoromethane; carbon tetrachloride and 1,1,1-trichloroethane. 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. Bromodichloromethane and chloroform were detected at  $>$  the PQL and dibromochloromethane at  $\leq$  the PQL in FB1, sample -001 associated with sample -002. Bromodichloromethane and chloroform were detected at  $>$  the PQL and dibromochloromethane at  $\leq$  the PQL in FB2, sample -009 associated with sample -010. Chloroform was detected at  $>$  the PQL and bromodichloromethane at  $\leq$  the PQL in FB4, sample -031 associated with samples -032 and -038. Chloroform was detected at  $>$  the PQL and bromodichloromethane at  $\leq$  the PQL in FB3, sample -045 associated with sample -046. Chloroform was detected at  $>$  the PQL and

bromodichloromethane at  $\leq$  the PQL in EB1, sample -017 associated with samples -032 and -038. The associated sample results were non-detect and will not be qualified.

Methylene chloride was detected at  $\leq$  the PQL in TB6, sample -044 associated with samples -031, -032 and -038. The associated result for sample -031 was non-detect and will not be qualified.

Methylene chloride was detected at  $\leq$  the PQL in FB2, sample -009, and EB1, sample -017, but the results were qualified non-detect due to TB contamination and will not be applied to the associated sample results.

Chloroform was detected at  $>$  the PQL and bromodichloromethane at  $\leq$  the PQL in MWL-QC1, sample -024, the deionized source water for EB1. No field sample results will be qualified. Methylene chloride was also detected at  $\leq$  the PQL in MWL-QC1 but was qualified non-detect due to TB contamination.

### **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 recoveries and RPDs met QC acceptance criteria.

### **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 acceptability were verified during data validation and met QC acceptance criteria.

Six TBs were submitted, one for each ARCOC. FB1 was submitted with ARCOC 620397; FB2 was submitted with ARCOC 620398; FB3 was submitted with ARCOC 620399 and FB4 was submitted with ARCOC 620402; the FBs were associated with the samples on their respective ARCOCs. EB1 was submitted with ARCOC 620400 and was associated with the samples on ARCOC 620402. A deionized water sample, the source water for EB1, was submitted with ARCOC 620401 and was not associated with any field samples. A field duplicate pair was submitted with ARCOC 620402. 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:** 12/05/19

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## Memorandum

Date: December 4, 2019

To: File

From: Linda Thal

Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 620397, 620398, 620399, 620400, 620401 and 620402  
SDG: 492949  
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**

Seven samples were prepared and analyzed with approved procedures using method EPA 6020B (ICP-MS). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times and Preservation**

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

### **ICP-MS Instrument Tune**

The ICP-MS tune met QC acceptance criteria.

### **Calibration**

All initial and continuing calibration criteria met QC acceptance criteria.

### **Reporting Limit Verification**

All LLCCV recoveries met QC acceptance criteria.

### **Blanks**

No target analytes were detected in any of the blanks with the following exceptions. U was detected at  $\leq$  the PQL in the initial calibration blank. The associated sample results were either detects  $>5X$  the blank value or non-detect and will not be qualified.

Ni was detected at  $\leq$  the PQL in sample 492949025. This was the deionized source water for EB1 and no field sample results will 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 for Ca, Mg, Al and Fe were  $<$  those in the ICS A and AB solutions.

### **ICP Serial Dilution**

The serial dilution met all QC acceptance criteria.

### **Other QC**

EB1 was submitted with ARCO 620400 and was associated with the samples on ARCO 620402. A deionized water sample, the source water for EB1, was submitted with ARCO 620401 and was not associated with any field samples. A field duplicate pair was submitted with ARCO 620402. 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:** 12/05/19

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## Memorandum

Date: December 5, 2019

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 620397, 620398, 620399, 620400, 620401 and 620402  
SDG: 492949  
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

Seven 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 (Rn-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 Alpha/Beta and Rn-222:

1. The sample results that were > the MDA but  $\leq 3X$  the MDA will be **qualified J,FR7**.

#### Gamma Spec:

1. The K-40 result for sample 492949026 was considered a false positive due to the peak not meeting identification criteria. The associated result will be **qualified R,Z2**.

### 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  $\geq$  the MDA and 2-sigma TPU.

Gross beta was detected at  $\geq$  the MDA but  $< 3X$  the MDA in sample -027. This was the deionized source water for EB1 and no field sample results will be qualified.

### **Tracer/Carrier Recovery**

Tracer/Carriers were not a method requirement.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

The MS and/or MSD met QC acceptance criteria

### **Laboratory Replicate**

All replicate error ratio acceptance criteria were met.

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

The LCS and/or LCSD met QC acceptance criteria for accuracy and/or precision.

### **Detection Limits/Dilutions**

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

### **Other QC**

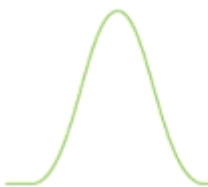
EB1 was submitted with ARCO 620400 and was associated with the samples on ARCO 620402. A deionized water sample, the source water for EB1, was submitted with ARCO 620401 and was not associated with any field samples. A field duplicate pair was submitted with ARCO 620402. There are no "required" review 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:** 12/05/19



## Sample Findings Summary



AR/COC: 620397, 620398, 620399, 620400, 620401, 620402

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	110516-004/MWL-EB1	ALPHA (12587-46-1)	BD, FR3
	110516-004/MWL-EB1	BETA (12587-47-2)	BD, FR3
	110518-004/MWL-QC1	ALPHA (12587-46-1)	BD, FR3
	110518-004/MWL-QC1	BETA (12587-47-2)	J, FR7
EPA 901.1			
	110505-003/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	110505-003/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3
	110505-003/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	110505-003/MWL-BW2	Potassium-40 (13966-00-2)	BD, FR3
	110508-003/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	110508-003/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	110508-003/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	110508-003/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
	110514-003/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	110514-003/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3
	110514-003/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	110514-003/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
	110516-003/MWL-EB1	Americium-241 (14596-10-2)	BD, FR3
	110516-003/MWL-EB1	Cesium-137 (10045-97-3)	BD, FR3
	110516-003/MWL-EB1	Cobalt-60 (10198-40-0)	BD, FR3
	110516-003/MWL-EB1	Potassium-40 (13966-00-2)	BD, FR3
	110518-003/MWL-QC1	Americium-241 (14596-10-2)	BD, FR3
	110518-003/MWL-QC1	Cesium-137 (10045-97-3)	BD, FR3
	110518-003/MWL-QC1	Cobalt-60 (10198-40-0)	BD, FR3



Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	110518-003/MWL-QC1	Potassium-40 (13966-00-2)	R, Z2
	110521-003/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	110521-003/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	110521-003/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	110521-003/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
	110522-003/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	110522-003/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	110522-003/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	110522-003/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
<b>EPA 906.0 Modified</b>			
	110505-005/MWL-BW2	Tritium (10028-17-8)	BD, FR3
	110508-005/MWL-MW7	Tritium (10028-17-8)	BD, FR3
	110514-005/MWL-MW9	Tritium (10028-17-8)	BD, FR3
	110516-005/MWL-EB1	Tritium (10028-17-8)	BD, FR3
	110518-005/MWL-QC1	Tritium (10028-17-8)	BD, FR3
	110521-005/MWL-MW8	Tritium (10028-17-8)	BD, FR3
	110522-005/MWL-MW8	Tritium (10028-17-8)	BD, FR3
<b>SM 7500 Rn B</b>			
	110508-006/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
	110516-006/MWL-EB1	Radon-222 (14859-67-7)	BD, FR3
	110518-006/MWL-QC1	Radon-222 (14859-67-7)	BD, FR3
	110521-006/MWL-MW8	Radon-222 (14859-67-7)	J, FR7
<b>SW846 8260B DOE-AL</b>			
	110504-001/MWL-FB1	Dibromochloromethane (124-48-1)	J+, I3,C2
	110505-001/MWL-BW2	Acetone (67-64-1)	10.0U, B2
	110507-001/MWL-FB2	Methylene chloride (75-09-2)	10.0U, B1
	110508-001/MWL-MW7	Methylene chloride (75-09-2)	10.0U, B1
	110516-001/MWL-EB1	Methylene chloride (75-09-2)	10.0U, B1
	110518-001/MWL-QC1	Methylene chloride (75-09-2)	10.0U, B1

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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	110521-001/MWL-MW8	Methylene chloride (75-09-2)	10.0U, B1
	110522-001/MWL-MW8	Methylene chloride (75-09-2)	10.0U, B1

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

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## Sandia Data Validation Summary Worksheet

ARCOC#: 620397, 620398, 620399, 620400, 620401 and 620402	Site/Project: MWL LTMMP	Validation Date: 12/04/2019
SDG #: 492949	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 52	CVR present: Yes
ARCOC(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: 10/14 through 10/17/2019.

