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### **Submittal of Mixed Waste Landfill Annual Long-Term Monitoring & Maintenance Report, April 2020-March 2021 for Sandia National Laboratories/New Mexico, EPA ID Number NM5890110518, June 2021**

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Laboratories**

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**MIXED WASTE LANDFILL  
ANNUAL LONG-TERM MONITORING & MAINTENANCE REPORT  
APRIL 2020 – MARCH 2021**

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

---

**JUNE 2021**



**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 2020 – MARCH 2021**

**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

**Owner:** United States Department of Energy  
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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 500 of the New Mexico Administrative Code (20.4.1.500 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 eighth MWL Annual Long-Term Monitoring & Maintenance Report documents monitoring, inspection, maintenance, and repair activities conducted at the MWL during the April 1, 2020 through March 31, 2021 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 2020, annual tritium surface soil sampling was conducted in July 2020, and annual biota sampling was conducted in August 2020. 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 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 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 two submittals of various updated reference documents cited in the LTMMP and submittal of the MWL Annual Long-Term Monitoring & Maintenance Report, April 2019 - March 2020. There were no LTMMP modifications during this reporting period.

All LTMMP requirements have been met for the April 1, 2020 through March 31, 2021 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 2020 – March 2021

## 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
ID	Identification
KAFB	Kirtland Air Force Base
LTMM	Long-Term Monitoring & Maintenance
LTMMMP	Long-Term Monitoring and Maintenance Plan
MDA	minimum detectable activity
MDL	method detection limit
mg/L	milligrams per liter
MWL	Mixed Waste Landfill
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
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 (LTMMMP) (SNL/NM March 2012) and have been met for the April 1, 2020 through March 31, 2021 reporting period. This eighth MWL Annual Long-Term Monitoring & Maintenance (LTMM) Report documents all activities and results as required by Section 4.8.1 of the LTMMMP. Based upon monitoring, inspection, and maintenance results, the MWL Evapotranspirative (ET) Cover and all monitoring systems are functioning as designed, and site conditions remain protective of human health and the environment. No monitoring trigger levels were exceeded. Industrial land use is being maintained for the MWL consistent with LTMMMP requirements.

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

- New Mexico Environment Department (NMED) Final Order *In the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill*, Number (No.) HWB 04-11(M) (NMED May 2005)
- Compliance Order on Consent (NMED April 2004)
- SNL/NM RCRA Permit
  - Module IV of RCRA Permit No. NM5890110518 (EPA August 1993)
  - Facility Operating Permit U.S. Environmental Protection Agency (EPA) Identification No. NM5890110518 (Permit) (NMED January 2015)
- New Mexico Administrative Code (NMAC), Title 20, Chapter 4, Part 1, Section 500 (20.4.1.500 NMAC) incorporating Title 40 of the Code of Federal Regulations (CFR), Part 264.101 (40 CFR 264.101)

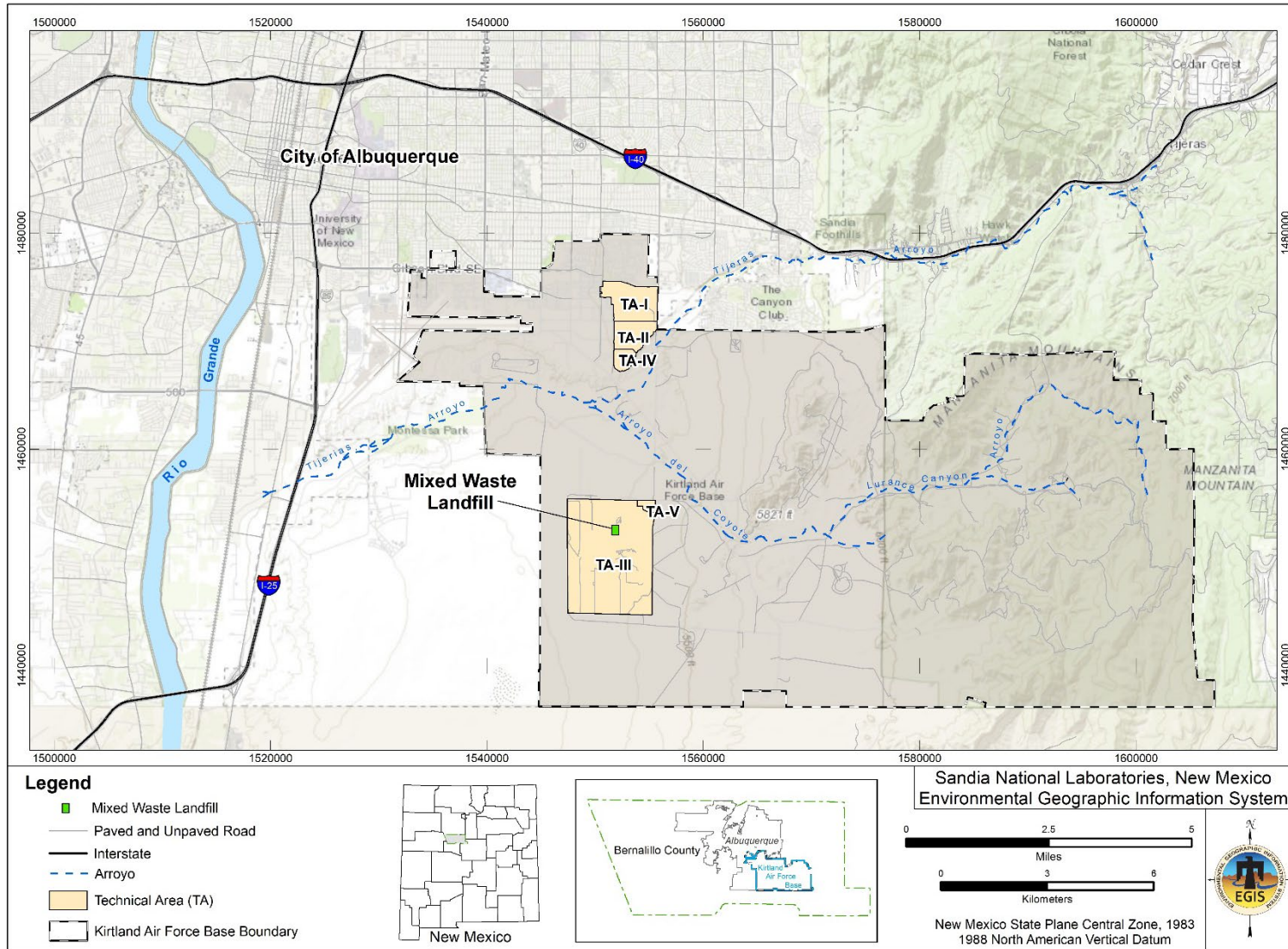


Figure 1-1  
Location of the Mixed Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

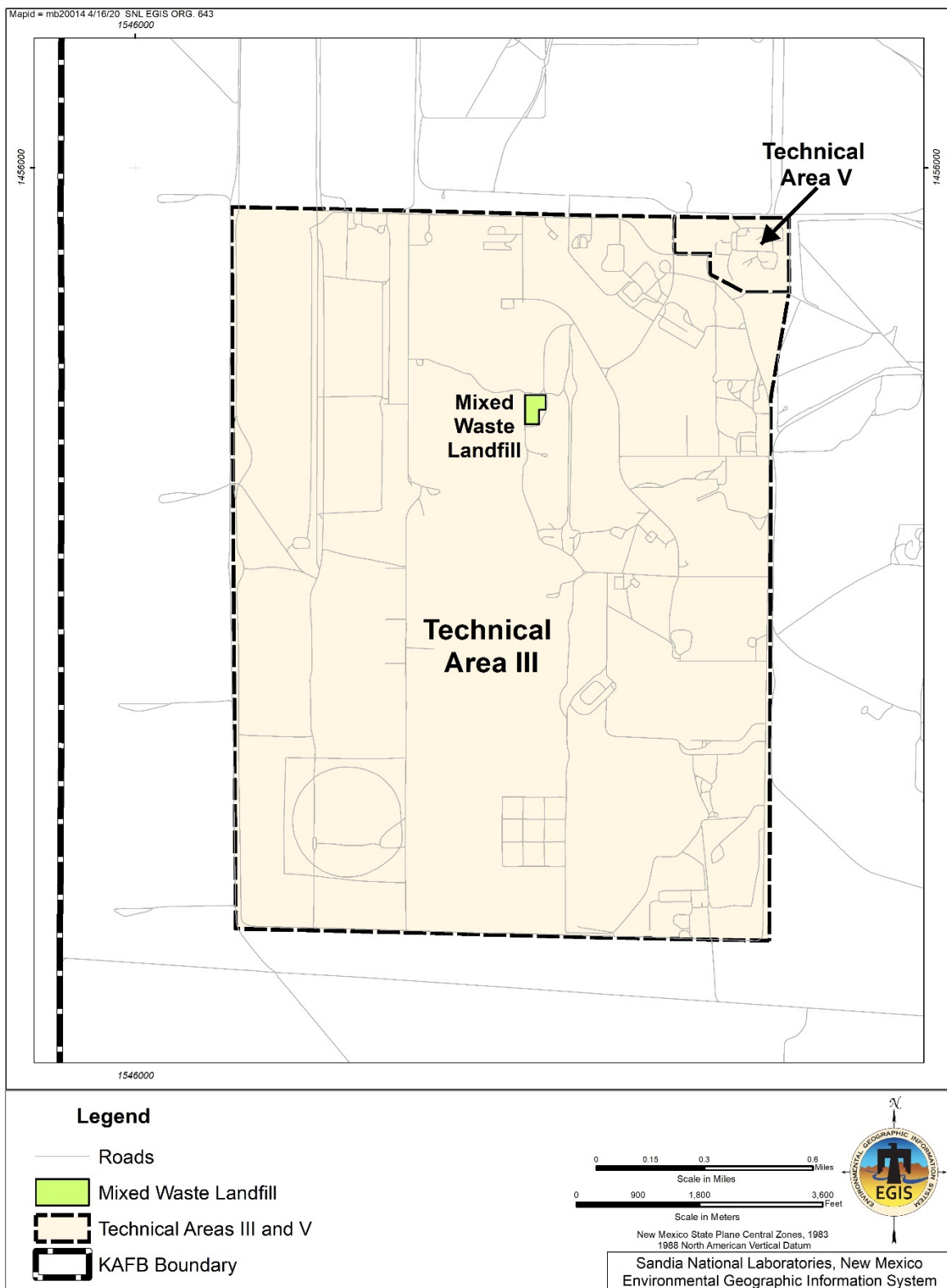


Figure 1-2  
Location of the Mixed Waste Landfill within Technical Area III



On February 12, 2016, the NMED issued the Final Order *In the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID No. NM5890110518, to Determine Corrective Action Complete with Controls at the Mixed Waste Landfill*, No. HWB 15-18 (P) (NMED February 2016). As of March 13, 2016, the February 2016 Final Order became effective, granting the Class 3 Permit Modification to reflect that the MWL is Corrective Action Complete with Controls. All controls required for the MWL are defined in the LTMMMP that was approved by NMED on January 8, 2014 (Blaine January 2014) and is included in Attachment M of the Permit (Kielling February 2016). Long-term monitoring and maintenance are 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, 2020 through March 31, 2021 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, Appendix 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 to 1-year 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 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 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. Frequency may be more conservative than required (e.g., Year 5 and subsequent years for radon air monitoring can be quarterly or semiannual versus annual).

<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

MWL

RCRA

VOC

= Long-Term Monitoring and Maintenance Plan.

= Mixed Waste Landfill.

= Resource Conservation and Recovery Act.

= 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), which occurred as of the August 2014 growing season inspection.

<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 ET Cover, inspections, and associated maintenance/repairs.

### 2.2.1 ET Cover

The ET Cover consists of four main layers: Compacted Subgrade, Rock 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 Compacted 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. After completion of the first phase, the second phase of annual inspections began that 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

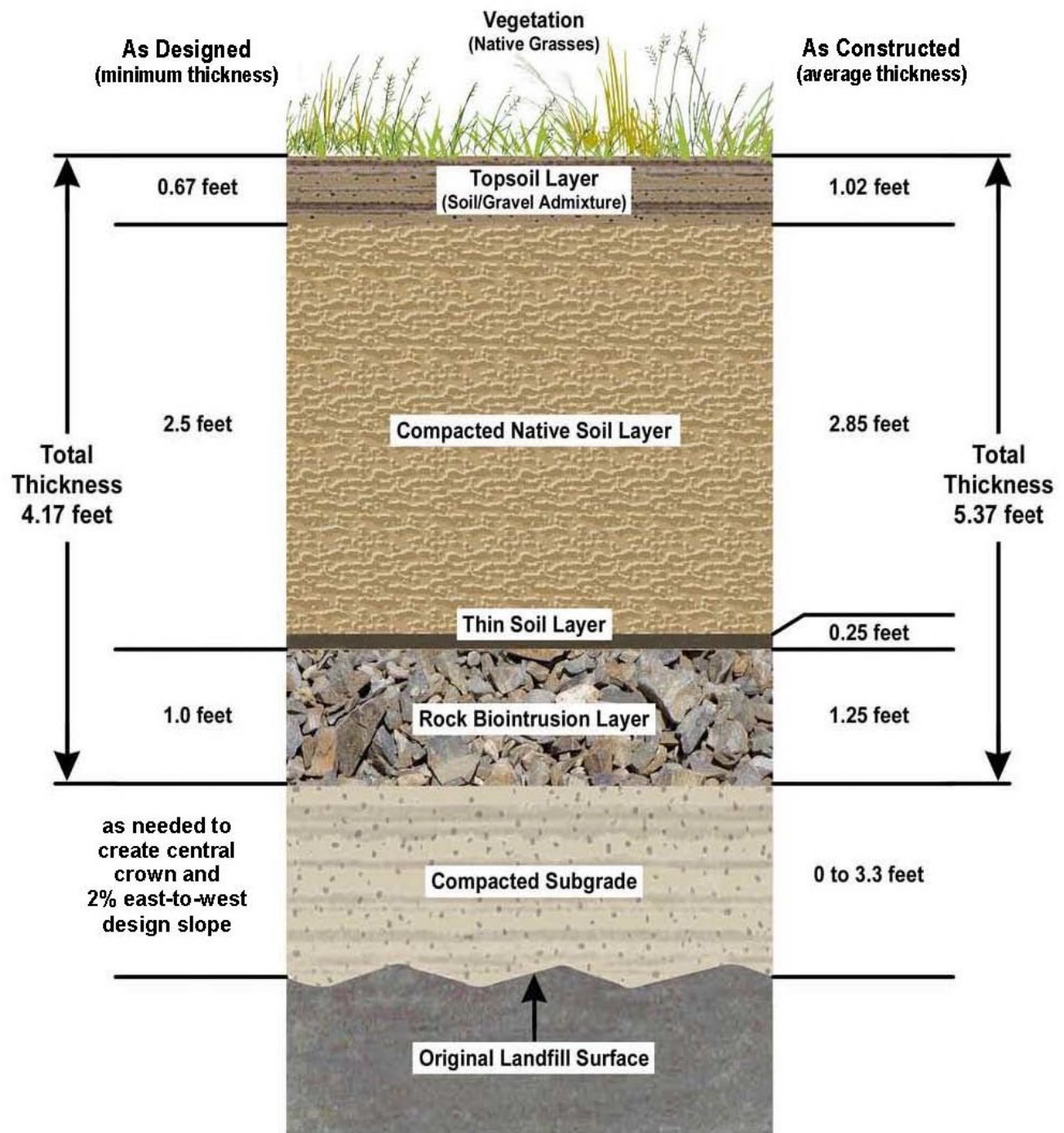


Figure 2-1  
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover Layers

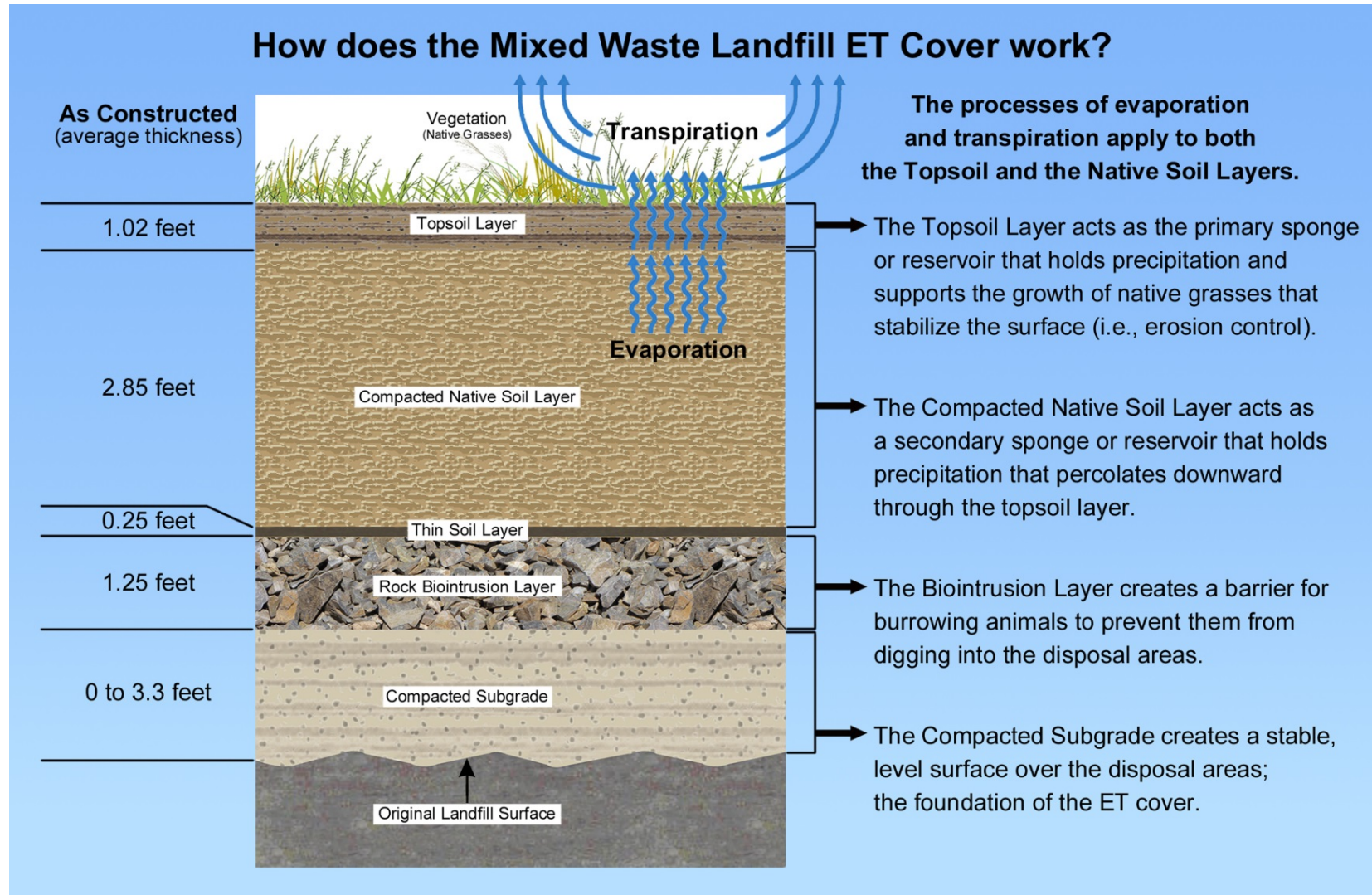


Figure 2-2  
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover and How it Works



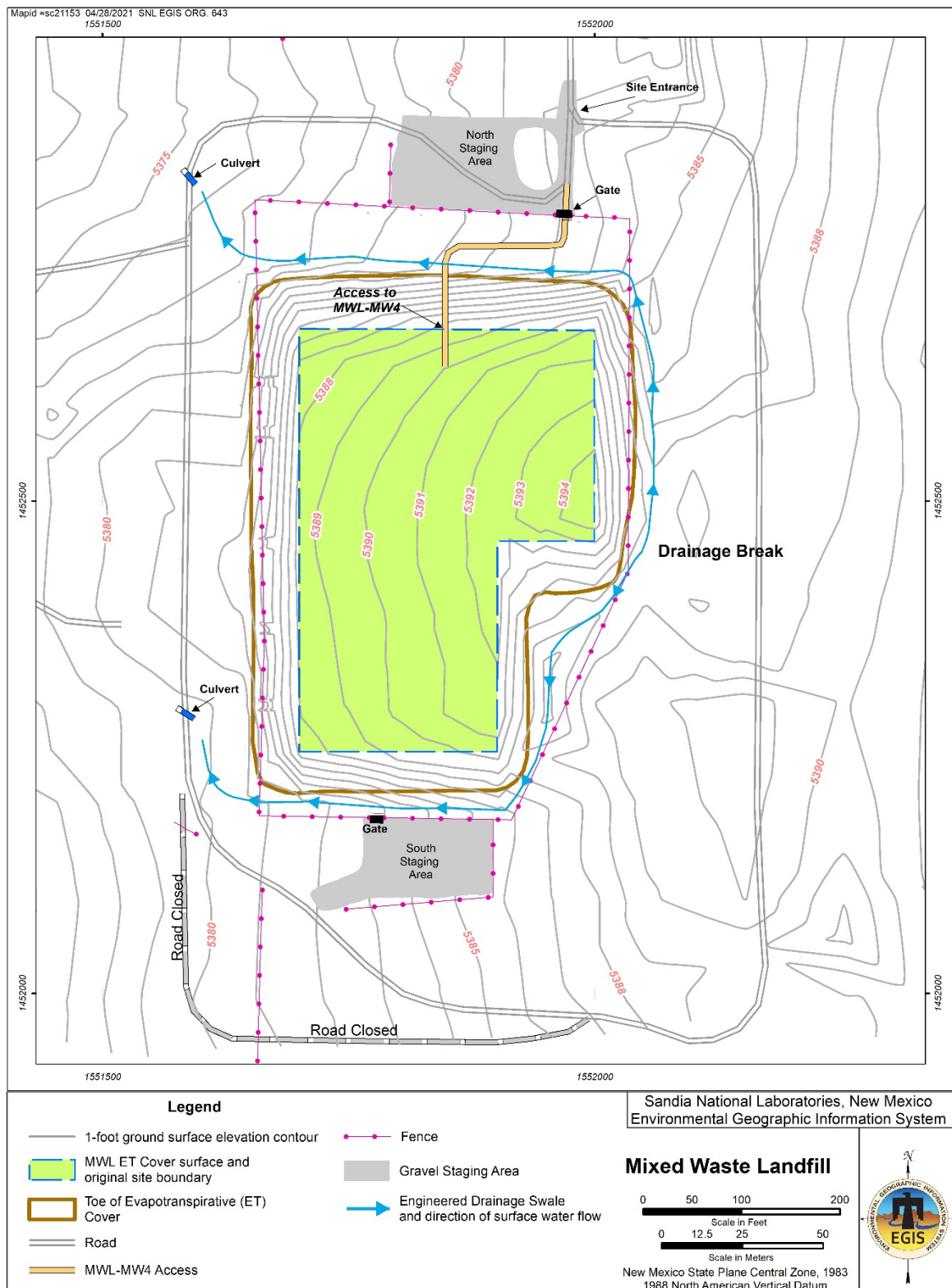


Figure 2-3  
Mixed Waste Landfill Engineered Storm-Water Drainage Swale

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 LTMMMP 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 LTMMMP 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 covering calendar year (CY) 2020, fulfilling the LTMMMP minimum requirement of annual monitoring. Radon monitoring presented for this April 1, 2020 through March 31, 2021 reporting period covers the period January 6, 2020 through January 18, 2021.

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 2020. 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 2020 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 2020 radon monitoring are summarized in Section 3.2.1.

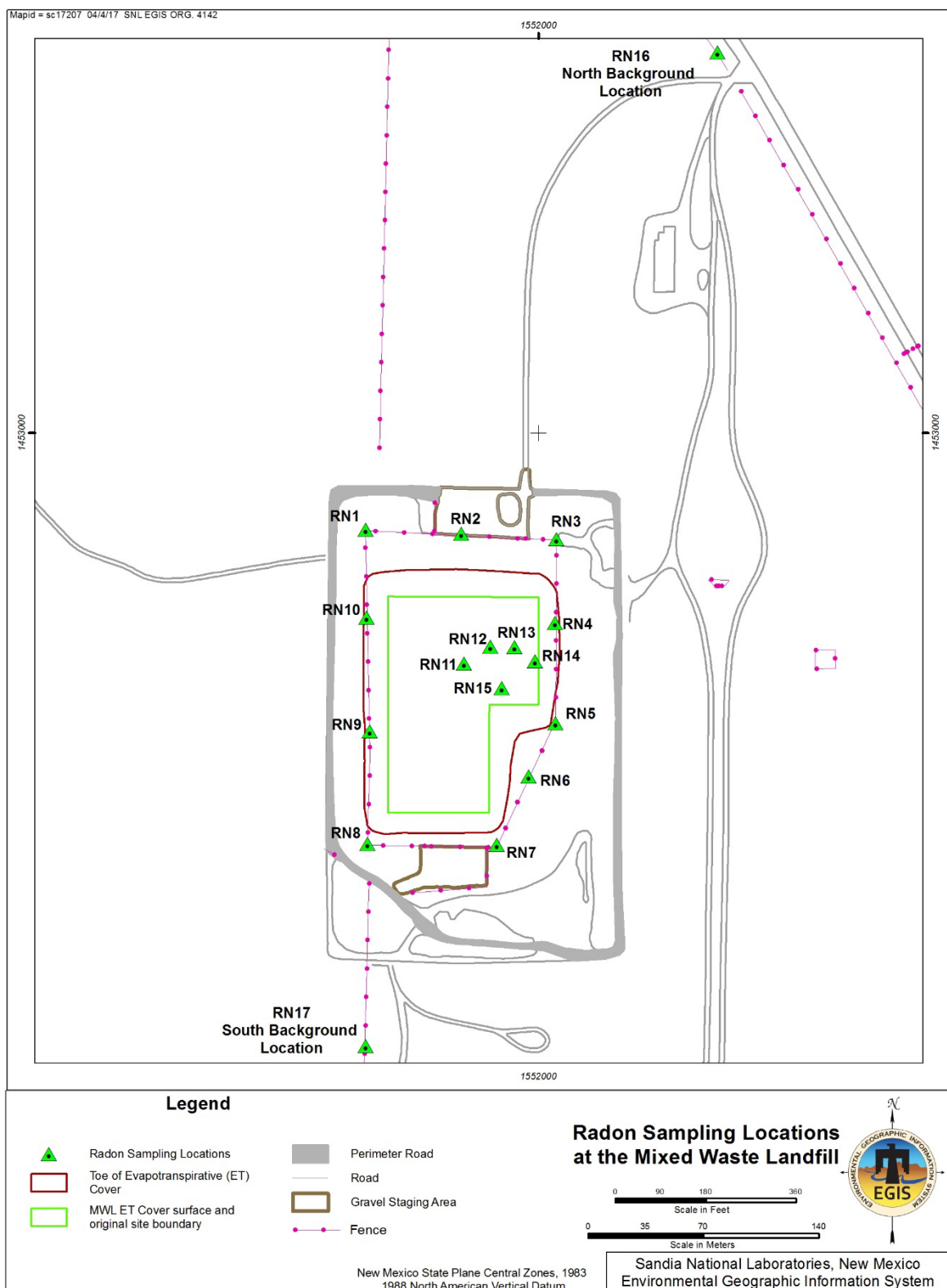


Figure 3-1  
Mixed Waste Landfill Radon Detector Locations

Table 3-1  
Summary of Radon Results  
Mixed Waste Landfill Air Monitoring  
Calendar Year 2020

Sample Location <sup>a</sup>	1 <sup>st</sup> Half CY 2020		2 <sup>nd</sup> Half CY 2020		CY 2020 Radon Air Concentration Range (pCi/L)	Trigger Level (pCi/L)
	Detector Deployment Date	Detector Collection Date	Detector Deployment Date	Detector Collection Date		
	1/6/2020	7/6/2020	7/6/2020	1/18/2021		
	Semiannual Time-Weighted Average Radon Air Concentration (pCi/L)					
RN1	<0.2 <sup>b</sup>		0.2 ± 0.2		<0.2 to 0.2	4
RN2	<0.2 <sup>b</sup>		0.2 ± 0.2		<0.2 to 0.2	4
RN3	<0.2 <sup>b</sup>		0.3 ± 0.2		<0.2 to 0.3	4
RN4	<0.2 <sup>b</sup>		<0.2 <sup>b</sup>		<0.2	4
RN5	<0.2 <sup>b</sup>		<0.2 <sup>b</sup>		<0.2	4
RN6	<0.2 <sup>b</sup>		0.3 ± 0.2		<0.2 to 0.3	4
RN7	0.3 ± 0.2		<0.2 <sup>b</sup>		<0.2 to 0.3	4
RN8	0.2 ± 0.2		0.2 ± 0.2		0.2	4
RN9	<0.2 <sup>b</sup>		<0.2 <sup>b</sup>		<0.2	4
RN10	<0.2 <sup>b</sup>		<0.2 <sup>b</sup>		<0.2	4
RN11	<0.2 <sup>b</sup>		0.3 ± 0.2		<0.2 to 0.3	NA
RN12	<0.2 <sup>b</sup>		<0.2 <sup>b</sup>		<0.2	NA
RN13	0.3 ± 0.2		0.4 ± 0.2		0.3 to 0.4	NA
RN14	0.3 ± 0.2		0.3 ± 0.2		0.3	NA
RN15	<0.2 <sup>b</sup>		0.2 ± 0.2		<0.2 to 0.2	NA
RN16	0.2 ± 0.2		0.3 ± 0.2		0.2 to 0.3	NA
RN17	0.4 ± 0.2		0.4 ± 0.2		0.4	NA
RNTB	<0.2 <sup>b</sup>		<0.2 <sup>b</sup>		<0.2	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 2020 at the 17 sampling locations and represent the monitoring periods January through June and July through December (Table 3-1). During the months between deployment and collection, inspections were conducted as a best practice 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 2020. 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 semiannual monitoring results are presented in Table 3-1. The CY 2020 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 0.2 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. For the January through June and July through December 2020 sampling periods, the trip blank results were 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. 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 LTMMP radon monitoring requirements.

## 3.3 Data Evaluation and Monitoring Trigger Level

The trigger level for radon in air is 4 pCi/L (time-weighted average), which applies to detectors RN1 through RN10 located on the perimeter fence. The trigger level of 4 pCi/L is the same as the 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 2020. The highest reported CY 2020 result was 0.4 pCi/L from background location RN17 (January through June and July through December) and location RN13 on the ET Cover (July through December). 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 July 27, 2020, 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 July 2020 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 July 27, 2020 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 July 2020 sampling event was collected at the southwest corner of the ET Cover, tritium monitoring location MWL TS-2SW (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 non-hazardous solid waste.

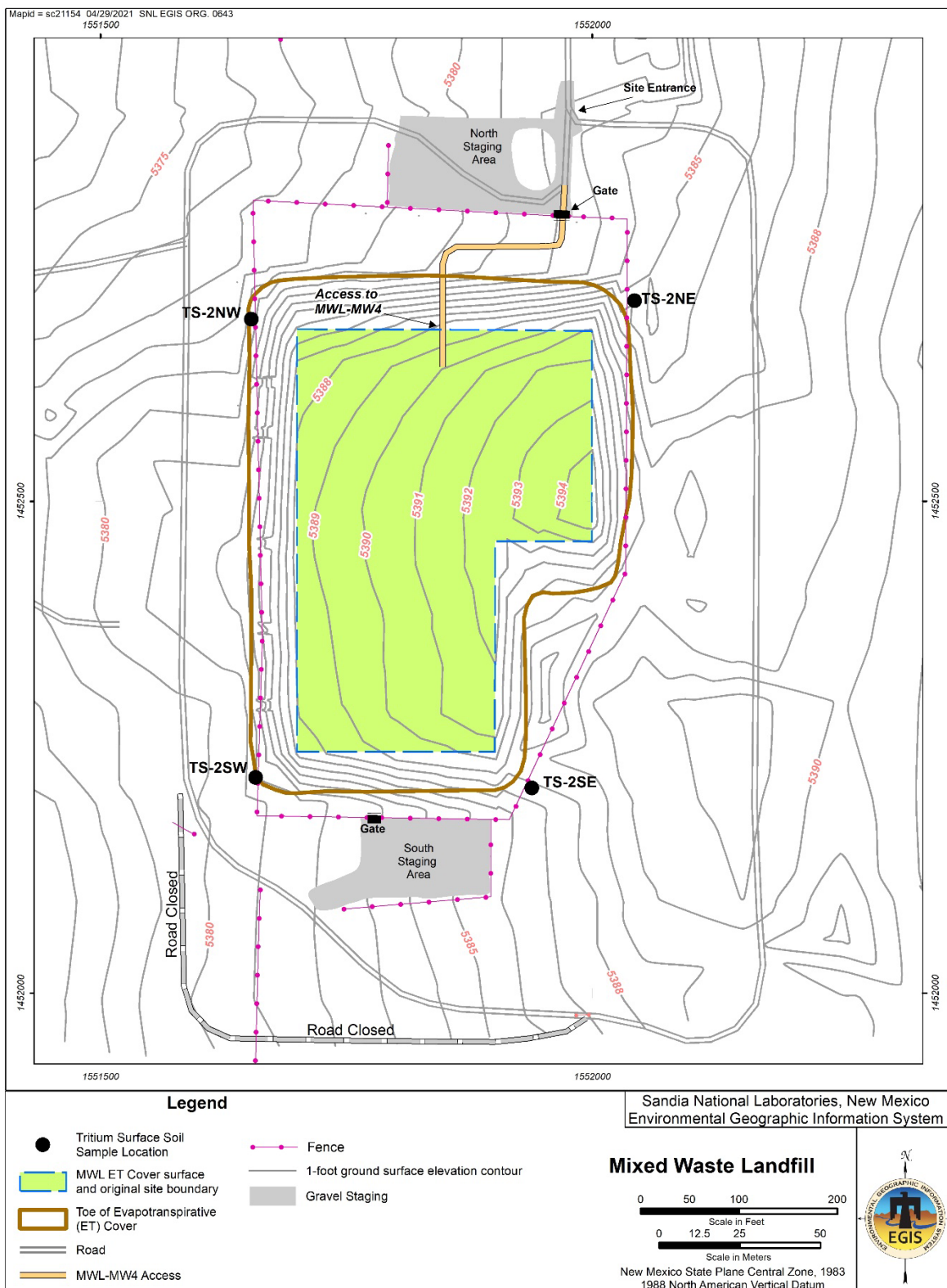


Figure 4-1  
Mixed Waste Landfill Tritium Surface Soil Sampling Locations

## 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 July 2020 sampling event. Similar to previous years, tritium was not detected in any of the samples. Reported activities were all below the MDA. All samples had good soil-moisture content, ranging from 6.91 to 10.5 percent by mass, and the MDA ranged from 211 pCi/L to 218 pCi/L. The results are consistent with 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 environmental 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, matrix spike and matrix spike duplicate 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. 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 2020a).

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  
July 2020

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)
July 2020						
MWL TS-2NW	45.9	10.5	211	U	BD, FR3	20,000
MWL TS-2SW	-23.8	6.92	218	U	BD, FR3	
MWL TS-2SW (Duplicate)	-3.85	9.80	216	U	BD, FR3	
MWL TS-2SE	8.76	9.94	218	U	BD, FR3	
MWL TS-2NE	6.52	6.91	212	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 July 2020 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 July 2020 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 (i.e., unsaturated soil and sediments above the Regional Aquifer) beneath the MWL. 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, a comparison of results to monitoring trigger levels, and a discussion of data quality are presented in Section 5.2; and historical data evaluation is 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, 2020 through March 31, 2021 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 11, 2020. Soil-vapor samples were collected from all monitoring well sampling ports. Duplicate samples were collected from MWL-SV01 and MWL-SV02 sampling ports (42.5 and 41.5 ft bgs, respectively).
- The second sampling event was conducted on November 13, 2020. Soil-vapor samples were collected from all monitoring well sampling ports. Duplicate samples were collected from two MWL-SV05 sampling ports (200 and 400 ft bgs).



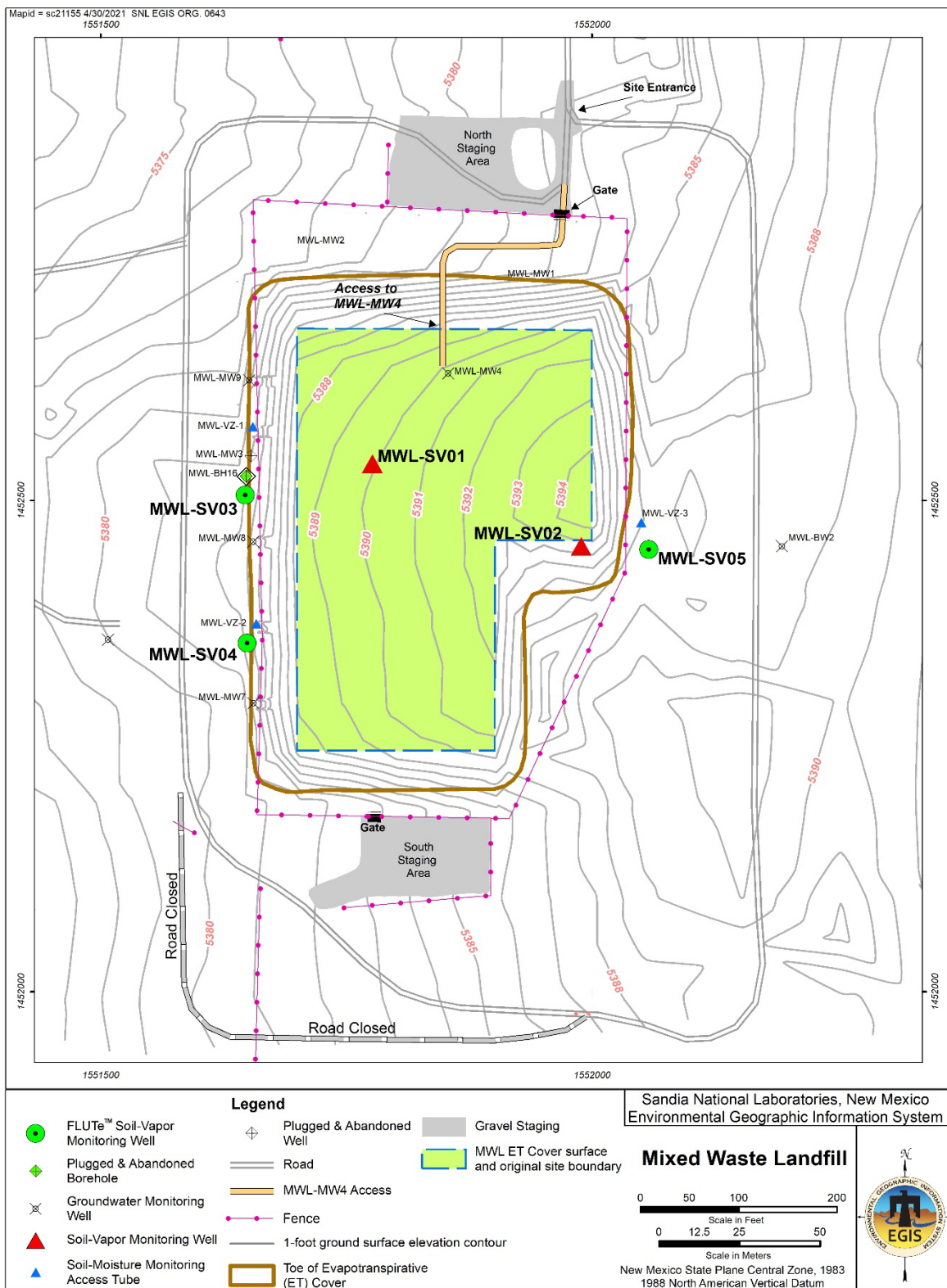


Figure 5-1  
Mixed Waste Landfill Soil-Vapor Monitoring Well Locations

### 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 2019) and LTMMP Appendix D. All wells were purged using a dedicated MWL vacuum pump. Real time continuous VOC screening was performed with a PID to determine stabilization during the purging process.

### 5.1.2 Field Quality Control

Field QC samples include 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 November 2020 sampling events included the collection of an environmental-duplicate sample pair from monitoring wells MWL-SV01-42.5 and MWL-SV02-41.5 in May, and the sampling ports located at 200 ft bgs and 400 ft bgs at monitoring well MWL-SV05 in November (i.e., MWL-SV05-200 and MWL-SV05-400). 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 0.320 ppmv from the May MWL-SV03-400 environmental sample. The TCE maximum concentration was 0.220 ppmv from the May MWL-SV03-400 environmental sample. The maximum Total VOCs concentration was 0.65647 ppmv from the May MWL-SV03-400 environmental sample. All May and November 2020 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, 2020 through March 31, 2021 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 11, 2020

A total of 26 compounds were detected above MDLs in May 2020 samples. All of these VOCs were also detected in the November 2020 samples except for yellow highlighted compounds.

Acetone	1,2-Dichloropropane
Benzene	Ethylbenzene
Bromodichloromethane	2-Hexanone
2-Butanone	4-Methyl-,2-Pentanone
Carbon Disulfide	Tetrachloroethene
Carbon Tetrachloride	Toluene
Chloroform	1,1,2-Trichloro-1,2,2-trifluoroethane
Chloromethane	1,1,1-Trichloroethane
1,2-Dichloro-1,1,2,2-tetrafluoroethane	Trichloroethene
Dichlorodifluoromethane	Trichlorofluoromethane
1,1-Dichloroethane	1,2,4-Trimethylbenzene
1,1-Dichloroethene	m-,p-Xylene
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 0.020 ppmv (MWL-SV04-50) to 0.450 ppmv (MWL-SV01-42.5). TCE concentrations ranged from 0.035 ppmv (MWL-SV04-50) to 0.220 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.204064 ppmv (MWL-SV04-50) to 0.9706 ppmv (MWL-SV01-42.5). Other VOCs detected in all monitoring wells, generally at lower concentrations include chloroform, dichlorodifluoromethane, 1,1-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,1-trichloroethane, and trichlorofluoromethane. The highest sample port VOC concentration was a PCE result of 0.450 ppmv from MWL-SV01-42.5.

For the May 2020 results from the three deepest sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05, PCE concentrations ranged from 0.098 ppmv (MWL-SV05-400) to 0.320 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.080 ppmv (MWL-SV04-400) to 0.220 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.33832 ppmv (MWL-SV04-400) to 0.65647 ppmv (MWL-SV03-400).

#### Second Sampling Event – November 13, 2020

A total of 16 compounds were detected above MDLs in November 2020 samples. All of these compounds were detected in the May 2020 samples.

Bromodichloromethane	Tetrachloroethene
Carbon Disulfide	Toluene
Carbon Tetrachloride	1,1,2-Trichloro-1,2,2-trifluoroethane
Chloroform	1,1,1-Trichloroethane
Dichlorodifluoromethane	Trichloroethene
1,1-Dichloroethane	Trichlorofluoromethane
1,1-Dichloroethene	1,2,4-Trimethylbenzene
cis-1,2-Dichloroethene	m,p-Xylene

PCE and TCE exhibited the highest concentrations and were reported in all environmental samples from all sampling ports. PCE was detected at concentrations ranging from 0.039 ppmv (MWL-SV05-50) to 0.380 ppmv (MWL-SV01-42.5). TCE concentrations ranged from 0.048 ppmv (MWL-SV04-50) to 0.220 ppmv (MWL-SV03-200 and MWL-SV05-200 environmental sample). Total VOCs concentrations ranged from 0.19580 ppmv (MWL-SV05-400, environmental duplicate sample) to 0.82923 ppmv (MWL-SV01-42.5). The highest sample port VOC concentration was a PCE result of 0.380 ppmv from MWL-SV01-42.5.

For the November 2020 results from the three deepest sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05, PCE concentrations ranged from 0.063 ppmv (MWL-SV05-400 environmental duplicate sample) to 0.240 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.053 ppmv (MWL-SV05-400, environmental duplicate sample) to 0.190 ppmv (MWL-SV03-400). Total VOCs concentrations ranged from 0.19580 ppmv (MWL-SV05-400, environmental duplicate sample) to 0.51541 ppmv (MWL-SV03-400).

Tables 5-1 and 5-2 (provided at the end of this chapter) summarize detected VOCs results for the May 2020 and November 2020 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 November 2020 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 November 2020 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 11, 2020

The two environmental-duplicate sample pairs collected during the May 2020 sampling event were analyzed for all analytical parameters. The calculated RPDs show good agreement for the environmental-duplicate sample pairs, ranging from 3 to 27 for 14 of the 15 duplicate pair results. One RPD result for the MWL-SV01-42.5 environmental duplicate pair (PCE) was 54. 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). No additional actions were taken since all but one of the detected compounds demonstrated good RPD results and the PCE RPD for the MWL-SV01-42.5 sample pair was just outside the established range.

A total of five field blank samples were submitted for analysis with the May 2020 environmental samples. VOCs detected above MDLs in field blank samples at very low concentrations include acetone (2 samples), benzene (4 samples), 2-butanone (2 samples), carbon disulfide (2 samples), carbon tetrachloride (1 sample), chloroform (1 sample), chloromethane (1 sample), 2-hexanone (1 sample), 4-methyl-2-pentanone (1 sample), methylene chloride (4 samples), PCE (4 samples), 1,1,2-trichloro-1,2,2-trifluoroethane (1 sample), toluene (1 sample), TCE (2 samples), and trichlorofluoromethane (2 samples). No corrective action was required for acetone, 2-butanone, chloroform, chloromethane, 4-methyl-2-pentanone, PCE, 1,1,2-trichloro-1,2,2-trifluoroethane, TCE, and trichlorofluoromethane since these compounds were not detected in associated environmental samples or detected at concentrations greater than five times the field blank concentration. Benzene, carbon disulfide, carbon tetrachloride, 2-hexanone, and methylene chloride 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 blank and corresponding environmental samples.

Table 5-3  
Summary of Duplicate Samples  
Mixed Waste Landfill Soil-Vapor Monitoring  
May and November 2020

Well ID/Parameter	Environmental Sample (R <sub>1</sub> )	Duplicate Sample (R <sub>2</sub> )	RPD <sup>a</sup> (%)
	(ppmv)		
May 2020 Environmental-Duplicate Sample Pair Results			
MWL-SV01-42.5			
Chloroform	0.017	0.016	6
Dichlorodifluoromethane	0.093	0.088	6
Tetrachloroethene	0.45	0.26	54
1,1,2-Trichloro-1,2,2-trifluoroethane	0.075	0.073	3
1,1,1-Trichloroethane	0.031	0.029	7
Trichloroethene	0.084	0.079	6
Trichlorofluoromethane	0.210	0.200	5
MWL-SV02-41.5			
Chloroform	0.0025	0.0026	4
Dichlorodifluoromethane	0.080	0.073	9
1,1-Dichloroethene	0.0088	0.0093	6
Tetrachloroethene	0.071	0.081	13
1,1,2-Trichloro-1,2,2-trifluoroethane	0.044	0.046	4
1,1,1-Trichloroethane	0.055	0.057	4
Trichloroethene	0.052	0.068	27
Trichlorofluoromethane	0.28	0.30	7
November 2020 Environmental-Duplicate Sample Pair Results			
MWL-SV04-200			
Dichlorodifluoromethane	0.074	0.073	1
1,1-Dichloroethene	0.040	0.039	3
Tetrachloroethene	0.14	0.13	7
1,1,2-Trichloro-1,2,2-trifluoroethane	0.16	0.15	6
Trichloroethene	0.22	0.21	5
Trichlorofluoromethane	0.090	0.089	1
MWL-SV04-400			
Dichlorodifluoromethane	0.020	0.015	29
1,1-Dichloroethene	0.012	0.0090	29
Tetrachloroethene	0.084	0.063	29
1,1,2-Trichloro-1,2,2-trifluoroethane	0.046	0.034	30
Trichloroethene	0.083	0.053	44
Trichlorofluoromethane	0.024	0.018	29

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.

% = Percent.  
ID = Identification.  
MWL = Mixed Waste Landfill.  
ppmv = Parts per million by volume basis.

### Second Sampling Event – November 13, 2020

The two environmental-duplicate sample pairs collected during the November 2020 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 1 to 44, with 11 of the 12 RPD results less than or equal to 30.

A total of five field blank samples were submitted for analysis with the November 2020 samples. VOCs detected above MDLs in field blank samples at very low concentrations included acetone, benzene, 2-butanone, ethylbenzene, m-,p-xylene, and o-xylene in all field blank samples; carbon disulfide (3 samples); chloroethane (1 sample); chloromethane (1 sample); dichlorodifluoromethane (1 sample); cis-1,2-dichloroethene (1 sample); methylene chloride (2 samples); PCE (3 samples); toluene (4 samples); TCE (1 sample); and trichlorofluoromethane (2 samples). No corrective action was required for chloroethane, chloromethane, dichlorodifluoromethane, PCE, TCE, trichlorofluoromethane, or m-,p-xylene since these compounds were not detected in associated environmental samples or detected at concentrations less than five times the field blank sample concentration. Acetone, benzene, 2-butanone, carbon disulfide, cis-1,2-dichloroethene, ethylbenzene, methylene chloride, toluene, and o-xylene 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 blank 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. All laboratory control sample results met the accuracy (i.e., percent recovery) requirement of 50 to 130 percent for detected compounds (Section 2.2 of LTMMMP Appendix D), except as explained below.

For the May 2020 sampling event, the percent recoveries for 1,2-dichloro-1,1,2,2-tetrafluoroethane (associated with the MWL-SV05-200 sample) and dichlorodifluoromethane (associated with all MWL-SV05 samples and MWL-SV04-300 and -400 samples) were outside LTMMMP limits. The associated environmental sample results for these compounds were qualified during data validation as estimated with a suspected positive (i.e, high) bias. In addition, due to initial calibration issues for methylene chloride associated with samples from MWL-SV01, MWL-SV04 (300 and 400 ft bgs ports), and MWL-SV05 (all ports), all non-detect methylene chloride results were qualified as not usable for the associated environmental samples.

For the November 2020 sampling event, the percent recoveries for 2-hexanone and 4-methyl-2-pentanone associated with samples from monitoring wells MWL-SV01, MWL-SV02, MWL-SV04 (100, 200, and 300 ft bgs sample ports), and MWL-SV05 (all sample ports) were outside LTMMMP limits but within the EPA Method TO-15 limits. 2-Hexanone was also reported in all laboratory method blank samples except for the method blank sample associated with MWL-

SV03-400 and had initial calibration issues associated with various samples. It was reported at very low concentrations (i.e., less than the RL) in all environmental samples except for MWL-SV03-400 and MWL-SV04-400 but qualified as not detected during data validation because of the associated laboratory method blank detections (i.e., laboratory contamination). 4-methyl-2-pentanone results for environmental samples were not qualified during data validation because the percent recovery of this compound was within the EPA Method TO-15 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 and June 2020a). Based upon the data validation and review criteria, the May and November 2020 analytical data were determined acceptable and met the DQOs. Reported QC sample results comply with analytical method and laboratory procedure requirements except as noted above. 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 LTMMP was identified for the May and November 2020 soil-vapor monitoring activities. This variance is considered minor because it has no adverse impact on data quality. During the purging process, a PID with an 11.7 electron volts (eV) lamp was used instead of an 11.8 eV lamp as specified in Section 3.3 in Appendix D of the LTMMP. 11.8 eV lamps are not currently available from the manufacturer or the distributors. A permit modification request is in preparation that will address this minor variance and submittal to NMED is anticipated in CY 2021.

### 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 14 semiannual monitoring events conducted since implementation of the LTMMP 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.
- 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>	Sept. 2014 <sup>b</sup> (ppmv)	Oct. 2014 <sup>b</sup> (ppmv)	April 2015 <sup>b</sup> (ppmv)	Oct. 2015 <sup>b</sup> (ppmv)	April 2016 <sup>b</sup> (ppmv)	Oct. 2016 <sup>b</sup> (ppmv)	May 2017 <sup>b</sup> (ppmv)	Oct. 2017 <sup>b</sup> (ppmv)	April 2018 <sup>b</sup> (ppmv)	Oct. 2018 <sup>b</sup> (ppmv)	May 2019 <sup>b</sup> (ppmv)	Oct. 2019 <sup>b</sup> (ppmv)	May 2020 <sup>b</sup> (ppmv)	Nov. 2020 <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	0.450	0.380
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	0.081	0.055
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	0.160	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	0.210	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	0.230	0.260
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	0.180	0.250
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	0.320	0.240
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	0.020	0.059
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	0.100	0.120
MWL-SV04-200	0.180	0.180	0.170	0.150	0.180	0.150	0.110	0.130	0.120	0.120	0.130	0.094	0.130	0.110
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	0.110	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	0.120	0.150
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	0.035	0.039
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	0.079	0.065
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	0.120	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	0.110	0.077
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	0.098	0.084

Notes:

All concentrations are not rounded so they match the reported concentrations in corresponding data tables; in some cases a zero is added to maintain significant digit consistency.

<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.

MWL = Mixed Waste Landfill.

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>	Sept. 2014 <sup>b</sup> (ppmv)	Oct. 2014 <sup>b</sup> (ppmv)	April 2015 <sup>b</sup> (ppmv)	Oct. 2015 <sup>b</sup> (ppmv)	April 2016 <sup>b</sup> (ppmv)	Oct. 2016 <sup>b</sup> (ppmv)	May 2017 <sup>b</sup> (ppmv)	Oct. 2017 <sup>b</sup> (ppmv)	April 2018 <sup>b</sup> (ppmv)	Oct. 2018 <sup>b</sup> (ppmv)	May 2019 <sup>b</sup> (ppmv)	Oct. 2019 <sup>b</sup> (ppmv)	May 2020 <sup>b</sup> (ppmv)	Nov. 2020 <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	0.084	0.081
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	0.068	0.055
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	0.120	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	0.180	0.160
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	0.200	0.220
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	0.170	0.170
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	0.220	0.190
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	0.035	0.048
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	0.096	0.120
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	0.160	0.140
MWL-SV04-300	0.076	0.091	0.064	0.093	0.081	0.097	0.087	0.094	0.067	0.076	0.091	0.075	0.089	0.063
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	0.080	0.110
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	0.047	0.049
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	0.100	0.084
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	0.180	0.220
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	0.130	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	0.090	0.083

Notes:

All concentrations are not rounded so they match the reported concentrations in corresponding data tables; in some cases a zero is added to maintain significant digit consistency.

<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.

MWL = Mixed Waste Landfill.

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>	Sept. 2014 <sup>b</sup> (ppmv)	Oct. 2014 <sup>b</sup> (ppmv)	April 2015 <sup>b</sup> (ppmv)	Oct. 2015 <sup>b</sup> (ppmv)	April 2016 <sup>b</sup> (ppmv)	Oct. 2016 <sup>b</sup> (ppmv)	May 2017 <sup>b</sup> (ppmv)	Oct. 2017 <sup>b</sup> (ppmv)	April 2018 <sup>b</sup> (ppmv)	Oct. 2018 <sup>b</sup> (ppmv)	May 2019 <sup>b</sup> (ppmv)	Oct. 2019 <sup>b</sup> (ppmv)	May 2020 <sup>b</sup> (ppmv)	Nov. 2020 <sup>b</sup> (ppmv)
MWL-SV01-42.5	1.14010	1.00870	1.11670	1.03620	0.93510	0.97570	0.74072	0.89810	0.82938	0.76617	0.98919	0.53118	0.97060	0.82923
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	0.67467	0.60661
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	0.44393	0.43056
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	0.61274	0.61284
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	0.69157	0.73170
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	0.56427	0.60664
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	0.65647	0.51541
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	0.20406	0.21711
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	0.38758	0.42548
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	0.57680	0.50409
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	0.34070	0.30656
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	0.33832	0.40556
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	0.27950	0.30139
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	0.52332	0.44824
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	0.65330	0.73969
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	0.46383	0.39804
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	0.36440	0.27466

Notes:

Some concentrations are rounded and/or a zero is added to maintain significant digit consistency, so they may not 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.

MWL = Mixed Waste Landfill.

ppmv = Parts per million by volume.

VOC = Volatile organic compound.

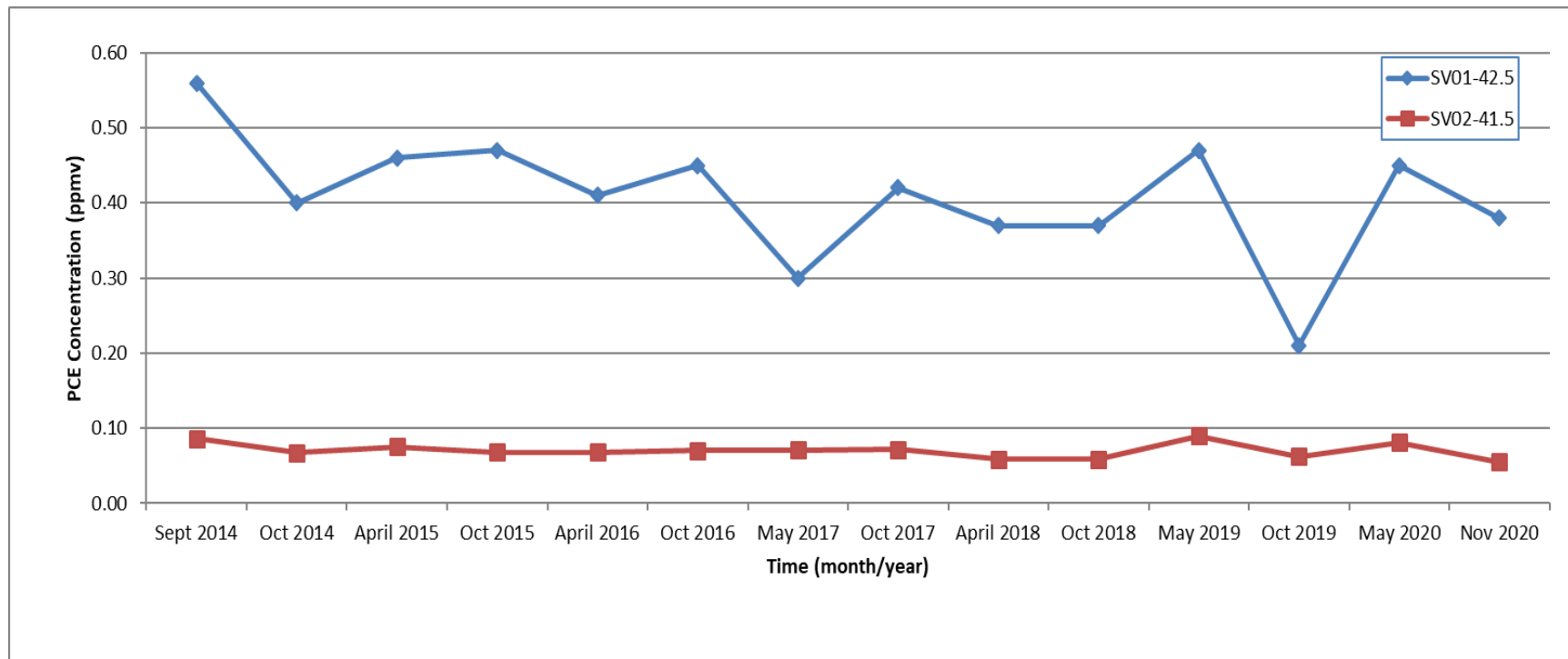


Figure 5-2  
PCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

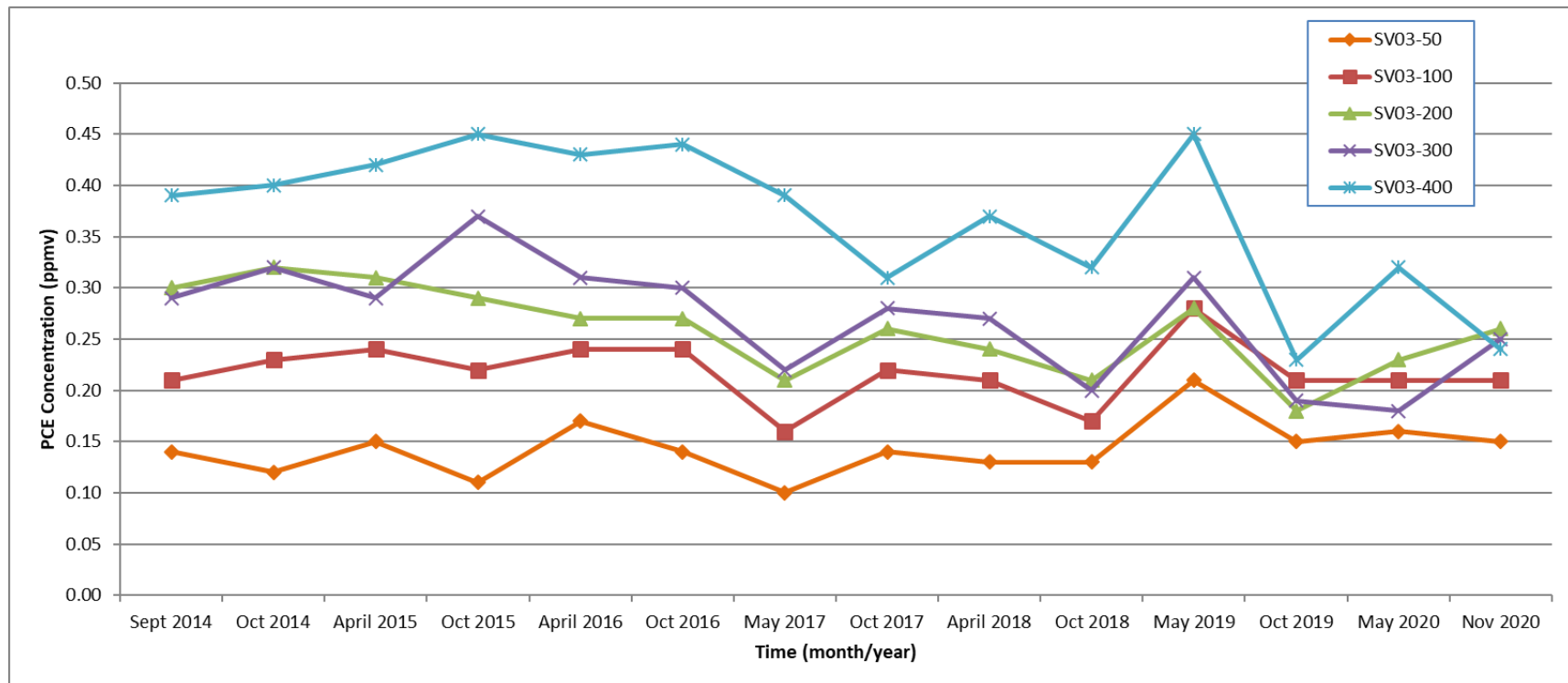


Figure 5-3  
PCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

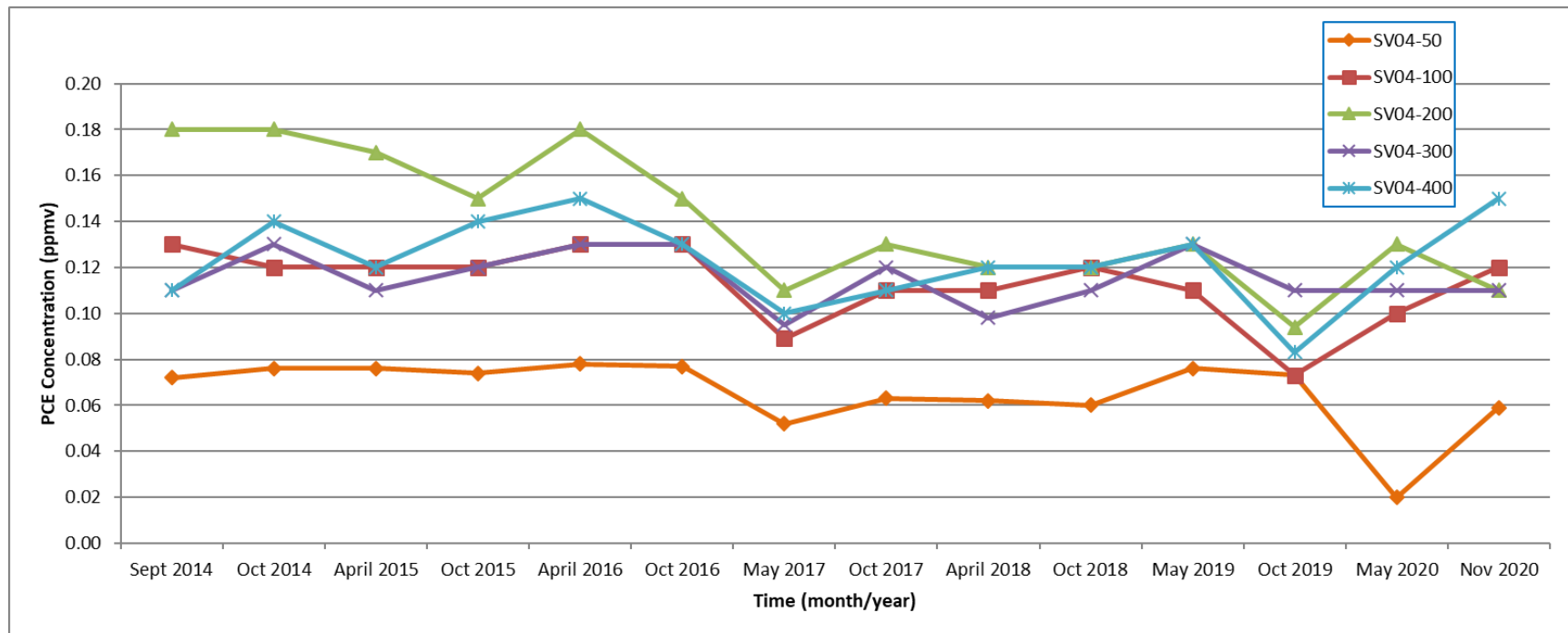


Figure 5-4  
PCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

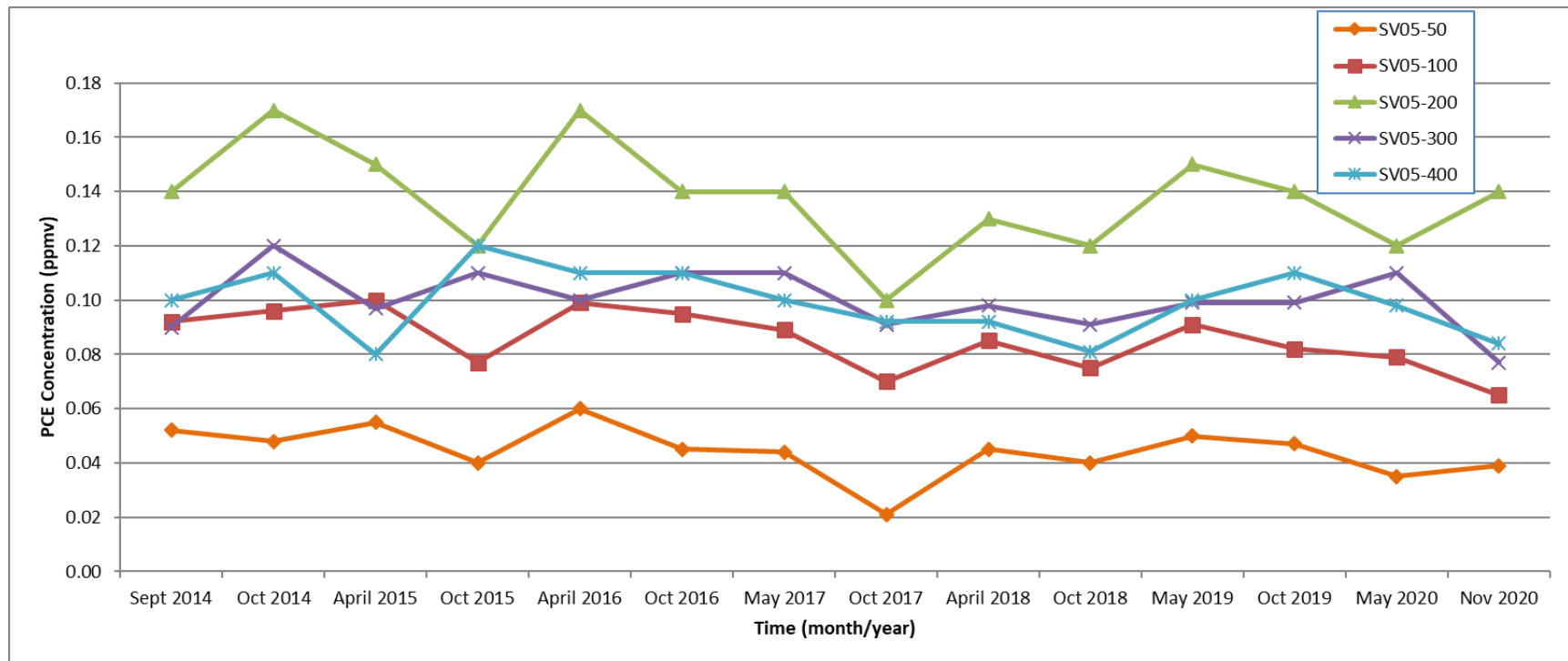


Figure 5-5  
PCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

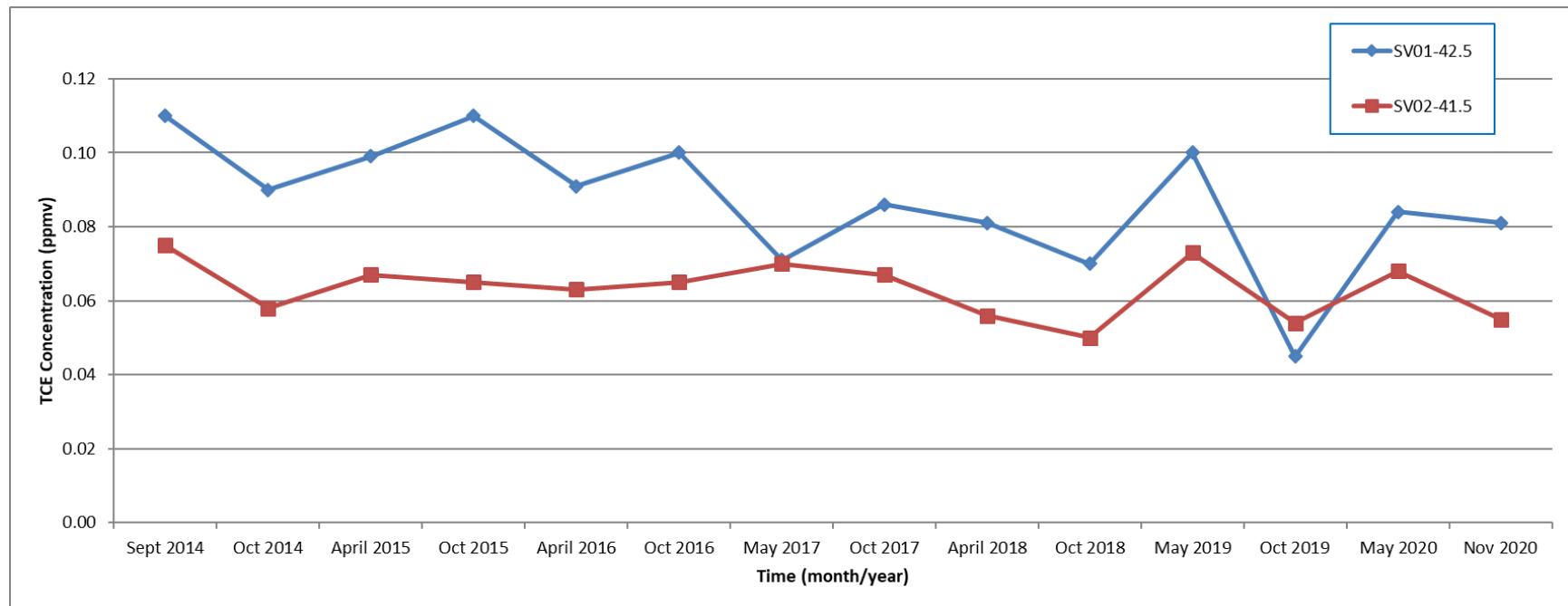


Figure 5-6  
TCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports



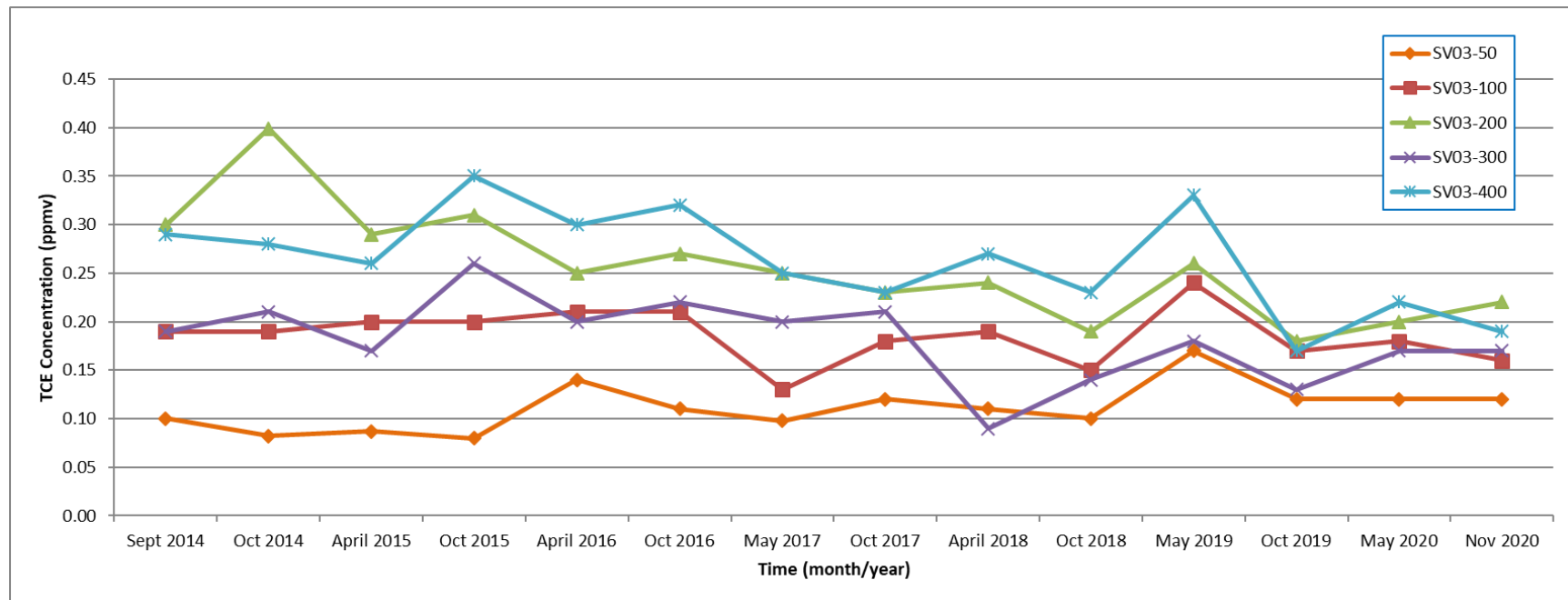


Figure 5-7  
TCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

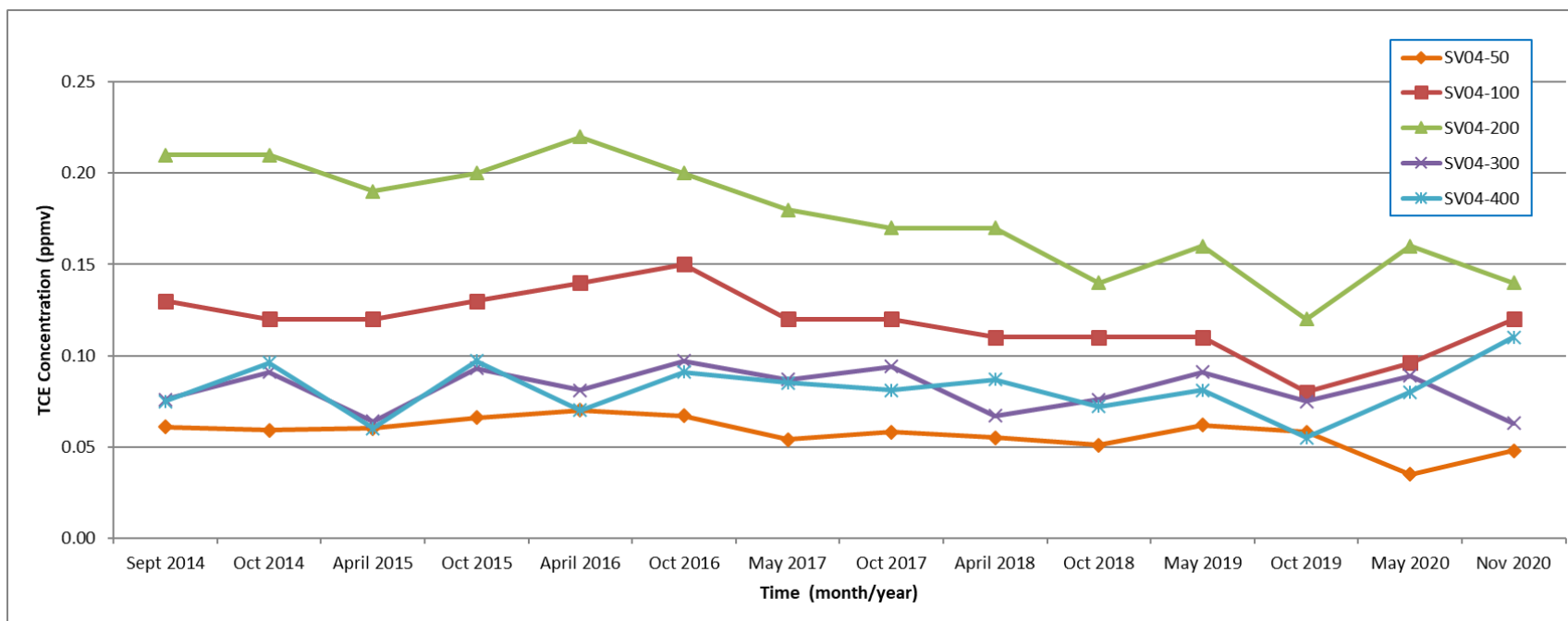


Figure 5-8  
TCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

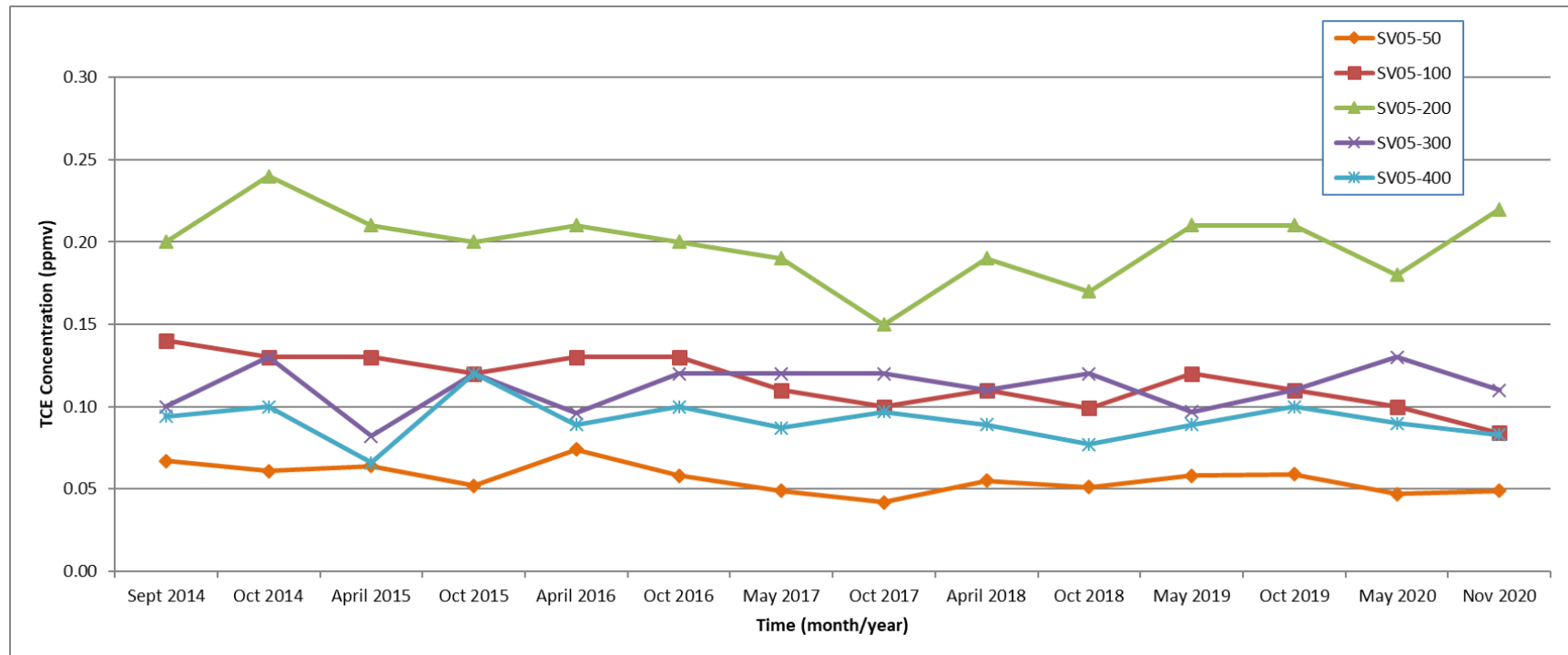


Figure 5-9  
TCE Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

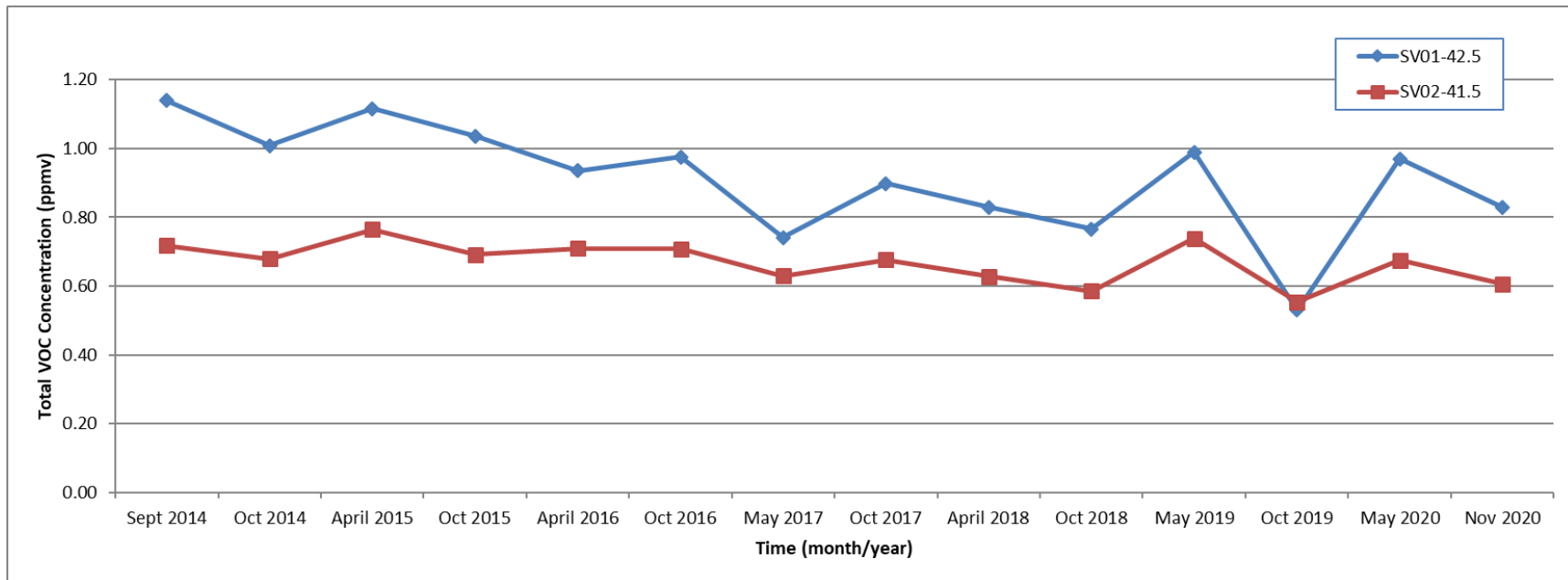


Figure 5-10  
Total VOCs Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

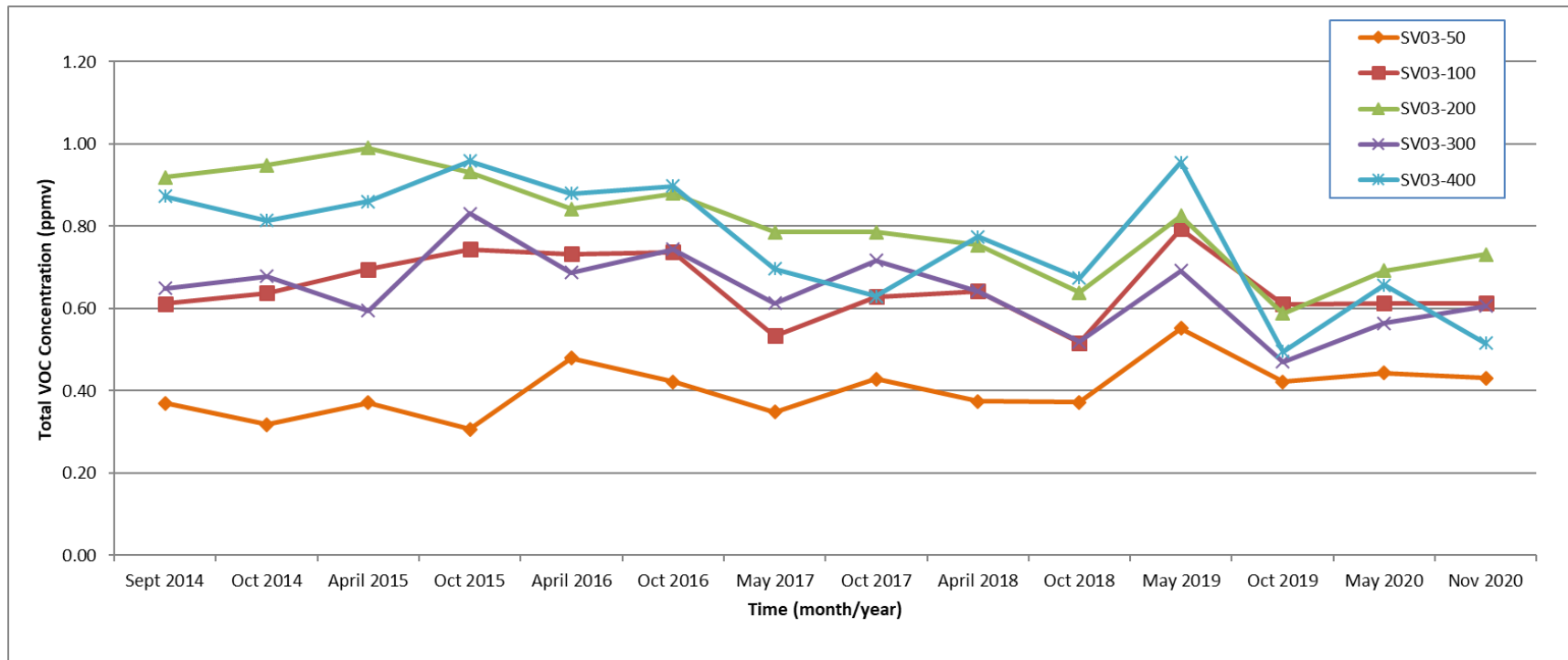


Figure 5-11  
Total VOCs Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

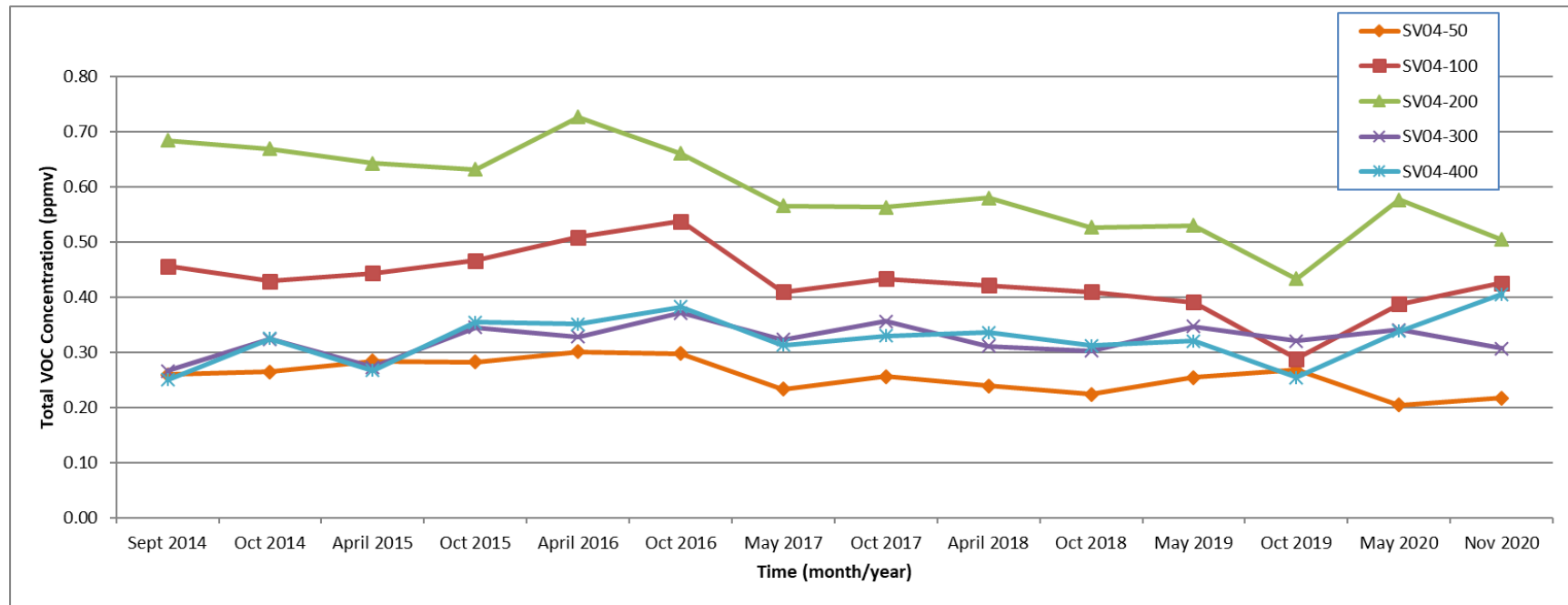


Figure 5-12  
Total VOCs Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

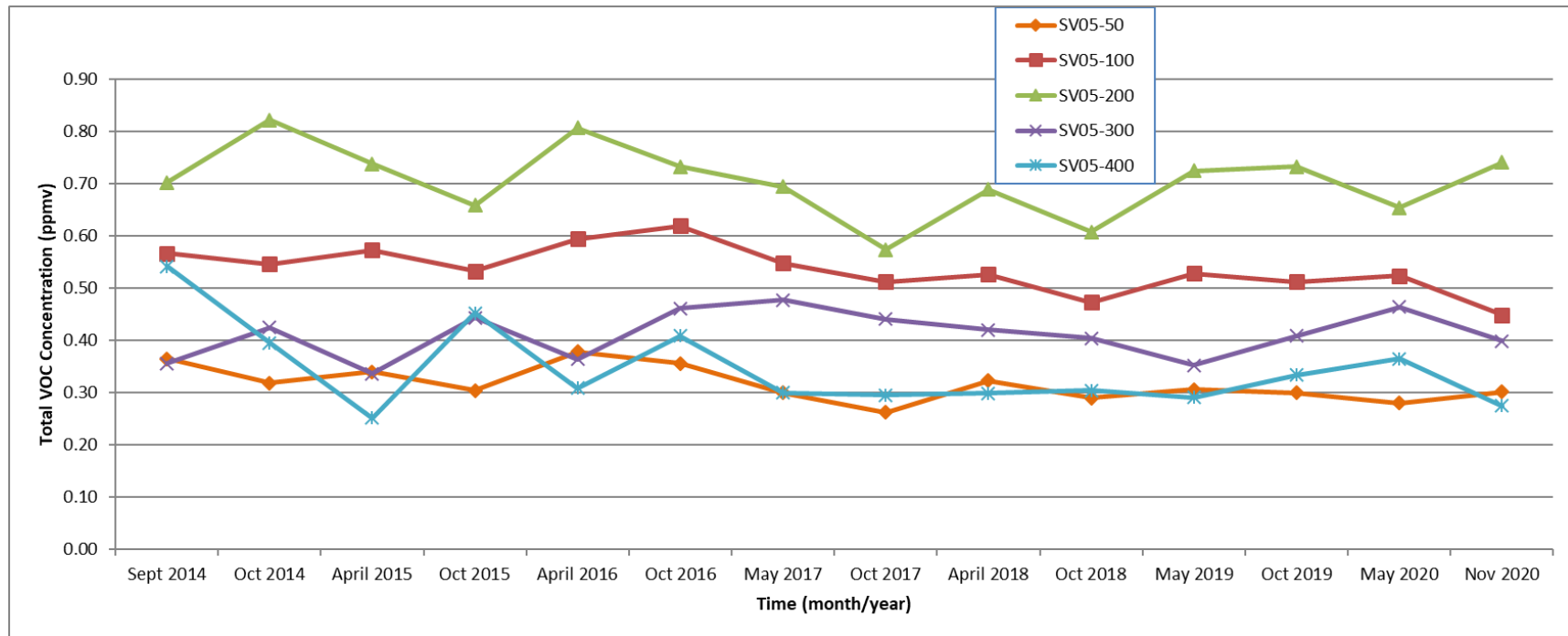


Figure 5-13  
Total VOCs Concentrations vs. Time  
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