The ARCOCs noted that the trip blanks were received from the lab with headspace.

ARCOC 620401 revised to show correct collection date

Validated by:

*L. Thal*

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 620397, 620398, 620399, 620400, 620401 and 620402	SDG: 492949	Matrix: Aqueous
Laboratory Sample IDs: 492949001, -002, -008, -009, -010, -016, -017, -023, -024, -030, -031, -032, -038, -044, -045, -046, -052		
Method/Batch #s: <b>8260B</b> 1927023 and 1931733	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	X5 (X10)	TB1 -008	X5 (X10)
	Int.	RF/ Slope	RSD/ r <sup>2</sup>	(ICV %D) CCV %D										
1927023 VOA2.1 Samples -001, -002, -008								-002						
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	2.81J	(28.1)	✓	NA
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	1.47	7.35	✓	NA
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	7.34	36.7	✓	NA
Dibromochloromethane	NA	✓	21	+23 <sup>4</sup>	✓	NA	✓	✓	✓	✓	0.7J	3.5	✓	NA
Methylene chloride	NA	✓	✓	✓	1.13J <sup>1</sup>	(11.3)	✓	✓	✓	✓	✓	NA	✓	NA
1,1-Dichloroethylene	+37	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Carbon disulfide	NA	✓	26	+29 <sup>1</sup> , +30 <sup>4</sup>	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
trans-1,3-Dichloropropylene	NA	✓	16	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Styrene	NA	✓	17	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Bromoform	NA	✓	29	+27 <sup>1</sup> , +32 <sup>4</sup>	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
Carbon tetrachloride	NA	✓	✓	+23 <sup>1</sup> , +21 <sup>4</sup>	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
cis-1,3-Dichloropropylene	NA	✓	✓	+22 <sup>4</sup>	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
1,1,1,-Trichloroethane	NA	✓	✓	+22 <sup>1</sup>	✓	NA	✓	✓	✓	✓	✓	NA	✓	NA
											FB2 9a FB4 31b FB3 45c	EB1 17d QC1 24e	TB2 16f TB4 23g TB5 30h	TB6 44i TB3 52
1931733 VOA1.I Samples -009 through -052								-010						
Methylene chloride	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	1.82Ja	1.7Jd 1.7Je	1.71Jf 1.72Jg 1.67Jh	2.1Ji
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	1.33a .55Jb 0.6Jc	.63Jd .55Je	✓	✓
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	7.12a 7.48b 7.58c	6.8d 7.5e	✓	✓
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	.66Ja	✓	✓	✓
Acetone	NA	✓	✓	-21 <sup>2</sup>	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
2-Butanone	NA	✓	✓	-21 <sup>2</sup>	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓

2-Hexanone	NA	✓	✓	-31 <sup>2</sup>	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Dichlorodifluoromethane	NA	✓	✓	+27 <sup>3</sup>	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
1,1,1,-Trichloroethane	NA	✓	✓	+23 <sup>3</sup>	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Carbon tetrachloride	NA	✓	✓	+28 <sup>3</sup>	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓

#### Surrogate Recovery Outliers

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

#### IS Outliers

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

Comments: HTs OK. Mass spectra for detects checked.

**1927023** VOA2.1 ICAL 10/7/2019 Linear: 1,1-Dichloroethylene

<sup>1</sup> associated with the MS/MSD only

<sup>4</sup> associated with samples -001, -002, -008

**1931733** VOA1.1 ICAL 10/14/2019 Linear: Methylene chloride

<sup>2</sup> associated with all samples *except* -045, -046, -052 <sup>3</sup> associated with samples -045, -046, -052

## Sandia Inorganic Metals Worksheet

ARCOG #(s): 620397, 620398, 620399, 620400, 620401 and 620402	SDG #(s): 492949	Matrix: Aqueous
Laboratory Sample IDs: 492949003, -011, -018, -025, -033, -039, -047		
Method/Batch #s: <b>3005A/6020B</b> :1930346/1930347		

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

Analyte (outliers)	Calibration						MB mg/L	5X Blank mg/L	LCS %R	MS %R	Lab Rep RPD	Serial Dil. %D	ICS AB %R	ICS A ±MDL ug/L (x50)	LLCCV %R	MWL- QC1 -025	EB1 -018	
	Int. mg/L	R <sup>2</sup>	ICV	CCV	ICB ug/L	CCB ug/L												
Ni	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	.000707J	✓	
U	NA	✓	✓	✓	.079	✓	✓	.0004	✓	✓	✓	✓	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 -003.

ICS NA



# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

492949

Internal Lab

Page 1 of 1

Batch No.		SMO Use		AR/COC <b>620397</b>								
Project Name: MWL LTMMMP		Date Samples Shipped: 10/14/19		SMO Authorization: [Signature]								
Project/Task Manager: Timmie Jackson		Carrier/Waybill No: 305329		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: CF01-20		Lab Destination: GEL										
		Contract No.: 1983530										
<div style="display: flex; justify-content: space-between;"> <div> <b>Tech Area:</b>  <b>Building:</b>      <b>Room:</b>      <b>Operational Site:</b> </div> <div> <input type="checkbox"/> Waste Characterization  <input type="checkbox"/> RMA  <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius         </div> </div>												
Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154												
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
110504	001	MWL-FB1	NA	10/14/19 10:50	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	001
110505	001	MWL-BW2	496	10/14/19 10:55	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	002
110505	002	MWL-BW2	496	10/14/19 10:57	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	003
110505	003	MWL-BW2	496	10/14/19 10:58	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
110505	004	MWL-BW2	496	10/14/19 10:59	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
110505	005	MWL-BW2	496	10/14/19 11:00	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	006
110505	006	MWL-BW2	496	10/14/19 11:01	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	007
110506	001	MWL-TB1	NA	10/14/19 10:50	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	008
<div style="display: flex; justify-content: space-between;"> <div> <b>Last Chain:</b> <input type="checkbox"/> Yes  <b>Validation Req'd:</b> <input checked="" type="checkbox"/> Yes  <b>Background:</b> <input type="checkbox"/> Yes  <b>Confirmatory:</b> <input type="checkbox"/> Yes         </div> <div> <b>Sample Tracking</b>      <b>SMO Use</b>  <b>Date Entered:</b>      <b>Entered by:</b>      <b>QC inits.:</b> </div> <div> <b>Special Instructions/QC Requirements:</b>  <b>EDD</b> <input checked="" type="checkbox"/> Yes  <b>Turnaround Time</b> <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day  <b>Negotiated TAT</b> <input type="checkbox"/> </div> <div> <b>Conditions on Receipt</b> </div> </div>												
<b>Sample Team Members</b>	Name		Signature		Init.	Company/Organization/Phone/Cell		<b>Sample Disposal</b> <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <b>Return Samples By:</b> Comments: Trip blanks received with head space.				
	William Gibson		[Signature]		WJG	SNL/08888/505-284-3307/505-239-7367						
	Tim Jackson		[Signature]		TJ	SNL/08888/505-284-2547/505-263-6639						
<div style="display: flex; justify-content: space-between;"> <div> <b>Relinquished by</b> [Signature]      Org. 00628      Date 10/14/19      Time 1149  <b>Received by</b> [Signature]      Org. 00628      Date 10/14/19      Time 1149  <b>Relinquished by</b> [Signature]      Org. 00628      Date 10/14/19      Time 1230  <b>Received by</b> [Signature]      Org.      Date 10/15/19      Time 1200         </div> <div> <b>Relinquished by</b>      Org.      Date      Time  <b>Received by</b>      Org.      Date      Time  <b>Relinquished by</b>      Org.      Date      Time  <b>Received by</b>      Org.      Date      Time         </div> </div>												