Table 5-1  
Summary of Detected VOCs – May 2020

Table 5-2  
Summary of Detected VOCs – November 2020



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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 2020

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 11-May-20	Benzene	0.0014	0.00033	0.0033	J	0.0033U
	Chloroform	0.017	0.00029	0.0033	--	--
	Dichlorodifluoromethane	0.093	0.00057	0.0033	--	--
	1,1-Dichloroethane	0.0026	0.00029	0.0033	J	--
	1,1-Dichloroethene	0.0069	0.00033	0.0033	--	--
	cis-1,2-Dichloroethene	0.0011	0.00041	0.0033	J	--
	Tetrachloroethene	0.45	0.00029	0.0033	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.075	0.00033	0.0033	--	--
	1,1,1-Trichloroethane	0.031	0.0015	0.0033	--	--
	Trichloroethene	0.084	0.00025	0.0016	--	--
	Trichlorofluoromethane	0.21	0.00045	0.0033	--	--
	Total Organics <sup>d</sup>	0.97060	NA	NA	NA	NA
MWL-SV01-42.5 (Duplicate) 11-May-20	Acetone	0.024	0.016	0.055	J	--
	Bromodichloromethane	0.00066	0.00049	0.0022	J	--
	2-Butanone	0.0022	0.0020	0.011	J	--
	Carbon tetrachloride	0.00024	0.00019	0.0022	J	0.0022U
	Chloroform	0.016	0.00019	0.0022	--	--
	Dichlorodifluoromethane	0.088	0.00038	0.0022	--	--
	1,1-Dichloroethane	0.0024	0.00019	0.0022	--	--
	1,1-Dichloroethene	0.0070	0.00022	0.0022	--	--
	cis-1,2-Dichloroethene	0.0012	0.00027	0.0022	J	--
	Tetrachloroethene	0.26	0.00052	0.0022	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.073	0.00022	0.0022	--	--
	1,1,1-Trichloroethane	0.029	0.0010	0.0022	--	--
	Trichloroethene	0.079	0.00016	0.0011	--	--
	Trichlorofluoromethane	0.20	0.00030	0.0022	--	--
	Total Organics <sup>d</sup>	0.78246	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 2020

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-SV02-41.5 11-May-20	Acetone	0.016	0.0029	0.010	CI	J+
	Benzene	0.00013	0.000040	0.00040	J	0.0004U
	2-Butanone	0.0052	0.00037	0.0020	--	J+
	Carbon disulfide	0.000085	0.000055	0.0010	J	--
	Carbon tetrachloride	0.00025	0.000035	0.00040	J	--
	Chloroform	0.0025	0.000035	0.00040	--	--
	1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00029	0.000060	0.00040	J	--
	Dichlorodifluoromethane	0.080	0.00062	0.0035	--	--
	1,1-Dichloroethane	0.0018	0.000035	0.00040	--	--
	1,1-Dichloroethene	0.0088	0.000040	0.00040	--	--
	cis-1,2-Dichloroethene	0.00065	0.000050	0.00040	--	--
	1,2-Dichloropropane	0.00025	0.000050	0.00040	J	NJ
	2-Hexanone	0.00036	0.000080	0.0010	J	0.001U
	Methylene chloride	0.0010	0.00080	0.0020	J	0.002UJ
	Tetrachloroethene	0.071	0.000035	0.00040	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.044	0.000040	0.00040	--	--
	1,1,1-Trichloroethane	0.055	0.00019	0.00040	--	--
	Trichloroethene	0.052	0.000030	0.00020	--	--
	Trichlorofluoromethane	0.28	0.00048	0.0035	--	--
	Total Organics <sup>d</sup>	0.617825	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 2020

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	Rb <sup>c</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV02-41.5 (Duplicate) 11-May-20	Acetone	0.023	0.0028	0.010	--	J+
	Benzene	0.00058	0.000040	0.00040	--	--
	2-Butanone	0.0085	0.00037	0.0020	--	--
	Carbon disulfide	0.00041	0.000055	0.0010	J	--
	Carbon tetrachloride	0.00029	0.000035	0.00040	J	--
	Chloroform	0.0026	0.000035	0.00040	--	--
	Chloromethane	0.00060	0.00033	0.0010	J	--
	1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00034	0.000060	0.00040	J	--
	Dichlorodifluoromethane	0.073	0.000070	0.00040	--	--
	1,1-Dichloroethane	0.0018	0.000035	0.00040	--	--
	1,1-Dichloroethene	0.0093	0.000040	0.00040	--	--
	cis-1,2-Dichloroethene	0.00072	0.000050	0.00040	--	--
	Ethylbenzene	0.00011	0.000065	0.00040	J	--
	2-Hexanone	0.00072	0.000080	0.0010	J	0.001U
	Methylene chloride	0.00099	0.00080	0.0020	J	0.002UJ
	Tetrachloroethene	0.081	0.000035	0.00040	--	--
	Toluene	0.00067	0.00039	0.00060	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.046	0.000040	0.00040	--	--
	1,1,1-Trichloroethane	0.057	0.00019	0.00040	--	--
	Trichloroethene	0.068	0.000030	0.00020	--	J
	Trichlorofluoromethane	0.30	0.00088	0.0064	--	--
	1,2,4-Trimethylbenzene	0.00018	0.00010	0.00040	J	--
	m,p-Xylene	0.00039	0.00015	0.00040	J	--
	o-Xylene	0.00018	0.000075	0.00040	J	--
	Total Organics <sup>d</sup>	0.67467	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 2020

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 11-May-20	Benzene	0.00027	0.000084	0.00084	J	0.00084U
	Carbon tetrachloride	0.00022	0.000074	0.00084	J	--
	Chloroform	0.0017	0.000074	0.00084	--	--
	Dichlorodifluoromethane	0.028	0.00015	0.00084	--	--
	1,1-Dichloroethane	0.0034	0.000074	0.00084	--	--
	1,1-Dichloroethene	0.012	0.000084	0.00084	--	--
	cis-1,2-Dichloroethene	0.0019	0.00011	0.00084	--	--
	Ethylbenzene	0.00014	0.00014	0.00084	J	--
	2-Hexanone	0.00024	0.00017	0.0021	J	--
	Methylene chloride	0.0019	0.0017	0.0042	J	0.0042UJ
	Tetrachloroethene	0.16	0.000074	0.00084	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.081	0.000084	0.00084	--	--
	1,1,1-Trichloroethane	0.0024	0.00039	0.00084	--	--
	Trichloroethene	0.12	0.000063	0.00042	--	--
	Trichlorofluoromethane	0.032	0.00012	0.00084	--	--
	m,p-Xylene	0.00071	0.00030	0.00084	J	--
	o-Xylene	0.00022	0.00016	0.00084	J	--
	Total Organics <sup>d</sup>	0.44393	NA	NA	NA	NA
MWL-SV03-100 11-May-20	Benzene	0.00024	0.00011	0.0011	J	0.0011U
	Carbon disulfide	0.00024	0.00015	0.0027	J	--
	Carbon tetrachloride	0.0021	0.000096	0.0011	--	--
	Chloroform	0.0035	0.000096	0.0011	--	--
	Dichlorodifluoromethane	0.037	0.00019	0.0011	--	--
	1,1-Dichloroethane	0.0050	0.000096	0.0011	--	--
	1,1-Dichloroethene	0.018	0.00011	0.0011	--	--
	cis-1,2-Dichloroethene	0.0030	0.00014	0.0011	--	--
	Methylene chloride	0.0027	0.0022	0.0055	J	0.0055UJ
	Tetrachloroethene	0.21	0.00019	0.0022	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.00011	0.0011	--	--
	1,1,1-Trichloroethane	0.0029	0.00051	0.0011	--	--
	Trichloroethene	0.18	0.000081	0.00055	--	--
	Trichlorofluoromethane	0.041	0.00015	0.0011	--	--
	Total Organics <sup>d</sup>	0.61274	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 2020

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>c</sup> (ppm v/v)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV03-200 11-May-20	Benzene	0.00080	0.00020	0.0020	J	0.002U
	Carbon disulfide	0.00046	0.00028	0.0050	J	--
	Carbon tetrachloride	0.00031	0.00018	0.0020	J	--
	Chloroform	0.0023	0.00018	0.0020	--	--
	Dichlorodifluoromethane	0.044	0.00035	0.0020	--	--
	1,1-Dichloroethane	0.0065	0.00018	0.0020	--	--
	1,1-Dichloroethene	0.025	0.00020	0.0020	--	--
	cis-1,2-Dichloroethene	0.0039	0.00025	0.0020	--	--
	Methylene chloride	0.0045	0.0040	0.010	J	0.01UJ
	Tetrachloroethene	0.23	0.00018	0.0020	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.14	0.00020	0.0020	--	--
	1,1,1-Trichloroethane	0.0021	0.00093	0.0020	--	--
	Trichloroethene	0.20	0.00015	0.0010	--	--
	Trichlorofluoromethane	0.037	0.00028	0.0020	--	--
	Total Organics <sup>d</sup>	0.69157	NA	NA	NA	NA
MWL-SV03-300 11-May-20	Benzene	0.00027	0.00014	0.0014	J	0.0014U
	Carbon tetrachloride	0.00027	0.00012	0.0014	J	--
	Chloroform	0.0015	0.00012	0.0014	--	--
	Dichlorodifluoromethane	0.036	0.00024	0.0014	--	--
	1,1-Dichloroethane	0.0035	0.00012	0.0014	--	--
	1,1-Dichloroethene	0.021	0.00014	0.0014	--	--
	cis-1,2-Dichloroethene	0.0021	0.00017	0.0014	--	--
	Methylene chloride	0.0032	0.0027	0.0068	J	0.0068UJ
	Tetrachloroethene	0.18	0.00030	0.0034	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.13	0.00014	0.0014	--	--
	1,1,1-Trichloroethane	0.00090	0.00063	0.0014	J	--
	Trichloroethene	0.17	0.00010	0.00068	--	--
	Trichlorofluoromethane	0.019	0.00019	0.0014	--	--
	Total Organics <sup>d</sup>	0.56427	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 2020

Well ID/Sample Port	Analyte	Result <sup>a</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> 11-May-20  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Benzene	0.00032	0.00014	0.0014	J	0.0014U
	Carbon disulfide	0.00025	0.00019	0.0034	J	--
	Carbon tetrachloride	0.00032	0.00012	0.0014	J	--
	Chloroform	0.0019	0.00012	0.0014	--	--
	Dichlorodifluoromethane	0.013	0.00024	0.0014	--	--
	1,1-Dichloroethane	0.0042	0.00012	0.0014	--	--
	1,1-Dichloroethene	0.022	0.00014	0.0014	--	--
	cis-1,2-Dichloroethene	0.0026	0.00017	0.0014	--	--
	Methylene chloride	0.0031	0.0027	0.0068	J	0.0068UJ
	Tetrachloroethene	0.32	0.00030	0.0034	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.054	0.00014	0.0014	--	--
	1,1,1-Trichloroethane	0.0012	0.00063	0.0014	J	--
	Trichloroethene	0.22	0.00026	0.0017	--	--
	Trichlorofluoromethane	0.017	0.00019	0.0014	--	--
	Total Organics <sup>d</sup>	0.65647	NA	NA	NA	NA
<b>MWL-SV04-50</b> 11-May-20	Acetone	0.0046	0.0011	0.0037	--	0.0046U
	Benzene	0.00014	0.000015	0.00015	J	0.00015U
	Bromodichloromethane	0.000045	0.000033	0.00015	J	--
	2-Butanone	0.00083	0.00014	0.00074	--	J+
	Carbon disulfide	0.000082	0.000020	0.00037	J	0.00037U
	Carbon tetrachloride	0.00018	0.000013	0.00015	--	--
	Chloroform	0.0018	0.000013	0.00015	--	--
	Chloromethane	0.00021	0.00012	0.00037	J	--
	Dichlorodifluoromethane	0.021	0.000026	0.00015	--	--
	1,1-Dichloroethane	0.0013	0.000013	0.00015	--	--
	1,1-Dichloroethene	0.0062	0.000015	0.00015	--	--
	cis-1,2-Dichloroethene	0.00045	0.000019	0.00015	--	--
	Ethylbenzene	0.000029	0.000024	0.00015	--	--
	4-Methyl-2-pentanone	0.00022	0.00010	0.00037	--	--
	Methylene chloride	0.00086	0.00030	0.00074	--	0.00086UJ
	Tetrachloroethene	0.020	0.000013	0.00015	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.068	0.00015	0.0015	--	--
	1,1,1-Trichloroethane	0.0068	0.000068	0.00015	--	--
	Trichloroethene	0.035	0.00011	0.00074	--	--
	Trichlorofluoromethane	0.042	0.00020	0.0015	--	--
	Total Organics <sup>d</sup>	0.204064	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 2020

Well ID/Sample Port	Analyte	Result <sup>b</sup> (ppmv)	MDL <sup>b</sup> (ppmv)	RL <sup>c</sup> (ppmv)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>c</sup>
MWL-SV04-100 11-May-20	Benzene	0.00022	0.000040	0.00040	J	0.0004U
	Carbon tetrachloride	0.00028	0.000035	0.00040	J	--
	Chloroform	0.0019	0.000035	0.00040	--	--
	Dichlorodifluoromethane	0.031	0.000071	0.00040	--	--
	1,1-Dichloroethane	0.0029	0.000035	0.00040	--	--
	1,1-Dichloroethene	0.014	0.000040	0.00040	--	--
	cis-1,2-Dichloroethene	0.0015	0.000051	0.0020	--	--
	Methylene chloride	0.0012	0.00081	0.00040	J	0.002UJ
	Tetrachloroethene	0.10	0.00012	0.0014	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.089	0.00014	0.0014	--	--
	1,1,1-Trichloroethane	0.0050	0.00019	0.00040	--	--
	Trichloroethene	0.096	0.00010	0.00069	--	--
	Trichlorofluoromethane	0.046	0.000056	0.00040	--	--
MWL-SV04-200 11-May-20	Total Organics <sup>d</sup>	0.38758	NA	NA	NA	NA
	Benzene	0.00037	0.00014	0.0014	J	0.0014U
	Carbon tetrachloride	0.00040	0.00012	0.0014	J	--
	Chloroform	0.0017	0.00012	0.0014	--	--
	Dichlorodifluoromethane	0.047	0.00025	0.0014	--	--
	1,1-Dichloroethane	0.0055	0.00012	0.0014	--	--
	1,1-Dichloroethene	0.029	0.00014	0.0014	--	--
	cis-1,2-Dichloroethene	0.0030	0.00018	0.0014	--	--
	Methylene chloride	0.0032	0.0028	0.0071	J	0.0071UJ
	Tetrachloroethene	0.13	0.00012	0.0014	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.15	0.00014	0.0014	--	--
	1,1,1-Trichloroethane	0.0022	0.00065	0.0014	--	--
	Trichloroethene	0.16	0.00011	0.00071	--	--
	Trichlorofluoromethane	0.048	0.00019	0.0014	--	--
	Total Organics <sup>d</sup>	0.57680	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 2020

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-SV04-300</b> 11-May-20	Benzene	0.00047	0.00018	0.0018	J	0.0018U
	Carbon tetrachloride	0.00024	0.00016	0.0018	J	--
	Chloroform	0.00092	0.00016	0.0018	J	--
	Dichlorodifluoromethane	0.027	0.00031	0.0018	*	J+
	1,1-Dichloroethane	0.0015	0.00016	0.0018	J	--
	1,1-Dichloroethene	0.013	0.00018	0.0018	--	--
	cis-1,2-Dichloroethene	0.00094	0.00022	0.0018	J	--
	Tetrachloroethene	0.11	0.00016	0.0018	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.078	0.00018	0.0018	--	--
	1,1,1-Trichloroethane	0.0011	0.00082	0.0018	J	--
	Trichloroethene	0.089	0.00013	0.00089	--	--
	Trichlorofluoromethane	0.019	0.00024	0.0018	--	--
	Total Organics <sup>d</sup>	0.34070	NA	NA	NA	NA
<b>MWL-SV04-400</b> 11-May-20  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Benzene	0.00072	0.00018	0.0018	J	0.0018U
	Carbon disulfide	0.0013	0.00024	0.0044	J	0.0044U
	Chloroform	0.00099	0.00015	0.0018	J	--
	Dichlorodifluoromethane	0.025	0.00031	0.0018	*	J+
	1,1-Dichloroethane	0.0012	0.00015	0.0018	J	--
	1,1-Dichloroethene	0.0086	0.00018	0.0018	--	--
	cis-1,2-Dichloroethene	0.00098	0.00022	0.0018	J	--
	4-Methyl-2-pentanone	0.0026	0.0012	0.0044	J	--
	Tetrachloroethene	0.12	0.00015	0.0018	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.080	0.00018	0.0018	--	--
	1,1,1-Trichloroethane	0.00095	0.00082	0.0018	J	--
	Trichloroethene	0.080	0.00013	0.00089	--	--
	Trichlorofluoromethane	0.018	0.00024	0.0018	--	--
	Total Organics <sup>d</sup>	0.33832	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 2020

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-SV05-50</b> 11-May-20	Benzene	0.00027	0.00018	0.0018	J	NJ
	Carbon tetrachloride	0.00024	0.00015	0.0018	J	--
	Chloroform	0.00095	0.00015	0.0018	J	--
	Dichlorodifluoromethane	0.043	0.00031	0.0018	*	J+
	1,1-Dichloroethane	0.0013	0.00015	0.0018	J	--
	1,1-Dichloroethene	0.0077	0.00018	0.0018	--	--
	cis-1,2-Dichloroethene	0.00044	0.00022	0.0018	J	--
	Tetrachloroethene	0.035	0.00015	0.0018	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.035	0.00018	0.0018	--	--
	1,1,1-Trichloroethane	0.0096	0.00082	0.0018	--	--
	Trichloroethene	0.047	0.00013	0.00089	--	--
	Trichlorofluoromethane	0.099	0.00024	0.0018	--	--
	Total Organics <sup>d</sup>	0.27950	NA	NA	NA	NA
<b>MWL-SV05-100</b> 11-May-20	Benzene	0.00036	0.00017	0.0017	J	NJ
	Carbon tetrachloride	0.00046	0.00015	0.0017	J	--
	Chloroform	0.0019	0.00015	0.0017	--	--
	Dichlorodifluoromethane	0.074	0.00030	0.0017	*	J+
	1,1-Dichloroethane	0.0035	0.00015	0.0017	--	--
	1,1-Dichloroethene	0.019	0.00017	0.0017	--	--
	cis-1,2-Dichloroethene	0.0011	0.00022	0.0017	J	--
	Tetrachloroethene	0.079	0.00015	0.0017	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.082	0.00017	0.0017	--	--
	1,1,1-Trichloroethane	0.012	0.00080	0.0017	--	--
	Trichloroethene	0.10	0.00013	0.00087	--	--
	Trichlorofluoromethane	0.15	0.00024	0.0017	--	--
	Total Organics <sup>d</sup>	0.52332	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 2020

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-SV05-200 11-May-20	Benzene	0.00039	0.00018	0.0018	J	NJ
	Carbon tetrachloride	0.00084	0.00016	0.0018	J	--
	Chloroform	0.0019	0.00016	0.0018	--	--
	1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00037	0.00027	0.0018	J, *	NJ+
	Dichlorodifluoromethane	0.071	0.00031	0.0018	*	J+
	1,1-Dichloroethane	0.0051	0.00016	0.0018	--	--
	1,1-Dichloroethene	0.034	0.00018	0.0018	--	--
	cis-1,2-Dichloroethene	0.0022	0.00022	0.0018	--	--
	Tetrachloroethene	0.12	0.00016	0.0018	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.14	0.00018	0.0018	--	--
	1,1,1-Trichloroethane	0.0035	0.00082	0.0018	--	--
	Trichloroethene	0.18	0.00013	0.00089	--	--
	Trichlorofluoromethane	0.094	0.00024	0.0018	--	--
MWL-SV05-300 11-May-20	Total Organics <sup>d</sup>	0.65330	NA	NA	NA	NA
	Benzene	0.00059	0.00018	0.0018	J	NJ
	Carbon disulfide	0.00029	0.00024	0.0044	J	--
	Carbon tetrachloride	0.0011	0.00015	0.0018	J	--
	Chloroform	0.0011	0.00015	0.0018	J	--
	Dichlorodifluoromethane	0.042	0.00031	0.0018	*	J+
	1,1-Dichloroethane	0.0026	0.00015	0.0018	--	--
	1,1-Dichloroethene	0.025	0.00018	0.0018	--	--
	cis-1,2-Dichloroethene	0.0010	0.00022	0.0018	J	--
	2-Hexanone	0.00045	0.00035	0.0044	J	--
	Tetrachloroethene	0.11	0.00015	0.0018	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.00018	0.0018	--	--
	1,1,1-Trichloroethane	0.0017	0.00081	0.0018	J	--
	Trichloroethene	0.13	0.00013	0.0018	--	--
	Trichlorofluoromethane	0.038	0.00024	0.00088	--	--
	Total Organics <sup>d</sup>	0.46383	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 2020

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> 11-May-20  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.023	0.012	0.044	J	NJ
	Benzene	0.00039	0.00017	0.0017	J	--
	2-Butanone	0.0035	0.0016	0.0087	J	--
	Carbon disulfide	0.00026	0.00024	0.0044	J	--
	Carbon tetrachloride	0.00059	0.00015	0.0017	J	--
	Chloroform	0.00088	0.00015	0.0017	J	--
	Dichlorodifluoromethane	0.032	0.00030	0.0017	*	J+
	1,1-Dichloroethane	0.0017	0.00015	0.0017	--	--
	1,1-Dichloroethene	0.018	0.00017	0.0017	--	--
	cis-1,2-Dichloroethene	0.00068	0.00022	0.0017	J	--
	Tetrachloroethene	0.098	0.00015	0.0017	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.055	0.00017	0.0017	J	--
	1,1,1-Trichloroethane	0.0014	0.00080	0.0017	--	--
	Trichloroethene	0.090	0.00013	0.00087	--	--
	Trichlorofluoromethane	0.039	0.00024	0.0017	--	--
	Total Organics <sup>d</sup>	0.36440	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 2020

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

CI = The peak identified by the data system exhibited chromatographic interference that could not be resolved. There is reason to suspect there may be a high bias.

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

\* = The laboratory control sample or laboratory control sample duplicate is outside acceptance limits.

Validation Qualifier

J = The associated value is an estimated quantity.

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

NJ = Presumptive evidence of the presence of the material at an estimated quantity.

NJ+ = Presumptive evidence of the presence of the material at 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., RL) 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.

MWL = Mixed Waste Landfill.

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  
November 2020

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-SV01-42.5</b> 13-Nov-20	Bromodichloromethane	0.00086	0.00084	0.0037	J	
	Carbon disulfide	0.0011	0.00051	0.0094	J	0.0094U
	Carbon tetrachloride	0.00037	0.00033	0.0037	J	--
	Chloroform	0.016	0.00033	0.0037	--	--
	Dichlorodifluoromethane	0.084	0.00065	0.0037	--	--
	1,1-Dichloroethane	0.0025	0.00033	0.0037	J	--
	1,1-Dichloroethene	0.0062	0.00037	0.0037	--	--
	cis-1,2-Dichloroethene	0.0013	0.00047	0.0037	J	--
	2-Hexanone	0.0026	0.00075	0.0094	B, J	0.0094UJ
	Tetrachloroethene	0.38	0.00033	0.0037	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.067	0.00037	0.0037	--	--
	1,1,1-Trichloroethane	0.030	0.0017	0.0037	--	--
	Trichloroethene	0.081	0.00028	0.0019	--	--
	Trichlorofluoromethane	0.16	0.00051	0.0037	--	--
	Total Organics <sup>d</sup>	0.82923	NA	NA	NA	NA
<b>MWL-SV02-41.5</b> 13-Nov-20	Acetone	0.029	0.026	0.092	J	0.092U
	Benzene	0.00054	0.00037	0.0037	J	0.0037U
	2-Butanone	0.0098	0.0033	0.018	J	0.018U
	Carbon disulfide	0.00055	0.00050	0.0092	J	--
	Chloroform	0.0029	0.00032	0.0037	J	--
	Dichlorodifluoromethane	0.090	0.00064	0.0037	--	--
	1,1-Dichloroethane	0.0022	0.00032	0.0037	J	--
	1,1-Dichloroethene	0.0092	0.00037	0.0037	--	--
	cis-1,2-Dichloroethene	0.00076	0.00046	0.0037	J	--
	2-Hexanone	0.0028	0.00073	0.0092	B, J	0.0092UJ
	Tetrachloroethene	0.055	0.00032	0.0037	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.044	0.00037	0.0037	--	--
	1,1,1-Trichloroethane	0.057	0.0017	0.0037	--	--
	Trichloroethene	0.055	0.00027	0.0018	--	--
	Trichlorofluoromethane	0.29	0.00050	0.0037	--	--
	Total Organics <sup>d</sup>	0.60661	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  
November 2020

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-SV03-50</b> 13-Nov-20	Benzene	0.00042	0.00020	0.0020	J	0.002U
	Carbon tetrachloride	0.00026	0.00017	0.0020	J	--
	Chloroform	0.0023	0.00017	0.0020	--	--
	Dichlorodifluoromethane	0.030	0.00034	0.0020	--	--
	1,1-Dichloroethane	0.0042	0.00017	0.0020	--	--
	1,1-Dichloroethene	0.013	0.00020	0.0020	--	--
	cis-1,2-Dichloroethene	0.0022	0.00025	0.0020	--	--
	2-Hexanone	0.0013	0.00039	0.0049	B, J	0.0049UJ
	Tetrachloroethene	0.15	0.00017	0.0020	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.078	0.00020	0.0020	--	--
	1,1,1-Trichloroethane	0.0026	0.00091	0.0020	--	--
	Trichloroethene	0.12	0.00015	0.00099	--	--
	Trichlorofluoromethane	0.028	0.00027	0.0020	--	--
	Total Organics <sup>d</sup>	0.43056	NA	NA	NA	NA
<b>MWL-SV03-100</b> 13-Nov-20	Benzene	0.00040	0.00023	0.0023	J	0.0023U
	Carbon disulfide	0.00090	0.00031	0.0057	J	0.0057U
	Carbon tetrachloride	0.00034	0.00020	0.0023	J	--
	Chloroform	0.0030	0.00020	0.0023	--	--
	Dichlorodifluoromethane	0.045	0.00040	0.0023	--	--
	1,1-Dichloroethane	0.0067	0.00020	0.0023	--	--
	1,1-Dichloroethene	0.020	0.00023	0.0023	--	--
	cis-1,2-Dichloroethene	0.0034	0.00029	0.0023	--	--
	2-Hexanone	0.0015	0.00046	0.0057	B, J	0.0057UJ
	Tetrachloroethene	0.21	0.00020	0.0023	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.12	0.00023	0.0023	--	--
	1,1,1-Trichloroethane	0.0034	0.0011	0.0023	--	--
	Trichloroethene	0.16	0.00017	0.0011	--	--
	Trichlorofluoromethane	0.041	0.00031	0.0023	--	--
	Total Organics <sup>d</sup>	0.61284	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  
November 2020

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-SV03-200 13-Nov-20	Benzene	0.00031	0.00018	0.0018	J	0.0018U
	Carbon disulfide	0.0058	0.00025	0.0045	--	--
	Carbon tetrachloride	0.00040	0.00016	0.0018	J	--
	Chloroform	0.0024	0.00016	0.0018	--	--
	Dichlorodifluoromethane	0.044	0.00031	0.0018	--	--
	1,1-Dichloroethane	0.0072	0.00016	0.0018	--	--
	1,1-Dichloroethene	0.024	0.00018	0.0018	--	--
	cis-1,2-Dichloroethene	0.0039	0.00022	0.0018	--	--
	2-Hexanone	0.0014	0.00036	0.0045	B, J	0.0045UJ
	Tetrachloroethene	0.26	0.00016	0.0018	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.13	0.00018	0.0018	--	--
	1,1,1-Trichloroethane	0.0020	0.00083	0.0018	--	--
	Trichloroethene	0.22	0.00013	0.00090	--	--
	Trichlorofluoromethane	0.032	0.00025	0.0018	--	--
	Total Organics <sup>d</sup>	0.73170	NA	NA	NA	NA
MWL-SV03-300 13-Nov-20	Benzene	0.00040	0.00035	0.0035	J	0.0035U
	Carbon disulfide	0.0011	0.00048	0.0088	J	0.0088U
	Carbon tetrachloride	0.00034	0.00031	0.0035	J	--
	Chloroform	0.0015	0.00031	0.0035	J	--
	Dichlorodifluoromethane	0.037	0.00061	0.0035	--	--
	1,1-Dichloroethane	0.0029	0.00031	0.0035	J	--
	1,1-Dichloroethene	0.018	0.00035	0.0035	--	--
	cis-1,2-Dichloroethene	0.0019	0.00044	0.0035	J	--
	2-Hexanone	0.0025	0.00070	0.0088	B, J	0.0088UJ
	Tetrachloroethene	0.25	0.00031	0.0035	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.00035	0.0035	--	--
	Trichloroethene	0.17	0.00026	0.0018	--	--
	Trichlorofluoromethane	0.015	0.00048	0.0035	--	--
	Total Organics <sup>d</sup>	0.60664	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  
November 2020

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> 13-Nov-20  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Benzene	0.00038	0.00023	0.0023	J	0.0023U
	Carbon tetrachloride	0.00051	0.00021	0.0023	J	--
	Chloroform	0.0015	0.00021	0.0023	J	--
	Dichlorodifluoromethane	0.018	0.00041	0.0023	--	--
	1,1-Dichloroethane	0.0022	0.00021	0.0023	J	--
	1,1-Dichloroethene	0.011	0.00023	0.0023	--	--
	cis-1,2-Dichloroethene	0.0019	0.00029	0.0023	J	--
	Tetrachloroethene	0.24	0.00021	0.0023	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.041	0.00023	0.0023	--	--
	Trichloroethene	0.19	0.00018	0.0012	--	--
	Trichlorofluoromethane	0.0093	0.00032	0.0023	--	--
	Total Organics <sup>d</sup>	0.51541	NA	NA	NA	NA
<b>MWL-SV04-50</b> 13-Nov-20	Benzene	0.00035	0.000073	0.00073	J	0.00073U
	Carbon disulfide	0.0037	0.00010	0.0018	--	--
	Carbon tetrachloride	0.00021	0.000064	0.00073	J	--
	Chloroform	0.0018	0.000064	0.00073	--	--
	Dichlorodifluoromethane	0.017	0.00013	0.00073	--	--
	1,1-Dichloroethane	0.0014	0.000064	0.00073	--	--
	1,1-Dichloroethene	0.0055	0.000073	0.00073	--	--
	cis-1,2-Dichloroethene	0.00049	0.000092	0.00073	J	0.00073U
	2-Hexanone	0.00049	0.00015	0.0018	B, J	0.0018UJ
	Methylene chloride	0.0039	0.0036	0.0037	--	0.0039U
	Tetrachloroethene	0.059	0.000064	0.00073	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.051	0.000073	0.00073	--	--
	1,1,1-Trichloroethane	0.0065	0.00034	0.00073	--	--
	Trichloroethene	0.048	0.000055	0.00037	--	--
	Trichlorofluoromethane	0.023	0.00010	0.00073	--	--
	Total Organics <sup>d</sup>	0.21711	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  
November 2020

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 13-Nov-20	Benzene	0.00033	0.00018	0.0018	J	0.0018U
	Carbon tetrachloride	0.00048	0.00016	0.0018	J	--
	Chloroform	0.0021	0.00016	0.0018	--	--
	Dichlorodifluoromethane	0.031	0.00032	0.0018	--	--
	1,1-Dichloroethane	0.0033	0.00016	0.0018	--	--
	1,1-Dichloroethene	0.015	0.00018	0.0018	--	--
	cis-1,2-Dichloroethene	0.0016	0.00023	0.0018	J	0.0018U
	2-Hexanone	0.0013	0.00036	0.0045	B, J	0.0045UJ
	Tetrachloroethene	0.12	0.00016	0.0018	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.092	0.00018	0.0018	--	--
	1,1,1-Trichloroethane	0.0056	0.00083	0.0018	--	--
	Trichloroethene	0.12	0.00014	0.00090	--	--
	Trichlorofluoromethane	0.036	0.00025	0.0018	--	--
MWL-SV04-200 13-Nov-20	Total Organics <sup>d</sup>	0.42548	NA	NA	NA	NA
	Benzene	0.00049	0.00019	0.0019	J	0.0019U
	Carbon disulfide	0.0016	0.00026	0.0048	J	0.0048U
	Carbon tetrachloride	0.00039	0.00017	0.0019	J	--
	Chloroform	0.0016	0.00017	0.0019	J	--
	Dichlorodifluoromethane	0.042	0.00033	0.0019	--	--
	1,1-Dichloroethane	0.0054	0.00017	0.0019	--	--
	1,1-Dichloroethene	0.027	0.00019	0.0019	--	--
	cis-1,2-Dichloroethene	0.0028	0.00024	0.0019	--	--
	2-Hexanone	0.0012	0.00038	0.0048	B, J	0.0048UJ
	Tetrachloroethene	0.11	0.00017	0.0019	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.14	0.00019	0.0019	--	--
	1,1,1-Trichloroethane	0.0019	0.00088	0.0019	--	--
	Trichloroethene	0.14	0.00014	0.00095	--	--
	Trichlorofluoromethane	0.033	0.00026	0.0019	--	--
	Total Organics <sup>d</sup>	0.50409	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  
November 2020

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-SV04-300</b> 13-Nov-20	Benzene	0.00034	0.00010	0.0010	J	0.001U
	Carbon disulfide	0.00094	0.00014	0.0025	J	0.0025U
	Carbon tetrachloride	0.00022	0.000088	0.0010	J	--
	Chloroform	0.00059	0.000088	0.0010	J	--
	Dichlorodifluoromethane	0.026	0.00018	0.0010	--	--
	1,1-Dichloroethane	0.0011	0.000088	0.0010	--	--
	1,1-Dichloroethene	0.011	0.00010	0.0010	--	--
	cis-1,2-Dichloroethene	0.00060	0.00013	0.0010	J	0.001U
	2-Hexanone	0.00067	0.00020	0.0025	B, J	0.0025UJ
	Tetrachloroethene	0.11	0.000088	0.0010	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.081	0.00010	0.0010	--	--
	1,1,1-Trichloroethane	0.00065	0.00046	0.0010	J	--
	Trichloroethene	0.063	0.000075	0.00050	--	--
	Trichlorofluoromethane	0.013	0.00014	0.0010	--	--
	Total Organics <sup>d</sup>	0.30656	NA	NA	NA	NA
<b>MWL-SV04-400</b> 13-Nov-20  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Acetone	0.020	0.017	0.059	J	0.059U
	Benzene	0.00094	0.00023	0.0023	J	0.0023U
	Carbon disulfide	0.00072	0.00032	0.0059	J	0.0059U
	Carbon tetrachloride	0.00033	0.00020	0.0023	J	--
	Chloroform	0.00073	0.00020	0.0023	J	--
	Dichlorodifluoromethane	0.025	0.00041	0.0023	--	--
	1,1-Dichloroethane	0.0015	0.00020	0.0023	J	--
	1,1-Dichloroethene	0.012	0.00023	0.0023	--	--
	cis-1,2-Dichloroethene	0.00077	0.00029	0.0023	J	0.0023U
	Tetrachloroethene	0.15	0.00020	0.0023	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.089	0.00023	0.0023	--	--
	Trichloroethene	0.11	0.00018	0.0012	--	--
	Trichlorofluoromethane	0.017	0.00032	0.0023	--	--
	Total Organics <sup>d</sup>	0.40556	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  
November 2020

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-SV05-50</b> 13-Nov-20	Benzene	0.00032	0.00021	0.0021	J	0.0021U
	Carbon tetrachloride	0.00031	0.00018	0.0021	J	--
	Chloroform	0.0015	0.00018	0.0021	J	--
	Dichlorodifluoromethane	0.046	0.00036	0.0021	--	--
	1,1-Dichloroethane	0.0018	0.00018	0.0021	J	--
	1,1-Dichloroethene	0.0091	0.00021	0.0021	--	--
	cis-1,2-Dichloroethene	0.00068	0.00026	0.0021	J	--
	2-Hexanone	0.0013	0.00041	0.0052	B, J	0.0052UJ
	Tetrachloroethene	0.039	0.00018	0.0021	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.042	0.00021	0.0021	--	--
	1,1,1-Trichloroethane	0.012	0.00095	0.0021	--	--
	Trichloroethene	0.049	0.00015	0.0010	--	--
	Trichlorofluoromethane	0.10	0.00028	0.0021	--	--
	Total Organics <sup>d</sup>	0.30139	NA	NA	NA	NA
<b>MWL-SV05-100</b> 13-Nov-20	Benzene	0.00030	0.00019	0.0019	J	0.0019U
	Carbon tetrachloride	0.00044	0.00016	0.0019	J	--
	Chloroform	0.0020	0.00016	0.0019	--	--
	Dichlorodifluoromethane	0.065	0.00032	0.0019	--	--
	1,1-Dichloroethane	0.0034	0.00016	0.0019	--	--
	1,1-Dichloroethene	0.018	0.00019	0.0019	--	--
	cis-1,2-Dichloroethene	0.0014	0.00023	0.0019	J	--
	2-Hexanone	0.0013	0.00037	0.0046	B, J	0.0046UJ
	Tetrachloroethene	0.065	0.00016	0.0019	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.077	0.00019	0.0019	--	--
	1,1,1-Trichloroethane	0.012	0.00086	0.0019	--	--
	Trichloroethene	0.084	0.00014	0.00093	--	--
	Trichlorofluoromethane	0.12	0.00025	0.0019	--	--
	Total Organics <sup>d</sup>	0.44824	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  
November 2020

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> 13-Nov-20	Benzene	0.00054	0.00019	0.0019	J	0.0019U
	Carbon disulfide	0.00049	0.00026	0.0048	J	--
	Carbon tetrachloride	0.0011	0.00017	0.0019	J	--
	Chloroform	0.0021	0.00017	0.0019	--	--
	Dichlorodifluoromethane	0.074	0.00034	0.0019	--	--
	1,1-Dichloroethane	0.0057	0.00017	0.0019	--	--
	1,1-Dichloroethene	0.040	0.00019	0.0019	--	--
	cis-1,2-Dichloroethene	0.0027	0.00024	0.0019	--	--
	2-Hexanone	0.0013	0.00038	0.0048	B, J	0.0048UJ
	Tetrachloroethene	0.14	0.00017	0.0019	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.16	0.00019	0.0019	--	--
	1,1,1-Trichloroethane	0.0036	0.00089	0.0019	--	--
	Trichloroethene	0.22	0.00014	0.00096	--	--
	Trichlorofluoromethane	0.090	0.00026	0.0019	--	--
	Total Organics <sup>d</sup>	0.73969	NA	NA	NA	NA
<b>MWL-SV05-200 (Duplicate)</b> 13-Nov-20	Benzene	0.00048	0.00019	0.0019	J	0.0019U
	Carbon tetrachloride	0.0010	0.00017	0.0019	J	--
	Chloroform	0.0021	0.00017	0.0019	--	--
	Dichlorodifluoromethane	0.073	0.00034	0.0019	--	--
	1,1-Dichloroethane	0.0059	0.00017	0.0019	--	--
	1,1-Dichloroethene	0.039	0.00019	0.0019	--	--
	cis-1,2-Dichloroethene	0.0026	0.00024	0.0019	--	--
	2-Hexanone	0.0013	0.00039	0.0048	B, J	0.0048UJ
	Tetrachloroethene	0.13	0.00017	0.0019	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.15	0.00019	0.0019	--	--
	1,1,1-Trichloroethane	0.0037	0.00089	0.0019	--	--
	Trichloroethene	0.21	0.00014	0.00097	--	--
	Trichlorofluoromethane	0.089	0.00027	0.0019	--	--
	Total Organics <sup>d</sup>	0.70630	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  
November 2020

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-SV05-300 13-Nov-20	Benzene	0.00084	0.00019	0.0019	J	0.0019U
	2-Butanone	0.0020	0.0017	0.0096	J	0.0096U
	Carbon disulfide	0.0053	0.00026	0.0048	--	--
	Carbon tetrachloride	0.00086	0.00017	0.0019	J	--
	Chloroform	0.0010	0.00017	0.0019	J	--
	Dichlorodifluoromethane	0.037	0.00033	0.0019	--	--
	1,1-Dichloroethane	0.0020	0.00017	0.0019	--	--
	1,1-Dichloroethene	0.022	0.00019	0.0019	--	--
	cis-1,2-Dichloroethene	0.0010	0.00024	0.0019	J	--
	Ethylbenzene	0.00096	0.00031	0.0019	J	0.0019U
	2-Hexanone	0.0013	0.00038	0.0048	B, J	0.0048UJ
	Tetrachloroethene	0.077	0.00017	0.0019	--	--
	Toluene	0.0071	0.0019	0.0029	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.10	0.00019	0.0019	--	--
	1,1,1-Trichloroethane	0.0016	0.00088	0.0019	J	--
	Trichloroethene	0.11	0.00014	0.00096	--	--
	Trichlorofluoromethane	0.029	0.00026	0.0019	--	--
	1,2,4-Trimethylbenzene	0.00068	0.00048	0.0019	J	--
	m,p-Xylene	0.0035	0.00069	0.0019	--	--
	o-Xylene	0.0013	0.00036	0.0019	J	0.0019U
	Total Organics <sup>d</sup>	0.39804	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  
November 2020

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> 13-Nov-20  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Benzene	0.00070	0.00019	0.0019	J	0.0019U
	Carbon disulfide	0.00035	0.00027	0.0048	J	--
	Carbon tetrachloride	0.00058	0.00017	0.0019	J	--
	Chloroform	0.00074	0.00017	0.0019	J	--
	Dichlorodifluoromethane	0.020	0.00034	0.0019		--
	1,1-Dichloroethane	0.0017	0.00017	0.0019	J	--
	1,1-Dichloroethene	0.012	0.00019	0.0019	--	--
	cis-1,2-Dichloroethene	0.00069	0.00024	0.0019	J	--
	2-Hexanone	0.0013	0.00039	0.0048	B, J	0.0048UJ
	Tetrachloroethene	0.084	0.00017	0.0019	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.046	0.00019	0.0019	--	--
	1,1,1-Trichloroethane	0.0016	0.00089	0.0019	J	--
	Trichloroethene	0.083	0.00014	0.00097	--	--
	Trichlorofluoromethane	0.024	0.00027	0.0019	--	--
	Total Organics <sup>d</sup>	0.27466	NA	NA	NA	NA
<b>MWL-SV05-400 (Duplicate)</b> 13-Nov-20  <b>Trigger Levels</b> Tetrachloroethene = 20 ppmv Trichloroethene = 20 ppmv Total Organics = 25 ppmv	Benzene	0.00053	0.000069	0.00069	J	0.00069U
	Carbon disulfide	0.00017	0.000095	0.0017	J	--
	Carbon tetrachloride	0.00032	0.000060	0.00069	J	--
	Chloroform	0.00054	0.000060	0.00069	J	--
	Dichlorodifluoromethane	0.015	0.00012	0.00069	--	--
	1,1-Dichloroethane	0.0012	0.000060	0.00069	--	--
	1,1-Dichloroethene	0.0090	0.000069	0.00069	--	--
	cis-1,2-Dichloroethene	0.00047	0.000086	0.00069	J	--
	2-Hexanone	0.00045	0.00014	0.0017	B, J	0.0017UJ
	Tetrachloroethene	0.063	0.000060	0.00069	--	--
	Toluene	0.00069	0.00067	0.0010	J	0.001U
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.034	0.000069	0.00069	--	--
	1,1,1-Trichloroethane	0.0011	0.00032	0.00069	--	--
	Trichloroethene	0.053	0.000052	0.00034	--	--
	Trichlorofluoromethane	0.018	0.000095	0.00069	--	--
	Total Organics <sup>d</sup>	0.19580	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  
November 2020

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

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., RL) 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.

MWL = Mixed Waste Landfill.

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.



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

This chapter presents soil-moisture monitoring activities (i.e., data collection and evaluation) in accordance with 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, 2020 through March 31, 2021 reporting period fulfilling the LTMMMP annual monitoring requirement. The monitoring event was conducted on April 9 and 15, 2020. 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 on each 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.

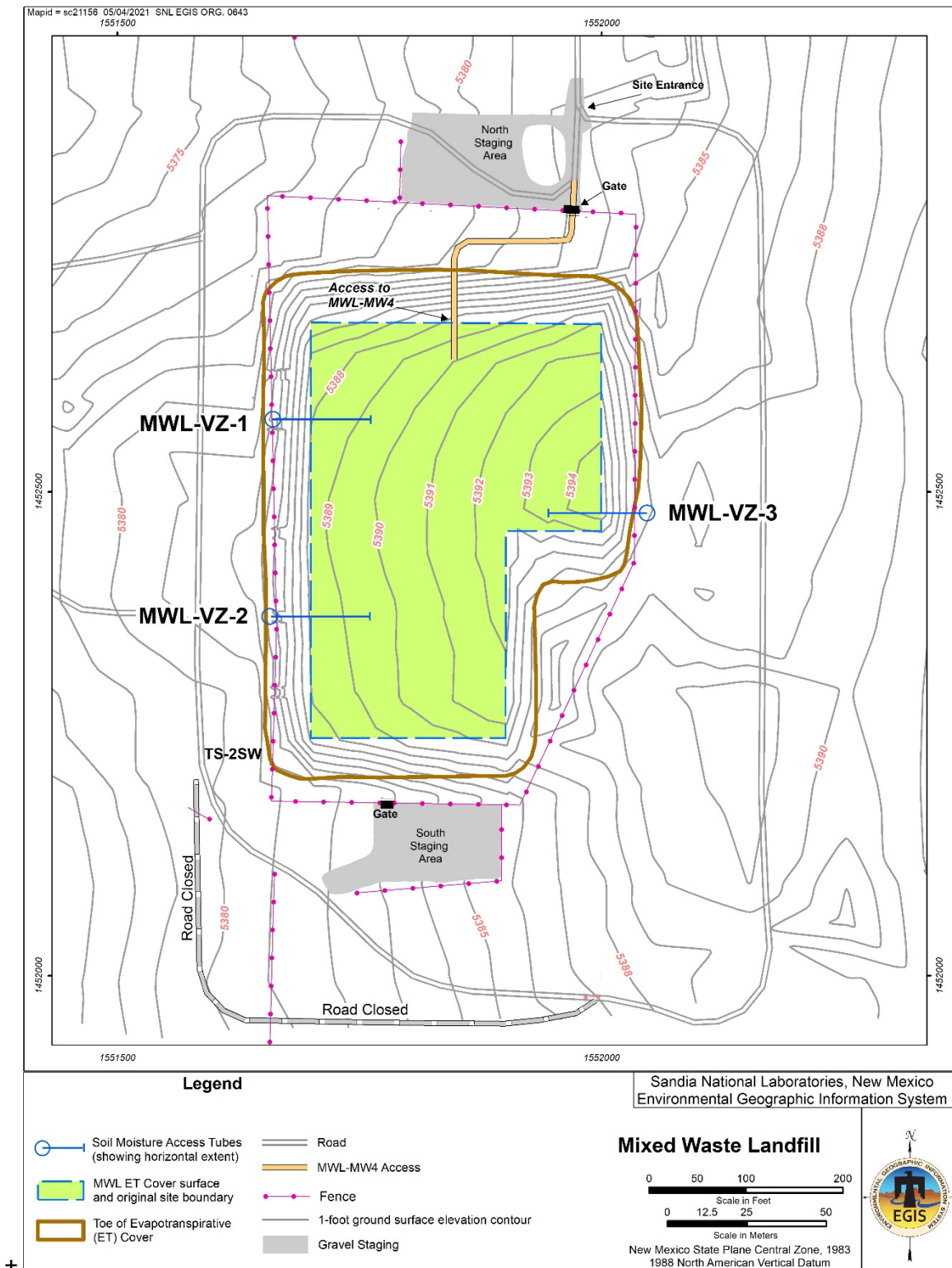


Figure 6-1  
Mixed Waste Landfill Soil-Moisture Monitoring Locations

## 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 9 and 15, 2020 annual monitoring event are plotted on these figures along with the baseline soil-moisture content and the trigger level for comparison. The April 2020 results track very closely with the established soil-moisture baseline for the three access tubes and indicate a dry vadose zone.

### 6.2.1 Variances

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

## 6.3 Data Evaluation and Monitoring Trigger Level

Soil-moisture data collected during the reporting period 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 2020 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 1.8 to 4.3 percent, compared to 1.7 to 5.6 percent baseline. At MWL-VZ-2 the soil-moisture content ranged from 2.1 to 4.7 percent, compared to 2.1 to 5.5 percent baseline. At MWL-VZ-3 the soil-moisture content ranged from 1.4 to 4.0 percent, compared to 1.8 to 4.5 percent baseline.

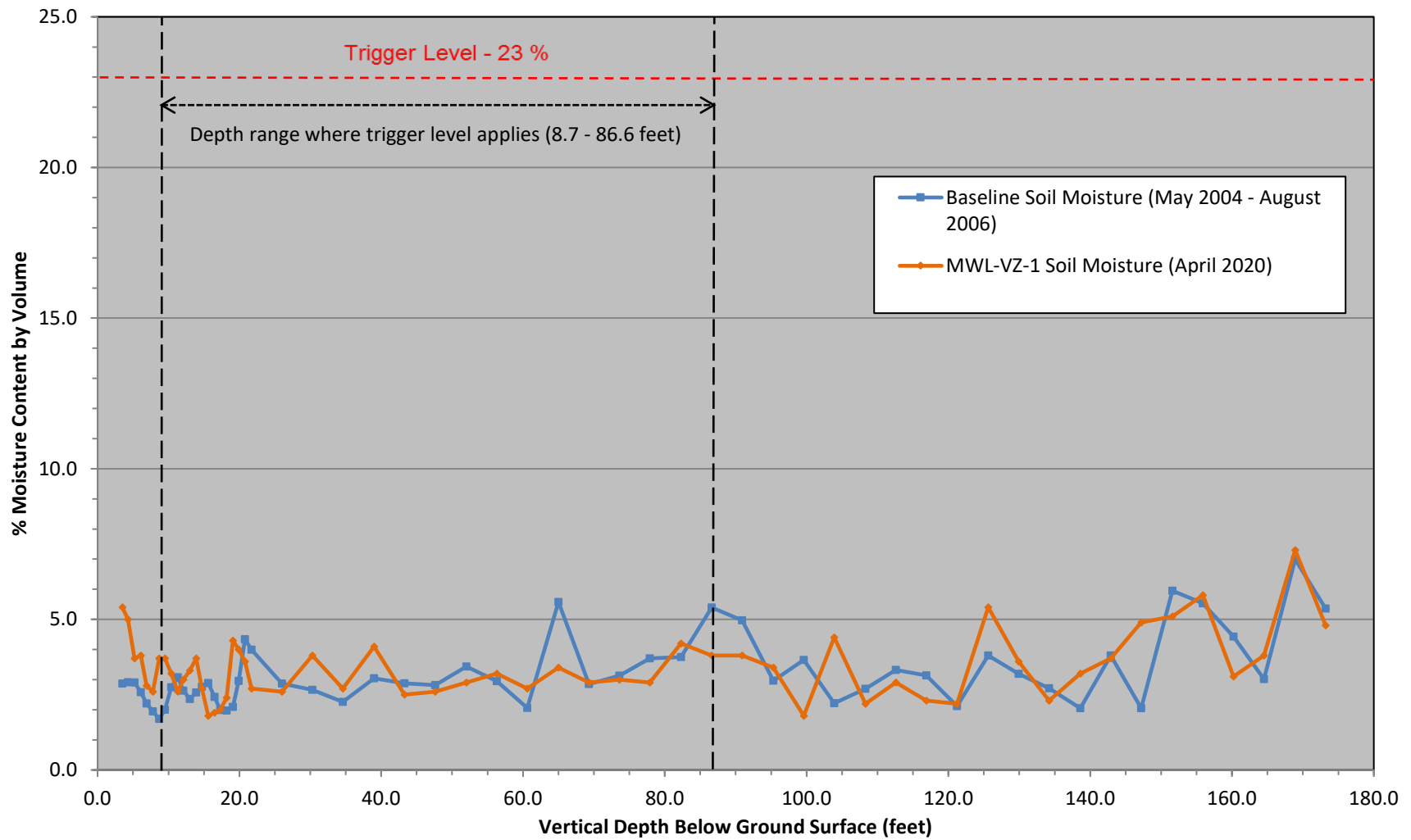


Figure 6-2  
Mixed Waste Landfill MWL-VZ-1 Soil-Moisture Monitoring Results

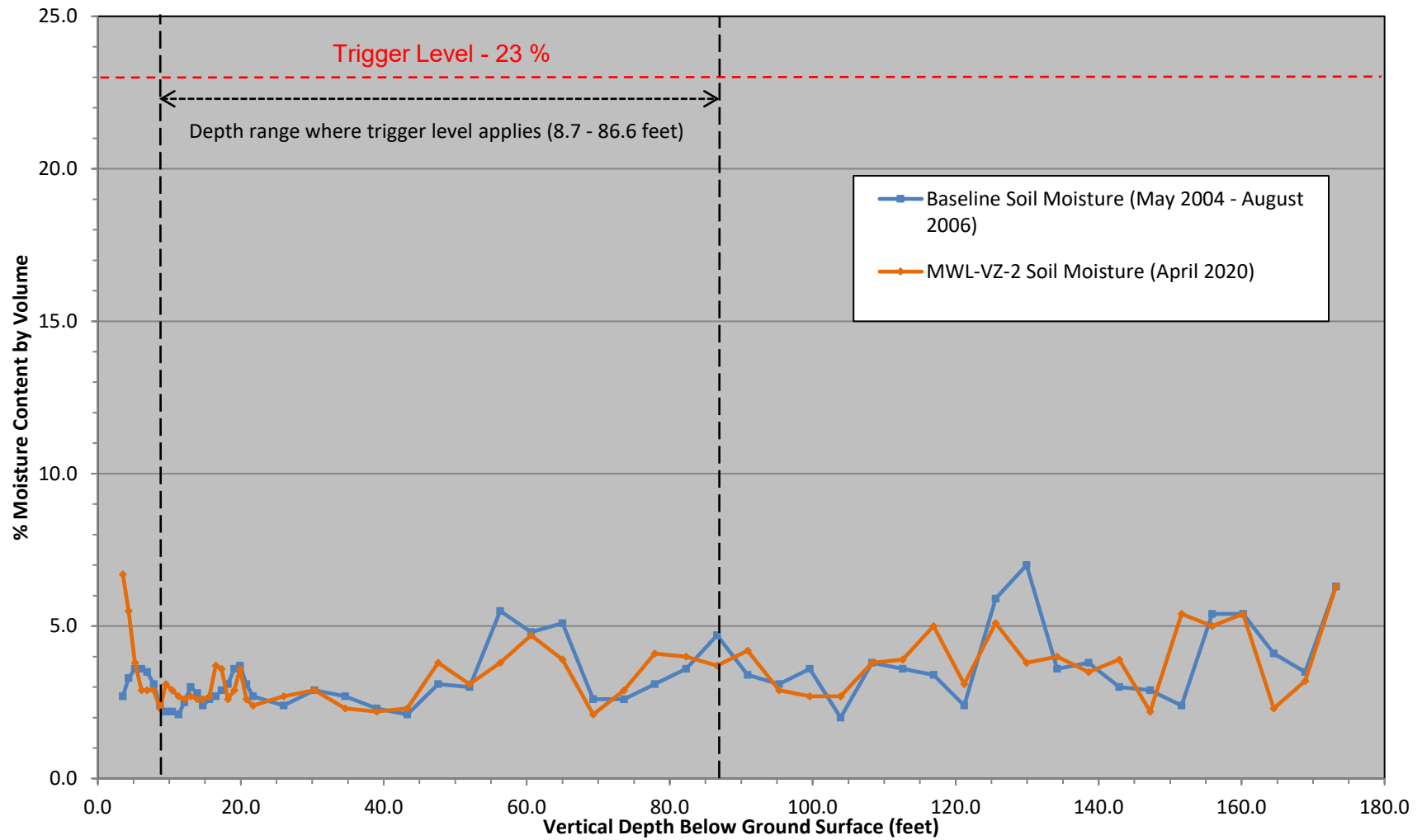


Figure 6-3  
Mixed Waste Landfill MWL-VZ-2 Soil-Moisture Monitoring Results

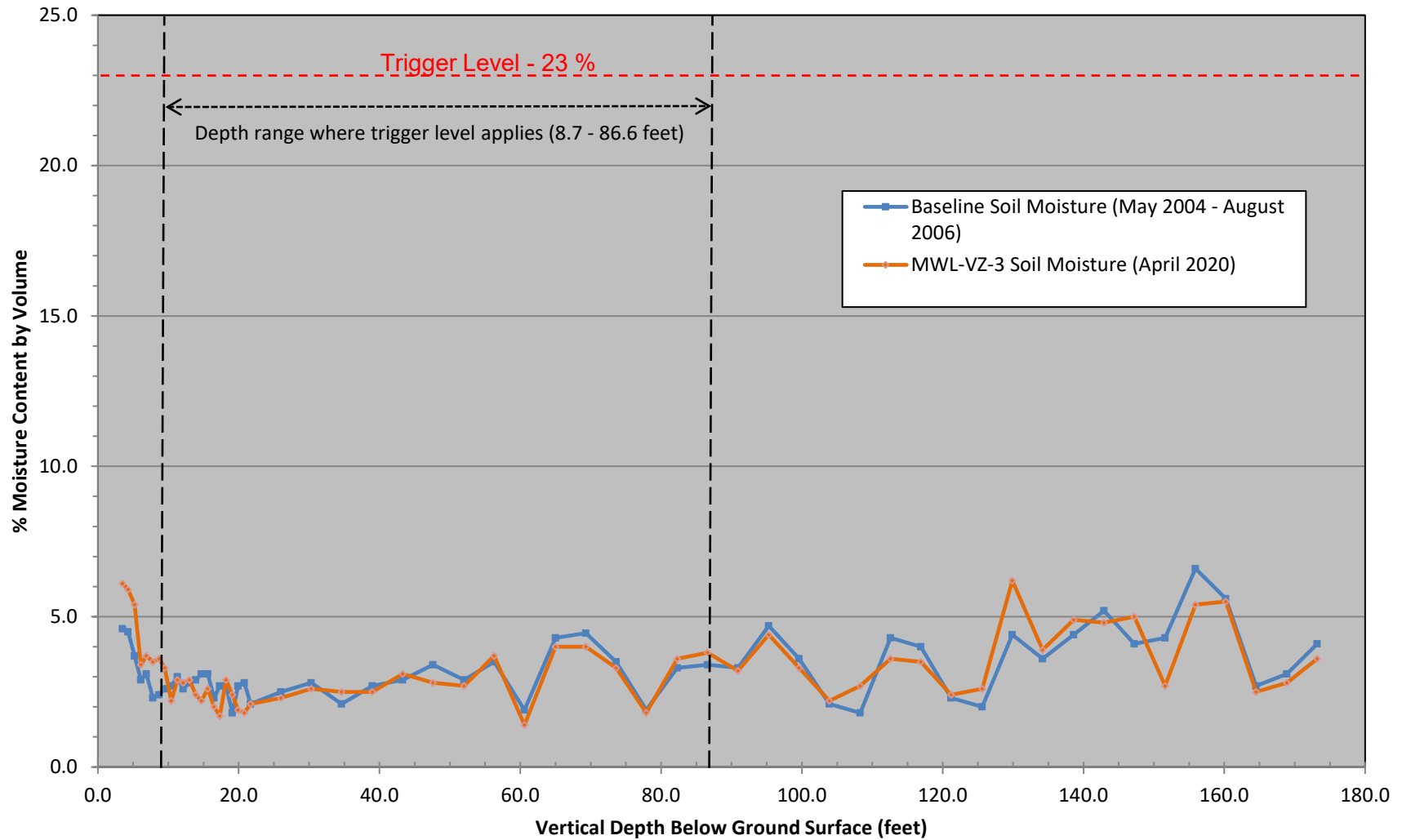


Figure 6-4  
Mixed Waste Landfill MWL-VZ-3 Soil-Moisture Monitoring Results

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

Groundwater sampling field activities are described in Section 7.1, analytical laboratory results are presented and compared to trigger levels in Section 7.2, followed by a discussion of data quality 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, 2020 through March 31, 2021 reporting period, fulfilling the LTMMP semiannual monitoring requirement. Groundwater samples were collected from monitoring wells MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9. Well locations are shown in Figure 7-1. The samples were analyzed for VOCs, metals (cadmium, chromium, nickel, and uranium), gamma-emitting radionuclides (Americium-241, Cesium-137, and Cobalt-60), gross alpha and beta activity, tritium, and radon-222. Field forms and documentation that address calibration of equipment, well purging and water quality measurements, and equipment decontamination activities are provided in Annex E.

The first sampling event was conducted between May 4 and 7, 2020. An environmental-duplicate sample pair was collected from MWL-MW7.

The second sampling event was conducted between November 9 and 12, 2020. An environmental-duplicate sample pair was collected from MWL-MW8.

Per the request of NMED (Kielling September 2019), groundwater samples were collected and analyzed during both events for 1,4-dioxane in addition to LTMMP-required analytes described above. The required two 1,4-dioxane sampling events were completed in CY 2020.

#### **7.1.1 Well Purging**

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



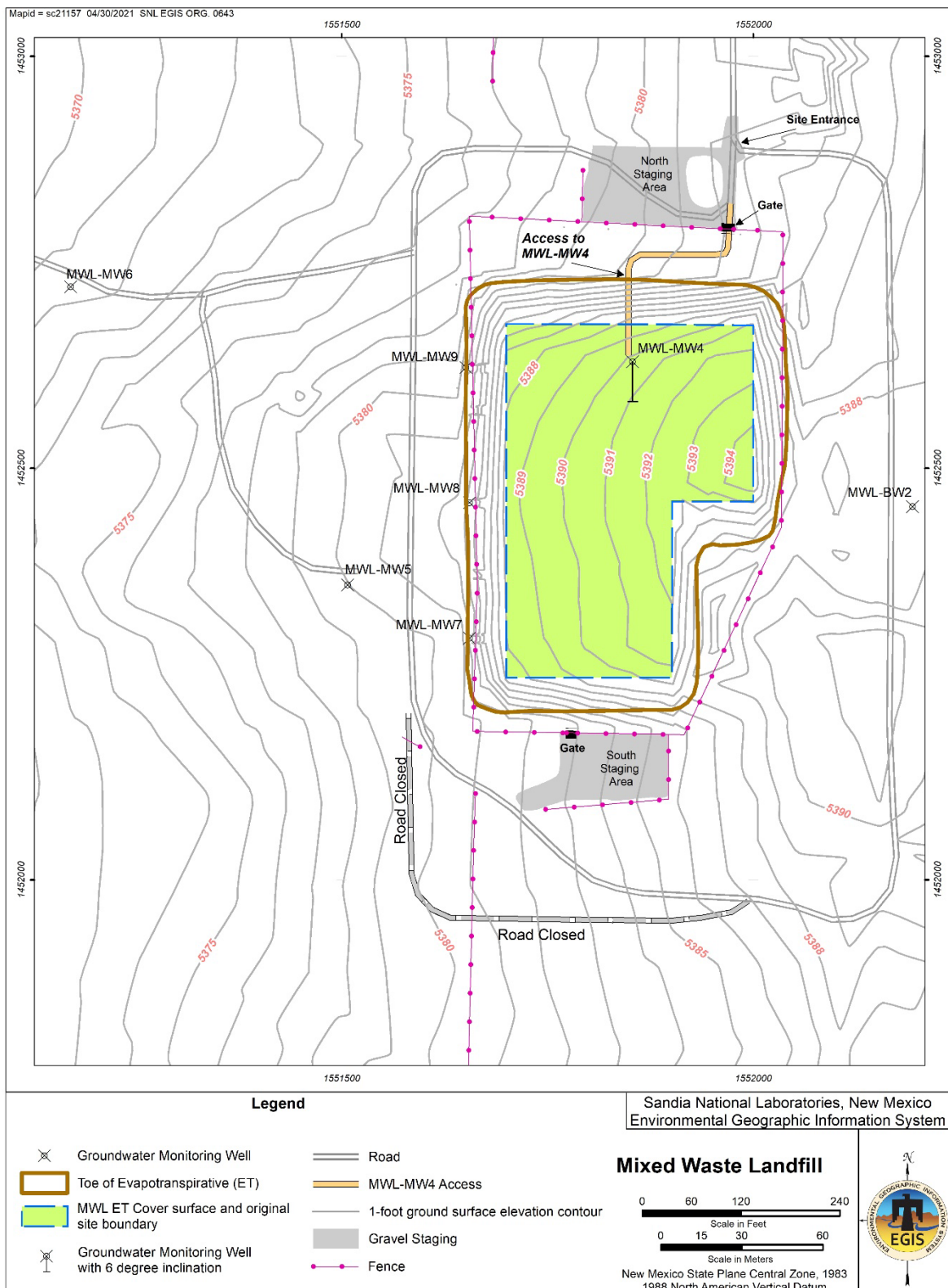


Figure 7-1  
Mixed Waste Landfill Groundwater Monitoring Well Locations

HACH™ Model 2100Q portable turbidity meter. Additional water quality measurements included oxidation-reduction potential and dissolved oxygen.

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 0.14 gallons per minute (gpm) at MWL-MW9 to 0.27 gpm at MWL-BW2 for the May 2020 sampling event. The average flow rates ranged from 0.15 gpm at MWL-MW7 and MWL-MW9 to 0.26 gpm at MWL-BW2 for the November 2020 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 May and November 2020 sampling events is provided below. Analytical results are presented in Section 7.2.

### First Sampling Event – May 4-7, 2020

One duplicate sample was collected at MWL-MW7. One equipment blank sample was collected prior to sampling monitoring well MWL-MW7. Four field blank samples were collected, one at each monitoring well location. Five trip blank samples were submitted with groundwater samples for VOC analysis.

### Second Sampling Event – November 9-12, 2020

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, one at each monitoring well location. 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 200 gallons of wastewater were generated during the May 2020 groundwater sampling event and approximately 240 gallons were generated during the November 2020 sampling event.

PPE and other solid waste generated during May and November 2020 soil-vapor and groundwater monitoring activities were managed in accordance with all applicable requirements. Analytical data from the sampling events were used to supplement the waste management process. Based on historical data and sampling results, 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 Annual LTMM 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.

No VOCs were detected in the May or November 2020 sampling events. Table 7-1 summarizes the MDLs for all VOCs. The May and November 2020 1,4-dioxane results are provided in Table 7-2. The May and November 2020 cadmium, chromium, nickel, and uranium results are presented 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 2020 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 Method Detection Limits for VOCs (EPA Method 8260B<sup>a</sup>)  
Mixed Waste Landfill Groundwater Monitoring  
May and November 2020

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
Ethylbenzene	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 7-2  
Summary of 1,4-Dioxane Results (EPA Method 8270D<sup>a</sup>)  
Mixed Waste Landfill Groundwater Monitoring  
May and November 2020

Well ID	Analyte	Result <sup>a</sup> (µg/L)	MDL (µg/L)	PQL (µg/L)	Laboratory Qualifier <sup>b</sup>	Validation Qualifier <sup>b</sup>
<b>May 2020 Sampling Event</b>						
<b>MWL-BW2</b> 04-May-20	1,4-Dioxane	ND	0.0400	0.400	U	--
<b>MWL-MW7</b> 05-May-20	1,4-Dioxane	ND	0.0400	0.400	U	--
<b>MWL-MW7</b> (Duplicate) 05-May-20	1,4-Dioxane	ND	0.0400	0.400	U	--
<b>MWL-MW8</b> 07-May-20	1,4-Dioxane	ND	0.0400	0.400	U	--
<b>MWL-MW9</b> 06-May-20	1,4-Dioxane	ND	0.0400	0.400	U	--
<b>November 2020 Sampling Event</b>						
<b>MWL-BW2</b> 09-Nov-20	1,4-Dioxane	ND	0.100	0.400	U	--
<b>MWL-MW7</b> 10-Nov-20	1,4-Dioxane	ND	0.100	0.400	U	--
<b>MWL-MW8</b> 12-Nov-20	1,4-Dioxane	ND	0.100	0.400	U	--
<b>MWL-MW8</b> (Duplicate) 12-Nov-20	1,4-Dioxane	ND	0.100	0.400	U	--
<b>MWL-MW9</b> 11-Nov-20	1,4-Dioxane	ND	0.100	0.400	N, U	UJ

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

Laboratory Qualifier

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

U = Analyte was not detected.

Validation Qualifier

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

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 greater than zero.

MWL = Mixed Waste Landfill.

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.

µg/L = Micrograms per liter.

Table 7-3  
Summary of Cadmium, Chromium, Nickel, and Uranium Results (EPA Method 6020B<sup>a</sup>)  
Mixed Waste Landfill Groundwater Monitoring  
May and November 2020

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>May 2020 Sampling Event</b>							
<b>MWL-BW2</b> 04-May-20	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00202	0.0006	0.002	0.050	--	--
	Uranium	0.00747	0.000067	0.0002	0.015	--	--
<b>MWL-MW7</b> 05-May-20	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00126	0.0006	0.002	0.050	J	--
	Uranium	0.00797	0.000067	0.0002	0.015	--	--
<b>MWL-MW7</b> (Duplicate) 05-May-20	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.00099	0.0006	0.002	0.050	J	--
	Uranium	0.00781	0.000067	0.0002	0.015	--	--
<b>MWL-MW8</b> 07-May-20	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	0.00815	0.000067	0.0002	0.015	--	--
<b>MWL-MW9</b> 06-May-2020	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	0.00890	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 6020B<sup>a</sup>)  
Mixed Waste Landfill Groundwater Monitoring  
May and November 2020

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>November 2020 Sampling Event</b>							
<b>MWL-BW2</b> 09-Nov-20	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000781	0.0006	0.002	0.050	J	--
	Uranium	0.00659	0.000067	0.0002	0.015	--	--
<b>MWL-MW7</b> 10-Nov-20	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000666	0.0006	0.002	0.050	J	--
	Uranium	0.00771	0.000067	0.0002	0.015	--	--
<b>MWL-MW8</b> 12-Nov-20	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000731	0.0006	0.002	0.050	J	--
	Uranium	0.00755	0.000067	0.0002	0.015	B	--
<b>MWL-MW8</b> (Duplicate) 12-Nov-20	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000730	0.0006	0.002	0.050	J	--
	Uranium	0.00757	0.000067	0.0002	0.015	B	--
<b>MWL-MW9</b> 11-Nov-20	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000693	0.0006	0.002	0.050	J	--
	Uranium	0.00901	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

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

J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL

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.

MWL = Mixed Waste Landfill.

ND = Not detected (at MDL).

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



Table 7-4  
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results  
Mixed Waste Landfill Groundwater Monitoring  
May and November 2020

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>May 2020 Sampling Event</b>							
<b>MWL-BW2</b> 04-May-2020	Americium-241	14.0 ± 16.7	25.6	NE	U	BD	EPA 901.1
	Cesium-137	1.56 ± 2.25	3.62	NE	U	BD	EPA 901.1
	Cobalt-60	0.459 ± 2.54	4.52	NE	U	BD	EPA 901.1
	Gross Alpha	2.40	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.12 ± 1.02	1.48	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	16.4 ± 97.7	176	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	559 ± 139	69.7	1,000 pCi/L	--	--	SM7500-Rn B
<b>MWL-MW7</b> 05-May-2020	Americium-241	1.62 ± 6.97	10.8	NE	U	BD	EPA 901.1
	Cesium-137	-1.68 ± 3.37	3.17	NE	U	BD	EPA 901.1
	Cobalt-60	0.201 ± 2.07	3.32	NE	U	BD	EPA 901.1
	Gross Alpha	3.82	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.51 ± 0.851	1.12	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	5.83 ± 101	184	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	123 ± 48.6	59.3	1,000 pCi/L	--	J	SM7500-Rn B
<b>MWL-MW7</b> (Duplicate) 05-May-2020	Americium-241	0.369 ± 5.61	8.97	NE	U	BD	EPA 901.1
	Cesium-137	-1.26 ± 2.55	3.02	NE	U	BD	EPA 901.1
	Cobalt-60	1.09 ± 1.86	3.39	NE	U	BD	EPA 901.1
	Gross Alpha	4.97	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.92 ± 0.952	1.33	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-34.9 ± 91.2	174	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	174 ± 57.4	59.4	1,000 pCi/L	--	J	SM7500-Rn B
<b>MWL-MW8</b> 07-May-2020	Americium-241	10.5 ± 18.3	29.2	NE	U	BD	EPA 901.1
	Cesium-137	2.04 ± 2.25	3.81	NE	U	BD	EPA 901.1
	Cobalt-60	0.965 ± 2.03	3.83	NE	U	BD	EPA 901.1
	Gross Alpha	3.70	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.31 ± 0.899	1.25	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	108 ± 109	177	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	160 ± 60.3	70.3	1,000 pCi/L	--	J	SM7500-Rn B
<b>MWL-MW9</b> 06-May-2020	Americium-241	17.1 ± 18.0	26.8	NE	U	BD	EPA 901.1
	Cesium-137	-0.00552 ± 2.23	3.91	NE	U	BD	EPA 901.1
	Cobalt-60	-0.237 ± 2.59	4.48	NE	U	BD	EPA 901.1
	Gross Alpha	3.46	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	6.33 ± 0.758	0.862	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-54.6 ± 93.2	181	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	550 ± 142	83.9	1,000 pCi/L	--	--	SM7500-RnB
<b>November 2020 Sampling Event</b>							
<b>MWL-BW2</b> 09-Nov-20	Americium-241	0.367 ± 3.87	6.93	NE	U	BD	EPA 901.1
	Cesium-137	-1.03 ± 1.73	2.69	NE	U	BD	EPA 901.1
	Cobalt-60	0.111 ± 1.58	2.96	NE	U	BD	EPA 901.1
	Gross Alpha	2.34	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	4.39 ± 1.21	1.88	4 mrem/yr	--	J	EPA 900.0
	Tritium <sup>f</sup>	11.5 ± 80.3	145	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	509 ± 125	59.2	1,000 pCi/L	--	--	SM7500-Rn B
<b>MWL-MW7</b> 10-Nov-20	Americium-241	3.43 ± 6.75	10.5	NE	U	BD	EPA 901.1
	Cesium-137	0.284 ± 1.79	3.13	NE	U	BD	EPA 901.1
	Cobalt-60	2.56 ± 2.09	3.36	NE	U	BD	EPA 901.1
	Gross Alpha	7.43	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.73 ± 1.10	1.61	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-19.8 ± 80.1	151	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	81.1 ± 47.1	69.5	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**  
**May and November 2020**

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>November 2020 Sampling Event (continued)</b>							
<b>MWL-MW8</b> 12-Nov-20	Americium-241	3.03 ± 17.6	20.3	NE	U	BD	EPA 901.1
	Cesium-137	1.31 ± 1.95	3.62	NE	U	BD	EPA 901.1
	Cobalt-60	0.660 ± 2.03	4.03	NE	U	BD	EPA 901.1
	Gross Alpha	4.52	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.28 ± 0.824	1.08	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-65.3 ± 77.6	155	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	170 ± 68.1	83.3	1,000 pCi/L	--	J	SM7500-Rn B
<b>MWL-MW8</b> (Duplicate) 12-Nov-20	Americium-241	3.98 ± 7.41	12.2	NE	U	BD	EPA 901.1
	Cesium-137	-0.320 ± 2.05	3.69	NE	U	BD	EPA 901.1
	Cobalt-60	0.0368 ± 2.29	4.08	NE	U	BD	EPA 901.1
	Gross Alpha	6.83	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	5.68 ± 1.00	1.44	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-33.7 ± 73.8	142	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	157 ± 66.1	83.5	1,000 pCi/L	--	J	SM7500-Rn B
<b>MWL-MW9</b> 11-Nov-20	Americium-241	6.88 ± 7.53	11.6	NE	U	BD	EPA 901.1
	Cesium-137	-1.13 ± 1.83	2.62	NE	U	BD	EPA 901.1
	Cobalt-60	0.952 ± 1.66	3.15	NE	U	BD	EPA 901.1
	Gross Alpha	3.77	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta <sup>e</sup>	4.72 ± 0.942	1.33	4 mrem/yr	--	--	EPA 900.0
	Tritium <sup>f</sup>	-54.2 ± 78.1	153	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	449 ± 112	60.2	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.

MWL = Mixed Waste Landfill.

mrem/yr = Millirem per year.

NE = Not established.

pCi/L = Picocuries per liter.

SM = Standard method.

Table 7-5  
Summary of Field Water Quality Measurements<sup>a</sup>  
Mixed Waste Landfill Groundwater Monitoring  
May and November 2020

Well ID	Temperature (°C)	SC (µmhos/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (% Sat)	DO (mg/L)
<b>May 2020 Sampling Event</b>							
MWL-BW2	22.38	715.59	95.0	7.29	2.07	24.98	2.02
MWL-MW7	20.47	631.27	136.0	7.51	0.33	69.10	5.81
MWL-MW8	22.34	618.43	155.9	7.43	0.32	36.77	3.87
MWL-MW9	22.98	619.58	169.3	7.40	1.00	14.30	1.12
<b>November 2020 Sampling Event</b>							
MWL-BW2	18.71	661.65	121.6	7.35	2.48	36.38	2.77
MWL-MW7	16.57	524.80	228.6	7.59	1.15	74.85	6.38
MWL-MW8	18.63	545.13	230.6	7.50	1.93	39.47	3.23
MWL-MW9	17.72	544.13	181.5	7.48	2.91	18.59	1.44

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.

MWL = Mixed Waste Landfill.

µmhos/cm = Micromhos per centimeter.

mV = Millivolts.

NTU = Nephelometric turbidity units.

ORP = Oxidation-reduction potential.

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

SC = Specific conductivity.

#### First Sampling Event – May 4-7, 2020

VOCs were not detected in the environmental samples above MDLs. The compound 1,4-dioxane was not detected in any of the environmental samples above the MDL.

Cadmium and chromium were not detected above the associated MDLs. Nickel was detected below the LTMMMP trigger level of 0.050 milligrams per liter (mg/L) in samples from monitoring wells MWL-BW2 and MWL-MW7 at a maximum concentration of 0.00202 mg/L (sample from MWL-BW2) and was not detected above the MDL in samples from the other wells. Uranium was detected below the LTMMMP trigger level in all groundwater samples. Uranium concentrations ranged from 0.00747 mg/L at MWL-BW2 to 0.00890 mg/L at MWL-MW9. All metals results are consistent with historical MWL groundwater monitoring results and 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 below the LTMMMP trigger level of 15 pCi/L in all samples ranging from 2.40 pCi/L (MWL-BW2) to 4.97 pCi/L (MWL-MW7 duplicate sample). Gross beta activity ranged from 5.12 pCi/L (MWL-BW2) to 6.33 pCi/L (MWL-MW9); results are consistent with background levels. Radon-222 was detected in all samples below the

LTMMMP trigger level of 1,000 pCi/L, with activities ranging from 123 pCi/L (MWL-MW7) to 559 pCi/L (MWL-BW2). 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 background activities for MWL groundwater, and below LTMMMP trigger levels.

#### Second Sampling Event – November 9-12, 2020

VOCs were not detected in the environmental samples above MDLs. The compound 1,4-dioxane was not detected in any of the environmental samples above the MDL.

Cadmium and chromium were not detected above the associated MDLs. Nickel was detected below the LTMMMP trigger level of 0.050 mg/L in all monitoring wells at a maximum concentration of 0.000781 mg/L in the sample from MWL-BW2. Uranium was detected in all groundwater samples with concentrations ranging from 0.00659 mg/L at MWL-BW2 to 0.00901 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 2.34 pCi/L (MWL-BW2) to 7.43 pCi/L (MWL-MW7). Gross beta activity was detected in all samples ranging from 4.39 pCi/L (MWL-BW2) to 5.73 pCi/L (MWL-MW7). Radon-222 was detected in all samples, with activities ranging from 81.1 pCi/L at MWL-MW7 to 509 pCi/L at MWL-BW2. 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 background activities for MWL groundwater, 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 activity 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.

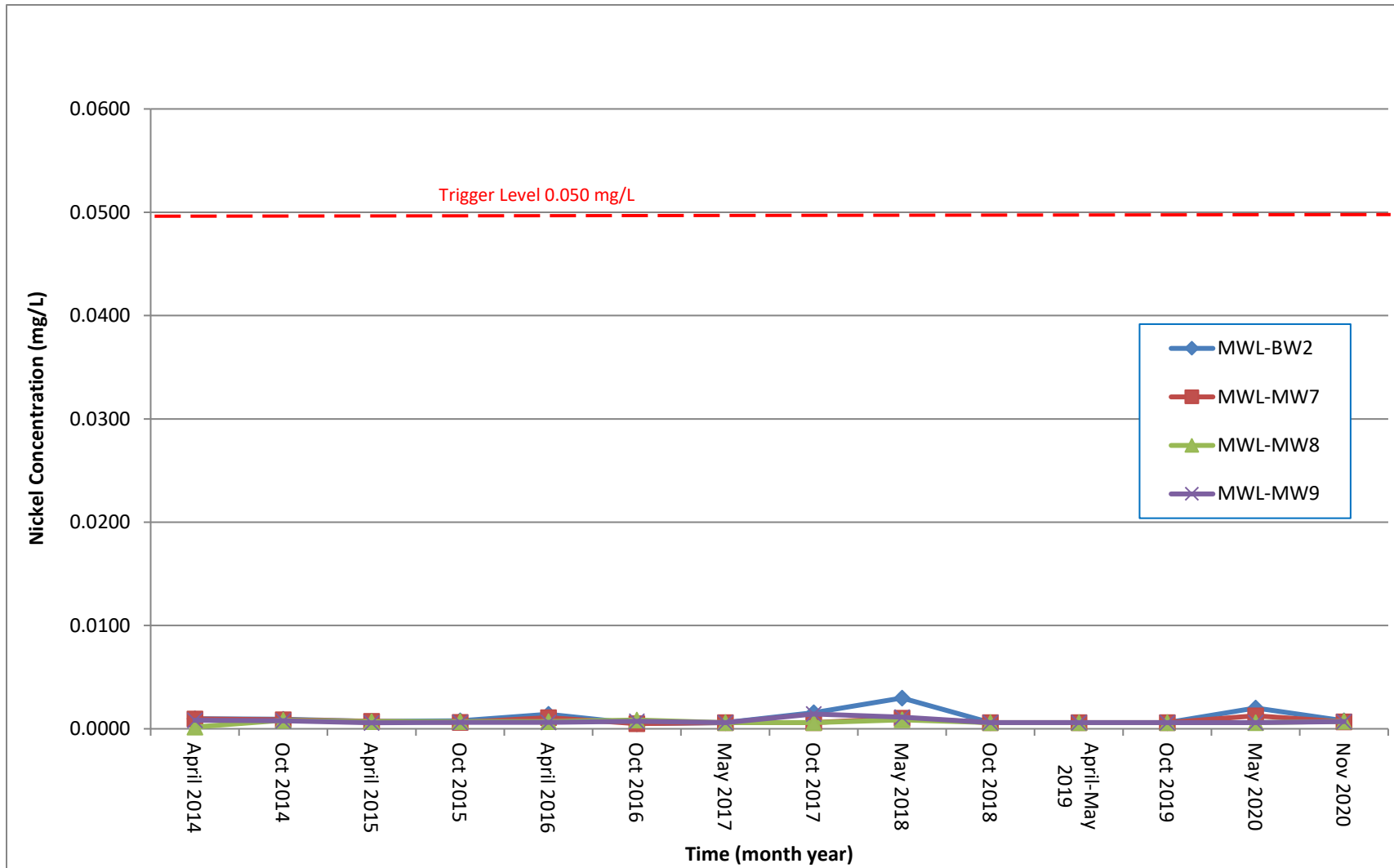


Figure 7-2  
Nickel Concentrations vs. Time  
Mixed Waste Landfill Groundwater Monitoring Wells

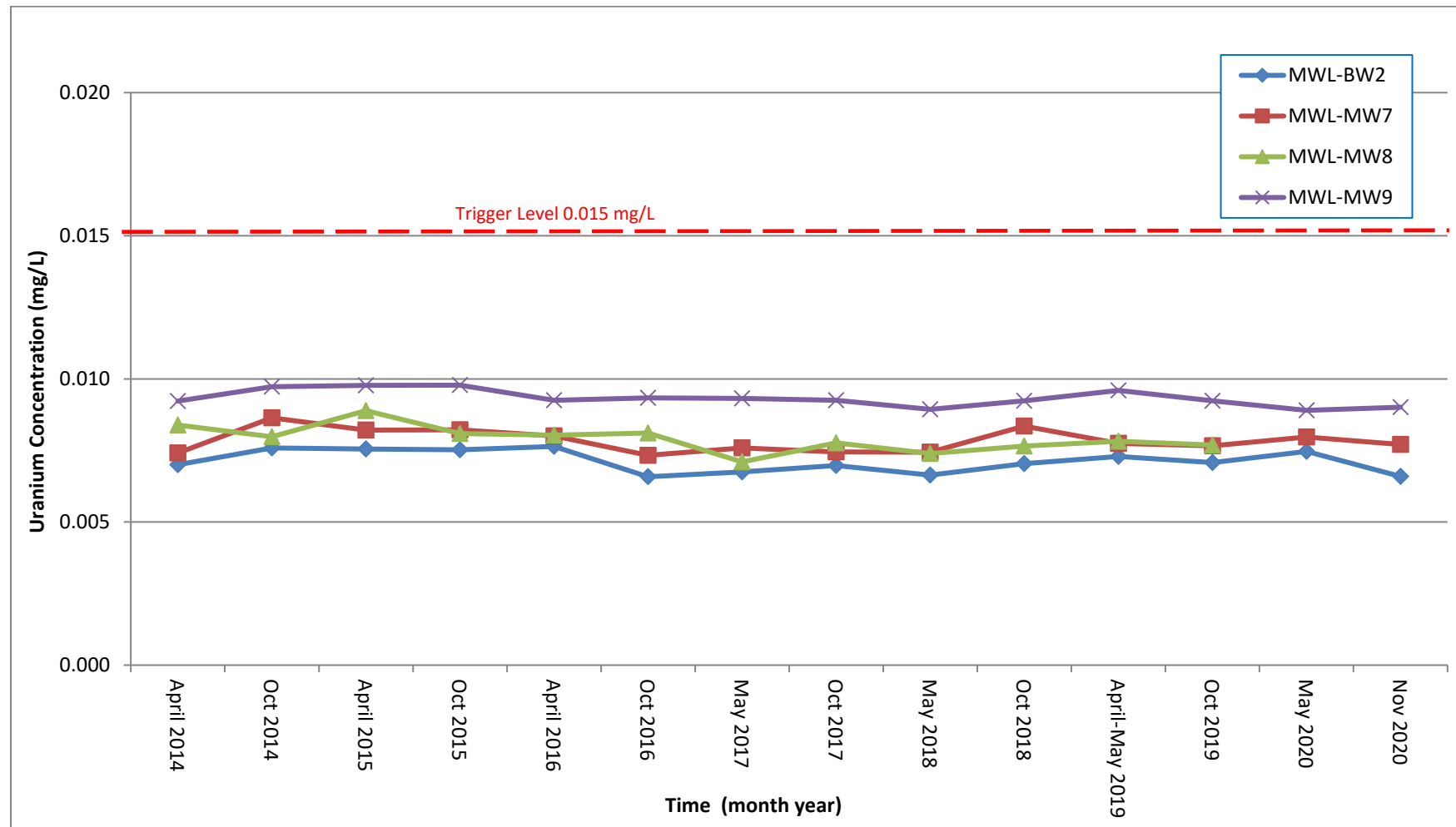


Figure 7-3  
Uranium Concentrations vs. Time  
Mixed Waste Landfill Groundwater Monitoring Wells

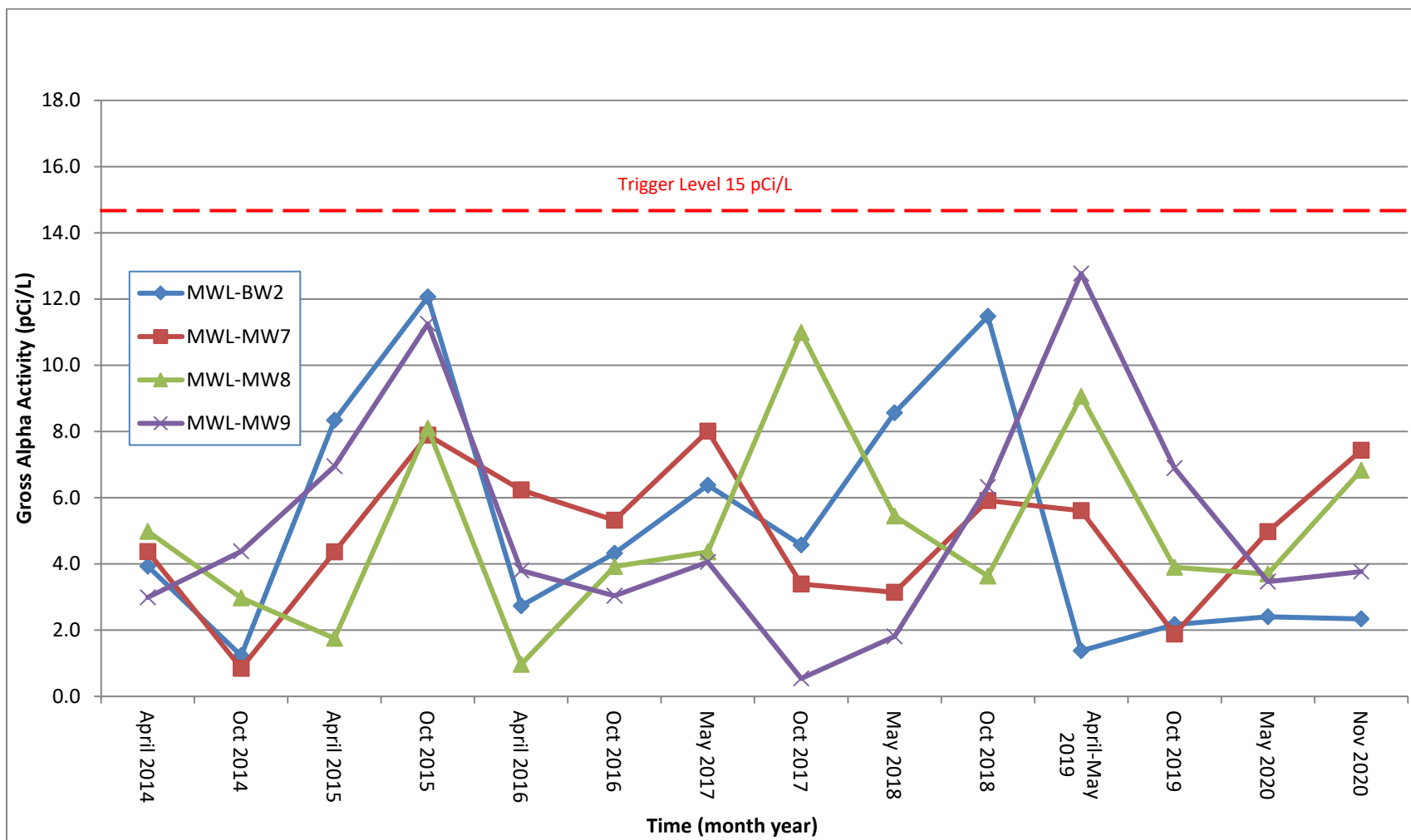


Figure 7-4  
Gross Alpha Activity vs. Time  
Mixed Waste Landfill Groundwater Monitoring Wells

## 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 May and November 2020 data sets. RPDs were calculated for constituents that exceeded the MDL in the sample pairs. Only the metals nickel and uranium were 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 less than 1 to 24.