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



CONTRACT LABORATORY  
ANALYSIS REQUEST AND CHAIN OF CUSTODY

492949

Internal Lab

Page 1 of 1

Batch No.		SMO Use		AR/COC 620398																				
Project Name: MWL LTMMMP		Date Samples Shipped: 10/15/19		SMO Authorization: [Signature]																				
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 305426		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: CF01-20		Lab Destination: GEL		<input type="checkbox"/> Waste Characterization																				
Contract No.: 1983530				<input type="checkbox"/> RMA																				
Tech Area:				<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												
110507	001	MWL- FB2	NA	10/15/19 10:52	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	009												
110508	001	MWL- MW7	496	10/15/19 10:54	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	010												
110508	002	MWL- MW7	496	10/15/19 10:55	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	011												
110508	003	MWL- MW7	496	10/15/19 10:56	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	012												
110508	004	MWL- MW7	496	10/15/19 10:57	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	013												
110508	005	MWL- MW7	496	10/15/19 10:58	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	014												
110508	006	MWL- MW7	496	10/15/19 10:59	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	015												
110509	001	MWL- TB2	NA	10/15/19 10:52	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	016												
Last Chain: <input type="checkbox"/> Yes																								
Validation Req'd: <input checked="" type="checkbox"/> Yes																								
Background: <input type="checkbox"/> Yes																								
Confirmatory: <input type="checkbox"/> Yes																								
Sample Team Members			Signature			Init.			Company/Organization/Phone/Cell			Special Instructions/QC Requirements:			Conditions on Receipt									
William Gibson			[Signature]			WJA			SNL/08888/505-284-3307/505-239-7367			EDD <input checked="" type="checkbox"/> Yes			Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day									
Zachary Tenorio			[Signature]			ZT			SNL/08888/505-845-8636/505-259-5765			Negotiated TAT <input type="checkbox"/>												
Denisha Sanchez			[Signature]			DS			SNL/08888/505-845-7829/505-208-1375			Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab												
Comments: Received trip blanks from lab with head space.																								
Relinquished by [Signature] Org. 08888 Date 10-15-19 Time 1144													Relinquished by			Org.			Date			Time		
Received by [Signature] Org. 0628 Date 10-15-19 Time 1144													Received by			Org.			Date			Time		
Relinquished by [Signature] Org. 0628 Date 10-15-19 Time 1300													Relinquished by			Org.			Date			Time		
Received by [Signature] Org. Date 10/16/19 Time 745													Received by			Org.			Date			Time		

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

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

492949

Page 1 of 1

Internal Lab

Batch No.

SMO Use

AR/COC 620401

Project Name: MWL LTMMMP	Date Samples Shipped: 10/17/19	SMO Authorization: [Signature]	<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. 305531	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: CF01-20	Lab Destination: GEL		
Contract No.: 1983530			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					
110518	001	MWL-QC1	NA	10/19/19 10:25	GW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260B)	024
110518	002	MWL-QC1	NA	10/19/19 10:26	GW	P	500 ml	HNO3	G	EB	METALS, LTMMMP - Cd, Cr, Ni, U	025
110518	003	MWL-QC1	NA	10/19/19 10:27	GW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	026
110518	004	MWL-QC1	NA	10/19/19 10:28	GW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	027
110518	005	MWL-QC1	NA	10/19/19 10:29	GW	AG	250 ml	NONE	G	EB	TRITIUM (EPA 906)	028
110518	006	MWL-QC1	NA	10/19/19 10:30	GW	G	2x40 ml	NONE	G	EB	RADON (SM7500 Rn B)	029
110519	001	MWL-TB5	NA	10/19/19 10:25	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	030

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt	
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day			
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT <input type="checkbox"/>		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Return Samples By:		Comments: Trip blanks received from lab with head space.			
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Lab Use			
	William Gibson	[Signature]	WG	SNL/08888/505-284-3307/505-239-7367					
	Denisha Sanchez	[Signature]	DS	SNL/08888/505-845-7829/505-208-1375					
	Zachary Tenorio	[Signature]	ZT	SNL/08888/505-845-8636/505-259-5765					
Relinquished by [Signature]		Org. 8888	Date 10-16-19	Time 1155	Relinquished by		Org.	Date	Time
Received by [Signature]		Org. 0628	Date 10-16-19	Time 1155	Received by		Org.	Date	Time
Relinquished by [Signature]		Org. 00628	Date 10-17-19	Time 1034	Relinquished by		Org.	Date	Time
Received by [Signature]		Org.	Date 10/18/19	Time 715	Received by		Org.	Date	Time

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

## AOP 95-16

Internal Lab

**SMO Use**

AR/COC 620401

Project Name: MWL LTMMP		Date Samples Shipped: 10/17/19		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 305531		SMO Contact Phone:		<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: CF01-20		Lab Destination: GEL		Send Report to SMO:		<input checked="" type="checkbox"/> 4° Celsius						
		Contract No.: 1983530		Stephanie Montaño/505-284-2553		Bill to: Sandia National Laboratories (Accounts Payable),						
Tech Area:						P.O. Box 5800, MS-0154						
Building:		Room:		Operational Site: 10/21/19		Albuquerque, NM 87185-0154						
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
110518	001	MWL-QC1	NA	10/19/19 10:25	GW	G	3x40 ml	HCl	G	EB	VOC-LTMMP (SW846-8260B)	1
110518	002	MWL-QC1	NA	10/19/19 10:26	GW	P	500 ml	HNO3	G	EB	METALS, LTMMP - Cd, Cr, Ni, U	2
110518	003	MWL-QC1	NA	10/19/19 10:27	GW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	3
110518	004	MWL-QC1	NA	10/19/19 10:28	GW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 903)	4
110518	005	MWL-QC1	NA	10/19/19 10:29	GW	AG	250 ml	NONE	G	EB	TRITIUM (EPA 906)	5
110518	006	MWL-QC1	NA	10/19/19 10:30	GW	G	2x40 ml	NONE	G	EB	RADON (SM7500 Rn 8)	6
110519	001	MWL-TB5	NA	10/19/19 10:25	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260B)	1
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			Return Samples By: Comments: Trip blanks received from lab with head space.		
	William Gibson	[Signature]	WG	SNL/08888/505-284-3307/505-239-7367								
	Denisha Sanchez	[Signature]	DS	SNL/08888/505-845-7829/505-208-1375								
	Zachary Tenorio	[Signature]	ZT	SNL/08888/505-845-8636/505-259-5765								
Relinquished by [Signature]			Org. 88888	Date 10-16-19	Time 11:55	Relinquished by			Org.	Date	Time	Lab Use
Received by [Signature]			Org. 00288	Date 10-16-19	Time 11:55	Received by			Org.	Date	Time	
Relinquished by [Signature]			Org. 00288	Date 10-17-19	Time 10:54	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

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

492949

Internal Lab

Page 1 of 1

Batch No.

SMO Use

AR/COC **620399**

Project Name: <u>MWL LTMMMP</u>	Date Samples Shipped: <u>10/17/19</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"/> <b>4° Celsius</b>
Project/Task Manager: <u>Timmie Jackson</u>	Carrier/Waybill No. <u>303531</u>	SMO Contact Phone: <u>Wendy Palencia/505-844-3132</u>	
Project/Task Number: <u>195122.10.11.08</u>	Lab Contact: <u>Edie Kent/843-769-7385</u>	Send Report to SMO: <u>Stephanie Montaño/505-284-2553</u>	
Service Order: <u>CF01-20</u>	Lab Destination: <u>GEL</u>		
Contract No.: <u>1983530</u>			

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					
110513	001	MWL- FB3	NA	10/16/19 10:53	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	045
110514	001	MWL-MW9	497	10/16/19 10:55	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	044
110514	002	MWL-MW9	497	10/16/19 10:56	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	047
110514	003	MWL-MW9	497	10/16/19 10:57	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	048
110514	004	MWL-MW9	497	10/16/19 10:58	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	049
110514	005	MWL-MW9	497	10/16/19 10:59	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	050
110514	006	MWL-MW9	497	10/16/19 11:00	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	051
110515	001	MWL- TB3	NA	10/16/19 10:53	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	052

Last Chain: <input type="checkbox"/> Yes			Sample Tracking		SMO Use			Special Instructions/QC Requirements:			Conditions on Receipt																			
Validation Req'd: <input checked="" type="checkbox"/> Yes			Date Entered:		EDD <input checked="" type="checkbox"/> Yes			Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day																						
Background: <input type="checkbox"/> Yes			Entered by:		Negotiated TAT <input type="checkbox"/>			Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab																						
Confirmatory: <input type="checkbox"/> Yes			QC inits.:		Return Samples By:			Comments: Trip blanks received from lab with head space.																						
<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>William Gibson</td> <td><u>[Signature]</u></td> <td><u>WG</u></td> <td>SNL/08888/505-284-3307/505-239-7367</td> </tr> <tr> <td></td> <td>Denisha Sanchez</td> <td><u>[Signature]</u></td> <td><u>DS</u></td> <td>SNL/08888/505-845-7829/505-208-1375</td> </tr> <tr> <td></td> <td>Zachary Tenorio</td> <td><u>[Signature]</u></td> <td><u>ZT</u></td> <td>SNL/08888/505-845-8636/505-259-5765</td> </tr> </table>			Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		William Gibson	<u>[Signature]</u>		<u>WG</u>	SNL/08888/505-284-3307/505-239-7367		Denisha Sanchez	<u>[Signature]</u>	<u>DS</u>	SNL/08888/505-845-7829/505-208-1375		Zachary Tenorio	<u>[Signature]</u>	<u>ZT</u>	SNL/08888/505-845-8636/505-259-5765							
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell																										
	William Gibson	<u>[Signature]</u>	<u>WG</u>	SNL/08888/505-284-3307/505-239-7367																										
	Denisha Sanchez	<u>[Signature]</u>	<u>DS</u>	SNL/08888/505-845-7829/505-208-1375																										
	Zachary Tenorio	<u>[Signature]</u>	<u>ZT</u>	SNL/08888/505-845-8636/505-259-5765																										

Relinquished by <u>[Signature]</u>	Org. <u>88888</u>	Date <u>10-10-19</u>	Time <u>1156</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>0628</u>	Date <u>10-10-19</u>	Time <u>1156</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>00628</u>	Date <u>10/17/19</u>	Time <u>1034</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org.	Date <u>10/18/19</u>	Time <u>715</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

492940

Page 1 of 1

Internal Lab

Batch No.