Table 7-6  
Summary of Duplicate Sample Results  
Mixed Waste Landfill Groundwater Monitoring  
May and November 2020

Well ID/Parameter	Environmental Sample (R <sub>1</sub> )	Duplicate Sample (R <sub>2</sub> )	RPD <sup>a</sup> (%)
<b>May 2020 Sampling Event</b>			
<b>MWL-MW7</b>			
Nickel (mg/L)	0.00126	0.00099	24
Uranium (mg/L)	0.00797	0.00781	2
<b>November 2020 Sampling Event</b>			
<b>MWL-MW8</b>			
Nickel (mg/L)	0.000731	0.000730	< 1
Uranium (mg/L)	0.00755	0.00757	< 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.  
ID = Identification.  
mg/L = Milligram(s) per liter.  
MWL = Mixed Waste Landfill.

A discussion of equipment, field, and trip blank results for the May and November 2020 sampling events is provided below.

### First Sampling Event – May 4-7, 2020

The equipment blank sample for the May 2020 sampling event was analyzed for all constituents. Acetone, 2-butanone, bromodichloromethane, and chloroform were detected



above laboratory MDLs. No corrective action was necessary since these compounds were not detected in the MWL-MW7 environmental and environmental duplicate samples.

Acetone, bromodichloromethane, chloroform, chloromethane, and dibromochloromethane were detected above MDLs in the field blank samples. No corrective action was necessary since these compounds were not detected in the associated environmental samples. VOCs were not detected above MDLs in the five trip blank samples associated with the May 2020 sampling event.

#### Second Sampling Event – November 9-12, 2020

The equipment blank sample for the November 2020 sampling event was analyzed for all constituents. Acetone, bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above the MDLs. No corrective action was necessary since these compounds were not detected in the MWL-MW8 environmental and environmental duplicate samples.

Acetone, bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in the field blank samples. No corrective action was necessary since these compounds were not detected in the associated environmental samples. VOCs were not detected above MDLs in the five trip blank samples associated with the November 2020 sampling event.

### 7.2.3 Laboratory Quality Control and Data Quality

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

#### First Sampling Event – May 4-7, 2020

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 LTMMMP Appendix F).

#### Second Sampling Event – November 9-12, 2020

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 LTMMMP Appendix F), except for acetone, 2-butanone, vinyl acetate, and vinyl chloride. No corrective action was necessary because the percent recovery results for these compounds were within laboratory

and analytical method acceptance limits and none of these compounds were detected in environmental samples.

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 and June 2020a). 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 May and November 2020 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 production 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 2020. 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 five years the rate of decline has significantly slowed, and between 2015 and 2017, wells located west of the MWL showed a small increase ranging from 0.11 to 0.53 feet for the two-year period. From October 2019 to October 2020, the groundwater elevation declined in MWL-BW2 (0.19 feet) and rose in the other three compliance monitoring wells. The range in elevation rise was 0.02 feet (MWL-MW7) to 0.21 feet (MWL-MW9). Changes were similar for the other three monitoring wells; MWL-MW4 showed a slight decline (0.02 feet) whereas MWL-MW5 and MWL-MW6 showed a rise of 0.08 feet and 0.37 feet, respectively. This is likely due to decreased pumping of ABCWUA production wells to the north.

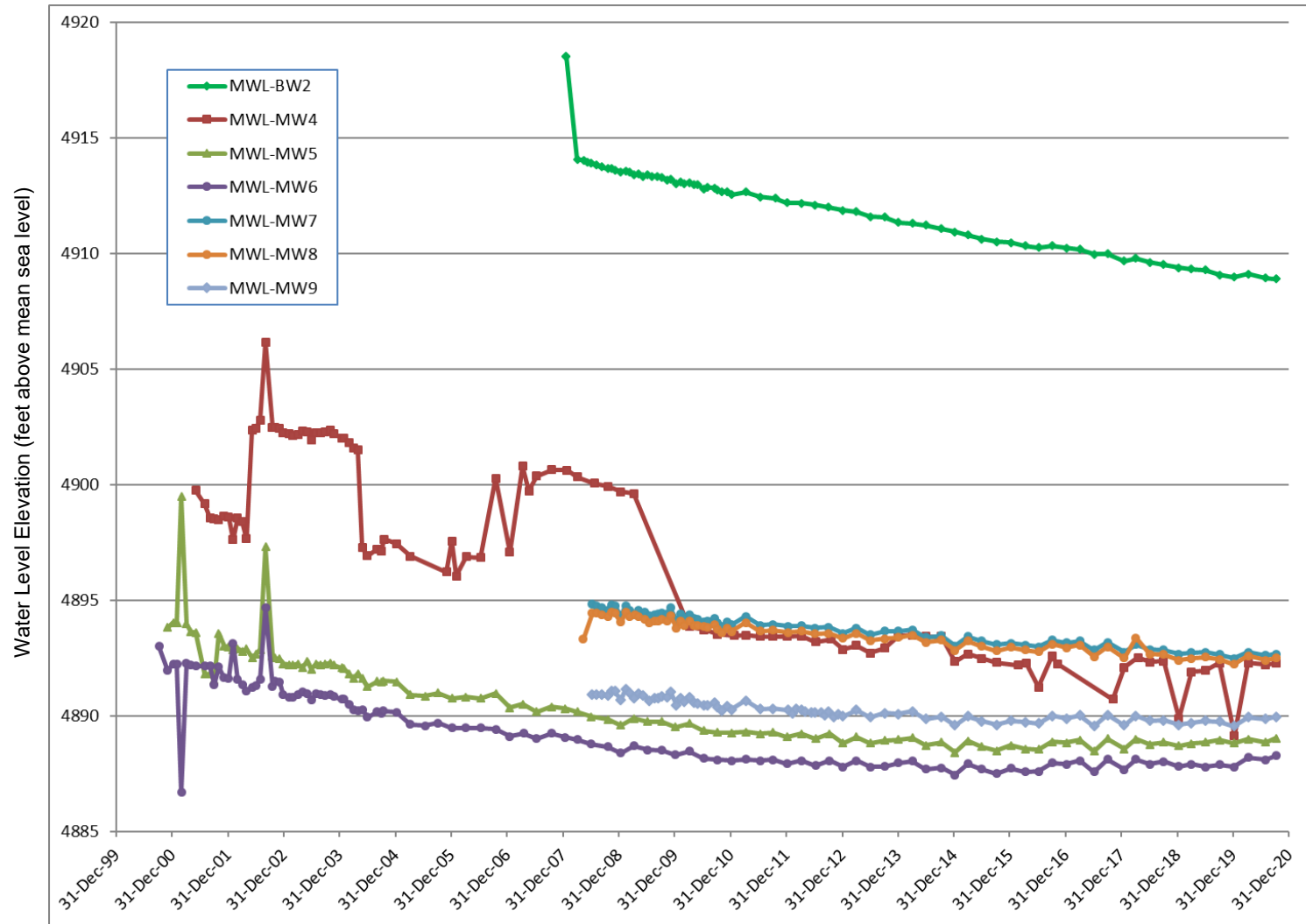


Figure 7-5  
Groundwater Level Elevations at Mixed Waste Landfill Groundwater Monitoring Wells

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 ET Cover. Groundwater recharge of the Regional Aquifer occurs primarily by the infiltration of precipitation in the Manzanita Mountains located approximately 5 miles to the east.

Figure 7-6 shows the October 2020 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 2020 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 2020 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 six years and are consistent with previous estimates for horizontal groundwater flow at the water table in the MWL vicinity.

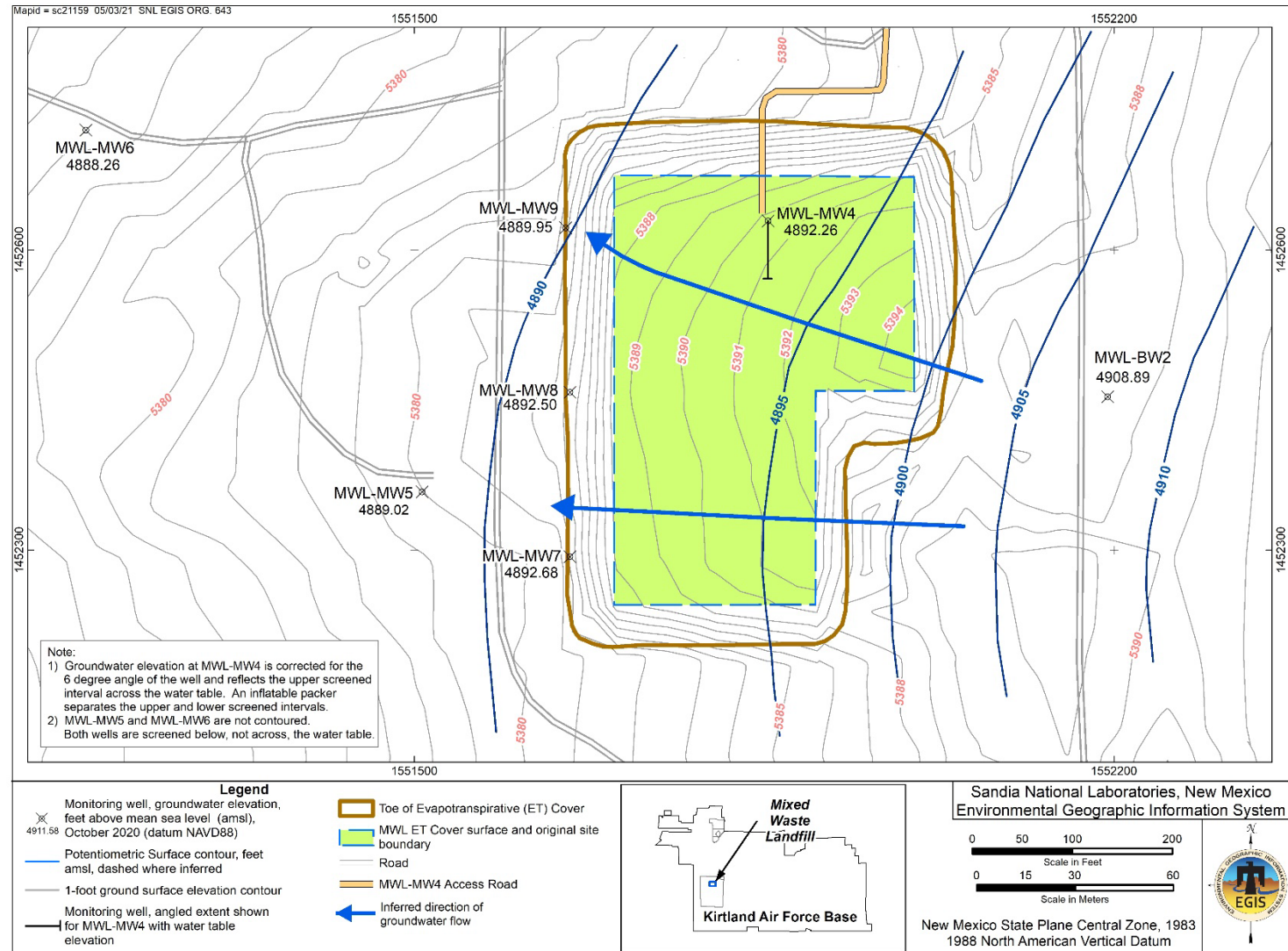


Figure 7-6  
Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2020

## **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, 2020 through March 31, 2021 reporting period fulfilling the LTMMMP annual monitoring requirement. The biota sampling locations were identified during the annual ET Cover Biology Inspection performed on August 18, 2020. The sampling locations are shown in Figure 8-1 and consist of two ant hills (MWL AHSS-01-2020 and MWL AHSS-02-2020). 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 August 27, 2020 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-01-2020.

#### **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.

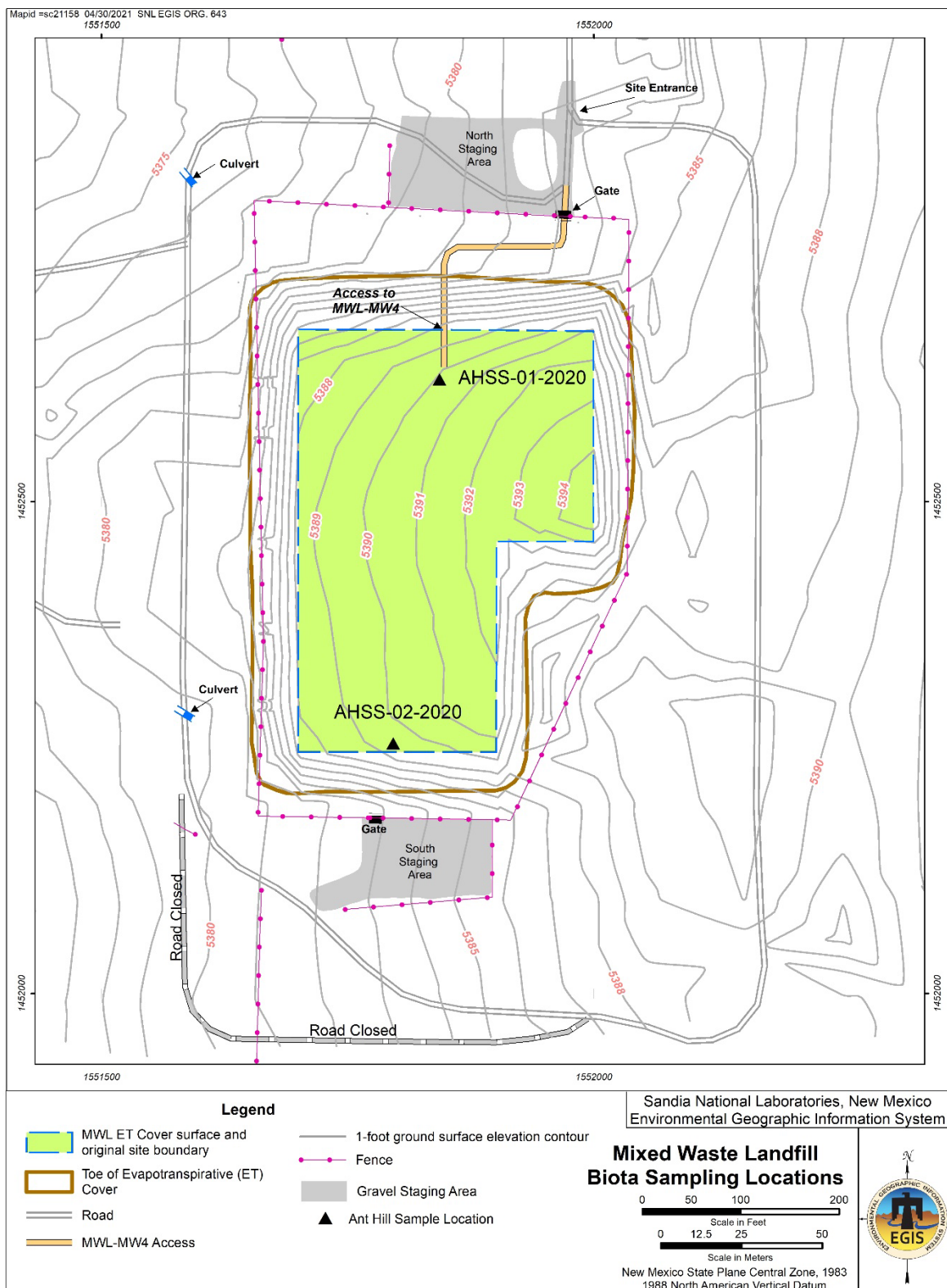


Figure 8-1  
Mixed Waste Landfill Biota Sampling Locations

## 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 and the respective NMED-approved background concentrations.

All gamma spectroscopy radionuclide activities were low, below the respective NMED-approved background activities. Seven of the 18 results were non-detects. 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 August 2020 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 2 to 26. 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.



Table 8-1  
Summary of Metals Results (EPA Method 6010D/7471B<sup>a</sup>)  
Mixed Waste Landfill Biota Monitoring  
August 2020

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-01-2020 27-Aug-20	Arsenic	2.78	0.489	2.94	5.6	17.7	J	J-, B4, B5
	Barium	66.6	0.0978	0.489	130	100,000	--	--
	Beryllium	0.275	0.0978	0.489	0.65	2,260	J	--
	Cadmium	ND	0.0978	0.489	<1	897	U	--
	Chromium	5.44	0.147	0.978	17.3	63.1	--	--
	Cobalt	2.09	0.147	0.489	5.2	20,500	--	--
	Copper	5.71	0.294	1.96	15.4	45,400	--	--
	Lead	5.72	0.323	1.96	21.4	800	B	--
	Mercury	ND	0.00705	0.0211	<0.25	73.6	U	--
	Nickel	4.53	0.147	0.489	11.5	22,500	--	--
	Selenium	0.592	0.489	2.94	<1	5,680	BJ	2.94U, B
	Silver	ND	0.0978	0.489	<1	5,680	U	--
	Vanadium	13.7	0.0978	0.489	20.4	5,680	--	--
	Zinc	17.1	0.391	1.96	62	100,000	--	--
MWL AHSS-01-2020 (Duplicate) 27-Aug-20	Arsenic	4.37	0.491	2.95	5.6	17.7	--	--
	Barium	86.1	0.0982	0.491	130	100,000	--	--
	Beryllium	0.351	0.0982	0.491	0.65	2,260	J	--
	Cadmium	0.108	0.0982	0.491	<1	897	J	--
	Chromium	6.57	0.147	0.982	17.3	63.1	--	--
	Cobalt	2.72	0.147	0.491	5.2	20,500	--	--
	Copper	7.05	0.295	1.96	15.4	45,400	--	--
	Lead	6.61	0.324	1.96	21.4	800	B	--
	Mercury	ND	0.00770	0.0230	<0.25	73.6	U	--
	Nickel	5.62	0.147	0.491	11.5	22,500	--	--
	Selenium	0.758	0.491	2.95	<1	5,680	BJ	2.95U, B
	Silver	ND	0.0982	0.491	<1	5,680	U	--
	Vanadium	16.4	0.0982	0.491	20.4	5,680	--	--
	Zinc	20.7	0.393	1.96	62	100,000	--	--
MWL AHSS-02-2020 27-Aug-20	Arsenic	2.26	0.482	2.89	5.6	17.7	J	J-, B4, B5
	Barium	46.8	0.0963	0.482	130	100,000	--	--
	Beryllium	0.233	0.0963	0.482	0.65	2,260	J	--
	Cadmium	ND	0.0963	0.482	<1	897	U	--
	Chromium	4.63	0.145	0.963	17.3	63.1	--	--
	Cobalt	1.72	0.145	0.482	5.2	20,500	--	--
	Copper	4.11	0.289	1.93	15.4	45,400	--	--
	Lead	4.84	0.318	1.93	21.4	800	B	--
	Mercury	ND	0.00726	0.0217	<0.25	73.6	U	--
	Nickel	3.45	0.145	0.482	11.5	22,500	--	--
	Selenium	0.579	0.482	2.89	<1	5,680	BJ	2.89U, B
	Silver	ND	0.0963	0.482	<1	5,680	U	--
	Vanadium	10.5	0.0963	0.482	20.4	5,680	--	--
	Zinc	14.7	0.385	1.93	62	100,000	--	--

Refer to notes at end of table.

Table 8-1 (Concluded)  
Summary of Metals Results (EPA Method 6010D/7471B<sup>a</sup>)  
Mixed Waste Landfill Biota Monitoring  
August 2020

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

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

BJ = The analyte was found in the blank above the effective MDL and the concentration is an estimated value greater than the MDL but less than the Reporting Limit.

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

U = Result less than the MDL.

Validation Qualifier

B = Method blank contamination at concentration greater than the MDL.

B4 = Negative value for calibration blank – absolute value less than the MDL.

B5 = Negative value for method blank – absolute value less than the MDL.

J- = The associated numerical value is an estimated quantity with a suspected negative bias.

U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

< = Less than.

DOE = U.S. Department of Energy.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

MWL = Mixed Waste Landfill.

ND = Not detected above the MDL.

NMED = New Mexico Environment Department.

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  
August 2020

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-01-2020 27-Aug-20	Cesium-137	0.0537 ± 0.0138	0.0132	1.5	--	--
	Cobalt-60	-0.00104 ± 0.00798	0.0141	NA	U	BD, FR3
	Radium-226	0.638 ± 0.0813	0.0245	2.7	--	--
	Thorium-232 <sup>d</sup>	0.942 ± 0.0972	0.0176	1.5	--	--
	Uranium-235	0.0448 ± 0.0607	0.0591	0.18	U	BD, FR3
	Uranium-238	0.616 ± 0.275	0.170	2.3	--	--
MWL AHSS-01-2020 27-Aug-20 (Duplicate)	Cesium-137	0.0501 ± 0.0166	0.0152	1.5	--	--
	Cobalt-60	-0.00245 ± 0.00920	0.0162	NA	U	BD, FR3
	Radium-226	0.627 ± 0.0720	0.0268	2.7	--	--
	Thorium-232 <sup>d</sup>	0.899 ± 0.0863	0.0213	1.5	--	--
	Uranium-235	0.00229 ± 0.0799	0.0783	0.18	U	BD, FR3
	Uranium-238	0.775 ± 0.739	0.624	2.3	--	J, FR7
MWL AHSS-02-2020 27-Aug-20	Cesium-137	0.212 ± 0.0340	0.0184	1.5	--	--
	Cobalt-60	-0.00405 ± 0.0105	0.0179	NA	U	BD, FR3
	Radium-226	0.623 ± 0.0775	0.0340	2.7	--	--
	Thorium-232 <sup>d</sup>	0.906 ± 0.0815	0.0276	1.5	--	--
	Uranium-235	0.0423 ± 0.106	0.0992	0.18	U	BD, FR3
	Uranium-238	0.366 ± -1.20	0.971	2.3	U	BD, FR3

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.

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.

<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.

MWL = Mixed Waste Landfill.

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  
August 2020

Sample Location	Environmental Sample (R <sub>1</sub> )	Duplicate Sample (R <sub>2</sub> )	RPD <sup>a</sup> (%)
<b>MWL AHSS-01-2020 – Metals (mg/kg)</b>			
Barium	66.6	86.1	26
Chromium	5.44	6.57	20
Cobalt	2.09	2.72	26
Copper	5.71	7.05	21
Lead	5.72	6.61	14
Nickel	4.53	5.62	22
Vanadium	13.7	16.4	18
Zinc	17.1	20.7	19
<b>MWL AHSS-01-2020 – Radionuclides (pCi/g)</b>			
Cesium-137	0.0537	0.0501	7
Radium-226	0.638	0.627	3
Thorium-232	0.942	0.899	2

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).  
MWL = Mixed Waste Landfill.  
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 replicate samples for the metals analyses. For the radiological analyses, method blanks, laboratory control samples, and replicate 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 2020a). Data Validation Reports that include the AR/COC forms and Contract Verification Review Forms 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, 2020 through March 31, 2021 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 August 18, 2020 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. Sixteen active ant hills and one inactive ant hill were observed mostly on the side slopes. No action or repairs were required based on the Biology Inspection.

Overall, the ET Cover vegetation and surface is in good condition with even coverage of mature, native perennial grasses. Additional information is provided on the August 18, 2020 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 upon inspections performed during the reporting period. Although only the annual Biology Inspection is required, the staff biologist performed biology verification inspections to support the quarterly ET Cover surface inspections performed by a field technician (Section 9.1.2) as a best practice. These 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 2020 – March 2021 Reporting Period

Inspection Type	Frequency	Checklist/Form <sup>a</sup>	Date Performed
ET Cover Biology Inspection	Annual <sup>b</sup>	Biology Inspection Checklist/Form	August 18, 2020
ET Cover Surface Inspection	Quarterly	Cover Inspection Checklist/Form	June 1, 2020
			September 2, 2020
			December 1, 2020
			March 1, 2021
Storm-Water Diversion Structure Inspection <sup>c</sup>	Quarterly	Cover Inspection Checklist/Form	June 1, 2020
			September 2, 2020
			December 1, 2020
			March 1, 2021
Soil-Vapor Monitoring Network Inspection	Semiannual <sup>d</sup>	Soil-Vapor Monitoring Network Checklist/Form	May 11, 2020
Soil-Moisture Monitoring Network Inspection	Annual <sup>d</sup>	Soil-Moisture Monitoring Network Checklist/Form	November 13, 2020
Groundwater Monitoring Network Inspection	Semiannual <sup>d</sup>	Groundwater Monitoring Network Checklist/Form	April 9 & 15, 2020
Security Fence Inspection <sup>c</sup>	Quarterly	Cover Inspection Checklist/Form	May 4, 2020
			November 9, 2020
			June 1, 2020
			September 2, 2020
			December 1, 2020
			March 1, 2021

Notes:

<sup>a</sup>All reporting period LTMMMP-required inspection forms are provided in Annex F. Best practice monthly supplemental radon monitoring location inspections are provided in Annex A.

<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.

LTMMMP = Long-Term Monitoring and Maintenance Plan

### 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 LTMMMP 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 LTMMMP 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. Accumulation of dead, windblown tumbleweeds were identified and removed from the road drainage culverts by the field technicians at time of the December 1, 2020 inspection.

### **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 1, 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.

#### **September 2, 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.



### December 1, 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.

### March 1, 2021 Inspection

Accumulation of dead, windblown tumbleweeds were identified along the perimeter fence. The plant debris was removed within 60 days during the March 8-9, 2021 ET Cover maintenance work as described in Section 9.7.

## **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 as verified through inspections. Supplemental watering was not conducted during this reporting period and only minimal ET Cover maintenance was needed.

Five minor weed control events were conducted during this reporting period that included live and windblown, dead weed removal as well as limited, selective pre-emergent herbicide and sterilant application (April 2020 event) to control weed growth. All removed weed material was loaded in a trailer and disposed at the KAFB Landfill. The objective of this best practice work is to promote the health of the existing native grasses on the ET Cover and perimeter area by reducing competition with weedy species for limited moisture and nutrients and to minimize future maintenance. This ET Cover maintenance work was performed by a contractor under the supervision of SNL/NM project personnel.

### April 15-17, 2020

Live and dead weeds were removed from the ET Cover, the perimeter fence and 3-foot area outside the fence, the area between the north toe of the ET Cover and the north fence, the western perimeter area between the fence and access road, the area surrounding all perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Debris and weeds were also cleared from all the access road drainage culvert inlets and outlets.

Weed control activities included the application of a pre-emergent herbicide, Prodiamine 65 WDG, to the areas surrounding the eastern and western perimeter monitoring well locations, the area between the north toe of the ET Cover and the north fence, the 3-foot area outside the perimeter fence, and the area from the western fence line up slope approximately 80 feet on to the ET Cover. The herbicide was applied to these areas where more prevalent weed growth has been observed in the past as a best practice to help control weed growth at the site and promote the health of the existing native grasses. The sterilant Hyvar was applied to the North and South Staging Areas. Prodiamine 65 WDG and Hyvar are approved for use at SNL/NM, do not carry a bee precaution rating according to the University of California Integrated Pest Management, and were applied following the manufacturer's instructions.

May 20-21, 2020

Live and dead weeds were removed from the ET Cover, the perimeter fence and 3-foot area outside the fence, the area between the north toe of the ET Cover and the north fence, the western perimeter area between the fence and access road, the area surrounding all perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Debris and weeds were also cleared from all the access road drainage culvert inlets and outlets and thorny shrubs along the outside perimeter of the west fence were cut near the ground surface and a root killing herbicide (Garlon 4) was applied to the stumps of the shrub.

July 7-8, 2020

Live and dead weeds were removed from the ET Cover, the perimeter fence and 3-foot area outside the fence, the area between the north toe of the ET Cover and the north fence, the western perimeter area between the fence and access road, the area surrounding all perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover).

October 30 & November 2, 2020

Live and dead weeds were removed from the ET Cover, the perimeter fence and 3-foot area outside the fence, the area between the north toe of the ET Cover and the north fence, the western perimeter area between the fence and access road, the area surrounding all perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Debris and weeds were also cleared from all the access road drainage culvert inlets and outlets.

March 8-9, 2021

Live and dead weeds were removed from the ET Cover, the perimeter fence and 3-foot area outside the fence, the area between the north toe of the ET Cover and the north fence, the western perimeter area between the fence and access road, the area surrounding all perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Debris and weeds were also cleared from all the access road drainage culvert inlets and outlets.

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## **10.0 REGULATORY ACTIVITIES**

On January 8, 2014, the NMED approved the MWL LTMM (Blaine January 2014). All MWL regulatory submittals that occurred during this April 1, 2020 through March 31, 2021 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 seventh MWL Annual LTMM Report, April 2019 – March 2020 (SNL/NM June 2020b), approved by NMED in July 2020 (Pierard July 2020). There were also two submittals of various updated reference documents cited in the LTMM SAPs (Harrell July 2020 and February 2021). These updates were made to keep the cited reference documents (field and AOPs) current and to reflect ongoing modifications and improvements to support MWL monitoring activities. The two 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 will be submitted to NMED in CY 2021.

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 D, 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

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.
<b>April 2020 through March 2021 Reporting Period Submittals</b>		
May 27, 2020	Section 4.8.1	MWL Annual LTMM Report, April 2019 – March 2020 • Approved in July 2020
June 26, 2020	Appendices D, F, and G	Updates to one document used by SNL/NM personnel to validate analytical data from contract laboratories.
February 9, 2021	Appendix F	Updates to four documents used by SNL/NM personnel to conduct groundwater monitoring activities at the MWL.

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, 2020 through March 31, 2021 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 2020. The range of radon activity for all monitoring locations was <0.2 to 0.4 pCi/L, and the range for the two background location results was 0.2 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 July 27, 2020. 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. Soil-vapor samples were collected in May and November 2020. A total of 26 VOCs were detected during the May 2020 sampling event and a total of 16 VOCs were detected during the November 2020 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 0.320 ppmv and 0.220 ppmv, respectively, at well MWL-SV03. The maximum concentration for Total VOCs at the 400 ft bgs sampling ports was 0.65647 ppmv at well MWL-SV03. All maximum values were from the May 2020 sampling event. 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. Soil-moisture measurements were collected on April 9 and 15, 2020. The trigger level for soil moisture applies to the shallow depth interval of 8.7 to 86.6 ft bgs at the three monitoring locations. The soil-moisture content by volume for this depth interval ranged from 1.4 to 4.7 percent, below the 23 percent soil-moisture content by volume trigger level. Soil-moisture monitoring results are consistent with baseline results established prior to ET Cover construction and indicate the ET Cover is performing as designed.

### Groundwater Monitoring

The groundwater monitoring frequency is semiannual. Groundwater samples were collected in May and November 2020. 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. Soil samples were collected on August 27, 2020 at two active ant hill locations on the ET Cover. No animal burrows were identified for sampling during the August 18, 2020 Biology Inspection. All metals and radionuclide results were below respective NMED-approved background levels and 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 August 18, 2020 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., minor maintenance such as 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.

Five 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 and perimeter area, removal of windblown tumbleweeds from the perimeter fence and drainage swale, and the selective application of an approved pre-emergent herbicide to a limited portion of the western ET Cover area and perimeter areas where more prevalent weed growth has been observed in the past. In addition, an approved sterilant was applied to the North and South Staging area. All of these actions were performed as best practice to 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, 2020 through March 31, 2021 reporting period included submittal of the seventh MWL Annual LTMM Report, April 2019 – March 2020 (SNL/NM June 2020b) that was approved by NMED (Pierard July 2020). Two submittals of various updated reference documents cited in the LTMM SAPs were also made within 30 days of the document effective dates (Harrell July 2020 and February 2021). 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 2021.

### **11.4 Conclusions**

All required LTMM monitoring, inspection, and maintenance/repair activities for the April 1, 2020 through March 31, 2021 reporting period were performed and documented in this eighth 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 2020**

**Data Evaluation Memos**

**Field Forms**

**Contract Verification**

**Radon Detector Inspection Forms**



**MIXED WASTE LANDFILL**

**RADON MONITORING**

**January-June 2020 Monitoring Period**



**Sandia National Laboratories**

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

Albuquerque, New Mexico 87185-0651

*date:* July 29, 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 – January through June 2020 Semiannual Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the January through June 2020 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 6, 2020 and were collected on July 6, 2020. 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) #620677 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 indicate very low activities of radon in the air at the MWL, consistent with historical results and background radon activity. Results ranged from <0.2 picocuries per liter ([pCi/L], i.e., non-detect, 11 out of 17 field location results) to 0.4 pCi/L (background location RN17); there were six detections ranging from 0.2 to 0.4 pCi/L. 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 #620677

RADONOVA Radon Monitoring Report 5557036:2 (analytical laboratory results for Radtrak2<sup>®</sup> detectors)

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

SMO 2012-ARCOG (4-2012)

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Page 1 of 2

Batch No.		SMO Use		AR/COC		620677									
Project Name: MWL RADON MONITORING		Date Samples Shipped: 7/7/20		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius									
Project/Task Manager: Robert Zlock		Carrier/Waybill No. 315955		SMO Contact Phone: Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154									
Project/Task Number: 195122.10.11.08		Lab Contact: Steve Leslie/331-814-2211		Send Report to SMO: Stephanie Montaño/505-284-2553											
Service Order: CF378-20		Lab Destination: RADON		Contract No.: 1776616											
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			
111975	001	RN1/Radtrak2 645934-1	N/A	7/6/20 09:44	AF	N	0 NA	NONE	C	SA	RADON				
111976	001	RN2/Radtrak2 195011-2	N/A	7/6/20 09:47	AF	N	0 NA	NONE	C	SA	RADON				
111977	001	RN3/Radtrak2 965539-0	N/A	7/6/20 09:10	AF	N	0 NA	NONE	C	SA	RADON				
111978	001	RN4/Radtrak2 148038-3	N/A	7/6/20 09:15	AF	N	0 NA	NONE	C	SA	RADON				
111979	001	RN5/Radtrak2 799003-9	N/A	7/6/20 09:18	AF	N	0 NA	NONE	C	SA	RADON				
111980	001	RN6/Radtrak2 933059-8	N/A	7/6/20 09:21	AF	N	0 NA	NONE	C	SA	RADON				
111981	001	RN7/Radtrak2 177423-1	N/A	7/6/20 09:24	AF	N	0 NA	NONE	C	SA	RADON				
111982	001	RN8/Radtrak2 378649-8	N/A	7/6/20 09:30	AF	N	0 NA	NONE	C	SA	RADON				
111983	001	RN9/Radtrak2 967937-4	N/A	7/6/20 09:38	AF	N	0 NA	NONE	C	SA	RADON				
111984	001	RN10/Radtrak2 203957-6	N/A	7/6/20 09:41	AF	N	0 NA	NONE	C	SA	RADON				
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt					
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		Entered by:		EDD <input checked="" type="checkbox"/> Yes				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day					
Background: <input type="checkbox"/> Yes		QC Inits.:		Negotiated TAT		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab									
Confirmatory: <input type="checkbox"/> Yes		Sample Team		Return Samples By:		Comments: Detectors were deployed 1/6/2020 to 7/6/2020; 182 days. See attached field form for additional information.									
Name		Signature		Init.		Company/Organization/Phone/Cell									
Danielle Michel		[Signature]		[Init.]		SNL/08854/505-845-7706/505-219-7143									
Robert Zlock		[Signature]		[Init.]		SNL/08888/505-845-0485/505-238-3668									
Relinquished by [Signature]		Org. 08888		Date 7/6/20		Time 1115		Relinquished by [Signature]		Org. [Signature]		Date 7/10/20		Time 430pm	
Received by [Signature]		Org. 00628		Date 7/6/20		Time 1115		Received by [Signature]		Org. [Signature]		Date 7/16/20		Time 1200 pm	
Relinquished by [Signature]		Org. 00628		Date 7/7/20		Time 0935		Relinquished by [Signature]		Org. [Signature]		Date [Signature]		Time [Signature]	
Received by [Signature]		Org. [Signature]		Date 7/8/20		Time 1200pm		Received by [Signature]		Org. [Signature]		Date [Signature]		Time [Signature]	

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

Review of MWL Radon-in-Air Data  
1<sup>st</sup> Semiannual CY 2020 (January – June 2020)  
July 24, 2020

SMO 2012-ARCO (4-2012)

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

AOP 95-16

Page 2 of 2

[illegible]





Danielle Michel

REPORT NUMBER  
5557036:2

REPORT PAGE  
1 of 3

REPORT DATE  
07/24/2020

PRINT DATE  
07/24/2020

OWN ID  
N/A

BY  
NTESS, LLC

REPORT RECEIVER(S)  
NTESS, LLC  
Danielle Michel

## 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 07/08/2020.  
They were measured 07/20/2020.

### Property data and address

MEASURE SITE ADDRESS

BUILDING ID  
ARCO # 620677

### Test results

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
645934-1	01/06/2020 – 07/06/2020	RN1		< 0.2 pCi/L
195011-2	01/06/2020 – 07/06/2020	RN2		< 0.2 pCi/L
965539-0	01/06/2020 – 07/06/2020	RN3		< 0.2 pCi/L
148038-3	01/06/2020 – 07/06/2020	RN4		< 0.2 pCi/L
799003-9	01/06/2020 – 07/06/2020	RN5		< 0.2 pCi/L
933059-8	01/06/2020 – 07/06/2020	RN6		< 0.2 pCi/L
177423-1	01/06/2020 – 07/06/2020	RN7		0.3 ± 0.2 pCi/L
378649-8	01/06/2020 – 07/06/2020	RN8		0.2 ± 0.2 pCi/L
967937-4	01/06/2020 – 07/06/2020	RN9		< 0.2 pCi/L
203957-6	01/06/2020 – 07/06/2020	RN10		< 0.2 pCi/L

### Comment to the results

This report replaces 5557036:1. Reason: new or corrected measurement information has been received.

US\_EN\_001\_v200615:1.ppcd

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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Danielle Michel

REPORT NUMBER  
5557036:2

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2 of 3

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BY  
NTESS, LLC

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NTESS, LLC  
Danielle Michel

## 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 07/08/2020.  
They were measured 07/20/2020.

### Property data and address

MEASURE SITE ADDRESS

BUILDING ID  
AROC # 620677

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
154713-2	01/06/2020 – 07/06/2020	RN11		< 0.2 pCi/L
913385-1	01/06/2020 – 07/06/2020	RN12		< 0.2 pCi/L
169908-1	01/06/2020 – 07/06/2020	RN13		0.3 ± 0.2 pCi/L
764115-2	01/06/2020 – 07/06/2020	RN14		0.3 ± 0.2 pCi/L
200181-6	01/06/2020 – 07/06/2020	RN15		< 0.2 pCi/L
949396-6	01/06/2020 – 07/06/2020	RN16		0.2 ± 0.2 pCi/L
929299-6	01/06/2020 – 07/06/2020	Rn17		0.4 ± 0.2 pCi/L
152383-6	01/06/2020 – 07/06/2020	RNTB**		< 0.2 pCi/L

### Comment to the results

This report replaces 5557036:1. Reason: new or corrected measurement information has been received.

US\_EN\_001\_v200615-1.pptd

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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REPORT NUMBER	REPORT DATE
5557036:2	07/24/2020
REPORT PAGE	PRINT DATE
3 of 3	07/24/2020
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:

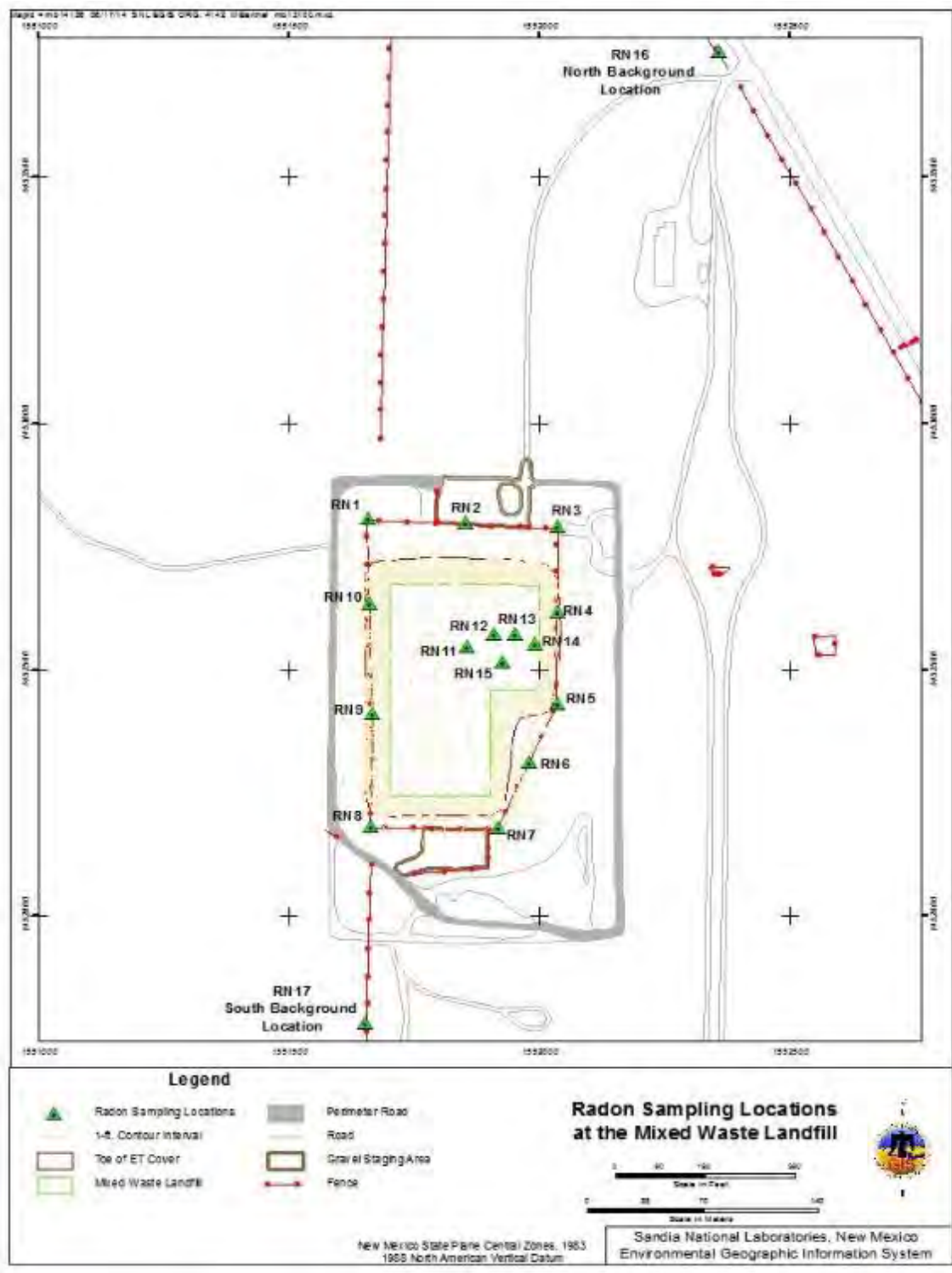


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Figure 1. Location of Radon Detectors at the MWL





# Mixed Waste Landfill Radon Detector Deployment/Collection Form

Name: Danielle Michel

Signature: Danielle Michel

Activity (check all that apply):

☒ Deployment ☒ CollectionName: ~~Robert Zick~~ Mike M. MichelSignature: Mike M. Michel☒ Deployment ☐ CollectionName: MARK LYONSignature: Mark Lyon☒ Deployment ☐ Collection

ARCOC #: 620677

Detector Type: Radtrak2

No. of Exposure Days: 182

Sampling Location	Sample Number	Detector Serial Number	Deployment Date	Deployment Time	Collection Date	Collection Time	Notes* Y/N Date(s) of Notes
RN1	111975	645934-1	1/6/2020	1005	7/6/2020	0944	
RN2	111976	195011-2		1003		0947	
RN3	111977	965539-0		0934		0910	
RN4	111978	148038-3		0936		0915	
RN5	111979	799003-9		0940		0918	
RN6	111980	933059-8		0942		0921	
RN7	111981	177423-1		0945		0924	
RN8	111982	378649-8		0950		0930	
RN9	111983	967937-4		0955		0932	Y-1/6/2020 Remove Cobalt
RN10	111984	203957-6		0956		0941	
RN11	111985	154713-2		1011		0944	
RN12	111986	913385-1		1012		0954	
RN13	111987	169908-1		1017		0957	
RN14	111988	764115-2		1020		1001	
RN15	111989	200181-6		1021		1004	
RN16	111990	949396-6		1026		1010	Y-1/6/2020 replaced plastic zip tie
RN17	111991	929299-6		0950		0935	Y-1/6/2020 removed webs
RNTB**	111992	152383-6	✓	SAB	✓	1030	

\*NOTES are documented on LTS RDN-2012-002 MWL Radon Detector Collection Inspection Form.

\*\*Document deployment date/time even though trip blank is not actually deployed and stays in sealed bag during sample detector deployment. Collection date/time is when sealed bag is opened and trip blank detector is placed in zip top sample bag for analysis.

**Send copy of this form with AR/COC.**

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 most current form. The official version is located in the Long-Term Stewardship (LTS) ARAS document library, for which access is required. Upon completion, this document becomes record.

## Contract Verification Form (CVR)

Project Leader ZIOCK

Project Name MWL RADON MONITORING

Project/Task No. 195122\_10.11.08

ARCOC No. 620677

Analytical Lab RADONOVA

SDG No. 5557036-1

*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	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		
	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: 07-22-2020 14:39:00

Closed by: Wendy Palencia Date: 07-22-2020 14:39:00

**MIXED WASTE LANDFILL**

**RADON MONITORING**

**July-December 2020 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:* March 3, 2021

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

*from:* David Farrar (0618) [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 2020 Semiannual Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the July through December 2020 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 July 6, 2020 and were collected on January 18, 2021. 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) #621130 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 indicate very low activities of radon in the air at the MWL, consistent with historical results and background radon activity. Results ranged from <0.2 picocuries per liter ([pCi/L], i.e., non-detect, 6 out of 17 field location results) to 0.4 pCi/L (RN13 and background location RN17); there were eleven detections ranging from 0.2 to 0.4 pCi/L. 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. The note on the RADNOVA laboratory report “*RN12, Can’t read the side note*” was in reference to a note on the SNL collection and inspection form that was not provided to the laboratory. Cobwebs were removed from the RN12 radon detector protective casing at time of collection.

DRF, 0618

Attachments:

Analysis Request/Chain of Custody #621130

RADONOVA Radon Monitoring Report 5643106:1 (analytical laboratory results for Radtrak2<sup>®</sup> detectors)

Locations of the Alpha Track Detectors at the MWL



Review of MWL Radon-in-Air Data  
 2<sup>nd</sup> Semiannual CY 2020 (July – December 2020)  
 March 3, 2021

SMO 2012-ARCO (4-2012)

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Page 1 of 2

Batch No.		SMO Use		AR/COC		621130						
Project Name: MWL RADON MONITORIN		Date Samples Shipped:		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: Robert Ziock		Carrier/Waybill No.		SMO Contact Phone:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154						
Project/Task Number: 195122.10.11.08		Lab Contact: Steve Leslie/331-814-2211		Wendy Palencia/505-844-3132								
Service Order: CF378-20		Lab Destination: RADON		Send Report to SMO:								
		Contract No.: 1776616		Stephanie Montaño/505-284-2553								
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
113060	001	RN1/Radtrak2 385746-3	N/A	1/18/21 1017	AF	N	0 NA	NONE	C	SA	RADON	
113061	001	RN2/Radtrak2 710089-4	N/A	1/18/21 1020	AF	N	0 NA	NONE	C	SA	RADON	
113062	001	RN3/Radtrak2 213436-9	N/A	1/18/21 0952	AF	N	0 NA	NONE	C	SA	RADON	
113063	001	RN4/Radtrak2 278703-4	N/A	1/18/21 0954	AF	N	0 NA	NONE	C	SA	RADON	
113064	001	RN5/Radtrak2 489360-8	N/A	1/18/21 0955	AF	N	0 NA	NONE	C	SA	RADON	
113065	001	RN6/Radtrak2 506123-9	N/A	1/18/21 0958	AF	N	0 NA	NONE	C	SA	RADON	
113066	001	RN7/Radtrak2 765655-6	N/A	1/18/21 1000	AF	N	0 NA	NONE	C	SA	RADON	
113067	001	RN8/Radtrak2 482040-3	N/A	1/18/21 1010	AF	N	0 NA	NONE	C	SA	RADON	
113068	001	RN9/Radtrak2 297252-9	N/A	1/18/21 1013	AF	N	0 NA	NONE	C	SA	RADON	
113069	001	RN10/Radtrak2 914952-7	N/A	1/18/21 1015	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		Return Samples By:		Comments: Detectors were deployed 7/6/2020 to 1/18/2021; 196 days. See attached field form for additional information.		
	Danielle Michel			SNL/08854/505-845-7706/505-219-7143								
	Robert Ziock			SNL/08888/505-845-0485/505-238-3668								
Relinquished by		Org.	Date	Time	Relinquished by	Org.	Date	Time	Relinquished by	Org.	Date	Time
Received by		Org.	Date	Time	Received by	Org.	Date	Time	Received by	Org.	Date	Time
Relinquished by		Org.	Date	Time	Relinquished by	Org.	Date	Time	Relinquished by	Org.	Date	Time
Received 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

Review of MWL Radon-in-Air Data  
2<sup>nd</sup> Semiannual CY 2020 (July – December 2020)  
February 10, 2021

SMO 2012-ARCOG (4-2012)

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

AOP 95-16

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REPORT NUMBER  
5643106:1

REPORT PAGE  
1 of 3

REPORT DATE  
02/05/2021

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02/05/2021

OWN ID  
ARCOC 621130

BY  
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NTESS

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## 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 01/28/2021.  
They were measured 02/03/2021.

*Test data have been given by NTESS*

### Property data and address

MEASURE SITE ADDRESS  
AR/CO C621130

BUILDING ID

### Test results

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
385746-3	07/06/2020 – 01/18/2021	RN1		0.2 ± 0.2 pCi/L
710089-4	07/06/2020 – 01/18/2021	RN2		0.2 ± 0.2 pCi/L
213436-9	07/06/2020 – 01/18/2021	RN3		0.3 ± 0.2 pCi/L
278703-4	07/06/2020 – 01/18/2021	RN4		< 0.2 pCi/L
489360-8	07/06/2020 – 01/18/2021	RN5		< 0.2 pCi/L
506123-9	07/06/2020 – 01/18/2021	RN6		0.3 ± 0.2 pCi/L
765655-6	07/06/2020 – 01/18/2021	RN7		< 0.2 pCi/L
482040-3	07/06/2020 – 01/18/2021	RN8		0.2 ± 0.2 pCi/L
297252-9	07/06/2020 – 01/18/2021	RN9		< 0.2 pCi/L
914952-7	07/06/2020 – 01/18/2021	RN10		< 0.2 pCi/L

### Comment to the results

Reported results are for detectors delivered with AR/COC #. 621130

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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### DISCLAIMER

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Westmont IL 60559

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REPORT NUMBER  
5643106:1

REPORT PAGE  
2 of 3

REPORT DATE  
02/05/2021

PRINT DATE  
02/05/2021

OWN ID  
ARCOC 621130

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 01/28/2021.  
They were measured 02/03/2021.

*Test data have been given by NTESS*

### Property data and address

MEASURE SITE ADDRESS  
AR/CO C621130

BUILDING ID

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
222208-1	07/06/2020 – 01/18/2021	RN11		0.3 ± 0.2 pCi/L
369236-5	07/06/2020 – 01/18/2021	RN12, Can't read the side note		< 0.2 pCi/L
257210-5	07/06/2020 – 01/18/2021	RN13		0.4 ± 0.2 pCi/L
296108-4	07/06/2020 – 01/18/2021	RN14		0.3 ± 0.2 pCi/L
653993-6	07/06/2020 – 01/18/2021	RN15		0.2 ± 0.2 pCi/L
567540-0	07/06/2020 – 01/18/2021	RN16		0.3 ± 0.2 pCi/L
754459-6	07/06/2020 – 01/18/2021	RN17		0.4 ± 0.2 pCi/L
700433-6	07/06/2020 – 01/18/2021	RNTB		< 0.2 pCi/L

### Comment to the results

Reported results are for detectors delivered with AR/COC #. 621130

Trygve Rönqvist (Electronically signed)

Signature Radonova Laboratories AB Laboratory Measurement Specialist

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REPORT NUMBER 5643106:1  
REPORT DATE 02/05/2021  
REPORT PAGE 3 of 3  
PRINT DATE 02/05/2021  
OWN ID  
ARCOC 621130

#### 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.

Measurement information displayed in italics on report has been provided by the customer.

#### Certification no:

107831-AL, 107830-RT, NRSB ARL1904

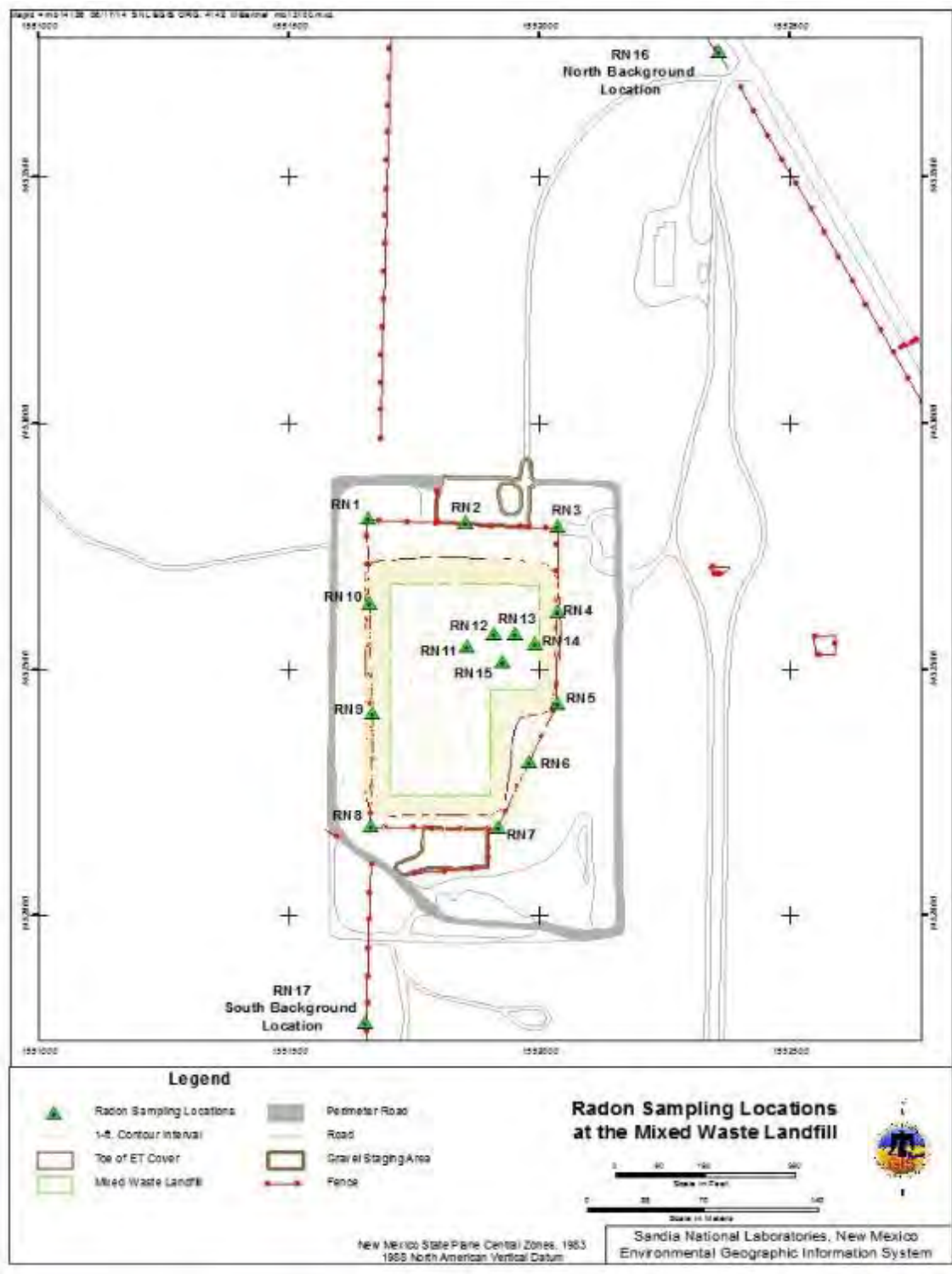


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Locations of Radon Detectors at the MWL





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

Name: Danielle MichelSignature: *Danielle Michel*

Activity (check all that apply):

☒ Deployment ☒ CollectionName: Robert ZiockSignature: *Robert Ziock*☒ Deployment ☒ CollectionName: Mike MitchellSignature: *Mike Mitchell*☐ Deployment ☒ CollectionARCO # 621130Detector Type: Radtrak2No. of Exposure Days: 196

Sampling Location	Sample Number	Detector Serial Number	Deployment Date	Deployment Time	Collection Date	Collection Time	Notes* Y/N Date(s) of Notes
RN1	113060	385746-3	7/6/2020	0944	1/18/2021	1017	N
RN2	113061	710089-4		0947		1020	N
RN3	113062	213436-9		0910		0952	N
RN4	113063	278703-4		0915		0954	N
RN5	113064	489360-8		0918		0955	N
RN6	113065	506123-9		0921		0958	N
RN7	113066	765655-6		0924		1000	N
RN8	113067	482040-3		0930		1010	N
RN9	113068	297252-9		0938		1013	N
RN10	113069	914952-7		0941		1015	N
RN11	113070	222208-1		0944		1024	N
RN12	113071	369236-5		0954		1026	4-1/18/2021
RN13	113072	257210-5		0957		1029	N
RN14	113073	296108-4		1001		1030	N
RN15	113074	653993-6		1004		1027	N
RN16	113075	567540-0		1010		1035	Y
RN17	113076	754459-6		0935		1004	N
RNTB**	113077	700433-6		NA		NA	N

\*NOTES are documented on LTS RDN-2012-002 MWL Radon Detector Collection Inspection Form.

\*\*Document deployment date/time even though trip blank is not actually deployed and stays in sealed bag during sample detector deployment. Collection date/time is when sealed bag is opened and trip blank detector is placed in zip top sample bag for analysis.

**Send copy of this form with AR/COC.**

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 most current form. The official version is located in the Long-Term Stewardship (LTS) ARAS document library, for which access is required. Upon completion, this document becomes record.

## Contract Verification Form (CVR)

Project Leader ZIOCK

Project Name MWL RADON MONITORING

Project/Task No. 195122\_10.11.08

ARCOC No. 621130

Analytical Lab RADONOVA

SDG No. 5643106-1

*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	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		
	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: 02-09-2021 09:49:00

Closed by: Wendy Palencia Date: 02-09-2021 09:49:00

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

**January-December 2020 Monitoring Period**

New Jan

**Mixed Waste Landfill  
Radon Detector Inspection Form**

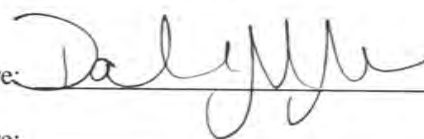
Date:

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

**Mixed Waste Landfill  
Radon Detector Inspection Form**

Date: 2/3/2020Name: Danielle MichelSignature: Danielle MichelName: Robert ZiockSignature: Robert Ziock

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	yes	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: 3/3/2020Name: Danielle KellelSignature: Danielle KellelName: Robert ZockSignature: Robert ZockAre detectors being collected? ☐ Yes ☒ NoDetector Type: Radtrak2

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.	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: April 6, 2020Name: Robert ZiolkSignature: *Robert Ziolk*Name: Danielle MichelSignature: *Danielle Michel*Are detectors being collected? ☐ Yes ☒ No

Detector Type:

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.	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	<b>Action Required</b> (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: 5/4/2020Name: Danielle NickelSignature: Danielle NickelName: Robert ZiackSignature: Robert ZiackAre 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	<b>Action Required</b> (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: 6/1/2020Name: Danielle MichelSignature: Danielle MichelName: Robert ZickSignature: Robert ZickAre detectors being collected? ☐ Yes ☒ NoDetector Type: RadtrakzRadon 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: 7/6/2020Name: Danielle MichelSignature: Danielle MichelName: 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	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	X	X	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	X	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: 8/3/2020  
Name: Danielle Michel

Signature: [Signature]  
Signature: \_\_\_\_\_

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

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	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: 9/2/2020Name: Danielle MichelSignature: Danielle MichelName: Robert ZickSignature: 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	
RN3	
RN4	
RN5	
RN6	
RN7	
RN8	
RN9	
RN10	
RN11	
RN12	
RN13	
RN14	
RN15	
RN16	
RN17	



**Mixed Waste Landfill  
Radon Detector Inspection Form**

Date: 10/7/2020Name: Danielle MichelSignature: Danielle MichelName: Robert ZickSignature: 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	<b>Action Required</b> (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: 11/5/2020Name: Danielle MichelSignature: [Signature]

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	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: 2/1/2020  
 Name: Danielle Michel  
 Name: Robert Eick

Signature: [Signature]  
 Signature: [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	

**ANNEX B**

**Mixed Waste Landfill  
Surface Soil Tritium and Biota Monitoring Forms and Reports  
April 2020-March 2021**

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

**Data Validation Reports**

**Contract Verification Reviews**

**Mixed Waste Landfill**  
**Surface Soil Tritium Monitoring**  
**July 2020 Sampling Event**





date: March 3, 2021

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

from: David Farrar (0618) [drfarra@sandia.gov](mailto:drfarra@sandia.gov) *David Farrar*

subject: Review of Results from Tritium-in-Soil Monitoring for the Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan

The purpose of this memo is to document my review of the results for the monitoring of surface soil tritium monitoring during the July 27, 2020 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  
July 27, 2020

Sample Location	Result (pCi/L)	MDA (pCi/L)	Percent Soil Moisture	Laboratory Qualifier	Validation Qualifier	Trigger Level (pCi/L)
MWL TS-2NW	45.9 ± 118	211	10.5	U	BD, FR3	20,000
MWL TS-2SW	-23.8 ± 112	218	6.92	U	BD, FR3	
MWL TS-2SW (Duplicate)	-3.85 ± 114	216	9.80	U	BD, FR3	
MWL TS-2SE	8.76 ± 117	218	9.94	U	BD, FR3	
MWL TS-2NE	6.52 ± 113	212	6.91	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.

MWL = Mixed Waste Landfill.

pCi/L = Picocuries per liter.

U = Analyzed for but undetected.

The July 2020 results were all non-detections below the minimum detectable activity, which is consistent with the August 2019 monitoring results (MWL Annual LTMM Report, June 2020), historical MWL surface soil tritium results, and below the trigger level of 20,000 picocuries per liter.

DRF, 0618



## Memorandum

Date: August 30, 2020

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL Radon Monitoring  
ARCOC: 621224  
SDG: 516828  
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 06.

### 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.

#### All analyses:

1. The sample results were < the associated 2-sigma TPU and/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 and were properly preserved.

### Quantification

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

### Calibration

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

### Blanks

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

**Tracer/Carrier Recovery**

Tracers/carriers were not a method requirement.

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

The MS met QC acceptance criteria.

**Laboratory Replicate**

All replicate error ratio acceptance criteria were met.

**Laboratory Control Sample (LCS)**

The LCS met QC acceptance criteria.

**Detection Limits/Dilutions**

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

**Other QC**

A field duplicate pair was submitted with ARCO 621224. 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:** 08/31/2020



## Sample Findings Summary



AR/COC: 621224

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
GL-RAD-A-002			
	113258-001/MWL TS-2NW	Tritium (10028-17-8)	BD, FR3
	113259-001/MWL TS-2SW	Tritium (10028-17-8)	BD, FR3
	113260-001/MWL TS-2SE	Tritium (10028-17-8)	BD, FR3
	113261-001/MWL TS-2NE	Tritium (10028-17-8)	BD, FR3
	113262-001/MWL TS-2SW	Tritium (10028-17-8)	BD, FR3

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 621224	Site/Project: MWL Radon Monitoring	Validation Date: 08/30/2020
SDG #: 516828	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 07/27/2020

Sample container for 113259-001 (516828002) listed the collection time as 08:10 and the ARCOG listed the collection time as 08:05.

Validated by:

*L. Thal*



CONTRACT LABORATORY  
ANALYSIS REQUEST AND CHAIN OF CUSTODY

516828

Page 1 of 1

Internal Lab

Batch No.		SMO Use		AR/COC		621224						
Project Name: MWL RADON MONITORING		Date Samples Shipped: 7/27/20		SMO Authorization: [Signature]		<input type="checkbox"/> Waste Characterization						
Project/Task Manager: Robert Ziock		Carrier/Waybill No. 316813		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: CF378-20		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
113258	001	MWL TS-2NW	N/A	7/27/20 0810	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	001
113259	001	MWL TS-2SW	N/A	7/27/20 0805	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	002
113260	001	MWL TS-2SE	N/A	7/27/20 0800	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	003
113261	001	MWL TS-2NE	N/A	7/27/20 0755	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	004
113262	001	MWL TS-2SW	N/A	7/27/20 0805	SOIL	P	2x1 L	None	G	DU	TRITIUM (EPA 906)	005
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:			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			
QC inits.:			Negotiated TAT			Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			Return Samples By:			
Comments:												
Sample Team Members			Name			Signature			Init.			
			Danielle Michel			[Signature]			SNL/08854/505-845-7706/505-219-7143			
			Robert Ziock			[Signature]			SNL/08888/505-845-0485/505-238-3668			
Relinquished by [Signature]			Org. 08854			Date 7/27/20			Time 0826			
Received by [Signature]			Org. 0628			Date 7/27/20			Time 0628			
Relinquished by [Signature]			Org. 0628			Date 7/27/20			Time 1052			
Received by [Signature]			Org. 0628			Date 7/28/20			Time 10:05			

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

## Contract Verification Form (CVR)

Project Leader Ziock

Project Name MWL Radon Monitoring

Project/Task No. 195122 / 10.11.08

ARCOC No. 621224

Analytical Lab GEL

SDG No. 516828

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

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

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

### 2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		

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	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	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: Kevin Lambert Date: 08-28-2020 08:16:00

Closed by: Kevin Lambert Date: 08-28-2020 08:16:00

**Mixed Waste Landfill**

**Biota Monitoring**

**August 2020 Sampling Event**

## Memorandum

Date: October 14, 2020  
To: File  
From: Linda Thal  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621360  
SDG: 520552  
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 06.

### Summary

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

### ICP-MS:

1. Se was detected in the MB and CCB at  $\leq$  the PQL. The associated sample results were detects  $\leq$  the PQL and will be **qualified U,B** at their respective PQLs.
2. As was detected in the MB and CCB at negative values with absolute values  $\leq$  the PQL. The associated results for samples 520552001 and -002 were detects  $< 5X$  the absolute blank values and will be **qualified J-,B4,B5**.

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

Instrument tuning was not a method requirement.

### **Calibration**

All initial and continuing calibration criteria met QC acceptance criteria except as follows.

The recovery for Hg was > 110% for a CCV bracketing sample -001. The associated sample result was non-detect and will not be qualified.

### **Reporting Limit Verification**

All LLCCV recoveries met QC acceptance criteria.

### **Blanks**

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

As was detected in the MB and CCB at negative values with absolute values  $\leq$  the PQL. The associated result for sample -003 was a detect > 5X the absolute blank values and will not be qualified.

Ag was detected in a CCB at  $\leq$  the PQL. The associated sample results were non-detect and will not be qualified.

Pb was detected in the MB at  $\leq$  the PQL. The associated sample results were detects > the PQL and > 5X the MB value and will not be qualified.

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

Internal standards were not a method requirement.

### **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**

A field duplicate pair was submitted with ARCOG 621360. 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:** 10/14/2020

## Memorandum

Date: October 14, 2020

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621360  
SDG: 520552  
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 06.

### Summary

Three 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. The sample results that were either  $<$  the associated 2-sigma TPU or  $<$  the associated MDA will be **qualified BD,FR3**.
2. The sample results that were  $\geq$  the MDA but  $< 3X$  the MDA will be **qualified J,FR7**.

### Holding Times and Preservation

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

### Quantification

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

### Calibration

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

### Blanks



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

**Tracer/Carrier Recovery**

Tracer/Carriers were not a method requirement.

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

An MS/MSD was not a method requirement.

**Laboratory Replicate**

All replicate error ratio acceptance criteria were met.

**Laboratory Control Sample (LCS)**

The LCS met all 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 621360. 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:** 10/14/2020



## Sample Findings Summary



AR/COC: 621360

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE HASL 300, 4.5.2.3/Ga-			
	113477-001/MWL AHSS-01-2020	Americium-241 (14596-10-2)	BD, FR3
	113477-001/MWL AHSS-01-2020	Beryllium-7 (13966-02-4)	J, FR7
	113477-001/MWL AHSS-01-2020	Cobalt-60 (10198-40-0)	BD, FR3
	113477-001/MWL AHSS-01-2020	Neptunium-237 (13994-20-2)	BD, FR3
	113477-001/MWL AHSS-01-2020	Radium-223 (15623-45-7)	BD, FR3
	113477-001/MWL AHSS-01-2020	Sodium-22 (13966-32-0)	BD, FR3
	113477-001/MWL AHSS-01-2020	Thorium-227 (15623-47-9)	BD, FR3
	113477-001/MWL AHSS-01-2020	Thorium-231 (14932-40-2)	BD, FR3
	113477-001/MWL AHSS-01-2020	Uranium-235 (15117-96-1)	BD, FR3
	113478-001/MWL AHSS-02-2020	Americium-241 (14596-10-2)	BD, FR3
	113478-001/MWL AHSS-02-2020	Beryllium-7 (13966-02-4)	J, FR7
	113478-001/MWL AHSS-02-2020	Cobalt-60 (10198-40-0)	BD, FR3
	113478-001/MWL AHSS-02-2020	Neptunium-237 (13994-20-2)	BD, FR3
	113478-001/MWL AHSS-02-2020	Radium-223 (15623-45-7)	BD, FR3
	113478-001/MWL AHSS-02-2020	Sodium-22 (13966-32-0)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	113478-001/MWL AHSS-02-2020	Thorium-227 (15623-47-9)	BD, FR3
	113478-001/MWL AHSS-02-2020	Thorium-231 (14932-40-2)	BD, FR3
	113478-001/MWL AHSS-02-2020	Thorium-234 (15065-10-8)	BD, FR3
	113478-001/MWL AHSS-02-2020	Uranium-235 (15117-96-1)	BD, FR3
	113478-001/MWL AHSS-02-2020	Uranium-238 (7440-61-1)	BD, FR3
	113479-001/MWL AHSS-01-2020	Americium-241 (14596-10-2)	BD, FR3
	113479-001/MWL AHSS-01-2020	Beryllium-7 (13966-02-4)	J, FR7
	113479-001/MWL AHSS-01-2020	Cobalt-60 (10198-40-0)	BD, FR3
	113479-001/MWL AHSS-01-2020	Neptunium-237 (13994-20-2)	BD, FR3
	113479-001/MWL AHSS-01-2020	Radium-223 (15623-45-7)	BD, FR3
	113479-001/MWL AHSS-01-2020	Sodium-22 (13966-32-0)	BD, FR3
	113479-001/MWL AHSS-01-2020	Thorium-227 (15623-47-9)	BD, FR3
	113479-001/MWL AHSS-01-2020	Thorium-231 (14932-40-2)	BD, FR3
	113479-001/MWL AHSS-01-2020	Thorium-234 (15065-10-8)	J, FR7
	113479-001/MWL AHSS-01-2020	Uranium-235 (15117-96-1)	BD, FR3
	113479-001/MWL AHSS-01-2020	Uranium-238 (7440-61-1)	J, FR7
<b>SW846 3050B/6010D</b>			
	113474-001/MWL AHSS-01-2020	Arsenic (7440-38-2)	J-, B4,B5

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	113474-001/MWL AHSS-01-2020	Selenium (7782-49-2)	2.94U, B
	113475-001/MWL AHSS-02-2020	Arsenic (7440-38-2)	J-, B4,B5
	113475-001/MWL AHSS-02-2020	Selenium (7782-49-2)	2.89U, B
	113476-001/MWL AHSS-01-2020	Selenium (7782-49-2)	2.95U, B

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

## Sandia Data Validation Summary Worksheet

ARCOC#: 621360	Site/Project: MWL LTMMMP	Validation Date: 10/14/2020
SDG #: 520552	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Soil	# of Samples: 6	CVR present: Yes
ARCOC(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

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

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

<u>Comments:</u> Collected 08/27/2020
<u>Validated by:</u> <i>L Thal</i>

## Sandia Inorganic Metals Worksheet

ARCOG #(s): 621360	SDG #(s): 520552	Matrix: Soil
Laboratory Sample IDs: 520552001, -002, -003		
Method/Batch #s: <b>3050B/6010D</b> : 2038620/2038621 <b>7471B</b> : 2042601/2042602		

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. ug/L	R <sup>2</sup>	ICV	CCV	ICB ug/L	CCB ug/L											
Pb	✓	✓	✓	✓	✓	✓	0.688J	3.44	✓	✓	✓	✓	NA	NA	✓		
Se	✓	✓	✓	✓	✓	6.24J	0.591J	3.12/2.96	✓	✓	✓	✓	NA	NA	✓		
As	✓	✓	✓	✓	✓	-6.59J	-0.518	3.30/2.59	✓	✓	✓	✓	NA	NA	✓		
Hg	✓	✓	✓	111 <sup>1</sup>	✓	✓	✓	NA	✓	✓	✓	✓	NA	NA	✓		
Ag	✓	✓	✓	✓	✓	1.54J	✓	0.77	✓	✓	✓	✓	NA	NA	✓		

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	Sample ID	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
NA				NA			

Comments: HTs OK. Matrix QC on -001

Ca, Mg, Al and Fe < ICS

<sup>1</sup> associated with sample -001 only



# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

520552

SDG: 520552 Rev 1

Internal Lab

Page 1 of 1

Batch No. <i>MA</i>		SMO Use		AR/COC <b>621360</b>																																																									
Project Name: MWL LTMMP		Date Samples Shipped: <i>9/3/20</i>		SMO Authorization: <i>[Signature]</i>																																																									
Project/Task Manager: Michael Mitchell		Carrier/Waybill No. <i>318758</i>		SMO Contact Phone: Wendy Palencia/505-844-3132																																																									
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Send Report to SMO: Stephanie Montaño/505-284-2553																																																									
Service Order: CF01-20		Lab Destination: GEL		<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.: 1983530				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154																																																									
Tech Area:		Operational Site:																																																											
Building:		Room:																																																											
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID																																																	
# 113474	001	MWL AHSS-01-2020	N/A	8/27/20 <i>1107</i>	SOIL	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470)+Be, Co, Cu, Ni, V, Zn	<i>001</i>																																																	
# 113475	001	MWL AHSS-02-2020	N/A	8/27/20 <i>1120</i>	SOIL	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470)+Be, Co, Cu, Ni, V, Zn	<i>002</i>																																																	
# 113476	001	MWL AHSS-01-2020	N/A	8/27/20 <i>1107</i>	SOIL	P	250 ml	None	G	DU	METALS, RCRA (SW846-6020/7470)+Be, Co, Cu, Ni, V, Zn	<i>003</i>																																																	
# 113477	001	MWL AHSS-01-2020	N/A	8/27/20 <i>1107</i>	SOIL	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	<i>004</i>																																																	
# 113478	001	MWL AHSS-02-2020	N/A	8/27/20 <i>1120</i>	SOIL	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	<i>005</i>																																																	
# 113479	001	MWL AHSS-01-2020	N/A	8/27/20 <i>1107</i>	SOIL	P	250 ml	None	G	DU	GAMMA SPEC (EPA 901)	<i>006</i>																																																	
<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: Include RCRA Metals and Be, Co, Cu, Ni, V, Zn Use Pb-212 to determine Th-232</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: Include RCRA Metals and Be, Co, Cu, Ni, V, Zn Use Pb-212 to determine Th-232		
Last Chain: <input type="checkbox"/> Yes			Sample Tracking			SMO Use			Special Instructions/QC Requirements:			Conditions on Receipt																																																	
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Confirmatory: <input type="checkbox"/> Yes			QC initials:			Return Samples By:			Comments: Include RCRA Metals and Be, Co, Cu, Ni, V, Zn Use Pb-212 to determine Th-232																																																				
Sample Team Members		Name	Signature	Init.	Company/Organization/Phone/Cell																																																								
		Robert Ziock	<i>[Signature]</i>	RZ	SNL/08888/845-0485																																																								
		Danielle Michel	<i>[Signature]</i>	DMM	SNL/08854/845-7706																																																								
Relinquished by <i>[Signature]</i>		Org. <i>08888</i>	Date <i>8/27/20</i>	Time <i>1228</i>	Relinquished by		Org.	Date	Time																																																				
Received by <i>[Signature]</i>		Org. <i>0628</i>	Date <i>9/3/20</i>	Time <i>1229</i>	Received by		Org.	Date	Time																																																				
Relinquished by <i>[Signature]</i>		Org. <i>0628</i>	Date <i>9-3-20</i>	Time <i>1003</i>	Relinquished by		Org.	Date	Time																																																				
Received by <i>[Signature]</i>		Org.	Date <i>9/4/20</i>	Time <i>1000</i>	Received by		Org.	Date	Time																																																				

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

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## Contract Verification Form (CVR)

Project Leader MITCHELL

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621360

Analytical Lab GEL

SDG No. 520552

*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	Lead and selenium detected in method blank (QC1204639082)
	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: 10-07-2020 09:10:00

Closed by: Wendy Palencia Date: 10-07-2020 09:10:00

**ANNEX C**

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

**April 2020-March 2021**

**Field Forms**

**Data Validation Reports**

**Contract Verification Forms**

**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 2020 SOIL-VAPOR MONITORING**



## Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (PSI)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB3	5/11/20	0827	09627	NA	NA	-24	-8	FB3
MWL-SV03-P1	5/11/20	0833	↓	0.0	8.0	NA	NA	50'
		↓	↓	0.0	↓	↓	↓	
		↓	↓	0.0	↓	↓	↓	
		0836	10575	NA	NA	-24	-8	
MWL-SV03-P2	5/11/20	0837	↓	0.0	8.0	NA	NA	100'
		↓	↓	0.0	↓	↓	↓	
		↓	↓	0.0	↓	↓	↓	
		0840	11612	NA	NA	-25	-8	
MWL-SV03-P3	5/11/20	0841	↓	0.0	8.0	NA	NA	200'
		↓	↓	0.0	↓	↓	↓	
		↓	↓	0.0	↓	↓	↓	
		0844	10635	NA	NA	-25	-8	
MWL-SV03-P4	5/11/20	0844	↓	0.0	8.0	NA	NA	300'
		↓	↓	0.0	↓	↓	↓	
		↓	↓	0.0	↓	↓	↓	
		0848	09878	NA	NA	-25	-8	
MWL-SV03-P5	5/11/20	0849	↓	0.0	8.0	NA	NA	400'
		↓	↓	0.0	↓	↓	↓	
		↓	↓	0.0	↓	↓	↓	
		0853	10423	NA	NA	-25	-8	
Field Notes:								

## Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (PSI)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB4	5/11/20	0915	11059	NA	NA	-24	-8	FB4
MWL-SV04-P1	5/11/20	0921	↓	0.0	8.0	NA	NA	50'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	0923	34006504	NA	NA	-25	-8	
MWL-SV04-P2	5/11/20	0927	↓	0.0	8.0	NA	NA	100'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	0929	10171	NA	NA	-25	-8	
MWL-SV04-P3	5/11/20	0930	↓	0.0	8.0	NA	NA	200'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	0932	10564	NA	NA	-25	-8	
MWL-SV04-P4	5/11/20	0936	↓	0.0	8.0	NA	NA	300'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	0939	09991	NA	NA	-25	-8	
MWL-SV04-P5	5/11/20	0940	↓	0.0	8.0	NA	NA	400'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	0943	09785	NA	NA	-25	-8	
Field Notes:								

## Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (PSI)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB5	5/11/20	0953	8131	NA	NA	-24	-8	FB5
MWL-SV05-P1	5/11/20	0956	↓	0.0	8.0	NA	NA	50'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	0957	09520	NA	NA	-25	-8	
MWL-SV05-P2	5/11/20	0959	↓	0.0	8.0	NA	NA	100'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	1001	10364	NA	NA	-25	-8	
MWL-SV05-P3	5/11/20	1002	↓	0.0	10.0	NA	NA	200'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	1004	11636	NA	NA	-25	-8	
MWL-SV05-P4	5/11/20	1005	↓	0.0	8.0	NA	NA	300'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	1007	10097	NA	NA	-25	-8	
MWL-SV05-P5	5/11/20	1008	↓	0.0	8.0	NA	NA	400'
	↓	↓	↓	0.0	↓	↓	↓	
	↓	↓	↓	0.0	↓	↓	↓	
	↓	1011	12003	NA	NA	-25	-8	
Field Notes:								



**SUMMARY SHEET FOR  
MAY 2020 SOIL-VAPOR SAMPLES**

**Sample Summary for Mixed Waste Landfill Soil-Vapor Monitoring  
May 2020**

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	11-May-20	MWL-SV01-42.5	09976	621041	112829	Environmental	621041 / 112828	
		MWL-SV01-42.5	12087		112830	Duplicate		
		MWL-SV-FB 1	09531		112828	Field QC	n/a	Ultra Pure N2
MWL-SV02	11-May-20	MWL-SV02-41.5	34000128	621042	112832	Environmental	621042 / 112831	
		MWL-SV02-41.5	11563		112833	Duplicate		
		MWL-SV-FB 2	12104		112831	Field QC	n/a	Ultra Pure N2
MWL-SV03	11-May-20	MWL-SV03-50	10575	621043	112835	Environmental	621043 / 112834	
		MWL-SV03-100	11612		112836	Environmental		
		MWL-SV03-200	10635		112837	Environmental		
		MWL-SV03-300	09878		112838	Environmental		
		MWL-SV03-400	10423		112839	Environmental		
		MWL-SV-FB 3	09627		112834	Field QC	n/a	Ultra Pure N2
MWL-SV04	11-May-20	MWL-SV04-50	34000504	621044	112841	Environmental	621044 / 112840	
		MWL-SV04-100	10171		112842	Environmental		
		MWL-SV04-200	10564		112843	Environmental		
		MWL-SV04-300	09991		112844	Environmental		
		MWL-SV04-400	09785		112845	Environmental		
		MWL-SV-FB 4	11059		112840	Field QC	n/a	Ultra Pure N2
MWL-SV05	11-May-20	MWL-SV05-50	09520	621045	112850	Environmental	621045 / 112849	
		MWL-SV05-100	10364		112851	Environmental		
		MWL-SV05-200	11636		112852	Environmental		
		MWL-SV05-300	10097		112853	Environmental		
		MWL-SV05-400	12003		112854	Environmental		
		MWL-SV-FB 5	8131		112849	Field QC	n/a	Ultra Pure N2

**DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES**

**MIXED WASTE LANDFILL**

**SOIL-VAPOR MONITORING**

**MAY 2020**

**AR/COC NUMBERS 621041, 621042, 621043, 621044, 621045**



## Memorandum

Date: June 19, 2020

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621041, 621042, 621043, 621044 and 621045  
SDG: 140-19107  
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. The initial calibration intercepts were negative with absolute values > the 3X the MDL for methylene chloride. The associated results for samples 140-19107-1, -4 through -16 and -19 were detects  $\leq$  3X the absolute value of the intercept and will be **qualified J-,I5**. All remaining associated sample results were non-detect and will be **qualified R,I5**.
2. For the CCV associated with samples -17 through -24, the %Ds were >30% and positive for dichlorodifluoromethane and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The dichlorodifluoromethane results for samples -17, -18 and -20 through -24 were detects and will be **qualified J+,C2**. The 1,2-dichloro-1,1,2,2-tetrafluoroethane result for sample -22 was a detect and will be **qualified J+,C2**.
3. Trichloroethene was detected at > the PQL and benzene; carbon disulfide; carbon tetrachloride; chloroform; methylene chloride; tetrachloroethene and trichlorofluoromethane were detected at  $\leq$  the PQL in FB1, sample -1, associated with samples -2 and -3. The benzene result for sample -2 and the carbon tetrachloride result for sample -3 were detects  $\leq$  the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.
4. Acetone and 2-butanone were detect at > the PQL and benzene; 2-hexanone and methylene chloride were detected at  $\leq$  the PQL in FB2, sample -4, associated with samples -5 and -6. The

acetone results for both samples and the 2-butanone result for sample -5 were > the PQL, >2X but ≤10X the FB value and will be **qualified J+,B2**. The benzene; 2-hexanone and methylene chloride results for sample -5 and the 2-hexanone and methylene chloride results for sample -6 were detects ≤ the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.

5. Methylene chloride and 4-methyl-2-pentanone (MIBK) were detected at > the PQL and acetone benzene; chloromethane; tetrachloroethene and toluene were detected at ≤ the PQL in FB3, sample -7, associated with samples -8 through -12. The methylene chloride and benzene results for all samples were detects ≤ the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.
6. Acetone and methylene chloride were detected at > the PQL and benzene; 2-butanone; carbon disulfide and tetrachloroethene were detected at ≤ the PQL in FB4, sample -13, associated with samples -14 through -18. The acetone and methylene chloride results for sample -14 were detects > the PQL but ≤ 2X the FB value and will be **qualified 0.0046U,B2** and **0.00086U,B2** respectively; non-detect at the sample results. The 2-butanone result for sample -14 was > the PQL, >2X but ≤10X the FB value and will be **qualified J+,B2**. The benzene results for all samples, the carbon disulfide results for samples -14 and -18 and the methylene chloride results for samples -15 and -16 were detects ≤ the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.
7. For the LCS associated with samples -17 through -24, the %Rs were >130% for dichlorodifluoromethane and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The dichlorodifluoromethane results for samples -17, -18 and -20 through -24 were detects and will be **qualified J+,L2**. The 1,2-dichloro-1,1,2,2-tetrafluoroethane result for sample -22 was a detect and will be **qualified J+,L2**.
8. The tetrachloroethene result for samples -6 was a detect > the high standard and the sample was not reanalyzed at a dilution. The associated sample result will be **qualified J,FR1**.
9. The benzene results for samples -20 through -24; the 1,2-dichloro-1,1,2,2-tetrafluoroethane result for sample -22 and the 1,2-dichloropropane result for sample -5 had mass spectra that were inconclusive and/or had questionable retention times. Therefore, these associated sample results will be **qualified NJ,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 and as follows.

For the ICAL associated with samples -1 through -16, the intercept was > the MDL and positive for bromoform. All associated sample results were non-detect and will not be qualified.

For the CCV associated with samples -17 through -24, the %Ds were >30% and positive for dichlorodifluoromethane and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The dichlorodifluoromethane result for sample -19 and the 1,2-dichloro-1,1,2,2-tetrafluoroethane results for all samples *except* sample -22 were non-detect and will not be qualified.

### **Blanks**

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

Trichloroethene was detected at > the PQL and benzene; carbon disulfide; carbon tetrachloride; chloroform; methylene chloride; tetrachloroethene and trichlorofluoromethane were detected at ≤ the PQL in FB1, sample -1, associated with samples -2 and -3. Tetrachloroethene; trichloroethene; chloroform and trichlorofluoromethane were detected at > the PQL and > 5X the FB values in samples -2, and -3 and will not be qualified. All remaining target analytes, excluding those already discussed, were non-detect and will not be qualified.

Acetone and 2-butanone were detected at > the PQL and benzene; 2-hexanone and methylene chloride were detected at ≤ the PQL in FB2, sample -4, associated with samples -5 and -6. The 2-butanone result for sample -6 was a detect > the PQL and >10X the FB value and will not be qualified. The benzene result for sample -6 was a detect > the PQL and >5X the FB value and will not be qualified.

Methylene chloride and 4-methyl-2-pentanone (MIBK) were detected at > the PQL and acetone benzene; chloromethane; tetrachloroethene and toluene were detected at ≤ the PQL in FB3, sample -7, associated with samples -8 through -12. The sample results for acetone, chloromethane, MIBK and toluene were non-detect and will not be qualified. The sample results for tetrachloroethene were detects > the PQL and >5X the FB value and will not be qualified.

Acetone and methylene chloride were detected at > the PQL and benzene; 2-butanone; carbon disulfide and tetrachloroethene were detected at ≤ the PQL in FB4, sample -13, associated with samples -14 through -18. The sample results for tetrachloroethene were detects > the PQL and >5X the FB value and will not be qualified. All remaining target analytes, excluding those already discussed, were non-detect and will not be qualified.

Methylene chloride and trichloroethene were detected at > the PQL and tetrachloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane and trichlorofluoromethane were detected at ≤ the PQL in FB5, sample -19, associated with samples -20 through -24. The sample results for methylene chloride were non-detect and will not be qualified. All remaining associated sample results were detects > the PQL and >5X the FB values and will not be qualified.

### **Surrogates**

All surrogate acceptance criteria were met.

### **Internal Standards**

All internal standards met QC acceptance criteria except as follows. For the ICV associated with the diluted results for samples -5 and -12, the internal standard recoveries were > 140%. The samples recoveries were in criteria and no field sample results will be qualified.

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

An MS/MSD was not performed.

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

The LCS for all batches met QC acceptance criteria with the following exceptions. For the LCS associated with samples -17 through -24, the %Rs were >130% for dichlorodifluoromethane and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The dichlorodifluoromethane result for sample -19 and the 1,2-dichloro-1,1,2,2-tetrafluoroethane results for all samples *except* sample -22 were non-detect and will not be qualified.

### **Laboratory Replicate**

Laboratory replicates met QC acceptance criteria.

### **Detection Limits/Dilutions**

All detection limits were properly reported and correctly adjusted for summa canister dilutions. The following canister dilutions were performed for all target analytes.

Sample -1 (1.83X); -2 (1.64X); -3 (1.64X); -4 (1.83X); -5 (1.76X); -6 (1.75X); -7 (1.7X); -8 (1.68X); -9 (1.64X); -10 (1.75X); -11 (1.7); -12 (1.7X); -13 (1.83X); -14 (1.85X); -15 (1.72X); -16 (1.77X); -17 (1.78X); -18 (1.77X); -19 (1.84X); -20 (1.77X); -21 (1.73X); -22 (1.78X); -23 (1.76X) and -24 (1.74X).

MDLs and PQLs were further adjusted for sample volume used during analysis. Samples -3, -5, -6, -9, -11, -12, -14 and -15 required reanalysis using a reduced sample volume for one or more of the following compounds; trichloroethene, trichlorofluoromethane, tetrachloroethene, dichlorodifluoromethane and/or 1,1,2-trichloro-1,2,2-trifluoroethane.

### **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 ARCO and were associated with the samples on the same ARCO. Field duplicate pairs were submitted with ARCOs 621041 and 621042. 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:** 06/22/2020



## Sample Findings Summary



AR/COC: 621041, 621042, 621043, 621044, 621045

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15_LL_PF			
	112828-001/MWL-FB1	METHYLENE CHLORIDE (75-09-2)	J-, I5
	112829-001/MWL-SV01-42.5	BENZENE (71-43-2)	0.0033U, B2
	112829-001/MWL-SV01-42.5	METHYLENE CHLORIDE (75-09-2)	R, I5
	112830-001/MWL-SV01-42.5	CARBON TETRACHLORIDE (56-23-5)	0.0022U, B2
	112830-001/MWL-SV01-42.5	METHYLENE CHLORIDE (75-09-2)	R, I5
	112831-001/MWL-FB2	METHYLENE CHLORIDE (75-09-2)	J-, I5
	112832-001/MWL-SV02-41.5	1,2-DICHLOROPROPANE (78-87-5)	NJ, Z1
	112832-001/MWL-SV02-41.5	2-BUTANONE (MEK) (78-93-3)	J+, B2
	112832-001/MWL-SV02-41.5	2-HEXANONE (591-78-6)	0.001U, B2
	112832-001/MWL-SV02-41.5	ACETONE (67-64-1)	J+, B2
	112832-001/MWL-SV02-41.5	BENZENE (71-43-2)	0.0004U, B2
	112832-001/MWL-SV02-41.5	METHYLENE CHLORIDE (75-09-2)	0.002UJ, B2,I5
	112833-001/MWL-SV02-41.5	2-HEXANONE (591-78-6)	0.001U, B2
	112833-001/MWL-SV02-41.5	ACETONE (67-64-1)	J+, B2
	112833-001/MWL-SV02-41.5	METHYLENE CHLORIDE (75-09-2)	0.002UJ, B2,I5
	112833-001/MWL-SV02-41.5	TETRACHLOROETHENE (127-18-4)	J, FR1
	112834-001/MWL-FB3	METHYLENE CHLORIDE (75-09-2)	J-, I5
	112835-001/MWL-SV03-50	BENZENE (71-43-2)	0.00084U, B2
	112835-001/MWL-SV03-50	METHYLENE CHLORIDE (75-09-2)	0.0042UJ, B2,I5
	112836-001/MWL-SV03-100	BENZENE (71-43-2)	0.0011U, B2
	112836-001/MWL-SV03-100	METHYLENE CHLORIDE (75-09-2)	0.0055UJ, B2,I5
	112837-001/MWL-SV03-200	BENZENE (71-43-2)	0.002U, B2
	112837-001/MWL-SV03-200	METHYLENE CHLORIDE (75-09-2)	0.01UJ, B2,I5
	112838-001/MWL-SV03-300	BENZENE (71-43-2)	0.0014U, B2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	112838-001/MWL-SV03-300	METHYLENE CHLORIDE (75-09-2)	0.0068UJ, B2,I5
	112839-001/MWL-SV03-400	BENZENE (71-43-2)	0.0014U, B2
	112839-001/MWL-SV03-400	METHYLENE CHLORIDE (75-09-2)	0.0068UJ, B2,I5
	112840-001/MWL-FB4	METHYLENE CHLORIDE (75-09-2)	J-, I5
	112841-001/MWL-SV04-50	2-BUTANONE (MEK) (78-93-3)	J+, B2
	112841-001/MWL-SV04-50	ACETONE (67-64-1)	0.0046U, B2
	112841-001/MWL-SV04-50	BENZENE (71-43-2)	0.00015U, B2
	112841-001/MWL-SV04-50	CARBON DISULFIDE (75-15-0)	0.00037U, B2
	112841-001/MWL-SV04-50	METHYLENE CHLORIDE (75-09-2)	0.00086UJ, B2,I5
	112842-001/MWL-SV04-100	BENZENE (71-43-2)	0.0004U, B2
	112842-001/MWL-SV04-100	METHYLENE CHLORIDE (75-09-2)	0.002UJ, B2,I5
	112843-001/MWL-SV04-200	BENZENE (71-43-2)	0.0014U, B2
	112843-001/MWL-SV04-200	METHYLENE CHLORIDE (75-09-2)	0.0071UJ, B2,I5
	112844-001/MWL-SV04-300	BENZENE (71-43-2)	0.0018U, B2
	112844-001/MWL-SV04-300	DICHLORODIFLUOROMETHANE (75-71-8)	J+, C2,L2
	112844-001/MWL-SV04-300	METHYLENE CHLORIDE (75-09-2)	R, I5
	112845-001/MWL-SV04-400	BENZENE (71-43-2)	0.0018U, B2
	112845-001/MWL-SV04-400	CARBON DISULFIDE (75-15-0)	0.0044U, B2
	112845-001/MWL-SV04-400	DICHLORODIFLUOROMETHANE (75-71-8)	J+, C2,L2
	112845-001/MWL-SV04-400	METHYLENE CHLORIDE (75-09-2)	R, I5
	112849-001/MWL-FB5	METHYLENE CHLORIDE (75-09-2)	J-, I5
	112850-001/MWL-SV05-50	BENZENE (71-43-2)	NJ, Z1
	112850-001/MWL-SV05-50	DICHLORODIFLUOROMETHANE (75-71-8)	J+, C2,L2
	112850-001/MWL-SV05-50	METHYLENE CHLORIDE (75-09-2)	R, I5
	112851-001/MWL-SV05-100	BENZENE (71-43-2)	NJ, Z1
	112851-001/MWL-SV05-100	DICHLORODIFLUOROMETHANE (75-71-8)	J+, C2,L2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	112851-001/MWL-SV05-100	METHYLENE CHLORIDE (75-09-2)	R, I5
	112852-001/MWL-SV05-200	1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE (76-14-2)	NJ+, C2,L2,Z1
	112852-001/MWL-SV05-200	BENZENE (71-43-2)	NJ, Z1
	112852-001/MWL-SV05-200	DICHLORODIFLUOROMETHANE (75-71-8)	J+, C2,L2
	112852-001/MWL-SV05-200	METHYLENE CHLORIDE (75-09-2)	R, I5
	112853-001/MWL-SV05-300	BENZENE (71-43-2)	NJ, Z1
	112853-001/MWL-SV05-300	DICHLORODIFLUOROMETHANE (75-71-8)	J+, C2,L2
	112853-001/MWL-SV05-300	METHYLENE CHLORIDE (75-09-2)	R, I5
	112854-001/MWL-SV05-400	BENZENE (71-43-2)	NJ, Z1
	112854-001/MWL-SV05-400	DICHLORODIFLUOROMETHANE (75-71-8)	J+, C2,L2
	112854-001/MWL-SV05-400	METHYLENE CHLORIDE (75-09-2)	R, I5

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

## Sandia Data Validation Summary Worksheet

ARCOC#: 621041, 621042, 621043. 621044 and 621045	Site/Project: MWL LTMMP	Validation Date: 06/17/2020
SDG #:140-19107	Laboratory: Eurofins TestAmerica, Knoxville	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								

<u>Comments:</u> Collected 05/11/2020
<u>Validated by:</u>



# Sandia Organic Worksheet (GC/MS VOC)

ARCOC #:621041, 621042, 621043, 621044 and 621045	SDG: 140-19107	Matrix: Air
Laboratory Sample IDs: 140-18189-1 through -24		
Method/Batch #s: TO-15/39649 (-1 thru -16 ); 39645 (-17 thru -24); 39694 (-3DL, -6DL, -9DL, -11DL, -14DL, -15DL); 39761 (-5DL, -12DL)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	FB1 -1	FB2 -4	FB3 -7	FB4 -13	DUP	
	Int. ppb	RF/ Slope	RSD/r 2	(ICV)/ CCV %D									
39649 (-1 through -16 MB, LCS, DUP -16) MG													
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	0.0039	0.00082J	0.003	✓	
Benzene	NA	✓	✓	✓	✓	NA	✓	0.0000084J	0.0000084J	0.000017J	0.0000082J	✓	
2-Butanone (MEK)	NA	✓	✓	✓	✓	NA	✓	✓	0.00052	✓	0.00022J	✓	
Carbon disulfide	NA	✓	✓	✓	✓	NA	✓	0.000016J	✓	✓	0.000014J	✓	
Carbon tetrachloride	NA	✓	✓	✓	✓	NA	✓	0.000037J	✓	✓	✓	✓	
Chloroform	NA	✓	✓	✓	✓	NA	✓	0.000064J	✓	✓	✓	✓	
Chloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.00007J	✓	✓	
Methylene Chloride	-0.72	✓	✓	✓	✓	NA	✓	0.00028J	0.00026J	0.00053	0.00073	✓	
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	0.00005J	✓	0.0000091J	0.000012J	✓	
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.00011J	✓	✓	
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	0.00012	✓	✓	✓	✓	
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	0.000011J	✓	✓	✓	✓	
2-Hexanone	NA	✓	✓	✓	✓	NA	✓	✓	0.000047J	✓	✓	✓	
4-Methyl-2-pentanone	NA	✓	✓	✓	✓	NA	✓	✓	✓	0.0003	✓	✓	
Bromoform	+0.042	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	
39645 (-17 thru -24, -MB, LCS DUP -24) MR									FB5 -19		DUP		
Methylene Chloride	-0.78	✓	✓	✓	✓	NA	✓	0.00051	✓				
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	0.000044J	✓				
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	✓	✓	✓	✓	NA	✓	0.000023J	✓				
1,2-Dichloro-1,1,2,2-tetrafluoroethane	NA	✓	✓	(+33) +51	✓	NA	151	✓	✓				
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	0.000054	✓				
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	0.000013J	✓				
Dichlorodifluoromethane	NA	✓	✓	+43	✓	NA	143	✓	✓				
	compare												
	on column												

39694 (-3DL, -6DL, -9DL, -11DL, -14DL, -15DL, MB, LCS, DUP -15) MG							DUP							
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	✓						
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓						
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓						
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	✓	✓	✓	✓	NA	✓	✓						
39761 (-5DL, -12DL, MB, LCS, DUP -12) MH							DUP							
Dichlorodifluoromethane	NA	✓	✓	✓	✓	NA	✓	✓						
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓						
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	✓						
Tetrachloroethene	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														
	CBM		1,4-DFBZ		Chl-d5									
Sample ID	Area	RT	Area	RT	Area	RT								
ICV (MH-20:21)	146%	✓	146%	✓	142%	✓								

Comments: HTs OK. LCS (MWL 70-130%) RSDs and CCVs ≤30%.

ICAL MG 39464 05/07/2020; Methylene chloride linear2 intercept neg and >3X MDL; bromoform lin 1; Batch # 39649, 39694 (4 TAL only)

ICAL MH 39100 04/16/2020; 4 TAL only Batch # 39761

ICAL MR 39590 05/07/2020; Methylene chloride linear2 intercept neg and >3X MDL Batch 39645

Samples missing ions that were “J” Qualified by the lab were not further qualified during DV. (eg benzene in FB 1, FB 2, FB 3 and FB 4)

Spot checked clean canisters and found them to be ND.

Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of "zero air" by Eurofins TestAmerica Knoxville.

-17 carbon tetrachloride RT same as benzene – both qual U due to FB contamination

-5 1,2-dichloropropane RT same as TCE, mass spectra inconclusive - qual NJ

-6 PCE “E” - qual J

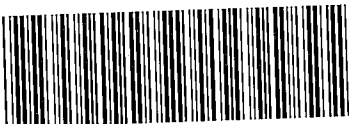
-20 thru -24 mass spectra inconclusive for benzene – NJ

-22 1,2-dichloro-1,1,2,2-tetrafluoroethane RT and mass spectra inconclusive – qual NJ

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>MA</i>		SMO Use <i>5/11/2020</i>		AR/COC <b>621041</b>	
Project Name: MWL LTMMF		Date Samples Shipped: <i>5/11/2020</i>		SMO Authorization: <i>[Signature]</i>	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>313364</i>		SMO Contact Phone: <i>Wendy Palencia/505-844-3132</i>	
Project/Task Number: 195122.10.11.08		Lab Contact: Jamie McKinney/865-291-3006		Send Report to SMO:	
Service Order: CF01-20		Lab Destination: TAKX		Stephanie Montaño/505-284-2553	
Contract No.: 1636780					
Tech Area:		Operational Site:		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> <b>4° Celsius</b>	
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					
112828	001	MWL-FB1	<i>09531</i>	NA	<i>5/11/20 1021</i>
112829	001	MWL-SV01-42.5	<i>09976</i>	42.5	<i>5/11/20 1030</i>
112830	001	MWL-SV01-42.5	<i>12087</i>	42.5	<i>5/11/20 1030</i>
 140-19107 Chain of Custody					
NO CUSTODY SEALS RECEIVED AMBIENT AND 5-10-20 SANDIA FIELD #444234523971 G 28 CANALS / 0 FLOWS / 1 GANGE					
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use	
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		Special Instructions/QC Requirements:	
Background: <input type="checkbox"/> Yes		Entered by:		EDD <input checked="" type="checkbox"/> Yes	
Confirmatory: <input type="checkbox"/> Yes		QC inits.:		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day	
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: Elevation and ambient pressure information on attached forms.			
		Lab Use			
Relinquished by <i>[Signature]</i>		Org. <i>8888</i> Date <i>5/11/20</i> Time <i>1305</i>		Relinquished by	
Received by <i>[Signature]</i>		Org. <i>0628</i> Date <i>5/11/20</i> Time <i>1305</i>		Received by	
Relinquished by <i>[Signature]</i>		Org. <i>0628</i> Date <i>5/11/20</i> Time <i>1345</i>		Relinquished by	
Received by <i>[Signature]</i>		Org. <i>515-20</i> Date <i>5-15-20</i> Time <i>11:00</i>		Received by	

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

05/28/2020

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. <i>N/A</i>		SMO Use		AR/COC		621043																																																																																																																																																													
Project Name: MWL LTMMMP		Date Samples Shipped: <i>5/11/2020</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>3/3364</i>		SMO Contact Phone: <i>Wendy Palencia/505-844-3132</i>		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154																																																																																																																																																													
Project/Task Number: 195122.10.11.08		Lab Contact: Jamie McKinney/865-291-3006		Send Report to SMO:																																																																																																																																																															
Service Order: CF01-20		Lab Destination: TAKX		Stephanie Montano/505-284-2553																																																																																																																																																															
Contract No.: 1636780																																																																																																																																																																			
Tech Area:		Operational Site:																																																																																																																																																																	
Building:		Room:																																																																																																																																																																	
Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID																																																																																																																																																							
112834	001	MWL-FB3 <i>09627</i>	NA	5/11/20 <i>0827</i>	UPN	S	6 L	None	G	FB	VOC (TO-15)																																																																																																																																																								
112835	001	MWL-SV03-50 <i>10575</i>	50	5/11/20 <i>0836</i>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																																								
112836	001	MWL-SV03-100 <i>11612</i>	100	5/11/20 <i>0840</i>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																																								
112837	001	MWL-SV03-200 <i>10635</i>	200	5/11/20 <i>0844</i>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																																								
112838	001	MWL-SV03-300 <i>09878</i>	300	5/11/20 <i>0848</i>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																																								
112839	001	MWL-SV03-400 <i>10423</i>	400	5/11/20 <i>0853</i>	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																																								
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\*Prior confirmation with SMO required for 7 and 15 day TAT

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05/28/2020

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No.		SMO Use		AR/COC <b>621044</b>	
Project Name: MWL LTMMMP		Date Samples Shipped: 5/11/2020		SMO Authorization: [Signature]	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 313364		SMO Contact Phone: Wendy Palencia/505-844-3132	
Project/Task Number: 195122.10.11.08		Lab Contact: Jamie McKinney/865-291-3006		Send Report to SMO: Stephanie Montaño/505-284-2553	
Service Order: CF01-20		Lab Destination: TAKX		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Contract No.: 1636780		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154			
Tech Area:		Operational Site:			
Building:		Room:			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
112840	001	MWL-FB4 11059	NA	5/11/20 0915	UPN	S	6 L	None	G	FB	VOC (TO-15)	
112841	001	MWL-SV04-50 34000504	50	5/11/20 0923	SG	S	6 L	None	G	SA	VOC (TO-15)	
112842	001	MWL-SV04-100 10171	100	5/11/20 0929	SG	S	6 L	None	G	SA	VOC (TO-15)	
112843	001	MWL-SV04-200 10564	200	5/11/20 0932	SG	S	6 L	None	G	SA	VOC (TO-15)	
112844	001	MWL-SV04-300 09991	300	5/11/20 0939	SG	S	6 L	None	G	SA	VOC (TO-15)	
112845	001	MWL-SV04-400 09785	400	5/11/20 0943	SG	S	6 L	None	G	SA	VOC (TO-15)	

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

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell	Sample Disposal	Return Samples By:
	William Gibson	[Signature]	WG	SNL/08888/505-284-3307/505-239-7367	<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab	Comments: Elevation and ambient pressure information on attached forms.
	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 5/11/20	Time 1305	Relinquished by	Org.	Date	Time
Received by [Signature]	Org. 0628	Date 5/11/20	Time 1309	Received by	Org.	Date	Time
Relinquished by [Signature]	Org. 0628	Date 5/11/20	Time 1345	Relinquished by	Org.	Date	Time
Received by [Signature]	Org. STAKX	Date 5/15/20	Time 11:00	Received by	Org.	Date	Time

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

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05/28/2020

05/28/2020

## **CONTRACT VERIFICATION REVIEW FORMS**

### **Mixed Waste Landfill Soil-Vapor Monitoring**

**May 2020**

Note: The forms in this section include AR/COC numbers for environmental and quality control samples; the AR/COC forms are provided in the Data Validation Reports in this annex.

<b>AR/COC Number</b>	<b>Sample Type</b>
621041	Environmental & Quality Control
621042	Environmental & Quality Control
621043	Environmental & Quality Control
621044	Environmental & Quality Control
621045	Environmental & Quality Control



## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621041, 621042, 621043, 621044 &amp; 621045

Analytical Lab TAKX

SDG No. 140-19107-1

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

### 2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	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	Dichlorodifluoromethane and 1,2-dichloro-1,1,2,2-tetrafluoroethane failed recovery limits for LCS (Batch 140-39645). Vinyl chloride, 1,2-dichloro-1,1,2,2-tetrafluoroethane, bromomethane and chloroethane failed recovery limits for LCS (Batch 140-39761). 4-Ethyltoluene failed recovery limits for LCS (Batch 140-39694).
	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 benzene, carbon tetrachloride, cis-1,2-dichloroethene and chloroform outside acceptance limits for 140-19107-24 DU

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	X		
3.5	Blank data a) Method or reagent blank data reported and met for all samples		X	Methylene chloride detected in method blank (Batch 140-39694)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Benzene, carbon disulfide, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, trichloroethene and trichlorofluoromethane detected in MWL-FB1. Acetone, benzene, 2-butanone, 2-hexanone and methylene chloride detected in MWL-FB2. Acetone, benzene, chloromethane, 4-methyl-2-pentanone, methylene chloride, tetrachloroethene and toluene detected in MWL-FB3. Acetone, benzene, 2-butanone, carbon disulfide, methylene chloride and tetrachloroethene detected in MWL-FB4. Methylene chloride, tetrachloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethene and Trichlorofluoromethane detected in MWL-FB5.
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		IC for methylene chloride did not meet the %RSD criteria

Line No.	Item	Yes	No	Comments
	c) Continuing calibration provided	X		Acrolein, dichlorodifluoromethane and 1,2-dichloro-1,1,2,2-tetrafluoroethane outside CCV acceptance limits (Batch 140-39645). Vinyl chloride, 1,2-dichloro-1,1,2,2-tetrafluoroethane, bromomethane and chloroethane outside CCV acceptance limits (Batch 140-39761). 4-Ethyltoluene outside CCV acceptance limits (Batch 140-39694).
	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	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: 06-12-2020 10:38:00

Closed by: Wendy Palencia Date: 06-12-2020 10:38:00

**CERTIFICATES OF ANALYSIS**

**Mixed Waste Landfill**

**May 2020 Soil-Vapor Samples**

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112828-001/MWL-FB1

Lab Sample ID: 140-19107-1

Date Collected: 05/11/20 10:21

Matrix: Air

Date Received: 05/15/20 11:00

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		0.0020	0.00057	ppm v/v			05/19/20 13:23	1.83
<b>Benzene</b>	<b>0.000084</b>	<b>J</b>	0.000080	0.000080	ppm v/v			05/19/20 13:23	1.83
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			05/19/20 13:23	1.83
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			05/19/20 13:23	1.83
Bromoform	ND		0.000080	0.0000090	ppm v/v			05/19/20 13:23	1.83
Bromomethane	ND		0.000080	0.000022	ppm v/v			05/19/20 13:23	1.83
2-Butanone (MEK)	ND		0.00040	0.000073	ppm v/v			05/19/20 13:23	1.83
<b>Carbon disulfide</b>	<b>0.000016</b>	<b>J</b>	0.00020	0.000011	ppm v/v			05/19/20 13:23	1.83
<b>Carbon tetrachloride</b>	<b>0.000037</b>	<b>J</b>	0.000080	0.0000070	ppm v/v			05/19/20 13:23	1.83
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			05/19/20 13:23	1.83
Chloroethane	ND		0.000080	0.000029	ppm v/v			05/19/20 13:23	1.83
<b>Chloroform</b>	<b>0.000064</b>	<b>J</b>	0.000080	0.0000070	ppm v/v			05/19/20 13:23	1.83
Chloromethane	ND		0.00020	0.000066	ppm v/v			05/19/20 13:23	1.83
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 13:23	1.83
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			05/19/20 13:23	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			05/19/20 13:23	1.83
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			05/19/20 13:23	1.83
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 13:23	1.83
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 13:23	1.83
Dichlorodifluoromethane	ND		0.000080	0.000014	ppm v/v			05/19/20 13:23	1.83
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 13:23	1.83
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			05/19/20 13:23	1.83
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			05/19/20 13:23	1.83
cis-1,2-Dichloroethene	ND		0.000080	0.000010	ppm v/v			05/19/20 13:23	1.83
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			05/19/20 13:23	1.83
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			05/19/20 13:23	1.83
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			05/19/20 13:23	1.83
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			05/19/20 13:23	1.83
Ethylbenzene	ND		0.000080	0.000013	ppm v/v			05/19/20 13:23	1.83
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			05/19/20 13:23	1.83
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			05/19/20 13:23	1.83
2-Hexanone	ND		0.00020	0.000016	ppm v/v			05/19/20 13:23	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			05/19/20 13:23	1.83
<b>Methylene Chloride</b>	<b>0.00028</b>	<b>J</b>	0.00040	0.00016	ppm v/v			05/19/20 13:23	1.83
Styrene	ND		0.000080	0.000024	ppm v/v			05/19/20 13:23	1.83
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			05/19/20 13:23	1.83
<b>Tetrachloroethene</b>	<b>0.000050</b>	<b>J</b>	0.000080	0.0000070	ppm v/v			05/19/20 13:23	1.83
Toluene	ND		0.00012	0.000078	ppm v/v			05/19/20 13:23	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			05/19/20 13:23	1.83
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			05/19/20 13:23	1.83
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			05/19/20 13:23	1.83
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 13:23	1.83
<b>Trichloroethene</b>	<b>0.00012</b>		0.000040	0.0000060	ppm v/v			05/19/20 13:23	1.83
<b>Trichlorofluoromethane</b>	<b>0.000011</b>	<b>J</b>	0.000080	0.000011	ppm v/v			05/19/20 13:23	1.83
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			05/19/20 13:23	1.83
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			05/19/20 13:23	1.83
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			05/19/20 13:23	1.83
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			05/19/20 13:23	1.83

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112828-001/MWL-FB1**

**Lab Sample ID: 140-19107-1**

**Date Collected: 05/11/20 10:21**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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		0.000080	0.000029	ppm v/v			05/19/20 13:23	1.83
o-Xylene	ND		0.000080	0.000015	ppm v/v			05/19/20 13:23	1.83
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140					05/19/20 13:23	1.83

**Client Sample ID: 112829-001/MWL-SV01-42.5**

**Lab Sample ID: 140-19107-2**

**Date Collected: 05/11/20 10:30**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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		0.082	0.023	ppm v/v			05/19/20 14:08	1.64
<b>Benzene</b>	<b>0.0014</b>	<b>J</b>	0.0033	0.00033	ppm v/v			05/19/20 14:08	1.64
Benzyl chloride	ND		0.0066	0.0016	ppm v/v			05/19/20 14:08	1.64
Bromodichloromethane	ND		0.0033	0.00074	ppm v/v			05/19/20 14:08	1.64
Bromoform	ND		0.0033	0.00037	ppm v/v			05/19/20 14:08	1.64
Bromomethane	ND		0.0033	0.00090	ppm v/v			05/19/20 14:08	1.64
2-Butanone (MEK)	ND		0.016	0.0030	ppm v/v			05/19/20 14:08	1.64
Carbon disulfide	ND		0.0082	0.00045	ppm v/v			05/19/20 14:08	1.64
Carbon tetrachloride	ND		0.0033	0.00029	ppm v/v			05/19/20 14:08	1.64
Chlorobenzene	ND		0.0033	0.00025	ppm v/v			05/19/20 14:08	1.64
Chloroethane	ND		0.0033	0.0012	ppm v/v			05/19/20 14:08	1.64
<b>Chloroform</b>	<b>0.017</b>		0.0033	0.00029	ppm v/v			05/19/20 14:08	1.64
Chloromethane	ND		0.0082	0.0027	ppm v/v			05/19/20 14:08	1.64
Dibromochloromethane	ND		0.0033	0.00029	ppm v/v			05/19/20 14:08	1.64
1,2-Dibromoethane (EDB)	ND		0.0033	0.00029	ppm v/v			05/19/20 14:08	1.64
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0033	0.00049	ppm v/v			05/19/20 14:08	1.64
1,2-Dichlorobenzene	ND		0.0033	0.0013	ppm v/v			05/19/20 14:08	1.64
1,3-Dichlorobenzene	ND		0.0033	0.00066	ppm v/v			05/19/20 14:08	1.64
1,4-Dichlorobenzene	ND		0.0033	0.00066	ppm v/v			05/19/20 14:08	1.64
<b>Dichlorodifluoromethane</b>	<b>0.093</b>		0.0033	0.00057	ppm v/v			05/19/20 14:08	1.64
<b>1,1-Dichloroethane</b>	<b>0.0026</b>	<b>J</b>	0.0033	0.00029	ppm v/v			05/19/20 14:08	1.64
1,2-Dichloroethane	ND		0.0033	0.00041	ppm v/v			05/19/20 14:08	1.64
<b>1,1-Dichloroethene</b>	<b>0.0069</b>		0.0033	0.00033	ppm v/v			05/19/20 14:08	1.64
<b>cis-1,2-Dichloroethene</b>	<b>0.0011</b>	<b>J</b>	0.0033	0.00041	ppm v/v			05/19/20 14:08	1.64
trans-1,2-Dichloroethene	ND		0.0033	0.00029	ppm v/v			05/19/20 14:08	1.64
1,2-Dichloropropane	ND		0.0033	0.00041	ppm v/v			05/19/20 14:08	1.64
cis-1,3-Dichloropropene	ND		0.0033	0.00066	ppm v/v			05/19/20 14:08	1.64
trans-1,3-Dichloropropene	ND		0.0033	0.00037	ppm v/v			05/19/20 14:08	1.64
Ethylbenzene	ND		0.0033	0.00053	ppm v/v			05/19/20 14:08	1.64
4-Ethyltoluene	ND		0.0066	0.00086	ppm v/v			05/19/20 14:08	1.64
Hexachlorobutadiene	ND		0.016	0.0013	ppm v/v			05/19/20 14:08	1.64
2-Hexanone	ND		0.0082	0.00066	ppm v/v			05/19/20 14:08	1.64
4-Methyl-2-pentanone (MIBK)	ND		0.0082	0.0022	ppm v/v			05/19/20 14:08	1.64
Methylene Chloride	ND		0.016	0.0066	ppm v/v			05/19/20 14:08	1.64
Styrene	ND		0.0033	0.00098	ppm v/v			05/19/20 14:08	1.64
1,1,2,2-Tetrachloroethane	ND		0.0033	0.00057	ppm v/v			05/19/20 14:08	1.64

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112829-001/MWL-SV01-42.5

Lab Sample ID: 140-19107-2

Date Collected: 05/11/20 10:30

Matrix: Air

Date Received: 05/15/20 11:00

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	0.45		0.0033	0.00029	ppm v/v			05/19/20 14:08	1.64
Toluene	ND		0.0049	0.0032	ppm v/v			05/19/20 14:08	1.64
1,1,2-Trichloro-1,2,2-trifluoroethane	0.075		0.0033	0.00033	ppm v/v			05/19/20 14:08	1.64
1,2,4-Trichlorobenzene	ND		0.016	0.0026	ppm v/v			05/19/20 14:08	1.64
1,1,1-Trichloroethane	0.031		0.0033	0.0015	ppm v/v			05/19/20 14:08	1.64
1,1,2-Trichloroethane	ND		0.0033	0.00029	ppm v/v			05/19/20 14:08	1.64
Trichloroethene	0.084		0.0016	0.00025	ppm v/v			05/19/20 14:08	1.64
Trichlorofluoromethane	0.21		0.0033	0.00045	ppm v/v			05/19/20 14:08	1.64
1,2,4-Trimethylbenzene	ND		0.0033	0.00082	ppm v/v			05/19/20 14:08	1.64
1,3,5-Trimethylbenzene	ND		0.0033	0.00090	ppm v/v			05/19/20 14:08	1.64
Vinyl acetate	ND		0.016	0.0011	ppm v/v			05/19/20 14:08	1.64
Vinyl chloride	ND		0.0016	0.0011	ppm v/v			05/19/20 14:08	1.64
m,p-Xylene	ND		0.0033	0.0012	ppm v/v			05/19/20 14:08	1.64
o-Xylene	ND		0.0033	0.00062	ppm v/v			05/19/20 14:08	1.64
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		60 - 140					05/19/20 14:08	1.64

Client Sample ID: 112830-001/MWL-SV01-42.5

Lab Sample ID: 140-19107-3

Date Collected: 05/11/20 10:30

Matrix: Air

Date Received: 05/15/20 11:00

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	0.024	J	0.055	0.016	ppm v/v			05/19/20 14:52	1.64
Benzene	ND		0.0022	0.00022	ppm v/v			05/19/20 14:52	1.64
Benzyl chloride	ND		0.0044	0.0010	ppm v/v			05/19/20 14:52	1.64
Bromodichloromethane	0.00066	J	0.0022	0.00049	ppm v/v			05/19/20 14:52	1.64
Bromoform	ND		0.0022	0.00025	ppm v/v			05/19/20 14:52	1.64
Bromomethane	ND		0.0022	0.00060	ppm v/v			05/19/20 14:52	1.64
2-Butanone (MEK)	0.0022	J	0.011	0.0020	ppm v/v			05/19/20 14:52	1.64
Carbon disulfide	ND		0.0055	0.00030	ppm v/v			05/19/20 14:52	1.64
Carbon tetrachloride	0.00024	J	0.0022	0.00019	ppm v/v			05/19/20 14:52	1.64
Chlorobenzene	ND		0.0022	0.00016	ppm v/v			05/19/20 14:52	1.64
Chloroethane	ND		0.0022	0.00079	ppm v/v			05/19/20 14:52	1.64
Chloroform	0.016		0.0022	0.00019	ppm v/v			05/19/20 14:52	1.64
Chloromethane	ND		0.0055	0.0018	ppm v/v			05/19/20 14:52	1.64
Dibromochloromethane	ND		0.0022	0.00019	ppm v/v			05/19/20 14:52	1.64
1,2-Dibromoethane (EDB)	ND		0.0022	0.00019	ppm v/v			05/19/20 14:52	1.64
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0022	0.00033	ppm v/v			05/19/20 14:52	1.64
1,2-Dichlorobenzene	ND		0.0022	0.00085	ppm v/v			05/19/20 14:52	1.64
1,3-Dichlorobenzene	ND		0.0022	0.00044	ppm v/v			05/19/20 14:52	1.64
1,4-Dichlorobenzene	ND		0.0022	0.00044	ppm v/v			05/19/20 14:52	1.64
Dichlorodifluoromethane	0.088		0.0022	0.00038	ppm v/v			05/19/20 14:52	1.64
1,1-Dichloroethane	0.0024		0.0022	0.00019	ppm v/v			05/19/20 14:52	1.64
1,2-Dichloroethane	ND		0.0022	0.00027	ppm v/v			05/19/20 14:52	1.64
1,1-Dichloroethene	0.0070		0.0022	0.00022	ppm v/v			05/19/20 14:52	1.64

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112830-001/MWL-SV01-42.5

Lab Sample ID: 140-19107-3

Date Collected: 05/11/20 10:30

Matrix: Air

Date Received: 05/15/20 11:00

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>cis-1,2-Dichloroethene</b>	<b>0.0012</b>	<b>J</b>	0.0022	0.00027	ppm v/v			05/19/20 14:52	1.64
trans-1,2-Dichloroethene	ND		0.0022	0.00019	ppm v/v			05/19/20 14:52	1.64
1,2-Dichloropropane	ND		0.0022	0.00027	ppm v/v			05/19/20 14:52	1.64
cis-1,3-Dichloropropene	ND		0.0022	0.00044	ppm v/v			05/19/20 14:52	1.64
trans-1,3-Dichloropropene	ND		0.0022	0.00025	ppm v/v			05/19/20 14:52	1.64
Ethylbenzene	ND		0.0022	0.00036	ppm v/v			05/19/20 14:52	1.64
4-Ethyltoluene	ND		0.0044	0.00057	ppm v/v			05/19/20 14:52	1.64
Hexachlorobutadiene	ND		0.011	0.00087	ppm v/v			05/19/20 14:52	1.64
2-Hexanone	ND		0.0055	0.00044	ppm v/v			05/19/20 14:52	1.64
4-Methyl-2-pentanone (MIBK)	ND		0.0055	0.0015	ppm v/v			05/19/20 14:52	1.64
Methylene Chloride	ND		0.011	0.0044	ppm v/v			05/19/20 14:52	1.64
Styrene	ND		0.0022	0.00066	ppm v/v			05/19/20 14:52	1.64
1,1,2,2-Tetrachloroethane	ND		0.0022	0.00038	ppm v/v			05/19/20 14:52	1.64
Toluene	ND		0.0033	0.0021	ppm v/v			05/19/20 14:52	1.64
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.073</b>		0.0022	0.00022	ppm v/v			05/19/20 14:52	1.64
1,2,4-Trichlorobenzene	ND		0.011	0.0017	ppm v/v			05/19/20 14:52	1.64
<b>1,1,1-Trichloroethane</b>	<b>0.029</b>		0.0022	0.0010	ppm v/v			05/19/20 14:52	1.64
1,1,2-Trichloroethane	ND		0.0022	0.00019	ppm v/v			05/19/20 14:52	1.64
<b>Trichloroethene</b>	<b>0.079</b>		0.0011	0.00016	ppm v/v			05/19/20 14:52	1.64
<b>Trichlorofluoromethane</b>	<b>0.20</b>		0.0022	0.00030	ppm v/v			05/19/20 14:52	1.64
1,2,4-Trimethylbenzene	ND		0.0022	0.00055	ppm v/v			05/19/20 14:52	1.64
1,3,5-Trimethylbenzene	ND		0.0022	0.00060	ppm v/v			05/19/20 14:52	1.64
Vinyl acetate	ND		0.011	0.00077	ppm v/v			05/19/20 14:52	1.64
Vinyl chloride	ND		0.0011	0.00071	ppm v/v			05/19/20 14:52	1.64
m,p-Xylene	ND		0.0022	0.00079	ppm v/v			05/19/20 14:52	1.64
o-Xylene	ND		0.0022	0.00041	ppm v/v			05/19/20 14:52	1.64

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140		05/19/20 14:52	1.64

## 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>0.26</b>		0.0060	0.00052	ppm v/v			05/20/20 18:24	1.64

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		60 - 140		05/20/20 18:24	1.64

Client Sample ID: 112831-001/MWL-FB2

Lab Sample ID: 140-19107-4

Date Collected: 05/11/20 10:34

Matrix: Air

Date Received: 05/15/20 11:00

## 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>0.0039</b>		0.0020	0.00057	ppm v/v			05/19/20 15:45	1.83
<b>Benzene</b>	<b>0.0000084</b>	<b>J</b>	0.000080	0.0000080	ppm v/v			05/19/20 15:45	1.83
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			05/19/20 15:45	1.83
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			05/19/20 15:45	1.83
Bromoform	ND		0.000080	0.0000090	ppm v/v			05/19/20 15:45	1.83
Bromomethane	ND		0.000080	0.000022	ppm v/v			05/19/20 15:45	1.83

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112831-001/MWL-FB2

Lab Sample ID: 140-19107-4

Date Collected: 05/11/20 10:34

Matrix: Air

Date Received: 05/15/20 11:00

## 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>0.00052</b>		0.00040	0.000073	ppm v/v			05/19/20 15:45	1.83
Carbon disulfide	ND		0.00020	0.000011	ppm v/v			05/19/20 15:45	1.83
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			05/19/20 15:45	1.83
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			05/19/20 15:45	1.83
Chloroethane	ND		0.000080	0.000029	ppm v/v			05/19/20 15:45	1.83
Chloroform	ND		0.000080	0.0000070	ppm v/v			05/19/20 15:45	1.83
Chloromethane	ND		0.00020	0.000066	ppm v/v			05/19/20 15:45	1.83
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 15:45	1.83
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			05/19/20 15:45	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			05/19/20 15:45	1.83
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			05/19/20 15:45	1.83
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 15:45	1.83
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 15:45	1.83
Dichlorodifluoromethane	ND		0.000080	0.000014	ppm v/v			05/19/20 15:45	1.83
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 15:45	1.83
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			05/19/20 15:45	1.83
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			05/19/20 15:45	1.83
cis-1,2-Dichloroethene	ND		0.000080	0.000010	ppm v/v			05/19/20 15:45	1.83
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			05/19/20 15:45	1.83
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			05/19/20 15:45	1.83
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			05/19/20 15:45	1.83
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			05/19/20 15:45	1.83
Ethylbenzene	ND		0.000080	0.000013	ppm v/v			05/19/20 15:45	1.83
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			05/19/20 15:45	1.83
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			05/19/20 15:45	1.83
<b>2-Hexanone</b>	<b>0.000047</b>	<b>J</b>	0.00020	0.000016	ppm v/v			05/19/20 15:45	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			05/19/20 15:45	1.83
<b>Methylene Chloride</b>	<b>0.00026</b>	<b>J</b>	0.00040	0.00016	ppm v/v			05/19/20 15:45	1.83
Styrene	ND		0.000080	0.000024	ppm v/v			05/19/20 15:45	1.83
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			05/19/20 15:45	1.83
Tetrachloroethene	ND		0.000080	0.0000070	ppm v/v			05/19/20 15:45	1.83
Toluene	ND		0.00012	0.000078	ppm v/v			05/19/20 15:45	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			05/19/20 15:45	1.83
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			05/19/20 15:45	1.83
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			05/19/20 15:45	1.83
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 15:45	1.83
Trichloroethene	ND		0.000040	0.0000060	ppm v/v			05/19/20 15:45	1.83
Trichlorofluoromethane	ND		0.000080	0.000011	ppm v/v			05/19/20 15:45	1.83
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			05/19/20 15:45	1.83
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			05/19/20 15:45	1.83
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			05/19/20 15:45	1.83
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			05/19/20 15:45	1.83
m,p-Xylene	ND		0.000080	0.000029	ppm v/v			05/19/20 15:45	1.83
o-Xylene	ND		0.000080	0.000015	ppm v/v			05/19/20 15:45	1.83

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		60 - 140		05/19/20 15:45	1.83

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112832-001/MWL-SV02-41.5**

**Lab Sample ID: 140-19107-5**

**Date Collected: 05/11/20 10:40**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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	0.016	CI	0.010	0.0029	ppm v/v			05/19/20 16:30	1.76
Benzene	0.00013	J	0.00040	0.000040	ppm v/v			05/19/20 16:30	1.76
Benzyl chloride	ND		0.00080	0.00019	ppm v/v			05/19/20 16:30	1.76
Bromodichloromethane	ND		0.00040	0.000091	ppm v/v			05/19/20 16:30	1.76
Bromoform	ND		0.00040	0.000045	ppm v/v			05/19/20 16:30	1.76
Bromomethane	ND		0.00040	0.00011	ppm v/v			05/19/20 16:30	1.76
2-Butanone (MEK)	0.0052		0.0020	0.00037	ppm v/v			05/19/20 16:30	1.76
Carbon disulfide	0.000085	J	0.0010	0.000055	ppm v/v			05/19/20 16:30	1.76
Carbon tetrachloride	0.00025	J	0.00040	0.000035	ppm v/v			05/19/20 16:30	1.76
Chlorobenzene	ND		0.00040	0.000030	ppm v/v			05/19/20 16:30	1.76
Chloroethane	ND		0.00040	0.00015	ppm v/v			05/19/20 16:30	1.76
Chloroform	0.0025		0.00040	0.000035	ppm v/v			05/19/20 16:30	1.76
Chloromethane	ND		0.0010	0.00033	ppm v/v			05/19/20 16:30	1.76
Dibromochloromethane	ND		0.00040	0.000035	ppm v/v			05/19/20 16:30	1.76
1,2-Dibromoethane (EDB)	ND		0.00040	0.000035	ppm v/v			05/19/20 16:30	1.76
1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00029	J	0.00040	0.000060	ppm v/v			05/19/20 16:30	1.76
1,2-Dichlorobenzene	ND		0.00040	0.00016	ppm v/v			05/19/20 16:30	1.76
1,3-Dichlorobenzene	ND		0.00040	0.000080	ppm v/v			05/19/20 16:30	1.76
1,4-Dichlorobenzene	ND		0.00040	0.000080	ppm v/v			05/19/20 16:30	1.76
1,1-Dichloroethane	0.0018		0.00040	0.000035	ppm v/v			05/19/20 16:30	1.76
1,2-Dichloroethane	ND		0.00040	0.000050	ppm v/v			05/19/20 16:30	1.76
1,1-Dichloroethene	0.0088		0.00040	0.000040	ppm v/v			05/19/20 16:30	1.76
cis-1,2-Dichloroethene	0.00065		0.00040	0.000050	ppm v/v			05/19/20 16:30	1.76
trans-1,2-Dichloroethene	ND		0.00040	0.000035	ppm v/v			05/19/20 16:30	1.76
1,2-Dichloropropane	0.00025	J	0.00040	0.000050	ppm v/v			05/19/20 16:30	1.76
cis-1,3-Dichloropropene	ND		0.00040	0.000080	ppm v/v			05/19/20 16:30	1.76
trans-1,3-Dichloropropene	ND		0.00040	0.000045	ppm v/v			05/19/20 16:30	1.76
Ethylbenzene	ND		0.00040	0.000065	ppm v/v			05/19/20 16:30	1.76
4-Ethyltoluene	ND		0.00080	0.00011	ppm v/v			05/19/20 16:30	1.76
Hexachlorobutadiene	ND		0.0020	0.00016	ppm v/v			05/19/20 16:30	1.76
2-Hexanone	0.00036	J	0.0010	0.000080	ppm v/v			05/19/20 16:30	1.76
4-Methyl-2-pentanone (MIBK)	ND		0.0010	0.00027	ppm v/v			05/19/20 16:30	1.76
Methylene Chloride	0.0010	J	0.0020	0.00080	ppm v/v			05/19/20 16:30	1.76
Styrene	ND		0.00040	0.00012	ppm v/v			05/19/20 16:30	1.76
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000070	ppm v/v			05/19/20 16:30	1.76
Tetrachloroethene	0.071		0.00040	0.000035	ppm v/v			05/19/20 16:30	1.76
Toluene	ND		0.00060	0.00039	ppm v/v			05/19/20 16:30	1.76
1,1,2-Trichloro-1,2,2-trifluoroethane	0.044		0.00040	0.000040	ppm v/v			05/19/20 16:30	1.76
1,2,4-Trichlorobenzene	ND		0.0020	0.00032	ppm v/v			05/19/20 16:30	1.76
1,1,1-Trichloroethane	0.055		0.00040	0.00019	ppm v/v			05/19/20 16:30	1.76
1,1,2-Trichloroethane	ND		0.00040	0.000035	ppm v/v			05/19/20 16:30	1.76
Trichloroethene	0.052		0.00020	0.000030	ppm v/v			05/19/20 16:30	1.76
1,2,4-Trimethylbenzene	ND		0.00040	0.00010	ppm v/v			05/19/20 16:30	1.76
1,3,5-Trimethylbenzene	ND		0.00040	0.00011	ppm v/v			05/19/20 16:30	1.76
Vinyl acetate	ND		0.0020	0.00014	ppm v/v			05/19/20 16:30	1.76
Vinyl chloride	ND		0.00020	0.00013	ppm v/v			05/19/20 16:30	1.76
m,p-Xylene	ND		0.00040	0.00015	ppm v/v			05/19/20 16:30	1.76

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112832-001/MWL-SV02-41.5**

**Lab Sample ID: 140-19107-5**

Date Collected: 05/11/20 10:40

Matrix: Air

Date Received: 05/15/20 11:00

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
o-Xylene	ND		0.00040	0.000075	ppm v/v			05/19/20 16:30	1.76
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140					05/19/20 16:30	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
Dichlorodifluoromethane	0.080		0.0035	0.00062	ppm v/v			05/23/20 03:17	1.76
Trichlorofluoromethane	0.28		0.0035	0.00048	ppm v/v			05/23/20 03:17	1.76
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		60 - 140					05/23/20 03:17	1.76

**Client Sample ID: 112833-001/MWL-SV02-41.5**

**Lab Sample ID: 140-19107-6**

Date Collected: 05/11/20 10:40

Matrix: Air

Date Received: 05/15/20 11:00

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	0.023		0.010	0.0028	ppm v/v			05/19/20 17:14	1.75
Benzene	0.00058		0.00040	0.000040	ppm v/v			05/19/20 17:14	1.75
Benzyl chloride	ND		0.00080	0.00019	ppm v/v			05/19/20 17:14	1.75
Bromodichloromethane	ND		0.00040	0.000090	ppm v/v			05/19/20 17:14	1.75
Bromoform	ND		0.00040	0.000045	ppm v/v			05/19/20 17:14	1.75
Bromomethane	ND		0.00040	0.00011	ppm v/v			05/19/20 17:14	1.75
2-Butanone (MEK)	0.0085		0.0020	0.00037	ppm v/v			05/19/20 17:14	1.75
Carbon disulfide	0.00041	J	0.0010	0.000055	ppm v/v			05/19/20 17:14	1.75
Carbon tetrachloride	0.00029	J	0.00040	0.000035	ppm v/v			05/19/20 17:14	1.75
Chlorobenzene	ND		0.00040	0.000030	ppm v/v			05/19/20 17:14	1.75
Chloroethane	ND		0.00040	0.00015	ppm v/v			05/19/20 17:14	1.75
Chloroform	0.0026		0.00040	0.000035	ppm v/v			05/19/20 17:14	1.75
Chloromethane	0.00060	J	0.0010	0.00033	ppm v/v			05/19/20 17:14	1.75
Dibromochloromethane	ND		0.00040	0.000035	ppm v/v			05/19/20 17:14	1.75
1,2-Dibromoethane (EDB)	ND		0.00040	0.000035	ppm v/v			05/19/20 17:14	1.75
1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.00034	J	0.00040	0.000060	ppm v/v			05/19/20 17:14	1.75
1,2-Dichlorobenzene	ND		0.00040	0.00016	ppm v/v			05/19/20 17:14	1.75
1,3-Dichlorobenzene	ND		0.00040	0.000080	ppm v/v			05/19/20 17:14	1.75
1,4-Dichlorobenzene	ND		0.00040	0.000080	ppm v/v			05/19/20 17:14	1.75
Dichlorodifluoromethane	0.073		0.00040	0.000070	ppm v/v			05/19/20 17:14	1.75
1,1-Dichloroethane	0.0018		0.00040	0.000035	ppm v/v			05/19/20 17:14	1.75
1,2-Dichloroethane	ND		0.00040	0.000050	ppm v/v			05/19/20 17:14	1.75
1,1-Dichloroethene	0.0093		0.00040	0.000040	ppm v/v			05/19/20 17:14	1.75
cis-1,2-Dichloroethene	0.00072		0.00040	0.000050	ppm v/v			05/19/20 17:14	1.75
trans-1,2-Dichloroethene	ND		0.00040	0.000035	ppm v/v			05/19/20 17:14	1.75
1,2-Dichloropropane	ND		0.00040	0.000050	ppm v/v			05/19/20 17:14	1.75
cis-1,3-Dichloropropene	ND		0.00040	0.000080	ppm v/v			05/19/20 17:14	1.75
trans-1,3-Dichloropropene	ND		0.00040	0.000045	ppm v/v			05/19/20 17:14	1.75
Ethylbenzene	0.00011	J	0.00040	0.000065	ppm v/v			05/19/20 17:14	1.75

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112833-001/MWL-SV02-41.5

Lab Sample ID: 140-19107-6

Date Collected: 05/11/20 10:40

Matrix: Air

Date Received: 05/15/20 11:00

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
4-Ethyltoluene	ND		0.00080	0.00011	ppm v/v			05/19/20 17:14	1.75
Hexachlorobutadiene	ND		0.0020	0.00016	ppm v/v			05/19/20 17:14	1.75
2-Hexanone	0.00072	J	0.0010	0.000080	ppm v/v			05/19/20 17:14	1.75
4-Methyl-2-pentanone (MIBK)	ND		0.0010	0.00027	ppm v/v			05/19/20 17:14	1.75
Methylene Chloride	0.00099	J	0.0020	0.00080	ppm v/v			05/19/20 17:14	1.75
Styrene	ND		0.00040	0.00012	ppm v/v			05/19/20 17:14	1.75
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000070	ppm v/v			05/19/20 17:14	1.75
Tetrachloroethene	0.081		0.00040	0.000035	ppm v/v			05/19/20 17:14	1.75
Toluene	0.00067		0.00060	0.00039	ppm v/v			05/19/20 17:14	1.75
1,1,2-Trichloro-1,2,2-trifluoroethane	0.046		0.00040	0.000040	ppm v/v			05/19/20 17:14	1.75
1,2,4-Trichlorobenzene	ND		0.0020	0.00032	ppm v/v			05/19/20 17:14	1.75
1,1,1-Trichloroethane	0.057		0.00040	0.00019	ppm v/v			05/19/20 17:14	1.75
1,1,2-Trichloroethane	ND		0.00040	0.000035	ppm v/v			05/19/20 17:14	1.75
Trichloroethene	0.068		0.00020	0.000030	ppm v/v			05/19/20 17:14	1.75
1,2,4-Trimethylbenzene	0.00018	J	0.00040	0.00010	ppm v/v			05/19/20 17:14	1.75
1,3,5-Trimethylbenzene	ND		0.00040	0.00011	ppm v/v			05/19/20 17:14	1.75
Vinyl acetate	ND		0.0020	0.00014	ppm v/v			05/19/20 17:14	1.75
Vinyl chloride	ND		0.00020	0.00013	ppm v/v			05/19/20 17:14	1.75
m,p-Xylene	0.00039	J	0.00040	0.00015	ppm v/v			05/19/20 17:14	1.75
o-Xylene	0.00018	J	0.00040	0.000075	ppm v/v			05/19/20 17:14	1.75
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140					05/19/20 17:14	1.75

## 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	0.30		0.0064	0.00088	ppm v/v			05/20/20 19:52	1.75
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		60 - 140					05/20/20 19:52	1.75

Client Sample ID: 112834-001/MWL-FB3

Lab Sample ID: 140-19107-7

Date Collected: 05/11/20 08:27

Matrix: Air

Date Received: 05/15/20 11:00

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	0.00082	J	0.0020	0.00057	ppm v/v			05/19/20 18:05	1.7
Benzene	0.000017	J	0.000080	0.0000080	ppm v/v			05/19/20 18:05	1.7
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			05/19/20 18:05	1.7
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			05/19/20 18:05	1.7
Bromoform	ND		0.000080	0.0000090	ppm v/v			05/19/20 18:05	1.7
Bromomethane	ND		0.000080	0.000022	ppm v/v			05/19/20 18:05	1.7
2-Butanone (MEK)	ND		0.00040	0.000073	ppm v/v			05/19/20 18:05	1.7
Carbon disulfide	ND		0.00020	0.000011	ppm v/v			05/19/20 18:05	1.7
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			05/19/20 18:05	1.7
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			05/19/20 18:05	1.7
Chloroethane	ND		0.000080	0.000029	ppm v/v			05/19/20 18:05	1.7

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112834-001/MWL-FB3**

**Lab Sample ID: 140-19107-7**

**Date Collected: 05/11/20 08:27**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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
Chloroform	ND		0.000080	0.0000070	ppm v/v			05/19/20 18:05	1.7
<b>Chloromethane</b>	<b>0.000070</b>	<b>J</b>	0.00020	0.000066	ppm v/v			05/19/20 18:05	1.7
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 18:05	1.7
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			05/19/20 18:05	1.7
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			05/19/20 18:05	1.7
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			05/19/20 18:05	1.7
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 18:05	1.7
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 18:05	1.7
Dichlorodifluoromethane	ND		0.000080	0.000014	ppm v/v			05/19/20 18:05	1.7
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 18:05	1.7
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			05/19/20 18:05	1.7
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			05/19/20 18:05	1.7
cis-1,2-Dichloroethene	ND		0.000080	0.000010	ppm v/v			05/19/20 18:05	1.7
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			05/19/20 18:05	1.7
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			05/19/20 18:05	1.7
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			05/19/20 18:05	1.7
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			05/19/20 18:05	1.7
Ethylbenzene	ND		0.000080	0.000013	ppm v/v			05/19/20 18:05	1.7
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			05/19/20 18:05	1.7
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			05/19/20 18:05	1.7
2-Hexanone	ND		0.00020	0.000016	ppm v/v			05/19/20 18:05	1.7
<b>4-Methyl-2-pentanone (MIBK)</b>	<b>0.00030</b>		0.00020	0.000054	ppm v/v			05/19/20 18:05	1.7
<b>Methylene Chloride</b>	<b>0.00053</b>		0.00040	0.00016	ppm v/v			05/19/20 18:05	1.7
Styrene	ND		0.000080	0.000024	ppm v/v			05/19/20 18:05	1.7
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			05/19/20 18:05	1.7
<b>Tetrachloroethene</b>	<b>0.0000091</b>	<b>J</b>	0.000080	0.0000070	ppm v/v			05/19/20 18:05	1.7
<b>Toluene</b>	<b>0.00011</b>	<b>J</b>	0.00012	0.000078	ppm v/v			05/19/20 18:05	1.7
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			05/19/20 18:05	1.7
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			05/19/20 18:05	1.7
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			05/19/20 18:05	1.7
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 18:05	1.7
Trichloroethene	ND		0.000040	0.0000060	ppm v/v			05/19/20 18:05	1.7
Trichlorofluoromethane	ND		0.000080	0.000011	ppm v/v			05/19/20 18:05	1.7
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			05/19/20 18:05	1.7
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			05/19/20 18:05	1.7
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			05/19/20 18:05	1.7
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			05/19/20 18:05	1.7
m,p-Xylene	ND		0.000080	0.000029	ppm v/v			05/19/20 18:05	1.7
o-Xylene	ND		0.000080	0.000015	ppm v/v			05/19/20 18:05	1.7

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		60 - 140		05/19/20 18:05	1.7

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112835-001/MWL-SV03-50

Lab Sample ID: 140-19107-8

Date Collected: 05/11/20 08:36

Matrix: Air

Date Received: 05/15/20 11:00

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		0.021	0.0060	ppm v/v			05/19/20 18:49	1.68
<b>Benzene</b>	<b>0.00027</b>	<b>J</b>	0.00084	0.000084	ppm v/v			05/19/20 18:49	1.68
Benzyl chloride	ND		0.0017	0.00040	ppm v/v			05/19/20 18:49	1.68
Bromodichloromethane	ND		0.00084	0.00019	ppm v/v			05/19/20 18:49	1.68
Bromoform	ND		0.00084	0.000095	ppm v/v			05/19/20 18:49	1.68
Bromomethane	ND		0.00084	0.00023	ppm v/v			05/19/20 18:49	1.68
2-Butanone (MEK)	ND		0.0042	0.00077	ppm v/v			05/19/20 18:49	1.68
Carbon disulfide	ND		0.0021	0.00012	ppm v/v			05/19/20 18:49	1.68
<b>Carbon tetrachloride</b>	<b>0.00022</b>	<b>J</b>	0.00084	0.000074	ppm v/v			05/19/20 18:49	1.68
Chlorobenzene	ND		0.00084	0.000063	ppm v/v			05/19/20 18:49	1.68
Chloroethane	ND		0.00084	0.00030	ppm v/v			05/19/20 18:49	1.68
<b>Chloroform</b>	<b>0.0017</b>		0.00084	0.000074	ppm v/v			05/19/20 18:49	1.68
Chloromethane	ND		0.0021	0.00069	ppm v/v			05/19/20 18:49	1.68
Dibromochloromethane	ND		0.00084	0.000074	ppm v/v			05/19/20 18:49	1.68
1,2-Dibromoethane (EDB)	ND		0.00084	0.000074	ppm v/v			05/19/20 18:49	1.68
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00084	0.00013	ppm v/v			05/19/20 18:49	1.68
1,2-Dichlorobenzene	ND		0.00084	0.00033	ppm v/v			05/19/20 18:49	1.68
1,3-Dichlorobenzene	ND		0.00084	0.00017	ppm v/v			05/19/20 18:49	1.68
1,4-Dichlorobenzene	ND		0.00084	0.00017	ppm v/v			05/19/20 18:49	1.68
<b>Dichlorodifluoromethane</b>	<b>0.028</b>		0.00084	0.00015	ppm v/v			05/19/20 18:49	1.68
<b>1,1-Dichloroethane</b>	<b>0.0034</b>		0.00084	0.000074	ppm v/v			05/19/20 18:49	1.68
1,2-Dichloroethane	ND		0.00084	0.00011	ppm v/v			05/19/20 18:49	1.68
<b>1,1-Dichloroethene</b>	<b>0.012</b>		0.00084	0.000084	ppm v/v			05/19/20 18:49	1.68
<b>cis-1,2-Dichloroethene</b>	<b>0.0019</b>		0.00084	0.00011	ppm v/v			05/19/20 18:49	1.68
trans-1,2-Dichloroethene	ND		0.00084	0.000074	ppm v/v			05/19/20 18:49	1.68
1,2-Dichloropropane	ND		0.00084	0.00011	ppm v/v			05/19/20 18:49	1.68
cis-1,3-Dichloropropene	ND		0.00084	0.00017	ppm v/v			05/19/20 18:49	1.68
trans-1,3-Dichloropropene	ND		0.00084	0.000095	ppm v/v			05/19/20 18:49	1.68
<b>Ethylbenzene</b>	<b>0.00014</b>	<b>J</b>	0.00084	0.00014	ppm v/v			05/19/20 18:49	1.68
4-Ethyltoluene	ND		0.0017	0.00022	ppm v/v			05/19/20 18:49	1.68
Hexachlorobutadiene	ND		0.0042	0.00034	ppm v/v			05/19/20 18:49	1.68
<b>2-Hexanone</b>	<b>0.00024</b>	<b>J</b>	0.0021	0.00017	ppm v/v			05/19/20 18:49	1.68
4-Methyl-2-pentanone (MIBK)	ND		0.0021	0.00057	ppm v/v			05/19/20 18:49	1.68
<b>Methylene Chloride</b>	<b>0.0019</b>	<b>J</b>	0.0042	0.0017	ppm v/v			05/19/20 18:49	1.68
Styrene	ND		0.00084	0.00025	ppm v/v			05/19/20 18:49	1.68
1,1,2,2-Tetrachloroethane	ND		0.00084	0.00015	ppm v/v			05/19/20 18:49	1.68
<b>Tetrachloroethene</b>	<b>0.16</b>		0.00084	0.000074	ppm v/v			05/19/20 18:49	1.68
Toluene	ND		0.0013	0.00082	ppm v/v			05/19/20 18:49	1.68
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.081</b>		0.00084	0.000084	ppm v/v			05/19/20 18:49	1.68
1,2,4-Trichlorobenzene	ND		0.0042	0.00067	ppm v/v			05/19/20 18:49	1.68
<b>1,1,1-Trichloroethane</b>	<b>0.0024</b>		0.00084	0.00039	ppm v/v			05/19/20 18:49	1.68
1,1,2-Trichloroethane	ND		0.00084	0.000074	ppm v/v			05/19/20 18:49	1.68
<b>Trichloroethene</b>	<b>0.12</b>		0.00042	0.000063	ppm v/v			05/19/20 18:49	1.68
<b>Trichlorofluoromethane</b>	<b>0.032</b>		0.00084	0.00012	ppm v/v			05/19/20 18:49	1.68
1,2,4-Trimethylbenzene	ND		0.00084	0.00021	ppm v/v			05/19/20 18:49	1.68
1,3,5-Trimethylbenzene	ND		0.00084	0.00023	ppm v/v			05/19/20 18:49	1.68
Vinyl acetate	ND		0.0042	0.00029	ppm v/v			05/19/20 18:49	1.68
Vinyl chloride	ND		0.00042	0.00027	ppm v/v			05/19/20 18:49	1.68

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112835-001/MWL-SV03-50**

**Lab Sample ID: 140-19107-8**

Date Collected: 05/11/20 08:36

Matrix: Air

Date Received: 05/15/20 11:00

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	0.00071	J	0.00084	0.00030	ppm v/v			05/19/20 18:49	1.68
o-Xylene	0.00022	J	0.00084	0.00016	ppm v/v			05/19/20 18:49	1.68
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140					05/19/20 18:49	1.68

**Client Sample ID: 112836-001/MWL-SV03-100**

**Lab Sample ID: 140-19107-9**

Date Collected: 05/11/20 08:40

Matrix: Air

Date Received: 05/15/20 11:00

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		0.027	0.0078	ppm v/v			05/19/20 19:33	1.64
Benzene	0.00024	J	0.0011	0.00011	ppm v/v			05/19/20 19:33	1.64
Benzyl chloride	ND		0.0022	0.00052	ppm v/v			05/19/20 19:33	1.64
Bromodichloromethane	ND		0.0011	0.00025	ppm v/v			05/19/20 19:33	1.64
Bromoform	ND		0.0011	0.00012	ppm v/v			05/19/20 19:33	1.64
Bromomethane	ND		0.0011	0.00030	ppm v/v			05/19/20 19:33	1.64
2-Butanone (MEK)	ND		0.0055	0.0010	ppm v/v			05/19/20 19:33	1.64
Carbon disulfide	0.00024	J	0.0027	0.00015	ppm v/v			05/19/20 19:33	1.64
Carbon tetrachloride	0.0021		0.0011	0.000096	ppm v/v			05/19/20 19:33	1.64
Chlorobenzene	ND		0.0011	0.000082	ppm v/v			05/19/20 19:33	1.64
Chloroethane	ND		0.0011	0.00040	ppm v/v			05/19/20 19:33	1.64
Chloroform	0.0035		0.0011	0.000096	ppm v/v			05/19/20 19:33	1.64
Chloromethane	ND		0.0027	0.00090	ppm v/v			05/19/20 19:33	1.64
Dibromochloromethane	ND		0.0011	0.000096	ppm v/v			05/19/20 19:33	1.64
1,2-Dibromoethane (EDB)	ND		0.0011	0.000096	ppm v/v			05/19/20 19:33	1.64
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0011	0.00016	ppm v/v			05/19/20 19:33	1.64
1,2-Dichlorobenzene	ND		0.0011	0.00042	ppm v/v			05/19/20 19:33	1.64
1,3-Dichlorobenzene	ND		0.0011	0.00022	ppm v/v			05/19/20 19:33	1.64
1,4-Dichlorobenzene	ND		0.0011	0.00022	ppm v/v			05/19/20 19:33	1.64
Dichlorodifluoromethane	0.037		0.0011	0.00019	ppm v/v			05/19/20 19:33	1.64
1,1-Dichloroethane	0.0050		0.0011	0.000096	ppm v/v			05/19/20 19:33	1.64
1,2-Dichloroethane	ND		0.0011	0.00014	ppm v/v			05/19/20 19:33	1.64
1,1-Dichloroethene	0.018		0.0011	0.00011	ppm v/v			05/19/20 19:33	1.64
cis-1,2-Dichloroethene	0.0030		0.0011	0.00014	ppm v/v			05/19/20 19:33	1.64
trans-1,2-Dichloroethene	ND		0.0011	0.000096	ppm v/v			05/19/20 19:33	1.64
1,2-Dichloropropane	ND		0.0011	0.00014	ppm v/v			05/19/20 19:33	1.64
cis-1,3-Dichloropropene	ND		0.0011	0.00022	ppm v/v			05/19/20 19:33	1.64
trans-1,3-Dichloropropene	ND		0.0011	0.00012	ppm v/v			05/19/20 19:33	1.64
Ethylbenzene	ND		0.0011	0.00018	ppm v/v			05/19/20 19:33	1.64
4-Ethyltoluene	ND		0.0022	0.00029	ppm v/v			05/19/20 19:33	1.64
Hexachlorobutadiene	ND		0.0055	0.00044	ppm v/v			05/19/20 19:33	1.64
2-Hexanone	ND		0.0027	0.00022	ppm v/v			05/19/20 19:33	1.64
4-Methyl-2-pentanone (MIBK)	ND		0.0027	0.00074	ppm v/v			05/19/20 19:33	1.64
Methylene Chloride	0.0027	J	0.0055	0.0022	ppm v/v			05/19/20 19:33	1.64
Styrene	ND		0.0011	0.00033	ppm v/v			05/19/20 19:33	1.64
1,1,2,2-Tetrachloroethane	ND		0.0011	0.00019	ppm v/v			05/19/20 19:33	1.64

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112836-001/MWL-SV03-100**

**Lab Sample ID: 140-19107-9**

**Date Collected: 05/11/20 08:40**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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		0.0016	0.0011	ppm v/v			05/19/20 19:33	1.64
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.11</b>		0.0011	0.00011	ppm v/v			05/19/20 19:33	1.64
1,2,4-Trichlorobenzene	ND		0.0055	0.00087	ppm v/v			05/19/20 19:33	1.64
<b>1,1,1-Trichloroethane</b>	<b>0.0029</b>		0.0011	0.00051	ppm v/v			05/19/20 19:33	1.64
1,1,2-Trichloroethane	ND		0.0011	0.000096	ppm v/v			05/19/20 19:33	1.64
<b>Trichloroethene</b>	<b>0.18</b>		0.00055	0.000082	ppm v/v			05/19/20 19:33	1.64
<b>Trichlorofluoromethane</b>	<b>0.041</b>		0.0011	0.00015	ppm v/v			05/19/20 19:33	1.64
1,2,4-Trimethylbenzene	ND		0.0011	0.00027	ppm v/v			05/19/20 19:33	1.64
1,3,5-Trimethylbenzene	ND		0.0011	0.00030	ppm v/v			05/19/20 19:33	1.64
Vinyl acetate	ND		0.0055	0.00038	ppm v/v			05/19/20 19:33	1.64
Vinyl chloride	ND		0.00055	0.00036	ppm v/v			05/19/20 19:33	1.64
m,p-Xylene	ND		0.0011	0.00040	ppm v/v			05/19/20 19:33	1.64
o-Xylene	ND		0.0011	0.00021	ppm v/v			05/19/20 19:33	1.64
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		60 - 140					05/19/20 19:33	1.64

## 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>0.21</b>		0.0022	0.00019	ppm v/v			05/20/20 20:39	1.64
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		60 - 140					05/20/20 20:39	1.64

**Client Sample ID: 112837-001/MWL-SV03-200**

**Lab Sample ID: 140-19107-10**

**Date Collected: 05/11/20 08:44**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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		0.050	0.014	ppm v/v			05/19/20 20:17	1.75
<b>Benzene</b>	<b>0.00080</b>	<b>J</b>	0.0020	0.00020	ppm v/v			05/19/20 20:17	1.75
Benzyl chloride	ND		0.0040	0.00095	ppm v/v			05/19/20 20:17	1.75
Bromodichloromethane	ND		0.0020	0.00045	ppm v/v			05/19/20 20:17	1.75
Bromoform	ND		0.0020	0.00023	ppm v/v			05/19/20 20:17	1.75
Bromomethane	ND		0.0020	0.00055	ppm v/v			05/19/20 20:17	1.75
2-Butanone (MEK)	ND		0.010	0.0018	ppm v/v			05/19/20 20:17	1.75
<b>Carbon disulfide</b>	<b>0.00046</b>	<b>J</b>	0.0050	0.00028	ppm v/v			05/19/20 20:17	1.75
<b>Carbon tetrachloride</b>	<b>0.00031</b>	<b>J</b>	0.0020	0.00018	ppm v/v			05/19/20 20:17	1.75
Chlorobenzene	ND		0.0020	0.00015	ppm v/v			05/19/20 20:17	1.75
Chloroethane	ND		0.0020	0.00073	ppm v/v			05/19/20 20:17	1.75
<b>Chloroform</b>	<b>0.0023</b>		0.0020	0.00018	ppm v/v			05/19/20 20:17	1.75
Chloromethane	ND		0.0050	0.0017	ppm v/v			05/19/20 20:17	1.75
Dibromochloromethane	ND		0.0020	0.00018	ppm v/v			05/19/20 20:17	1.75
1,2-Dibromoethane (EDB)	ND		0.0020	0.00018	ppm v/v			05/19/20 20:17	1.75
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0020	0.00030	ppm v/v			05/19/20 20:17	1.75
1,2-Dichlorobenzene	ND		0.0020	0.00078	ppm v/v			05/19/20 20:17	1.75
1,3-Dichlorobenzene	ND		0.0020	0.00040	ppm v/v			05/19/20 20:17	1.75

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112837-001/MWL-SV03-200

Lab Sample ID: 140-19107-10

Date Collected: 05/11/20 08:44

Matrix: Air

Date Received: 05/15/20 11:00

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		0.0020	0.00040	ppm v/v			05/19/20 20:17	1.75
Dichlorodifluoromethane	0.044		0.0020	0.00035	ppm v/v			05/19/20 20:17	1.75
1,1-Dichloroethane	0.0065		0.0020	0.00018	ppm v/v			05/19/20 20:17	1.75
1,2-Dichloroethane	ND		0.0020	0.00025	ppm v/v			05/19/20 20:17	1.75
1,1-Dichloroethene	0.025		0.0020	0.00020	ppm v/v			05/19/20 20:17	1.75
cis-1,2-Dichloroethene	0.0039		0.0020	0.00025	ppm v/v			05/19/20 20:17	1.75
trans-1,2-Dichloroethene	ND		0.0020	0.00018	ppm v/v			05/19/20 20:17	1.75
1,2-Dichloropropane	ND		0.0020	0.00025	ppm v/v			05/19/20 20:17	1.75
cis-1,3-Dichloropropene	ND		0.0020	0.00040	ppm v/v			05/19/20 20:17	1.75
trans-1,3-Dichloropropene	ND		0.0020	0.00023	ppm v/v			05/19/20 20:17	1.75
Ethylbenzene	ND		0.0020	0.00033	ppm v/v			05/19/20 20:17	1.75
4-Ethyltoluene	ND		0.0040	0.00053	ppm v/v			05/19/20 20:17	1.75
Hexachlorobutadiene	ND		0.010	0.00080	ppm v/v			05/19/20 20:17	1.75
2-Hexanone	ND		0.0050	0.00040	ppm v/v			05/19/20 20:17	1.75
4-Methyl-2-pentanone (MIBK)	ND		0.0050	0.0014	ppm v/v			05/19/20 20:17	1.75
Methylene Chloride	0.0045	J	0.010	0.0040	ppm v/v			05/19/20 20:17	1.75
Styrene	ND		0.0020	0.00060	ppm v/v			05/19/20 20:17	1.75
1,1,2,2-Tetrachloroethane	ND		0.0020	0.00035	ppm v/v			05/19/20 20:17	1.75
Tetrachloroethene	0.23		0.0020	0.00018	ppm v/v			05/19/20 20:17	1.75
Toluene	ND		0.0030	0.0020	ppm v/v			05/19/20 20:17	1.75
1,1,2-Trichloro-1,2,2-trifluoroethane	0.14		0.0020	0.00020	ppm v/v			05/19/20 20:17	1.75
1,2,4-Trichlorobenzene	ND		0.010	0.0016	ppm v/v			05/19/20 20:17	1.75
1,1,1-Trichloroethane	0.0021		0.0020	0.00093	ppm v/v			05/19/20 20:17	1.75
1,1,2-Trichloroethene	ND		0.0020	0.00018	ppm v/v			05/19/20 20:17	1.75
Trichloroethene	0.20		0.0010	0.00015	ppm v/v			05/19/20 20:17	1.75
Trichlorofluoromethane	0.037		0.0020	0.00028	ppm v/v			05/19/20 20:17	1.75
1,2,4-Trimethylbenzene	ND		0.0020	0.00050	ppm v/v			05/19/20 20:17	1.75
1,3,5-Trimethylbenzene	ND		0.0020	0.00055	ppm v/v			05/19/20 20:17	1.75
Vinyl acetate	ND		0.010	0.00070	ppm v/v			05/19/20 20:17	1.75
Vinyl chloride	ND		0.0010	0.00065	ppm v/v			05/19/20 20:17	1.75
m,p-Xylene	ND		0.0020	0.00073	ppm v/v			05/19/20 20:17	1.75
o-Xylene	ND		0.0020	0.00038	ppm v/v			05/19/20 20:17	1.75
<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					05/19/20 20:17	1.75

Client Sample ID: 112838-001/MWL-SV03-300

Lab Sample ID: 140-19107-11

Date Collected: 05/11/20 08:48

Matrix: Air

Date Received: 05/15/20 11:00

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		0.034	0.0097	ppm v/v			05/19/20 21:04	1.7
Benzene	0.00027	J	0.0014	0.00014	ppm v/v			05/19/20 21:04	1.7
Benzyl chloride	ND		0.0027	0.00065	ppm v/v			05/19/20 21:04	1.7
Bromodichloromethane	ND		0.0014	0.00031	ppm v/v			05/19/20 21:04	1.7
Bromoform	ND		0.0014	0.00015	ppm v/v			05/19/20 21:04	1.7

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112838-001/MWL-SV03-300

Lab Sample ID: 140-19107-11

Date Collected: 05/11/20 08:48

Matrix: Air

Date Received: 05/15/20 11:00

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		0.0014	0.00037	ppm v/v			05/19/20 21:04	1.7
2-Butanone (MEK)	ND		0.0068	0.0012	ppm v/v			05/19/20 21:04	1.7
Carbon disulfide	ND		0.0034	0.00019	ppm v/v			05/19/20 21:04	1.7
Carbon tetrachloride	0.00027	J	0.0014	0.00012	ppm v/v			05/19/20 21:04	1.7
Chlorobenzene	ND		0.0014	0.00010	ppm v/v			05/19/20 21:04	1.7
Chloroethane	ND		0.0014	0.00049	ppm v/v			05/19/20 21:04	1.7
Chloroform	0.0015		0.0014	0.00012	ppm v/v			05/19/20 21:04	1.7
Chloromethane	ND		0.0034	0.0011	ppm v/v			05/19/20 21:04	1.7
Dibromochloromethane	ND		0.0014	0.00012	ppm v/v			05/19/20 21:04	1.7
1,2-Dibromoethane (EDB)	ND		0.0014	0.00012	ppm v/v			05/19/20 21:04	1.7
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00020	ppm v/v			05/19/20 21:04	1.7
1,2-Dichlorobenzene	ND		0.0014	0.00053	ppm v/v			05/19/20 21:04	1.7
1,3-Dichlorobenzene	ND		0.0014	0.00027	ppm v/v			05/19/20 21:04	1.7
1,4-Dichlorobenzene	ND		0.0014	0.00027	ppm v/v			05/19/20 21:04	1.7
Dichlorodifluoromethane	0.036		0.0014	0.00024	ppm v/v			05/19/20 21:04	1.7
1,1-Dichloroethane	0.0035		0.0014	0.00012	ppm v/v			05/19/20 21:04	1.7
1,2-Dichloroethane	ND		0.0014	0.00017	ppm v/v			05/19/20 21:04	1.7
1,1-Dichloroethene	0.021		0.0014	0.00014	ppm v/v			05/19/20 21:04	1.7
cis-1,2-Dichloroethene	0.0021		0.0014	0.00017	ppm v/v			05/19/20 21:04	1.7
trans-1,2-Dichloroethene	ND		0.0014	0.00012	ppm v/v			05/19/20 21:04	1.7
1,2-Dichloropropane	ND		0.0014	0.00017	ppm v/v			05/19/20 21:04	1.7
cis-1,3-Dichloropropene	ND		0.0014	0.00027	ppm v/v			05/19/20 21:04	1.7
trans-1,3-Dichloropropene	ND		0.0014	0.00015	ppm v/v			05/19/20 21:04	1.7
Ethylbenzene	ND		0.0014	0.00022	ppm v/v			05/19/20 21:04	1.7
4-Ethyltoluene	ND		0.0027	0.00036	ppm v/v			05/19/20 21:04	1.7
Hexachlorobutadiene	ND		0.0068	0.00054	ppm v/v			05/19/20 21:04	1.7
2-Hexanone	ND		0.0034	0.00027	ppm v/v			05/19/20 21:04	1.7
4-Methyl-2-pentanone (MIBK)	ND		0.0034	0.00092	ppm v/v			05/19/20 21:04	1.7
Methylene Chloride	0.0032	J	0.0068	0.0027	ppm v/v			05/19/20 21:04	1.7
Styrene	ND		0.0014	0.00041	ppm v/v			05/19/20 21:04	1.7
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00024	ppm v/v			05/19/20 21:04	1.7
Toluene	ND		0.0020	0.0013	ppm v/v			05/19/20 21:04	1.7
1,1,2-Trichloro-1,2,2-trifluoroethane	0.13		0.0014	0.00014	ppm v/v			05/19/20 21:04	1.7
1,2,4-Trichlorobenzene	ND		0.0068	0.0011	ppm v/v			05/19/20 21:04	1.7
1,1,1-Trichloroethane	0.00090	J	0.0014	0.00063	ppm v/v			05/19/20 21:04	1.7
1,1,2-Trichloroethane	ND		0.0014	0.00012	ppm v/v			05/19/20 21:04	1.7
Trichloroethene	0.17		0.00068	0.00010	ppm v/v			05/19/20 21:04	1.7
Trichlorofluoromethane	0.019		0.0014	0.00019	ppm v/v			05/19/20 21:04	1.7
1,2,4-Trimethylbenzene	ND		0.0014	0.00034	ppm v/v			05/19/20 21:04	1.7
1,3,5-Trimethylbenzene	ND		0.0014	0.00037	ppm v/v			05/19/20 21:04	1.7
Vinyl acetate	ND		0.0068	0.00048	ppm v/v			05/19/20 21:04	1.7
Vinyl chloride	ND		0.00068	0.00044	ppm v/v			05/19/20 21:04	1.7
m,p-Xylene	ND		0.0014	0.00049	ppm v/v			05/19/20 21:04	1.7
o-Xylene	ND		0.0014	0.00026	ppm v/v			05/19/20 21:04	1.7

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		60 - 140		05/19/20 21:04	1.7

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112838-001/MWL-SV03-300**

**Lab Sample ID: 140-19107-11**

Date Collected: 05/11/20 08:48

Matrix: Air

Date Received: 05/15/20 11:00

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	0.18		0.0034	0.00030	ppm v/v			05/20/20 21:24	1.7
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		60 - 140					05/20/20 21:24	1.7

**Client Sample ID: 112839-001/MWL-SV03-400**

**Lab Sample ID: 140-19107-12**

Date Collected: 05/11/20 08:53

Matrix: Air

Date Received: 05/15/20 11:00

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		0.034	0.0097	ppm v/v			05/19/20 21:49	1.7
Benzene	0.00032	J	0.0014	0.00014	ppm v/v			05/19/20 21:49	1.7
Benzyl chloride	ND		0.0027	0.00065	ppm v/v			05/19/20 21:49	1.7
Bromodichloromethane	ND		0.0014	0.00031	ppm v/v			05/19/20 21:49	1.7
Bromoform	ND		0.0014	0.00015	ppm v/v			05/19/20 21:49	1.7
Bromomethane	ND		0.0014	0.00037	ppm v/v			05/19/20 21:49	1.7
2-Butanone (MEK)	ND		0.0068	0.0012	ppm v/v			05/19/20 21:49	1.7
Carbon disulfide	0.00025	J	0.0034	0.00019	ppm v/v			05/19/20 21:49	1.7
Carbon tetrachloride	0.00032	J	0.0014	0.00012	ppm v/v			05/19/20 21:49	1.7
Chlorobenzene	ND		0.0014	0.00010	ppm v/v			05/19/20 21:49	1.7
Chloroethane	ND		0.0014	0.00049	ppm v/v			05/19/20 21:49	1.7
Chloroform	0.0019		0.0014	0.00012	ppm v/v			05/19/20 21:49	1.7
Chloromethane	ND		0.0034	0.0011	ppm v/v			05/19/20 21:49	1.7
Dibromochloromethane	ND		0.0014	0.00012	ppm v/v			05/19/20 21:49	1.7
1,2-Dibromoethane (EDB)	ND		0.0014	0.00012	ppm v/v			05/19/20 21:49	1.7
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00020	ppm v/v			05/19/20 21:49	1.7
1,2-Dichlorobenzene	ND		0.0014	0.00053	ppm v/v			05/19/20 21:49	1.7
1,3-Dichlorobenzene	ND		0.0014	0.00027	ppm v/v			05/19/20 21:49	1.7
1,4-Dichlorobenzene	ND		0.0014	0.00027	ppm v/v			05/19/20 21:49	1.7
Dichlorodifluoromethane	0.013		0.0014	0.00024	ppm v/v			05/19/20 21:49	1.7
1,1-Dichloroethane	0.0042		0.0014	0.00012	ppm v/v			05/19/20 21:49	1.7
1,2-Dichloroethane	ND		0.0014	0.00017	ppm v/v			05/19/20 21:49	1.7
1,1-Dichloroethene	0.022		0.0014	0.00014	ppm v/v			05/19/20 21:49	1.7
cis-1,2-Dichloroethene	0.0026		0.0014	0.00017	ppm v/v			05/19/20 21:49	1.7
trans-1,2-Dichloroethene	ND		0.0014	0.00012	ppm v/v			05/19/20 21:49	1.7
1,2-Dichloropropane	ND		0.0014	0.00017	ppm v/v			05/19/20 21:49	1.7
cis-1,3-Dichloropropene	ND		0.0014	0.00027	ppm v/v			05/19/20 21:49	1.7
trans-1,3-Dichloropropene	ND		0.0014	0.00015	ppm v/v			05/19/20 21:49	1.7
Ethylbenzene	ND		0.0014	0.00022	ppm v/v			05/19/20 21:49	1.7
4-Ethyltoluene	ND		0.0027	0.00036	ppm v/v			05/19/20 21:49	1.7
Hexachlorobutadiene	ND		0.0068	0.00054	ppm v/v			05/19/20 21:49	1.7
2-Hexanone	ND		0.0034	0.00027	ppm v/v			05/19/20 21:49	1.7
4-Methyl-2-pentanone (MIBK)	ND		0.0034	0.00092	ppm v/v			05/19/20 21:49	1.7
Methylene Chloride	0.0031	J	0.0068	0.0027	ppm v/v			05/19/20 21:49	1.7
Styrene	ND		0.0014	0.00041	ppm v/v			05/19/20 21:49	1.7
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00024	ppm v/v			05/19/20 21:49	1.7
Toluene	ND		0.0020	0.0013	ppm v/v			05/19/20 21:49	1.7

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112839-001/MWL-SV03-400

Lab Sample ID: 140-19107-12

Date Collected: 05/11/20 08:53

Matrix: Air

Date Received: 05/15/20 11:00

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-Trichloro-1,2,2-trifluoroethane	0.054		0.0014	0.00014	ppm v/v			05/19/20 21:49	1.7
1,2,4-Trichlorobenzene	ND		0.0068	0.0011	ppm v/v			05/19/20 21:49	1.7
1,1,1-Trichloroethane	0.0012	J	0.0014	0.00063	ppm v/v			05/19/20 21:49	1.7
1,1,2-Trichloroethane	ND		0.0014	0.00012	ppm v/v			05/19/20 21:49	1.7
Trichlorofluoromethane	0.017		0.0014	0.00019	ppm v/v			05/19/20 21:49	1.7
1,2,4-Trimethylbenzene	ND		0.0014	0.00034	ppm v/v			05/19/20 21:49	1.7
1,3,5-Trimethylbenzene	ND		0.0014	0.00037	ppm v/v			05/19/20 21:49	1.7
Vinyl acetate	ND		0.0068	0.00048	ppm v/v			05/19/20 21:49	1.7
Vinyl chloride	ND		0.00068	0.00044	ppm v/v			05/19/20 21:49	1.7
m,p-Xylene	ND		0.0014	0.00049	ppm v/v			05/19/20 21:49	1.7
o-Xylene	ND		0.0014	0.00026	ppm v/v			05/19/20 21:49	1.7

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		60 - 140		05/19/20 21:49	1.7

## 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	0.32		0.0034	0.00030	ppm v/v			05/23/20 04:10	1.7
Trichloroethene	0.22		0.0017	0.00026	ppm v/v			05/23/20 04:10	1.7

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		60 - 140		05/23/20 04:10	1.7

Client Sample ID: 112840-001/MWL-FB4

Lab Sample ID: 140-19107-13

Date Collected: 05/11/20 09:15

Matrix: Air

Date Received: 05/15/20 11:00

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	CI	0.0020	0.00057	ppm v/v			05/19/20 22:39	1.83
Benzene	0.0000082	J	0.000080	0.0000080	ppm v/v			05/19/20 22:39	1.83
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			05/19/20 22:39	1.83
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			05/19/20 22:39	1.83
Bromoform	ND		0.000080	0.0000090	ppm v/v			05/19/20 22:39	1.83
Bromomethane	ND		0.000080	0.000022	ppm v/v			05/19/20 22:39	1.83
2-Butanone (MEK)	0.00022	J	0.00040	0.000073	ppm v/v			05/19/20 22:39	1.83
Carbon disulfide	0.000014	J	0.00020	0.000011	ppm v/v			05/19/20 22:39	1.83
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			05/19/20 22:39	1.83
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			05/19/20 22:39	1.83
Chloroethane	ND		0.000080	0.000029	ppm v/v			05/19/20 22:39	1.83
Chloroform	ND		0.000080	0.0000070	ppm v/v			05/19/20 22:39	1.83
Chloromethane	ND		0.00020	0.000066	ppm v/v			05/19/20 22:39	1.83
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 22:39	1.83
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			05/19/20 22:39	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			05/19/20 22:39	1.83
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			05/19/20 22:39	1.83
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 22:39	1.83
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 22:39	1.83

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112840-001/MWL-FB4

Lab Sample ID: 140-19107-13

Date Collected: 05/11/20 09:15

Matrix: Air

Date Received: 05/15/20 11:00

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
Dichlorodifluoromethane	ND		0.000080	0.000014	ppm v/v			05/19/20 22:39	1.83
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 22:39	1.83
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			05/19/20 22:39	1.83
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			05/19/20 22:39	1.83
cis-1,2-Dichloroethene	ND		0.000080	0.000010	ppm v/v			05/19/20 22:39	1.83
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			05/19/20 22:39	1.83
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			05/19/20 22:39	1.83
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			05/19/20 22:39	1.83
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			05/19/20 22:39	1.83
Ethylbenzene	ND		0.000080	0.000013	ppm v/v			05/19/20 22:39	1.83
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			05/19/20 22:39	1.83
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			05/19/20 22:39	1.83
2-Hexanone	ND		0.00020	0.000016	ppm v/v			05/19/20 22:39	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			05/19/20 22:39	1.83
Methylene Chloride	0.00073		0.00040	0.00016	ppm v/v			05/19/20 22:39	1.83
Styrene	ND		0.000080	0.000024	ppm v/v			05/19/20 22:39	1.83
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			05/19/20 22:39	1.83
Tetrachloroethene	0.000012	J	0.000080	0.0000070	ppm v/v			05/19/20 22:39	1.83
Toluene	ND		0.00012	0.000078	ppm v/v			05/19/20 22:39	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			05/19/20 22:39	1.83
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			05/19/20 22:39	1.83
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			05/19/20 22:39	1.83
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 22:39	1.83
Trichloroethene	ND		0.000040	0.0000060	ppm v/v			05/19/20 22:39	1.83
Trichlorofluoromethane	ND		0.000080	0.000011	ppm v/v			05/19/20 22:39	1.83
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			05/19/20 22:39	1.83
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			05/19/20 22:39	1.83
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			05/19/20 22:39	1.83
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			05/19/20 22:39	1.83
m,p-Xylene	ND		0.000080	0.000029	ppm v/v			05/19/20 22:39	1.83
o-Xylene	ND		0.000080	0.000015	ppm v/v			05/19/20 22:39	1.83

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		60 - 140		05/19/20 22:39	1.83