### SMO Use

AR/COC	620400
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Project Name: MWL LTMMMP		Date Samples Shipped: 10/17/19		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization									
Project/Task Manager: Timmie Jackson		Carrier/Waybill No: 305531		SMO Contact Phone: Wendy Palencia/505-844-3132		<input type="checkbox"/> RMA									
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Send Report to SMO: Stephanie Montaño/505-284-2553		<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius									
Service Order: CF01-20		Lab Destination: GEL				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154									
Contract No.: 1983530															
Tech Area:		Operational Site:													
Building:		Room:													
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID			
110516	001	MWL- EB1	NA	10/16/19 15:33	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260B)	017			
110516	002	MWL- EB1	NA	10/16/19 15:35	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMMP - Cd, Cr, Ni, U	018			
110516	003	MWL- EB1	NA	10/16/19 15:36	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	019			
110516	004	MWL- EB1	NA	10/16/19 15:38	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	020			
110516	005	MWL- EB1	NA	10/16/19 15:39	DIW	AG	250 ml	NONE	G	EB	TRITIUM (EPA 906)	021			
110516	006	MWL- EB1	NA	10/16/19 15:40	DIW	G	2x40 ml	NONE	G	EB	RADON (SM7500 Rn B)	022			
110517	001	MWL- TB4	NA	10/16/19 15:33	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260B)	023			
Last Chain: <input type="checkbox"/> Yes															
Validation Req'd: <input checked="" type="checkbox"/> Yes															
Background: <input type="checkbox"/> Yes															
Confirmatory: <input type="checkbox"/> Yes															
Sample Tracking		SMO Use		Special Instructions/QC Requirements:						Conditions on Receipt					
Date Entered:				EDD <input checked="" type="checkbox"/> Yes											
Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day											
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:				Comments: Trip blanks received from lab with head space.						Lab Use					
Robert Lynch		[Signature]		SNL/08888/505-844-4013/505-250-7090											
Zachary Tenorio		[Signature]		SNL/08888/505-845-8636/505-259-5765											
Denisha Sanchez		[Signature]		SNL/08888/505-845-7829/505-208-1375											
Relinquished by		Org. 8888		Date 10/16/19		Time 1550		Relinquished by		Org.		Date		Time	
Received by		Org. 0028		Date 10/16/19		Time 1530		Received by		Org.		Date		Time	
Relinquished by		Org. 0028		Date 10/17/19		Time 1331		Relinquished by		Org.		Date		Time	
Received by		Org.		Date 10/19/19		Time 930		Received by		Org.		Date		Time	

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

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

492949

Page 1 of 2

Internal Lab

Batch No.		SMO Use		AR/COC		620402						
Project Name: MWL LTMMMP		Date Samples Shipped: 10/17/19		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: 305531		SMO Contact Phone:								
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132								
Service Order: CF01-20		Lab Destination: GEL		Send Report to SMO:								
Tech Area:		Contract No.: 1983530		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 Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
110520	001	MWL- FB4	NA	10/17/19 10:49	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	031
110521	001	MWL- MW8	497	10/17/19 11:13	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	032
110521	002	MWL- MW8	497	10/17/19 11:14	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	033
110521	003	MWL- MW8	497	10/17/19 11:17	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	034
110521	004	MWL- MW8	497	10/17/19 11:19	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	035
110521	005	MWL- MW8	497	10/17/19 11:21	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	036
110521	006	MWL- MW8	497	10/17/19 11:23	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	037
110522	001	MWL- MW8	497	10/17/19 11:13	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMMP (SW846-8260B)	038
110522	002	MWL- MW8	497	10/17/19 11:14	GW	P	500 ml	HNO3	G	DU	METALS, LTMMMP - Cd, Cr, Ni, U	039
110522	003	MWL- MW8	497	10/17/19 11:17	GW	P	1 L	HNO3	G	DU	GAMMA SPEC, SHORT LIST (EPA 901)	040
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		Comments: Trip blanks rec'd from lab with head space.				
	William Gibson	<i>William Gibson</i>	WG	SNL/08888/505-284-3307/505-239-7367		Return Samples By:						
	Zachary Tenorio	<i>Zachary Tenorio</i>	3	SNL/08888/505-845-8636/505-259-5765								
Relinquished by <i>William Gibson</i>		Org. 08888	Date 10-17-19	Time 1221	Relinquished by		Org.	Date	Time	Lab Use		
Received by <i>William Gibson</i>		Org. 0628	Date 10-17-19	Time 1221	Received by		Org.	Date	Time			
Relinquished by <i>William Gibson</i>		Org. 0628	Date 10/17/19	Time 1331	Relinquished by		Org.	Date	Time			
Received by <i>William Gibson</i>		Org.	Date 10/17/19	Time 1330	Received by		Org.	Date	Time			

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



## AOP 95-16

492949

AR/COC 620402

[illegible]

**CONTRACT VERIFICATION REVIEW FORMS**  
**Mixed Waste Landfill Groundwater Monitoring**  
**October 2019**

<b>AR/COC Number</b>	<b>Sample Type</b>
620397	Environmental*
620398	Environmental*
620399	Environmental*
620402	Environmental*

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



## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 620397, 620398, 620399, 620400, 620401 &amp; 620402

Analytical Lab GEL

SDG No. 492949

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 location detail incorrect for MWL-MW7
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		

Line No.	Item	Complete?		If no, explain
		Yes	No	
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 or 1-sigma for bioassay) 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	X		
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		
	c) Laboratory control sample duplicate RPD data reported and met for other analyses	X		
3.5	Blank data a) Method or reagent blank data reported and met for all samples		X	Methylene detected in method blank (QC1204417022)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromodichloromethane, chloroform and dibromochloromethane detected in MWL-FB1. Bromodichloromethane, chloroform, dibromochloromethane and methylene chloride detected in MWL-FB2. Methylene chloride detected in MWL-TB2, MWL-TB4, MWL-TB5 and MWL-TB6. Bromodichloromethane, chloroform and methylene chloride detected in MWL-EB1. Bromodichloromethane, chloroform, methylene chloride, nickel and gross beta detected in MWL-QC1. Bromodichloromethane and chloroform detected in MWL-FB4 and MWL-FB3.
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 and TO-15) a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		
	d) Internal standard performance data provided	X		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	X		
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850 and 8330) 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	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

Line No.	Item	Yes	No	Comments
	e) Instrument run logs provided	X		
4.6	Radiochemistry and General Chemistry a) Instrument run logs provided	X		

## 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
110508	ALL	Sample location detail incorrect for MWL-MW7

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: 11-20-2019

Reviewed by: Wendy Palencia Date: 11-20-2019 10:13:00

Were resolutions adequate and data package complete? ☒ Yes ☐ No

Closed by: Wendy Palencia Date: 12-03-2019 13:28:00

## **ANNEX F**

### **Mixed Waste Landfill Inspection Forms**

**April 2019-March 2020**

**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 5/2/19
2. Time of Inspection 1202
3. Name of Inspector Zach Tenorio

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

<b>I. SOIL-VAPOR MONITORING LOCATIONS [Semiannually or Annually]</b>			
<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	
<b>II. SAMPLING EQUIPMENT [Semiannually or Annually]</b>			
<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	
<b>III. PREVIOUS DEFICIENCIES</b>			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill  
Soil-Vapor Monitoring Network Checklist/Form (Continued)**

**NOTES**

Note Number	Description

31  
5/2/9

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:**

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Inspector's Signature                     

Original to: Mixed Waste Landfill Operating Record

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**Mixed Waste Landfill  
Soil-Vapor Monitoring Network Checklist/Form**

1. Date of Inspection 10/10/19
2. Time of Inspection 1057
3. Name of Inspector Tim Jackson

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

<b>I. SOIL-VAPOR MONITORING LOCATIONS [Semiannually or Annually]</b>			
<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	
<b>II. SAMPLING EQUIPMENT [Semiannually or Annually]</b>			
<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	
<b>III. PREVIOUS DEFICIENCIES</b>			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill  
Soil-Vapor Monitoring Network Checklist/Form (Continued)**

**NOTES**

Note Number	Description

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

**Additional Comments:**

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Inspector's Signature T. J. [Signature]

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# Mixed Waste Landfill Soil-Moisture Monitoring Network Checklist/Form

1. Date of Inspection April 25, 2019
2. Time of Inspection 12:35 to 14:40
3. Name of Inspector Robert Zöck, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