Client Sample ID: 112841-001/MWL-SV04-50

Lab Sample ID: 140-19107-14

Date Collected: 05/11/20 09:23

Matrix: Air

Date Received: 05/15/20 11:00

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	0.0046		0.0037	0.0011	ppm v/v			05/19/20 23:27	1.85
Benzene	0.00014	J	0.00015	0.000015	ppm v/v			05/19/20 23:27	1.85
Benzyl chloride	ND		0.00030	0.000070	ppm v/v			05/19/20 23:27	1.85
Bromodichloromethane	0.000045	J	0.00015	0.000033	ppm v/v			05/19/20 23:27	1.85
Bromoform	ND		0.00015	0.000017	ppm v/v			05/19/20 23:27	1.85
Bromomethane	ND		0.00015	0.000041	ppm v/v			05/19/20 23:27	1.85
2-Butanone (MEK)	0.00083		0.00074	0.00014	ppm v/v			05/19/20 23:27	1.85

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112841-001/MWL-SV04-50

Lab Sample ID: 140-19107-14

Date Collected: 05/11/20 09:23

Matrix: Air

Date Received: 05/15/20 11:00

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
Carbon disulfide	0.000082	J	0.00037	0.000020	ppm v/v			05/19/20 23:27	1.85
Carbon tetrachloride	0.00018		0.00015	0.000013	ppm v/v			05/19/20 23:27	1.85
Chlorobenzene	ND		0.00015	0.000011	ppm v/v			05/19/20 23:27	1.85
Chloroethane	ND		0.00015	0.000054	ppm v/v			05/19/20 23:27	1.85
Chloroform	0.0018		0.00015	0.000013	ppm v/v			05/19/20 23:27	1.85
Chloromethane	0.00021	J	0.00037	0.00012	ppm v/v			05/19/20 23:27	1.85
Dibromochloromethane	ND		0.00015	0.000013	ppm v/v			05/19/20 23:27	1.85
1,2-Dibromoethane (EDB)	ND		0.00015	0.000013	ppm v/v			05/19/20 23:27	1.85
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00015	0.000022	ppm v/v			05/19/20 23:27	1.85
1,2-Dichlorobenzene	ND		0.00015	0.000057	ppm v/v			05/19/20 23:27	1.85
1,3-Dichlorobenzene	ND		0.00015	0.000030	ppm v/v			05/19/20 23:27	1.85
1,4-Dichlorobenzene	ND		0.00015	0.000030	ppm v/v			05/19/20 23:27	1.85
Dichlorodifluoromethane	0.021		0.00015	0.000026	ppm v/v			05/19/20 23:27	1.85
1,1-Dichloroethane	0.0013		0.00015	0.000013	ppm v/v			05/19/20 23:27	1.85
1,2-Dichloroethane	ND		0.00015	0.000019	ppm v/v			05/19/20 23:27	1.85
1,1-Dichloroethene	0.0062		0.00015	0.000015	ppm v/v			05/19/20 23:27	1.85
cis-1,2-Dichloroethene	0.00045		0.00015	0.000019	ppm v/v			05/19/20 23:27	1.85
trans-1,2-Dichloroethene	ND		0.00015	0.000013	ppm v/v			05/19/20 23:27	1.85
1,2-Dichloropropane	ND		0.00015	0.000019	ppm v/v			05/19/20 23:27	1.85
cis-1,3-Dichloropropene	ND		0.00015	0.000030	ppm v/v			05/19/20 23:27	1.85
trans-1,3-Dichloropropene	ND		0.00015	0.000017	ppm v/v			05/19/20 23:27	1.85
Ethylbenzene	0.000029	J	0.00015	0.000024	ppm v/v			05/19/20 23:27	1.85
4-Ethyltoluene	ND		0.00030	0.000039	ppm v/v			05/19/20 23:27	1.85
Hexachlorobutadiene	ND		0.00074	0.000059	ppm v/v			05/19/20 23:27	1.85
2-Hexanone	ND		0.00037	0.000030	ppm v/v			05/19/20 23:27	1.85
4-Methyl-2-pentanone (MIBK)	0.00022	J	0.00037	0.00010	ppm v/v			05/19/20 23:27	1.85
Methylene Chloride	0.00086		0.00074	0.00030	ppm v/v			05/19/20 23:27	1.85
Styrene	ND		0.00015	0.000044	ppm v/v			05/19/20 23:27	1.85
1,1,2,2-Tetrachloroethane	ND		0.00015	0.000026	ppm v/v			05/19/20 23:27	1.85
Tetrachloroethene	0.020		0.00015	0.000013	ppm v/v			05/19/20 23:27	1.85
Toluene	ND		0.00022	0.00014	ppm v/v			05/19/20 23:27	1.85
1,2,4-Trichlorobenzene	ND		0.00074	0.00012	ppm v/v			05/19/20 23:27	1.85
1,1,1-Trichloroethane	0.0068		0.00015	0.000068	ppm v/v			05/19/20 23:27	1.85
1,1,2-Trichloroethane	ND		0.00015	0.000013	ppm v/v			05/19/20 23:27	1.85
1,2,4-Trimethylbenzene	ND		0.00015	0.000037	ppm v/v			05/19/20 23:27	1.85
1,3,5-Trimethylbenzene	ND		0.00015	0.000041	ppm v/v			05/19/20 23:27	1.85
Vinyl acetate	ND		0.00074	0.000052	ppm v/v			05/19/20 23:27	1.85
Vinyl chloride	ND		0.00074	0.000048	ppm v/v			05/19/20 23:27	1.85
m,p-Xylene	ND		0.00015	0.000054	ppm v/v			05/19/20 23:27	1.85
o-Xylene	ND		0.00015	0.000028	ppm v/v			05/19/20 23:27	1.85

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		60 - 140		05/19/20 23:27	1.85

## 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
1,1,2-Trichloro-1,2,2-trifluoroethane	0.068		0.0015	0.00015	ppm v/v			05/20/20 22:54	1.85
Trichloroethene	0.035		0.00074	0.00011	ppm v/v			05/20/20 22:54	1.85

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112841-001/MWL-SV04-50**

**Lab Sample ID: 140-19107-14**

Date Collected: 05/11/20 09:23

Matrix: Air

Date Received: 05/15/20 11:00

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
Trichlorofluoromethane	0.042		0.0015	0.00020	ppm v/v			05/20/20 22:54	1.85
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		60 - 140					05/20/20 22:54	1.85

**Client Sample ID: 112842-001/MWL-SV04-100**

**Lab Sample ID: 140-19107-15**

Date Collected: 05/11/20 09:29

Matrix: Air

Date Received: 05/15/20 11:00

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		0.010	0.0029	ppm v/v			05/20/20 00:13	1.72
Benzene	0.00022	J	0.00040	0.000040	ppm v/v			05/20/20 00:13	1.72
Benzyl chloride	ND		0.00081	0.00019	ppm v/v			05/20/20 00:13	1.72
Bromodichloromethane	ND		0.00040	0.000091	ppm v/v			05/20/20 00:13	1.72
Bromoform	ND		0.00040	0.000046	ppm v/v			05/20/20 00:13	1.72
Bromomethane	ND		0.00040	0.00011	ppm v/v			05/20/20 00:13	1.72
2-Butanone (MEK)	ND		0.0020	0.00037	ppm v/v			05/20/20 00:13	1.72
Carbon disulfide	ND		0.0010	0.000056	ppm v/v			05/20/20 00:13	1.72
Carbon tetrachloride	0.00028	J	0.00040	0.000035	ppm v/v			05/20/20 00:13	1.72
Chlorobenzene	ND		0.00040	0.000030	ppm v/v			05/20/20 00:13	1.72
Chloroethane	ND		0.00040	0.00015	ppm v/v			05/20/20 00:13	1.72
Chloroform	0.0019		0.00040	0.000035	ppm v/v			05/20/20 00:13	1.72
Chloromethane	ND		0.0010	0.00033	ppm v/v			05/20/20 00:13	1.72
Dibromochloromethane	ND		0.00040	0.000035	ppm v/v			05/20/20 00:13	1.72
1,2-Dibromoethane (EDB)	ND		0.00040	0.000035	ppm v/v			05/20/20 00:13	1.72
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00040	0.000061	ppm v/v			05/20/20 00:13	1.72
1,2-Dichlorobenzene	ND		0.00040	0.00016	ppm v/v			05/20/20 00:13	1.72
1,3-Dichlorobenzene	ND		0.00040	0.000081	ppm v/v			05/20/20 00:13	1.72
1,4-Dichlorobenzene	ND		0.00040	0.000081	ppm v/v			05/20/20 00:13	1.72
Dichlorodifluoromethane	0.031		0.00040	0.000071	ppm v/v			05/20/20 00:13	1.72
1,1-Dichloroethane	0.0029		0.00040	0.000035	ppm v/v			05/20/20 00:13	1.72
1,2-Dichloroethane	ND		0.00040	0.000051	ppm v/v			05/20/20 00:13	1.72
1,1-Dichloroethene	0.014		0.00040	0.000040	ppm v/v			05/20/20 00:13	1.72
cis-1,2-Dichloroethene	0.0015		0.00040	0.000051	ppm v/v			05/20/20 00:13	1.72
trans-1,2-Dichloroethene	ND		0.00040	0.000035	ppm v/v			05/20/20 00:13	1.72
1,2-Dichloropropane	ND		0.00040	0.000051	ppm v/v			05/20/20 00:13	1.72
cis-1,3-Dichloropropene	ND		0.00040	0.000081	ppm v/v			05/20/20 00:13	1.72
trans-1,3-Dichloropropene	ND		0.00040	0.000046	ppm v/v			05/20/20 00:13	1.72
Ethylbenzene	ND		0.00040	0.000066	ppm v/v			05/20/20 00:13	1.72
4-Ethyltoluene	ND		0.00081	0.00011	ppm v/v			05/20/20 00:13	1.72
Hexachlorobutadiene	ND		0.0020	0.00016	ppm v/v			05/20/20 00:13	1.72
2-Hexanone	ND		0.0010	0.000081	ppm v/v			05/20/20 00:13	1.72
4-Methyl-2-pentanone (MIBK)	ND		0.0010	0.00027	ppm v/v			05/20/20 00:13	1.72
Methylene Chloride	0.0012	J	0.0020	0.00081	ppm v/v			05/20/20 00:13	1.72
Styrene	ND		0.00040	0.00012	ppm v/v			05/20/20 00:13	1.72
1,1,2,2-Tetrachloroethane	ND		0.00040	0.000071	ppm v/v			05/20/20 00:13	1.72
Toluene	ND		0.00061	0.00039	ppm v/v			05/20/20 00:13	1.72

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112842-001/MWL-SV04-100

Lab Sample ID: 140-19107-15

Date Collected: 05/11/20 09:29

Matrix: Air

Date Received: 05/15/20 11:00

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
1,2,4-Trichlorobenzene	ND		0.0020	0.00032	ppm v/v			05/20/20 00:13	1.72
1,1,1-Trichloroethane	0.0050		0.00040	0.00019	ppm v/v			05/20/20 00:13	1.72
1,1,2-Trichloroethane	ND		0.00040	0.000035	ppm v/v			05/20/20 00:13	1.72
Trichlorofluoromethane	0.046		0.00040	0.000056	ppm v/v			05/20/20 00:13	1.72
1,2,4-Trimethylbenzene	ND		0.00040	0.00010	ppm v/v			05/20/20 00:13	1.72
1,3,5-Trimethylbenzene	ND		0.00040	0.00011	ppm v/v			05/20/20 00:13	1.72
Vinyl acetate	ND		0.0020	0.00014	ppm v/v			05/20/20 00:13	1.72
Vinyl chloride	ND		0.00020	0.00013	ppm v/v			05/20/20 00:13	1.72
m,p-Xylene	ND		0.00040	0.00015	ppm v/v			05/20/20 00:13	1.72
o-Xylene	ND		0.00040	0.000076	ppm v/v			05/20/20 00:13	1.72

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		60 - 140		05/20/20 00:13	1.72

## 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	0.10		0.0014	0.00012	ppm v/v			05/20/20 23:39	1.72
1,1,2-Trichloro-1,2,2-trifluoroethane	0.089		0.0014	0.00014	ppm v/v			05/20/20 23:39	1.72
Trichloroethene	0.096		0.00069	0.00010	ppm v/v			05/20/20 23:39	1.72

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140		05/20/20 23:39	1.72

Client Sample ID: 112843-001/MWL-SV04-200

Lab Sample ID: 140-19107-16

Date Collected: 05/11/20 09:32

Matrix: Air

Date Received: 05/15/20 11:00

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		0.035	0.010	ppm v/v			05/20/20 00:56	1.77
Benzene	0.00037	J	0.0014	0.00014	ppm v/v			05/20/20 00:56	1.77
Benzyl chloride	ND		0.0028	0.00067	ppm v/v			05/20/20 00:56	1.77
Bromodichloromethane	ND		0.0014	0.00032	ppm v/v			05/20/20 00:56	1.77
Bromoform	ND		0.0014	0.00016	ppm v/v			05/20/20 00:56	1.77
Bromomethane	ND		0.0014	0.00039	ppm v/v			05/20/20 00:56	1.77
2-Butanone (MEK)	ND		0.0071	0.0013	ppm v/v			05/20/20 00:56	1.77
Carbon disulfide	ND		0.0035	0.00019	ppm v/v			05/20/20 00:56	1.77
Carbon tetrachloride	0.00040	J	0.0014	0.00012	ppm v/v			05/20/20 00:56	1.77
Chlorobenzene	ND		0.0014	0.00011	ppm v/v			05/20/20 00:56	1.77
Chloroethane	ND		0.0014	0.00051	ppm v/v			05/20/20 00:56	1.77
Chloroform	0.0017		0.0014	0.00012	ppm v/v			05/20/20 00:56	1.77
Chloromethane	ND		0.0035	0.0012	ppm v/v			05/20/20 00:56	1.77
Dibromochloromethane	ND		0.0014	0.00012	ppm v/v			05/20/20 00:56	1.77
1,2-Dibromoethane (EDB)	ND		0.0014	0.00012	ppm v/v			05/20/20 00:56	1.77
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00021	ppm v/v			05/20/20 00:56	1.77
1,2-Dichlorobenzene	ND		0.0014	0.00055	ppm v/v			05/20/20 00:56	1.77
1,3-Dichlorobenzene	ND		0.0014	0.00028	ppm v/v			05/20/20 00:56	1.77
1,4-Dichlorobenzene	ND		0.0014	0.00028	ppm v/v			05/20/20 00:56	1.77

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112843-001/MWL-SV04-200

Lab Sample ID: 140-19107-16

Date Collected: 05/11/20 09:32

Matrix: Air

Date Received: 05/15/20 11:00

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
Dichlorodifluoromethane	0.047		0.0014	0.00025	ppm v/v			05/20/20 00:56	1.77
1,1-Dichloroethane	0.0055		0.0014	0.00012	ppm v/v			05/20/20 00:56	1.77
1,2-Dichloroethane	ND		0.0014	0.00018	ppm v/v			05/20/20 00:56	1.77
1,1-Dichloroethene	0.029		0.0014	0.00014	ppm v/v			05/20/20 00:56	1.77
cis-1,2-Dichloroethene	0.0030		0.0014	0.00018	ppm v/v			05/20/20 00:56	1.77
trans-1,2-Dichloroethene	ND		0.0014	0.00012	ppm v/v			05/20/20 00:56	1.77
1,2-Dichloropropane	ND		0.0014	0.00018	ppm v/v			05/20/20 00:56	1.77
cis-1,3-Dichloropropene	ND		0.0014	0.00028	ppm v/v			05/20/20 00:56	1.77
trans-1,3-Dichloropropene	ND		0.0014	0.00016	ppm v/v			05/20/20 00:56	1.77
Ethylbenzene	ND		0.0014	0.00023	ppm v/v			05/20/20 00:56	1.77
4-Ethyltoluene	ND		0.0028	0.00037	ppm v/v			05/20/20 00:56	1.77
Hexachlorobutadiene	ND		0.0071	0.00057	ppm v/v			05/20/20 00:56	1.77
2-Hexanone	ND		0.0035	0.00028	ppm v/v			05/20/20 00:56	1.77
4-Methyl-2-pentanone (MIBK)	ND		0.0035	0.00096	ppm v/v			05/20/20 00:56	1.77
Methylene Chloride	0.0032	J	0.0071	0.0028	ppm v/v			05/20/20 00:56	1.77
Styrene	ND		0.0014	0.00042	ppm v/v			05/20/20 00:56	1.77
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00025	ppm v/v			05/20/20 00:56	1.77
Tetrachloroethene	0.13		0.0014	0.00012	ppm v/v			05/20/20 00:56	1.77
Toluene	ND		0.0021	0.0014	ppm v/v			05/20/20 00:56	1.77
1,1,2-Trichloro-1,2,2-trifluoroethane	0.15		0.0014	0.00014	ppm v/v			05/20/20 00:56	1.77
1,2,4-Trichlorobenzene	ND		0.0071	0.0011	ppm v/v			05/20/20 00:56	1.77
1,1,1-Trichloroethane	0.0022		0.0014	0.00065	ppm v/v			05/20/20 00:56	1.77
1,1,2-Trichloroethane	ND		0.0014	0.00012	ppm v/v			05/20/20 00:56	1.77
Trichloroethene	0.16		0.00071	0.00011	ppm v/v			05/20/20 00:56	1.77
Trichlorofluoromethane	0.048		0.0014	0.00019	ppm v/v			05/20/20 00:56	1.77
1,2,4-Trimethylbenzene	ND		0.0014	0.00035	ppm v/v			05/20/20 00:56	1.77
1,3,5-Trimethylbenzene	ND		0.0014	0.00039	ppm v/v			05/20/20 00:56	1.77
Vinyl acetate	ND		0.0071	0.00050	ppm v/v			05/20/20 00:56	1.77
Vinyl chloride	ND		0.00071	0.00046	ppm v/v			05/20/20 00:56	1.77
m,p-Xylene	ND		0.0014	0.00051	ppm v/v			05/20/20 00:56	1.77
o-Xylene	ND		0.0014	0.00027	ppm v/v			05/20/20 00:56	1.77

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		60 - 140		05/20/20 00:56	1.77

Client Sample ID: 112844-001/MWL-SV04-300

Lab Sample ID: 140-19107-17

Date Collected: 05/11/20 09:39

Matrix: Air

Date Received: 05/15/20 11:00

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		0.045	0.013	ppm v/v			05/19/20 17:51	1.78
Benzene	0.00047	J	0.0018	0.00018	ppm v/v			05/19/20 17:51	1.78
Benzyl chloride	ND		0.0036	0.00085	ppm v/v			05/19/20 17:51	1.78
Bromodichloromethane	ND		0.0018	0.00040	ppm v/v			05/19/20 17:51	1.78
Bromoform	ND		0.0018	0.00020	ppm v/v			05/19/20 17:51	1.78
Bromomethane	ND		0.0018	0.00049	ppm v/v			05/19/20 17:51	1.78

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112844-001/MWL-SV04-300

Lab Sample ID: 140-19107-17

Date Collected: 05/11/20 09:39

Matrix: Air

Date Received: 05/15/20 11:00

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
2-Butanone (MEK)	ND		0.0089	0.0016	ppm v/v			05/19/20 17:51	1.78
Carbon disulfide	ND		0.0045	0.00024	ppm v/v			05/19/20 17:51	1.78
Carbon tetrachloride	0.00024	J	0.0018	0.00016	ppm v/v			05/19/20 17:51	1.78
Chlorobenzene	ND		0.0018	0.00013	ppm v/v			05/19/20 17:51	1.78
Chloroethane	ND		0.0018	0.00065	ppm v/v			05/19/20 17:51	1.78
Chloroform	0.00092	J	0.0018	0.00016	ppm v/v			05/19/20 17:51	1.78
Chloromethane	ND		0.0045	0.0015	ppm v/v			05/19/20 17:51	1.78
Dibromochloromethane	ND		0.0018	0.00016	ppm v/v			05/19/20 17:51	1.78
1,2-Dibromoethane (EDB)	ND		0.0018	0.00016	ppm v/v			05/19/20 17:51	1.78
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*	0.0018	0.00027	ppm v/v			05/19/20 17:51	1.78
1,2-Dichlorobenzene	ND		0.0018	0.00069	ppm v/v			05/19/20 17:51	1.78
1,3-Dichlorobenzene	ND		0.0018	0.00036	ppm v/v			05/19/20 17:51	1.78
1,4-Dichlorobenzene	ND		0.0018	0.00036	ppm v/v			05/19/20 17:51	1.78
Dichlorodifluoromethane	0.027	*	0.0018	0.00031	ppm v/v			05/19/20 17:51	1.78
1,1-Dichloroethane	0.0015	J	0.0018	0.00016	ppm v/v			05/19/20 17:51	1.78
1,2-Dichloroethane	ND		0.0018	0.00022	ppm v/v			05/19/20 17:51	1.78
1,1-Dichloroethene	0.013		0.0018	0.00018	ppm v/v			05/19/20 17:51	1.78
cis-1,2-Dichloroethene	0.00094	J	0.0018	0.00022	ppm v/v			05/19/20 17:51	1.78
trans-1,2-Dichloroethene	ND		0.0018	0.00016	ppm v/v			05/19/20 17:51	1.78
1,2-Dichloropropane	ND		0.0018	0.00022	ppm v/v			05/19/20 17:51	1.78
cis-1,3-Dichloropropene	ND		0.0018	0.00036	ppm v/v			05/19/20 17:51	1.78
trans-1,3-Dichloropropene	ND		0.0018	0.00020	ppm v/v			05/19/20 17:51	1.78
Ethylbenzene	ND		0.0018	0.00029	ppm v/v			05/19/20 17:51	1.78
4-Ethyltoluene	ND		0.0036	0.00047	ppm v/v			05/19/20 17:51	1.78
Hexachlorobutadiene	ND		0.0089	0.00071	ppm v/v			05/19/20 17:51	1.78
2-Hexanone	ND		0.0045	0.00036	ppm v/v			05/19/20 17:51	1.78
4-Methyl-2-pentanone (MIBK)	ND		0.0045	0.0012	ppm v/v			05/19/20 17:51	1.78
Methylene Chloride	ND		0.0089	0.0036	ppm v/v			05/19/20 17:51	1.78
Styrene	ND		0.0018	0.00053	ppm v/v			05/19/20 17:51	1.78
1,1,2,2-Tetrachloroethane	ND		0.0018	0.00031	ppm v/v			05/19/20 17:51	1.78
Tetrachloroethene	0.11		0.0018	0.00016	ppm v/v			05/19/20 17:51	1.78
Toluene	ND		0.0027	0.0017	ppm v/v			05/19/20 17:51	1.78
1,1,2-Trichloro-1,2,2-trifluoroethane	0.078		0.0018	0.00018	ppm v/v			05/19/20 17:51	1.78
1,2,4-Trichlorobenzene	ND		0.0089	0.0014	ppm v/v			05/19/20 17:51	1.78
1,1,1-Trichloroethane	0.0011	J	0.0018	0.00082	ppm v/v			05/19/20 17:51	1.78
1,1,2-Trichloroethane	ND		0.0018	0.00016	ppm v/v			05/19/20 17:51	1.78
Trichloroethene	0.089		0.00089	0.00013	ppm v/v			05/19/20 17:51	1.78
Trichlorofluoromethane	0.019		0.0018	0.00024	ppm v/v			05/19/20 17:51	1.78
1,2,4-Trimethylbenzene	ND		0.0018	0.00045	ppm v/v			05/19/20 17:51	1.78
1,3,5-Trimethylbenzene	ND		0.0018	0.00049	ppm v/v			05/19/20 17:51	1.78
Vinyl acetate	ND		0.0089	0.00062	ppm v/v			05/19/20 17:51	1.78
Vinyl chloride	ND		0.00089	0.00058	ppm v/v			05/19/20 17:51	1.78
m,p-Xylene	ND		0.0018	0.00065	ppm v/v			05/19/20 17:51	1.78
o-Xylene	ND		0.0018	0.00033	ppm v/v			05/19/20 17:51	1.78

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		60 - 140		05/19/20 17:51	1.78

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112845-001/MWL-SV04-400

Lab Sample ID: 140-19107-18

Date Collected: 05/11/20 09:43

Matrix: Air

Date Received: 05/15/20 11:00

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		0.044	0.013	ppm v/v			05/19/20 18:38	1.77
<b>Benzene</b>	<b>0.00072</b>	<b>J</b>	0.0018	0.00018	ppm v/v			05/19/20 18:38	1.77
Benzyl chloride	ND		0.0035	0.00084	ppm v/v			05/19/20 18:38	1.77
Bromodichloromethane	ND		0.0018	0.00040	ppm v/v			05/19/20 18:38	1.77
Bromoform	ND		0.0018	0.00020	ppm v/v			05/19/20 18:38	1.77
Bromomethane	ND		0.0018	0.00049	ppm v/v			05/19/20 18:38	1.77
2-Butanone (MEK)	ND		0.0089	0.0016	ppm v/v			05/19/20 18:38	1.77
<b>Carbon disulfide</b>	<b>0.0013</b>	<b>J</b>	0.0044	0.00024	ppm v/v			05/19/20 18:38	1.77
Carbon tetrachloride	ND		0.0018	0.00015	ppm v/v			05/19/20 18:38	1.77
Chlorobenzene	ND		0.0018	0.00013	ppm v/v			05/19/20 18:38	1.77
Chloroethane	ND		0.0018	0.00064	ppm v/v			05/19/20 18:38	1.77
<b>Chloroform</b>	<b>0.00099</b>	<b>J</b>	0.0018	0.00015	ppm v/v			05/19/20 18:38	1.77
Chloromethane	ND		0.0044	0.0015	ppm v/v			05/19/20 18:38	1.77
Dibromochloromethane	ND		0.0018	0.00015	ppm v/v			05/19/20 18:38	1.77
1,2-Dibromoethane (EDB)	ND		0.0018	0.00015	ppm v/v			05/19/20 18:38	1.77
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*	0.0018	0.00027	ppm v/v			05/19/20 18:38	1.77
1,2-Dichlorobenzene	ND		0.0018	0.00069	ppm v/v			05/19/20 18:38	1.77
1,3-Dichlorobenzene	ND		0.0018	0.00035	ppm v/v			05/19/20 18:38	1.77
1,4-Dichlorobenzene	ND		0.0018	0.00035	ppm v/v			05/19/20 18:38	1.77
<b>Dichlorodifluoromethane</b>	<b>0.025</b>	<b>*</b>	0.0018	0.00031	ppm v/v			05/19/20 18:38	1.77
<b>1,1-Dichloroethane</b>	<b>0.0012</b>	<b>J</b>	0.0018	0.00015	ppm v/v			05/19/20 18:38	1.77
1,2-Dichloroethane	ND		0.0018	0.00022	ppm v/v			05/19/20 18:38	1.77
<b>1,1-Dichloroethene</b>	<b>0.0086</b>		0.0018	0.00018	ppm v/v			05/19/20 18:38	1.77
<b>cis-1,2-Dichloroethene</b>	<b>0.00098</b>	<b>J</b>	0.0018	0.00022	ppm v/v			05/19/20 18:38	1.77
trans-1,2-Dichloroethene	ND		0.0018	0.00015	ppm v/v			05/19/20 18:38	1.77
1,2-Dichloropropane	ND		0.0018	0.00022	ppm v/v			05/19/20 18:38	1.77
cis-1,3-Dichloropropene	ND		0.0018	0.00035	ppm v/v			05/19/20 18:38	1.77
trans-1,3-Dichloropropene	ND		0.0018	0.00020	ppm v/v			05/19/20 18:38	1.77
Ethylbenzene	ND		0.0018	0.00029	ppm v/v			05/19/20 18:38	1.77
4-Ethyltoluene	ND		0.0035	0.00046	ppm v/v			05/19/20 18:38	1.77
Hexachlorobutadiene	ND		0.0089	0.00071	ppm v/v			05/19/20 18:38	1.77
2-Hexanone	ND		0.0044	0.00035	ppm v/v			05/19/20 18:38	1.77
<b>4-Methyl-2-pentanone (MIBK)</b>	<b>0.0026</b>	<b>J</b>	0.0044	0.0012	ppm v/v			05/19/20 18:38	1.77
Methylene Chloride	ND		0.0089	0.0035	ppm v/v			05/19/20 18:38	1.77
Styrene	ND		0.0018	0.00053	ppm v/v			05/19/20 18:38	1.77
1,1,2,2-Tetrachloroethane	ND		0.0018	0.00031	ppm v/v			05/19/20 18:38	1.77
<b>Tetrachloroethene</b>	<b>0.12</b>		0.0018	0.00015	ppm v/v			05/19/20 18:38	1.77
Toluene	ND		0.0027	0.0017	ppm v/v			05/19/20 18:38	1.77
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.080</b>		0.0018	0.00018	ppm v/v			05/19/20 18:38	1.77
1,2,4-Trichlorobenzene	ND		0.0089	0.0014	ppm v/v			05/19/20 18:38	1.77
<b>1,1,1-Trichloroethane</b>	<b>0.00095</b>	<b>J</b>	0.0018	0.00082	ppm v/v			05/19/20 18:38	1.77
1,1,2-Trichloroethane	ND		0.0018	0.00015	ppm v/v			05/19/20 18:38	1.77
<b>Trichloroethene</b>	<b>0.080</b>		0.00089	0.00013	ppm v/v			05/19/20 18:38	1.77
<b>Trichlorofluoromethane</b>	<b>0.018</b>		0.0018	0.00024	ppm v/v			05/19/20 18:38	1.77
1,2,4-Trimethylbenzene	ND		0.0018	0.00044	ppm v/v			05/19/20 18:38	1.77
1,3,5-Trimethylbenzene	ND		0.0018	0.00049	ppm v/v			05/19/20 18:38	1.77
Vinyl acetate	ND		0.0089	0.00062	ppm v/v			05/19/20 18:38	1.77
Vinyl chloride	ND		0.00089	0.00058	ppm v/v			05/19/20 18:38	1.77

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112845-001/MWL-SV04-400**

**Lab Sample ID: 140-19107-18**

**Date Collected: 05/11/20 09:43**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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		0.0018	0.00064	ppm v/v			05/19/20 18:38	1.77
o-Xylene	ND		0.0018	0.00033	ppm v/v			05/19/20 18:38	1.77
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		60 - 140					05/19/20 18:38	1.77

**Client Sample ID: 112849-001/MWL-FB5**

**Lab Sample ID: 140-19107-19**

**Date Collected: 05/11/20 09:53**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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		0.0020	0.00057	ppm v/v			05/19/20 19:34	1.84
Benzene	ND		0.000080	0.0000080	ppm v/v			05/19/20 19:34	1.84
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			05/19/20 19:34	1.84
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			05/19/20 19:34	1.84
Bromoform	ND		0.000080	0.0000090	ppm v/v			05/19/20 19:34	1.84
Bromomethane	ND		0.000080	0.000022	ppm v/v			05/19/20 19:34	1.84
2-Butanone (MEK)	ND		0.00040	0.000073	ppm v/v			05/19/20 19:34	1.84
Carbon disulfide	ND		0.00020	0.000011	ppm v/v			05/19/20 19:34	1.84
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			05/19/20 19:34	1.84
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			05/19/20 19:34	1.84
Chloroethane	ND		0.000080	0.000029	ppm v/v			05/19/20 19:34	1.84
Chloroform	ND		0.000080	0.0000070	ppm v/v			05/19/20 19:34	1.84
Chloromethane	ND		0.00020	0.000066	ppm v/v			05/19/20 19:34	1.84
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 19:34	1.84
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			05/19/20 19:34	1.84
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*	0.000080	0.000012	ppm v/v			05/19/20 19:34	1.84
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			05/19/20 19:34	1.84
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 19:34	1.84
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			05/19/20 19:34	1.84
Dichlorodifluoromethane	ND	*	0.000080	0.000014	ppm v/v			05/19/20 19:34	1.84
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 19:34	1.84
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			05/19/20 19:34	1.84
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			05/19/20 19:34	1.84
cis-1,2-Dichloroethene	ND		0.000080	0.000010	ppm v/v			05/19/20 19:34	1.84
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			05/19/20 19:34	1.84
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			05/19/20 19:34	1.84
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			05/19/20 19:34	1.84
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			05/19/20 19:34	1.84
Ethylbenzene	ND		0.000080	0.000013	ppm v/v			05/19/20 19:34	1.84
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			05/19/20 19:34	1.84
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			05/19/20 19:34	1.84
2-Hexanone	ND		0.00020	0.000016	ppm v/v			05/19/20 19:34	1.84
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			05/19/20 19:34	1.84
Methylene Chloride	0.00051		0.00040	0.00016	ppm v/v			05/19/20 19:34	1.84
Styrene	ND		0.000080	0.000024	ppm v/v			05/19/20 19:34	1.84
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			05/19/20 19:34	1.84

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112849-001/MWL-FB5

Lab Sample ID: 140-19107-19

Date Collected: 05/11/20 09:53

Matrix: Air

Date Received: 05/15/20 11:00

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	0.000044	J	0.000080	0.0000070	ppm v/v			05/19/20 19:34	1.84
Toluene	ND		0.00012	0.000078	ppm v/v			05/19/20 19:34	1.84
1,1,2-Trichloro-1,2,2-trifluoroethane	0.000023	J	0.000080	0.0000080	ppm v/v			05/19/20 19:34	1.84
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			05/19/20 19:34	1.84
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			05/19/20 19:34	1.84
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			05/19/20 19:34	1.84
Trichloroethene	0.000054		0.000040	0.0000060	ppm v/v			05/19/20 19:34	1.84
Trichlorofluoromethane	0.000013	J	0.000080	0.000011	ppm v/v			05/19/20 19:34	1.84
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			05/19/20 19:34	1.84
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			05/19/20 19:34	1.84
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			05/19/20 19:34	1.84
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			05/19/20 19:34	1.84
m,p-Xylene	ND		0.000080	0.000029	ppm v/v			05/19/20 19:34	1.84
o-Xylene	ND		0.000080	0.000015	ppm v/v			05/19/20 19:34	1.84
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		60 - 140					05/19/20 19:34	1.84

Client Sample ID: 112850-001/MWL-SV05-50

Lab Sample ID: 140-19107-20

Date Collected: 05/11/20 09:57

Matrix: Air

Date Received: 05/15/20 11:00

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		0.044	0.013	ppm v/v			05/19/20 20:22	1.77
Benzene	0.00027	J	0.0018	0.00018	ppm v/v			05/19/20 20:22	1.77
Benzyl chloride	ND		0.0035	0.00084	ppm v/v			05/19/20 20:22	1.77
Bromodichloromethane	ND		0.0018	0.00040	ppm v/v			05/19/20 20:22	1.77
Bromoform	ND		0.0018	0.00020	ppm v/v			05/19/20 20:22	1.77
Bromomethane	ND		0.0018	0.00049	ppm v/v			05/19/20 20:22	1.77
2-Butanone (MEK)	ND		0.0089	0.0016	ppm v/v			05/19/20 20:22	1.77
Carbon disulfide	ND		0.0044	0.00024	ppm v/v			05/19/20 20:22	1.77
Carbon tetrachloride	0.00024	J	0.0018	0.00015	ppm v/v			05/19/20 20:22	1.77
Chlorobenzene	ND		0.0018	0.00013	ppm v/v			05/19/20 20:22	1.77
Chloroethane	ND		0.0018	0.00064	ppm v/v			05/19/20 20:22	1.77
Chloroform	0.00095	J	0.0018	0.00015	ppm v/v			05/19/20 20:22	1.77
Chloromethane	ND		0.0044	0.0015	ppm v/v			05/19/20 20:22	1.77
Dibromochloromethane	ND		0.0018	0.00015	ppm v/v			05/19/20 20:22	1.77
1,2-Dibromoethane (EDB)	ND		0.0018	0.00015	ppm v/v			05/19/20 20:22	1.77
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*	0.0018	0.00027	ppm v/v			05/19/20 20:22	1.77
1,2-Dichlorobenzene	ND		0.0018	0.00069	ppm v/v			05/19/20 20:22	1.77
1,3-Dichlorobenzene	ND		0.0018	0.00035	ppm v/v			05/19/20 20:22	1.77
1,4-Dichlorobenzene	ND		0.0018	0.00035	ppm v/v			05/19/20 20:22	1.77
Dichlorodifluoromethane	0.043	*	0.0018	0.00031	ppm v/v			05/19/20 20:22	1.77
1,1-Dichloroethane	0.0013	J	0.0018	0.00015	ppm v/v			05/19/20 20:22	1.77
1,2-Dichloroethane	ND		0.0018	0.00022	ppm v/v			05/19/20 20:22	1.77
1,1-Dichloroethene	0.0077		0.0018	0.00018	ppm v/v			05/19/20 20:22	1.77

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112850-001/MWL-SV05-50

Lab Sample ID: 140-19107-20

Date Collected: 05/11/20 09:57

Matrix: Air

Date Received: 05/15/20 11:00

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>cis-1,2-Dichloroethene</b>	<b>0.00044</b>	<b>J</b>	0.0018	0.00022	ppm v/v			05/19/20 20:22	1.77
trans-1,2-Dichloroethene	ND		0.0018	0.00015	ppm v/v			05/19/20 20:22	1.77
1,2-Dichloropropane	ND		0.0018	0.00022	ppm v/v			05/19/20 20:22	1.77
cis-1,3-Dichloropropene	ND		0.0018	0.00035	ppm v/v			05/19/20 20:22	1.77
trans-1,3-Dichloropropene	ND		0.0018	0.00020	ppm v/v			05/19/20 20:22	1.77
Ethylbenzene	ND		0.0018	0.00029	ppm v/v			05/19/20 20:22	1.77
4-Ethyltoluene	ND		0.0035	0.00046	ppm v/v			05/19/20 20:22	1.77
Hexachlorobutadiene	ND		0.0089	0.00071	ppm v/v			05/19/20 20:22	1.77
2-Hexanone	ND		0.0044	0.00035	ppm v/v			05/19/20 20:22	1.77
4-Methyl-2-pentanone (MIBK)	ND		0.0044	0.0012	ppm v/v			05/19/20 20:22	1.77
Methylene Chloride	ND		0.0089	0.0035	ppm v/v			05/19/20 20:22	1.77
Styrene	ND		0.0018	0.00053	ppm v/v			05/19/20 20:22	1.77
1,1,2,2-Tetrachloroethane	ND		0.0018	0.00031	ppm v/v			05/19/20 20:22	1.77
<b>Tetrachloroethene</b>	<b>0.035</b>		0.0018	0.00015	ppm v/v			05/19/20 20:22	1.77
Toluene	ND		0.0027	0.0017	ppm v/v			05/19/20 20:22	1.77
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.035</b>		0.0018	0.00018	ppm v/v			05/19/20 20:22	1.77
1,2,4-Trichlorobenzene	ND		0.0089	0.0014	ppm v/v			05/19/20 20:22	1.77
<b>1,1,1-Trichloroethane</b>	<b>0.0096</b>		0.0018	0.00082	ppm v/v			05/19/20 20:22	1.77
1,1,2-Trichloroethane	ND		0.0018	0.00015	ppm v/v			05/19/20 20:22	1.77
<b>Trichloroethene</b>	<b>0.047</b>		0.00089	0.00013	ppm v/v			05/19/20 20:22	1.77
<b>Trichlorofluoromethane</b>	<b>0.099</b>		0.0018	0.00024	ppm v/v			05/19/20 20:22	1.77
1,2,4-Trimethylbenzene	ND		0.0018	0.00044	ppm v/v			05/19/20 20:22	1.77
1,3,5-Trimethylbenzene	ND		0.0018	0.00049	ppm v/v			05/19/20 20:22	1.77
Vinyl acetate	ND		0.0089	0.00062	ppm v/v			05/19/20 20:22	1.77
Vinyl chloride	ND		0.00089	0.00058	ppm v/v			05/19/20 20:22	1.77
m,p-Xylene	ND		0.0018	0.00064	ppm v/v			05/19/20 20:22	1.77
o-Xylene	ND		0.0018	0.00033	ppm v/v			05/19/20 20:22	1.77
<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)	93		60 - 140					05/19/20 20:22	1.77

Client Sample ID: 112851-001/MWL-SV05-100

Lab Sample ID: 140-19107-21

Date Collected: 05/11/20 10:01

Matrix: Air

Date Received: 05/15/20 11:00

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		0.043	0.012	ppm v/v			05/19/20 21:09	1.73
<b>Benzene</b>	<b>0.00036</b>	<b>J</b>	0.0017	0.00017	ppm v/v			05/19/20 21:09	1.73
Benzyl chloride	ND		0.0035	0.00082	ppm v/v			05/19/20 21:09	1.73
Bromodichloromethane	ND		0.0017	0.00039	ppm v/v			05/19/20 21:09	1.73
Bromoform	ND		0.0017	0.00019	ppm v/v			05/19/20 21:09	1.73
Bromomethane	ND		0.0017	0.00048	ppm v/v			05/19/20 21:09	1.73
2-Butanone (MEK)	ND		0.0087	0.0016	ppm v/v			05/19/20 21:09	1.73
Carbon disulfide	ND		0.0043	0.00024	ppm v/v			05/19/20 21:09	1.73
<b>Carbon tetrachloride</b>	<b>0.00046</b>	<b>J</b>	0.0017	0.00015	ppm v/v			05/19/20 21:09	1.73
Chlorobenzene	ND		0.0017	0.00013	ppm v/v			05/19/20 21:09	1.73

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112851-001/MWL-SV05-100

Lab Sample ID: 140-19107-21

Date Collected: 05/11/20 10:01

Matrix: Air

Date Received: 05/15/20 11:00

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		0.0017	0.00063	ppm v/v			05/19/20 21:09	1.73
<b>Chloroform</b>	<b>0.0019</b>		0.0017	0.00015	ppm v/v			05/19/20 21:09	1.73
Chloromethane	ND		0.0043	0.0014	ppm v/v			05/19/20 21:09	1.73
Dibromochloromethane	ND		0.0017	0.00015	ppm v/v			05/19/20 21:09	1.73
1,2-Dibromoethane (EDB)	ND		0.0017	0.00015	ppm v/v			05/19/20 21:09	1.73
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*	0.0017	0.00026	ppm v/v			05/19/20 21:09	1.73
1,2-Dichlorobenzene	ND		0.0017	0.00067	ppm v/v			05/19/20 21:09	1.73
1,3-Dichlorobenzene	ND		0.0017	0.00035	ppm v/v			05/19/20 21:09	1.73
1,4-Dichlorobenzene	ND		0.0017	0.00035	ppm v/v			05/19/20 21:09	1.73
<b>Dichlorodifluoromethane</b>	<b>0.074</b>	*	0.0017	0.00030	ppm v/v			05/19/20 21:09	1.73
<b>1,1-Dichloroethane</b>	<b>0.0035</b>		0.0017	0.00015	ppm v/v			05/19/20 21:09	1.73
1,2-Dichloroethane	ND		0.0017	0.00022	ppm v/v			05/19/20 21:09	1.73
<b>1,1-Dichloroethene</b>	<b>0.019</b>		0.0017	0.00017	ppm v/v			05/19/20 21:09	1.73
<b>cis-1,2-Dichloroethene</b>	<b>0.0011</b>	J	0.0017	0.00022	ppm v/v			05/19/20 21:09	1.73
trans-1,2-Dichloroethene	ND		0.0017	0.00015	ppm v/v			05/19/20 21:09	1.73
1,2-Dichloropropane	ND		0.0017	0.00022	ppm v/v			05/19/20 21:09	1.73
cis-1,3-Dichloropropene	ND		0.0017	0.00035	ppm v/v			05/19/20 21:09	1.73
trans-1,3-Dichloropropene	ND		0.0017	0.00019	ppm v/v			05/19/20 21:09	1.73
Ethylbenzene	ND		0.0017	0.00028	ppm v/v			05/19/20 21:09	1.73
4-Ethyltoluene	ND		0.0035	0.00045	ppm v/v			05/19/20 21:09	1.73
Hexachlorobutadiene	ND		0.0087	0.00069	ppm v/v			05/19/20 21:09	1.73
2-Hexanone	ND		0.0043	0.00035	ppm v/v			05/19/20 21:09	1.73
4-Methyl-2-pentanone (MIBK)	ND		0.0043	0.0012	ppm v/v			05/19/20 21:09	1.73
Methylene Chloride	ND		0.0087	0.0035	ppm v/v			05/19/20 21:09	1.73
Styrene	ND		0.0017	0.00052	ppm v/v			05/19/20 21:09	1.73
1,1,2,2-Tetrachloroethane	ND		0.0017	0.00030	ppm v/v			05/19/20 21:09	1.73
<b>Tetrachloroethene</b>	<b>0.079</b>		0.0017	0.00015	ppm v/v			05/19/20 21:09	1.73
Toluene	ND		0.0026	0.0017	ppm v/v			05/19/20 21:09	1.73
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.082</b>		0.0017	0.00017	ppm v/v			05/19/20 21:09	1.73
1,2,4-Trichlorobenzene	ND		0.0087	0.0014	ppm v/v			05/19/20 21:09	1.73
<b>1,1,1-Trichloroethane</b>	<b>0.012</b>		0.0017	0.00080	ppm v/v			05/19/20 21:09	1.73
1,1,2-Trichloroethane	ND		0.0017	0.00015	ppm v/v			05/19/20 21:09	1.73
<b>Trichloroethene</b>	<b>0.10</b>		0.00087	0.00013	ppm v/v			05/19/20 21:09	1.73
<b>Trichlorofluoromethane</b>	<b>0.15</b>		0.0017	0.00024	ppm v/v			05/19/20 21:09	1.73
1,2,4-Trimethylbenzene	ND		0.0017	0.00043	ppm v/v			05/19/20 21:09	1.73
1,3,5-Trimethylbenzene	ND		0.0017	0.00048	ppm v/v			05/19/20 21:09	1.73
Vinyl acetate	ND		0.0087	0.00061	ppm v/v			05/19/20 21:09	1.73
Vinyl chloride	ND		0.00087	0.00056	ppm v/v			05/19/20 21:09	1.73
m,p-Xylene	ND		0.0017	0.00063	ppm v/v			05/19/20 21:09	1.73
o-Xylene	ND		0.0017	0.00032	ppm v/v			05/19/20 21:09	1.73

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		60 - 140		05/19/20 21:09	1.73

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112852-001/MWL-SV05-200

Lab Sample ID: 140-19107-22

Date Collected: 05/11/20 10:04

Matrix: Air

Date Received: 05/15/20 11:00

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		0.045	0.013	ppm v/v			05/19/20 21:57	1.78
<b>Benzene</b>	<b>0.00039</b>	<b>J</b>	0.0018	0.00018	ppm v/v			05/19/20 21:57	1.78
Benzyl chloride	ND		0.0036	0.00085	ppm v/v			05/19/20 21:57	1.78
Bromodichloromethane	ND		0.0018	0.00040	ppm v/v			05/19/20 21:57	1.78
Bromoform	ND		0.0018	0.00020	ppm v/v			05/19/20 21:57	1.78
Bromomethane	ND		0.0018	0.00049	ppm v/v			05/19/20 21:57	1.78
2-Butanone (MEK)	ND		0.0089	0.0016	ppm v/v			05/19/20 21:57	1.78
Carbon disulfide	ND		0.0045	0.00024	ppm v/v			05/19/20 21:57	1.78
<b>Carbon tetrachloride</b>	<b>0.00084</b>	<b>J</b>	0.0018	0.00016	ppm v/v			05/19/20 21:57	1.78
Chlorobenzene	ND		0.0018	0.00013	ppm v/v			05/19/20 21:57	1.78
Chloroethane	ND		0.0018	0.00065	ppm v/v			05/19/20 21:57	1.78
<b>Chloroform</b>	<b>0.0019</b>		0.0018	0.00016	ppm v/v			05/19/20 21:57	1.78
Chloromethane	ND		0.0045	0.0015	ppm v/v			05/19/20 21:57	1.78
Dibromochloromethane	ND		0.0018	0.00016	ppm v/v			05/19/20 21:57	1.78
1,2-Dibromoethane (EDB)	ND		0.0018	0.00016	ppm v/v			05/19/20 21:57	1.78
<b>1,2-Dichloro-1,1,2,2-tetrafluoroethane</b>	<b>0.00037</b>	<b>J *</b>	0.0018	0.00027	ppm v/v			05/19/20 21:57	1.78
1,2-Dichlorobenzene	ND		0.0018	0.00069	ppm v/v			05/19/20 21:57	1.78
1,3-Dichlorobenzene	ND		0.0018	0.00036	ppm v/v			05/19/20 21:57	1.78
1,4-Dichlorobenzene	ND		0.0018	0.00036	ppm v/v			05/19/20 21:57	1.78
<b>Dichlorodifluoromethane</b>	<b>0.071</b>	<b>*</b>	0.0018	0.00031	ppm v/v			05/19/20 21:57	1.78
<b>1,1-Dichloroethane</b>	<b>0.0051</b>		0.0018	0.00016	ppm v/v			05/19/20 21:57	1.78
1,2-Dichloroethane	ND		0.0018	0.00022	ppm v/v			05/19/20 21:57	1.78
<b>1,1-Dichloroethene</b>	<b>0.034</b>		0.0018	0.00018	ppm v/v			05/19/20 21:57	1.78
<b>cis-1,2-Dichloroethene</b>	<b>0.0022</b>		0.0018	0.00022	ppm v/v			05/19/20 21:57	1.78
trans-1,2-Dichloroethene	ND		0.0018	0.00016	ppm v/v			05/19/20 21:57	1.78
1,2-Dichloropropane	ND		0.0018	0.00022	ppm v/v			05/19/20 21:57	1.78
cis-1,3-Dichloropropene	ND		0.0018	0.00036	ppm v/v			05/19/20 21:57	1.78
trans-1,3-Dichloropropene	ND		0.0018	0.00020	ppm v/v			05/19/20 21:57	1.78
Ethylbenzene	ND		0.0018	0.00029	ppm v/v			05/19/20 21:57	1.78
4-Ethyltoluene	ND		0.0036	0.00047	ppm v/v			05/19/20 21:57	1.78
Hexachlorobutadiene	ND		0.0089	0.00071	ppm v/v			05/19/20 21:57	1.78
2-Hexanone	ND		0.0045	0.00036	ppm v/v			05/19/20 21:57	1.78
4-Methyl-2-pentanone (MIBK)	ND		0.0045	0.0012	ppm v/v			05/19/20 21:57	1.78
Methylene Chloride	ND		0.0089	0.0036	ppm v/v			05/19/20 21:57	1.78
Styrene	ND		0.0018	0.00053	ppm v/v			05/19/20 21:57	1.78
1,1,2,2-Tetrachloroethane	ND		0.0018	0.00031	ppm v/v			05/19/20 21:57	1.78
<b>Tetrachloroethene</b>	<b>0.12</b>		0.0018	0.00016	ppm v/v			05/19/20 21:57	1.78
Toluene	ND		0.0027	0.0017	ppm v/v			05/19/20 21:57	1.78
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.14</b>		0.0018	0.00018	ppm v/v			05/19/20 21:57	1.78
1,2,4-Trichlorobenzene	ND		0.0089	0.0014	ppm v/v			05/19/20 21:57	1.78
<b>1,1,1-Trichloroethane</b>	<b>0.0035</b>		0.0018	0.00082	ppm v/v			05/19/20 21:57	1.78
1,1,2-Trichloroethane	ND		0.0018	0.00016	ppm v/v			05/19/20 21:57	1.78
<b>Trichloroethene</b>	<b>0.18</b>		0.00089	0.00013	ppm v/v			05/19/20 21:57	1.78
<b>Trichlorofluoromethane</b>	<b>0.094</b>		0.0018	0.00024	ppm v/v			05/19/20 21:57	1.78
1,2,4-Trimethylbenzene	ND		0.0018	0.00045	ppm v/v			05/19/20 21:57	1.78
1,3,5-Trimethylbenzene	ND		0.0018	0.00049	ppm v/v			05/19/20 21:57	1.78
Vinyl acetate	ND		0.0089	0.00062	ppm v/v			05/19/20 21:57	1.78

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

**Client Sample ID: 112852-001/MWL-SV05-200**

**Lab Sample ID: 140-19107-22**

**Date Collected: 05/11/20 10:04**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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
Vinyl chloride	ND		0.00089	0.00058	ppm v/v			05/19/20 21:57	1.78
m,p-Xylene	ND		0.0018	0.00065	ppm v/v			05/19/20 21:57	1.78
o-Xylene	ND		0.0018	0.00033	ppm v/v			05/19/20 21:57	1.78
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		60 - 140					05/19/20 21:57	1.78

**Client Sample ID: 112853-001/MWL-SV05-300**

**Lab Sample ID: 140-19107-23**

**Date Collected: 05/11/20 10:07**

**Matrix: Air**

**Date Received: 05/15/20 11:00**

**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		0.044	0.012	ppm v/v			05/19/20 22:45	1.76
<b>Benzene</b>	<b>0.00059</b>	<b>J</b>	0.0018	0.00018	ppm v/v			05/19/20 22:45	1.76
Benzyl chloride	ND		0.0035	0.00084	ppm v/v			05/19/20 22:45	1.76
Bromodichloromethane	ND		0.0018	0.00040	ppm v/v			05/19/20 22:45	1.76
Bromoform	ND		0.0018	0.00020	ppm v/v			05/19/20 22:45	1.76
Bromomethane	ND		0.0018	0.00048	ppm v/v			05/19/20 22:45	1.76
2-Butanone (MEK)	ND		0.0088	0.0016	ppm v/v			05/19/20 22:45	1.76
<b>Carbon disulfide</b>	<b>0.00029</b>	<b>J</b>	0.0044	0.00024	ppm v/v			05/19/20 22:45	1.76
<b>Carbon tetrachloride</b>	<b>0.0011</b>	<b>J</b>	0.0018	0.00015	ppm v/v			05/19/20 22:45	1.76
Chlorobenzene	ND		0.0018	0.00013	ppm v/v			05/19/20 22:45	1.76
Chloroethane	ND		0.0018	0.00064	ppm v/v			05/19/20 22:45	1.76
<b>Chloroform</b>	<b>0.0011</b>	<b>J</b>	0.0018	0.00015	ppm v/v			05/19/20 22:45	1.76
Chloromethane	ND		0.0044	0.0015	ppm v/v			05/19/20 22:45	1.76
Dibromochloromethane	ND		0.0018	0.00015	ppm v/v			05/19/20 22:45	1.76
1,2-Dibromoethane (EDB)	ND		0.0018	0.00015	ppm v/v			05/19/20 22:45	1.76
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*	0.0018	0.00026	ppm v/v			05/19/20 22:45	1.76
1,2-Dichlorobenzene	ND		0.0018	0.00068	ppm v/v			05/19/20 22:45	1.76
1,3-Dichlorobenzene	ND		0.0018	0.00035	ppm v/v			05/19/20 22:45	1.76
1,4-Dichlorobenzene	ND		0.0018	0.00035	ppm v/v			05/19/20 22:45	1.76
<b>Dichlorodifluoromethane</b>	<b>0.042</b>	<b>*</b>	0.0018	0.00031	ppm v/v			05/19/20 22:45	1.76
<b>1,1-Dichloroethane</b>	<b>0.0026</b>		0.0018	0.00015	ppm v/v			05/19/20 22:45	1.76
1,2-Dichloroethane	ND		0.0018	0.00022	ppm v/v			05/19/20 22:45	1.76
<b>1,1-Dichloroethene</b>	<b>0.025</b>		0.0018	0.00018	ppm v/v			05/19/20 22:45	1.76
<b>cis-1,2-Dichloroethene</b>	<b>0.0010</b>	<b>J</b>	0.0018	0.00022	ppm v/v			05/19/20 22:45	1.76
trans-1,2-Dichloroethene	ND		0.0018	0.00015	ppm v/v			05/19/20 22:45	1.76
1,2-Dichloropropane	ND		0.0018	0.00022	ppm v/v			05/19/20 22:45	1.76
cis-1,3-Dichloropropene	ND		0.0018	0.00035	ppm v/v			05/19/20 22:45	1.76
trans-1,3-Dichloropropene	ND		0.0018	0.00020	ppm v/v			05/19/20 22:45	1.76
Ethylbenzene	ND		0.0018	0.00029	ppm v/v			05/19/20 22:45	1.76
4-Ethyltoluene	ND		0.0035	0.00046	ppm v/v			05/19/20 22:45	1.76
Hexachlorobutadiene	ND		0.0088	0.00070	ppm v/v			05/19/20 22:45	1.76
<b>2-Hexanone</b>	<b>0.00045</b>	<b>J</b>	0.0044	0.00035	ppm v/v			05/19/20 22:45	1.76
4-Methyl-2-pentanone (MIBK)	ND		0.0044	0.0012	ppm v/v			05/19/20 22:45	1.76
Methylene Chloride	ND		0.0088	0.0035	ppm v/v			05/19/20 22:45	1.76
Styrene	ND		0.0018	0.00053	ppm v/v			05/19/20 22:45	1.76

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112853-001/MWL-SV05-300

Lab Sample ID: 140-19107-23

Date Collected: 05/11/20 10:07

Matrix: Air

Date Received: 05/15/20 11:00

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		0.0018	0.00031	ppm v/v			05/19/20 22:45	1.76
<b>Tetrachloroethene</b>	<b>0.11</b>		0.0018	0.00015	ppm v/v			05/19/20 22:45	1.76
Toluene	ND		0.0026	0.0017	ppm v/v			05/19/20 22:45	1.76
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.11</b>		0.0018	0.00018	ppm v/v			05/19/20 22:45	1.76
1,2,4-Trichlorobenzene	ND		0.0088	0.0014	ppm v/v			05/19/20 22:45	1.76
<b>1,1,1-Trichloroethane</b>	<b>0.0017</b>	<b>J</b>	0.0018	0.00081	ppm v/v			05/19/20 22:45	1.76
1,1,2-Trichloroethane	ND		0.0018	0.00015	ppm v/v			05/19/20 22:45	1.76
<b>Trichloroethene</b>	<b>0.13</b>		0.00088	0.00013	ppm v/v			05/19/20 22:45	1.76
<b>Trichlorofluoromethane</b>	<b>0.038</b>		0.0018	0.00024	ppm v/v			05/19/20 22:45	1.76
1,2,4-Trimethylbenzene	ND		0.0018	0.00044	ppm v/v			05/19/20 22:45	1.76
1,3,5-Trimethylbenzene	ND		0.0018	0.00048	ppm v/v			05/19/20 22:45	1.76
Vinyl acetate	ND		0.0088	0.00062	ppm v/v			05/19/20 22:45	1.76
Vinyl chloride	ND		0.00088	0.00057	ppm v/v			05/19/20 22:45	1.76
m,p-Xylene	ND		0.0018	0.00064	ppm v/v			05/19/20 22:45	1.76
o-Xylene	ND		0.0018	0.00033	ppm v/v			05/19/20 22:45	1.76
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140					05/19/20 22:45	1.76

Client Sample ID: 112854-001/MWL-SV05-400

Lab Sample ID: 140-19107-24

Date Collected: 05/11/20 10:11

Matrix: Air

Date Received: 05/15/20 11:00

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>0.023</b>	<b>J</b>	0.044	0.012	ppm v/v			05/19/20 23:33	1.74
<b>Benzene</b>	<b>0.00039</b>	<b>J</b>	0.0017	0.00017	ppm v/v			05/19/20 23:33	1.74
Benzyl chloride	ND		0.0035	0.00083	ppm v/v			05/19/20 23:33	1.74
Bromodichloromethane	ND		0.0017	0.00039	ppm v/v			05/19/20 23:33	1.74
Bromoform	ND		0.0017	0.00020	ppm v/v			05/19/20 23:33	1.74
Bromomethane	ND		0.0017	0.00048	ppm v/v			05/19/20 23:33	1.74
<b>2-Butanone (MEK)</b>	<b>0.0035</b>	<b>J</b>	0.0087	0.0016	ppm v/v			05/19/20 23:33	1.74
<b>Carbon disulfide</b>	<b>0.00026</b>	<b>J</b>	0.0044	0.00024	ppm v/v			05/19/20 23:33	1.74
<b>Carbon tetrachloride</b>	<b>0.00059</b>	<b>J</b>	0.0017	0.00015	ppm v/v			05/19/20 23:33	1.74
Chlorobenzene	ND		0.0017	0.00013	ppm v/v			05/19/20 23:33	1.74
Chloroethane	ND		0.0017	0.00063	ppm v/v			05/19/20 23:33	1.74
<b>Chloroform</b>	<b>0.00088</b>	<b>J</b>	0.0017	0.00015	ppm v/v			05/19/20 23:33	1.74
Chloromethane	ND		0.0044	0.0014	ppm v/v			05/19/20 23:33	1.74
Dibromochloromethane	ND		0.0017	0.00015	ppm v/v			05/19/20 23:33	1.74
1,2-Dibromoethane (EDB)	ND		0.0017	0.00015	ppm v/v			05/19/20 23:33	1.74
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*	0.0017	0.00026	ppm v/v			05/19/20 23:33	1.74
1,2-Dichlorobenzene	ND		0.0017	0.00067	ppm v/v			05/19/20 23:33	1.74
1,3-Dichlorobenzene	ND		0.0017	0.00035	ppm v/v			05/19/20 23:33	1.74
1,4-Dichlorobenzene	ND		0.0017	0.00035	ppm v/v			05/19/20 23:33	1.74
<b>Dichlorodifluoromethane</b>	<b>0.032</b>	*	0.0017	0.00030	ppm v/v			05/19/20 23:33	1.74
<b>1,1-Dichloroethane</b>	<b>0.0017</b>		0.0017	0.00015	ppm v/v			05/19/20 23:33	1.74
1,2-Dichloroethane	ND		0.0017	0.00022	ppm v/v			05/19/20 23:33	1.74

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMP

Job ID: 140-19107-1

Client Sample ID: 112854-001/MWL-SV05-400

Lab Sample ID: 140-19107-24

Date Collected: 05/11/20 10:11

Matrix: Air

Date Received: 05/15/20 11:00

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	0.018		0.0017	0.00017	ppm v/v			05/19/20 23:33	1.74
cis-1,2-Dichloroethene	0.00068	J	0.0017	0.00022	ppm v/v			05/19/20 23:33	1.74
trans-1,2-Dichloroethene	ND		0.0017	0.00015	ppm v/v			05/19/20 23:33	1.74
1,2-Dichloropropane	ND		0.0017	0.00022	ppm v/v			05/19/20 23:33	1.74
cis-1,3-Dichloropropene	ND		0.0017	0.00035	ppm v/v			05/19/20 23:33	1.74
trans-1,3-Dichloropropene	ND		0.0017	0.00020	ppm v/v			05/19/20 23:33	1.74
Ethylbenzene	ND		0.0017	0.00028	ppm v/v			05/19/20 23:33	1.74
4-Ethyltoluene	ND		0.0035	0.00046	ppm v/v			05/19/20 23:33	1.74
Hexachlorobutadiene	ND		0.0087	0.00070	ppm v/v			05/19/20 23:33	1.74
2-Hexanone	ND		0.0044	0.00035	ppm v/v			05/19/20 23:33	1.74
4-Methyl-2-pentanone (MIBK)	ND		0.0044	0.0012	ppm v/v			05/19/20 23:33	1.74
Methylene Chloride	ND		0.0087	0.0035	ppm v/v			05/19/20 23:33	1.74
Styrene	ND		0.0017	0.00052	ppm v/v			05/19/20 23:33	1.74
1,1,2,2-Tetrachloroethane	ND		0.0017	0.00030	ppm v/v			05/19/20 23:33	1.74
Tetrachloroethene	0.098		0.0017	0.00015	ppm v/v			05/19/20 23:33	1.74
Toluene	ND		0.0026	0.0017	ppm v/v			05/19/20 23:33	1.74
1,1,2-Trichloro-1,2,2-trifluoroethane	0.055		0.0017	0.00017	ppm v/v			05/19/20 23:33	1.74
1,2,4-Trichlorobenzene	ND		0.0087	0.0014	ppm v/v			05/19/20 23:33	1.74
1,1,1-Trichloroethane	0.0014	J	0.0017	0.00080	ppm v/v			05/19/20 23:33	1.74
1,1,2-Trichloroethane	ND		0.0017	0.00015	ppm v/v			05/19/20 23:33	1.74
Trichloroethene	0.090		0.00087	0.00013	ppm v/v			05/19/20 23:33	1.74
Trichlorofluoromethane	0.039		0.0017	0.00024	ppm v/v			05/19/20 23:33	1.74
1,2,4-Trimethylbenzene	ND		0.0017	0.00044	ppm v/v			05/19/20 23:33	1.74
1,3,5-Trimethylbenzene	ND		0.0017	0.00048	ppm v/v			05/19/20 23:33	1.74
Vinyl acetate	ND		0.0087	0.00061	ppm v/v			05/19/20 23:33	1.74
Vinyl chloride	ND		0.00087	0.00057	ppm v/v			05/19/20 23:33	1.74
m,p-Xylene	ND		0.0017	0.00063	ppm v/v			05/19/20 23:33	1.74
o-Xylene	ND		0.0017	0.00033	ppm v/v			05/19/20 23:33	1.74
<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)	91		60 - 140					05/19/20 23:33	1.74

**FIELD SAMPLING FORMS**  
**NOVEMBER 2020 SOIL-VAPOR MONITORING**



## Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (cc/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-SV03-FB3	11/13/20	0844	34000383	NA	NA	-24	-8	
MWL-SV03-50	11/13/20	0848	↓	0.2	12	NA	NA	
		↓	↓	↓	↓	↓	↓	
		0849	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		0850	11474	NA	NA	-25	-8	
MWL-SV03-100	11/13/20	0852	↓	0.1	12	NA	NA	
		↓	↓	↓	↓	↓	↓	
		0852	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		0853	8224	NA	NA	-24	-8	
MWL-SV03-200	11/13/20	0855	↓	0.1	10	NA	NA	
		↓	↓	↓	↓	↓	↓	
		0856	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		0857	11156	NA	NA	-24	-8	
MWL-SV03-300	11/13/20	0858	↓	0.1	10	NA	NA	
		↓	↓	↓	↓	↓	↓	
		0900	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		0901	10988	NA	NA	-23	-8	
MWL-SV03-400	11/13/20	0908	↓	0.2	15	NA	NA	
		↓	↓	↓	↓	↓	↓	
		0910	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	↓	
		0911	11147	NA	NA	-24	-8	

## Field Notes:

Continuous PID Readings During Purge.

Background PID Readings:

SV03- 0.2

OB-FB

OB-Split 300 + 400



## Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (scfh)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-SV04-FB4	11/13/20	0949	10478	NA	NA	-24	-8	
MWL-SV04-50	11/13/20	0954		0.4	10	NA	NA	
		↓	↓	↓	↓	↓	↓	
		0954	↓	↓	↓	↓	↓	
		0955	34001402	NA	NA	-23	-8	
MWL-SV04-100	11/13/20	1000		0.4	15	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1001	↓	↓	↓	↓	↓	
		1002	09692	NA	NA	-24	-8	
MWL-SV04-200	11/13/20	1003		0.4	15	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1004	↓	↓	↓	↓	↓	
		1005	7963	NA	NA	-24	-8	
MWL-SV04-300	11/13/20	1009		0.4	12	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1010	↓	↓	↓	↓	↓	
		1011	09520	NA	NA	-24	0	
MWL-SV04-400	11/13/20	1022		0.4	15	NA	NA	
		↓	↓	↓	↓	↓	↓	
		1023	↓	↓	↓	↓	↓	
		1024	12087	NA	NA	-24	-8	

## Field Notes:

Continuous PID Readings During Purge.

Background PID Readings:

SV04- 0.4

0B- FB

0B- Split @ 300 /u Du + 400

## Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	PID (ppm)	Flow Rate (scf/min)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-SV05-FB5	11/13/20	1042	10812	NA	NA	-24	-8	
MWL-SV05-50	11/13/20	1045	↓	0.4	10	NA	NA	
	↓	↓	↓	↓	↓	↓	↓	
		1046	↓	↓	↓	↓	↓	
	↓	1047	10701	NA	NA	-24	-8	
MWL-SV05-100	11/13/20	1048	↓	0.3	10	NA	NA	
	↓	↓	↓	↓	↓	↓	↓	
		1049	↓	↓	↓	↓	↓	
	↓	1050	7904	NA	NA	-24	-8	
MWL-SV05-200	11/13/20	1051	↓	0.3	12	NA	NA	
	↓	↓	↓	↓	↓	↓	↓	
		1052	↓	↓	↓	↓	↓	
	↓	1053	10718	NA	NA	-24	-8	SA
	↓	1053	34001169	NA	NA	-24	-8	DU
MWL-SV05-300	11/13/20	1056	↓	0.3	10	NA	NA	
	↓	↓	↓	↓	↓	↓	↓	
		1058	↓	↓	↓	↓	↓	
	↓	1059	34002141	NA	NA	-25	-8	
MWL-SV05-400	11/13/20	1103	↓	0.3	10	NA	NA	
	↓	↓	↓	↓	↓	↓	↓	
		1105	↓	↓	↓	↓	↓	
	↓	1106	34000886	NA	NA	-24	-8	SA
	↓	1106	10692	NA	NA	-24	-8	DU

## Field Notes:

Continuous PID Readings During Purge.

Background PID Readings:

SV05- 0.3

OB- FB

OB- Split 300x 400

**SUMMARY SHEET FOR  
NOVEMBER 2020 SOIL-VAPOR SAMPLES**

**Sample Summary for Mixed Waste Landfill Soil-Vapor Monitoring**  
**November 2020**

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 01-21</b>								
MWL-SV01	13-Nov-20	MWL-SV01-42.5	34000091	621604	113984	Environmental	621604 / 113983	
		MWL-FB1	12102		113983	Field QC	n/a	Ultra Pure N2
MWL-SV02	13-Nov-20	MWL-SV02-41.5	11043	621605	113986	Environmental	621605 / 113985	
		MWL-FB2	11167		113985	Field QC	n/a	Ultra Pure N2
MWL-SV03	13-Nov-20	MWL-SV03-50	11474	621606	113988	Environmental	621606 / 113987	
		MWL-SV03-100	8224		113989	Environmental		
		MWL-SV03-200	11156		113990	Environmental		
		MWL-SV03-300	10988		113991	Environmental		
		MWL-SV03-400	11147		113992	Environmental		
		MWL-FB3	34000383		113987	Field QC	n/a	Ultra Pure N2
MWL-SV04	13-Nov-20	MWL-SV04-50	34001402	621607	113994	Environmental	621607 / 113993	
		MWL-SV04-100	09692		113995	Environmental		
		MWL-SV04-200	7963		113996	Environmental		
		MWL-SV04-300	09520		113997	Environmental		
		MWL-SV04-400	12087		113998	Environmental		
		MWL-FB4	10478		113993	Field QC	n/a	Ultra Pure N2
MWL-SV05	13-Nov-20	MWL-SV05-50	10701	621608	114000	Environmental	621608 / 113999	
		MWL-SV05-100	7904		114001	Environmental		
		MWL-SV05-200	10718		114002	Environmental		
		MWL-SV05-200	34001169		114003	Duplicate		
		MWL-SV05-300	34002141		114004	Environmental		
		MWL-SV05-400	34000886		114005	Environmental		
		MWL-SV05-400	10692		114006	Duplicate		
		MWL-FB5	10812		113999	Field QC	n/a	Ultra Pure N2

**DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES**

**MIXED WASTE LANDFILL**

**SOIL-VAPOR MONITORING**

**NOVEMBER 2020**

**AR/COC NUMBERS 621604, 621605, 621606, 621607, 621608**

## Memorandum

Date: December 10, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621604, 621605, 621606, 621607 and 621608  
SDG: 140-21095  
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 6.

### 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* sample 140-21095-24, the intercept was positive and  $> \text{MDL}$  for 2-hexanone. All associated samples results, *except* the result for sample -18, were detects  $< 3X$  the intercept and will be **qualified J+,I5**.
2. For the CCV associated with samples -1 through -11, -13, -15 through -17 and -19, the %D was  $> 30\%$  and positive for 2-hexanone. All associated sample results were detects and will be **qualified J+,C2**.
3. 2-Hexanone was detected at  $\leq$  the PQL in the MBs associated with all samples except sample -24. All associated sample results *except* sample -18 were detects  $\leq$  the PQL and will be **qualified U,B**; non-detect at their respective PQLs.
4. Acetone and 2-butanone were detected at  $>$  the PQL and benzene was detected at  $\leq$  the PQL in FB2, sample -1, associated with sample -2. The associated sample results for acetone, 2-butanone and benzene were detects  $\leq$  the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.

5. Carbon disulfide was detected at  $\leq$  the PQL in FB1, sample -3, associated with sample -4. The associated sample result was a detect  $\leq$  the PQL and will be **qualified 0.0094U,B2**; non-detect at the PQL.
6. Benzene; 2-butanone; ethylbenzene; toluene and o-xylene were detected at  $\leq$  the PQL in FB5, sample -5, associated with samples -6 through -12. All associated sample results for benzene; the 2-butanone; ethylbenzene and o-xylene results for sample -10 and the toluene result for sample -12 were detects  $\leq$  the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.
7. Acetone and methylene chloride were detected at  $>$  the PQL and benzene; carbon disulfide; cis-1,2-dichloroethene were detected at  $\leq$  the PQL in FB4, sample -13, associated with samples -14 through -18. The acetone result for sample -18, all associated sample results for benzene; the carbon disulfide results for samples -16 through -18, the cis-1,2-dichloroethene result for samples -14, -15, -17 and -18 were detects  $\leq$  the PQL and will be **qualified U,B2**; non-detect at their respective PQLs. The methylene chloride result for sample -14 was a detect  $>$  the PQL and  $<2X$  the FB value and will be **qualified 0.0039U,B2**, non-detect at the sample result.
8. Benzene and carbon disulfide were detected at  $\leq$  the PQL in FB3, sample -19, associated with samples -20 through -24. All associated sample results for benzene and the carbon disulfide results for samples -21 and -23 were detects  $\leq$  the PQL and will be **qualified U,B2**; non-detect at their respective PQLs.

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 and as follows.

For the initial calibration associated with all samples *except* sample -24, the intercept was positive and  $>$  MDL for 2-hexanone. The associated result for sample -18 was non-detect and will not be qualified.

For the CCV associated with samples -1 through -11, -13, -15 through -17 and -19, the %D was  $>30\%$  and positive for 4-methyl-2-pentanone. The associated sample results were non-detect and will not be qualified.

### **Blanks**

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

2-Hexanone was detected at  $\leq$  the PQL in the MBs associated with all samples *except* sample -24. The associated result for sample -18 was non-detect and will not be qualified.



Chloroethane; ethylbenzene; 2-hexanone; toluene; m,p-xylene and o-xylene were detected at  $\leq$  the PQL in FB2, sample -1, associated with sample -2. It should be noted that the FB result for 2-hexanone was qualified non-detect due to MB contamination and will not be applied to the associated field sample result. All remaining associated target analytes were non-detect and will not be qualified.

Acetone and 2-butanone were detected at  $>$  the PQL and benzene; ethylbenzene; 2-hexanone; m,p-xylene and o-xylene were detected at  $\leq$  the PQL in FB1, sample -3 associated with sample -4. It should be noted that the FB result for 2-hexanone was qualified non-detect due to MB contamination and will not be applied to the associated field sample result. All remaining associated target analytes were non-detect and will not be qualified. In addition, tetrachloroethene was detected at  $>$  the PQL and trichloroethene was detected at  $\leq$  the PQL in FB1. The associated sample results were detects  $>$  the PQL and  $>5X$  the FB value and will not be qualified.

Acetone was detected at  $>$  the PQL and 2-butanone; ethylbenzene; 2-hexanone; tetrachloroethene; toluene; m,p-xylene and o-xylene were detected at  $\leq$  the PQL in FB5, sample -5, associated with samples -6 through -12. It should be noted that the FB result for 2-hexanone was qualified non-detect due to MB contamination and will not be applied to the associated field sample results. All associated sample results for tetrachloroethene, and the toluene and m,p-xylene results for sample -10 were detects  $>$  the PQL and  $>5(10)X$  the FB value and will not be qualified. All remaining associated target analytes were non-detect and will not be qualified.

Acetone and methylene chloride were detected at  $>$  the PQL and 2-butanone; carbon disulfide; chloromethane; dichlorodifluoromethane; cis-1,2-dichloroethene; ethylbenzene; 2-hexanone; tetrachloroethene; toluene; trichlorofluoromethane; m,p-xylene and o-xylene were detected at  $\leq$  the PQL in FB4, sample -13, associated with samples -14 through -18. It should be noted that the FB result for 2-hexanone was qualified non-detect due to MB contamination and will not be applied to the associated field sample results. All associated sample results for dichlorodifluoromethane, tetrachloroethene and trichlorofluoromethane; the carbon disulfide result for sample -14 and the cis-1,2-dichloroethene result for sample -16 were detects  $>$  the PQL and  $>5X$  the FB value and will not be qualified. All remaining associated target analytes were non-detect and will not be qualified.

Acetone; 2-butanone; methylene chloride and m,p-xylene were detected at  $>$  the PQL and carbon disulfide; ethylbenzene; 2-hexanone; toluene; trichlorofluoromethane and o-xylene were detected at  $\leq$  the PQL in FB3, sample -19, associated with samples -20 through -24. It should be noted that the FB result for 2-hexanone was qualified non-detect due to MB contamination and will not be applied to the associated field sample results. All associated sample results for trichlorofluoromethane and the carbon disulfide result for sample -22 were detects  $>$  the PQL and  $>5X$  the FB value and will not be qualified. All remaining associated target analytes were non-detect and will not be qualified.

### **Surrogates**

All surrogate acceptance criteria were met.

### **Internal Standards**

All internal standards met QC acceptance criteria.

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

An MS/MSD was not performed.

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

The LCS for all batches met QC acceptance criteria with the following exceptions. For the LCS associated with samples -1 through -11, -13, -15 through -17 and -19 the %Rs were > the upper acceptance limits for 2-hexanone and 4-methyl-2-pentanone. Up to two LCS recovery infractions are allowed since 50 LCS analytes were reported. Therefore, the associated sample results will not be qualified.

### **Laboratory Replicate**

Laboratory replicates met QC acceptance criteria.

### **Detection Limits/Dilutions**

All detection limits were properly reported and correctly adjusted for summa canister dilutions. The following canister dilutions were performed for all target analytes.

Sample -1 (1.98X); -2 (1.83X); -3 (1.97X); -4 (1.87X); -5 (1.79X); -6 (2.06X); -7 (1.85X); -8 (1.92X); -9 (1.93X); -10 (1.91X); -11 (1.93); -12 (1.72X); -13 (1.83X); -14 (1.83X); -15 (1.8X); -16 (1.9X); -17 (1X); -18 (2.34X); -19 (1.97X); -20 (1.97X); -21 (2.28X); -22 (1.79X); -23 (1.75X) and -24 (1.76X).

### **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 and were associated with the samples on the same ARCOC. Two field duplicate pairs were submitted with ARCOCs 621608. 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:** 12/14/2020



## Sample Findings Summary



AR/COC: 621604, 621605, 621606, 621607, 621608

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15_LL_PF	113983-001/MWL-FB1	2-HEXANONE (591-78-6)	0.0002UJ, B,I5,C2
	113984-001/MWL-SV01-42.5	2-HEXANONE (591-78-6)	0.0094UJ, B,I5,C2
	113984-001/MWL-SV01-42.5	CARBON DISULFIDE (75-15-0)	0.0094U, B2
	113985-001/MWL-FB2	2-HEXANONE (591-78-6)	0.0002UJ, B,I5,C2
	113986-001/MWL-SV02-41.5	2-BUTANONE (MEK) (78-93-3)	0.018U, B2
	113986-001/MWL-SV02-41.5	2-HEXANONE (591-78-6)	0.0092UJ, B,I5,C2
	113986-001/MWL-SV02-41.5	ACETONE (67-64-1)	0.092U, B2
	113986-001/MWL-SV02-41.5	BENZENE (71-43-2)	0.0037U, B2
	113987-001/MWL-FB3	2-HEXANONE (591-78-6)	0.0002UJ, B,I5,C2
	113988-001/MWL-SV03-50	2-HEXANONE (591-78-6)	0.0049UJ, B,I5
	113988-001/MWL-SV03-50	BENZENE (71-43-2)	0.002U, B2
	113989-001/MWL-SV03-100	2-HEXANONE (591-78-6)	0.0057UJ, B,I5
	113989-001/MWL-SV03-100	BENZENE (71-43-2)	0.0023U, B2
	113989-001/MWL-SV03-100	CARBON DISULFIDE (75-15-0)	0.0057U, B2
	113990-001/MWL-SV03-200	2-HEXANONE (591-78-6)	0.0045UJ, B,I5
	113990-001/MWL-SV03-200	BENZENE (71-43-2)	0.0018U, B2
	113991-001/MWL-SV03-300	2-HEXANONE (591-78-6)	0.0088UJ, B,I5
	113991-001/MWL-SV03-300	BENZENE (71-43-2)	0.0035U, B2
	113991-001/MWL-SV03-300	CARBON DISULFIDE (75-15-0)	0.0088U, B2
	113992-001/MWL-SV03-400	BENZENE (71-43-2)	0.0023U, B2
	113993-001/MWL-FB4	2-HEXANONE (591-78-6)	0.0002UJ, B,I5,C2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	113994-001/MWL-SV04-50	2-HEXANONE (591-78-6)	0.0018UJ, B,I5
	113994-001/MWL-SV04-50	BENZENE (71-43-2)	0.00073U, B2
	113994-001/MWL-SV04-50	CIS-1,2-DICHLOROETHENE (156-59-2)	0.00073U, B2
	113994-001/MWL-SV04-50	METHYLENE CHLORIDE (75-09-2)	0.0039U, B2
	113995-001/MWL-SV04-100	2-HEXANONE (591-78-6)	0.0045UJ, B,I5,C2
	113995-001/MWL-SV04-100	BENZENE (71-43-2)	0.0018U, B2
	113995-001/MWL-SV04-100	CIS-1,2-DICHLOROETHENE (156-59-2)	0.0018U, B2
	113996-001/MWL-SV04-200	2-HEXANONE (591-78-6)	0.0048UJ, B,I5,C2
	113996-001/MWL-SV04-200	BENZENE (71-43-2)	0.0019U, B2
	113996-001/MWL-SV04-200	CARBON DISULFIDE (75-15-0)	0.0048U, B2
	113997-001/MWL-SV04-300	2-HEXANONE (591-78-6)	0.0025UJ, B,I5,C2
	113997-001/MWL-SV04-300	BENZENE (71-43-2)	0.001U, B2
	113997-001/MWL-SV04-300	CARBON DISULFIDE (75-15-0)	0.0025U, B2
	113997-001/MWL-SV04-300	CIS-1,2-DICHLOROETHENE (156-59-2)	0.001U, B2
	113998-001/MWL-SV04-400	ACETONE (67-64-1)	0.059U, B2
	113998-001/MWL-SV04-400	BENZENE (71-43-2)	0.0023U, B2
	113998-001/MWL-SV04-400	CARBON DISULFIDE (75-15-0)	0.0059U, B2
	113998-001/MWL-SV04-400	CIS-1,2-DICHLOROETHENE (156-59-2)	0.0023U, B2
	113999-001/MWL-FB5	2-HEXANONE (591-78-6)	0.0002UJ, B,I5,C2
	114000-001/MWL-SV05-50	2-HEXANONE (591-78-6)	0.0052UJ, B,I5,C2
	114000-001/MWL-SV05-50	BENZENE (71-43-2)	0.0021U, B2
	114001-001/MWL-SV05-100	2-HEXANONE (591-78-6)	0.0046UJ, B,I5,C2
	114001-001/MWL-SV05-100	BENZENE (71-43-2)	0.0019U, B2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	114002-001/MWL-SV05-200	2-HEXANONE (591-78-6)	0.0048UJ, B,I5,C2
	114002-001/MWL-SV05-200	BENZENE (71-43-2)	0.0019U, B2
	114003-001/MWL-SV05-200	2-HEXANONE (591-78-6)	0.0048UJ, B,I5,C2
	114003-001/MWL-SV05-200	BENZENE (71-43-2)	0.0019U, B2
	114004-001/MWL-SV05-300	2-BUTANONE (MEK) (78-93-3)	0.0096U, B2
	114004-001/MWL-SV05-300	2-HEXANONE (591-78-6)	0.0048UJ, B,I5,C2
	114004-001/MWL-SV05-300	BENZENE (71-43-2)	0.0019U, B2
	114004-001/MWL-SV05-300	ETHYLBENZENE (100-41-4)	0.0019U, B2
	114004-001/MWL-SV05-300	O-XYLENE (95-47-6)	0.0019U, B2
	114005-001/MWL-SV05-400	2-HEXANONE (591-78-6)	0.0048UJ, B,I5,C2
	114005-001/MWL-SV05-400	BENZENE (71-43-2)	0.0019U, B2
	114006-001/MWL-SV05-400	2-HEXANONE (591-78-6)	0.0017UJ, B,I5
	114006-001/MWL-SV05-400	BENZENE (71-43-2)	0.00069U, B2
	114006-001/MWL-SV05-400	TOLUENE (108-88-3)	0.001U, B2

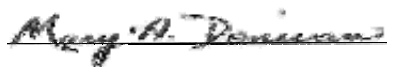
All other analyses met QC acceptance criteria; no further data should be qualified.

## Sandia Data Validation Summary Worksheet

ARCOC#: 621604, 621605, 621606, 621607 and 621608	Site/Project: MWL LTMMP	Validation Date: 12/09/2020
SDG #: 140-21095	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: 11/13/2020  No custody seals.
<u>Validated by:</u>  <div style="text-align: center;">  </div>

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 621604, 621605, 621606, 621607 and 621608	SDG: 140-21095	Matrix: Air
Laboratory Sample IDs: 140-21095-1 through -24		
Method/Batch #s: <b>TO-15</b> /44679 (-1 through -11, -13, -15 through -17, -19, -17DU); 44710 (-12, -14, -18, -20 through -23, -14DU); 44812 (-24, -24DU)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

[illegible]

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	Lab. REP RPD	FB5 -5	5X (10X)	FB4 -13	5X (10X)		
	Int.	RF/ Slope	RSD/ r <sup>2</sup>	(ICV)/CC V %D										
Instrument MG ICAL 11/09/2020 Batch 44679 (samples -1 through -11, -13, -15 through -17, -19, -17DU ) Batch 44710 (samples -12, -14, -18, -20 through -23, -14DU)														
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	0.0022	(0.022)	0.0035	(0.035)		
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	0.000014J	0.00007	0.000031J	0.00016		
2-Butanone	NA	✓	✓	✓	✓	NA	✓	✓	0.00016J	(0.0016)	0.00022J	(0.0022)		
Carbon disulfide	NA	✓	✓	✓	✓	NA	✓	✓	✓	NA	0.000039J	0.0002		
Chloromethane	NA	✓	✓		✓	NA	✓	✓	✓	NA	0.00016J	0.0008		
Dichlorodifluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	NA	0.000016J	0.00008		
cis-1,2-Dichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	✓	NA	0.000012J	0.00006		
Ethylbenzene	NA	✓	✓	✓	✓	NA	✓	✓	0.000020J	0.0001	0.000028J	0.00014		
2-Hexanone	+0.000048	✓	✓	+31 <sup>1</sup>	0.0000512J <sup>1</sup> 0.0000529J <sup>2</sup>	0.000256 0.000265	131 <sup>1</sup>	✓	0.000062J	0.00031	0.000083J	0.00042		
4-Methyl-2-pentanone	NA	✓	✓	+35 <sup>1</sup>	✓	NA	135 <sup>1</sup>	✓	✓	NA	✓	NA		
Methylene chloride	NA	✓	✓	✓	✓	NA	✓	✓	✓	NA	0.0040	(0.04)		
Tetrachloroethene	NA	✓	✓	✓	✓	NA	✓	✓	0.000012J	0.00006	0.000043J	0.00022		
Toluene	✓	✓	✓	✓	✓	NA	✓	✓	0.000093J	(0.00093)	0.00075	(0.0075)		
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	NA	0.000030J	0.00015		
m,p-Xylene	NA	✓	✓	✓	✓	NA	✓	✓	0.000051J	0.00026	0.000095	0.00048		
o-Xylene	NA	✓	✓	✓	✓	NA	✓	✓	0.000017J	0.000085	0.000035J	0.00018		
									FB3 -19	5X (10X)				
Acetone									0.0046	(0.046)				
Benzene									0.000015J	0.000075				
2-Butanone									0.0046	(0.046)				
Carbon disulfide									0.00012J	0.0006				
Ethylbenzene									0.000030J	0.00015				
2-Hexanone									0.000071J	0.00036				
Methylene chloride									0.00048	(0.0048)				
Toluene									0.00011J	(0.0011)				
Trichlorofluoromethane									0.000016J	0.00008				
m,p-Xylene									0.000092	0.00046				
o-Xylene									0.000033J	0.00017				



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									
	CBM		DFBZ		ChI-d5				
Sample ID	Area	RT	Area	RT	Area	RT			
None									

Comments: HTs OK. LCS limits MWL 70-130%

ICAL MG 11/09/2020; 2-hexanone linear2

<sup>1</sup>Associated with batch 44679

<sup>2</sup>Associated with batch 44710

ICAL MR 11/18/2020; All avg. (batch 44812)

Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of "zero air" by Eurofins TestAmerica Knoxville.

Canisters ND for all target compounds.

Internal Lab

Page 1 of 1

Batch No.

**SMO Use**

AR/COC

**621604**

[illegible]

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

## CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY



140-21095 Chain of Custody

Page 1 of 1

Internal Lab

Batch No. 11/14

### SMO Use


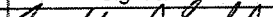


AR/COC

**621605**

Project Name:	MWL LTMMMP	Date Samples Shipped:	11/16/20	SMO Authorization:	<i>[Signature]</i>	<input type="checkbox"/> Waste Characterization
Project/Task Manager:	Timmie Jackson	Carrier/Waybill No.	322074	SMO Contact Phone:		<input type="checkbox"/> RMA
Project/Task Number:	195122.10.11.08	Lab Contact:	Jamie Mckinney/865-291-3006		Wendy Palencia/505-844-3132	<input type="checkbox"/> Released by COC No.
Service Order:	CF01-21	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:		P.O. Box 5800, MS-0154
Building:	Room:	Operational Site: Albuquerque, NM 87185-0154

[illegible]

Last Chain: <input checked="" type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes		QC inits.:				Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Lab Use
	William Gibson		WG	SNL/08888/505-284-3307/505-239-7367		Return Samples By:		
	Robert Lynch		RL	SNL/08888/505-844-4013/505-250-7090		Comments: Elevation and ambient pressure information on attached forms.		
	Zachary Tenorio		ZT	SNL/08888/505-845-8636/505-259-5765				
	Denisha Sanchez		DS	SNL/08888/505-845-7829/505-208-1375				

Relinquished by	Org. 8888	Date 11/16/20	Time 0850	Relinquished by	Org.	Date	Time
Received by	Org. 00029	Date 11/16/20	Time 0850	Received by	Org.	Date	Time
Relinquished by	Org. 0028	Date 11/16/20	Time 1025	Relinquished by	Org.	Date	Time
Received by	Org. ETA	Date 11/19/20	Time 1146	Received by	Org.	Date	Time

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

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12/04/2020

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC **621606**

Project Name: MWL LTMMMP  
 Project/Task Manager: Timmie Jackson  
 Project/Task Number: 195122.10.11.08  
 Service Order: CF01-21

Date Samples Shipped: *11/16/20*  
 Carrier/Waybill No: *322074*  
 Lab Contact: Jamie McKinney/865-291-3006  
 Lab Destination: TAKX  
 Contract No.: 1636780

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

☐ Waste Characterization  
☐ RMA  
☐ Released by COC No. ☒ 4° Celsius

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

Tech Area:  
 Building: Room: Operational Site:

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
113987	001	MWL-FB3 34000383	NA	11/13/20 08:44	UPN	S	6 L	None	G	FB	VOC (TO-15)	
113988	001	MWL-SV03-50 11474	50	11/13/20 08:50	SG	S	6 L	None	G	SA	VOC (TO-15)	
113989	001	MWL-SV03-100 8224	100	11/13/20 08:53	SG	S	6 L	None	G	SA	VOC (TO-15)	
113990	001	MWL-SV03-200 11156	200	11/13/20 08:57	SG	S	6 L	None	G	SA	VOC (TO-15)	
113991	001	MWL-SV03-300 10988	300	11/13/20 09:01	SG	S	6 L	None	G	SA	VOC (TO-15)	
113992	001	MWL-SV03-400 11147	400	11/13/20 09:11	SG	S	6 L	None	G	SA	VOC (TO-15)	

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	<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

Sample Disposal ☐ Return to Client ☒ Disposal by Lab

Return Samples By:  
 Comments: Elevation and ambient pressure information on attached forms.

Lab Use

Relinquished by <i>[Signature]</i>	Org. <i>8888</i>	Date <i>11/16/20</i>	Time <i>0850</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00124</i>	Date <i>11/16/20</i>	Time <i>0850</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>0628</i>	Date <i>11/16/20</i>	Time <i>1025</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>ETA</i>	Date <i>11/16/20</i>	Time <i>1190</i>	Received by	Org.	Date	Time

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

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12/04/2020

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab		Batch No. <u>8/14</u>		SMO Use		AR/COC		621607																																																																																																																																															
Project Name: MWL LTMMP		Date Samples Shipped: <u>11/16/20</u>		SMO Authorization: <u>[Signature]</u>		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius																																																																																																																																																	
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <u>322074</u>		SMO Contact Phone: <u>Wendy Palencia/505-844-3132</u>																																																																																																																																																			
Project/Task Number: 195122.10.11.08		Lab Contact: <u>Jamie McKinney/865-291-3006</u>		Send Report to SMO:																																																																																																																																																			
Service Order: CF01-21		Lab Destination: <u>TAKX</u>		<u>Stephanie Montaño/505-284-2553</u>																																																																																																																																																			
Contract No.: 1636780																																																																																																																																																							
Tech Area:		Building:		Room:		Operational Site:		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154																																																																																																																																															
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113993	001	MWL-FB4 10478	NA	11/13/20 09:49	UPN	S	6 L	None	G	FB	VOC (TO-15)																																																																																																																																												
113994	001	MWL-SV04-50 34001402	50	11/13/20 09:55	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																												
113995	001	MWL-SV04-100 09692	100	11/13/20 10:02	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																												
113996	001	MWL-SV04-200 7963	200	11/13/20 10:05	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																												
113997	001	MWL-SV04-300 09520	300	11/13/20 10:11	SG	S	6 L	None	G	SA	VOC (TO-15)																																																																																																																																												
113998	001	MWL-SV04-400 12087	400	11/13/20 10:24	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="2">Sample Tracking</td> <td colspan="2">SMO Use</td> <td colspan="3">Special Instructions/QC Requirements:</td> <td colspan="2" rowspan="4">Conditions on Receipt</td> </tr> <tr> <td colspan="3">Validation Req'd: <input checked="" type="checkbox"/> Yes</td> <td colspan="2">Date Entered:</td> <td colspan="2"></td> <td colspan="3">EDD <input checked="" type="checkbox"/> Yes</td> </tr> <tr> <td colspan="3">Background: <input type="checkbox"/> Yes</td> <td colspan="2">Entered by:</td> <td colspan="2"></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="2">QC inits.:</td> <td colspan="2"></td> <td colspan="3">Negotiated TAT <input type="checkbox"/></td> </tr> <tr> <td rowspan="5">Sample Team Members</td> <td colspan="2">Name</td> <td colspan="2">Signature</td> <td colspan="2">Init.</td> <td colspan="2">Company/Organization/Phone/Cell</td> <td colspan="2">Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab</td> <td rowspan="5">Lab Use</td> </tr> <tr> <td colspan="2">William Gibson</td> <td colspan="2"><u>[Signature]</u></td> <td colspan="2">WG</td> <td colspan="2">SNL/08888/505-284-3307/505-239-7367</td> <td colspan="2">Return Samples By:</td> </tr> <tr> <td colspan="2">Robert Lynch</td> <td colspan="2"><u>[Signature]</u></td> <td colspan="2">RL</td> <td colspan="2">SNL/08888/505-844-4013/505-250-7090</td> <td colspan="2">Comments: Elevation and ambient pressure information on attached forms.</td> </tr> <tr> <td colspan="2">Zachary Tenorio</td> <td colspan="2"><u>[Signature]</u></td> <td colspan="2">ZT</td> <td colspan="2">SNL/08888/505-845-8636/505-259-5765</td> <td colspan="2"></td> </tr> <tr> <td colspan="2">Denisha Sanchez</td> <td colspan="2"><u>[Signature]</u></td> <td colspan="2">DS</td> <td colspan="2">SNL/08888/505-845-7829/505-208-1375</td> <td colspan="2"></td> </tr> <tr> <td colspan="13"> <table border="1"> <tr> <td>Relinquished by <u>[Signature]</u></td> <td>Org. <u>8888</u></td> <td>Date <u>11/16/20</u></td> <td>Time <u>0850</u></td> <td>Relinquished by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Received by <u>[Signature]</u></td> <td>Org. <u>00624</u></td> <td>Date <u>11/16/20</u></td> <td>Time <u>0850</u></td> <td>Received by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Relinquished by <u>[Signature]</u></td> <td>Org. <u>00625</u></td> <td>Date <u>11/16/20</u></td> <td>Time <u>1025</u></td> <td>Relinquished by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Received by <u>[Signature]</u></td> <td>Org. <u>ETA</u></td> <td>Date <u>11/19/20</u></td> <td>Time <u>1140</u></td> <td>Received by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> </table> </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			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		<u>[Signature]</u>		WG		SNL/08888/505-284-3307/505-239-7367		Return Samples By:		Robert Lynch		<u>[Signature]</u>		RL		SNL/08888/505-844-4013/505-250-7090		Comments: Elevation and ambient pressure information on attached forms.		Zachary Tenorio		<u>[Signature]</u>		ZT		SNL/08888/505-845-8636/505-259-5765				Denisha Sanchez		<u>[Signature]</u>		DS		SNL/08888/505-845-7829/505-208-1375				<table border="1"> <tr> <td>Relinquished by <u>[Signature]</u></td> <td>Org. <u>8888</u></td> <td>Date <u>11/16/20</u></td> <td>Time <u>0850</u></td> <td>Relinquished by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Received by <u>[Signature]</u></td> <td>Org. <u>00624</u></td> <td>Date <u>11/16/20</u></td> <td>Time <u>0850</u></td> <td>Received by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Relinquished by <u>[Signature]</u></td> <td>Org. <u>00625</u></td> <td>Date <u>11/16/20</u></td> <td>Time <u>1025</u></td> <td>Relinquished by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Received by <u>[Signature]</u></td> <td>Org. <u>ETA</u></td> <td>Date <u>11/19/20</u></td> <td>Time <u>1140</u></td> <td>Received by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> </table>													Relinquished by <u>[Signature]</u>	Org. <u>8888</u>	Date <u>11/16/20</u>	Time <u>0850</u>	Relinquished by	Org.	Date	Time	Received by <u>[Signature]</u>	Org. <u>00624</u>	Date <u>11/16/20</u>	Time <u>0850</u>	Received by	Org.	Date	Time	Relinquished by <u>[Signature]</u>	Org. <u>00625</u>	Date <u>11/16/20</u>	Time <u>1025</u>	Relinquished by	Org.	Date	Time	Received by <u>[Signature]</u>	Org. <u>ETA</u>	Date <u>11/19/20</u>	Time <u>1140</u>	Received by	Org.	Date	Time
Last Chain: <input type="checkbox"/> Yes			Sample Tracking		SMO Use		Special Instructions/QC Requirements:			Conditions on Receipt																																																																																																																																													
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\*Prior confirmation with SMO required for 7 and 15 day TAT

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12/04/2020

## ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A**TRG 11/16/20*  
SMO Use

Page 1 of 1

AR/COC

621608

Project Name: MWL LTMMF	Date Samples Shipped: <i>322074 11/16/20</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>322074</i>	SMO Contact Phone:	
Project/Task Number: 195122.10.11.08	Lab Contact: Jamie McKinney/865-291-3006	Wendy Palencia/505-844-3132	
Service Order: CF01-21	Lab Destination: TAKX	Send Report to SMO: Stephanie Montañio/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:	Operational Site:		
Building:	Room:		

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
113999	001	MWL-FB5 10812	NA	11/13/20 10:42	UPN	S	6 L	None	G	FB	VOC (TO-15)	
114000	001	MWL-SV05-50 10701	50	11/13/20 10:47	SG	S	6 L	None	G	SA	VOC (TO-15)	
114001	001	MWL-SV05-100 7904	100	11/13/20 10:50	SG	S	6 L	None	G	SA	VOC (TO-15)	
114002	001	MWL-SV05-200 10718	200	11/13/20 10:53	SG	S	6 L	None	G	SA	VOC (TO-15)	
114003	001	MWL-SV05-200 34001169	200	11/13/20 10:53	SG	S	6 L	None	G	DU	VOC (TO-15)	
114004	001	MWL-SV05-300 34002141	300	11/13/20 10:59	SG	S	6 L	None	G	SA	VOC (TO-15)	
114005	001	MWL-SV05-400 34000886	400	11/13/20 11:06	SG	S	6 L	None	G	SA	VOC (TO-15)	
114006	001	MWL-SV05-400 10692	400	11/13/20 11:06	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					
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day					
Confirmatory: <input type="checkbox"/> Yes		QC inits:				Negotiated TAT <input type="checkbox"/>					
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab				Lab Use	
	William Gibson	<i>[Signature]</i>	<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: Elevation and ambient pressure information on attached forms.					
	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>11/16/20</i>	Time <i>0850</i>	Relinquished by		Org.	Date	Time		
Received by <i>[Signature]</i>		Org. <i>DD628</i>	Date <i>11/16/20</i>	Time <i>0950</i>	Received by		Org.	Date	Time		
Relinquished by <i>[Signature]</i>		Org. <i>0628</i>	Date <i>11/16/20</i>	Time <i>1025</i>	Relinquished by		Org.	Date	Time		
Received by <i>[Signature]</i>		Org. <i>CTA</i>	Date <i>11/16/20</i>	Time <i>1140</i>	Received by		Org.	Date	Time		

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

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12/04/2020

## **CONTRACT VERIFICATION REVIEW FORMS**

### **Mixed Waste Landfill Soil-Vapor Monitoring**

**November 2020**

Note: The forms in this section include AR/COC numbers for environmental and quality control samples; the AR/COC forms are provided in the Data Validation Reports in this annex.

<b>AR/COC Number</b>	<b>Sample Type</b>
621604	Environmental & Quality Control
621605	Environmental & Quality Control
621606	Environmental & Quality Control
621607	Environmental & Quality Control
621608	Environmental & Quality Control

## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOG No. 621604, 621605, 621606, 621607 &amp; 621608

Analytical Lab TAKX

SDG No. 140-21095-1

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

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

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

### 2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.1	Data reviewed, signature	X		
2.2	Method reference number(s) complete and correct	X		
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X		
2.4	Matrix spike/matrix spike duplicate data provided	X		
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and Lc	X		

ARCOG No. 621604, 621605, 621606, 621607 &amp; 621608



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	N/A		
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		Sample replicates analyzed for precision
3.5	Blank data a) Method or reagent blank data reported and met for all samples		X	2-Hexanone detected in method blanks 140-44679/4 and 140-44710/4
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Several analytes detected in MWL-FB1, MWL-FB2, MWL-FB3, MWL-FB4 & MWL-FB5
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
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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: 12-09-2020 11:29:00

Closed by: Wendy Palencia Date: 12-09-2020 11:29:00

**CERTIFICATES OF ANALYSIS**

**Mixed Waste Landfill**

**November 2020 Soil-Vapor Samples**

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 113985-001/MWL-FB2**

**Lab Sample ID: 140-21095-1**

**Date Collected: 11/13/20 11:24**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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	0.0067		0.0020	0.00057	ppm v/v			11/23/20 12:20	1.98
Benzene	0.000011	J	0.000080	0.0000080	ppm v/v			11/23/20 12:20	1.98
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			11/23/20 12:20	1.98
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			11/23/20 12:20	1.98
Bromoform	ND		0.000080	0.0000090	ppm v/v			11/23/20 12:20	1.98
Bromomethane	ND		0.000080	0.000022	ppm v/v			11/23/20 12:20	1.98
2-Butanone (MEK)	0.00083		0.00040	0.000073	ppm v/v			11/23/20 12:20	1.98
Carbon disulfide	ND		0.00020	0.000011	ppm v/v			11/23/20 12:20	1.98
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			11/23/20 12:20	1.98
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			11/23/20 12:20	1.98
Chloroethane	0.000037	J	0.000080	0.000029	ppm v/v			11/23/20 12:20	1.98
Chloroform	ND		0.000080	0.0000070	ppm v/v			11/23/20 12:20	1.98
Chloromethane	ND		0.00020	0.000066	ppm v/v			11/23/20 12:20	1.98
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 12:20	1.98
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			11/23/20 12:20	1.98
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			11/23/20 12:20	1.98
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			11/23/20 12:20	1.98
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 12:20	1.98
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 12:20	1.98
Dichlorodifluoromethane	ND		0.000080	0.000014	ppm v/v			11/23/20 12:20	1.98
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 12:20	1.98
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			11/23/20 12:20	1.98
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			11/23/20 12:20	1.98
cis-1,2-Dichloroethene	ND		0.000080	0.000010	ppm v/v			11/23/20 12:20	1.98
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			11/23/20 12:20	1.98
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			11/23/20 12:20	1.98
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			11/23/20 12:20	1.98
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			11/23/20 12:20	1.98
Ethylbenzene	0.000020	J	0.000080	0.000013	ppm v/v			11/23/20 12:20	1.98
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/23/20 12:20	1.98
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			11/23/20 12:20	1.98
2-Hexanone	0.000091	J B	0.00020	0.000016	ppm v/v			11/23/20 12:20	1.98
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			11/23/20 12:20	1.98
Methylene Chloride	ND		0.00040	0.000039	ppm v/v			11/23/20 12:20	1.98
Styrene	ND		0.000080	0.000024	ppm v/v			11/23/20 12:20	1.98
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			11/23/20 12:20	1.98
Tetrachloroethene	ND		0.000080	0.0000070	ppm v/v			11/23/20 12:20	1.98
Toluene	0.000080	J	0.00012	0.000078	ppm v/v			11/23/20 12:20	1.98
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			11/23/20 12:20	1.98
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			11/23/20 12:20	1.98
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			11/23/20 12:20	1.98
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 12:20	1.98
Trichloroethene	ND		0.000040	0.0000060	ppm v/v			11/23/20 12:20	1.98
Trichlorofluoromethane	ND		0.000080	0.000011	ppm v/v			11/23/20 12:20	1.98
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			11/23/20 12:20	1.98
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			11/23/20 12:20	1.98
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			11/23/20 12:20	1.98
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			11/23/20 12:20	1.98

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 113985-001/MWL-FB2**

**Lab Sample ID: 140-21095-1**

Date Collected: 11/13/20 11:24

Matrix: Air

Date Received: 11/19/20 11:40

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	0.000056	J	0.000080	0.000029	ppm v/v			11/23/20 12:20	1.98
o-Xylene	0.000021	J	0.000080	0.000015	ppm v/v			11/23/20 12:20	1.98
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		60 - 140					11/23/20 12:20	1.98

**Client Sample ID: 113986-001/MWL-SV02-41.5**

**Lab Sample ID: 140-21095-2**

Date Collected: 11/13/20 11:50

Matrix: Air

Date Received: 11/19/20 11:40

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	0.029	J	0.092	0.026	ppm v/v			11/23/20 17:48	1.83
Benzene	0.00054	J	0.0037	0.00037	ppm v/v			11/23/20 17:48	1.83
Benzyl chloride	ND		0.0073	0.0017	ppm v/v			11/23/20 17:48	1.83
Bromodichloromethane	ND		0.0037	0.00082	ppm v/v			11/23/20 17:48	1.83
Bromoform	ND		0.0037	0.00041	ppm v/v			11/23/20 17:48	1.83
Bromomethane	ND		0.0037	0.0010	ppm v/v			11/23/20 17:48	1.83
2-Butanone (MEK)	0.0098	J	0.018	0.0033	ppm v/v			11/23/20 17:48	1.83
Carbon disulfide	0.00055	J	0.0092	0.00050	ppm v/v			11/23/20 17:48	1.83
Carbon tetrachloride	ND		0.0037	0.00032	ppm v/v			11/23/20 17:48	1.83
Chlorobenzene	ND		0.0037	0.00027	ppm v/v			11/23/20 17:48	1.83
Chloroethane	ND		0.0037	0.0013	ppm v/v			11/23/20 17:48	1.83
Chloroform	0.0029	J	0.0037	0.00032	ppm v/v			11/23/20 17:48	1.83
Chloromethane	ND		0.0092	0.0030	ppm v/v			11/23/20 17:48	1.83
Dibromochloromethane	ND		0.0037	0.00032	ppm v/v			11/23/20 17:48	1.83
1,2-Dibromoethane (EDB)	ND		0.0037	0.00032	ppm v/v			11/23/20 17:48	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0037	0.00055	ppm v/v			11/23/20 17:48	1.83
1,2-Dichlorobenzene	ND		0.0037	0.0014	ppm v/v			11/23/20 17:48	1.83
1,3-Dichlorobenzene	ND		0.0037	0.00073	ppm v/v			11/23/20 17:48	1.83
1,4-Dichlorobenzene	ND		0.0037	0.00073	ppm v/v			11/23/20 17:48	1.83
Dichlorodifluoromethane	0.090		0.0037	0.00064	ppm v/v			11/23/20 17:48	1.83
1,1-Dichloroethane	0.0022	J	0.0037	0.00032	ppm v/v			11/23/20 17:48	1.83
1,2-Dichloroethane	ND		0.0037	0.00046	ppm v/v			11/23/20 17:48	1.83
1,1-Dichloroethene	0.0092		0.0037	0.00037	ppm v/v			11/23/20 17:48	1.83
cis-1,2-Dichloroethene	0.00076	J	0.0037	0.00046	ppm v/v			11/23/20 17:48	1.83
trans-1,2-Dichloroethene	ND		0.0037	0.00032	ppm v/v			11/23/20 17:48	1.83
1,2-Dichloropropane	ND		0.0037	0.00046	ppm v/v			11/23/20 17:48	1.83
cis-1,3-Dichloropropene	ND		0.0037	0.00073	ppm v/v			11/23/20 17:48	1.83
trans-1,3-Dichloropropene	ND		0.0037	0.00041	ppm v/v			11/23/20 17:48	1.83
Ethylbenzene	ND		0.0037	0.00059	ppm v/v			11/23/20 17:48	1.83
4-Ethyltoluene	ND		0.0073	0.00096	ppm v/v			11/23/20 17:48	1.83
Hexachlorobutadiene	ND		0.018	0.0015	ppm v/v			11/23/20 17:48	1.83
2-Hexanone	0.0028	J B	0.0092	0.00073	ppm v/v			11/23/20 17:48	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.0092	0.0025	ppm v/v			11/23/20 17:48	1.83
Methylene Chloride	ND		0.018	0.018	ppm v/v			11/23/20 17:48	1.83
Styrene	ND		0.0037	0.0011	ppm v/v			11/23/20 17:48	1.83
1,1,2,2-Tetrachloroethane	ND		0.0037	0.00064	ppm v/v			11/23/20 17:48	1.83

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMP

Job ID: 140-21095-1

Client Sample ID: 113986-001/MWL-SV02-41.5

Lab Sample ID: 140-21095-2

Date Collected: 11/13/20 11:50

Matrix: Air

Date Received: 11/19/20 11:40

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	0.055		0.0037	0.00032	ppm v/v			11/23/20 17:48	1.83
Toluene	ND		0.0055	0.0036	ppm v/v			11/23/20 17:48	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	0.044		0.0037	0.00037	ppm v/v			11/23/20 17:48	1.83
1,2,4-Trichlorobenzene	ND		0.018	0.0029	ppm v/v			11/23/20 17:48	1.83
1,1,1-Trichloroethane	0.057		0.0037	0.0017	ppm v/v			11/23/20 17:48	1.83
1,1,2-Trichloroethane	ND		0.0037	0.00032	ppm v/v			11/23/20 17:48	1.83
Trichloroethene	0.055		0.0018	0.00027	ppm v/v			11/23/20 17:48	1.83
Trichlorofluoromethane	0.29		0.0037	0.00050	ppm v/v			11/23/20 17:48	1.83
1,2,4-Trimethylbenzene	ND		0.0037	0.00092	ppm v/v			11/23/20 17:48	1.83
1,3,5-Trimethylbenzene	ND		0.0037	0.0010	ppm v/v			11/23/20 17:48	1.83
Vinyl acetate	ND		0.018	0.0013	ppm v/v			11/23/20 17:48	1.83
Vinyl chloride	ND		0.0018	0.0012	ppm v/v			11/23/20 17:48	1.83
m,p-Xylene	ND		0.0037	0.0013	ppm v/v			11/23/20 17:48	1.83
o-Xylene	ND		0.0037	0.00069	ppm v/v			11/23/20 17:48	1.83
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140					11/23/20 17:48	1.83

Client Sample ID: 113983-001/MWL-FB1

Lab Sample ID: 140-21095-3

Date Collected: 11/13/20 11:25

Matrix: Air

Date Received: 11/19/20 11:40

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	0.0062		0.0020	0.00057	ppm v/v			11/23/20 13:11	1.97
Benzene	0.000014	J	0.000080	0.0000080	ppm v/v			11/23/20 13:11	1.97
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			11/23/20 13:11	1.97
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			11/23/20 13:11	1.97
Bromoform	ND		0.000080	0.0000090	ppm v/v			11/23/20 13:11	1.97
Bromomethane	ND		0.000080	0.000022	ppm v/v			11/23/20 13:11	1.97
2-Butanone (MEK)	0.00070		0.00040	0.000073	ppm v/v			11/23/20 13:11	1.97
Carbon disulfide	0.000015	J	0.00020	0.000011	ppm v/v			11/23/20 13:11	1.97
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			11/23/20 13:11	1.97
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			11/23/20 13:11	1.97
Chloroethane	ND		0.000080	0.000029	ppm v/v			11/23/20 13:11	1.97
Chloroform	ND		0.000080	0.0000070	ppm v/v			11/23/20 13:11	1.97
Chloromethane	ND		0.00020	0.000066	ppm v/v			11/23/20 13:11	1.97
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 13:11	1.97
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			11/23/20 13:11	1.97
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			11/23/20 13:11	1.97
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			11/23/20 13:11	1.97
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 13:11	1.97
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 13:11	1.97
Dichlorodifluoromethane	ND		0.000080	0.000014	ppm v/v			11/23/20 13:11	1.97
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 13:11	1.97
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			11/23/20 13:11	1.97
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			11/23/20 13:11	1.97

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMP

Job ID: 140-21095-1

Client Sample ID: 113983-001/MWL-FB1

Lab Sample ID: 140-21095-3

Date Collected: 11/13/20 11:25

Matrix: Air

Date Received: 11/19/20 11:40

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		0.000080	0.000010	ppm v/v			11/23/20 13:11	1.97
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			11/23/20 13:11	1.97
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			11/23/20 13:11	1.97
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			11/23/20 13:11	1.97
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			11/23/20 13:11	1.97
Ethylbenzene	0.000021	J	0.000080	0.000013	ppm v/v			11/23/20 13:11	1.97
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/23/20 13:11	1.97
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			11/23/20 13:11	1.97
2-Hexanone	0.000093	J B	0.00020	0.000016	ppm v/v			11/23/20 13:11	1.97
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			11/23/20 13:11	1.97
Methylene Chloride	ND		0.00040	0.00039	ppm v/v			11/23/20 13:11	1.97
Styrene	ND		0.000080	0.000024	ppm v/v			11/23/20 13:11	1.97
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			11/23/20 13:11	1.97
Tetrachloroethene	0.00011		0.000080	0.0000070	ppm v/v			11/23/20 13:11	1.97
Toluene	ND		0.00012	0.000078	ppm v/v			11/23/20 13:11	1.97
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			11/23/20 13:11	1.97
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			11/23/20 13:11	1.97
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			11/23/20 13:11	1.97
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 13:11	1.97
Trichloroethene	0.000019	J	0.000040	0.0000060	ppm v/v			11/23/20 13:11	1.97
Trichlorofluoromethane	ND		0.000080	0.000011	ppm v/v			11/23/20 13:11	1.97
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			11/23/20 13:11	1.97
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			11/23/20 13:11	1.97
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			11/23/20 13:11	1.97
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			11/23/20 13:11	1.97
m,p-Xylene	0.000064	J	0.000080	0.000029	ppm v/v			11/23/20 13:11	1.97
o-Xylene	0.000022	J	0.000080	0.000015	ppm v/v			11/23/20 13:11	1.97
<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)	100		60 - 140					11/23/20 13:11	1.97

Client Sample ID: 113984-001/MWL-SV01-42.5

Lab Sample ID: 140-21095-4

Date Collected: 11/13/20 11:42

Matrix: Air

Date Received: 11/19/20 11:40

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		0.094	0.027	ppm v/v			11/23/20 18:30	1.87
Benzene	ND		0.0037	0.00037	ppm v/v			11/23/20 18:30	1.87
Benzyl chloride	ND		0.0075	0.0018	ppm v/v			11/23/20 18:30	1.87
Bromodichloromethane	0.00086	J	0.0037	0.00084	ppm v/v			11/23/20 18:30	1.87
Bromoform	ND		0.0037	0.00042	ppm v/v			11/23/20 18:30	1.87
Bromomethane	ND		0.0037	0.0010	ppm v/v			11/23/20 18:30	1.87
2-Butanone (MEK)	ND		0.019	0.0034	ppm v/v			11/23/20 18:30	1.87
Carbon disulfide	0.0011	J	0.0094	0.00051	ppm v/v			11/23/20 18:30	1.87
Carbon tetrachloride	0.00037	J	0.0037	0.00033	ppm v/v			11/23/20 18:30	1.87
Chlorobenzene	ND		0.0037	0.00028	ppm v/v			11/23/20 18:30	1.87
Chloroethane	ND		0.0037	0.0014	ppm v/v			11/23/20 18:30	1.87

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113984-001/MWL-SV01-42.5

Lab Sample ID: 140-21095-4

Date Collected: 11/13/20 11:42

Matrix: Air

Date Received: 11/19/20 11:40

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>Chloroform</b>	<b>0.016</b>		0.0037	0.00033	ppm v/v			11/23/20 18:30	1.87
Chloromethane	ND		0.0094	0.0031	ppm v/v			11/23/20 18:30	1.87
Dibromochloromethane	ND		0.0037	0.00033	ppm v/v			11/23/20 18:30	1.87
1,2-Dibromoethane (EDB)	ND		0.0037	0.00033	ppm v/v			11/23/20 18:30	1.87
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0037	0.00056	ppm v/v			11/23/20 18:30	1.87
1,2-Dichlorobenzene	ND		0.0037	0.0014	ppm v/v			11/23/20 18:30	1.87
1,3-Dichlorobenzene	ND		0.0037	0.00075	ppm v/v			11/23/20 18:30	1.87
1,4-Dichlorobenzene	ND		0.0037	0.00075	ppm v/v			11/23/20 18:30	1.87
<b>Dichlorodifluoromethane</b>	<b>0.084</b>		0.0037	0.00065	ppm v/v			11/23/20 18:30	1.87
<b>1,1-Dichloroethane</b>	<b>0.0025</b>	<b>J</b>	0.0037	0.00033	ppm v/v			11/23/20 18:30	1.87
1,2-Dichloroethane	ND		0.0037	0.00047	ppm v/v			11/23/20 18:30	1.87
<b>1,1-Dichloroethene</b>	<b>0.0062</b>		0.0037	0.00037	ppm v/v			11/23/20 18:30	1.87
<b>cis-1,2-Dichloroethene</b>	<b>0.0013</b>	<b>J</b>	0.0037	0.00047	ppm v/v			11/23/20 18:30	1.87
trans-1,2-Dichloroethene	ND		0.0037	0.00033	ppm v/v			11/23/20 18:30	1.87
1,2-Dichloropropane	ND		0.0037	0.00047	ppm v/v			11/23/20 18:30	1.87
cis-1,3-Dichloropropene	ND		0.0037	0.00075	ppm v/v			11/23/20 18:30	1.87
trans-1,3-Dichloropropene	ND		0.0037	0.00042	ppm v/v			11/23/20 18:30	1.87
Ethylbenzene	ND		0.0037	0.00061	ppm v/v			11/23/20 18:30	1.87
4-Ethyltoluene	ND		0.0075	0.00098	ppm v/v			11/23/20 18:30	1.87
Hexachlorobutadiene	ND		0.019	0.0015	ppm v/v			11/23/20 18:30	1.87
<b>2-Hexanone</b>	<b>0.0026</b>	<b>J B</b>	0.0094	0.00075	ppm v/v			11/23/20 18:30	1.87
4-Methyl-2-pentanone (MIBK)	ND		0.0094	0.0025	ppm v/v			11/23/20 18:30	1.87
Methylene Chloride	ND		0.019	0.018	ppm v/v			11/23/20 18:30	1.87
Styrene	ND		0.0037	0.0011	ppm v/v			11/23/20 18:30	1.87
1,1,2,2-Tetrachloroethane	ND		0.0037	0.00065	ppm v/v			11/23/20 18:30	1.87
<b>Tetrachloroethene</b>	<b>0.38</b>		0.0037	0.00033	ppm v/v			11/23/20 18:30	1.87
Toluene	ND		0.0056	0.0036	ppm v/v			11/23/20 18:30	1.87
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.067</b>		0.0037	0.00037	ppm v/v			11/23/20 18:30	1.87
1,2,4-Trichlorobenzene	ND		0.019	0.0030	ppm v/v			11/23/20 18:30	1.87
<b>1,1,1-Trichloroethane</b>	<b>0.030</b>		0.0037	0.0017	ppm v/v			11/23/20 18:30	1.87
1,1,2-Trichloroethane	ND		0.0037	0.00033	ppm v/v			11/23/20 18:30	1.87
<b>Trichloroethene</b>	<b>0.081</b>		0.0019	0.00028	ppm v/v			11/23/20 18:30	1.87
<b>Trichlorofluoromethane</b>	<b>0.16</b>		0.0037	0.00051	ppm v/v			11/23/20 18:30	1.87
1,2,4-Trimethylbenzene	ND		0.0037	0.00094	ppm v/v			11/23/20 18:30	1.87
1,3,5-Trimethylbenzene	ND		0.0037	0.0010	ppm v/v			11/23/20 18:30	1.87
Vinyl acetate	ND		0.019	0.0013	ppm v/v			11/23/20 18:30	1.87
Vinyl chloride	ND		0.0019	0.0012	ppm v/v			11/23/20 18:30	1.87
m,p-Xylene	ND		0.0037	0.0014	ppm v/v			11/23/20 18:30	1.87
o-Xylene	ND		0.0037	0.00070	ppm v/v			11/23/20 18:30	1.87

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140		11/23/20 18:30	1.87

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 113999-001/MWL-FB5**

**Lab Sample ID: 140-21095-5**

**Date Collected: 11/13/20 10:42**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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	0.0022	CI	0.0020	0.00057	ppm v/v			11/23/20 14:53	1.79
Benzene	0.000014	J	0.000080	0.0000080	ppm v/v			11/23/20 14:53	1.79
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			11/23/20 14:53	1.79
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			11/23/20 14:53	1.79
Bromoform	ND		0.000080	0.0000090	ppm v/v			11/23/20 14:53	1.79
Bromomethane	ND		0.000080	0.000022	ppm v/v			11/23/20 14:53	1.79
2-Butanone (MEK)	0.00016	J	0.00040	0.000073	ppm v/v			11/23/20 14:53	1.79
Carbon disulfide	ND		0.00020	0.000011	ppm v/v			11/23/20 14:53	1.79
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			11/23/20 14:53	1.79
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			11/23/20 14:53	1.79
Chloroethane	ND		0.000080	0.000029	ppm v/v			11/23/20 14:53	1.79
Chloroform	ND		0.000080	0.0000070	ppm v/v			11/23/20 14:53	1.79
Chloromethane	ND		0.00020	0.000066	ppm v/v			11/23/20 14:53	1.79
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 14:53	1.79
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			11/23/20 14:53	1.79
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			11/23/20 14:53	1.79
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			11/23/20 14:53	1.79
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 14:53	1.79
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 14:53	1.79
Dichlorodifluoromethane	ND		0.000080	0.000014	ppm v/v			11/23/20 14:53	1.79
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 14:53	1.79
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			11/23/20 14:53	1.79
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			11/23/20 14:53	1.79
cis-1,2-Dichloroethene	ND		0.000080	0.000010	ppm v/v			11/23/20 14:53	1.79
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			11/23/20 14:53	1.79
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			11/23/20 14:53	1.79
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			11/23/20 14:53	1.79
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			11/23/20 14:53	1.79
Ethylbenzene	0.000020	J	0.000080	0.000013	ppm v/v			11/23/20 14:53	1.79
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/23/20 14:53	1.79
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			11/23/20 14:53	1.79
2-Hexanone	0.000062	J B	0.00020	0.000016	ppm v/v			11/23/20 14:53	1.79
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			11/23/20 14:53	1.79
Methylene Chloride	ND		0.00040	0.000039	ppm v/v			11/23/20 14:53	1.79
Styrene	ND		0.000080	0.000024	ppm v/v			11/23/20 14:53	1.79
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			11/23/20 14:53	1.79
Tetrachloroethene	0.000012	J	0.000080	0.0000070	ppm v/v			11/23/20 14:53	1.79
Toluene	0.000093	J	0.00012	0.000078	ppm v/v			11/23/20 14:53	1.79
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			11/23/20 14:53	1.79
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			11/23/20 14:53	1.79
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			11/23/20 14:53	1.79
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 14:53	1.79
Trichloroethene	ND		0.000040	0.0000060	ppm v/v			11/23/20 14:53	1.79
Trichlorofluoromethane	ND		0.000080	0.000011	ppm v/v			11/23/20 14:53	1.79
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			11/23/20 14:53	1.79
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			11/23/20 14:53	1.79
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			11/23/20 14:53	1.79
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			11/23/20 14:53	1.79

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 113999-001/MWL-FB5**

**Lab Sample ID: 140-21095-5**

Date Collected: 11/13/20 10:42

Matrix: Air

Date Received: 11/19/20 11:40

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	0.000051	J	0.000080	0.000029	ppm v/v			11/23/20 14:53	1.79
o-Xylene	0.000017	J	0.000080	0.000015	ppm v/v			11/23/20 14:53	1.79
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140					11/23/20 14:53	1.79

**Client Sample ID: 114000-001/MWL-SV05-50**

**Lab Sample ID: 140-21095-6**

Date Collected: 11/13/20 10:47

Matrix: Air

Date Received: 11/19/20 11:40

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		0.052	0.015	ppm v/v			11/23/20 19:12	2.06
Benzene	0.00032	J	0.0021	0.00021	ppm v/v			11/23/20 19:12	2.06
Benzyl chloride	ND		0.0041	0.00098	ppm v/v			11/23/20 19:12	2.06
Bromodichloromethane	ND		0.0021	0.00046	ppm v/v			11/23/20 19:12	2.06
Bromoform	ND		0.0021	0.00023	ppm v/v			11/23/20 19:12	2.06
Bromomethane	ND		0.0021	0.00057	ppm v/v			11/23/20 19:12	2.06
2-Butanone (MEK)	ND		0.010	0.0019	ppm v/v			11/23/20 19:12	2.06
Carbon disulfide	ND		0.0052	0.00028	ppm v/v			11/23/20 19:12	2.06
Carbon tetrachloride	0.00031	J	0.0021	0.00018	ppm v/v			11/23/20 19:12	2.06
Chlorobenzene	ND		0.0021	0.00015	ppm v/v			11/23/20 19:12	2.06
Chloroethane	ND		0.0021	0.00075	ppm v/v			11/23/20 19:12	2.06
Chloroform	0.0015	J	0.0021	0.00018	ppm v/v			11/23/20 19:12	2.06
Chloromethane	ND		0.0052	0.0017	ppm v/v			11/23/20 19:12	2.06
Dibromochloromethane	ND		0.0021	0.00018	ppm v/v			11/23/20 19:12	2.06
1,2-Dibromoethane (EDB)	ND		0.0021	0.00018	ppm v/v			11/23/20 19:12	2.06
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0021	0.00031	ppm v/v			11/23/20 19:12	2.06
1,2-Dichlorobenzene	ND		0.0021	0.00080	ppm v/v			11/23/20 19:12	2.06
1,3-Dichlorobenzene	ND		0.0021	0.00041	ppm v/v			11/23/20 19:12	2.06
1,4-Dichlorobenzene	ND		0.0021	0.00041	ppm v/v			11/23/20 19:12	2.06
Dichlorodifluoromethane	0.046		0.0021	0.00036	ppm v/v			11/23/20 19:12	2.06
1,1-Dichloroethane	0.0018	J	0.0021	0.00018	ppm v/v			11/23/20 19:12	2.06
1,2-Dichloroethane	ND		0.0021	0.00026	ppm v/v			11/23/20 19:12	2.06
1,1-Dichloroethene	0.0091		0.0021	0.00021	ppm v/v			11/23/20 19:12	2.06
cis-1,2-Dichloroethene	0.00068	J	0.0021	0.00026	ppm v/v			11/23/20 19:12	2.06
trans-1,2-Dichloroethene	ND		0.0021	0.00018	ppm v/v			11/23/20 19:12	2.06
1,2-Dichloropropane	ND		0.0021	0.00026	ppm v/v			11/23/20 19:12	2.06
cis-1,3-Dichloropropene	ND		0.0021	0.00041	ppm v/v			11/23/20 19:12	2.06
trans-1,3-Dichloropropene	ND		0.0021	0.00023	ppm v/v			11/23/20 19:12	2.06
Ethylbenzene	ND		0.0021	0.00033	ppm v/v			11/23/20 19:12	2.06
4-Ethyltoluene	ND		0.0041	0.00054	ppm v/v			11/23/20 19:12	2.06
Hexachlorobutadiene	ND		0.010	0.00082	ppm v/v			11/23/20 19:12	2.06
2-Hexanone	0.0013	J B	0.0052	0.00041	ppm v/v			11/23/20 19:12	2.06
4-Methyl-2-pentanone (MIBK)	ND		0.0052	0.0014	ppm v/v			11/23/20 19:12	2.06
Methylene Chloride	ND		0.010	0.010	ppm v/v			11/23/20 19:12	2.06
Styrene	ND		0.0021	0.00062	ppm v/v			11/23/20 19:12	2.06
1,1,2,2-Tetrachloroethane	ND		0.0021	0.00036	ppm v/v			11/23/20 19:12	2.06

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMP

Job ID: 140-21095-1

Client Sample ID: 114000-001/MWL-SV05-50

Lab Sample ID: 140-21095-6

Date Collected: 11/13/20 10:47

Matrix: Air

Date Received: 11/19/20 11:40

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	0.039		0.0021	0.00018	ppm v/v			11/23/20 19:12	2.06
Toluene	ND		0.0031	0.0020	ppm v/v			11/23/20 19:12	2.06
1,1,2-Trichloro-1,2,2-trifluoroethane	0.042		0.0021	0.00021	ppm v/v			11/23/20 19:12	2.06
1,2,4-Trichlorobenzene	ND		0.010	0.0016	ppm v/v			11/23/20 19:12	2.06
1,1,1-Trichloroethane	0.012		0.0021	0.00095	ppm v/v			11/23/20 19:12	2.06
1,1,2-Trichloroethane	ND		0.0021	0.00018	ppm v/v			11/23/20 19:12	2.06
Trichloroethene	0.049		0.0010	0.00015	ppm v/v			11/23/20 19:12	2.06
Trichlorofluoromethane	0.10		0.0021	0.00028	ppm v/v			11/23/20 19:12	2.06
1,2,4-Trimethylbenzene	ND		0.0021	0.00052	ppm v/v			11/23/20 19:12	2.06
1,3,5-Trimethylbenzene	ND		0.0021	0.00057	ppm v/v			11/23/20 19:12	2.06
Vinyl acetate	ND		0.010	0.00072	ppm v/v			11/23/20 19:12	2.06
Vinyl chloride	ND		0.0010	0.00067	ppm v/v			11/23/20 19:12	2.06
m,p-Xylene	ND		0.0021	0.00075	ppm v/v			11/23/20 19:12	2.06
o-Xylene	ND		0.0021	0.00039	ppm v/v			11/23/20 19:12	2.06
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140					11/23/20 19:12	2.06

Client Sample ID: 114001-001/MWL-SV05-100

Lab Sample ID: 140-21095-7

Date Collected: 11/13/20 10:50

Matrix: Air

Date Received: 11/19/20 11:40

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		0.046	0.013	ppm v/v			11/23/20 19:54	1.85
Benzene	0.00030	J	0.0019	0.00019	ppm v/v			11/23/20 19:54	1.85
Benzyl chloride	ND		0.0037	0.00088	ppm v/v			11/23/20 19:54	1.85
Bromodichloromethane	ND		0.0019	0.00042	ppm v/v			11/23/20 19:54	1.85
Bromoform	ND		0.0019	0.00021	ppm v/v			11/23/20 19:54	1.85
Bromomethane	ND		0.0019	0.00051	ppm v/v			11/23/20 19:54	1.85
2-Butanone (MEK)	ND		0.0093	0.0017	ppm v/v			11/23/20 19:54	1.85
Carbon disulfide	ND		0.0046	0.00025	ppm v/v			11/23/20 19:54	1.85
Carbon tetrachloride	0.00044	J	0.0019	0.00016	ppm v/v			11/23/20 19:54	1.85
Chlorobenzene	ND		0.0019	0.00014	ppm v/v			11/23/20 19:54	1.85
Chloroethane	ND		0.0019	0.00067	ppm v/v			11/23/20 19:54	1.85
Chloroform	0.0020		0.0019	0.00016	ppm v/v			11/23/20 19:54	1.85
Chloromethane	ND		0.0046	0.0015	ppm v/v			11/23/20 19:54	1.85
Dibromochloromethane	ND		0.0019	0.00016	ppm v/v			11/23/20 19:54	1.85
1,2-Dibromoethane (EDB)	ND		0.0019	0.00016	ppm v/v			11/23/20 19:54	1.85
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00028	ppm v/v			11/23/20 19:54	1.85
1,2-Dichlorobenzene	ND		0.0019	0.00072	ppm v/v			11/23/20 19:54	1.85
1,3-Dichlorobenzene	ND		0.0019	0.00037	ppm v/v			11/23/20 19:54	1.85
1,4-Dichlorobenzene	ND		0.0019	0.00037	ppm v/v			11/23/20 19:54	1.85
Dichlorodifluoromethane	0.065		0.0019	0.00032	ppm v/v			11/23/20 19:54	1.85
1,1-Dichloroethane	0.0034		0.0019	0.00016	ppm v/v			11/23/20 19:54	1.85
1,2-Dichloroethane	ND		0.0019	0.00023	ppm v/v			11/23/20 19:54	1.85
1,1-Dichloroethene	0.018		0.0019	0.00019	ppm v/v			11/23/20 19:54	1.85

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 114001-001/MWL-SV05-100**

**Lab Sample ID: 140-21095-7**

**Date Collected: 11/13/20 10:50**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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>cis-1,2-Dichloroethene</b>	<b>0.0014</b>	<b>J</b>	0.0019	0.00023	ppm v/v			11/23/20 19:54	1.85
trans-1,2-Dichloroethene	ND		0.0019	0.00016	ppm v/v			11/23/20 19:54	1.85
1,2-Dichloropropane	ND		0.0019	0.00023	ppm v/v			11/23/20 19:54	1.85
cis-1,3-Dichloropropene	ND		0.0019	0.00037	ppm v/v			11/23/20 19:54	1.85
trans-1,3-Dichloropropene	ND		0.0019	0.00021	ppm v/v			11/23/20 19:54	1.85
Ethylbenzene	ND		0.0019	0.00030	ppm v/v			11/23/20 19:54	1.85
4-Ethyltoluene	ND		0.0037	0.00049	ppm v/v			11/23/20 19:54	1.85
Hexachlorobutadiene	ND		0.0093	0.00074	ppm v/v			11/23/20 19:54	1.85
<b>2-Hexanone</b>	<b>0.0013</b>	<b>J B</b>	0.0046	0.00037	ppm v/v			11/23/20 19:54	1.85
4-Methyl-2-pentanone (MIBK)	ND		0.0046	0.0012	ppm v/v			11/23/20 19:54	1.85
Methylene Chloride	ND		0.0093	0.0090	ppm v/v			11/23/20 19:54	1.85
Styrene	ND		0.0019	0.00056	ppm v/v			11/23/20 19:54	1.85
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00032	ppm v/v			11/23/20 19:54	1.85
<b>Tetrachloroethene</b>	<b>0.065</b>		0.0019	0.00016	ppm v/v			11/23/20 19:54	1.85
Toluene	ND		0.0028	0.0018	ppm v/v			11/23/20 19:54	1.85
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.077</b>		0.0019	0.00019	ppm v/v			11/23/20 19:54	1.85
1,2,4-Trichlorobenzene	ND		0.0093	0.0015	ppm v/v			11/23/20 19:54	1.85
<b>1,1,1-Trichloroethane</b>	<b>0.012</b>		0.0019	0.00086	ppm v/v			11/23/20 19:54	1.85
1,1,2-Trichloroethane	ND		0.0019	0.00016	ppm v/v			11/23/20 19:54	1.85
<b>Trichloroethene</b>	<b>0.084</b>		0.00093	0.00014	ppm v/v			11/23/20 19:54	1.85
<b>Trichlorofluoromethane</b>	<b>0.12</b>		0.0019	0.00025	ppm v/v			11/23/20 19:54	1.85
1,2,4-Trimethylbenzene	ND		0.0019	0.00046	ppm v/v			11/23/20 19:54	1.85
1,3,5-Trimethylbenzene	ND		0.0019	0.00051	ppm v/v			11/23/20 19:54	1.85
Vinyl acetate	ND		0.0093	0.00065	ppm v/v			11/23/20 19:54	1.85
Vinyl chloride	ND		0.00093	0.00060	ppm v/v			11/23/20 19:54	1.85
m,p-Xylene	ND		0.0019	0.00067	ppm v/v			11/23/20 19:54	1.85
o-Xylene	ND		0.0019	0.00035	ppm v/v			11/23/20 19:54	1.85
<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)	102		60 - 140					11/23/20 19:54	1.85

**Client Sample ID: 114002-001/MWL-SV05-200**

**Lab Sample ID: 140-21095-8**

**Date Collected: 11/13/20 10:53**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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		0.048	0.014	ppm v/v			11/23/20 20:36	1.92
<b>Benzene</b>	<b>0.00054</b>	<b>J</b>	0.0019	0.00019	ppm v/v			11/23/20 20:36	1.92
Benzyl chloride	ND		0.0038	0.00091	ppm v/v			11/23/20 20:36	1.92
Bromodichloromethane	ND		0.0019	0.00043	ppm v/v			11/23/20 20:36	1.92
Bromoform	ND		0.0019	0.00022	ppm v/v			11/23/20 20:36	1.92
Bromomethane	ND		0.0019	0.00053	ppm v/v			11/23/20 20:36	1.92
2-Butanone (MEK)	ND		0.0096	0.0018	ppm v/v			11/23/20 20:36	1.92
<b>Carbon disulfide</b>	<b>0.00049</b>	<b>J</b>	0.0048	0.00026	ppm v/v			11/23/20 20:36	1.92
<b>Carbon tetrachloride</b>	<b>0.0011</b>	<b>J</b>	0.0019	0.00017	ppm v/v			11/23/20 20:36	1.92
Chlorobenzene	ND		0.0019	0.00014	ppm v/v			11/23/20 20:36	1.92

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 114002-001/MWL-SV05-200

Lab Sample ID: 140-21095-8

Date Collected: 11/13/20 10:53

Matrix: Air

Date Received: 11/19/20 11:40

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		0.0019	0.00070	ppm v/v			11/23/20 20:36	1.92
<b>Chloroform</b>	<b>0.0021</b>		0.0019	0.00017	ppm v/v			11/23/20 20:36	1.92
Chloromethane	ND		0.0048	0.0016	ppm v/v			11/23/20 20:36	1.92
Dibromochloromethane	ND		0.0019	0.00017	ppm v/v			11/23/20 20:36	1.92
1,2-Dibromoethane (EDB)	ND		0.0019	0.00017	ppm v/v			11/23/20 20:36	1.92
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00029	ppm v/v			11/23/20 20:36	1.92
1,2-Dichlorobenzene	ND		0.0019	0.00074	ppm v/v			11/23/20 20:36	1.92
1,3-Dichlorobenzene	ND		0.0019	0.00038	ppm v/v			11/23/20 20:36	1.92
1,4-Dichlorobenzene	ND		0.0019	0.00038	ppm v/v			11/23/20 20:36	1.92
<b>Dichlorodifluoromethane</b>	<b>0.074</b>		0.0019	0.00034	ppm v/v			11/23/20 20:36	1.92
<b>1,1-Dichloroethane</b>	<b>0.0057</b>		0.0019	0.00017	ppm v/v			11/23/20 20:36	1.92
1,2-Dichloroethane	ND		0.0019	0.00024	ppm v/v			11/23/20 20:36	1.92
<b>1,1-Dichloroethene</b>	<b>0.040</b>		0.0019	0.00019	ppm v/v			11/23/20 20:36	1.92
<b>cis-1,2-Dichloroethene</b>	<b>0.0027</b>		0.0019	0.00024	ppm v/v			11/23/20 20:36	1.92
trans-1,2-Dichloroethene	ND		0.0019	0.00017	ppm v/v			11/23/20 20:36	1.92
1,2-Dichloropropane	ND		0.0019	0.00024	ppm v/v			11/23/20 20:36	1.92
cis-1,3-Dichloropropene	ND		0.0019	0.00038	ppm v/v			11/23/20 20:36	1.92
trans-1,3-Dichloropropene	ND		0.0019	0.00022	ppm v/v			11/23/20 20:36	1.92
Ethylbenzene	ND		0.0019	0.00031	ppm v/v			11/23/20 20:36	1.92
4-Ethyltoluene	ND		0.0038	0.00050	ppm v/v			11/23/20 20:36	1.92
Hexachlorobutadiene	ND		0.0096	0.00077	ppm v/v			11/23/20 20:36	1.92
<b>2-Hexanone</b>	<b>0.0013</b>	<b>J B</b>	0.0048	0.00038	ppm v/v			11/23/20 20:36	1.92
4-Methyl-2-pentanone (MIBK)	ND		0.0048	0.0013	ppm v/v			11/23/20 20:36	1.92
Methylene Chloride	ND		0.0096	0.0094	ppm v/v			11/23/20 20:36	1.92
Styrene	ND		0.0019	0.00058	ppm v/v			11/23/20 20:36	1.92
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00034	ppm v/v			11/23/20 20:36	1.92
<b>Tetrachloroethene</b>	<b>0.14</b>		0.0019	0.00017	ppm v/v			11/23/20 20:36	1.92
Toluene	ND		0.0029	0.0019	ppm v/v			11/23/20 20:36	1.92
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.16</b>		0.0019	0.00019	ppm v/v			11/23/20 20:36	1.92
1,2,4-Trichlorobenzene	ND		0.0096	0.0015	ppm v/v			11/23/20 20:36	1.92
<b>1,1,1-Trichloroethane</b>	<b>0.0036</b>		0.0019	0.00089	ppm v/v			11/23/20 20:36	1.92
1,1,2-Trichloroethane	ND		0.0019	0.00017	ppm v/v			11/23/20 20:36	1.92
<b>Trichloroethene</b>	<b>0.22</b>		0.00096	0.00014	ppm v/v			11/23/20 20:36	1.92
<b>Trichlorofluoromethane</b>	<b>0.090</b>		0.0019	0.00026	ppm v/v			11/23/20 20:36	1.92
1,2,4-Trimethylbenzene	ND		0.0019	0.00048	ppm v/v			11/23/20 20:36	1.92
1,3,5-Trimethylbenzene	ND		0.0019	0.00053	ppm v/v			11/23/20 20:36	1.92
Vinyl acetate	ND		0.0096	0.00067	ppm v/v			11/23/20 20:36	1.92
Vinyl chloride	ND		0.00096	0.00062	ppm v/v			11/23/20 20:36	1.92
m,p-Xylene	ND		0.0019	0.00070	ppm v/v			11/23/20 20:36	1.92
o-Xylene	ND		0.0019	0.00036	ppm v/v			11/23/20 20:36	1.92

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140		11/23/20 20:36	1.92

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMP

Job ID: 140-21095-1

Client Sample ID: 114003-001/MWL-SV05-200

Lab Sample ID: 140-21095-9

Date Collected: 11/13/20 10:53

Matrix: Air

Date Received: 11/19/20 11:40

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		0.048	0.014	ppm v/v			11/23/20 21:18	1.93
<b>Benzene</b>	<b>0.00048</b>	<b>J</b>	0.0019	0.00019	ppm v/v			11/23/20 21:18	1.93
Benzyl chloride	ND		0.0039	0.00092	ppm v/v			11/23/20 21:18	1.93
Bromodichloromethane	ND		0.0019	0.00043	ppm v/v			11/23/20 21:18	1.93
Bromoform	ND		0.0019	0.00022	ppm v/v			11/23/20 21:18	1.93
Bromomethane	ND		0.0019	0.00053	ppm v/v			11/23/20 21:18	1.93
2-Butanone (MEK)	ND		0.0097	0.0018	ppm v/v			11/23/20 21:18	1.93
Carbon disulfide	ND		0.0048	0.00027	ppm v/v			11/23/20 21:18	1.93
<b>Carbon tetrachloride</b>	<b>0.0010</b>	<b>J</b>	0.0019	0.00017	ppm v/v			11/23/20 21:18	1.93
Chlorobenzene	ND		0.0019	0.00014	ppm v/v			11/23/20 21:18	1.93
Chloroethane	ND		0.0019	0.00070	ppm v/v			11/23/20 21:18	1.93
<b>Chloroform</b>	<b>0.0021</b>		0.0019	0.00017	ppm v/v			11/23/20 21:18	1.93
Chloromethane	ND		0.0048	0.0016	ppm v/v			11/23/20 21:18	1.93
Dibromochloromethane	ND		0.0019	0.00017	ppm v/v			11/23/20 21:18	1.93
1,2-Dibromoethane (EDB)	ND		0.0019	0.00017	ppm v/v			11/23/20 21:18	1.93
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00029	ppm v/v			11/23/20 21:18	1.93
1,2-Dichlorobenzene	ND		0.0019	0.00075	ppm v/v			11/23/20 21:18	1.93
1,3-Dichlorobenzene	ND		0.0019	0.00039	ppm v/v			11/23/20 21:18	1.93
1,4-Dichlorobenzene	ND		0.0019	0.00039	ppm v/v			11/23/20 21:18	1.93
<b>Dichlorodifluoromethane</b>	<b>0.073</b>		0.0019	0.00034	ppm v/v			11/23/20 21:18	1.93
<b>1,1-Dichloroethane</b>	<b>0.0059</b>		0.0019	0.00017	ppm v/v			11/23/20 21:18	1.93
1,2-Dichloroethane	ND		0.0019	0.00024	ppm v/v			11/23/20 21:18	1.93
<b>1,1-Dichloroethene</b>	<b>0.039</b>		0.0019	0.00019	ppm v/v			11/23/20 21:18	1.93
<b>cis-1,2-Dichloroethene</b>	<b>0.0026</b>		0.0019	0.00024	ppm v/v			11/23/20 21:18	1.93
trans-1,2-Dichloroethene	ND		0.0019	0.00017	ppm v/v			11/23/20 21:18	1.93
1,2-Dichloropropane	ND		0.0019	0.00024	ppm v/v			11/23/20 21:18	1.93
cis-1,3-Dichloropropene	ND		0.0019	0.00039	ppm v/v			11/23/20 21:18	1.93
trans-1,3-Dichloropropene	ND		0.0019	0.00022	ppm v/v			11/23/20 21:18	1.93
Ethylbenzene	ND		0.0019	0.00031	ppm v/v			11/23/20 21:18	1.93
4-Ethyltoluene	ND		0.0039	0.00051	ppm v/v			11/23/20 21:18	1.93
Hexachlorobutadiene	ND		0.0097	0.00077	ppm v/v			11/23/20 21:18	1.93
<b>2-Hexanone</b>	<b>0.0013</b>	<b>J B</b>	0.0048	0.00039	ppm v/v			11/23/20 21:18	1.93
4-Methyl-2-pentanone (MIBK)	ND		0.0048	0.0013	ppm v/v			11/23/20 21:18	1.93
Methylene Chloride	ND		0.0097	0.0094	ppm v/v			11/23/20 21:18	1.93
Styrene	ND		0.0019	0.00058	ppm v/v			11/23/20 21:18	1.93
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00034	ppm v/v			11/23/20 21:18	1.93
<b>Tetrachloroethene</b>	<b>0.13</b>		0.0019	0.00017	ppm v/v			11/23/20 21:18	1.93
Toluene	ND		0.0029	0.0019	ppm v/v			11/23/20 21:18	1.93
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.15</b>		0.0019	0.00019	ppm v/v			11/23/20 21:18	1.93
1,2,4-Trichlorobenzene	ND		0.0097	0.0015	ppm v/v			11/23/20 21:18	1.93
<b>1,1,1-Trichloroethane</b>	<b>0.0037</b>		0.0019	0.00089	ppm v/v			11/23/20 21:18	1.93
1,1,2-Trichloroethane	ND		0.0019	0.00017	ppm v/v			11/23/20 21:18	1.93
<b>Trichloroethene</b>	<b>0.21</b>		0.00097	0.00014	ppm v/v			11/23/20 21:18	1.93
<b>Trichlorofluoromethane</b>	<b>0.089</b>		0.0019	0.00027	ppm v/v			11/23/20 21:18	1.93
1,2,4-Trimethylbenzene	ND		0.0019	0.00048	ppm v/v			11/23/20 21:18	1.93
1,3,5-Trimethylbenzene	ND		0.0019	0.00053	ppm v/v			11/23/20 21:18	1.93
Vinyl acetate	ND		0.0097	0.00068	ppm v/v			11/23/20 21:18	1.93
Vinyl chloride	ND		0.00097	0.00063	ppm v/v			11/23/20 21:18	1.93



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 114003-001/MWL-SV05-200**

**Lab Sample ID: 140-21095-9**

**Date Collected: 11/13/20 10:53**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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		0.0019	0.00070	ppm v/v			11/23/20 21:18	1.93
o-Xylene	ND		0.0019	0.00036	ppm v/v			11/23/20 21:18	1.93
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		60 - 140					11/23/20 21:18	1.93

**Client Sample ID: 114004-001/MWL-SV05-300**

**Lab Sample ID: 140-21095-10**

**Date Collected: 11/13/20 10:59**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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		0.048	0.014	ppm v/v			11/23/20 22:00	1.91
<b>Benzene</b>	<b>0.00084</b>	<b>J</b>	0.0019	0.00019	ppm v/v			11/23/20 22:00	1.91
Benzyl chloride	ND		0.0038	0.00091	ppm v/v			11/23/20 22:00	1.91
Bromodichloromethane	ND		0.0019	0.00043	ppm v/v			11/23/20 22:00	1.91
Bromoform	ND		0.0019	0.00021	ppm v/v			11/23/20 22:00	1.91
Bromomethane	ND		0.0019	0.00053	ppm v/v			11/23/20 22:00	1.91
<b>2-Butanone (MEK)</b>	<b>0.0020</b>	<b>J</b>	0.0096	0.0017	ppm v/v			11/23/20 22:00	1.91
<b>Carbon disulfide</b>	<b>0.0053</b>		0.0048	0.00026	ppm v/v			11/23/20 22:00	1.91
<b>Carbon tetrachloride</b>	<b>0.00086</b>	<b>J</b>	0.0019	0.00017	ppm v/v			11/23/20 22:00	1.91
Chlorobenzene	ND		0.0019	0.00014	ppm v/v			11/23/20 22:00	1.91
Chloroethane	ND		0.0019	0.00069	ppm v/v			11/23/20 22:00	1.91
<b>Chloroform</b>	<b>0.0010</b>	<b>J</b>	0.0019	0.00017	ppm v/v			11/23/20 22:00	1.91
Chloromethane	ND		0.0048	0.0016	ppm v/v			11/23/20 22:00	1.91
Dibromochloromethane	ND		0.0019	0.00017	ppm v/v			11/23/20 22:00	1.91
1,2-Dibromoethane (EDB)	ND		0.0019	0.00017	ppm v/v			11/23/20 22:00	1.91
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00029	ppm v/v			11/23/20 22:00	1.91
1,2-Dichlorobenzene	ND		0.0019	0.00074	ppm v/v			11/23/20 22:00	1.91
1,3-Dichlorobenzene	ND		0.0019	0.00038	ppm v/v			11/23/20 22:00	1.91
1,4-Dichlorobenzene	ND		0.0019	0.00038	ppm v/v			11/23/20 22:00	1.91
<b>Dichlorodifluoromethane</b>	<b>0.037</b>		0.0019	0.00033	ppm v/v			11/23/20 22:00	1.91
<b>1,1-Dichloroethane</b>	<b>0.0020</b>		0.0019	0.00017	ppm v/v			11/23/20 22:00	1.91
1,2-Dichloroethane	ND		0.0019	0.00024	ppm v/v			11/23/20 22:00	1.91
<b>1,1-Dichloroethene</b>	<b>0.022</b>		0.0019	0.00019	ppm v/v			11/23/20 22:00	1.91
<b>cis-1,2-Dichloroethene</b>	<b>0.0010</b>	<b>J</b>	0.0019	0.00024	ppm v/v			11/23/20 22:00	1.91
trans-1,2-Dichloroethene	ND		0.0019	0.00017	ppm v/v			11/23/20 22:00	1.91
1,2-Dichloropropane	ND		0.0019	0.00024	ppm v/v			11/23/20 22:00	1.91
cis-1,3-Dichloropropene	ND		0.0019	0.00038	ppm v/v			11/23/20 22:00	1.91
trans-1,3-Dichloropropene	ND		0.0019	0.00021	ppm v/v			11/23/20 22:00	1.91
<b>Ethylbenzene</b>	<b>0.00096</b>	<b>J</b>	0.0019	0.00031	ppm v/v			11/23/20 22:00	1.91
4-Ethyltoluene	ND		0.0038	0.00050	ppm v/v			11/23/20 22:00	1.91
Hexachlorobutadiene	ND		0.0096	0.00076	ppm v/v			11/23/20 22:00	1.91
<b>2-Hexanone</b>	<b>0.0013</b>	<b>J B</b>	0.0048	0.00038	ppm v/v			11/23/20 22:00	1.91
4-Methyl-2-pentanone (MIBK)	ND		0.0048	0.0013	ppm v/v			11/23/20 22:00	1.91
Methylene Chloride	ND		0.0096	0.0093	ppm v/v			11/23/20 22:00	1.91
Styrene	ND		0.0019	0.00057	ppm v/v			11/23/20 22:00	1.91
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00033	ppm v/v			11/23/20 22:00	1.91

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMP

Job ID: 140-21095-1

Client Sample ID: 114004-001/MWL-SV05-300

Lab Sample ID: 140-21095-10

Date Collected: 11/13/20 10:59

Matrix: Air

Date Received: 11/19/20 11:40

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	0.077		0.0019	0.00017	ppm v/v			11/23/20 22:00	1.91
Toluene	0.0071		0.0029	0.0019	ppm v/v			11/23/20 22:00	1.91
1,1,2-Trichloro-1,2,2-trifluoroethane	0.10		0.0019	0.00019	ppm v/v			11/23/20 22:00	1.91
1,2,4-Trichlorobenzene	ND		0.0096	0.0015	ppm v/v			11/23/20 22:00	1.91
1,1,1-Trichloroethane	0.0016	J	0.0019	0.00088	ppm v/v			11/23/20 22:00	1.91
1,1,2-Trichloroethane	ND		0.0019	0.00017	ppm v/v			11/23/20 22:00	1.91
Trichloroethene	0.11		0.00096	0.00014	ppm v/v			11/23/20 22:00	1.91
Trichlorofluoromethane	0.029		0.0019	0.00026	ppm v/v			11/23/20 22:00	1.91
1,2,4-Trimethylbenzene	0.00068	J	0.0019	0.00048	ppm v/v			11/23/20 22:00	1.91
1,3,5-Trimethylbenzene	ND		0.0019	0.00053	ppm v/v			11/23/20 22:00	1.91
Vinyl acetate	ND		0.0096	0.00067	ppm v/v			11/23/20 22:00	1.91
Vinyl chloride	ND		0.00096	0.00062	ppm v/v			11/23/20 22:00	1.91
m,p-Xylene	0.0035		0.0019	0.00069	ppm v/v			11/23/20 22:00	1.91
o-Xylene	0.0013	J	0.0019	0.00036	ppm v/v			11/23/20 22:00	1.91
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140					11/23/20 22:00	1.91

Client Sample ID: 114005-001/MWL-SV05-400

Lab Sample ID: 140-21095-11

Date Collected: 11/13/20 11:06

Matrix: Air

Date Received: 11/19/20 11:40

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		0.048	0.014	ppm v/v			11/23/20 22:42	1.93
Benzene	0.00070	J	0.0019	0.00019	ppm v/v			11/23/20 22:42	1.93
Benzyl chloride	ND		0.0039	0.00092	ppm v/v			11/23/20 22:42	1.93
Bromodichloromethane	ND		0.0019	0.00043	ppm v/v			11/23/20 22:42	1.93
Bromoform	ND		0.0019	0.00022	ppm v/v			11/23/20 22:42	1.93
Bromomethane	ND		0.0019	0.00053	ppm v/v			11/23/20 22:42	1.93
2-Butanone (MEK)	ND		0.0097	0.0018	ppm v/v			11/23/20 22:42	1.93
Carbon disulfide	0.00035	J	0.0048	0.00027	ppm v/v			11/23/20 22:42	1.93
Carbon tetrachloride	0.00058	J	0.0019	0.00017	ppm v/v			11/23/20 22:42	1.93
Chlorobenzene	ND		0.0019	0.00014	ppm v/v			11/23/20 22:42	1.93
Chloroethane	ND		0.0019	0.00070	ppm v/v			11/23/20 22:42	1.93
Chloroform	0.00074	J	0.0019	0.00017	ppm v/v			11/23/20 22:42	1.93
Chloromethane	ND		0.0048	0.0016	ppm v/v			11/23/20 22:42	1.93
Dibromochloromethane	ND		0.0019	0.00017	ppm v/v			11/23/20 22:42	1.93
1,2-Dibromoethane (EDB)	ND		0.0019	0.00017	ppm v/v			11/23/20 22:42	1.93
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00029	ppm v/v			11/23/20 22:42	1.93
1,2-Dichlorobenzene	ND		0.0019	0.00075	ppm v/v			11/23/20 22:42	1.93
1,3-Dichlorobenzene	ND		0.0019	0.00039	ppm v/v			11/23/20 22:42	1.93
1,4-Dichlorobenzene	ND		0.0019	0.00039	ppm v/v			11/23/20 22:42	1.93
Dichlorodifluoromethane	0.020		0.0019	0.00034	ppm v/v			11/23/20 22:42	1.93
1,1-Dichloroethane	0.0017	J	0.0019	0.00017	ppm v/v			11/23/20 22:42	1.93
1,2-Dichloroethane	ND		0.0019	0.00024	ppm v/v			11/23/20 22:42	1.93
1,1-Dichloroethene	0.012		0.0019	0.00019	ppm v/v			11/23/20 22:42	1.93

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 114005-001/MWL-SV05-400

Lab Sample ID: 140-21095-11

Date Collected: 11/13/20 11:06

Matrix: Air

Date Received: 11/19/20 11:40

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	0.00069	J	0.0019	0.00024	ppm v/v			11/23/20 22:42	1.93
trans-1,2-Dichloroethene	ND		0.0019	0.00017	ppm v/v			11/23/20 22:42	1.93
1,2-Dichloropropane	ND		0.0019	0.00024	ppm v/v			11/23/20 22:42	1.93
cis-1,3-Dichloropropene	ND		0.0019	0.00039	ppm v/v			11/23/20 22:42	1.93
trans-1,3-Dichloropropene	ND		0.0019	0.00022	ppm v/v			11/23/20 22:42	1.93
Ethylbenzene	ND		0.0019	0.00031	ppm v/v			11/23/20 22:42	1.93
4-Ethyltoluene	ND		0.0039	0.00051	ppm v/v			11/23/20 22:42	1.93
Hexachlorobutadiene	ND		0.0097	0.00077	ppm v/v			11/23/20 22:42	1.93
2-Hexanone	0.0013	J B	0.0048	0.00039	ppm v/v			11/23/20 22:42	1.93
4-Methyl-2-pentanone (MIBK)	ND		0.0048	0.0013	ppm v/v			11/23/20 22:42	1.93
Methylene Chloride	ND		0.0097	0.0094	ppm v/v			11/23/20 22:42	1.93
Styrene	ND		0.0019	0.00058	ppm v/v			11/23/20 22:42	1.93
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00034	ppm v/v			11/23/20 22:42	1.93
Tetrachloroethene	0.084		0.0019	0.00017	ppm v/v			11/23/20 22:42	1.93
Toluene	ND		0.0029	0.0019	ppm v/v			11/23/20 22:42	1.93
1,1,2-Trichloro-1,2,2-trifluoroethane	0.046		0.0019	0.00019	ppm v/v			11/23/20 22:42	1.93
1,2,4-Trichlorobenzene	ND		0.0097	0.0015	ppm v/v			11/23/20 22:42	1.93
1,1,1-Trichloroethane	0.0016	J	0.0019	0.00089	ppm v/v			11/23/20 22:42	1.93
1,1,2-Trichloroethane	ND		0.0019	0.00017	ppm v/v			11/23/20 22:42	1.93
Trichloroethene	0.083		0.00097	0.00014	ppm v/v			11/23/20 22:42	1.93
Trichlorofluoromethane	0.024		0.0019	0.00027	ppm v/v			11/23/20 22:42	1.93
1,2,4-Trimethylbenzene	ND		0.0019	0.00048	ppm v/v			11/23/20 22:42	1.93
1,3,5-Trimethylbenzene	ND		0.0019	0.00053	ppm v/v			11/23/20 22:42	1.93
Vinyl acetate	ND		0.0097	0.00068	ppm v/v			11/23/20 22:42	1.93
Vinyl chloride	ND		0.00097	0.00063	ppm v/v			11/23/20 22:42	1.93
m,p-Xylene	ND		0.0019	0.00070	ppm v/v			11/23/20 22:42	1.93
o-Xylene	ND		0.0019	0.00036	ppm v/v			11/23/20 22:42	1.93
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140					11/23/20 22:42	1.93

Client Sample ID: 114006-001/MWL-SV05-400

Lab Sample ID: 140-21095-12

Date Collected: 11/13/20 11:06

Matrix: Air

Date Received: 11/19/20 11:40

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		0.017	0.0049	ppm v/v			11/24/20 20:10	1.72
Benzene	0.00053	J	0.00069	0.000069	ppm v/v			11/24/20 20:10	1.72
Benzyl chloride	ND		0.0014	0.00033	ppm v/v			11/24/20 20:10	1.72
Bromodichloromethane	ND		0.00069	0.00015	ppm v/v			11/24/20 20:10	1.72
Bromoform	ND		0.00069	0.000077	ppm v/v			11/24/20 20:10	1.72
Bromomethane	ND		0.00069	0.00019	ppm v/v			11/24/20 20:10	1.72
2-Butanone (MEK)	ND		0.0034	0.00063	ppm v/v			11/24/20 20:10	1.72
Carbon disulfide	0.00017	J	0.0017	0.000095	ppm v/v			11/24/20 20:10	1.72
Carbon tetrachloride	0.00032	J	0.00069	0.000060	ppm v/v			11/24/20 20:10	1.72
Chlorobenzene	ND		0.00069	0.000052	ppm v/v			11/24/20 20:10	1.72

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 114006-001/MWL-SV05-400

Lab Sample ID: 140-21095-12

Date Collected: 11/13/20 11:06

Matrix: Air

Date Received: 11/19/20 11:40

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		0.00069	0.00025	ppm v/v			11/24/20 20:10	1.72
<b>Chloroform</b>	<b>0.00054</b>	<b>J</b>	0.00069	0.000060	ppm v/v			11/24/20 20:10	1.72
Chloromethane	ND		0.0017	0.00057	ppm v/v			11/24/20 20:10	1.72
Dibromochloromethane	ND		0.00069	0.000060	ppm v/v			11/24/20 20:10	1.72
1,2-Dibromoethane (EDB)	ND		0.00069	0.000060	ppm v/v			11/24/20 20:10	1.72
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00069	0.00010	ppm v/v			11/24/20 20:10	1.72
1,2-Dichlorobenzene	ND		0.00069	0.00027	ppm v/v			11/24/20 20:10	1.72
1,3-Dichlorobenzene	ND		0.00069	0.00014	ppm v/v			11/24/20 20:10	1.72
1,4-Dichlorobenzene	ND		0.00069	0.00014	ppm v/v			11/24/20 20:10	1.72
<b>Dichlorodifluoromethane</b>	<b>0.015</b>		0.00069	0.00012	ppm v/v			11/24/20 20:10	1.72
<b>1,1-Dichloroethane</b>	<b>0.0012</b>		0.00069	0.000060	ppm v/v			11/24/20 20:10	1.72
1,2-Dichloroethane	ND		0.00069	0.000086	ppm v/v			11/24/20 20:10	1.72
<b>1,1-Dichloroethene</b>	<b>0.0090</b>		0.00069	0.000069	ppm v/v			11/24/20 20:10	1.72
<b>cis-1,2-Dichloroethene</b>	<b>0.00047</b>	<b>J</b>	0.00069	0.000086	ppm v/v			11/24/20 20:10	1.72
trans-1,2-Dichloroethene	ND		0.00069	0.000060	ppm v/v			11/24/20 20:10	1.72
1,2-Dichloropropane	ND		0.00069	0.000086	ppm v/v			11/24/20 20:10	1.72
cis-1,3-Dichloropropene	ND		0.00069	0.00014	ppm v/v			11/24/20 20:10	1.72
trans-1,3-Dichloropropene	ND		0.00069	0.000077	ppm v/v			11/24/20 20:10	1.72
Ethylbenzene	ND		0.00069	0.00011	ppm v/v			11/24/20 20:10	1.72
4-Ethyltoluene	ND		0.0014	0.00018	ppm v/v			11/24/20 20:10	1.72
Hexachlorobutadiene	ND		0.0034	0.00028	ppm v/v			11/24/20 20:10	1.72
<b>2-Hexanone</b>	<b>0.00045</b>	<b>J B</b>	0.0017	0.00014	ppm v/v			11/24/20 20:10	1.72
4-Methyl-2-pentanone (MIBK)	ND		0.0017	0.00046	ppm v/v			11/24/20 20:10	1.72
Methylene Chloride	ND		0.0034	0.0034	ppm v/v			11/24/20 20:10	1.72
Styrene	ND		0.00069	0.00021	ppm v/v			11/24/20 20:10	1.72
1,1,2,2-Tetrachloroethane	ND		0.00069	0.00012	ppm v/v			11/24/20 20:10	1.72
<b>Tetrachloroethene</b>	<b>0.063</b>		0.00069	0.000060	ppm v/v			11/24/20 20:10	1.72
<b>Toluene</b>	<b>0.00069</b>	<b>J</b>	0.0010	0.00067	ppm v/v			11/24/20 20:10	1.72
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.034</b>		0.00069	0.000069	ppm v/v			11/24/20 20:10	1.72
1,2,4-Trichlorobenzene	ND		0.0034	0.00055	ppm v/v			11/24/20 20:10	1.72
<b>1,1,1-Trichloroethane</b>	<b>0.0011</b>		0.00069	0.00032	ppm v/v			11/24/20 20:10	1.72
1,1,2-Trichloroethane	ND		0.00069	0.000060	ppm v/v			11/24/20 20:10	1.72
<b>Trichloroethene</b>	<b>0.053</b>		0.00034	0.000052	ppm v/v			11/24/20 20:10	1.72
<b>Trichlorofluoromethane</b>	<b>0.018</b>		0.00069	0.000095	ppm v/v			11/24/20 20:10	1.72
1,2,4-Trimethylbenzene	ND		0.00069	0.00017	ppm v/v			11/24/20 20:10	1.72
1,3,5-Trimethylbenzene	ND		0.00069	0.00019	ppm v/v			11/24/20 20:10	1.72
Vinyl acetate	ND		0.0034	0.00024	ppm v/v			11/24/20 20:10	1.72
Vinyl chloride	ND		0.00034	0.00022	ppm v/v			11/24/20 20:10	1.72
m,p-Xylene	ND		0.00069	0.00025	ppm v/v			11/24/20 20:10	1.72
o-Xylene	ND		0.00069	0.00013	ppm v/v			11/24/20 20:10	1.72

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140		11/24/20 20:10	1.72

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113993-001/MWL-FB4

Lab Sample ID: 140-21095-13

Date Collected: 11/13/20 09:49

Matrix: Air

Date Received: 11/19/20 11:40

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	0.0035		0.0020	0.00057	ppm v/v			11/23/20 16:16	1.83
Benzene	0.000031	J	0.000080	0.0000080	ppm v/v			11/23/20 16:16	1.83
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			11/23/20 16:16	1.83
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			11/23/20 16:16	1.83
Bromoform	ND		0.000080	0.0000090	ppm v/v			11/23/20 16:16	1.83
Bromomethane	ND		0.000080	0.000022	ppm v/v			11/23/20 16:16	1.83
2-Butanone (MEK)	0.00022	J	0.00040	0.000073	ppm v/v			11/23/20 16:16	1.83
Carbon disulfide	0.000039	J	0.00020	0.000011	ppm v/v			11/23/20 16:16	1.83
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			11/23/20 16:16	1.83
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			11/23/20 16:16	1.83
Chloroethane	ND		0.000080	0.000029	ppm v/v			11/23/20 16:16	1.83
Chloroform	ND		0.000080	0.0000070	ppm v/v			11/23/20 16:16	1.83
Chloromethane	0.00016	J	0.00020	0.000066	ppm v/v			11/23/20 16:16	1.83
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 16:16	1.83
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			11/23/20 16:16	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			11/23/20 16:16	1.83
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			11/23/20 16:16	1.83
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 16:16	1.83
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 16:16	1.83
Dichlorodifluoromethane	0.000016	J	0.000080	0.000014	ppm v/v			11/23/20 16:16	1.83
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 16:16	1.83
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			11/23/20 16:16	1.83
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			11/23/20 16:16	1.83
cis-1,2-Dichloroethene	0.000012	J	0.000080	0.000010	ppm v/v			11/23/20 16:16	1.83
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			11/23/20 16:16	1.83
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			11/23/20 16:16	1.83
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			11/23/20 16:16	1.83
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			11/23/20 16:16	1.83
Ethylbenzene	0.000028	J	0.000080	0.000013	ppm v/v			11/23/20 16:16	1.83
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/23/20 16:16	1.83
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			11/23/20 16:16	1.83
2-Hexanone	0.000083	J B	0.00020	0.000016	ppm v/v			11/23/20 16:16	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			11/23/20 16:16	1.83
Methylene Chloride	0.0040		0.00040	0.00039	ppm v/v			11/23/20 16:16	1.83
Styrene	ND		0.000080	0.000024	ppm v/v			11/23/20 16:16	1.83
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			11/23/20 16:16	1.83
Tetrachloroethene	0.000043	J	0.000080	0.0000070	ppm v/v			11/23/20 16:16	1.83
Toluene	0.00075		0.00012	0.000078	ppm v/v			11/23/20 16:16	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			11/23/20 16:16	1.83
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			11/23/20 16:16	1.83
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			11/23/20 16:16	1.83
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 16:16	1.83
Trichloroethene	ND		0.000040	0.0000060	ppm v/v			11/23/20 16:16	1.83
Trichlorofluoromethane	0.000030	J	0.000080	0.000011	ppm v/v			11/23/20 16:16	1.83
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			11/23/20 16:16	1.83
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			11/23/20 16:16	1.83
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			11/23/20 16:16	1.83
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			11/23/20 16:16	1.83

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 113993-001/MWL-FB4**

**Lab Sample ID: 140-21095-13**

Date Collected: 11/13/20 09:49

Matrix: Air

Date Received: 11/19/20 11:40

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	0.000095		0.000080	0.000029	ppm v/v			11/23/20 16:16	1.83
o-Xylene	0.000035	J	0.000080	0.000015	ppm v/v			11/23/20 16:16	1.83
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140					11/23/20 16:16	1.83

**Client Sample ID: 113994-001/MWL-SV04-50**

**Lab Sample ID: 140-21095-14**

Date Collected: 11/13/20 09:55

Matrix: Air

Date Received: 11/19/20 11:40

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		0.018	0.0052	ppm v/v			11/24/20 20:53	1.83
Benzene	0.00035	J	0.00073	0.000073	ppm v/v			11/24/20 20:53	1.83
Benzyl chloride	ND		0.0015	0.00035	ppm v/v			11/24/20 20:53	1.83
Bromodichloromethane	ND		0.00073	0.00016	ppm v/v			11/24/20 20:53	1.83
Bromoform	ND		0.00073	0.000082	ppm v/v			11/24/20 20:53	1.83
Bromomethane	ND		0.00073	0.00020	ppm v/v			11/24/20 20:53	1.83
2-Butanone (MEK)	ND		0.0037	0.00067	ppm v/v			11/24/20 20:53	1.83
Carbon disulfide	0.0037		0.0018	0.00010	ppm v/v			11/24/20 20:53	1.83
Carbon tetrachloride	0.00021	J	0.00073	0.000064	ppm v/v			11/24/20 20:53	1.83
Chlorobenzene	ND		0.00073	0.000055	ppm v/v			11/24/20 20:53	1.83
Chloroethane	ND		0.00073	0.00027	ppm v/v			11/24/20 20:53	1.83
Chloroform	0.0018		0.00073	0.000064	ppm v/v			11/24/20 20:53	1.83
Chloromethane	ND		0.0018	0.00060	ppm v/v			11/24/20 20:53	1.83
Dibromochloromethane	ND		0.00073	0.000064	ppm v/v			11/24/20 20:53	1.83
1,2-Dibromoethane (EDB)	ND		0.00073	0.000064	ppm v/v			11/24/20 20:53	1.83
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00073	0.00011	ppm v/v			11/24/20 20:53	1.83
1,2-Dichlorobenzene	ND		0.00073	0.00028	ppm v/v			11/24/20 20:53	1.83
1,3-Dichlorobenzene	ND		0.00073	0.00015	ppm v/v			11/24/20 20:53	1.83
1,4-Dichlorobenzene	ND		0.00073	0.00015	ppm v/v			11/24/20 20:53	1.83
Dichlorodifluoromethane	0.017		0.00073	0.00013	ppm v/v			11/24/20 20:53	1.83
1,1-Dichloroethane	0.0014		0.00073	0.000064	ppm v/v			11/24/20 20:53	1.83
1,2-Dichloroethane	ND		0.00073	0.000092	ppm v/v			11/24/20 20:53	1.83
1,1-Dichloroethene	0.0055		0.00073	0.000073	ppm v/v			11/24/20 20:53	1.83
cis-1,2-Dichloroethene	0.00049	J	0.00073	0.000092	ppm v/v			11/24/20 20:53	1.83
trans-1,2-Dichloroethene	ND		0.00073	0.000064	ppm v/v			11/24/20 20:53	1.83
1,2-Dichloropropane	ND		0.00073	0.000092	ppm v/v			11/24/20 20:53	1.83
cis-1,3-Dichloropropene	ND		0.00073	0.00015	ppm v/v			11/24/20 20:53	1.83
trans-1,3-Dichloropropene	ND		0.00073	0.000082	ppm v/v			11/24/20 20:53	1.83
Ethylbenzene	ND		0.00073	0.00012	ppm v/v			11/24/20 20:53	1.83
4-Ethyltoluene	ND		0.0015	0.00019	ppm v/v			11/24/20 20:53	1.83
Hexachlorobutadiene	ND		0.0037	0.00029	ppm v/v			11/24/20 20:53	1.83
2-Hexanone	0.00049	J B	0.0018	0.00015	ppm v/v			11/24/20 20:53	1.83
4-Methyl-2-pentanone (MIBK)	ND		0.0018	0.00049	ppm v/v			11/24/20 20:53	1.83
Methylene Chloride	0.0039		0.0037	0.0036	ppm v/v			11/24/20 20:53	1.83
Styrene	ND		0.00073	0.00022	ppm v/v			11/24/20 20:53	1.83
1,1,2,2-Tetrachloroethane	ND		0.00073	0.00013	ppm v/v			11/24/20 20:53	1.83

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113994-001/MWL-SV04-50

Lab Sample ID: 140-21095-14

Date Collected: 11/13/20 09:55

Matrix: Air

Date Received: 11/19/20 11:40

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	0.059		0.00073	0.000064	ppm v/v			11/24/20 20:53	1.83
Toluene	ND		0.0011	0.00071	ppm v/v			11/24/20 20:53	1.83
1,1,2-Trichloro-1,2,2-trifluoroethane	0.051		0.00073	0.000073	ppm v/v			11/24/20 20:53	1.83
1,2,4-Trichlorobenzene	ND		0.0037	0.00059	ppm v/v			11/24/20 20:53	1.83
1,1,1-Trichloroethane	0.0065		0.00073	0.00034	ppm v/v			11/24/20 20:53	1.83
1,1,2-Trichloroethane	ND		0.00073	0.000064	ppm v/v			11/24/20 20:53	1.83
Trichloroethene	0.048		0.00037	0.000055	ppm v/v			11/24/20 20:53	1.83
Trichlorofluoromethane	0.023		0.00073	0.00010	ppm v/v			11/24/20 20:53	1.83
1,2,4-Trimethylbenzene	ND		0.00073	0.00018	ppm v/v			11/24/20 20:53	1.83
1,3,5-Trimethylbenzene	ND		0.00073	0.00020	ppm v/v			11/24/20 20:53	1.83
Vinyl acetate	ND		0.0037	0.00026	ppm v/v			11/24/20 20:53	1.83
Vinyl chloride	ND		0.00037	0.00024	ppm v/v			11/24/20 20:53	1.83
m,p-Xylene	ND		0.00073	0.00027	ppm v/v			11/24/20 20:53	1.83
o-Xylene	ND		0.00073	0.00014	ppm v/v			11/24/20 20:53	1.83
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		60 - 140					11/24/20 20:53	1.83

Client Sample ID: 113995-001/MWL-SV04-100

Lab Sample ID: 140-21095-15

Date Collected: 11/13/20 10:02

Matrix: Air

Date Received: 11/19/20 11:40

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		0.045	0.013	ppm v/v			11/24/20 00:48	1.8
Benzene	0.00033	J	0.0018	0.00018	ppm v/v			11/24/20 00:48	1.8
Benzyl chloride	ND		0.0036	0.00086	ppm v/v			11/24/20 00:48	1.8
Bromodichloromethane	ND		0.0018	0.00041	ppm v/v			11/24/20 00:48	1.8
Bromoform	ND		0.0018	0.00020	ppm v/v			11/24/20 00:48	1.8
Bromomethane	ND		0.0018	0.00050	ppm v/v			11/24/20 00:48	1.8
2-Butanone (MEK)	ND		0.0090	0.0016	ppm v/v			11/24/20 00:48	1.8
Carbon disulfide	ND		0.0045	0.00025	ppm v/v			11/24/20 00:48	1.8
Carbon tetrachloride	0.00048	J	0.0018	0.00016	ppm v/v			11/24/20 00:48	1.8
Chlorobenzene	ND		0.0018	0.00014	ppm v/v			11/24/20 00:48	1.8
Chloroethane	ND		0.0018	0.00065	ppm v/v			11/24/20 00:48	1.8
Chloroform	0.0021		0.0018	0.00016	ppm v/v			11/24/20 00:48	1.8
Chloromethane	ND		0.0045	0.0015	ppm v/v			11/24/20 00:48	1.8
Dibromochloromethane	ND		0.0018	0.00016	ppm v/v			11/24/20 00:48	1.8
1,2-Dibromoethane (EDB)	ND		0.0018	0.00016	ppm v/v			11/24/20 00:48	1.8
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0018	0.00027	ppm v/v			11/24/20 00:48	1.8
1,2-Dichlorobenzene	ND		0.0018	0.00070	ppm v/v			11/24/20 00:48	1.8
1,3-Dichlorobenzene	ND		0.0018	0.00036	ppm v/v			11/24/20 00:48	1.8
1,4-Dichlorobenzene	ND		0.0018	0.00036	ppm v/v			11/24/20 00:48	1.8
Dichlorodifluoromethane	0.031		0.0018	0.00032	ppm v/v			11/24/20 00:48	1.8
1,1-Dichloroethane	0.0033		0.0018	0.00016	ppm v/v			11/24/20 00:48	1.8
1,2-Dichloroethane	ND		0.0018	0.00023	ppm v/v			11/24/20 00:48	1.8
1,1-Dichloroethene	0.015		0.0018	0.00018	ppm v/v			11/24/20 00:48	1.8

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113995-001/MWL-SV04-100

Lab Sample ID: 140-21095-15

Date Collected: 11/13/20 10:02

Matrix: Air

Date Received: 11/19/20 11:40

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	0.0016	J	0.0018	0.00023	ppm v/v			11/24/20 00:48	1.8
trans-1,2-Dichloroethene	ND		0.0018	0.00016	ppm v/v			11/24/20 00:48	1.8
1,2-Dichloropropane	ND		0.0018	0.00023	ppm v/v			11/24/20 00:48	1.8
cis-1,3-Dichloropropene	ND		0.0018	0.00036	ppm v/v			11/24/20 00:48	1.8
trans-1,3-Dichloropropene	ND		0.0018	0.00020	ppm v/v			11/24/20 00:48	1.8
Ethylbenzene	ND		0.0018	0.00029	ppm v/v			11/24/20 00:48	1.8
4-Ethyltoluene	ND		0.0036	0.00047	ppm v/v			11/24/20 00:48	1.8
Hexachlorobutadiene	ND		0.0090	0.00072	ppm v/v			11/24/20 00:48	1.8
2-Hexanone	0.0013	J B	0.0045	0.00036	ppm v/v			11/24/20 00:48	1.8
4-Methyl-2-pentanone (MIBK)	ND		0.0045	0.0012	ppm v/v			11/24/20 00:48	1.8
Methylene Chloride	ND		0.0090	0.0088	ppm v/v			11/24/20 00:48	1.8
Styrene	ND		0.0018	0.00054	ppm v/v			11/24/20 00:48	1.8
1,1,2,2-Tetrachloroethane	ND		0.0018	0.00032	ppm v/v			11/24/20 00:48	1.8
Tetrachloroethene	0.12		0.0018	0.00016	ppm v/v			11/24/20 00:48	1.8
Toluene	ND		0.0027	0.0018	ppm v/v			11/24/20 00:48	1.8
1,1,2-Trichloro-1,2,2-trifluoroethane	0.092		0.0018	0.00018	ppm v/v			11/24/20 00:48	1.8
1,2,4-Trichlorobenzene	ND		0.0090	0.0014	ppm v/v			11/24/20 00:48	1.8
1,1,1-Trichloroethane	0.0056		0.0018	0.00083	ppm v/v			11/24/20 00:48	1.8
1,1,2-Trichloroethane	ND		0.0018	0.00016	ppm v/v			11/24/20 00:48	1.8
Trichloroethene	0.12		0.00090	0.00014	ppm v/v			11/24/20 00:48	1.8
Trichlorofluoromethane	0.036		0.0018	0.00025	ppm v/v			11/24/20 00:48	1.8
1,2,4-Trimethylbenzene	ND		0.0018	0.00045	ppm v/v			11/24/20 00:48	1.8
1,3,5-Trimethylbenzene	ND		0.0018	0.00050	ppm v/v			11/24/20 00:48	1.8
Vinyl acetate	ND		0.0090	0.00063	ppm v/v			11/24/20 00:48	1.8
Vinyl chloride	ND		0.00090	0.00059	ppm v/v			11/24/20 00:48	1.8
m,p-Xylene	ND		0.0018	0.00065	ppm v/v			11/24/20 00:48	1.8
o-Xylene	ND		0.0018	0.00034	ppm v/v			11/24/20 00:48	1.8
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		60 - 140					11/24/20 00:48	1.8