<b>I. SOIL-MOSITURE MONITORING LOCATIONS [Semiannually or Annually]</b>			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	yes	No	
B. Access tube cover caps in need of repair/maintenance.	yes	No	
C. Access tube casing in need of repair/maintenance.	yes	No	
D. Monitoring location properly labeled.	yes	No	
E. Locks in need of cleaning or replacement.	yes	No	
<b>II. SAMPLING EQUIPMENT [Semiannually or Annually]</b>			
<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	
<b>III. PREVIOUS DEFICIENCIES</b>			
<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**

<b>Note Number</b>	<b>Description</b>

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:**

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Inspector's Signature



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# Mixed Waste Landfill Groundwater Monitoring Network Checklist/Form

1. Date of Inspection 04/25/19
2. Time of Inspection 0811
3. Name of Inspector Robert Lynch

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

<b>I. GROUNDWATER MONITORING LOCATIONS [Semiannually]</b>			
<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	
<b>II. GROUNDWATER SAMPLING EQUIPMENT [Semiannually]</b>			
<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	
<b>III. PREVIOUS DEFICIENCIES</b>			
<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**

<b>Note Number</b>	<b>Description</b>
1	Baroball's installed on all GW 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:**

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Inspector's Signature



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# Mixed Waste Landfill Groundwater Monitoring Network Checklist/Form

1. Date of Inspection 10/17/19
2. Time of Inspection 0931
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	Baroball valves installed on monitoring 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:**

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Inspector's Signature

*William J. Smith*

Original to: Mixed Waste Landfill Operating Record

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## Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection June 5, 2019
2. Time of Inspection 0958-1050
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.

<b>I. COVER SYSTEM [Quarterly]</b>			
<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 <sup>2</sup> . 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	
<b>II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]</b>			
<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)**

<b>III. SECURITY FENCE [Quarterly]</b>			
<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	
<b>IV. PREVIOUS DEFICIENCIES</b>			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

## NOTES

[illegible]

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1. assigned to Robert Zink Date action completed 6/5/2019

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

**Additional Comments:**

1. Wind blown plant debris removed from security fence at time of the inspection.

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

Inspector's Signature

Robert Zink

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



*date:* June 13, 2019

*to:* Mike Mitchell (08854)  
Robert Ziock (08888)

*from:* Jennifer Payne (00643) [jjpayne@sandia.gov](mailto:jjpayne@sandia.gov)

*subject:* **June 2019 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 would be conducted according to applicable requirements identified in ESH001, ES&H Policy. Detailed instruction can be found in the ES&H Manual, MN471022: "Migratory Birds, Protected Species, and Other Biota".

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**ET Covers Observations and Recommendations**

The biology quarterly evaluation of the three ET Covers was conducted on June 11, 2019.

**CAMU**

Overall the cover looks very healthy.

- Grasses on the side slopes have greened up and many of the grasses near the bottom of the slopes have already set seed. Grasses on the top of the cover are beginning to green up.
- Whiptail lizards observed on the cover and butterflies are utilizing native vegetation across the entire ET cover.
- Russian thistles were observed to be growing on the southern slope, at the base of the west slope, and very small Russian thistle plants are scattered throughout the drainage swale at the base of

the cover on the east side (mostly in the northern portion of the eastern drainage swale). Very few Russian thistles are growing on top of the cover.

- No deeply rooted plants observed.
- Pin flags were removed from north end that marked the bird nest that was active earlier in the season.
- At the north east corner there appears to be an abandoned digging in the drainage swale at the base of the cover.



#### CAMU Recommendations

- Backfill the hole in the drainage swale at the northeast corner of the ET Cover. Check it for signs of recent animal activity before backfilling.
- Apply a pre-emergent across the cover in December 2019. Apply a pre-emergent again in April 2020. According to Sequoia, Surflan is effective for 6 months.

#### CWL

- The recent weeding event was extremely successful, the crew did a great job.
- The bunchgrasses are not greening up very well. The native bunchgrasses are struggling a surprising amount considering the health of the native bunchgrasses surrounding the CWL and at the other two ET Covers.

- The CWL surface is covered with increasingly compacted gravel and soil. The soil is much more compacted than the CAMU or the MWL, both other Covers have lightly compacted soil. Divots are notable across the entire cover where weedy plants have been dug out.
- Overall the cover is not robust. No thick dark green leaf blades were observed. The green grass blades were observed to be relatively thin and a weak shade of green. I anticipate the bunchgrasses will make it through the summer but I am concerned about their long-term health. They have had intense competition from weedy plants since 2013. Intense foot traffic in the area from weeding events could possibly be contributing to soil compaction and affecting root health.

#### CWL Recommendations

- If there is not adequate monsoon precipitation, supplemental water should be applied in late September/Oct to provide bolster root health over the winter with soil moisture.
- In future years: The most time and cost-effective weed reduction strategy over the long term for the CWL is to have pre-emergent applied very early, before Winter Shutdown. The first week of January 2019 I observed a high density of very small winter across the cover. Weed seeds from 2019 winter and spring, and from previous years have created a high weed seed bank in the soil. According to Sequoia, Surflan is effective for 6 months. For complete annual control we should plan to apply it across the CWL in early December 2019 and then plan for 5 months later, in early April. If we repeat this process for two years (minimum) – three years, the site should be on a self-sustaining trajectory.

#### MWL

Overall the cover looks very healthy.

- The native bunchgrasses are beginning to green up nicely across the Cover. The native bunchgrasses have greened up more on the slide slopes.
- A lot of grasshoppers were present across the Cover and butterflies were commonly observed.
- Russian thistles are scattered throughout the western slope of the cover. The Russian thistles are most easily observed near the well pads, but they are also widely scattered among the grasses on the western MWL slope. Russian thistles are similarly scattered among the bunchgrasses on the south facing slope, the south west corner of the cover, and up onto the top of the cover along these areas. Russian thistles are similarly scattered among the bunchgrasses on the northern portion of the east slope. And *very* small Russian thistles were observed to be clustered just inside the north entrance gate.

#### MWL Recommendations

- Apply a pre-emergent across the cover in December 2019. Apply a pre-emergent again in April 2020. According to Sequoia, Surflan is effective for 6 months.

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](mailto:jjpayne@sandia.gov).

cc: Customer Funded Records Center  
Ecology Library  
Matt Baumann



## Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection September 9, 2019
2. Time of Inspection 08:45 to 09:27
3. Name of Inspector Robert Zock, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

<b>I. COVER SYSTEM [Quarterly]</b>			
<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 <sup>2</sup> . 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	
<b>II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]</b>			
<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)**

<b>III. SECURITY FENCE [Quarterly]</b>			
<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	
<b>IV. PREVIOUS DEFICIENCIES</b>			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

## NOTES

[illegible]

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

Action (Note Number) \_\_\_\_\_ 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 \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

**Additional Comments:**

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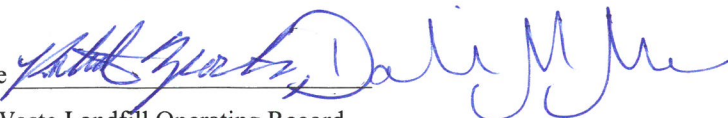
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Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

## Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection December 4, 2019
2. Time of Inspection 1338-1422
3. Name of Inspector Robert Zick, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

<b>I. COVER SYSTEM [Quarterly]</b>			
<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 <sup>2</sup> . 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	
<b>II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]</b>			
<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)**

<b>III. SECURITY FENCE [Quarterly]</b>			
<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	
<b>IV. PREVIOUS DEFICIENCIES</b>			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

## NOTES

[illegible]

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1 assigned to Robert Ziak Date action completed 12/4/2019

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

**Additional Comments:**

1. Wind-blown plant debris removed from security  
fence on the same day as the inspection.  
12/4/2019

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Inspector's Signature Robert Ziak

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center





*date:* January 13, 2019

*to:* Mike Mitchell (08888)  
Robert Ziock (00641)

*from:* Jennifer Payne (00643) [jjpayne@sandia.gov](mailto:jjpayne@sandia.gov)

*subject:* **December 2019 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".

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**ET Covers Observations and Recommendations**

The biology quarterly evaluation of the three ET Covers was conducted on December 19, 2019.

**CAMU**

- The ET Cover appears to be in very good condition.
- The mature native perennial grasses continue to have good, even spacing across the cover and a small amount of green photosynthesis was observed occurring at the base of the grasses.
- No winter annuals (weedy species) observed on the cover and very little windblown plant debris from tumbleweeds was present on the ET Cover.
- The fence lines were clear of windblown plant debris.
- Frost heave was observed across the flat soil areas within the fence line surrounding the ET Cover. This naturally occurring winter soil loosening can promote plant establishment and growth.