Client Sample ID: 113996-001/MWL-SV04-200

Lab Sample ID: 140-21095-16

Date Collected: 11/13/20 10:05

Matrix: Air

Date Received: 11/19/20 11:40

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		0.048	0.014	ppm v/v			11/24/20 01:30	1.9
Benzene	0.00049	J	0.0019	0.00019	ppm v/v			11/24/20 01:30	1.9
Benzyl chloride	ND		0.0038	0.00090	ppm v/v			11/24/20 01:30	1.9
Bromodichloromethane	ND		0.0019	0.00043	ppm v/v			11/24/20 01:30	1.9
Bromoform	ND		0.0019	0.00021	ppm v/v			11/24/20 01:30	1.9
Bromomethane	ND		0.0019	0.00052	ppm v/v			11/24/20 01:30	1.9
2-Butanone (MEK)	ND		0.0095	0.0017	ppm v/v			11/24/20 01:30	1.9
Carbon disulfide	0.0016	J	0.0048	0.00026	ppm v/v			11/24/20 01:30	1.9
Carbon tetrachloride	0.00039	J	0.0019	0.00017	ppm v/v			11/24/20 01:30	1.9
Chlorobenzene	ND		0.0019	0.00014	ppm v/v			11/24/20 01:30	1.9

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# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113996-001/MWL-SV04-200

Lab Sample ID: 140-21095-16

Date Collected: 11/13/20 10:05

Matrix: Air

Date Received: 11/19/20 11:40

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		0.0019	0.00069	ppm v/v			11/24/20 01:30	1.9
<b>Chloroform</b>	<b>0.0016</b>	<b>J</b>	0.0019	0.00017	ppm v/v			11/24/20 01:30	1.9
Chloromethane	ND		0.0048	0.0016	ppm v/v			11/24/20 01:30	1.9
Dibromochloromethane	ND		0.0019	0.00017	ppm v/v			11/24/20 01:30	1.9
1,2-Dibromoethane (EDB)	ND		0.0019	0.00017	ppm v/v			11/24/20 01:30	1.9
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0019	0.00029	ppm v/v			11/24/20 01:30	1.9
1,2-Dichlorobenzene	ND		0.0019	0.00074	ppm v/v			11/24/20 01:30	1.9
1,3-Dichlorobenzene	ND		0.0019	0.00038	ppm v/v			11/24/20 01:30	1.9
1,4-Dichlorobenzene	ND		0.0019	0.00038	ppm v/v			11/24/20 01:30	1.9
<b>Dichlorodifluoromethane</b>	<b>0.042</b>		0.0019	0.00033	ppm v/v			11/24/20 01:30	1.9
<b>1,1-Dichloroethane</b>	<b>0.0054</b>		0.0019	0.00017	ppm v/v			11/24/20 01:30	1.9
1,2-Dichloroethane	ND		0.0019	0.00024	ppm v/v			11/24/20 01:30	1.9
<b>1,1-Dichloroethene</b>	<b>0.027</b>		0.0019	0.00019	ppm v/v			11/24/20 01:30	1.9
<b>cis-1,2-Dichloroethene</b>	<b>0.0028</b>		0.0019	0.00024	ppm v/v			11/24/20 01:30	1.9
trans-1,2-Dichloroethene	ND		0.0019	0.00017	ppm v/v			11/24/20 01:30	1.9
1,2-Dichloropropane	ND		0.0019	0.00024	ppm v/v			11/24/20 01:30	1.9
cis-1,3-Dichloropropene	ND		0.0019	0.00038	ppm v/v			11/24/20 01:30	1.9
trans-1,3-Dichloropropene	ND		0.0019	0.00021	ppm v/v			11/24/20 01:30	1.9
Ethylbenzene	ND		0.0019	0.00031	ppm v/v			11/24/20 01:30	1.9
4-Ethyltoluene	ND		0.0038	0.00050	ppm v/v			11/24/20 01:30	1.9
Hexachlorobutadiene	ND		0.0095	0.00076	ppm v/v			11/24/20 01:30	1.9
<b>2-Hexanone</b>	<b>0.0012</b>	<b>J B</b>	0.0048	0.00038	ppm v/v			11/24/20 01:30	1.9
4-Methyl-2-pentanone (MIBK)	ND		0.0048	0.0013	ppm v/v			11/24/20 01:30	1.9
Methylene Chloride	ND		0.0095	0.0093	ppm v/v			11/24/20 01:30	1.9
Styrene	ND		0.0019	0.00057	ppm v/v			11/24/20 01:30	1.9
1,1,2,2-Tetrachloroethane	ND		0.0019	0.00033	ppm v/v			11/24/20 01:30	1.9
<b>Tetrachloroethene</b>	<b>0.11</b>		0.0019	0.00017	ppm v/v			11/24/20 01:30	1.9
Toluene	ND		0.0029	0.0019	ppm v/v			11/24/20 01:30	1.9
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.14</b>		0.0019	0.00019	ppm v/v			11/24/20 01:30	1.9
1,2,4-Trichlorobenzene	ND		0.0095	0.0015	ppm v/v			11/24/20 01:30	1.9
<b>1,1,1-Trichloroethane</b>	<b>0.0019</b>		0.0019	0.00088	ppm v/v			11/24/20 01:30	1.9
1,1,2-Trichloroethane	ND		0.0019	0.00017	ppm v/v			11/24/20 01:30	1.9
<b>Trichloroethene</b>	<b>0.14</b>		0.00095	0.00014	ppm v/v			11/24/20 01:30	1.9
<b>Trichlorofluoromethane</b>	<b>0.033</b>		0.0019	0.00026	ppm v/v			11/24/20 01:30	1.9
1,2,4-Trimethylbenzene	ND		0.0019	0.00048	ppm v/v			11/24/20 01:30	1.9
1,3,5-Trimethylbenzene	ND		0.0019	0.00052	ppm v/v			11/24/20 01:30	1.9
Vinyl acetate	ND		0.0095	0.00067	ppm v/v			11/24/20 01:30	1.9
Vinyl chloride	ND		0.00095	0.00062	ppm v/v			11/24/20 01:30	1.9
m,p-Xylene	ND		0.0019	0.00069	ppm v/v			11/24/20 01:30	1.9
o-Xylene	ND		0.0019	0.00036	ppm v/v			11/24/20 01:30	1.9

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140		11/24/20 01:30	1.9

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMP

Job ID: 140-21095-1

Client Sample ID: 113997-001/MWL-SV04-300

Lab Sample ID: 140-21095-17

Date Collected: 11/13/20 10:11

Matrix: Air

Date Received: 11/19/20 11:40

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		0.025	0.0071	ppm v/v			11/24/20 02:13	1
<b>Benzene</b>	<b>0.00034</b>	<b>J</b>	0.0010	0.00010	ppm v/v			11/24/20 02:13	1
Benzyl chloride	ND		0.0020	0.00048	ppm v/v			11/24/20 02:13	1
Bromodichloromethane	ND		0.0010	0.00023	ppm v/v			11/24/20 02:13	1
Bromoform	ND		0.0010	0.00011	ppm v/v			11/24/20 02:13	1
Bromomethane	ND		0.0010	0.00028	ppm v/v			11/24/20 02:13	1
2-Butanone (MEK)	ND		0.0050	0.00091	ppm v/v			11/24/20 02:13	1
<b>Carbon disulfide</b>	<b>0.00094</b>	<b>J</b>	0.0025	0.00014	ppm v/v			11/24/20 02:13	1
<b>Carbon tetrachloride</b>	<b>0.00022</b>	<b>J</b>	0.0010	0.000088	ppm v/v			11/24/20 02:13	1
Chlorobenzene	ND		0.0010	0.000075	ppm v/v			11/24/20 02:13	1
Chloroethane	ND		0.0010	0.00036	ppm v/v			11/24/20 02:13	1
<b>Chloroform</b>	<b>0.00059</b>	<b>J</b>	0.0010	0.000088	ppm v/v			11/24/20 02:13	1
Chloromethane	ND		0.0025	0.00083	ppm v/v			11/24/20 02:13	1
Dibromochloromethane	ND		0.0010	0.000088	ppm v/v			11/24/20 02:13	1
1,2-Dibromoethane (EDB)	ND		0.0010	0.000088	ppm v/v			11/24/20 02:13	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0010	0.00015	ppm v/v			11/24/20 02:13	1
1,2-Dichlorobenzene	ND		0.0010	0.00039	ppm v/v			11/24/20 02:13	1
1,3-Dichlorobenzene	ND		0.0010	0.00020	ppm v/v			11/24/20 02:13	1
1,4-Dichlorobenzene	ND		0.0010	0.00020	ppm v/v			11/24/20 02:13	1
<b>Dichlorodifluoromethane</b>	<b>0.026</b>		0.0010	0.00018	ppm v/v			11/24/20 02:13	1
<b>1,1-Dichloroethane</b>	<b>0.0011</b>		0.0010	0.000088	ppm v/v			11/24/20 02:13	1
1,2-Dichloroethane	ND		0.0010	0.00013	ppm v/v			11/24/20 02:13	1
<b>1,1-Dichloroethene</b>	<b>0.011</b>		0.0010	0.00010	ppm v/v			11/24/20 02:13	1
<b>cis-1,2-Dichloroethene</b>	<b>0.00060</b>	<b>J</b>	0.0010	0.00013	ppm v/v			11/24/20 02:13	1
trans-1,2-Dichloroethene	ND		0.0010	0.000088	ppm v/v			11/24/20 02:13	1
1,2-Dichloropropane	ND		0.0010	0.00013	ppm v/v			11/24/20 02:13	1
cis-1,3-Dichloropropene	ND		0.0010	0.00020	ppm v/v			11/24/20 02:13	1
trans-1,3-Dichloropropene	ND		0.0010	0.00011	ppm v/v			11/24/20 02:13	1
Ethylbenzene	ND		0.0010	0.00016	ppm v/v			11/24/20 02:13	1
4-Ethyltoluene	ND		0.0020	0.00026	ppm v/v			11/24/20 02:13	1
Hexachlorobutadiene	ND		0.0050	0.00040	ppm v/v			11/24/20 02:13	1
<b>2-Hexanone</b>	<b>0.00067</b>	<b>J B</b>	0.0025	0.00020	ppm v/v			11/24/20 02:13	1
4-Methyl-2-pentanone (MIBK)	ND		0.0025	0.00068	ppm v/v			11/24/20 02:13	1
Methylene Chloride	ND		0.0050	0.0049	ppm v/v			11/24/20 02:13	1
Styrene	ND		0.0010	0.00030	ppm v/v			11/24/20 02:13	1
1,1,2,2-Tetrachloroethane	ND		0.0010	0.00018	ppm v/v			11/24/20 02:13	1
<b>Tetrachloroethene</b>	<b>0.11</b>		0.0010	0.000088	ppm v/v			11/24/20 02:13	1
Toluene	ND		0.0015	0.00098	ppm v/v			11/24/20 02:13	1
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.081</b>		0.0010	0.00010	ppm v/v			11/24/20 02:13	1
1,2,4-Trichlorobenzene	ND		0.0050	0.00080	ppm v/v			11/24/20 02:13	1
<b>1,1,1-Trichloroethane</b>	<b>0.00065</b>	<b>J</b>	0.0010	0.00046	ppm v/v			11/24/20 02:13	1
1,1,2-Trichloroethane	ND		0.0010	0.000088	ppm v/v			11/24/20 02:13	1
<b>Trichloroethene</b>	<b>0.063</b>		0.00050	0.000075	ppm v/v			11/24/20 02:13	1
<b>Trichlorofluoromethane</b>	<b>0.013</b>		0.0010	0.00014	ppm v/v			11/24/20 02:13	1
1,2,4-Trimethylbenzene	ND		0.0010	0.00025	ppm v/v			11/24/20 02:13	1
1,3,5-Trimethylbenzene	ND		0.0010	0.00028	ppm v/v			11/24/20 02:13	1
Vinyl acetate	ND		0.0050	0.00035	ppm v/v			11/24/20 02:13	1
Vinyl chloride	ND		0.00050	0.00033	ppm v/v			11/24/20 02:13	1

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 113997-001/MWL-SV04-300**

**Lab Sample ID: 140-21095-17**

**Date Collected: 11/13/20 10:11**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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		0.0010	0.00036	ppm v/v			11/24/20 02:13	1
o-Xylene	ND		0.0010	0.00019	ppm v/v			11/24/20 02:13	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		60 - 140					11/24/20 02:13	1

**Client Sample ID: 113998-001/MWL-SV04-400**

**Lab Sample ID: 140-21095-18**

**Date Collected: 11/13/20 10:24**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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	0.059	0.017	ppm v/v			11/24/20 15:50	2.34
Benzene	0.00094	J	0.0023	0.00023	ppm v/v			11/24/20 15:50	2.34
Benzyl chloride	ND		0.0047	0.0011	ppm v/v			11/24/20 15:50	2.34
Bromodichloromethane	ND		0.0023	0.00053	ppm v/v			11/24/20 15:50	2.34
Bromoform	ND		0.0023	0.00026	ppm v/v			11/24/20 15:50	2.34
Bromomethane	ND		0.0023	0.00064	ppm v/v			11/24/20 15:50	2.34
2-Butanone (MEK)	ND		0.012	0.0021	ppm v/v			11/24/20 15:50	2.34
Carbon disulfide	0.00072	J	0.0059	0.00032	ppm v/v			11/24/20 15:50	2.34
Carbon tetrachloride	0.00033	J	0.0023	0.00020	ppm v/v			11/24/20 15:50	2.34
Chlorobenzene	ND		0.0023	0.00018	ppm v/v			11/24/20 15:50	2.34
Chloroethane	ND		0.0023	0.00085	ppm v/v			11/24/20 15:50	2.34
Chloroform	0.00073	J	0.0023	0.00020	ppm v/v			11/24/20 15:50	2.34
Chloromethane	ND		0.0059	0.0019	ppm v/v			11/24/20 15:50	2.34
Dibromochloromethane	ND		0.0023	0.00020	ppm v/v			11/24/20 15:50	2.34
1,2-Dibromoethane (EDB)	ND		0.0023	0.00020	ppm v/v			11/24/20 15:50	2.34
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0023	0.00035	ppm v/v			11/24/20 15:50	2.34
1,2-Dichlorobenzene	ND		0.0023	0.00091	ppm v/v			11/24/20 15:50	2.34
1,3-Dichlorobenzene	ND		0.0023	0.00047	ppm v/v			11/24/20 15:50	2.34
1,4-Dichlorobenzene	ND		0.0023	0.00047	ppm v/v			11/24/20 15:50	2.34
Dichlorodifluoromethane	0.025		0.0023	0.00041	ppm v/v			11/24/20 15:50	2.34
1,1-Dichloroethane	0.0015	J	0.0023	0.00020	ppm v/v			11/24/20 15:50	2.34
1,2-Dichloroethane	ND		0.0023	0.00029	ppm v/v			11/24/20 15:50	2.34
1,1-Dichloroethene	0.012		0.0023	0.00023	ppm v/v			11/24/20 15:50	2.34
cis-1,2-Dichloroethene	0.00077	J	0.0023	0.00029	ppm v/v			11/24/20 15:50	2.34
trans-1,2-Dichloroethene	ND		0.0023	0.00020	ppm v/v			11/24/20 15:50	2.34
1,2-Dichloropropane	ND		0.0023	0.00029	ppm v/v			11/24/20 15:50	2.34
cis-1,3-Dichloropropene	ND		0.0023	0.00047	ppm v/v			11/24/20 15:50	2.34
trans-1,3-Dichloropropene	ND		0.0023	0.00026	ppm v/v			11/24/20 15:50	2.34
Ethylbenzene	ND		0.0023	0.00038	ppm v/v			11/24/20 15:50	2.34
4-Ethyltoluene	ND		0.0047	0.00061	ppm v/v			11/24/20 15:50	2.34
Hexachlorobutadiene	ND		0.012	0.00094	ppm v/v			11/24/20 15:50	2.34
2-Hexanone	ND		0.0059	0.00047	ppm v/v			11/24/20 15:50	2.34
4-Methyl-2-pentanone (MIBK)	ND		0.0059	0.0016	ppm v/v			11/24/20 15:50	2.34
Methylene Chloride	ND		0.012	0.011	ppm v/v			11/24/20 15:50	2.34
Styrene	ND		0.0023	0.00070	ppm v/v			11/24/20 15:50	2.34
1,1,2,2-Tetrachloroethane	ND		0.0023	0.00041	ppm v/v			11/24/20 15:50	2.34

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113998-001/MWL-SV04-400

Lab Sample ID: 140-21095-18

Date Collected: 11/13/20 10:24

Matrix: Air

Date Received: 11/19/20 11:40

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>0.15</b>		0.0023	0.00020	ppm v/v			11/24/20 15:50	2.34
Toluene	ND		0.0035	0.0023	ppm v/v			11/24/20 15:50	2.34
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.089</b>		0.0023	0.00023	ppm v/v			11/24/20 15:50	2.34
1,2,4-Trichlorobenzene	ND		0.012	0.0019	ppm v/v			11/24/20 15:50	2.34
1,1,1-Trichloroethane	ND		0.0023	0.0011	ppm v/v			11/24/20 15:50	2.34
1,1,2-Trichloroethane	ND		0.0023	0.00020	ppm v/v			11/24/20 15:50	2.34
<b>Trichloroethene</b>	<b>0.11</b>		0.0012	0.00018	ppm v/v			11/24/20 15:50	2.34
<b>Trichlorofluoromethane</b>	<b>0.017</b>		0.0023	0.00032	ppm v/v			11/24/20 15:50	2.34
1,2,4-Trimethylbenzene	ND		0.0023	0.00059	ppm v/v			11/24/20 15:50	2.34
1,3,5-Trimethylbenzene	ND		0.0023	0.00064	ppm v/v			11/24/20 15:50	2.34
Vinyl acetate	ND		0.012	0.00082	ppm v/v			11/24/20 15:50	2.34
Vinyl chloride	ND		0.0012	0.00076	ppm v/v			11/24/20 15:50	2.34
m,p-Xylene	ND		0.0023	0.00085	ppm v/v			11/24/20 15:50	2.34
o-Xylene	ND		0.0023	0.00044	ppm v/v			11/24/20 15:50	2.34
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		60 - 140					11/24/20 15:50	2.34

Client Sample ID: 113987-001/MWL-FB3

Lab Sample ID: 140-21095-19

Date Collected: 11/13/20 08:44

Matrix: Air

Date Received: 11/19/20 11:40

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>0.0046</b>	<b>CI</b>	0.0020	0.00057	ppm v/v			11/23/20 17:06	1.97
<b>Benzene</b>	<b>0.000015</b>	<b>J</b>	0.000080	0.0000080	ppm v/v			11/23/20 17:06	1.97
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			11/23/20 17:06	1.97
Bromodichloromethane	ND		0.000080	0.000018	ppm v/v			11/23/20 17:06	1.97
Bromoform	ND		0.000080	0.0000090	ppm v/v			11/23/20 17:06	1.97
Bromomethane	ND		0.000080	0.000022	ppm v/v			11/23/20 17:06	1.97
<b>2-Butanone (MEK)</b>	<b>0.00046</b>		0.00040	0.000073	ppm v/v			11/23/20 17:06	1.97
<b>Carbon disulfide</b>	<b>0.00012</b>	<b>J</b>	0.00020	0.000011	ppm v/v			11/23/20 17:06	1.97
Carbon tetrachloride	ND		0.000080	0.0000070	ppm v/v			11/23/20 17:06	1.97
Chlorobenzene	ND		0.000080	0.0000060	ppm v/v			11/23/20 17:06	1.97
Chloroethane	ND		0.000080	0.000029	ppm v/v			11/23/20 17:06	1.97
Chloroform	ND		0.000080	0.0000070	ppm v/v			11/23/20 17:06	1.97
Chloromethane	ND		0.00020	0.000066	ppm v/v			11/23/20 17:06	1.97
Dibromochloromethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 17:06	1.97
1,2-Dibromoethane (EDB)	ND		0.000080	0.0000070	ppm v/v			11/23/20 17:06	1.97
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000080	0.000012	ppm v/v			11/23/20 17:06	1.97
1,2-Dichlorobenzene	ND		0.000080	0.000031	ppm v/v			11/23/20 17:06	1.97
1,3-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 17:06	1.97
1,4-Dichlorobenzene	ND		0.000080	0.000016	ppm v/v			11/23/20 17:06	1.97
Dichlorodifluoromethane	ND		0.000080	0.000014	ppm v/v			11/23/20 17:06	1.97
1,1-Dichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 17:06	1.97
1,2-Dichloroethane	ND		0.000080	0.000010	ppm v/v			11/23/20 17:06	1.97
1,1-Dichloroethene	ND		0.000080	0.0000080	ppm v/v			11/23/20 17:06	1.97

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113987-001/MWL-FB3

Lab Sample ID: 140-21095-19

Date Collected: 11/13/20 08:44

Matrix: Air

Date Received: 11/19/20 11:40

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		0.000080	0.000010	ppm v/v			11/23/20 17:06	1.97
trans-1,2-Dichloroethene	ND		0.000080	0.0000070	ppm v/v			11/23/20 17:06	1.97
1,2-Dichloropropane	ND		0.000080	0.000010	ppm v/v			11/23/20 17:06	1.97
cis-1,3-Dichloropropene	ND		0.000080	0.000016	ppm v/v			11/23/20 17:06	1.97
trans-1,3-Dichloropropene	ND		0.000080	0.0000090	ppm v/v			11/23/20 17:06	1.97
Ethylbenzene	0.000030	J	0.000080	0.000013	ppm v/v			11/23/20 17:06	1.97
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/23/20 17:06	1.97
Hexachlorobutadiene	ND		0.00040	0.000032	ppm v/v			11/23/20 17:06	1.97
2-Hexanone	0.000071	J B	0.00020	0.000016	ppm v/v			11/23/20 17:06	1.97
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000054	ppm v/v			11/23/20 17:06	1.97
Methylene Chloride	0.00048		0.00040	0.00039	ppm v/v			11/23/20 17:06	1.97
Styrene	ND		0.000080	0.000024	ppm v/v			11/23/20 17:06	1.97
1,1,2,2-Tetrachloroethane	ND		0.000080	0.000014	ppm v/v			11/23/20 17:06	1.97
Tetrachloroethene	ND		0.000080	0.0000070	ppm v/v			11/23/20 17:06	1.97
Toluene	0.00011	J	0.00012	0.000078	ppm v/v			11/23/20 17:06	1.97
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000080	0.0000080	ppm v/v			11/23/20 17:06	1.97
1,2,4-Trichlorobenzene	ND		0.00040	0.000064	ppm v/v			11/23/20 17:06	1.97
1,1,1-Trichloroethane	ND		0.000080	0.000037	ppm v/v			11/23/20 17:06	1.97
1,1,2-Trichloroethane	ND		0.000080	0.0000070	ppm v/v			11/23/20 17:06	1.97
Trichloroethene	ND		0.000040	0.0000060	ppm v/v			11/23/20 17:06	1.97
Trichlorofluoromethane	0.000016	J	0.000080	0.000011	ppm v/v			11/23/20 17:06	1.97
1,2,4-Trimethylbenzene	ND		0.000080	0.000020	ppm v/v			11/23/20 17:06	1.97
1,3,5-Trimethylbenzene	ND		0.000080	0.000022	ppm v/v			11/23/20 17:06	1.97
Vinyl acetate	ND		0.00040	0.000028	ppm v/v			11/23/20 17:06	1.97
Vinyl chloride	ND		0.000040	0.000026	ppm v/v			11/23/20 17:06	1.97
m,p-Xylene	0.000092		0.000080	0.000029	ppm v/v			11/23/20 17:06	1.97
o-Xylene	0.000033	J	0.000080	0.000015	ppm v/v			11/23/20 17:06	1.97
<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)	102		60 - 140					11/23/20 17:06	1.97

Client Sample ID: 113988-001/MWL-SV03-50

Lab Sample ID: 140-21095-20

Date Collected: 11/13/20 08:50

Matrix: Air

Date Received: 11/19/20 11:40

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		0.049	0.014	ppm v/v			11/24/20 16:34	1.97
Benzene	0.00042	J	0.0020	0.00020	ppm v/v			11/24/20 16:34	1.97
Benzyl chloride	ND		0.0039	0.00094	ppm v/v			11/24/20 16:34	1.97
Bromodichloromethane	ND		0.0020	0.00044	ppm v/v			11/24/20 16:34	1.97
Bromoform	ND		0.0020	0.00022	ppm v/v			11/24/20 16:34	1.97
Bromomethane	ND		0.0020	0.00054	ppm v/v			11/24/20 16:34	1.97
2-Butanone (MEK)	ND		0.0099	0.0018	ppm v/v			11/24/20 16:34	1.97
Carbon disulfide	ND		0.0049	0.00027	ppm v/v			11/24/20 16:34	1.97
Carbon tetrachloride	0.00026	J	0.0020	0.00017	ppm v/v			11/24/20 16:34	1.97
Chlorobenzene	ND		0.0020	0.00015	ppm v/v			11/24/20 16:34	1.97
Chloroethane	ND		0.0020	0.00071	ppm v/v			11/24/20 16:34	1.97

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113988-001/MWL-SV03-50

Lab Sample ID: 140-21095-20

Date Collected: 11/13/20 08:50

Matrix: Air

Date Received: 11/19/20 11:40

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>Chloroform</b>	<b>0.0023</b>		0.0020	0.00017	ppm v/v			11/24/20 16:34	1.97
Chloromethane	ND		0.0049	0.0016	ppm v/v			11/24/20 16:34	1.97
Dibromochloromethane	ND		0.0020	0.00017	ppm v/v			11/24/20 16:34	1.97
1,2-Dibromoethane (EDB)	ND		0.0020	0.00017	ppm v/v			11/24/20 16:34	1.97
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0020	0.00030	ppm v/v			11/24/20 16:34	1.97
1,2-Dichlorobenzene	ND		0.0020	0.00076	ppm v/v			11/24/20 16:34	1.97
1,3-Dichlorobenzene	ND		0.0020	0.00039	ppm v/v			11/24/20 16:34	1.97
1,4-Dichlorobenzene	ND		0.0020	0.00039	ppm v/v			11/24/20 16:34	1.97
<b>Dichlorodifluoromethane</b>	<b>0.030</b>		0.0020	0.00034	ppm v/v			11/24/20 16:34	1.97
<b>1,1-Dichloroethane</b>	<b>0.0042</b>		0.0020	0.00017	ppm v/v			11/24/20 16:34	1.97
1,2-Dichloroethane	ND		0.0020	0.00025	ppm v/v			11/24/20 16:34	1.97
<b>1,1-Dichloroethene</b>	<b>0.013</b>		0.0020	0.00020	ppm v/v			11/24/20 16:34	1.97
<b>cis-1,2-Dichloroethene</b>	<b>0.0022</b>		0.0020	0.00025	ppm v/v			11/24/20 16:34	1.97
trans-1,2-Dichloroethene	ND		0.0020	0.00017	ppm v/v			11/24/20 16:34	1.97
1,2-Dichloropropane	ND		0.0020	0.00025	ppm v/v			11/24/20 16:34	1.97
cis-1,3-Dichloropropene	ND		0.0020	0.00039	ppm v/v			11/24/20 16:34	1.97
trans-1,3-Dichloropropene	ND		0.0020	0.00022	ppm v/v			11/24/20 16:34	1.97
Ethylbenzene	ND		0.0020	0.00032	ppm v/v			11/24/20 16:34	1.97
4-Ethyltoluene	ND		0.0039	0.00052	ppm v/v			11/24/20 16:34	1.97
Hexachlorobutadiene	ND		0.0099	0.00079	ppm v/v			11/24/20 16:34	1.97
<b>2-Hexanone</b>	<b>0.0013</b>	<b>J B</b>	0.0049	0.00039	ppm v/v			11/24/20 16:34	1.97
4-Methyl-2-pentanone (MIBK)	ND		0.0049	0.0013	ppm v/v			11/24/20 16:34	1.97
Methylene Chloride	ND		0.0099	0.0096	ppm v/v			11/24/20 16:34	1.97
Styrene	ND		0.0020	0.00059	ppm v/v			11/24/20 16:34	1.97
1,1,2,2-Tetrachloroethane	ND		0.0020	0.00034	ppm v/v			11/24/20 16:34	1.97
<b>Tetrachloroethene</b>	<b>0.15</b>		0.0020	0.00017	ppm v/v			11/24/20 16:34	1.97
Toluene	ND		0.0030	0.0019	ppm v/v			11/24/20 16:34	1.97
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.078</b>		0.0020	0.00020	ppm v/v			11/24/20 16:34	1.97
1,2,4-Trichlorobenzene	ND		0.0099	0.0016	ppm v/v			11/24/20 16:34	1.97
<b>1,1,1-Trichloroethane</b>	<b>0.0026</b>		0.0020	0.00091	ppm v/v			11/24/20 16:34	1.97
1,1,2-Trichloroethane	ND		0.0020	0.00017	ppm v/v			11/24/20 16:34	1.97
<b>Trichloroethene</b>	<b>0.12</b>		0.00099	0.00015	ppm v/v			11/24/20 16:34	1.97
<b>Trichlorofluoromethane</b>	<b>0.028</b>		0.0020	0.00027	ppm v/v			11/24/20 16:34	1.97
1,2,4-Trimethylbenzene	ND		0.0020	0.00049	ppm v/v			11/24/20 16:34	1.97
1,3,5-Trimethylbenzene	ND		0.0020	0.00054	ppm v/v			11/24/20 16:34	1.97
Vinyl acetate	ND		0.0099	0.00069	ppm v/v			11/24/20 16:34	1.97
Vinyl chloride	ND		0.00099	0.00064	ppm v/v			11/24/20 16:34	1.97
m,p-Xylene	ND		0.0020	0.00071	ppm v/v			11/24/20 16:34	1.97
o-Xylene	ND		0.0020	0.00037	ppm v/v			11/24/20 16:34	1.97
<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)	101		60 - 140					11/24/20 16:34	1.97



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113989-001/MWL-SV03-100

Lab Sample ID: 140-21095-21

Date Collected: 11/13/20 08:53

Matrix: Air

Date Received: 11/19/20 11:40

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		0.057	0.016	ppm v/v			11/24/20 17:18	2.28
<b>Benzene</b>	<b>0.00040</b>	<b>J</b>	0.0023	0.00023	ppm v/v			11/24/20 17:18	2.28
Benzyl chloride	ND		0.0046	0.0011	ppm v/v			11/24/20 17:18	2.28
Bromodichloromethane	ND		0.0023	0.00051	ppm v/v			11/24/20 17:18	2.28
Bromoform	ND		0.0023	0.00026	ppm v/v			11/24/20 17:18	2.28
Bromomethane	ND		0.0023	0.00063	ppm v/v			11/24/20 17:18	2.28
2-Butanone (MEK)	ND		0.011	0.0021	ppm v/v			11/24/20 17:18	2.28
<b>Carbon disulfide</b>	<b>0.00090</b>	<b>J</b>	0.0057	0.00031	ppm v/v			11/24/20 17:18	2.28
<b>Carbon tetrachloride</b>	<b>0.00034</b>	<b>J</b>	0.0023	0.00020	ppm v/v			11/24/20 17:18	2.28
Chlorobenzene	ND		0.0023	0.00017	ppm v/v			11/24/20 17:18	2.28
Chloroethane	ND		0.0023	0.00083	ppm v/v			11/24/20 17:18	2.28
<b>Chloroform</b>	<b>0.0030</b>		0.0023	0.00020	ppm v/v			11/24/20 17:18	2.28
Chloromethane	ND		0.0057	0.0019	ppm v/v			11/24/20 17:18	2.28
Dibromochloromethane	ND		0.0023	0.00020	ppm v/v			11/24/20 17:18	2.28
1,2-Dibromoethane (EDB)	ND		0.0023	0.00020	ppm v/v			11/24/20 17:18	2.28
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0023	0.00034	ppm v/v			11/24/20 17:18	2.28
1,2-Dichlorobenzene	ND		0.0023	0.00088	ppm v/v			11/24/20 17:18	2.28
1,3-Dichlorobenzene	ND		0.0023	0.00046	ppm v/v			11/24/20 17:18	2.28
1,4-Dichlorobenzene	ND		0.0023	0.00046	ppm v/v			11/24/20 17:18	2.28
<b>Dichlorodifluoromethane</b>	<b>0.045</b>		0.0023	0.00040	ppm v/v			11/24/20 17:18	2.28
<b>1,1-Dichloroethane</b>	<b>0.0067</b>		0.0023	0.00020	ppm v/v			11/24/20 17:18	2.28
1,2-Dichloroethane	ND		0.0023	0.00029	ppm v/v			11/24/20 17:18	2.28
<b>1,1-Dichloroethene</b>	<b>0.020</b>		0.0023	0.00023	ppm v/v			11/24/20 17:18	2.28
<b>cis-1,2-Dichloroethene</b>	<b>0.0034</b>		0.0023	0.00029	ppm v/v			11/24/20 17:18	2.28
trans-1,2-Dichloroethene	ND		0.0023	0.00020	ppm v/v			11/24/20 17:18	2.28
1,2-Dichloropropane	ND		0.0023	0.00029	ppm v/v			11/24/20 17:18	2.28
cis-1,3-Dichloropropene	ND		0.0023	0.00046	ppm v/v			11/24/20 17:18	2.28
trans-1,3-Dichloropropene	ND		0.0023	0.00026	ppm v/v			11/24/20 17:18	2.28
Ethylbenzene	ND		0.0023	0.00037	ppm v/v			11/24/20 17:18	2.28
4-Ethyltoluene	ND		0.0046	0.00060	ppm v/v			11/24/20 17:18	2.28
Hexachlorobutadiene	ND		0.011	0.00091	ppm v/v			11/24/20 17:18	2.28
<b>2-Hexanone</b>	<b>0.0015</b>	<b>J B</b>	0.0057	0.00046	ppm v/v			11/24/20 17:18	2.28
4-Methyl-2-pentanone (MIBK)	ND		0.0057	0.0015	ppm v/v			11/24/20 17:18	2.28
Methylene Chloride	ND		0.011	0.011	ppm v/v			11/24/20 17:18	2.28
Styrene	ND		0.0023	0.00068	ppm v/v			11/24/20 17:18	2.28
1,1,2,2-Tetrachloroethane	ND		0.0023	0.00040	ppm v/v			11/24/20 17:18	2.28
<b>Tetrachloroethene</b>	<b>0.21</b>		0.0023	0.00020	ppm v/v			11/24/20 17:18	2.28
Toluene	ND		0.0034	0.0022	ppm v/v			11/24/20 17:18	2.28
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.12</b>		0.0023	0.00023	ppm v/v			11/24/20 17:18	2.28
1,2,4-Trichlorobenzene	ND		0.011	0.0018	ppm v/v			11/24/20 17:18	2.28
<b>1,1,1-Trichloroethane</b>	<b>0.0034</b>		0.0023	0.0011	ppm v/v			11/24/20 17:18	2.28
1,1,2-Trichloroethane	ND		0.0023	0.00020	ppm v/v			11/24/20 17:18	2.28
<b>Trichloroethene</b>	<b>0.16</b>		0.0011	0.00017	ppm v/v			11/24/20 17:18	2.28
<b>Trichlorofluoromethane</b>	<b>0.041</b>		0.0023	0.00031	ppm v/v			11/24/20 17:18	2.28
1,2,4-Trimethylbenzene	ND		0.0023	0.00057	ppm v/v			11/24/20 17:18	2.28
1,3,5-Trimethylbenzene	ND		0.0023	0.00063	ppm v/v			11/24/20 17:18	2.28
Vinyl acetate	ND		0.011	0.00080	ppm v/v			11/24/20 17:18	2.28
Vinyl chloride	ND		0.0011	0.00074	ppm v/v			11/24/20 17:18	2.28

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

**Client Sample ID: 113989-001/MWL-SV03-100**

**Lab Sample ID: 140-21095-21**

**Date Collected: 11/13/20 08:53**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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		0.0023	0.00083	ppm v/v			11/24/20 17:18	2.28
o-Xylene	ND		0.0023	0.00043	ppm v/v			11/24/20 17:18	2.28
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		60 - 140					11/24/20 17:18	2.28

**Client Sample ID: 113990-001/MWL-SV03-200**

**Lab Sample ID: 140-21095-22**

**Date Collected: 11/13/20 08:57**

**Matrix: Air**

**Date Received: 11/19/20 11:40**

**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		0.045	0.013	ppm v/v			11/24/20 18:01	1.79
<b>Benzene</b>	<b>0.00031</b>	<b>J</b>	0.0018	0.00018	ppm v/v			11/24/20 18:01	1.79
Benzyl chloride	ND		0.0036	0.00085	ppm v/v			11/24/20 18:01	1.79
Bromodichloromethane	ND		0.0018	0.00040	ppm v/v			11/24/20 18:01	1.79
Bromoform	ND		0.0018	0.00020	ppm v/v			11/24/20 18:01	1.79
Bromomethane	ND		0.0018	0.00049	ppm v/v			11/24/20 18:01	1.79
2-Butanone (MEK)	ND		0.0090	0.0016	ppm v/v			11/24/20 18:01	1.79
<b>Carbon disulfide</b>	<b>0.0058</b>		0.0045	0.00025	ppm v/v			11/24/20 18:01	1.79
<b>Carbon tetrachloride</b>	<b>0.00040</b>	<b>J</b>	0.0018	0.00016	ppm v/v			11/24/20 18:01	1.79
Chlorobenzene	ND		0.0018	0.00013	ppm v/v			11/24/20 18:01	1.79
Chloroethane	ND		0.0018	0.00065	ppm v/v			11/24/20 18:01	1.79
<b>Chloroform</b>	<b>0.0024</b>		0.0018	0.00016	ppm v/v			11/24/20 18:01	1.79
Chloromethane	ND		0.0045	0.0015	ppm v/v			11/24/20 18:01	1.79
Dibromochloromethane	ND		0.0018	0.00016	ppm v/v			11/24/20 18:01	1.79
1,2-Dibromoethane (EDB)	ND		0.0018	0.00016	ppm v/v			11/24/20 18:01	1.79
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0018	0.00027	ppm v/v			11/24/20 18:01	1.79
1,2-Dichlorobenzene	ND		0.0018	0.00069	ppm v/v			11/24/20 18:01	1.79
1,3-Dichlorobenzene	ND		0.0018	0.00036	ppm v/v			11/24/20 18:01	1.79
1,4-Dichlorobenzene	ND		0.0018	0.00036	ppm v/v			11/24/20 18:01	1.79
<b>Dichlorodifluoromethane</b>	<b>0.044</b>		0.0018	0.00031	ppm v/v			11/24/20 18:01	1.79
<b>1,1-Dichloroethane</b>	<b>0.0072</b>		0.0018	0.00016	ppm v/v			11/24/20 18:01	1.79
1,2-Dichloroethane	ND		0.0018	0.00022	ppm v/v			11/24/20 18:01	1.79
<b>1,1-Dichloroethene</b>	<b>0.024</b>		0.0018	0.00018	ppm v/v			11/24/20 18:01	1.79
<b>cis-1,2-Dichloroethene</b>	<b>0.0039</b>		0.0018	0.00022	ppm v/v			11/24/20 18:01	1.79
trans-1,2-Dichloroethene	ND		0.0018	0.00016	ppm v/v			11/24/20 18:01	1.79
1,2-Dichloropropane	ND		0.0018	0.00022	ppm v/v			11/24/20 18:01	1.79
cis-1,3-Dichloropropene	ND		0.0018	0.00036	ppm v/v			11/24/20 18:01	1.79
trans-1,3-Dichloropropene	ND		0.0018	0.00020	ppm v/v			11/24/20 18:01	1.79
Ethylbenzene	ND		0.0018	0.00029	ppm v/v			11/24/20 18:01	1.79
4-Ethyltoluene	ND		0.0036	0.00047	ppm v/v			11/24/20 18:01	1.79
Hexachlorobutadiene	ND		0.0090	0.00072	ppm v/v			11/24/20 18:01	1.79
<b>2-Hexanone</b>	<b>0.0014</b>	<b>J B</b>	0.0045	0.00036	ppm v/v			11/24/20 18:01	1.79
4-Methyl-2-pentanone (MIBK)	ND		0.0045	0.0012	ppm v/v			11/24/20 18:01	1.79
Methylene Chloride	ND		0.0090	0.0087	ppm v/v			11/24/20 18:01	1.79
Styrene	ND		0.0018	0.00054	ppm v/v			11/24/20 18:01	1.79
1,1,2,2-Tetrachloroethane	ND		0.0018	0.00031	ppm v/v			11/24/20 18:01	1.79

Eurofins TestAmerica, Knoxville



# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMP

Job ID: 140-21095-1

Client Sample ID: 113990-001/MWL-SV03-200

Lab Sample ID: 140-21095-22

Date Collected: 11/13/20 08:57

Matrix: Air

Date Received: 11/19/20 11:40

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	0.26		0.0018	0.00016	ppm v/v			11/24/20 18:01	1.79
Toluene	ND		0.0027	0.0017	ppm v/v			11/24/20 18:01	1.79
1,1,2-Trichloro-1,2,2-trifluoroethane	0.13		0.0018	0.00018	ppm v/v			11/24/20 18:01	1.79
1,2,4-Trichlorobenzene	ND		0.0090	0.0014	ppm v/v			11/24/20 18:01	1.79
1,1,1-Trichloroethane	0.0020		0.0018	0.00083	ppm v/v			11/24/20 18:01	1.79
1,1,2-Trichloroethane	ND		0.0018	0.00016	ppm v/v			11/24/20 18:01	1.79
Trichloroethene	0.22		0.00090	0.00013	ppm v/v			11/24/20 18:01	1.79
Trichlorofluoromethane	0.032		0.0018	0.00025	ppm v/v			11/24/20 18:01	1.79
1,2,4-Trimethylbenzene	ND		0.0018	0.00045	ppm v/v			11/24/20 18:01	1.79
1,3,5-Trimethylbenzene	ND		0.0018	0.00049	ppm v/v			11/24/20 18:01	1.79
Vinyl acetate	ND		0.0090	0.00063	ppm v/v			11/24/20 18:01	1.79
Vinyl chloride	ND		0.00090	0.00058	ppm v/v			11/24/20 18:01	1.79
m,p-Xylene	ND		0.0018	0.00065	ppm v/v			11/24/20 18:01	1.79
o-Xylene	ND		0.0018	0.00034	ppm v/v			11/24/20 18:01	1.79
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		60 - 140					11/24/20 18:01	1.79

Client Sample ID: 113991-001/MWL-SV03-300

Lab Sample ID: 140-21095-23

Date Collected: 11/13/20 09:01

Matrix: Air

Date Received: 11/19/20 11:40

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			11/24/20 18:44	1.75
Benzene	0.00040	J	0.0035	0.00035	ppm v/v			11/24/20 18:44	1.75
Benzyl chloride	ND		0.0070	0.0017	ppm v/v			11/24/20 18:44	1.75
Bromodichloromethane	ND		0.0035	0.00079	ppm v/v			11/24/20 18:44	1.75
Bromoform	ND		0.0035	0.00039	ppm v/v			11/24/20 18:44	1.75
Bromomethane	ND		0.0035	0.00096	ppm v/v			11/24/20 18:44	1.75
2-Butanone (MEK)	ND		0.018	0.0032	ppm v/v			11/24/20 18:44	1.75
Carbon disulfide	0.0011	J	0.0088	0.00048	ppm v/v			11/24/20 18:44	1.75
Carbon tetrachloride	0.00034	J	0.0035	0.00031	ppm v/v			11/24/20 18:44	1.75
Chlorobenzene	ND		0.0035	0.00026	ppm v/v			11/24/20 18:44	1.75
Chloroethane	ND		0.0035	0.0013	ppm v/v			11/24/20 18:44	1.75
Chloroform	0.0015	J	0.0035	0.00031	ppm v/v			11/24/20 18:44	1.75
Chloromethane	ND		0.0088	0.0029	ppm v/v			11/24/20 18:44	1.75
Dibromochloromethane	ND		0.0035	0.00031	ppm v/v			11/24/20 18:44	1.75
1,2-Dibromoethane (EDB)	ND		0.0035	0.00031	ppm v/v			11/24/20 18:44	1.75
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0035	0.00053	ppm v/v			11/24/20 18:44	1.75
1,2-Dichlorobenzene	ND		0.0035	0.0014	ppm v/v			11/24/20 18:44	1.75
1,3-Dichlorobenzene	ND		0.0035	0.00070	ppm v/v			11/24/20 18:44	1.75
1,4-Dichlorobenzene	ND		0.0035	0.00070	ppm v/v			11/24/20 18:44	1.75
Dichlorodifluoromethane	0.037		0.0035	0.00061	ppm v/v			11/24/20 18:44	1.75
1,1-Dichloroethane	0.0029	J	0.0035	0.00031	ppm v/v			11/24/20 18:44	1.75
1,2-Dichloroethane	ND		0.0035	0.00044	ppm v/v			11/24/20 18:44	1.75
1,1-Dichloroethene	0.018		0.0035	0.00035	ppm v/v			11/24/20 18:44	1.75

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113991-001/MWL-SV03-300

Lab Sample ID: 140-21095-23

Date Collected: 11/13/20 09:01

Matrix: Air

Date Received: 11/19/20 11:40

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>cis-1,2-Dichloroethene</b>	<b>0.0019</b>	<b>J</b>	0.0035	0.00044	ppm v/v			11/24/20 18:44	1.75
trans-1,2-Dichloroethene	ND		0.0035	0.00031	ppm v/v			11/24/20 18:44	1.75
1,2-Dichloropropane	ND		0.0035	0.00044	ppm v/v			11/24/20 18:44	1.75
cis-1,3-Dichloropropene	ND		0.0035	0.00070	ppm v/v			11/24/20 18:44	1.75
trans-1,3-Dichloropropene	ND		0.0035	0.00039	ppm v/v			11/24/20 18:44	1.75
Ethylbenzene	ND		0.0035	0.00057	ppm v/v			11/24/20 18:44	1.75
4-Ethyltoluene	ND		0.0070	0.00092	ppm v/v			11/24/20 18:44	1.75
Hexachlorobutadiene	ND		0.018	0.0014	ppm v/v			11/24/20 18:44	1.75
<b>2-Hexanone</b>	<b>0.0025</b>	<b>J B</b>	0.0088	0.00070	ppm v/v			11/24/20 18:44	1.75
4-Methyl-2-pentanone (MIBK)	ND		0.0088	0.0024	ppm v/v			11/24/20 18:44	1.75
Methylene Chloride	ND		0.018	0.017	ppm v/v			11/24/20 18:44	1.75
Styrene	ND		0.0035	0.0011	ppm v/v			11/24/20 18:44	1.75
1,1,2,2-Tetrachloroethane	ND		0.0035	0.00061	ppm v/v			11/24/20 18:44	1.75
<b>Tetrachloroethene</b>	<b>0.25</b>		0.0035	0.00031	ppm v/v			11/24/20 18:44	1.75
Toluene	ND		0.0053	0.0034	ppm v/v			11/24/20 18:44	1.75
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.11</b>		0.0035	0.00035	ppm v/v			11/24/20 18:44	1.75
1,2,4-Trichlorobenzene	ND		0.018	0.0028	ppm v/v			11/24/20 18:44	1.75
1,1,1-Trichloroethane	ND		0.0035	0.0016	ppm v/v			11/24/20 18:44	1.75
1,1,2-Trichloroethane	ND		0.0035	0.00031	ppm v/v			11/24/20 18:44	1.75
<b>Trichloroethene</b>	<b>0.17</b>		0.0018	0.00026	ppm v/v			11/24/20 18:44	1.75
<b>Trichlorofluoromethane</b>	<b>0.015</b>		0.0035	0.00048	ppm v/v			11/24/20 18:44	1.75
1,2,4-Trimethylbenzene	ND		0.0035	0.00088	ppm v/v			11/24/20 18:44	1.75
1,3,5-Trimethylbenzene	ND		0.0035	0.00096	ppm v/v			11/24/20 18:44	1.75
Vinyl acetate	ND		0.018	0.0012	ppm v/v			11/24/20 18:44	1.75
Vinyl chloride	ND		0.0018	0.0011	ppm v/v			11/24/20 18:44	1.75
m,p-Xylene	ND		0.0035	0.0013	ppm v/v			11/24/20 18:44	1.75
o-Xylene	ND		0.0035	0.00066	ppm v/v			11/24/20 18:44	1.75
<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					11/24/20 18:44	1.75

Client Sample ID: 113992-001/MWL-SV03-400

Lab Sample ID: 140-21095-24

Date Collected: 11/13/20 09:11

Matrix: Air

Date Received: 11/19/20 11:40

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		0.059	0.017	ppm v/v			11/30/20 11:00	1.76
<b>Benzene</b>	<b>0.00038</b>	<b>J</b>	0.0023	0.00023	ppm v/v			11/30/20 11:00	1.76
Benzyl chloride	ND		0.0047	0.0011	ppm v/v			11/30/20 11:00	1.76
Bromodichloromethane	ND		0.0023	0.00053	ppm v/v			11/30/20 11:00	1.76
Bromoform	ND		0.0023	0.00026	ppm v/v			11/30/20 11:00	1.76
Bromomethane	ND		0.0023	0.00065	ppm v/v			11/30/20 11:00	1.76
2-Butanone (MEK)	ND		0.012	0.0021	ppm v/v			11/30/20 11:00	1.76
Carbon disulfide	ND		0.0059	0.00032	ppm v/v			11/30/20 11:00	1.76
<b>Carbon tetrachloride</b>	<b>0.00051</b>	<b>J</b>	0.0023	0.00021	ppm v/v			11/30/20 11:00	1.76
Chlorobenzene	ND		0.0023	0.00018	ppm v/v			11/30/20 11:00	1.76

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Sandia National Laboratories  
Project/Site: MWL LTMMMP

Job ID: 140-21095-1

Client Sample ID: 113992-001/MWL-SV03-400

Lab Sample ID: 140-21095-24

Date Collected: 11/13/20 09:11

Matrix: Air

Date Received: 11/19/20 11:40

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		0.0023	0.00085	ppm v/v			11/30/20 11:00	1.76
<b>Chloroform</b>	<b>0.0015</b>	<b>J</b>	0.0023	0.00021	ppm v/v			11/30/20 11:00	1.76
Chloromethane	ND		0.0059	0.0019	ppm v/v			11/30/20 11:00	1.76
Dibromochloromethane	ND		0.0023	0.00021	ppm v/v			11/30/20 11:00	1.76
1,2-Dibromoethane (EDB)	ND		0.0023	0.00021	ppm v/v			11/30/20 11:00	1.76
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0023	0.00035	ppm v/v			11/30/20 11:00	1.76
1,2-Dichlorobenzene	ND		0.0023	0.00091	ppm v/v			11/30/20 11:00	1.76
1,3-Dichlorobenzene	ND		0.0023	0.00047	ppm v/v			11/30/20 11:00	1.76
1,4-Dichlorobenzene	ND		0.0023	0.00047	ppm v/v			11/30/20 11:00	1.76
<b>Dichlorodifluoromethane</b>	<b>0.018</b>		0.0023	0.00041	ppm v/v			11/30/20 11:00	1.76
<b>1,1-Dichloroethane</b>	<b>0.0022</b>	<b>J</b>	0.0023	0.00021	ppm v/v			11/30/20 11:00	1.76
1,2-Dichloroethane	ND		0.0023	0.00029	ppm v/v			11/30/20 11:00	1.76
<b>1,1-Dichloroethene</b>	<b>0.011</b>		0.0023	0.00023	ppm v/v			11/30/20 11:00	1.76
<b>cis-1,2-Dichloroethene</b>	<b>0.0019</b>	<b>J</b>	0.0023	0.00029	ppm v/v			11/30/20 11:00	1.76
trans-1,2-Dichloroethene	ND		0.0023	0.00021	ppm v/v			11/30/20 11:00	1.76
1,2-Dichloropropane	ND		0.0023	0.00029	ppm v/v			11/30/20 11:00	1.76
cis-1,3-Dichloropropene	ND		0.0023	0.00047	ppm v/v			11/30/20 11:00	1.76
trans-1,3-Dichloropropene	ND		0.0023	0.00026	ppm v/v			11/30/20 11:00	1.76
Ethylbenzene	ND		0.0023	0.00038	ppm v/v			11/30/20 11:00	1.76
4-Ethyltoluene	ND		0.0047	0.00062	ppm v/v			11/30/20 11:00	1.76
Hexachlorobutadiene	ND		0.012	0.00094	ppm v/v			11/30/20 11:00	1.76
2-Hexanone	ND		0.0059	0.00047	ppm v/v			11/30/20 11:00	1.76
4-Methyl-2-pentanone (MIBK)	ND		0.0059	0.0016	ppm v/v			11/30/20 11:00	1.76
Methylene Chloride	ND		0.012	0.011	ppm v/v			11/30/20 11:00	1.76
Styrene	ND		0.0023	0.00070	ppm v/v			11/30/20 11:00	1.76
1,1,2,2-Tetrachloroethane	ND		0.0023	0.00041	ppm v/v			11/30/20 11:00	1.76
<b>Tetrachloroethene</b>	<b>0.24</b>		0.0023	0.00021	ppm v/v			11/30/20 11:00	1.76
Toluene	ND		0.0035	0.0023	ppm v/v			11/30/20 11:00	1.76
<b>1,1,2-Trichloro-1,2,2-trifluoroethane</b>	<b>0.041</b>		0.0023	0.00023	ppm v/v			11/30/20 11:00	1.76
1,2,4-Trichlorobenzene	ND		0.012	0.0019	ppm v/v			11/30/20 11:00	1.76
1,1,1-Trichloroethane	ND		0.0023	0.0011	ppm v/v			11/30/20 11:00	1.76
1,1,2-Trichloroethane	ND		0.0023	0.00021	ppm v/v			11/30/20 11:00	1.76
<b>Trichloroethene</b>	<b>0.19</b>		0.0012	0.00018	ppm v/v			11/30/20 11:00	1.76
<b>Trichlorofluoromethane</b>	<b>0.0093</b>		0.0023	0.00032	ppm v/v			11/30/20 11:00	1.76
1,2,4-Trimethylbenzene	ND		0.0023	0.00059	ppm v/v			11/30/20 11:00	1.76
1,3,5-Trimethylbenzene	ND		0.0023	0.00065	ppm v/v			11/30/20 11:00	1.76
Vinyl acetate	ND		0.012	0.00082	ppm v/v			11/30/20 11:00	1.76
Vinyl chloride	ND		0.0012	0.00076	ppm v/v			11/30/20 11:00	1.76
m,p-Xylene	ND		0.0023	0.00085	ppm v/v			11/30/20 11:00	1.76
o-Xylene	ND		0.0023	0.00044	ppm v/v			11/30/20 11:00	1.76

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		60 - 140		11/30/20 11:00	1.76

## **ANNEX D**

### **Mixed Waste Landfill Soil-Moisture Monitoring Forms**

**April 2020-March 2021**

**Field Forms and Tables**

**MIXED WASTE LANDFILL**  
**SOIL MOISTURE MONITORING**

**Soil Moisture Monitoring Field Forms**

## Mixed Waste Landfill Neutron Logging Data Field Form

Name: <i>Robert Tröck</i>	Standard Count: <i>6568</i>	Chi: <i>1.03</i>
Name: <i>Danielle Michel</i>	Previous Count: <i>6601</i>	Count Time: 30 seconds
Notes: <i>4/15/20 S-6577, P-6568, chi 0.97</i>		

Vertical Depth Below Top of Casing (ft)	Linear Depth Along Casing (ft)	Winch Counter Reading (ft)	VZ-3 Counts (E Side) Date/Time	VZ-2 Counts (SW Corner) Date/Time	VZ-1 Counts (NW Corner) Date/Time
<i>Ground Surface</i> 0.0	0	0	<i>4/9/20 -1400</i> 1035	<i>4/15/20-1317</i> 2242	<i>4/15/20-1415</i> 2363
0.9	1	9999	3614	3040	3218
1.7	2	9998	4251	3336	3093
2.6	3	9997	3840	3136	2781
3.5	4	9996	3003	3249	2764
4.3	5	9995	2945	2806	2631
5.2	6	9994	2752	2191	2125
6.1	7	9993	2023	1826	2167
6.9	8	9992	2136	1849	1803
7.8	9	9991	2057	1835	1726
8.7	10	9990	2087	1621	2134
9.5	11	9989	1979	1898	2145
10.4	12	9988	1599	1831	1952
11.3	13	9987	1845	1774	1743
12.1	14	9986	1814	1715	1871
13.0	15	9985	1838	1750	1997
13.9	16	9984	1664	1734	2150
14.7	17	9983	1578	1747	1779
15.6	18	9982	1733	1781	1442
16.5	19	9981	1506	2148	1472
17.3	20	9980	1382	2083	1502
18.2	21	9979	1827	1743	1667
19.1	22	9978	1658	1826	2378
19.9	23	9977	1462	2086	2258
20.8	24	9976	1445	1722	2111
21.7	25	9975	1556	1648	1785



4/9/20, 4/15/20

## Mixed Waste Landfill Neutron Logging Data Field Form

Ground Surface 11/4/16

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	1635	1773	1730
30.3	35	9965	1717	1856	2159
34.6	40	9960	1708	1630	1772
39.0	45	9955	1675	1575	2268
43.3	50	9950	1896	1621	1687
47.6	55	9945	1812	2166	1732
52.0	60	9940	1783	1928	1847
56.3	65	9935	2125	2179	1952
60.6	70	9930	1274	2492	1782
65.0	75	9925	2259	2195	2020
69.3	80	9920	2254	1559	1840
73.6	85	9915	1972	1826	1886
77.9	90	9910	1437	2286	1859 1859
82.3	95	9905	2093	2263	2324
86.6	100	9900	2180	2134	2178
90.9	105	9895	1950	2325	2167
95.3	110	9890	2394	1849	2030
99.6	115	9885	1971	1779	1419
103.9	120	9880	1591	1766	2407
108.3	125	9875	1763	2187	1584
112.6	130	9870	2110	2226	1842
116.9	135	9865	2067	2634	1617
121.2	140	9860	1637	1927	1565
125.6	145	9855	1714	2639	2764
129.9	150	9850	3067	2187	2116
134.2	155	9845	2220	2262	1616
138.6	160	9840	2573	2058	1949
142.9	165	9835	2557	2210	2140
147.2	170	9830	2625	1586	2574
151.6	175	9825	1764	2778	2658
155.9	180	9820	2762	2605	2909
160.2	185	9815	2807	2784	1904
164.5	190	9810	1697	1605	2158
168.9	195	9805	1794	1960	3461
173.2	200	9800	2083	3105	2529

**MIXED WASTE LANDFILL**  
**SOIL MOISTURE MONITORING**

**Soil Moisture Monitoring Results Tables**



Table D-1  
VZ-1 Soil-Moisture Monitoring Results  
April 2020

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2020	Baseline Average (2004-2006)	Difference between Baseline Average & April 2020	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	5.4	2.9	2.5	NA
4.3	5	5.0	2.9	2.1	NA
5.2	6	3.7	2.9	0.8	NA
6.1	7	3.8	2.6	1.2	NA
6.9	8	2.8	2.2	0.6	NA
7.8	9	2.6	1.9	0.7	NA
8.7	10	3.7	1.7	2.0	23
9.5	11	3.7	2.0	1.7	23
10.4	12	3.2	2.7	0.5	23
11.3	13	2.6	3.1	-0.5	23
12.1	14	3.0	2.6	0.4	23
13.0	15	3.3	2.4	0.9	23
13.9	16	3.7	2.6	1.1	23
14.7	17	2.7	2.8	-0.1	23
15.6	18	1.8	2.9	-1.1	23
16.5	19	1.9	2.4	-0.5	23
17.3	20	2.0	2.0	0.0	23
18.2	21	2.4	2.0	0.4	23
19.1	22	4.3	2.1	2.2	23
19.9	23	4.0	3.0	1.0	23
20.8	24	3.6	4.3	-0.7	23
21.7	25	2.7	4.0	-1.3	23
26.0	30	2.6	2.9	-0.3	23
30.3	35	3.8	2.7	1.1	23
34.6	40	2.7	2.3	0.4	23
39.0	45	4.1	3.0	1.1	23
43.3	50	2.5	2.9	-0.4	23
47.6	55	2.6	2.8	-0.2	23
52.0	60	2.9	3.4	-0.5	23
56.3	65	3.2	2.9	0.3	23

Table D-1 (Concluded)  
VZ-1 Soil-Moisture Monitoring Results  
April 2020

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2020	Baseline Average (2004-2006)	Difference between Baseline Average & April 2020	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	2.7	2.1	0.6	23
65.0	75	3.4	5.6	-2.2	23
69.3	80	2.9	2.8	0.1	23
73.6	85	3.0	3.1	-0.1	23
77.9	90	2.9	3.7	-0.8	23
82.3	95	4.2	3.7	0.5	23
86.6	100	3.8	5.4	-1.6	23
90.9	105	3.8	5.0	-1.2	NA
95.3	110	3.4	3.0	0.4	NA
99.6	115	1.8	3.6	-1.8	NA
103.9	120	4.4	2.2	2.2	NA
108.3	125	2.2	2.7	-0.5	NA
112.6	130	2.9	3.3	-0.4	NA
116.9	135	2.3	3.1	-0.8	NA
121.2	140	2.2	2.1	0.1	NA
125.6	145	5.4	3.8	1.6	NA
129.9	150	3.6	3.2	0.4	NA
134.2	155	2.3	2.7	-0.4	NA
138.6	160	3.2	2.1	1.1	NA
142.9	165	3.7	3.8	-0.1	NA
147.2	170	4.9	2.0	2.9	NA
151.6	175	5.1	6.0	-0.9	NA
155.9	180	5.8	5.5	0.3	NA
160.2	185	3.1	4.4	-1.3	NA
164.5	190	3.8	3.0	0.8	NA
168.9	195	7.3	7.0	0.3	NA
173.2	200	4.8	5.4	-0.6	NA
	Average	3.4	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 2020

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2020	Baseline Average (2004-2006)	Difference between Baseline Average & April 2020	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	6.7	2.7	4.0	NA
4.3	5	5.5	3.3	2.2	NA
5.2	6	3.8	3.6	0.2	NA
6.1	7	2.9	3.6	-0.7	NA
6.9	8	2.9	3.5	-0.6	NA
7.8	9	2.9	3.1	-0.2	NA
8.7	10	2.3	2.4	-0.1	23
9.5	11	3.1	2.2	0.9	23
10.4	12	2.9	2.2	0.7	23
11.3	13	2.7	2.1	0.6	23
12.1	14	2.6	2.5	0.1	23
13.0	15	2.7	3.0	-0.3	23
13.9	16	2.6	2.8	-0.2	23
14.7	17	2.6	2.4	0.2	23
15.6	18	2.7	2.6	0.1	23
16.5	19	3.7	2.7	1.0	23
17.3	20	3.6	2.9	0.7	23
18.2	21	2.6	3.1	-0.5	23
19.1	22	2.9	3.6	-0.7	23
19.9	23	3.6	3.7	-0.1	23
20.8	24	2.6	3.1	-0.5	23
21.7	25	2.4	2.7	-0.3	23
26.0	30	2.7	2.4	0.3	23
30.3	35	2.9	2.9	0.0	23
34.6	40	2.3	2.7	-0.4	23
39.0	45	2.2	2.3	-0.1	23
43.3	50	2.3	2.1	0.2	23
47.6	55	3.8	3.1	0.7	23
52.0	60	3.1	3.0	0.1	23
56.3	65	3.8	5.5	-1.7	23

Table D-2 (Concluded)  
VZ-2 Soil-Moisture Monitoring Results  
April 2020

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2020	Baseline Average (2004-2006)	Difference between Baseline Average & April 2020	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	4.7	4.8	-0.1	23
65.0	75	3.9	5.1	-1.2	23
69.3	80	2.1	2.6	-0.5	23
73.6	85	2.9	2.6	0.3	23
77.9	90	4.1	3.1	1.0	23
82.3	95	4.0	3.6	0.4	23
86.6	100	3.7	4.7	-1.0	23
90.9	105	4.2	3.4	0.8	NA
95.3	110	2.9	3.1	-0.2	NA
99.6	115	2.7	3.6	-0.9	NA
103.9	120	2.7	2.0	0.7	NA
108.3	125	3.8	3.8	0.0	NA
112.6	130	3.9	3.6	0.3	NA
116.9	135	5.0	3.4	1.6	NA
121.2	140	3.1	2.4	0.7	NA
125.6	145	5.1	5.9	-0.8	NA
129.9	150	3.8	7.0	-3.2	NA
134.2	155	4.0	3.6	0.4	NA
138.6	160	3.5	3.8	-0.3	NA
142.9	165	3.9	3.0	0.9	NA
147.2	170	2.2	2.9	-0.7	NA
151.6	175	5.4	2.4	3.0	NA
155.9	180	5.0	5.4	-0.4	NA
160.2	185	5.4	5.4	0.0	NA
164.5	190	2.3	4.1	-1.8	NA
168.9	195	3.2	3.5	-0.3	NA
173.2	200	6.3	6.3	0.0	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 2020

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2020	Baseline Average (2004-2006)	Difference between Baseline Average & April 2020	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	6.1	4.6	1.5	NA
4.3	5	5.9	4.5	1.4	NA
5.2	6	5.4	3.7	1.7	NA
6.1	7	3.4	2.9	0.5	NA
6.9	8	3.7	3.1	0.6	NA
7.8	9	3.5	2.3	1.2	NA
8.7	10	3.6	2.4	1.2	23
9.5	11	3.3	2.6	0.7	23
10.4	12	2.2	2.7	-0.5	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	2.4	2.9	-0.5	23
14.7	17	2.2	3.1	-0.9	23
15.6	18	2.6	3.1	-0.5	23
16.5	19	2.0	2.3	-0.3	23
17.3	20	1.7	2.7	-1.0	23
18.2	21	2.9	2.7	0.2	23
19.1	22	2.4	1.8	0.6	23
19.9	23	1.9	2.7	-0.8	23
20.8	24	1.8	2.8	-1.0	23
21.7	25	2.1	2.1	0.0	23
26.0	30	2.3	2.5	-0.2	23
30.3	35	2.6	2.8	-0.2	23
34.6	40	2.5	2.1	0.4	23
39.0	45	2.5	2.7	-0.2	23
43.3	50	3.1	2.9	0.2	23
47.6	55	2.8	3.4	-0.6	23
52.0	60	2.7	2.9	-0.2	23
56.3	65	3.7	3.5	0.2	23

Table D-3 (Concluded)  
VZ-3 Soil-Moisture Monitoring Results  
April 2020

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2020	Baseline Average (2004-2006)	Difference between Baseline Average & April 2020	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	1.4	1.9	-0.5	23
65.0	75	4.0	4.3	-0.3	23
69.3	80	4.0	4.5	-0.5	23
73.6	85	3.3	3.5	-0.2	23
77.9	90	1.8	1.9	-0.1	23
82.3	95	3.6	3.3	0.3	23
86.6	100	3.8	3.4	0.4	23
90.9	105	3.2	3.3	-0.1	NA
95.3	110	4.4	4.7	-0.3	NA
99.6	115	3.3	3.6	-0.3	NA
103.9	120	2.2	2.1	0.1	NA
108.3	125	2.7	1.8	0.9	NA
112.6	130	3.6	4.3	-0.7	NA
116.9	135	3.5	4.0	-0.5	NA
121.2	140	2.4	2.3	0.1	NA
125.6	145	2.6	2.0	0.6	NA
129.9	150	6.2	4.4	1.8	NA
134.2	155	3.9	3.6	0.3	NA
138.6	160	4.9	4.4	0.5	NA
142.9	165	4.8	5.2	-0.4	NA
147.2	170	5.0	4.1	0.9	NA
151.6	175	2.7	4.3	-1.6	NA
155.9	180	5.4	6.6	-1.2	NA
160.2	185	5.5	5.6	-0.1	NA
164.5	190	2.5	2.7	-0.2	NA
168.9	195	2.8	3.1	-0.3	NA
173.2	200	3.6	4.1	-0.5	NA
	Average	3.3	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 2020-March 2021**

**Field Forms**

**Sample Summary Sheet**

**Data Validation Reports**

**Contract Verification Forms**

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

<b>Form Title</b>	<b>Corresponding Procedure</b>
Field Measurement Log For Groundwater Sample Collection	FOP 05-01
Groundwater Sample Collection Field Equipment Check Log	FOP 05-02
Portable Pump and Tubing/Water Level Indicator Decontamination Log Form	FOP 05-03
Analysis Request and Chain of Custody*	LOP 94-03

\*Completed AR/COC forms are provided in the Data Validation Reports in this Annex.



**FIELD SAMPLING FORMS**  
**MAY 2020 GROUNDWATER MONITORING**

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL		
Well I.D.: MWL-BW2	Date: 05/04/20	
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)
481.38	0951	Start							
482.89	1013	5	23.46	744.11	174.9	7.25	0.59	41.01	3.23
483.97	1033	10	22.17	714.63	140.4	7.27	0.51	18.05	1.46
484.66	1052	15	22.28	710.70	113.1	7.28	0.65	14.67	1.18
485.46	1112	20	22.36	716.12	99.7	7.28	0.82	12.74	1.02
486.15	1123	23	22.53	718.92	96.3	7.27	0.57	12.38	0.99
486.61	1131	25	22.42	718.19	94.9	7.27	0.74	14.22	1.25
487.04	1139	27	22.35	713.83	94.3	7.28	1.21	16.91	1.36
487.27	1143	28	22.38	712.92	94.4	7.27	1.31	17.92	1.44
487.53	1147	29	22.39	711.73	93.7	7.28	1.72	19.92	1.61
487.81	1150	30	22.39	718.08	94.5	7.28	1.82	21.82	1.76
488.61	1154	31	22.38	715.59	95.0	7.29	2.07	24.98	2.02
	1155	Sampling →							

Comments: ~1.5 gals purged from tubing @ 0958

FB LOT # 040820

Bennet pump not working, pulled pump and replaced restart purge @ 951

Project Name: MWL		
Well I.D.: MWL-MW7	Date: 05/05/20	
Method: Portable pump	<input checked="" type="checkbox"/> X	Dedicated pump <input type="checkbox"/> Pump depth: 496'

[illegible]

Comments: ~1.5 gals purged from tubing @ 0843

Project Name: MWL	
Well I.D.: MWL-MW8	Date: 05/07/20
Method: Portable pump <input checked="" type="checkbox"/> Dedicated pump <input type="checkbox"/> Pump depth: 497'	

[illegible]

Comments: ~1.5 gals purged from tubing @ 0839

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: MWL	
Well I.D.: MWL-MW9	Date: 5/06/20
Method: Portable pump <input checked="" type="checkbox"/> X	Dedicated pump <input type="checkbox"/> Pump depth: 497'

## PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L <u>gal</u> )	Temp (°C)	SC (μS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
491.45	0822	START	—	—	—	—	—	—	—
493.14	0844	1	23.82	640.59	188.9	7.35	0.49	41.47	3.19
493.71	0851	2	23.20	627.12	186.9	7.38	0.78	29.02	2.27
494.12	0858	3	22.83	617.73	184.6	7.40	0.28	26.05	2.06
494.59	0905	4	22.70	614.66	182.2	7.40	0.36	24.98	1.98
494.91	0912	5	22.55	614.76	180.0	7.40	0.64	23.08	1.83
495.25	0919	6	22.40	612.47	178.4	7.41	0.67	21.26	1.69
495.53	0926	7	22.49	614.32	176.1	7.40	1.85	18.87	1.50
495.79	0933	8	22.55	615.10	173.8	7.40	2.69	17.08	1.35
495.96	0941	9	22.80	617.76	171.5	7.40	2.25	15.49	1.22
496.16	0949	10	22.98	619.58	169.3	7.40	1.00	14.30	1.12
	0950	Sampling →							

Comments: ~ 1.5 gals purged from tubing @ 0838

White Truck

## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL						
Calibrations done by: R Lynch				Date: 05/04/20		
Make & Model: INSITU AT 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (S/N): NA						
<b>pH Calibration/Check</b>						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: 0637	4.00	23.52	7.00	23.54	10.00	23.63
2. Time: 1404	4.00	24.39	7.02	24.52	10.01	24.47
3. Time:						
4. Time:						
Standard lot no.: 9GA042		9GK721		9GJ881		
Expiration date: JAN/22		NOV/21		OCT/21		
<b>SC Calibration/Check</b>						
Reference Value: 1413 uS/cm @ 25C			Standard Lot No.: 9GL652			
	Value	Temp	Expiration Date: DEC/20			
1. Time: 0634	1362.2	22.91				
2. Time: 1411	1379.9	23.80				
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: 220 mV			Standard Lot No. 9GL301			
	Value	Temp	Expiration Date: SEP/20			
1. Time: 0633	220.7	22.69				
2. Time: 1410	220.2	23.77				
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value: 100%	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: 0632	86.27	27.86				
2. Time: 1401	87.54	28.40				
3. Time:						
4. Time:						

**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 05/04/20	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C076301	
Reference Value	10	20	100	800
Standard Lot No.	A9156	A9155	A9156	A9157
1. Time 0630	10.1	19.8	98.9	803
2. Time 1400	9.98	20.2	103	796
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: MWL						
Calibrations done by: R Lynch				Date: 05/05/20		
Make & Model: INSITU AT 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (S/N): NA						
<b>pH Calibration/Check</b>						
pH Calibrated to (std):				pH sloped to (std):		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: 0627	3.99	21.97	6.98	21.60	9.98	22.19
2. Time: 1256	4.00	23.66	6.99	23.69	10.00	23.86
3. Time:						
4. Time:						
Standard lot no.:	9GA042		9GK721		9GJ881	
Expiration date:	JAN/22		NOV/21		OCT/21	
<b>SC Calibration/Check</b>						
Reference Value: 1413 uS/cm @ 25C			Standard Lot No.: 9GL652			
	Value	Temp	Expiration Date: DEC/20			
1. Time: 0638	1322.1	21.80				
2. Time: 1254	1349.9	22.53				
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: 220 mV			Standard Lot No. 9GL301			
	Value	Temp	Expiration Date: SEP/20			
1. Time: 0636	221.0	22.44				
2. Time: 1307	219.9	23.61				
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value: 100%	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: 0626	87.71	28.03				
2. Time: 1252	87.94	28.44				
3. Time:						
4. Time:						



**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 05/05/20	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C076301	
Reference Value	10	20	100	800
Standard Lot No.	A9156	A9155	A9156	A9157
1. Time 0626	10.3	20.2	101	797
2. Time 1250	10.1	19.9	102	794
3. Time				
4. Time				
Comments:				

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## 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>5/06/20</b>		
Make & Model: <b>INSITU AT 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>571025</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>0624</b>	<b>4.00</b>	<b>21.92</b>	<b>7.02</b>	<b>21.82</b>	<b>10.01</b>	<b>21.91</b>
2. Time: <b>1234</b>	<b>4.02</b>	<b>24.11</b>	<b>7.02</b>	<b>24.21</b>	<b>9.99</b>	<b>24.29</b>
3. Time:						
4. Time:						
Standard lot no.: <b>OGA042</b>		<b>9GK721</b>		<b>9GJ881</b>		
Expiration date: <b>JAN/22</b>		<b>NOV/21</b>		<b>OCT/21</b>		
<b>SC Calibration/Check</b>						
Reference Value: <b>1413 uS/cm @ 25C</b>			Standard Lot No.: <b>9GL652</b>			
	Value	Temp	Expiration Date: <b>DEC/20</b>			
1. Time: <b>0630</b>	<b>1413.1</b>	<b>21.96</b>				
2. Time: <b>1242</b>	<b>1351.3</b>	<b>23.88</b>				
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: <b>220 mV</b>			Standard Lot No. <b>9GL301</b>			
	Value	Temp	Expiration Date: <b>SEP/20</b>			
1. Time: <b>0632</b>	<b>221.5</b>	<b>21.95</b>				
2. Time: <b>1248</b>	<b>219.6</b>	<b>23.76</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>0622</b>	<b>79.53</b>	<b>27.57</b>				
2. Time: <b>1231</b>	<b>79.20</b>	<b>27.57</b>				
3. Time:						
4. Time:						

**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**

SNL/NM Project Name: TAV				
Calibration done by: D. Sanchez			Date: 5/06/20	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C076301	
Reference Value	10	20	100	800
Standard Lot No.	A9156	A9155	A9156	A9157
1. Time 0619	10.0	19.7	99.8	798
2. Time 1227	9.98	19.7	99.7	801
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: MWL						
Calibrations done by: R Lynch				Date: 05/07/20		
Make & Model: INSITU AT 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (S/N): NA						
<b>pH Calibration/Check</b>						
pH Calibrated to (std):			pH sloped to (std):			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time: 0622	3.99	23.38	7.01	23.30	9.98	23.33
2. Time: 1250	3.99	23.70	7.00	23.88	9.99	23.90
3. Time:						
4. Time:						
Standard lot no.: 9GA042		9GK721		9GJ881		
Expiration date: JAN/22		NOV/21		OCT/21		
<b>SC Calibration/Check</b>						
Reference Value: 1413 uS/cm @ 25C			Standard Lot No.: 9GL652			
	Value	Temp	Expiration Date: DEC/20			
1. Time: 0625	1366.2	23.39				
2. Time: 1249	1379.0	23.93				
3. Time:						
4. Time:						
<b>ORP Calibration/Check</b>						
Reference Value: 220 mV			Standard Lot No. 9GL301			
	Value	Temp	Expiration Date: SEP/20			
1. Time: 0627	220.4	23.38				
2. Time: 1256	219.8	23.81				
3. Time:						
4. Time:						
<b>DO Calibration/Check</b>						
Calibration Value: 100%	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time: 0621	87.37	27.58				
2. Time: 1247	89.16	28.39				
3. Time:						
4. Time:						

**GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2**



SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 05/07/20	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C076301	
Reference Value	10	20	100	800
Standard Lot No.	A9156	A9155	A9156	A9157
1. Time 0620	10.1	20.0	103	801
2. Time 1245	9.99	20.2	101	800
3. Time				
4. Time				
Comments:				

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**Portable Pump and Tubing / Water Level Indicator  
Decontamination Log Form**

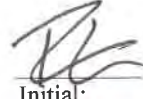

<b>Project Name:</b> <u>MWL</u>	<b>Monitoring Well ID #:</b> <u>MWL-BW2</u>	<b>Date:</b> <u>5/4/2020</u>
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03		
<b>Pump and Tubing Bundle ID #:</b> <u>1807B-950</u>	<b>Water Level Indicator ID #:</b> <u>362721</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>William Gibson</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>Culligan</u>	<b>Grade:</b> <u>NA</u>	
<b>Lot Number:</b> <u>3/27/20 - 4/8/20</u>	<b>UN #:</b> <u>NA</u>	
	<b>Manufacturer:</b> <u>NA</u>	
	<b>Lot Number:</b> <u>NA</u>	

**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>5/5/2020</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>1807B-950</u>	<b>Water Level Indicator ID #:</b> <u>362721</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Zach 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>Culligan</u>	<b>Grade:</b> <u>NA</u>	
<b>Lot Number:</b> <u>4/22/20</u>	<b>UN #:</b> <u>NA</u>	
	<b>Manufacturer:</b> <u>NA</u>	
	<b>Lot Number:</b> <u>NA</u>	

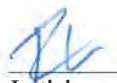
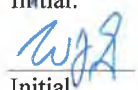
**IMPORTANT NOTICE:** A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network (SRN), 4100 Controlled Documents home page.

**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>05-06-20</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>1807B-950</u>	<b>Water Level Indicator ID #:</b> <u>362721</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<b>Robert Lynch</b> Print Name:	 Initial:	
<b>Zach Tenorio</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>Culligan</u>	<b>Grade:</b> <u>NA</u>	
<b>Lot Number:</b> <u>03/27/20-04/08/20</u>	<b>UN #:</b> <u>NA</u>	
	<b>Manufacturer:</b> <u>NA</u>	
	<b>Lot Number:</b> <u>NA</u>	



**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>05-07-20</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>1807B-950</u>	<b>Water Level Indicator ID #:</b> <u>362721</u>	
<b><u>Personnel Performing Decontamination:</u></b>		
<u>Robert Lynch</u> Print Name:	 Initial:	
<u>William Gibson</u> 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>Culligan</u>	<b>Grade:</b> <u>NA</u>	
<b>Lot Number:</b> <u>04/22/20</u>	<b>UN #:</b> <u>NA</u>	
	<b>Manufacturer:</b> <u>NA</u>	
	<b>Lot Number:</b> <u>NA</u>	

**SUMMARY SHEET FOR  
MAY 2020 GROUNDWATER SAMPLES**

**Sample Summary for Mixed Waste Landfill Groundwater Monitoring  
May 2020**

<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	4-May-20	621046	112847	Environmental	n/a	621046 / 112848	621046 / 112846	
MWL-MW7	5-May-20	621048	112861	Environmental	621047 / 112855	621048 / 112863	621048 / 112860	
MWL-MW7	5-May-20	621048	112862	Duplicate	621047 / 112855	621048 / 112863	621048 / 112860	
MWL-MW8	7-May-20	621050	112868	Environmental	n/a	621050 / 112869	621050 / 112867	
MWL-MW9	6-May-20	621049	112865	Environmental	n/a	621049 / 112866	621049 / 112864	
MWL-EB 1	4-May-20	621047	112855	Equipment Blank	n/a	621047 / 112856	n/a	Equipment blank sample prior to MWL-MW7.
MWL-EB 2	7-May-20	621051	112870	Equipment Blank	n/a	621051 / 112871	n/a	Equipment blank sample at end of project.
MWL-FB 1	4-May-20	621046	112846	Field Blank	n/a	621046 / 112848	n/a	at MWL-BW2
MWL-FB 2	5-May-20	621048	112860	Field Blank	n/a	621048 / 112863	n/a	at MWL-MW7
MWL-FB 3	6-May-20	621049	112864	Field Blank	n/a	621049 / 112866	n/a	at MWL-MW9
MWL-FB 4	7-May-20	621050	112867	Field Blank	n/a	621050 / 112869	n/a	at MWL-MW8

**DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES**  
**GROUNDWATER MONITORING**  
**MAY 2020**

**AR/COC NUMBERS 621046, 621047**

## Memorandum

Date: June 16, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOG: 621046 and 621047  
SDG: 510589  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: VOCs

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

### Summary

Five samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The ICAL intercept was negative with an absolute value  $>$  the MDL but  $\leq 3X$  the MDL for cis-1,2-dichloroethylene. The associated sample results were non-detect and will be **qualified UJ,I5**.

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 ICAL intercepts were positive and  $>$  the MDL for 1,1-dichloroethylene and bromoform. All associated sample results were non-detect and will not be qualified.

The ICV/CCV %Ds were  $> 20\%$  but  $\leq 40\%$  with negative bias for bromoform. The associated sample results were non-detect and since the positive intercept was not considered another ICAL infraction, will not be qualified.

### **Blanks**

No target analytes were detected in any of the blanks except as follows. Acetone was detected at  $\leq$  the PQL in the MB associated with samples 510589002, -009 and -017. The associated samples results were non-detect and will not be qualified.

Chloroform was detected at  $>$  the PQL and acetone, bromodichloromethane and dibromochloromethane were detected at  $\leq$  the PQL in FB 1, sample -001 associated with sample -002. The associated sample results were non-detect and will not be qualified.

Chloroform was detected at  $>$  the PQL and acetone, bromodichloromethane and 2-butanone were detected at  $\leq$  the PQL in EB 1, which was associated with the samples on ARCO 621048, submitted in another SDG. No sample data in this SDG were qualified as a result.

### **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.

It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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

All LCS acceptance criteria were met except as follows. For the LCS associated with samples -001 and -010, the %R was  $>$  the upper acceptance limit for chloromethane. The associated sample results were non-detect and will not be qualified.

### **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**

One TB was submitted with each ARCOC. FB 1 was submitted with ARCOC 621046 and was associated with the samples on the same ARCOC. EB 1 was submitted with ARCOC 621047 and was associated with the samples on ARCOC 621048, submitted in another SDG.

Mass spectra acceptability were verified during data validation and met QC acceptance criteria.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020

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## Memorandum

Date: June 16, 2020  
To: File  
From: Mary Donovan  
Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621046 and 621047  
SDG: 510589  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: SVOCs

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

### Summary

Two samples were prepared and analyzed with accepted procedures using method SW846 8270D SIM (SVOCs - 1,4-dioxane). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

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

### Holding Times

The samples were analyzed within the prescribed holding times but one sample was improperly preserved. The initial pH was >4 for sample 510589008 but since the sample was extracted in ≤7 days, no data will be qualified.

### Instrument Tune

All instrument tune requirements were met.

### Calibration

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

### Reporting Limit Verification

The CMDL (reporting level verification standard) recovery met QC acceptance criteria.

**Blanks**

No target analyte was detected in the method blank or EB.

**Surrogates**

All surrogate recoveries met QC acceptance criteria.

**Internal Standards**

All internal standards met QC acceptance criteria.

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

The MS/MSD met QC acceptance criteria for accuracy and precision.

**Laboratory Control Sample**

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**

EB 1 was submitted with ARCO 621047 and was associated with the samples on ARCO 621048, submitted in another SDG.

Mass spectra acceptability were verified during data validation and met QC acceptance criteria.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020

## Memorandum

Date: June 16, 2020  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621046 and 621047  
SDG: 510589  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: Metals

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

### **Summary**

Two samples were prepared and analyzed with approved procedures using method EPA 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 except as follows. U was detected at  $\leq$  the PQL in the bracketing CCBs. The associated sample results were either a detect  $>5X$  the blank value or non-detect and will not be qualified.

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

The ICP-MS internal standards met QC acceptance criteria.

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

The MS met all QC acceptance criteria.

### **Laboratory Replicate**

The replicate met all QC acceptance criteria.

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

The LCS met all QC acceptance criteria.

### **Detection Limits/Dilutions**

All detection limits were properly reported. The samples were not diluted.

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

Results of the ICS A and AB analyses were not evaluated because the sample concentrations 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**

EB 1 was submitted with ARCOG 621047 and was associated with the samples on ARCOG 621048, submitted in another SDG.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020

## Memorandum

Date: June 16, 2020

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621046 and 621047  
SDG: 510589  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: RAD

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

### Summary

Two samples were prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec - short list), EPA 900.0 (gross alpha/beta), SM 7500 Rn B (Rn-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

#### All analytes:

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

### Holding Times and Preservation

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

### Quantification

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

### **Calibration**

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

### **Blanks**

No target analytes were detected in the blanks at concentrations  $\geq$  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.

### **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**

EB 1 was submitted with ARCO 621047 and was associated with the samples on ARCO 621048, submitted in another SDG.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020



## Sample Findings Summary



AR/COC: 621046, 621047

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	112855-004/MWL- EB 1	ALPHA (12587-46-1)	BD, FR3
	112855-004/MWL- EB 1	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	112847-003/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	112847-003/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3
	112847-003/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	112847-003/MWL-BW2	Potassium-40 (13966-00-2)	BD, FR3
	112855-003/MWL- EB 1	Americium-241 (14596-10-2)	BD, FR3
	112855-003/MWL- EB 1	Cesium-137 (10045-97-3)	BD, FR3
	112855-003/MWL- EB 1	Cobalt-60 (10198-40-0)	BD, FR3
	112855-003/MWL- EB 1	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	112847-005/MWL-BW2	Tritium (10028-17-8)	BD, FR3
	112855-005/MWL- EB 1	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	112855-006/MWL- EB 1	Radon-222 (14859-67-7)	BD, FR3
SW846 8260B DOE-AL			
	112846-001/MWL- FB 1	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112847-001/MWL-BW2	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112848-001/MWL- TB 1	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112855-001/MWL- EB 1	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112856-001/MWL- TB 2	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 621046 and 621047	Site/Project: MWL LTMMP	Validation Date: 06/16/2020
SDG #: 510589	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 17	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: 05/04/2020

The ARCOGs noted that the trip blank vials were received from the lab with headspace.  
 ARCOG 621047 included EB 1 which was associated with ARCOG 621048, submitted in another SDG.

Validated by:

*Mary A. Donovan*



## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 621046 and 621047	SDG: 510589	Matrix: Aqueous
Laboratory Sample IDs: 510589001, -002, -009, -010, -017		
Method/Batch #s: <b>8260B</b> 1996670	Tuning (pass/fail):pass	TICs Required? (yes/no):no

[illegible]

Comments: HTs OK. MS/MSD on SNL sample 510761002

ICAL VOA6.I 04/01/2020. Linear: 1,1-Dichloroethylene; Methylene chloride; trans-1,2-Dichloroethylene; cis-1,2-Dichloroethylene; Bromoform

<sup>1</sup>Associated with samples -001 and -010, MS/MSD

<sup>2</sup>Associated with samples -002, -009, -017

## Sandia Organic Worksheet (GC/MS SVOC)

ARCOC #: 621046 and 621047	SDG:510589	Matrix: Aqueous
Laboratory Sample IDs: 510589008, -016		
Method/Batch #s: <b>3535A/8270D SIM</b> 1994765/1994766	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)			Calibration				MB	5X MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	CMDL	EB 1 -016		
			Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D										
none																
Surrogate Recovery Outliers																
Sample ID	1,4-Dioxane-d8		Sample ID	1,4-Dioxane-d8												
none																
IS Outliers																
	Tetrahydrofuran-d8															
Sample ID	Area	RT	Area		RT	Area		RT	Area		RT	Area		RT	Area	RT
none																

Comments: GC/MS SIM with solid phase extraction.

Samples preserved with NaHSO<sub>4</sub> to a pH ≤ 4 have 28 days to extraction. RSD 20%. ICV/CCV 20%. CMDL/end CCV 50%.