**CWL**

- Overall the ET Cover appears to be in good condition during winter dormancy.
- The native perennial grasses continue to be in a middle to older juvenile stage of development and a small amount of green photosynthesis was observed occurring at the base of the grasses.
- The ET Cover looks very tidy, the weed removal event was very effective.
- No winter annuals (weedy species) were observed on the ET Cover.
- Only a small amount of windblown plant debris was observed on the west fence.

**MWL**

- The ET Cover appears to be in very good condition.
- The mature native perennial grasses continue to have good, even spacing across the cover and a small amount of green photosynthesis was observed occurring at the base of the grasses.
- No winter annuals (weedy species) observed on the cover and very little windblown plant debris from tumbleweeds was present on the ET Cover.
- The fence lines were clear of windblown plant debris.
- Frost heave was observed across the flat soil areas within the fence line surrounding the ET Cover and on the ET Cover, including the side-slopes. This naturally occurring winter soil loosening can promote plant establishment and growth.

**ET Covers Recommendations**

- All of the EUs appeared to be in very good winter conditions.
- The only current recommendation is to follow the current plan for a second pre-emergent herbicide application in late spring 2020. The first pre-emergent herbicide application was in the first week of December 2019. November 2019 received more than 4 times the mean monthly precipitation; this late autumn rainfall will bolster soil moisture throughout the winter months. Improved winter soil moisture will benefit both the native perennial plants and weedy winter annuals. With the large quantity of weed seed in the CWL soil, the December 2019 pre-emergent herbicide application is excellent timing and will be hugely beneficial to prevent a large crop of winter weeds from germinating on the CWL and potentially on the MWL and CAMU as well.

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](mailto:jjpayne@sandia.gov).

cc: Customer Funded Records Center  
Ecology Library  
Steve Cox  
Robert Ziock  
Rick Dotson  
Stephanie Salinas

**Mixed Waste Landfill  
Cover Inspection Checklist/Form**

1. Date of Inspection March 3, 2020
2. Time of Inspection 08:40 to 09:38
3. Name of Inspector Robert Eick, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

<b>I. COVER SYSTEM [Quarterly]</b>			
<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 <sup>2</sup> . 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	
<b>II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]</b>			
<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)**

<b>III. SECURITY FENCE [Quarterly]</b>			
<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	
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	
<b>IV. PREVIOUS DEFICIENCIES</b>			
<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 Ziock Date action completed 3/3/2020

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:**

Windblown plant debris was removed from  
security fence at time of the inspection.

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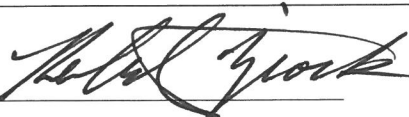
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Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

**NOTES**

Note Number	Description
1.	Wind blown plant debris on security fence.



*date:* March 26, 2020

*to:* Mike Mitchell (08854)

*from:* Jennifer Payne (00643) [jjpayne@sandia.gov](mailto:jjpayne@sandia.gov)

*subject:* **March 2020 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 would be conducted according to applicable requirements identified in ESH001, ES&H Policy. Detailed instruction can be found in the ES&H Manual, MN471022: "Migratory Birds, Protected Species, and Other Biota".

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**ET Covers Observations and Recommendations**

The biology quarterly evaluation of the three ET Covers was conducted on March 10, 2020.

**CAMU Observations**

- The ET Cover is in excellent condition.
- The bases of some native grass clumps are beginning to green up, displaying a small amount of early warm season growth
- There are more seasonal annual weeds on the CAMU than I have typically observed in March, except in March 2019. In 2019 the more abundant late winter/early spring weeds were most likely due to the above average winter precipitation. The current March 2020 weeds are probably a result of the abundant 2019 weed seeds. At the time of my evaluation the weeds had developed moderate-sized basal rosettes. The weeds remain as a small percentage of the overall foliar coverage.

### CAMU Recommendations

- Post-emergent herbicide application is not recommended at this time because the weeds are too large. Post-emergent herbicides are only effective when weeds are very small.
- Current weeds could be removed by hand, but not necessary. Although the weed presence is much greater than normal, weeds remain a small percentage of the total vegetative cover.
- A greater than normal number of weeds are anticipated to continue across the ET Cover throughout the 2020 growing season. This is due to above normal weed growth and weed seed deposition in 2019.
- Apply a 6-month pre-emergent across the entire cover in late October/early November 2020 to prevent pre-winter weed seed germination. Apply a pre/post-emergent combination in late March/early April 2021. These two planned applications should provide decent weed control for a handful of upcoming years.

Herbicide application note: herbicide must be carefully applied, including under the bunchgrass canopies. Most of the current weeds are growing close to bunch grasses: the seeds from these weeds most likely be at the edge of, and partially under, the bunchgrass canopies.

### CWL Observations

- The native grasses look good. The bases of most native grass clumps are beginning to display some green, showing a modest amount of early warm season growth.
- Weeds were observed to be scattered across the CWL. Although the weeds are not present at such a high density as they were in March 2019, the weeds are regularly present across the ET Cover. The current late winter/spring weed seed bank in the soil is very high due to the abundance of weeds observed across the CWL in March 2019. With a significantly reduced spring weed density observed in March 2020, it appears that the early December 2019 pre-emergent application was beneficial.
- Most weeds observed were small- to moderate-sized, but many have already flowered and will set seed soon.
- The dominant weed has not yet been identified, it has an irregular yellow flower and is most likely in the Ranunculus Family. This weed is present at a much, much higher rate than the other two observed species of photosynthesizing weeds. Based on the abundance of the dominant weed, it most likely germinated in the fall before the pre-emergent was applied. The other two weed species have only formed basal rosettes at the time of inspection and it was not possible to identify either from their basal rosette. Based on the much lower presence of the other two weed species, they may have germinated in areas where the pre-emergent did not have complete soil coverage due to the gravel or above ground biomass intercepting the herbicide.



### CWL Recommendations

- The current weeds are too large for a post-emergent herbicide application to be effective.
- Pre-emergent herbicide is planned to be applied across the CWL in April. This event may not be as effective as originally anticipated due to the unexpected weed presence after the early December 2019 pre-emergent herbicide application.
  - o The herbicide may need to be applied more attentively around the existing weeds and bunchgrasses in April than it is typically applied. It should be applied more thoroughly in the areas where above ground biomass intercepts the spray, including spraying under the canopies of bunchgrasses as much as possible.
    - The current 2020 weeds are growing in both open areas and close to bunchgrasses. The seeds from the current weeds located at the edge of, and partially under, the bunchgrass canopies are protected from the herbicide effects by the canopies if not carefully sprayed. If not addressed, the canopy areas are prime places for weeds to continue to grow and drop seeds in future years.
  - o And/or a higher application rate may be needed to achieve more even herbicide bonding across all portions of the soil.
  - o And/or more water may be needed to better wash the herbicide down past the biomass and the gravel, to help it bond more evenly across the soil.
- Apply a 6-month pre-emergent across the entire cover in late October/early November 2020 to prevent pre-winter weed seed germination. Apply a pre/post-emergent combination in late March/early April 2021.

Herbicide application note: similar to the CAMU herbicide must be carefully applied, including under the bunchgrass canopies.

- Due to the unexpected incomplete control provided by the early December 2019 application, the pre-emergent annual planned application process will need to be on the longer end of the projected timeline (3 years). Pre-emergent applications should plan to be repeated again in Oct/Nov 2021 and March/early April 2022. Repeated planned efforts will be required to move the CWL native vegetation community onto a self-sustaining trajectory.

### MWL Observations

- The ET Cover is in excellent condition.
- The bases of some native grass clumps are beginning to green up, displaying a small amount of early warm season growth.
- Only a few small weeds were observed across the cover.

MWL Recommendations

- None based on March 10, 2020 observations

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](mailto:jjpayne@sandia.gov).

cc: Customer Funded Records Center  
Ecology Library  
Matt Baumann  
Robert Ziock  
Rick Dotson

# Mixed Waste Landfill

## Biology Inspection Checklist/Form for the MWL Cover

Approximate vegetative coverage (actively photosynthesizing\*): 44 %

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 Cover<sup>1</sup></u>
<u>Pleuraphis jamesii</u>	<u>Galleta grass</u>	<u>36 %</u>
<u>Bouteloua gracilis</u>	<u>Blue grama</u>	<u>2 %</u>
<u>Sporobolus flexuosus</u>	<u>Mesa dropseed</u>	<u>2 %</u>
<u>Bouteloua eriopoda</u>	<u>Black grama</u>	<u>2 %</u>
<u>Sporobolus cryptandrus</u>	<u>Sand dropseed</u>	<u>2 %</u>
<u>Xanthisma spinulosum</u>	<u>Spiny goldenweed</u>	<u>&lt; 0.5%</u>
<u>Salsola tragus</u>	<u>Russian thistle</u>	<u>&lt; 0.5%</u>
<u>Sporobolus contractus</u>	<u>Spike dropseed</u>	<u>&lt; 0.5%</u>
<u>Gutierrezia sarothrae</u>	<u>Broom snakeweed</u>	<u>&lt; 0.5%</u>
<u>Sphaeralcea angustifolia</u>	<u>Narrowleaf globemallow</u>	<u>&lt; 0.5%</u>
<u>Oryzopsis hymenoides</u>	<u>Indian ricegrass</u>	<u>&lt; 0.5%</u>
<u>Solanum elaeagnifolium</u>	<u>Silverleaf nightshade</u>	<u>&lt; 0.5%</u>
<u>Opuntia phaeacantha</u>	<u>Brown-spined prickly pear</u>	<u>&lt; 0.5%</u>
<u>Senecio flaccidus</u>	<u>Threadleaf groundsel</u>	<u>&lt; 0.5%</u>

Notes:

\* Living plants per Section 4.1 of the MWL LTMMMP.

<sup>1</sup> 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: \_\_\_\_\_

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**Inspection for Animal and Insect Intrusion into MWL Cover**

Are any burrows present on the cover? No

Do any of the burrows appear to be active? N/A

Any ant hills/nests? Yes

Describe below observations regarding animal and insect features. If burrows with an entrance diameter of 4 inches or greater are present or appear to be that of a species that is able to burrow 6 feet deep or greater, indicate the location(s) on a map and attach to this checklist. Address actions and schedule to repair cover damage that exceeds prescribed limits. As appropriate, identify animal and insect features and have them surveyed and marked for biota sampling.

Notes: Ten active and four inactive ant hills were observed on the cover, occurring primarily on the side-slopes. Two ant hill locations were selected, flagged for biota sampling, and surveyed using a GPS unit. The sampling locations are shown in the biological inspection map.

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**Mixed Waste Landfill**  
**Biology Inspection Checklist/Form for the MWL Cover**  
**(continued)**

Notes (continued):

General Observations:

- Overall the MWL ET Cover vegetation is in excellent condition. The species complexity, spacing, and appearance of the mature native perennial grasses is similar to that of the surrounding area vegetation.
- Low weed presence on the MWL Cover. A higher density of Russian thistle (*Salsola tragus*) was observed on the west-facing slope than on other areas of the cover, possibly due to ground disturbance during well pad work.
- The mature native grasses are not as robust and as deeply green as is typical in September due to the lack of monsoon rains in 2019. Similarly, the native grasses surrounding the MWL are not as robust and deeply green as is typical in September. The mature native grasses are healthy due to extensive root systems and good winter moisture, they are just not as green as they normally are when a typical monsoon rainfall occurs.
- Coyote droppings were observed on the cover. This observation is consistent with previous biology inspection observations indicating the MWL Cover is recognized as native habitat by wildlife.

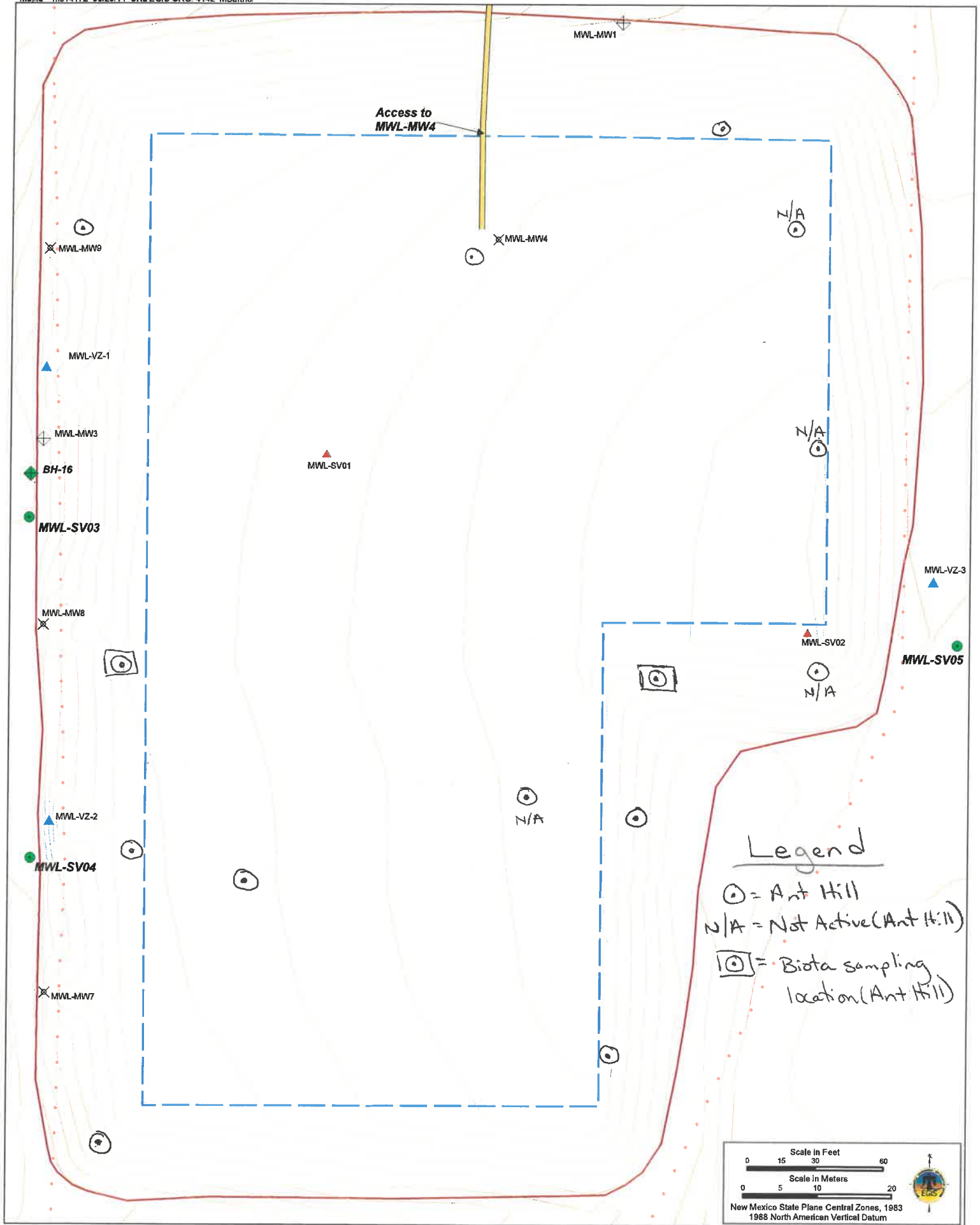
Biological Aspects Map -- [note: sketch map to locate specific features described above will be attached as appropriate]

Inspector's Signature: \_\_\_\_\_

Date: September 5, 2019

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



MWL Biological Inspection Map - Sept. 5, 2019

**ANNEX G**

**Mixed Waste Landfill  
Biology Report**

**April 2019-March 2020**

# **2019-2020 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, 2019-March 31, 2020) 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 2019 growing season and reporting period, expand on the inspection results, if appropriate, and provide recommendations for future ET Cover vegetation monitoring and maintenance. The annual Biology Inspection of the ET Cover was conducted on September 5, 2019. 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 2019, and March 2020) 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



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2014 growing season inspection, which provided confirmation that all successful revegetation criteria had been met (SNL/NM June 2015).

Percentage of vegetative cover of each species across the site (i.e., foliar coverage of living plants of each identified species) 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 2019 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.

Meteorological conditions during the nine months preceding the 2019 monsoon season were favorable for the health of perennial native vegetation. The months of October 2018 through June 2019 was a period of above average precipitation and relative humidity. Total precipitation for this period was 6.38 inches, which is 41% above normal and 1.87 inches above the mean precipitation of 4.51 inches. The average relative humidity for this period was 44.5% versus the mean monthly relative humidity of 39.5%; 12.7% above normal. Above normal precipitation provides additional soil moisture, and above normal relative humidity benefits soil moisture retention.

Table 1 provides meteorological data for CY 2019. Table 2 provides meteorological data for the first 3-month period of CY 2020. A 20-year data set (1995-2014) provides the reference mean monthly meteorological data and will be the reference mean data set until late 2020, when a 25-year data set will be created for the 1994-2018 time period.

#### *Precipitation, Relative Humidity and Winds*

Warmer than average temperatures with below average precipitation have been the meteorological norm in the MWL area since 2008. As of March 26, 2020, the area was categorized as "Abnormally Dry" according to the U.S. Drought Monitor (U.S. Drought Monitor March 2020).

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**Table 1**  
**Summary of 2019 Meteorological Data at the Mixed Waste Landfill<sup>a</sup>**

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	
Year	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	
Temperature (°F)													Annual <sup>b</sup>
Monthly Mean	35.9	39.9	50.0	57.6	61.5	73.9	79.3	78.8	72.7	57.9	45.5	41.1	57.8
20-year Temperature Means	37.7	41.7	48.8	55.8	66.1	75.4	76.7	74.8	68.9	57.9	46.4	37.0	57.3
Precipitation (Inches)													Annual <sup>c</sup>
Monthly Total	0.60	0.46	0.67	1.21	0.57	0.21	1.61	.66	0.28	0.73	1.73	0.35	9.08
20-year Precipitation 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 <sup>b</sup>
Monthly Mean	61.2	47.3	41.5	38.3	33.7	28.4	35.4	37.9	40.4	35.0	50.5	58.2	42.3
20-year Relative Humidity 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 <sup>b</sup>
Monthly Mean	6.3	8.9	9.9	9.1	9.8	10.0	9.0	7.9	8.0	8.6	7.0	6.1	8.2
20-year Wind Speed Means	6.9	8.1	9.1	10.5	10.0	9.8	8.4	7.9	8.0	7.8	7.1	6.8	8.4

<sup>a</sup>Information Source: SNL/NM Meteorological Monitoring Network.

<sup>b</sup>Values provided are averages of the monthly data.

<sup>c</sup>Values provided are totals of the monthly data.

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**Table 2**  
**Summary of January-March 2020 Meteorological Data at the Mixed Waste Landfill<sup>a</sup>**

Month	January	February	March
<b>Temperature (°F)</b>			
Monthly Mean	38.6	41.3	51.1
20-year Temperature Means	37.7	41.7	48.8
<b>Precipitation (Inches)</b>			
Monthly Total	0.30	0.60	0.35
20-year Precipitation Means	0.34	0.45	0.56
<b>Relative Humidity (%)</b>			
Monthly Mean	51.9	51.2	43.2
20-year Relative Humidity Means	49.9	44.9	36.4
<b>Wind (Miles/hour)</b>			
Monthly Mean	7.0	8.9	9.2
20-year Wind Speed Means	6.9	8.1	9.1

<sup>a</sup>Information Source: SNL/NM Meteorological Monitoring Network.

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Total annual precipitation for 2019 was 9.08 inches, slightly higher than the 20-year annual precipitation mean of 8.72 inches. However, the monthly timing of significant precipitation was very different than the 20-year monthly means.

The monsoon season begins July 1 and ends September 30. The North American Monsoon is an important feature of New Mexico's summer climate. In the MWL area monsoonal moisture typically provides approximately half of the annual precipitation.

The 2019 monsoon season experienced below normal precipitation and relative humidity. The MWL area received 2.55 inches of rain during this timeframe, which is 1.66 inches, or 39%, below the mean monsoon season rainfall of 4.21 inches. July received almost exactly the mean precipitation for the month, but August and September received far less than their respective means. The average relative humidity for the 3-month monsoon timeframe was 37.9% versus the 20-year mean of 43.7%; approximately 13.3% below normal.

The below normal monsoon precipitation resulted in lower-than-normal native grass seed production and photosynthetic activity as documented in the September 2019 annual inspection. However, the wetter autumn-winter-spring months before the 2019 growing season (October and December 2018, and January through May 2019) benefitted root growth and the health of the native vegetation. In arid and semiarid climates such as New Mexico, plant functions such as growth and photosynthesis are limited by low soil moisture conditions (Xu January 2011).

Generally, the 2019 monthly and annual wind speed means were very close to 20-year monthly and annual means. The only month with variation between the monthly and 20-year means exceeding 1.0 miles per hour was April, where the monthly average was 1.4 mph below its monthly mean wind speed. Higher than normal winds can increase the rate of soil moisture evaporation.

### *Temperature*

Average monthly temperature for October 2018 through June 2019 was one degree cooler than normal. Average annual temperature for 2019 was 57.8°F, which is 0.5°F above the 20-year annual mean of 57.3°F.

In CY 2019 the MWL experienced 92.5 degrees of temperature variability, with a low of 6.2°F in January 2019 and a high of 98.7°F in July 2019. In comparing mean monthly temperatures, May 2019 experienced the greatest departure from its historical mean monthly temperature, 4.6°F below its historical mean temperature. Three other months in 2019 experienced a greater than 2°F departure from their mean temperatures. July, August and September 2019 were 2.6°F, 4.0°F and 3.8°F above their respective historical mean temperatures.

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During the first three months of 2020, only March experienced a greater than 2°F departure from its mean temperature. March 2020 was 2.3°F above its historical mean temperature.

### **4.0 September 2019 Inspection Results**

The September 5, 2019 MWL ET Cover Biology Inspection occurred near the end of the New Mexico growing season, which typically ends in mid-September as evening temperatures begin to fall. The growing season inspections allow the most accurate assessment of living plant coverage because the greatest amount of photosynthesis occurs during this time of the year.

The September 2019 MWL ET Cover Biology Inspection results confirmed the ET Cover continues to meet the successful revegetation criteria defined in the MWL LTMMMP, Section 4.1 (SNL/NM March 2012). The approximate foliar coverage of living plants was 44%, with 99% of the foliar coverage comprised of native perennial species. There were no contiguous bare areas that exceeded 200 square feet.

Nearly all the MWL ET Cover vegetation was comprised of grasses, with galleta grass continuing as the dominant grass species (Figures 1 and 2). The vegetative community was observed to be very healthy overall, with native species spaced evenly across the cover.

The overall species complexity, spacing, and appearance of the mature native grass community was very similar to the surrounding vegetation in Technical Area III. The mature native grasses on the ET Cover were not as robust and as deeply green as is typical in September due to the lack of monsoon rains in 2019. Similarly, the native grasses surrounding the MWL were not as robust and deeply green as is typical in September. Based on the history of the ET Cover vegetation community development, the appearance of the vegetation community at the time of inspection, and the 12-month meteorological conditions prior to inspection, the mature native grasses were determined to be healthy. The native grasses have well-established, extensive root systems and received above normal winter moisture (December 2018 – February 2019) that bolstered soil moisture and root health.

Weeds were present in very low numbers on the MWL ET Cover. On the west-facing slope a higher density of Russian thistle (*Salsola tragus*) was observed; this is likely due to previous ground disturbance during well pad erosion and burrow control work and is common after soil disturbing activities.

No burrows were observed on the MWL ET Cover during the September 2019 Biology Inspection. Fourteen ant hills were observed across the ET Cover on both the side-slopes and cover surface.

Biota sampling locations were identified for ant hills during the September 2019 Biology Inspection. Two ant hills were marked in the field and surveyed. The ant hill sampling locations were selected based on signs of current ant activity and to obtain samples from different areas of the ET Cover including side slopes. No potentially deep-rooted plants

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were observed in 2019. Biota sampling activities and results are presented in Chapter 8 of this MWL Annual LTMM Report.

Coyote droppings were observed on the ET Cover. This observation is consistent with previous biology inspection observations that wildlife recognizes the MWL Cover as native habitat.

### **5.0 Cover Maintenance**

Maintenance activities performed on the MWL ET Cover during the April 2019 - March 2020 reporting period are summarized in Section 9.7 of this MWL Annual LTMM Report. Three routine weed control events were conducted in May, August, and December 2019 as a best practice. These events included removal of live and dead, windblown tumbleweeds from the ET Cover surface, perimeter fence, and drainage swale, as well as removal of minimal live weeds from the ET Cover, perimeter fence line, and 10-foot perimeter around erosion control features on the western perimeter. The December 2019 maintenance event included the application of a pre-emergent herbicide to the perimeter monitoring well locations, the area between the north toe of the ET Cover and the north fence, and the 3-foot area outside the perimeter fence. The pre-emergent herbicide is approved for use at SNL/NM, was applied selectively in accordance with the manufacturer's specifications, and does not carry a bee precaution rating according to the University of California Integrated Pest Management. These 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 2020 – 2021 reporting period to clear the perimeter fence and remove windblown tumbleweeds from the ET Cover, perimeter drainage, and perimeter area based on LTMMMP inspection requirements and best practice. Pre-emergent, post-emergent and/or sterilant herbicides should be applied as needed to the graveled staging areas and along the perimeter fence, which is prone to weed growth due to the unavoidable accumulation of windblown weeds and their seeds. If present, other annual weedy species on the MWL ET Cover should also be considered for removal during the growing season weed removal events if they pose a threat to the established native grasses. If observed, four-wing saltbush and any other potentially deep-rooted plants or shrubs will be pulled by hand, clipped at the ground surface, or removed for biota sampling. These routine weed control activities help the desired native grasses by reducing the availability of weed seeds and competition from the future growth of invasive plants. Based on experience since initial seeding of the ET Cover in 2009, these activities have had a significant, positive impact on the establishment of healthy, self-sustaining native grasses in a relatively short period of time. Successful

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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.

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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 2020)

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<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 September 5, 2019 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 September 5, 2019 MWL ET Cover Photographs – Cover Side Slopes**