HT OK. Sample -008 pH 1 =7 extracted  $\leq 7$  days; no data qualified

MS/MSD on sample -008

ICAL MSD6.I 05/07/2020

## Sandia Inorganic Metals Worksheet

ARCO #s: 621046 and 621047	SDG #(s): 510589	Matrix: Aqueous
Laboratory Sample IDs: 510589003 and -011		
Method/Batch #s: <b>3005A/6020B</b> :1994818/1994819		

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	EB 1 -011		
	Int. mg/L	R <sup>2</sup>	ICV	CCV	ICB ug/L	CCB ug/L												
U	NA	✓	✓	✓	✓	0.082	✓	0.0004	✓	✓	✓	✓	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

# Sandia Radiochemistry Worksheet

ARCOC #(s): 621046 and 621047	SDG #:510589	Matrix: Aqueous
Laboratory Sample IDs:510589 – see below		
Method/Batch#s: EPA 901.1 (gammasspec)/1994694 Samples -004, -012		
Method/Batch#s: EPA 900.0/SW846 9310 (gross A/B)/1996241 Samples -005, -013		
Method/Batch#s: SM 7500 Rn B (Rn-222)/1995112 Samples -007, -015		
Method/Batch#s: EPA 906.0 Modified (tritium)/1996311 Samples -006, -014		

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	EB 1			
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 <.

GS: DUP on -004

Gross A/B: DUP, MS/MSD on sample -005. Sample volume for -005 and DUP were reduced due to sample matrix; Sample and DUP 150ml; MS/MSD 50ml; 3X dilution.

Rn-222: DUP on sample -007. LCS/LCSD

Tritium: DUP and MS on sample -006

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

510589

Page 1 of 1

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC **621046**

Project Name: MWL LTMMMP	Date Samples Shipped: <i>5/4/2020</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>313085</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: CF01-20	Lab Destination: GEL	Send Report to SMO: Stephanie Montaño/505-284-2553	
Contract No.: 1983530			

Tech Area:

Building:

Room:

Operational Site:

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

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
112846	001	MWL- FB 1	NA	5/4/20 11:48	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	001
112847	001	MWL-BW2	496	5/4/20 11:55	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	002
112847	002	MWL-BW2	496	5/4/20 11:56	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	003
112847	003	MWL-BW2	496	5/4/20 11:57	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
112847	004	MWL-BW2	496	5/4/20 11:58	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
112847	005	MWL-BW2	496	5/4/20 11:59	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	006
112847	006	MWL-BW2	496	5/4/20 12:00	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	007
112847	007	MWL-BW2	496	5/4/20 12:01	GW	AG	500 ml	NaHSO4	G	SA	1,4-DIOXANE (EPA 8270 SIM)	008
112848	001	MWL- TB 1	NA	5/4/20 11:48	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	009

Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes		
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day		
Confirmatory: <input type="checkbox"/> Yes		QC inits.:				Negotiated TAT <input type="checkbox"/>		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Lab Use
	William Gibson	<i>[Signature]</i>	<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: Trip blanks received from lab with head space.		
	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>5/4/20</i> Time <i>1315</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>0628</i> Date <i>5/4/20</i> Time <i>1315</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>0628</i> Date <i>5/4/20</i> Time <i>1330</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. Date <i>5-5-20</i> Time <i>740</i>	Received by	Org.	Date	Time

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

Internal Lab		<b>AR/COC</b> <b>621047</b>																																																																																																															
Batch No. <i>N/A</i>		SMO Use																																																																																																															
Project Name: MWL LTMMMP	Date Samples Shipped: <i>5/4/2020</i>	SMO Authorization: <i>[Signature]</i>																																																																																																															
Project/Task Manager: Timmie Jackson	Carrier/Waybill No. <i>393089</i>	SMO Contact Phone: <i>SMO</i>																																																																																																															
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112855	001	MWL- EB 1	NA	5/4/20 12:54	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260B)	010																																																																																																					
112855	002	MWL- EB 1	NA	5/4/20 12:55	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMMP - Cd, Cr, Ni, U	011																																																																																																					
112855	003	MWL- EB 1	NA	5/4/20 12:56	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	012																																																																																																					
112855	004	MWL- EB 1	NA	5/4/20 12:57	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	013																																																																																																					
112855	005	MWL- EB 1	NA	5/4/20 12:58	DIW	AG	250 ml	NONE	G	EB	TRITIUM (EPA 906)	014																																																																																																					
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112855	007	MWL- EB 1	NA	5/4/20 13:00	DIW	AG	500 ml	NaHSO4	G	EB	1,4-DIOXANE (EPA 8270 SIM)	016																																																																																																					
112856	001	MWL- TB 2	NA	5/4/20 12:54	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	017																																																																																																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <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"></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="5">Sample Team Members</td> <td>Name</td> <td>Signature</td> <td>Init.</td> <td colspan="4">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 rowspan="5">Lab Use</td> </tr> <tr> <td>William Gibson</td> <td><i>[Signature]</i></td> <td><i>WG</i></td> <td colspan="4">SNL/08888/505-284-3307/505-239-7367</td> <td colspan="3">Return Samples By:</td> </tr> <tr> <td>Robert Lynch</td> <td><i>[Signature]</i></td> <td><i>RL</i></td> <td colspan="4">SNL/08888/505-844-4013/505-250-7090</td> <td colspan="3">Comments: Trip blanks recieved from lab with head space.</td> </tr> <tr> <td>Zachary Tenorio</td> <td><i>[Signature]</i></td> <td><i>ZT</i></td> <td colspan="4">SNL/08888/505-845-8636/505-259-5765</td> <td colspan="3"></td> </tr> <tr> <td>Denisha Sanchez</td> <td><i>[Signature]</i></td> <td><i>DS</i></td> <td colspan="4">SNL/08888/505-845-7829/505-208-1375</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			Background: <input type="checkbox"/> Yes			Entered by:						Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day			Confirmatory: <input type="checkbox"/> Yes			QC inits.:						Negotiated TAT <input type="checkbox"/>			Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell				Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab			Lab Use	William Gibson	<i>[Signature]</i>	<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: Trip blanks recieved from lab with head space.			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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Received by <i>[Signature]</i>		Org.	Date <i>5-5-20</i>	Time <i>740</i>	Received by		Org.	Date	Time																																																																																																								

**AR/COC NUMBER 621048**

## Memorandum

Date: June 17, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621048  
SDG: 510644  
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

Four 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 ICAL intercept was negative with an absolute value  $>$  the MDL but  $\leq 3X$  the MDL for cis-1,2-dichloroethylene. The associated sample results were non-detect and will be **qualified UJ,I5**.

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 ICAL intercepts were positive and  $>$  the MDL for 1,1-dichloroethylene and bromoform. All associated sample results were non-detect and will not be qualified.



The ICV/CCV %Ds were  $> 20\%$  but  $\leq 40\%$  with negative bias for bromoform. The associated sample results were non-detect and since the positive intercept was not considered another ICAL infraction, will not be qualified.

### **Blanks**

No target analytes were detected in any of the blanks except as follows. Acetone was detected at  $\leq$  the PQL in the MB associated with samples 510644002 and -016. The associated samples results were non-detect and will not be qualified.

Chloroform was detected at  $>$  the PQL and acetone, bromodichloromethane and dibromochloromethane were detected at  $\leq$  the PQL in FB 2, sample -001 associated with samples -002 and -009. The associated sample results were non-detect and will not be qualified.

Chloroform was detected at  $>$  the PQL and acetone, bromodichloromethane and 2-butanone were detected at  $\leq$  the PQL in EB 1, sample 510589010 which was submitted in another SDG and associated with samples -002 and -009. The associated samples results were non-detect and will not be qualified.

### **Surrogates**

All surrogate recoveries met QC acceptance criteria.

### **Internal Standards**

All internal standards met QC acceptance criteria.

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

All MS/MSD recoveries and RPDs met QC acceptance criteria.

It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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

All LCS acceptance criteria were met except as follows. For the LCS associated with samples -001 and -009, the %R was  $>$  the upper acceptance limit for chloromethane. The associated sample results were non-detect and will not be qualified.

### **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**

One TB was submitted with ARCOC 621048. FB 2 was submitted with ARCOC 621048 and was associated with the samples on the same ARCOC. EB 1 was submitted with ARCOC 621047 in another SDG and was associated

with the samples on ARCOG 621048. A field duplicate pair was submitted with ARCOG 621048. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

Mass spectra acceptability were verified during data validation and met QC acceptance criteria.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020

---

## Memorandum

Date: June 17, 2020  
To: File  
From: Mary Donovan  
Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOG: 621048  
SDG: 510644  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: SVOCs

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

### Summary

Two samples were prepared and analyzed with accepted procedures using method SW846 8270D SIM (SVOCs - 1,4-dioxane). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

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

### Holding Times

The samples were analyzed within the prescribed holding times but were improperly preserved. The initial pH was >4 but since the samples were extracted in  $\leq 7$  days, no data will be qualified.

### Instrument Tune

All instrument tune requirements were met.

### Calibration

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

### Reporting Limit Verification

The CMDL (reporting level verification standard) recovery met QC acceptance criteria.

**Blanks**

No target analyte was detected in the method blank or EB.

**Surrogates**

All surrogate recoveries met QC acceptance criteria.

**Internal Standards**

All internal standards met QC acceptance criteria.

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

The MS/MSD met QC acceptance criteria for accuracy and precision.

It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

**Laboratory Control Sample**

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**

EB 1 was submitted with ARCO 621047 in another SDG and was associated with the samples on ARCO 621048. A field duplicate pair was submitted with ARCO 621048. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

Mass spectra acceptability were verified during data validation and met QC acceptance criteria.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020

## Memorandum

Date: June 17, 2020  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621048  
SDG: 510644  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: Metals

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

### **Summary**

Two samples were prepared and analyzed with approved procedures using method EPA 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**

EB 1 was submitted with ARCO 621047 in another SDG and was associated with the samples on ARCO 621048. A field duplicate pair was submitted with ARCO 621048. 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:** 06/18/2020

## Memorandum

Date: June 17, 2020

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621048  
SDG: 510644  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: RAD

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

### Summary

Two samples were prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec - short list), EPA 900.0 (gross alpha/beta), SM 7500 Rn B (Rn-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

#### Gamma spec and Tritium:

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

#### Rn-222:

1. The sample results which were > the MDA but  $\leq 3X$  the MDA will be **qualified J,FR7**.

### Holding Times and Preservation

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

### Quantification

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

### **Calibration**

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

### **Blanks**

No target analytes were detected in the blanks at concentrations  $\geq$  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 for gross alpha/beta and the MS for tritium were performed on SNL samples 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 analyses for all analytes were performed on SNL samples 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**

EB 1 was submitted with ARCOG 621047 in another SDG and was associated with the samples on ARCOG 621048. A field duplicate pair was submitted with ARCOG 621048. 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:** 06/18/2020

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## Sample Findings Summary



AR/COC: 621048

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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	112861-003/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	112861-003/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	112861-003/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	112861-003/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
	112862-003/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	112862-003/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	112862-003/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	112862-003/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	112861-005/MWL-MW7	Tritium (10028-17-8)	BD, FR3
	112862-005/MWL-MW7	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	112861-006/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
	112862-006/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
SW846 8260B DOE-AL			
	112860-001/MWL- FB 2	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112861-001/MWL-MW7	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112862-001/MWL-MW7	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112863-001/MWL- TB 3	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 621048	Site/Project: MWL LTMMP	Validation Date: 06/16/2020
SDG #: 510644	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 16	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: 05/05/2020

The ARCOG noted that the trip blank vials were received from the lab with headspace.

ARCOG 621047 included EB 1, submitted in another SDG, and associated with the samples on ARCOG 621048.

Validated by:

*Mary A. Donovan*

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 621048	SDG: 510644	Matrix: Aqueous
Laboratory Sample IDs: 510644001, -002, -009, -016		
Method/Batch #s: <b>8260B</b> 1996670	Tuning (pass/fail):pass	TICs Required? (yes/no):no

[illegible]

Comments: HTs OK. MS/MSD on SNL sample 510761002

ICAL VOA6.I 04/01/2020. Linear: 1,1-Dichloroethylene; Methylene chloride; trans-1,2-Dichloroethylene; cis-1,2-Dichloroethylene; Bromoform

<sup>1</sup>Associated with samples -001 and -009, MS/MSD

<sup>2</sup>Associated with samples -002, -016

## Sandia Organic Worksheet (GC/MS SVOC)

ARCOC #: 621048	SDG:510644	Matrix: Aqueous
Laboratory Sample IDs: 510644008, -015		
Method/Batch #s: <b>3535A/8270D SIM</b> 1994765/1994766	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)			Calibration				MB	5X MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	CMDL	EB 1 510589 -016		
			Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D										
none																
Surrogate Recovery Outliers																
Sample ID	1,4-Dioxane-d8		Sample ID	1,4-Dioxane-d8												
none																
IS Outliers																
	Tetrahydrofuran-d8															
Sample ID	Area	RT	Area		RT	Area		RT	Area		RT	Area		RT	Area	RT
none																

Comments: GC/MS SIM with solid phase extraction.

Samples preserved with NaHSO<sub>4</sub> to a pH ≤ 4 have 28 days to extraction. RSD 20%. ICV/CCV 20%. CMDL/end CCV 50%.

HT OK. Samples -008 and -015 pH 1 = 7 extracted  $\leq 7$  days; no data qualified

MS/MSD on SNL sample 510589008

ICAL MSD6.I 05/07/2020

## Sandia Inorganic Metals Worksheet

ARCOG #(s): 621048	SDG #(s): 510644	Matrix: Aqueous
Laboratory Sample IDs: 510644003, -010		
Method/Batch #s: <b>3005A/6020B</b> :1994977/1994978		

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	EB 1 510589 -011		
	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				CCV04 05/12 21:54	In 76%		
				CCB04 05/12 21:58	Sc 78%	In 72%	Lu 73%

Comments: HTs OK. MS/DUP/SD -003.  
ICS NA



# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

510644

Page 1 of 2

Internal Lab

Batch No. *NA*

SMO Use

AR/COC 621048

Project Name: MWL LTMMP	Date Samples Shipped: <i>5/5/2020</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>313088</i>	SMO Contact Phone: <i>5mo</i>	
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: 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:
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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					
112860	001	MWL- FB 2	NA	5/5/20 09:41	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260B)	001
112861	001	MWL-MW7	496	5/5/20 09:51	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260B)	002
112861	002	MWL-MW7	496	5/5/20 09:53	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	003
112861	003	MWL-MW7	496	5/5/20 09:55	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
112861	004	MWL-MW7	496	5/5/20 09:57	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
112861	005	MWL-MW7	496	5/5/20 09:59	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	006
112861	006	MWL-MW7	496	5/5/20 10:01	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	007
112861	007	MWL-MW7	496	5/5/20 10:03	GW	AG	500 ml	NaHSO4	G	SA	1,4-DIOXANE (EPA 8270 SIM)	008
112862	001	MWL-MW7	496	5/5/20 09:52	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMP (SW846-8260B)	009
112862	002	MWL-MW7	496	5/5/20 09:54	GW	P	500 ml	HNO3	G	DU	METALS, LTMMP - Cd, Cr, Ni, U	010

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: Trip blanks received from lab with head space.		
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Lab Use		
	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				

Relinquished by <i>[Signature]</i>	Org. <i>8888</i>	Date <i>5/5/20</i>	Time <i>1030</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. <i>00128</i>	Date <i>5/5/20</i>	Time <i>1030</i>	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. <i>00128</i>	Date <i>5/5/20</i>	Time <i>1230</i>	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date <i>5/6/20</i>	Time <i>735</i>	Received by	Org.	Date	Time

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

## ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Page 2 of 2

AR/COC 621048

[illegible]



**AR/COC NUMBER 621049**

## Memorandum

Date: June 17, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621049  
SDG: 510761  
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 ICAL intercept was negative with an absolute value  $>$  the MDL but  $\leq 3X$  the MDL for cis-1,2-dichloroethylene. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. Acetone was detected at  $\leq$  the PQL in the MB associated with sample 510761001. The associated sample result was a detect  $\leq$  the PQL and will be **qualified 10U,B**, non-detect at the PQL.

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

### Holding Times and Preservation

The samples were 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 ICAL intercepts were positive and > the MDL for 1,1-dichloroethylene and bromoform. All associated sample results were non-detect and will not be qualified.

The ICV/CCV %Ds were > 20% but ≤ 40% with negative bias for bromoform. All associated sample results were non-detect and since the positive intercept was not considered another ICAL infraction, will not be qualified.

For the CCV associated with sample -001, the %D was >20% but ≤40% with negative bias for methylene chloride. The associated sample result was non-detect and, since no other calibration infraction occurred, will not be qualified.

### **Blanks**

No target analytes were detected in any of the blanks except as noted above in the Summary section and as follows. Acetone was detected at ≤ the PQL in the MB associated with samples -002 and -009. The associated sample results were non-detect and will not be qualified.

Bromodichloromethane, chloroform and dibromochloromethane were detected at > the PQL and acetone was detected at ≤ the PQL in FB 3, sample -001 associated with sample -002. The associated sample results were non-detect and will not be qualified. It should be noted that acetone result in FB 3 was qualified non-detect due to MB 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.

It should be noted that the MS/MSD analyses associated with sample -001 were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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

All LCS acceptance criteria were met.

### **Detection Limits/Dilutions**

All detection limits were properly reported. The samples were not diluted.

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

TIC reports were not required.

### **Other QC**

One TB was submitted with the ARCOC. FB 3 was submitted with ARCOC 621049 and was associated with the sample on the same ARCOC.

Mass spectra acceptability were verified during data validation and met QC acceptance criteria.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020

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## Memorandum

Date: June 17, 2020  
To: File  
From: Mary Donovan  
Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOG: 621049  
SDG: 510761  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: SVOCs

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 accepted procedures using method SW846 8270D SIM (SVOCs - 1,4-dioxane). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times**

The sample was analyzed within the prescribed holding times but was improperly preserved. The initial pH was  $>4$  but since the sample was extracted in  $\leq 7$  days, no data will be qualified.

### **Instrument Tune**

All instrument tune requirements were met.

### **Calibration**

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

### **Reporting Limit Verification**

The CMDL (reporting level verification standard) recovery met QC acceptance criteria.

**Blanks**

No target analyte was detected in the method blank.

**Surrogates**

All surrogate recoveries met QC acceptance criteria.

**Internal Standards**

All internal standards met QC acceptance criteria.

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

The MS/MSD met QC acceptance criteria for accuracy and precision.

It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

**Laboratory Control Sample**

All LCS acceptance criteria were met.

**Detection Limits/Dilutions**

All detection limits were properly reported. The sample was 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.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020

## Memorandum

Date: June 18, 2020  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621049  
SDG: 510761  
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 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**

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020



## Memorandum

Date: June 18, 2020

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621049  
SDG: 510761  
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.

#### Gamma spec and Tritium:

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

### Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

### Quantification

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

### Calibration

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

### Blanks

No target analytes were detected in the blanks at concentrations  $\geq$  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 for gross alpha/beta and the MS for tritium were performed on SNL samples 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 analyses for Gross alpha/beta and tritium were performed on SNL samples 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 sample was not diluted. All required detection limits were met.

### **Other QC**

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/18/2020

## Sandia Data Validation Summary Worksheet

ARCOG#: 621049	Site/Project: MWL LTMMP	Validation Date: 06/17/2020
SDG #: 510761	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 9	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: 05/06/2020

The ARCOG noted that the trip blank vials were received from the lab with headspace.

Validated by:

*Mary A. Donovan*

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 621049	SDG: 510761	Matrix: Aqueous
Laboratory Sample IDs: 510761001, -002, -009		
Method/Batch #s: <b>8260B</b> 1997666(-001) and 1996670 (-002, -009)	Tuning (pass/fail):pass	TICs Required? (yes/no):no

[illegible]

### Surrogate Recovery Outliers

[illegible]

## IS Outliers

[illegible]

Comments: HTs OK. MS/MSD on SNL sample 511199001(batch 1997666)<sup>1</sup> and sample -002 (batch 1996670)<sup>3</sup>  
ICAL VOA6.I 04/01/2020. Linear: 1,1-Dichloroethylene; Methylene chloride; trans-1,2-Dichloroethylene; cis-1,2-Dichloroethylene; Bromoform  
<sup>1</sup>Associated with sample -001, MS/MSD; <sup>2</sup>Associated with sample -002, -009; <sup>3</sup>Associated with MS/MSD



## Sandia Inorganic Metals Worksheet

ARCOG #(s): 621049	SDG #(s): 510761	Matrix: Aqueous
Laboratory Sample IDs: 510761003		
Method/Batch #: <b>3005A/6020B</b> : 1995718/1995719		

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				CCV03 05/12 21:54	In 76%		
				CCB03 05/12 21:58	Sc 78%	In 72%	Lu 73%

Comments: HTs OK. MS/DUP/SD -003.  
ICS NA

# Sandia Radiochemistry Worksheet

ARCOC #(s): 621049	SDG #:510761	Matrix: Aqueous
Laboratory Sample IDs:510761 – see below		
Method/Batch#s: EPA 901.1 (gammaspect)/1995985 Sample -004		
Method/Batch#s: EPA 900.0/SW846 9310 (gross A/B)/1996241 Sample -005		
Method/Batch#s: SM 7500 Rn B (Rn-222)/1995618 Sample -007		
Method/Batch#s: EPA 906.0 Modified (tritium)/1996311 Samples -006, -014		

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				
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 <.

GS: DUP on -004

Gross A/B: DUP, MS/MSD on SNL sample 510589005. Sample volume for -005 was reduced due to sample matrix; Sample and DUP 150ml; MS/MSD 50ml; 3X dilution.

Rn-222: DUP on sample -007. LCS/LCSD

Tritium: DUP and MS on SNL sample 510589006

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

510761

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Internal Lab

Batch No. *NA*

SMO Use

AR/COC **621049**

Project Name: MWL LTMMMP  
 Project/Task Manager: Timmie Jackson  
 Project/Task Number: 195122.10.11.08  
 Service Order: CF01-20

Date Samples Shipped: *5/6/2020*Carrier/Waybill No. *513124*

Lab Contact:

Edie Kent/843-769-7385

Lab Destination:

GEL

Contract No.:

1983530

SMO Authorization: *[Signature]*

SMO Contact Phone:

Wendy Palencia/505-844-3132

Send Report to SMO:

Stephanie Montaño/505-284-2553

☐ Waste Characterization☐ RMA☐ Released by COC No.☒ 4° Celsius

Bill to: Sandia National Laboratories (Accounts Payable),

P.O. Box 5800, MS-0154

Albuquerque, NM 87185-0154

Tech Area:

Building:

Room:

Operational Site:

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
112864	001	MWL- FB 3	NA	5/6/20 09:35	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	001
112865	001	MWL-MW9	497	5/6/20 09:50	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	002
112865	002	MWL-MW9	497	5/6/20 09:52	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	003
112865	003	MWL-MW9	497	5/6/20 09:54	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
112865	004	MWL-MW9	497	5/6/20 09:56	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
112865	005	MWL-MW9	497	5/6/20 09:58	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	006
112865	006	MWL-MW9	497	5/6/20 09:59	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	007
112865	007	MWL-MW9	497	5/6/20 10:00	GW	AG	500 ml	NaHSO4	G	SA	1,4-DIOXANE (EPA 8270 SIM)	008
112866	001	MWL- TB 4	NA	5/6/20 09:35	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	009
												010

Last Chain: ☐ YesValidation Req'd: ☒ YesBackground: ☐ YesConfirmatory: ☐ Yes

Sample Tracking

SMO Use

Date Entered:

Entered by:

QC initials:

Special Instructions/QC Requirements:

EDD ☒ YesTurnaround Time ☐ 7-Day\* ☐ 15-Day\* ☒ 30-DayNegotiated TAT ☐Sample Disposal ☐ Return to Client ☒ Disposal by Lab

Return Samples By:

Comments: Trip blanks received from lab with head space.

Conditions on Receipt

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
	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>8338</i>	Date <i>5/6/20</i>	Time <i>11:30</i>
Received by: <i>[Signature]</i>	Org. <i>0628</i>	Date <i>5/10/20</i>	Time <i>10:30</i>
Relinquished by: <i>[Signature]</i>	Org. <i>0628</i>	Date <i>5/16/2020</i>	Time <i>11:30</i>
Received by: <i>[Signature]</i>	Org. <i>0628</i>	Date <i>5-7-20</i>	Time <i>740</i>

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

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



**AR/COC NUMBERS 621050, 621051**

## Memorandum

Date: June 15, 2020  
To: File  
From: Mary Donovan  
Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621050 and 621051  
SDG: 510889  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: VOCs

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

### Summary

Five samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The ICAL intercept was negative with an absolute value  $>$  the MDL but  $\leq 3X$  the MDL for cis-1,2-dichloroethylene. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. The ICAL intercept was positive and  $>$  the MDL for bromoform. The bromoform result for sample 510889010 was a detect  $< 3X$  the value of the intercept and will be **qualified J+,I5**.
3. The ICV and CCV %Ds were  $> 20\%$  but  $\leq 40\%$  with negative bias for bromoform. The bromoform result for sample -010 was a detect and will be **qualified J-,C3**.
4. Acetone was detected at  $\leq$  the PQL in the MB. The associated results for samples -001 and -010 were detects  $\leq$  the PQL and will be **qualified 10U,B**, non-detect at the PQL.

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

### Holding Times and Preservation

The samples were 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 ICAL intercepts were positive and  $>$  the MDL for 1,1-dichloroethylene and bromoform. All associated sample results *except* the bromoform result for sample -010 were non-detect and will not be qualified.

The ICV/CCV %Ds were  $> 20\%$  but  $\leq 40\%$  with negative bias for bromoform. All associated sample results except sample -010, were non-detect and since the positive intercept was not considered another ICAL infraction, will not be qualified.

The CCV %D was  $> 20\%$  but  $\leq 40\%$  with negative bias for methylene chloride. The associated sample results were non-detect and, since no other calibration infraction occurred, will not be qualified.

### **Blanks**

No target analytes were detected in any of the blanks except as follows. Acetone was detected at  $\leq$  the PQL in the MB. The associated results for samples -002, -009 and -013 were non-detect and will not be qualified.

Bromodichloromethane, chloroform and dibromochloromethane were detected at  $>$  the PQL and acetone and chloromethane were detected at  $\leq$  the PQL in FB 4, sample -001 associated with sample -002. The associated sample results were non-detect and will not be qualified.

Bromodichloromethane, chloroform and dibromochloromethane were detected at  $>$  the PQL and acetone, bromoform and 2-butanone were detected at  $\leq$  the PQL in EB 2, which was collected at the end of the project. No sample data were qualified as a result.

It should be noted that acetone results in FB 4 and EB 2 were qualified non-detect due to MB 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.

It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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

All LCS acceptance criteria were met.

**Detection Limits/Dilutions**

All detection limits were properly reported. The samples were not diluted.

**Tentatively Identified Compounds (TICs)**

TIC reports were not required.

**Other QC**

One TB was submitted with each ARCOC. FB 4 was submitted with ARCOC 621050 and was associated with the samples on the same ARCOC. EB 2 was submitted with ARCOC 621051 and was collected at the end of the project.

Mass spectra acceptability were verified during data validation and met QC acceptance criteria.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/16/2020

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## Memorandum

Date: June 15, 2020  
To: File  
From: Mary Donovan  
Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621050 and 621051  
SDG: 510889  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: SVOCs

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

### **Summary**

Two samples were prepared and analyzed with accepted procedures using method SW846 8270D SIM (SVOCs - 1,4-dioxane). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times**

The samples were analyzed within the prescribed holding times but were improperly preserved. The initial pH was >4 for both samples but since they were extracted in  $\leq 7$  days, no data will be qualified.

### **Instrument Tune**

All instrument tune requirements were met.

### **Calibration**

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

### **Reporting Limit Verification**

The CMDL (reporting level verification standard) recovery met QC acceptance criteria.

**Blanks**

No target analyte was detected in the method blank or EB.

**Surrogates**

All surrogate recoveries met QC acceptance criteria.

**Internal Standards**

All internal standards met QC acceptance criteria.

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

The MS/MSD met QC acceptance criteria for accuracy and precision.

**Laboratory Control Sample**

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**

EB 2 was submitted with ARCO 621051 and was collected at the end of the project.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/16/2020

## Memorandum

Date: June 15, 2020  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621050 and 621051  
SDG: 510889  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: Metals

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

### **Summary**

Two samples were prepared and analyzed with approved procedures using method EPA 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 except as follows. U was detected at  $\leq$  the PQL in the final CCB. The associated sample results were either a detect  $>5X$  the blank value or non-detect and will not be qualified.

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

The ICP-MS internal standards met QC acceptance criteria.

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

The MS met all QC acceptance criteria.

### **Laboratory Replicate**

The replicate met all QC acceptance criteria.

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

The LCS met all QC acceptance criteria.

### **Detection Limits/Dilutions**

All detection limits were properly reported. The samples were not diluted.

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

Results of the ICS A and AB analyses were not evaluated because the sample concentrations 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**

EB 2 was submitted with ARCO 621051 and was collected at the end of the project.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/16/2020



## Memorandum

Date: June 15, 2020

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621050  
SDG: 510889  
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.

#### Gamma Spec and tritium:

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

#### Gamma Spec 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 sample was prepared and analyzed within the prescribed holding times and was properly preserved.

### Quantification

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

### **Calibration**

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

### **Blanks**

No target analytes were detected in the blanks at concentrations  $\geq$  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 and the MS for tritium were performed on SNL samples of similar matrix from other SDGs. No data will be qualified.

### **Laboratory Replicate**

All replicate error ratio acceptance criteria were met. It should be noted that the replicate analyses for all target analytes were performed on SNL samples of similar matrix from other SDGs. 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 sample was not diluted. All required detection limits were met.

### **Other QC**

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 06/16/2020



## Sample Findings Summary



AR/COC: 621050, 621051

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	112868-003/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	112868-003/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	112868-003/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	112868-003/MWL-MW8	Potassium-40 (13966-00-2)	J, FR7
EPA 906.0 Modified			
	112868-005/MWL-MW8	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	112868-006/MWL-MW8	Radon-222 (14859-67-7)	J, FR7
SW846 8260B DOE-AL			
	112867-001/MWL- FB 4	Acetone (67-64-1)	10U, B
	112867-001/MWL- FB 4	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112868-001/MWL-MW8	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112869-001/MWL- TB 5	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112870-001/MWL- EB 2	Acetone (67-64-1)	10U, B
	112870-001/MWL- EB 2	Bromoform (75-25-2)	J, I5,C3
	112870-001/MWL- EB 2	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5
	112871-001/MWL- TB 6	cis-1,2-Dichloroethylene (156-59-2)	UJ, I5

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 621050 and 621051	Site/Project: MWL LTMMP	Validation Date: 06/15/2020
SDG #: 510889	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 13	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: 05/07/2020

The ARCOGs noted that the trip blank vials were received from the lab with headspace.  
 ARCOG 621051 included EB 2 which was collected at the end of the project.

Validated by:

*Mary A. Donovan*

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 621050 and 621051	SDG: 510889	Matrix: Aqueous
Laboratory Sample IDs: 510889001, -002, -009, -010, -013		
Method/Batch #s: <b>8260B</b> 1997666	Tuning (pass/fail):pass	TICs Required? (yes/no):no

[illegible]

Comments: HTs OK. MS/MSD on SNL sample 511199001  
ICAL VOA6.I 04/01/2020. Linear: 1,1-Dichloroethylene; Methylene chloride; trans-1,2-Dichloroethylene; cis-1,2-Dichloroethylene; Bromoform

## Sandia Organic Worksheet (GC/MS SVOC)

ARCOC #: 621050 and 621051	SDG:510889	Matrix: Aqueous
Laboratory Sample IDs:510889008, -012		
Method/Batch #s: <b>3535A/8270D SIM</b> 1996135/1996136	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)			Calibration				MB	5X MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	CMDL	EB 2 -012		
			Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D										
none																
Surrogate Recovery Outliers																
Sample ID	1,4-Dioxane-d8		Sample ID	1,4-Dioxane-d8												
none																
IS Outliers																
	Tetrahydrofuran-d8															
Sample ID	Area	RT	Area		RT	Area		RT	Area		RT	Area		RT	Area	RT
none																

Comments: GC/MS SIM with solid phase extraction.

Samples preserved with NaHSO<sub>4</sub> to a pH ≤ 4 have 28 days to extraction. RSD 20%. ICV/CCV 20%. CMDL/end CCV 50%.

HT OK. Samples -008 and -012 pH 1 = 7 extracted  $\leq 7$  days; no data qualified

MS/MSD on sample -008

ICAL MSD6.I 05/07/2020

## Sandia Inorganic Metals Worksheet

ARCOG #(s): 621050 and 621051	SDG #(s): 510889	Matrix: Aqueous
Laboratory Sample IDs: 510889003 and -011		
Method/Batch #s: <b>3005A/6020B</b> :1996087/1996088		

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	EB 2 -011		
	Int. mg/L	R <sup>2</sup>	ICV	CCV	ICB ug/L	CCB ug/L												
U	NA	✓	✓	✓	✓	.077	✓	0.0004	✓	✓	✓	✓	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

# Sandia Radiochemistry Worksheet

ARCOC #(s): 621050	SDG #:510889	Matrix: Aqueous
Laboratory Sample IDs:510889 – see below		
Method/Batch#s: EPA 901.1 (gammaspect)/1995985 Sample -004		
Method/Batch#s: EPA 900.0/SW846 9310 (gross A/B)/1996241 Sample -005		
Method/Batch#s: SM 7500 Rn B (Rn-222)/1995618 Sample -007		
Method/Batch#s: EPA 906.0 Modified (tritium)/1996311 Sample -006		

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				
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 <.

GS: DUP on SNL sample 510761004

Gross A/B: DUP, MS/MSD on SNL sample 510589005. Sample and DUP 150ml; MS/MSD 50ml; 3X dilution.  
-005 aliquot reduced due to the sample matrix

Rn-222: DUP on SNL sample 510761007. LCS/LCSD

Tritium: DUP and MS on SNL sample 510589006



# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

510889

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Internal Lab

Batch No.		SMO Use		AR/COC		621050						
Project Name: MWL LTMMMP		Date Samples Shipped: 5/7/20		SMO Authorization: <u>TSC</u>		<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. 313282		SMO Contact Phone: Wendy Palencia/505-844-3132		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154						
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Send Report to SMO:								
Service Order: CF01-20		Lab Destination: GEL		Stephanie Montaño/505-284-2553								
Tech Area:		Contract No.: 1983530										
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
112867	001	MWL- FB 4	NA	5/7/20 09:27	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SWB46-8260B)	001
112868	001	MWL-MW8	497	5/7/20 09:35	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SWB46-8260B)	002
112868	002	MWL-MW8	497	5/7/20 09:36	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	003
112868	003	MWL-MW8	497	5/7/20 09:38	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
112868	004	MWL-MW8	497	5/7/20 09:39	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
112868	005	MWL-MW8	497	5/7/20 09:40	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	006
112868	006	MWL-MW8	497	5/7/20 09:41	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	007
112868	007	MWL-MW8	497	5/7/20 09:43	GW	AG	500 ml	NaHSO4	G	SA	1,4-DIOXANE (EPA 8270 SIM)	008
112869	001	MWL- TB 5	NA	5/7/20 09:27	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SWB46-8260B)	009
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 to Client		<input checked="" type="checkbox"/> Disposal by Lab		
	William Gibson	<i>William Gibson</i>	WG	SNL/08888/505-284-3307/505-239-7367		Return Samples By:						
	Robert Lynch	<i>Robert Lynch</i>	RL	SNL/08888/505-844-4013/505-250-7090		Comments: Trip blanks received from lab with head space.						
	Zachary Tenorio	<i>Zachary Tenorio</i>	ZT	SNL/08888/505-845-8636/505-259-5765								
	Denisha Sanchez	<i>Denisha Sanchez</i>	DS	SNL/08888/505-845-7829/505-208-1375								
Relinquished by <i>Denisha Sanchez</i>		Org. 8888	Date 5/7/20	Time 11:06	Relinquished by		Org.	Date	Time			
Received by <i>Stephanie Montaño</i>		Org. 6028	Date 5/7/20	Time 11:06	Received by		Org.	Date	Time			
Relinquished by <i>Stephanie Montaño</i>		Org. 0628	Date 5/7/20	Time 11:42	Relinquished by		Org.	Date	Time			
Received by <i>Stephanie Montaño</i>		Org.	Date 5/7/20	Time 10:15	Received by		Org.	Date	Time			

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

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab												AR/COC <b>621051</b>	
Batch No.		SMO Use										<input type="checkbox"/> Waste Characterization <input type="checkbox"/> RMA <input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius	
Project Name: MWL LTMMMP		Date Samples Shipped: 5/7/20				SMO Authorization: [Signature]							
Project/Task Manager: Timmie Jackson		Carrier/Waybill No: 313282				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											
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		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID	
112870	001	MWL- EB 2	NA	5/7/20 10:38	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260B)	010	
112870	002	MWL- EB 2	NA	5/7/20 10:39	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMMP - Cd, Cr, Ni, U	011	
112870	003	MWL- EB 2	NA	5/7/20 10:40	DIW	AG	500 ml	NaHSO4	G	EB	1,4-DIOXANE (EPA 8270 SIM)	012	
112871	001	MWL- TB 6	NA	5/7/20 10:38	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260B)	013	
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			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				Return Samples By:				Lab Use	
	William Gibson	[Signature]	WG	SNL/08888/505-284-3307/505-239-7367									
	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 5/7/20	Time 11:06	Relinquished by		Org.	Date	Time				
Received by [Signature]		Org. 00628	Date 5/7/20	Time 11:06	Received by		Org.	Date	Time				
Relinquished by [Signature]		Org. 00628	Date 5/7/20	Time 11:42	Relinquished by		Org.	Date	Time				
Received by [Signature]		Org.	Date 5/8/20	Time 10:15	Received by		Org.	Date	Time				

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

## **CONTRACT VERIFICATION REVIEW FORMS**

### **Mixed Waste Landfill Groundwater Monitoring**

**May 2020**

Note: The forms in this section include AR/COC numbers for environmental and quality control samples; the AR/COC forms are provided in the Data Validation Reports in this annex.

<b>AR/COC Number</b>	<b>Sample Type</b>
621046	Environmental & Quality Control
621047	Quality Control
621048	Environmental & Quality Control
621049	Environmental & Quality Control
621050	Environmental & Quality Control
621051	Quality Control

## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621046 &amp; 621047

Analytical Lab GEL

SDG No. 510589

*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	Chloromethane failed recovery limits for LCS (QC1204560222)
	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		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromodichloromethane, chloroform and dibromochloromethane detected in MWL-FB 1. 2-Butanone, acetone, bromodichloromethane and chloroform detected in MWL-EB 1.
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

#### 4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 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	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
All	VOCs	MS/MSD not reported on runlog

Were deficiencies unresolved? ☒ Yes ☐ No

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

If no, provide nonconformance report or correction request number  and date correction request was submitted: 06-10-2020

Reviewed by: Wendy Palencia Date: 06-10-2020 09:21:00

Were resolutions adequate and data package complete? ☒ Yes ☐ No

Closed by: Wendy Palencia Date: 06-16-2020 07:05:00



## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621048

Analytical Lab GEL

SDG No. 510644

*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	Chloromethane failed recovery limits for LCS (QC1204560222)
	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	Acetone detected in method blank (QC1204560216)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromodichloromethane, chloroform and dibromochloromethane detected in MWL-FB 2
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

#### 4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 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	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
All	VOCs	MS/MSD not reported on runlog
.	.	.

Were deficiencies unresolved? ☒ Yes ☐ No

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

If no, provide nonconformance report or correction request number  and date correction request was submitted: 06-10-2020

Reviewed by: Wendy Palencia Date: 06-10-2020 13:04:00

Were resolutions adequate and data package complete? ☒ Yes ☐ No

Closed by: Wendy Palencia Date: 06-16-2020 07:14:00

## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621049

Analytical Lab GEL

SDG No. 510761

*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	Chloromethane failed recovery limits for LCS (QC1204560222)
	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	Acetone detected in method blanks (QC1204560216) and (QC1204562556)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromodichloromethane, chloroform and dibromochloromethane detected in MWL-FB 3
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		
	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	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
All	VOCs	MS/MSD not reported on runlog

Were deficiencies unresolved? ☒ Yes ☐ No

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

If no, provide nonconformance report or correction request number  and date correction request was submitted: 06-10-2020

Reviewed by: Wendy Palencia Date: 06-10-2020 14:11:00

Were resolutions adequate and data package complete? ☒ Yes ☐ No

Closed by: Wendy Palencia Date: 06-16-2020 07:15:00

## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621050 &amp; 621051

Analytical Lab GEL

SDG No. 510889

*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	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	Acetone detected in method blank (QC1204562556)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromodichloromethane, chloroform, chloromethane and dibromochloromethane detected in MWL-FB 4. 2-Butanone, acetone, bromodichloromethane, bromoform, chloroform and dibromochloromethane detected in MWL-EB 2.
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

#### 4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 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	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: 06-11-2020 10:11:00

Closed by: Wendy Palencia Date: 06-11-2020 10:11:00

**FIELD SAMPLING FORMS**  
**NOVEMBER 2020 GROUNDWATER MONITORING**



## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

SNL/NM Project Name: MWL		
Well ID: MWL-BW2	Date: 11/09/20	Date:
Pump Method: Dedicated	Pump Depth: 496'	

## PURGE MEASUREMENTS

[illegible]**Comments:**

~1.5 gals purged from tubing @ 0.853

FBI LOT# 102220

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

SNL/NM Project Name: MWL		
Well ID: MWL-MW7	Date: 11/10/20	Date:
Pump Method: Dedicated	Pump Depth: 496'	

## PURGE MEASUREMENTS

[illegible]

Comments:

~1.5 gals purged from tubing @ 0853

## FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

SNL/NM Project Name: MWL		
Well ID: MWL-MW8	Date: 11/12/20	Date:
Pump Method: Dedicated	Pump Depth: 497'	

## PURGE MEASUREMENTS

Depth to Water (ft)	Time (24 hr)	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
491.45	0847	Start							
492.71	0906	1	18.84	523.54	266.8	7.49	0.58	60.17	4.91
493.48	0912	2	18.79	543.27	255.6	7.53	0.45	55.46	4.52
493.82	0918	3	18.65	538.00	249.5	7.53	0.41	54.03	4.42
494.37	0925	4	18.89	529.25	244.9	7.54	0.55	54.25	4.42
494.66	0931	5	19.13	549.30	242.5	7.52	0.46	52.30	4.23
495.06	0938	6	18.92	546.15	238.4	7.52	1.01	52.90	4.11
495.45	0944	7	18.44	544.62	234.2	7.51	1.30	46.97	3.86
495.81	0950	8	18.49	549.58	232.2	7.51	2.14	43.25	3.54
496.03	0955	9	18.63	545.13	230.6	7.52	1.93	39.47	3.03
	0956		Sampling						

Comments:

~1.5 gals purged from tubing @ 8901



**FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION**

SNL/NM Project Name: MWL		
Well ID: MWL-MW9	Date: 11/11/20	Date:
Pump Method: Dedicated	Pump Depth: 497'	

**PURGE MEASUREMENTS**

Depth to Water (ft)	Time (24 hr)	Vol. (L/gal)	Temp (°C)	SC (μS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
491.18	0837	Start	-----	-----	-----	-----	-----	-----	-----
493.22	0854	1	16.96	416.38	187.7	7.47	0.66	43.63	3.36
493.56	0859	2	17.33	499.99	187.5	7.49	0.42	25.55	2.00
494.03	0905	3	17.55	510.23	186.6	7.50	0.44	28.68	2.24
494.47	0911	4	17.72	523.45	186.0	7.51	0.58	23.65	1.84
494.90	0917	5	17.90	535.72	184.3	7.52	0.68	26.15	2.00
495.22	0923	6	18.09	540.90	183.4	7.51	0.81	18.85	1.45
495.43	0929	7	17.86	538.53	184.4	7.49	1.00	27.28	2.11
495.64	0938	8	17.54	536.82	184.3	7.49	4.85	20.86	1.62
495.80	0946	9	17.68	539.91	182.6	7.49	4.03	23.91	1.85
495.92	0953	10	17.72	544.13	181.5	7.48	2.91	18.59	1.44
	0954	Sampling →							

Comments:

~1.5 gals purged from tubing @ 0848

FB Lot # 102820

## 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>11/09/20</b>		
Make & Model: <b>In-Situ Aqua Troll 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>NA</b>						
Other (SN): <b>743841</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 (24 hr):	<b>0642</b>	<b>4.00</b>	<b>19.22</b>	<b>7.02</b>	<b>19.08</b>	<b>10.04</b>
2. Time (24 hr):	<b>1337</b>	<b>4.00</b>	<b>21.24</b>	<b>7.01</b>	<b>21.12</b>	<b>10.02</b>
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	<b>OGD788</b>		<b>OGD405</b>		<b>OGD495</b>	
Expiration Date.:	<b>APR/22</b>		<b>APR/22</b>		<b>APR/22</b>	
<b>SC Calibration/Check</b>				<b>ORP Calibration/Check</b>		
Reference Value: <b>1413 uS/cm @ 25 C</b>				Reference Value: <b>220 mV</b>		
	Value	Temp		Value	Temp	
1. Time (24 hr):	<b>0649</b>	<b>1255.1</b>	<b>19.15</b>	1. Time (24 hr):	<b>0651</b>	<b>220.0</b>
2. Time (24 hr):	<b>1334</b>	<b>1307.6</b>	<b>21.16</b>	2. Time (24 hr):	<b>1335</b>	<b>220.4</b>
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	<b>OGD943</b>		Expiration Date.:	<b>APR/21</b>		Standard Lot No.:
						<b>OGJ297</b>
						Expiration Date.:
						<b>JUL/21</b>
<b>DO Calibration/Check</b>						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time (24 hr):	<b>0641</b>	<b>87.55</b>	<b>26.16</b>			
2. Time (24 hr):	<b>1333</b>	<b>90.31</b>	<b>24.94</b>			
3. Time (24 hr):						
4. Time (24 hr):						

**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>11/09/22</b>	
<b>TURBIDIMETER</b>				
Make & Model: <b>HACH 2100Q</b>			Serial No. S/N <b>19050C076301</b>	
Reference Value	10	20	100	800
Standard Lot No.	<b>A9155</b>	<b>A9179</b>	<b>A9156</b>	<b>A9157</b>
1. Time (24 hr): <b>0640</b>	<b>10.1</b>	<b>20.0</b>	<b>101</b>	<b>803</b>
2. Time (24 hr): <b>1330</b>	<b>10.0</b>	<b>19.9</b>	<b>103</b>	<b>796</b>
3. Time (24 hr):				
4. Time (24 hr):				
Comments:				

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## 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>11/10/20</b>		
Make & Model: <b>In-Situ Aqua Troll 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>NA</b>						
Other (SN): <b>743841</b>						
<b>pH Calibration/Check</b>						
pH Calibrated to (std): <b>NA</b>			pH sloped to (std): <b>NA</b>			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	<b>0628</b>	<b>3.98</b>	<b>23.33</b>	<b>6.99</b>	<b>21.58</b>	<b>10.01</b>
2. Time (24 hr):	<b>1305</b>	<b>3.99</b>	<b>21.32</b>	<b>6.99</b>	<b>21.30</b>	<b>10.04</b>
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	<b>OGD788</b>		<b>OGD405</b>		<b>OGD495</b>	
Expiration Date.:	<b>APR/22</b>		<b>APR/22</b>		<b>APR/22</b>	
<b>SC Calibration/Check</b>			<b>ORP Calibration/Check</b>			
Reference Value: <b>1413 uS/cm @ 25 C</b>			Reference Value: <b>220 mV</b>			
	Value	Temp		Value	Temp	
1. Time (24 hr):	<b>0635</b>	<b>1320.3</b>	<b>21.51</b>	1. Time (24 hr):	<b>0636</b>	<b>220.2</b>
2. Time (24 hr):	<b>1310</b>	<b>1317.2</b>	<b>21.39</b>	2. Time (24 hr):	<b>1309</b>	<b>219.3</b>
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	<b>OGD843</b>	Expiration Date.:	<b>APR/21</b>	Standard Lot No.:	<b>OGJ297</b>	Expiration Date.:
<b>DO Calibration/Check</b>						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time (24 hr):	<b>0627</b>	<b>86.53</b>	<b>26.31</b>			
2. Time (24 hr):	<b>1302</b>	<b>87.11</b>	<b>26.22</b>			
3. Time (24 hr):						
4. Time (24 hr):						

**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>11/10/20</b>	
<b>TURBIDIMETER</b>				
Make & Model: <b>HACH 2100Q</b>			Serial No. S/N <b>19050C076301</b>	
Reference Value	10	20	100	800
Standard Lot No.	<b>A9155</b>	<b>A9179</b>	<b>A9156</b>	<b>A9157</b>
1. Time (24 hr): <b>0626</b>	<b>9.98</b>	<b>20.1</b>	<b>100</b>	<b>796</b>
2. Time (24 hr): <b>1302</b>	<b>10.1</b>	<b>20.0</b>	<b>99.8</b>	<b>801</b>
3. Time (24 hr):				
4. Time (24 hr):				
Comments:				

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**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>11/11/20</b>		
Make & Model: <b>In-Situ Aqua Troll 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>NA</b>						
Other (SN): <b>743841</b>						
<b>pH Calibration/Check</b>						
pH Calibrated to (std): <b>NA</b>			pH sloped to (std): <b>NA</b>			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	<b>0639</b>	<b>3.99</b>	<b>21.41</b>	<b>7.00</b>	<b>21.37</b>	<b>10.04</b>
2. Time (24 hr):	<b>1405</b>	<b>4.02</b>	<b>20.74</b>	<b>6.99</b>	<b>20.86</b>	<b>10.03</b>
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	<b>OGD788</b>		<b>OGD405</b>		<b>OGD495</b>	
Expiration Date.:	<b>APR/22</b>		<b>APR/22</b>		<b>APR/22</b>	
<b>SC Calibration/Check</b>			<b>ORP Calibration/Check</b>			
Reference Value: <b>1413 uS/cm @ 25 C</b>			Reference Value: <b>220 mV</b>			
	Value	Temp		Value	Temp	
1. Time (24 hr):	<b>0638</b>	<b>1318.8</b>	<b>21.65</b>	1. Time (24 hr):	<b>0637</b>	<b>218.8</b>
2. Time (24 hr):	<b>1403</b>	<b>1290.9</b>	<b>20.70</b>	2. Time (24 hr):	<b>1402</b>	<b>219.3</b>
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	<b>OGD843</b>		Expiration Date.:	<b>APR/21</b>		Standard Lot No.:
						<b>OGJ297</b>
						Expiration Date.:
						<b>JUL/21</b>
<b>DO Calibration/Check</b>						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time (24 hr):	<b>0636</b>	<b>92.79</b>	<b>24.50</b>			
2. Time (24 hr):	<b>1401</b>	<b>88.67</b>	<b>25.71</b>			
3. Time (24 hr):						
4. Time (24 hr):						

## GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG (continued) Page 2 of 2

SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 11/11/20	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 19050C076301	
Reference Value	10	20	100	800
Standard Lot No.	A9155	A9179	A9156	A9157
1. Time (24 hr): 0636	10.3	20.1	103	801
2. Time (24 hr): 1400	10.1	20.0	101	800
3. Time (24 hr):				
4. Time (24 hr):				
Comments:				

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## 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>11/12/20</b>		
Make & Model: <b>In-Situ Aqua Troll 600</b>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <b>NA</b>						
Other (SN): <b>743841</b>						
<b>pH Calibration/Check</b>						
pH Calibrated to (std): <b>NA</b>			pH sloped to (std): <b>NA</b>			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	<b>0642</b>	<b>4.01</b>	<b>23.44</b>	<b>7.00</b>	<b>21.66</b>	<b>10.01</b>
2. Time (24 hr):	<b>1248</b>	<b>3.99</b>	<b>21.38</b>	<b>7.02</b>	<b>21.46</b>	<b>10.02</b>
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	<b>0GD788</b>		<b>0GD405</b>		<b>0GD495</b>	
Expiration Date.:	<b>APR/22</b>		<b>APR/22</b>		<b>APR/22</b>	
<b>SC Calibration/Check</b>			<b>ORP Calibration/Check</b>			
Reference Value: <b>1413 uS/cm @ 25 C</b>			Reference Value: <b>220 mV</b>			
	Value	Temp		Value	Temp	
1. Time (24 hr):	<b>0647</b>	<b>1330.1</b>	<b>21.59</b>	1. Time (24 hr):	<b>0648</b>	<b>221.0</b>
2. Time (24 hr):	<b>1246</b>	<b>1321.7</b>	<b>21.45</b>	2. Time (24 hr):	<b>1247</b>	<b>221.1</b>
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	<b>0GD943</b>		Expiration Date.:	<b>APR/21</b>		Standard Lot No.:
						<b>0GJ297</b>
						Expiration Date.:
						<b>JUL/21</b>
<b>DO Calibration/Check</b>						
Calibration Value:	81% air saturation @ 5200 ft.			Atmospheric Pressure in Hg		
1. Time (24 hr):	<b>0641</b>	<b>88.09</b>		<b>26.32</b>		
2. Time (24 hr):	<b>1245</b>	<b>88.99</b>		<b>25.89</b>		
3. Time (24 hr):						
4. Time (24 hr):						

**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>11/12/20</b>	
<b>TURBIDIMETER</b>				
Make & Model: <b>HACH 2100Q</b>			Serial No. S/N <b>19050C076301</b>	
Reference Value	10	20	100	800
Standard Lot No.	<b>A9155</b>	<b>A9179</b>	<b>A9156</b>	<b>A9157</b>
1. Time (24 hr): 0640	10.0	19.8	101	797
2. Time (24 hr): 1244	10.1	20.2	100	802
3. Time (24 hr):				
4. Time (24 hr):				
Comments:				



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## Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: <u>MWL</u>	Monitoring Well ID #: <u>Pre-Decon</u>	Date: <u>11/6/2020</u> Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: <u>1806B-732</u>	Water Level Indicator ID #: _____	
Personnel Performing Decontamination:		
Robert Lynch Print Name: _____	Initial: <u>RL</u>	
William Gibson Print Name: _____	Initial: <u>WJG</u>	
Condition of Equipment		
Pump: <u>Excellent</u>	Tubing Bundle: <u>Excellent</u>	Water Level Indicator: <u>Excellent</u>
List of Decontamination Materials		
Deionized Water Source: <u>Culligan</u> Lot Number: <u>10/22/20- 10/28/20</u> _____ _____	HNO <sub>3</sub> Grade: <u>NA</u> UN #: <u>NA</u> Manufacturer: <u>NA</u> Lot Number: <u>NA</u>	Detergent Manufacturer: <u>liquinox</u> Lot Number: <u>L1F9</u> Expiration Date: <u>06/21</u>



IMPORTANT NOTICE: A printed (and uncompleted) copy of this form may not be the most current form. The official version is located in the Long-Term Stewardship (LTS) ARAS document library, for which access is required. Upon completion, this document becomes record.

## Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

<b>SNL/NM</b> <b>Project Name:</b> <u>MWL</u>	<b>Monitoring Well ID #:</b> <u>MWL-BW2</u>	<b>Date:</b> <u>11/9/2020</u> <b>Date:</b> _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
<b>Pump and Tubing Bundle ID #:</b> <u>1806B-732</u>	<b>Water Level Indicator ID #:</b> <u>362721</u>	
<b>Personnel Performing Decontamination:</b>		
<b>Robert Lynch</b> Print Name: _____	 Initial: _____	
<b>Zach Tenorio</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>Culligan</u> <b>Lot Number:</b> <u>10/22/20- 10/28/20</u> _____ _____	<b>HNO<sub>3</sub></b> <b>Grade:</b> <u>NA</u> <b>UN #:</b> <u>NA</u> <b>Manufacturer:</b> <u>NA</u> <b>Lot Number:</b> <u>NA</u>	<b>Detergent</b> <b>Manufacturer:</b> <u>liquinox</u> <b>Lot Number:</b> <u>L1F9</u> <b>Expiration Date:</b> <u>06/21</u>

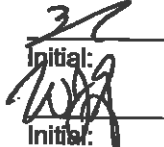
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## Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: MWL	Monitoring Well ID #: MWL-MW7	Date: 11/10/2020 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1806B-732	Water Level Indicator ID #: 362721	
Personnel Performing Decontamination:		
Robert Lynch Print Name: _____	 Initial: _____	
William Gibson Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Delonized Water Source: Culligan Lot Number: 10/28/20 _____ _____	HNO <sub>3</sub> Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: liquinox Lot Number: L1F9 Expiration Date: 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-MW9	<b>Date:</b> 11/11/2020 <b>Date:</b> _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
<b>Pump and Tubing Bundle ID #:</b> 1806B-732	<b>Water Level Indicator ID #:</b> 362721	
<b>Personnel Performing Decontamination:</b>		
<b>Zach Tenorio</b> Print Name: _____	 Initial: _____ Initial: _____	
<b>William Gibson</b> Print Name: _____		
<b>Condition of Equipment</b>		
<b>Pump:</b> Excellent	<b>Tubing Bundle:</b> Excellent	<b>Water Level Indicator:</b> Excellent
<b>List of Decontamination Materials</b>		
<b>Delonized Water</b> <b>Source:</b> Culligan <b>Lot Number:</b> 10/15/20 -10/28/20- 11/05/20 _____ _____	<b>HNO<sub>3</sub></b> <b>Grade:</b> NA <b>UN #:</b> NA <b>Manufacturer:</b> NA <b>Lot Number:</b> NA	<b>Detergent</b> <b>Manufacturer:</b> liquinox <b>Lot Number:</b> L1F9 <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> 11/12/2020 <b>Date:</b> _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
<b>Pump and Tubing Bundle ID #:</b> 1806B-732	<b>Water Level Indicator ID #:</b> 362721	
<b>Personnel Performing Decontamination:</b>		
<b>Denisha Sanchez</b> Print Name: _____	 Initial: _____	
<b>Robert Lynch</b> Print Name: _____	 Initial: _____	
<b>Condition of Equipment</b>		
<b>Pump:</b> Excellent	<b>Tubing Bundle:</b> Excellent	<b>Water Level Indicator:</b> Excellent
<b>List of Decontamination Materials</b>		
<b>Deionized Water</b> <b>Source:</b> Culligan <b>Lot Number:</b> 10/28/20- 11/05/20 _____ _____	<b>HNO<sub>3</sub></b> <b>Grade:</b> NA <b>UN #:</b> NA <b>Manufacturer:</b> NA <b>Lot Number:</b> NA	<b>Detergent</b> <b>Manufacturer:</b> liquinox <b>Lot Number:</b> L1F9 <b>Expiration Date:</b> 06/21

**IMPORTANT NOTICE:** A printed (and uncompleted) copy of this form may not be the most current form. The official version is located in the Long-Term Stewardship (LTS) ARAS document library, for which access is required. Upon completion, this document becomes record.

**SUMMARY SHEET FOR**  
**NOVEMBER 2020 GROUNDWATER SAMPLES**

**Sample Summary for Mixed Waste Landfill Groundwater Monitoring  
November 2020**

<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 # CF01-21</b>								
MWL-BW2	9-Nov-20	621583	113952	Environmental	n/a	621583 / 113953	621583 / 113951	
MWL-MW7	10-Nov-20	621584	113955	Environmental	n/a	621584 / 113956	621584 / 113954	
MWL-MW8	12-Nov-20	621586	113961	Environmental	621587 / 113964	621586 / 113963	621586 / 113960	
MWL-MW8	12-Nov-20	621586	113962	Duplicate	621587 / 113964	621586 / 113963	621586 / 113960	
MWL-MW9	11-Nov-20	621585	113958	Environmental	n/a	621585 / 113959	621585 / 113957	
MWL-EB 1	11-Nov-20	621587	113964	Equipment Blank	n/a	621587 / 113965	n/a	Equipment blank sample prior to MWL-MW8.
MWL-FB 1	9-Nov-20	621583	113951	Field Blank	n/a	621583 / 113953	n/a	at MWL-BW2
MWL-FB 2	10-Nov-20	621584	113954	Field Blank	n/a	621584 / 113956	n/a	at MWL-MW7
MWL-FB 3	11-Nov-20	621585	113957	Field Blank	n/a	621585 / 113959	n/a	at MWL-MW9
MWL-FB 4	12-Nov-20	621586	113960	Field Blank	n/a	621586 / 113963	n/a	at MWL-MW8

**DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES**  
**GROUNDWATER MONITORING**  
**NOVEMBER 2020**

**AR/COC NUMBER 621583**

## Memorandum

Date: December 14, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOG: 621583  
SDG: 526843  
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 06.

### Summary

Three samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was  $>$  the MDL but  $\leq 3X$  the MDL with negative bias for methylene chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. The initial calibration intercepts were positive and  $>$  the MDL for bromoform and dibromochloromethane. The associated results for sample 526843001 were detects  $<3X$  the value of the intercepts and will be **qualified J+,I5**.

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 bromoform and dibromochloromethane. All remaining associated sample results, *except* the bromoform and dibromochloromethane results for sample -001, were non-detect and will not be qualified.

### **Blanks**

No target analytes were detected in any of the blanks except as follows.

Chloroform was detected at > the PQL and acetone, bromodichloromethane, bromoform and dibromochloromethane were detected at  $\leq$  the PQL in FB1, sample -001, associated with sample -002. The associated sample results were non-detect and will not be qualified.

### **Surrogates**

All surrogate recoveries met QC acceptance criteria.

### **Internal Standards**

All internal standards met QC acceptance criteria.

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

All MS/MSD 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. Sample results < the PQL with missing ions or poor ratios were qualified J by the laboratory and were not further qualified during data validation.

One TB was submitted with the ARCOC. FB1 was submitted with ARCOC 621583 and was associated with the sample on the same ARCOC.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/15/2020

## Memorandum

Date: December 14, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621583  
SDG: 526843  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: SVOCs

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 06.

### **Summary**

One sample was prepared and analyzed with accepted procedures using method SW846 8270D SIM (SVOCs - 1,4-dioxane). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times**

The sample was extracted and analyzed within the prescribed holding times and was properly preserved.

### **Instrument Tune**

All instrument tune requirements were met.

### **Calibration**

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

### **Reporting Limit Verification**

The CMDL (reporting level verification standard) recovery met QC acceptance criteria.

### **Blanks**



No target analyte was detected in the method blank.

**Surrogates**

All surrogate recoveries met QC acceptance criteria.

**Internal Standards**

All internal standards met QC acceptance criteria.

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

The MS/MSD met QC acceptance criteria for accuracy and precision.

**Laboratory Control Sample**

All LCS acceptance criteria were met.

**Detection Limits/Dilutions**

All detection limits were properly reported. The sample was not diluted.

**Tentatively Identified Compounds (TICs)**

TIC reports were not required.

**Other QC**

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/15/2020

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## Memorandum

Date: December 14, 2020  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621583  
SDG: 526843  
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 06.

### **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:** Linda Thal

**Level:** I

**Date:** 12/15/2020

## Memorandum

Date: December 14, 2020

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621583  
SDG: 526843  
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 06.

### 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.

#### Gamma spec and Tritium:

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

#### Gross Beta:

1. The sample result for gross beta was  $\geq$  the MDA but < 3X the MDA and will be **qualified J,FR7**.

### Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

### Quantification

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

### Calibration

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

**Blanks**

No target analytes were detected in the blanks at concentrations  $\geq$  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.

**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 sample was not diluted. All required detection limits were met.

**Other QC**

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/15/2020



## Sample Findings Summary



AR/COC: 621583

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	113952-005/MWL-BW2	BETA (12587-47-2)	J, FR7
EPA 901.1			
	113952-004/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	113952-004/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3
	113952-004/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	113952-004/MWL-BW2	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	113952-006/MWL-BW2	Tritium (10028-17-8)	BD, FR3
SW846 8260B DOE-AL			
	113951-001/MWL-FB1	Bromoform (75-25-2)	J+, I5
	113951-001/MWL-FB1	Dibromochloromethane (124-48-1)	J+, I5
	113951-001/MWL-FB1	Methylene chloride (75-09-2)	UJ, I5
	113952-001/MWL-BW2	Methylene chloride (75-09-2)	UJ, I5
	113953-001/MWL-TB 1	Methylene chloride (75-09-2)	UJ, I5

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 621583	Site/Project: MWL LTMMP	Validation Date: 12/14/2020
SDG #: 526843	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 9	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: 11/09/2020

The ARCOG noted that the trip blank vials were received from the lab with headspace.

Validated by:

*Mary A. Donovan*

## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 621583	SDG: 526843	Matrix: Aqueous
Laboratory Sample IDs: 526843001, -002, -009		
Method/Batch #s: <b>8260B</b> 2065286	Tuning (pass/fail):pass	TICs Required? (yes/no):no

[illegible][illegible][illegible]

Comments: HTs OK.

ICAL VOA9.I 09/09/2020 Linear: Bromoform; Dibromochloromethane; Methylene chloride  
MS/MSD on sample -002



## Sandia Organic Worksheet (GC/MS SVOC)

ARCOC #: 621583	SDG:526843	Matrix: Aqueous
Laboratory Sample IDs: 523843003		
Method/Batch #s: <b>3535A/8270D SIM</b> 2061067/2061069	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)		Calibration				MB	5X MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	CMDL					
		Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D												
None																	
Surrogate Recovery Outliers																	
Sample ID	1,4-Dioxane-d8		Sample ID		1,4-Dioxane-d8												
none																	
IS Outliers																	
	Tetrahydrofuran-d8																
Sample ID	Area	RT	Area		RT	Area		RT	Area		RT	Area		RT	Area		RT
none																	

Comments: GC/MS SIM with solid phase extraction.

Samples preserved with NaHSO<sub>4</sub> to a pH ≤ 4 have 28 days to extraction. RSD 20%. ICV/CCV 20%. CMDL/end CCV 50%.

HT OK. Sample -003 pH 1 = 3

MS/MSD on sample -003

ICAL MSD6.I 11/01/2020, linear

Sandia Inorganic Metals Worksheet

ARCOG #(s): 621583	SDG #(s): 526843	Matrix: Aqueous
Laboratory Sample IDs: 526843004		
Method/Batch #s: <b>3005A/6020B</b> : 2061171/2061172		

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. ug/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	Sample ID	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
LCS 11/24 23:28	Sc 128			None			

Comments: HTs OK. Matrix QC on -004.  
Al, Ca, Fe, Mg < 100mg/l

# Sandia Radiochemistry Worksheet

ARCOC #(s): 621583	SDG #:526843	Matrix: Aqueous
Laboratory Sample IDs:526843 – see below		
Method/Batch#s: EPA 901.1 (gammasspec)/2061403 Sample -005		
Method/Batch#s: EPA 900.0/SW846 9310 (gross A/B)/2062702 Sample -006		
Method/Batch#s: SM 7500 Rn B (Rn-222)/2061036 Sample -008		
Method/Batch#s: EPA 906.0 Modified (tritium)/2064238 Sample -007		

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				
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 <.

GS: DUP on sample -005. K-40 in MB considered a false positive due to peak not meeting identification criteria.

Gross A/B: DUP, MS/MSD on sample -006. Sample and DUP 150ml; MS/MSD 30ml; 5X dilution.

Rn-222: DUP on sample -008. LCS/LCSD

Tritium: DUP and MS on sample -007

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

526843

Internal Lab

Page 1 of 2

Batch No. <u>N/A</u>		SMO Use		AR/COC <b>621583</b>								
Project Name: <u>MWL LTMMMP</u>		Date Samples Shipped: <u>11/9/2020</u>		SMO Authorization: <u>[Signature]</u>								
Project/Task Manager: <u>Timmie Jackson</u>		Carrier/Waybill No. <u>321717</u>		SMO Contact Phone: <u>[Signature]</u>								
Project/Task Number: <u>195122.10.11.08</u>		Lab Contact: <u>Edie Kent/843-769-7385</u>		Wendy Palencia/505-844-3132								
Service Order: <u>CF01-21</u>		Lab Destination: <u>GEL</u>		Send Report to SMO: <u>[Signature]</u>								
		Contract No.: <u>1983530</u>		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
113951	001	MWL-FB 1	NA	11/9/20 10:34	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	001
113952	001	MWL-BW2	496	11/9/20 10:54	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	002
113952	002	MWL-BW2	496	11/9/20 10:55	GW	AG	500 ml	NaHSO4	G	SA	1,4-DIOXANE (EPA 8270 SIM)	003
113952	003	MWL-BW2	496	11/9/20 10:56	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	004
113952	004	MWL-BW2	496	11/9/20 10:57	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	005
113952	005	MWL-BW2	496	11/9/20 10:58	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	006
113952	006	MWL-BW2	496	11/9/20 10:59	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	007
113952	007	MWL-BW2	496	11/9/20 11:00	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	008
113953	001	MWL-TB 1	NA	11/9/20 10:34	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	009
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								
	William Gibson	[Signature]	PL	SNL/08888/505-284-3307/505-239-7367								
	Robert Lynch	[Signature]	WL	SNL/08888/505-844-4013/505-250-7090								
	Zachary Tenorio	[Signature]	31	SNL/08888/505-845-8636/505-259-5765								
Relinquished by <u>[Signature]</u> Org. <u>08888</u> Date <u>11-9-20</u> Time <u>1137</u>												
Received by <u>[Signature]</u> Org. <u>0628</u> Date <u>11-9-20</u> Time <u>1137</u>												
Relinquished by <u>[Signature]</u> Org. <u>0628</u> Date <u>11-9-20</u> Time <u>1230</u>												
Received by <u>[Signature]</u> Org. <u>0628</u> Date <u>11-9-20</u> Time <u>755</u>												

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

**AR/COC NUMBER 621584**

## Memorandum

Date: December 14, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621584  
SDG: 526995  
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 06.

### Summary

Three samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was  $>$  the MDL but  $\leq 3X$  the MDL with negative bias for methylene chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. The initial calibration intercepts were positive and  $>$  the MDL for bromoform and dibromochloromethane. The associated results for sample 526995001 were detects  $<3X$  the value of the intercepts and will be **qualified J+,I5**.

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 bromoform and dibromochloromethane. All remaining associated sample results, *except* the bromoform and dibromochloromethane results for sample -001, were non-detect and will not be qualified.

### **Blanks**

No target analytes were detected in any of the blanks except as follows.

Bromodichloromethane, bromoform, chloroform and dibromochloromethane were detected at > the PQL and acetone was detected at ≤ the PQL in FB 2, sample -001, associated with sample -002. The associated sample results were non-detect and will not be qualified.

### **Surrogates**

All surrogate recoveries met QC acceptance criteria.

### **Internal Standards**

All internal standards met QC acceptance criteria.

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

All MS/MSD recoveries and RPDs met QC acceptance criteria.

It should be noted that the MS/MSD was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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

All LCS acceptance criteria were met.

### **Detection Limits/Dilutions**

All detection limits were properly reported. The samples were not diluted.

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

TIC reports were not required.

### **Other QC**

Mass spectra 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.

One TB was submitted with the ARCOC. FB 2 was submitted with ARCOC 621584 and was associated with the sample on the same ARCOC.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/16/2020

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## Memorandum

Date: December 14, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621584  
SDG: 526995  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: SVOCs

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 06.

### **Summary**

One sample was prepared and analyzed with accepted procedures using method SW846 8270D SIM (SVOCs - 1,4-dioxane). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times**

The sample was extracted and analyzed within the prescribed holding times and was properly preserved.

### **Instrument Tune**

All instrument tune requirements were met.

### **Calibration**

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

### **Reporting Limit Verification**

The CMDL (reporting level verification standard) recovery met QC acceptance criteria.

### **Blanks**

No target analyte was detected in the method blank.

**Surrogates**

All surrogate recoveries met QC acceptance criteria.

**Internal Standards**

All internal standards met QC acceptance criteria.

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

The MS/MSD met QC acceptance criteria for accuracy and precision.

**Laboratory Control Sample**

All LCS acceptance criteria were met.

**Detection Limits/Dilutions**

All detection limits were properly reported. The sample was not diluted.

**Tentatively Identified Compounds (TICs)**

TIC reports were not required.

**Other QC**

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/16/2020

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## Memorandum

Date: December 14, 2020  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621584  
SDG: 526995  
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 06.

### **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:** Linda Thal

**Level:** I

**Date:** 12/16/2020

## Memorandum

Date: December 14, 2020

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621584  
SDG: 526995  
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 06.

### 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.

#### Gamma spec and Tritium:

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

#### Rn-222:

1. The sample result for Rn-222 was  $\geq$  the MDA but < 3X the MDA and will be **qualified J,FR7**.

### Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and was properly preserved.

### Quantification

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

### Calibration

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

### **Blanks**

No target analytes were detected in the blanks at concentrations  $\geq$  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 for tritium and the MS/MSD for gross alpha/beta were performed on samples 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 for gamma spec, gross alpha/beta and tritium were performed on samples 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 sample was not diluted. All required detection limits were met.

### **Other QC**

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/16/2020



## Sample Findings Summary



AR/COC: 621584

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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	113955-004/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	113955-004/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	113955-004/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	113955-004/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	113955-006/MWL-MW7	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	113955-007/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
SW846 8260B DOE-AL			
	113954-001/MWL-FB 2	Bromoform (75-25-2)	J+, I5
	113954-001/MWL-FB 2	Dibromochloromethane (124-48-1)	J+, I5
	113954-001/MWL-FB 2	Methylene chloride (75-09-2)	UJ, I5
	113955-001/MWL-MW7	Methylene chloride (75-09-2)	UJ, I5
	113956-001/MWL-TB 2	Methylene chloride (75-09-2)	UJ, I5

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 621584	Site/Project: MWL LTMMP	Validation Date: 12/14/2020
SDG #: 526995	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 9	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: 11/10/2020

The ARCOG noted that the trip blank vials were received from the lab with headspace.

Validated by:

*Mary A. Donovan*



## Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 621584	SDG: 526995	Matrix: Aqueous
Laboratory Sample IDs: 526995001, -002, -009		
Method/Batch #s: <b>8260B</b> 2065286	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	TB 2 -009	FB 2 -001	5X (10X)	
	Int.	RF/ Slope	RSD/ r <sup>2</sup>	(ICV)/CCV %D										
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	2.25J	(22.5)	
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	2.20	11	
Bromoform	+0.77	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	1.22	6.1	
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	6.99	35	
Dibromochloromethane	+0.59	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	1.7	8.5	
Methylene chloride	-2.57	✓	✓	✓	✓	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.

ICAL VOA9.I 09/09/2020 Linear: Bromoform; Dibromochloromethane; Methylene chloride  
MS/MSD on SNL sample 526843002

## Sandia Organic Worksheet (GC/MS SVOC)

ARCOC #: 621584	SDG:526995	Matrix: Aqueous
Laboratory Sample IDs: 526995003		
Method/Batch #s: <b>3535A/8270D SIM</b> 2061601/2061605	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)			Calibration				MB	5X MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	CMDL			
			Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D										
None																
Surrogate Recovery Outliers																
Sample ID	1,4-Dioxane-d8		Sample ID		1,4-Dioxane-d8											
MS	69		MSD		69											
IS Outliers																
	Tetrahydrofuran-d8															
Sample ID	Area	RT	Area		RT	Area		RT	Area		RT	Area		RT	Area	RT
none																

Comments: GC/MS SIM with solid phase extraction.

Samples preserved with NaHSO<sub>4</sub> to a pH ≤ 4 have 28 days to extraction. RSD 20%. ICV/CCV 20%. CMDL/end CCV 50%.

HT OK. Sample -003 pH 1 = 3

MS/MSD on sample -003

ICAL MSD6.I 11/01/2020, linear

Sandia Inorganic Metals Worksheet

ARCOG #(s): 621584	SDG #(s): 526995	Matrix: Aqueous
Laboratory Sample IDs: 526995004		
Method/Batch #s: <b>3005A/6020B</b> : 2061790/2061791		

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. ug/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	Sample ID	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
None				None			

Comments: HTs OK. Matrix QC on -004.  
Al, Ca, Fe, Mg < 100mg/l



# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

526995

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Internal Lab		Batch No. <i>N/A</i>		SMO Use		AR/COC		621584				
Project Name: MWL LTMMMP		Date Samples Shipped: <i>11/10/2020</i>		SMO Authorization: <i>[Signature]</i>		<input type="checkbox"/> Waste Characterization						
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <i>321778</i>		SMO Contact Phone: <i>[Signature]</i>		<input type="checkbox"/> RMA						
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132		<input type="checkbox"/> Released by COC No.		<input checked="" type="checkbox"/> 4° Celsius				
Service Order: CF01-21		Lab Destination: GEL		Send Report to SMO:		Stephanie Montañó/505-284-2553		Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154				
Contract No.: 1983530												
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
113954	001	MWL-FB 2	NA	11/10/20 09:53	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	001
113955	001	MWL-MW7	496	11/10/20 09:59	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	002
113955	002	MWL-MW7	496	11/10/20 10:00	GW	AG	500 ml	NaHSO4	G	SA	1,4-DIOXANE (EPA 8270 SIM)	003
113955	003	MWL-MW7	496	11/10/20 10:01	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	004
113955	004	MWL-MW7	496	11/10/20 10:02	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	005
113955	005	MWL-MW7	496	11/10/20 10:03	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	006
113955	006	MWL-MW7	496	11/10/20 10:04	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	007
113955	007	MWL-MW7	496	11/10/20 10:05	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	008
113956	001	MWL-TB 2	NA	11/10/20 09:53	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	009
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:		Conditions on Receipt				
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:				EDD <input checked="" type="checkbox"/> Yes						
Background: <input type="checkbox"/> Yes		Entered by:				Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Confirmatory: <input type="checkbox"/> Yes		QC Inits.:				Negotiated TAT <input type="checkbox"/>						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell		Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Lab Use				
	William Gibson	<i>[Signature]</i>	<i>[Init.]</i>	SNL/08888/505-284-3307/505-239-7367		Return Samples By:						
	Robert Lynch	<i>[Signature]</i>	<i>[Init.]</i>	SNL/08888/505-844-4013/505-250-7090		Comments: Trip blanks received from lab with head space.						
	Zachary Tenorio	<i>[Signature]</i>	<i>[Init.]</i>	SNL/08888/505-845-8636/505-259-5765								
Relinquished by <i>[Signature]</i>		Org. 08888	Date 11/10/20	Time 1100	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org. 0628	Date 11/10/20	Time 1100	Received by		Org.	Date	Time			
Relinquished by <i>[Signature]</i>		Org. 0628	Date 11/10/20	Time 1215	Relinquished by		Org.	Date	Time			
Received by <i>[Signature]</i>		Org.	Date 11/11/20	Time 725	Received by		Org.	Date	Time			

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

**AR/COC NUMBERS 621585, 621587**

## Memorandum

Date: December 15, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621585 and 621587  
SDG: 527136  
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 06.

### Summary

Five samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was positive and  $>$  the MDL for bromoform. The associated result for sample 527136010 was a detect  $<3X$  the value of the intercept and will be **qualified J+,I5**.
2. The initial calibration RRF was  $< 0.050$  but  $\geq 0.010$  for 2- butanone. The associated sample results were non-detect and will be **qualified UJ,I4**.
3. The CCV %Ds were  $>20\%$  and positive for acetone and bromodichloromethane. The associated results for samples -001 and -010 were detect and will be **qualified J+,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. The initial calibration intercept was positive and > the MDL for bromoform. All associated sample results, *except* the bromoform result for sample -010, were non-detect and will not be qualified.

The CCV %Ds were >20% and positive for acetone; bromodichloromethane; 2-butanone; carbon disulfide; cis-1,3-dichloropropylene; 1,1-dichloroethane; 1,2-dichloroethane and vinyl acetate. All associated sample results *except* the acetone and bromodichloromethane results for samples -001 and -010 were non-detect and will not be qualified.

## **Blanks**

No target analytes were detected in any of the blanks except as follows.

Bromodichloromethane and chloroform were detected at > the PQL and acetone and dibromochloromethane were detected at ≤ the PQL in FB 3, sample -001, associated with sample -002. The associated sample results were non-detect and will not be qualified.

Bromodichloromethane and chloroform and were detected at > the PQL and acetone, bromoform and dibromochloromethane were detected at ≤ the PQL in EB 1, sample -010, associated with the samples on ARCO 621586 submitted in another SDG. No sample results in this SDG will be qualified.

## **Surrogates**

All surrogate recoveries met QC acceptance criteria.

## **Internal Standards**

All internal standards met QC acceptance criteria.

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

All MS/MSD recoveries and RPDs met QC acceptance criteria.

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

All LCS acceptance criteria were met except as follows. The %R was > the upper acceptance limit for vinyl acetate. Up to two LCS recovery infractions are allowed since 36 LCS analytes were reported. Therefore, the associated sample results will not be qualified.

## **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. Sample results < the PQL with missing ions or poor ratios were qualified J by the laboratory and were not further qualified during data validation.

Two TBs were submitted, one for each ARCOC. FB 3 was submitted with ARCOC 621585 and was associated with the sample on the same ARCOC. EB 1 was submitted on ARCOC 621587 and was associated with the samples on ARCOC 621586 submitted in another SDG.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/17/2020

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## Memorandum

Date: December 15, 2020  
To: File  
From: Mary Donovan  
Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621585 and 621587  
SDG: 527136  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: SVOCs

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 06.

### Summary

Two samples were prepared and analyzed with accepted procedures using method SW846 8270D SIM (SVOCs - 1,4-dioxane). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The MSD %R was < the lower acceptance limit but  $\geq 20\%$  for 1,4-dioxane. The associated sample results were non-detect and will be **qualified UJ,MS3**.

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

### Holding Times

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

### Instrument Tune

All instrument tune requirements were met.

### Calibration

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

### Reporting Limit Verification

The CMDL (reporting level verification standard) recovery met QC acceptance criteria.

**Blanks**

No target analyte was detected in the method blank or EB.

**Surrogates**

All surrogate recoveries met QC acceptance criteria.

**Internal Standards**

All internal standards met QC acceptance criteria.

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

The MS/MSD met QC acceptance criteria for accuracy and precision except as noted above in the Summary section.

**Laboratory Control Sample**

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**

EB 1 was submitted on ARCOG 621587 and was associated with the samples on ARCOG 621586 submitted in another SDG.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/17/2020

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## Memorandum

Date: December 15, 2020  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621585 and 621587  
SDG: 527136  
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 06.

### **Summary**

Two 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**

EB 1 was submitted on ARCOG 621587 and was associated with the samples on ARCOG 621586 submitted in another SDG.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/17/2020

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## Memorandum

Date: December 15, 2020

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621585 and 621587  
SDG: 527136  
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 06.

### Summary

Two samples were prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec - short list), EPA 900.0 (gross alpha/beta), SM 7500 Rn B (Rn-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

#### All Analytes:

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

### Holding Times and Preservation

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

### Quantification

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

### Calibration

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

### Blanks

No target analytes were detected in the blanks at concentrations  $\geq$  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 for tritium and the MS/MSD for gross alpha/beta associated with sample -006 were performed on samples 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 for gross alpha/beta associated with sample -006 and tritium were performed on samples 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**

EB 1 was submitted on ARCOG 621587 and was associated with the samples on ARCOG 621586 submitted in another SDG.

No other specific issues that affect data quality were identified.

**Reviewed by:** Linda Thal

**Level:** I

**Date:** 12/17/2020



## Sample Findings Summary



AR/COC: 621585, 621587

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	113964-005/MWL-EB 1	ALPHA (12587-46-1)	BD, FR3
	113964-005/MWL-EB 1	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	113958-004/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	113958-004/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3
	113958-004/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	113958-004/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
	113964-004/MWL-EB 1	Americium-241 (14596-10-2)	BD, FR3
	113964-004/MWL-EB 1	Cesium-137 (10045-97-3)	BD, FR3
	113964-004/MWL-EB 1	Cobalt-60 (10198-40-0)	BD, FR3
	113964-004/MWL-EB 1	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	113958-006/MWL-MW9	Tritium (10028-17-8)	BD, FR3
	113964-006/MWL-EB 1	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	113964-007/MWL-EB 1	Radon-222 (14859-67-7)	BD, FR3
SW846 3535A/8270D SIM			
	113958-002/MWL-MW9	1,4-Dioxane (123-91-1)	UJ, MS3
	113964-002/MWL-EB 1	1,4-Dioxane (123-91-1)	UJ, MS3
SW846 8260B DOE-AL			
	113957-001/MWL-FB 3	2-Butanone (78-93-3)	UJ, I4
	113957-001/MWL-FB 3	Acetone (67-64-1)	J+, C2
	113957-001/MWL-FB 3	Bromodichloromethane (75-27-4)	J+, C2
	113958-001/MWL-MW9	2-Butanone (78-93-3)	UJ, I4
	113959-001/MWL-TB 3	2-Butanone (78-93-3)	UJ, I4
	113964-001/MWL-EB 1	2-Butanone (78-93-3)	UJ, I4



Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	113964-001/MWL-EB 1	Acetone (67-64-1)	J+, C2
	113964-001/MWL-EB 1	Bromodichloromethane (75-27-4)	J+, C2
	113964-001/MWL-EB 1	Bromoform (75-25-2)	J+, I5
	113965-001/MWL-TB 5	2-Butanone (78-93-3)	UJ, I4

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 621585 and 621587	Site/Project: MWL LTMMP	Validation Date: 12/15/2020
SDG #: 527136	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 17	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: 11/11/2020

The ARCOGs noted that the trip blank vials were received from the lab with headspace.

ARCOG 621587 included EB 1 and was associated with the samples on ARCOG 621586 submitted in another SDG.

Validated by:

*Mary A. Donovan*

## Sandia Organic Worksheet (GC/MS VOC)

ARCO #s): 621585 and 621587	SDG: 527136	Matrix: Aqueous
Laboratory Sample IDs: 527136001, -002, -009, -010, -017		
Method/Batch #s: <b>8260B</b> 2066367	Tuning (pass/fail):pass	TICs Required? (yes/no):no

[illegible][illegible][illegible]

Comments: HTs OK.  
ICAL VOA3.I 10/29/2020 Linear: Bromoform  
MS/MSD on sample -002

## Sandia Organic Worksheet (GC/MS SVOC)

ARCOC #: 621585 and 621587	SDG:527136	Matrix: Aqueous
Laboratory Sample IDs: 527136003, -011		
Method/Batch #s: <b>3535A/8270D SIM</b> 2062281/2062282	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)		Calibration				MB	5X MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	CMDL	EB1 -011			
		Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D											
1,4-Dioxane		✓	✓	✓	✓	✓	NA	✓	✓	63	✓	✓	✓			
Surrogate Recovery Outliers																
Sample ID	1,4-Dioxane-d8		Sample ID		1,4-Dioxane-d8											
MSD	65															
IS Outliers																
	Tetrahydrofuran-d8															
Sample ID	Area	RT	Area		RT	Area		RT	Area		RT	Area		RT	Area	RT
none																

Comments: GC/MS SIM with solid phase extraction.

Samples preserved with NaHSO<sub>4</sub> to a pH ≤ 4 have 28 days to extraction. RSD 20%. ICV/CCV 20%. CMDL/end CCV 50%.

HT OK. Samples -003 and -011 pH 1 = 2

MS/MSD on sample -003

ICAL MSD6.I 11/01/2020, linear

# Sandia Inorganic Metals Worksheet

ARCOC #(s): 621585 and 621587	SDG #(s): 527136	Matrix: Aqueous
Laboratory Sample IDs: 527136004, -012		
Method/Batch #s: <b>3005A/6020B</b> : 2062317/2062318		

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	EB 1 -012	
	Int. ug/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	Sample ID	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
None				None			

Comments: HTs OK. Matrix QC on -004.  
Al, Ca, Fe, Mg < 100mg/l

# Sandia Radiochemistry Worksheet

ARCO #s: 621585 and 621587	SDG #:527136	Matrix: Aqueous
Laboratory Sample IDs:527136 – see below		
Method/Batch#s: EPA 901.1 (gammascpec)/2062049 Samples -005, -013		
Method/Batch#s: EPA 900.0/SW846 9310 (gross A/B)/2062702 Sample -006; 2063210 Sample -014		
Method/Batch#s: SM 7500 Rn B (Rn-222)/2061969 Samples -008, -016		
Method/Batch#s: EPA 906.0 Modified (tritium)/2064238 Samples -007, -015		

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	LCS/ LCSD RER	EB 1		
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 <.

GS: DUP on sample -005.

Gross A/B: batch 2062702 DUP, MS/MSD on SNL sample 526843006. Sample and DUP 150ml; MS/MSD 30ml; 5X dilution. Batch 2063210 LCS/LCSD

Rn-222: DUP on sample -008. LCS/LCSD

Tritium: DUP and MS on SNL sample 526843007

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

527136

SDG: 327136

Internal Lab

Page 1 of 1

Batch No. <u>N/A</u>		SMO Use		AR/COC <b>621585</b>																																																																																																																																					
Project Name: MWL LTMMMP		Date Samples Shipped: <u>11/11/2020</u>		SMO Authorization: <u>[Signature]</u>																																																																																																																																					
Project/Task Manager: Timmie Jackson		Carrier/Waybill No. <u>321867</u>		SMO Contact Phone: <u>SMO</u>																																																																																																																																					
Project/Task Number: 195122.10.11.08		Lab Contact: Edie Kent/843-769-7385		Wendy Palencia/505-844-3132																																																																																																																																					
Service Order: CF01-21		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"/> <b>4° Celsius</b>																																																																																																																																					
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																																																																																																																													
113957	001	MWL-FB 3	NA	11/11/20 09:32	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	001																																																																																																																													
113958	001	MWL-MW9	497	11/11/20 09:54	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	002																																																																																																																													
113958	002	MWL-MW9	497	11/11/20 09:55	GW	AG	500 ml	NaHSO4	G	SA	1,4-DIOXANE (EPA 8270 SIM)	003																																																																																																																													
113958	003	MWL-MW9	497	11/11/20 09:56	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	004																																																																																																																													
113958	004	MWL-MW9	497	11/11/20 09:57	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	005																																																																																																																													
113958	005	MWL-MW9	497	11/11/20 09:58	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	006																																																																																																																													
113958	006	MWL-MW9	497	11/11/20 09:59	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	007																																																																																																																													
113958	007	MWL-MW9	497	11/11/20 10:00	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	008																																																																																																																													
113959	001	MWL-TB 3	NA	11/11/20 09:32	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	009																																																																																																																													
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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: Trip blanks received from lab with head space.																																																																																																																															
	William Gibson	<u>[Signature]</u>	<u>WJG</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																																																																																																																																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Relinquished by <u>[Signature]</u></td> <td>Org. <u>08888</u></td> <td>Date <u>11/11/20</u></td> <td>Time <u>1135</u></td> <td>Relinquished by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Received by <u>[Signature]</u></td> <td>Org. <u>00628</u></td> <td>Date <u>11/11/20</u></td> <td>Time <u>1135</u></td> <td>Received by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Relinquished by <u>[Signature]</u></td> <td>Org. <u>00628</u></td> <td>Date <u>11/11/20</u></td> <td>Time <u>1200</u></td> <td>Relinquished by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> <tr> <td>Received by <u>[Signature]</u></td> <td>Org.</td> <td>Date <u>11/12/20</u></td> <td>Time <u>725</u></td> <td>Received by</td> <td>Org.</td> <td>Date</td> <td>Time</td> </tr> </table>													Relinquished by <u>[Signature]</u>	Org. <u>08888</u>	Date <u>11/11/20</u>	Time <u>1135</u>	Relinquished by	Org.	Date	Time	Received by <u>[Signature]</u>	Org. <u>00628</u>	Date <u>11/11/20</u>	Time <u>1135</u>	Received by	Org.	Date	Time	Relinquished by <u>[Signature]</u>	Org. <u>00628</u>	Date <u>11/11/20</u>	Time <u>1200</u>	Relinquished by	Org.	Date	Time	Received by <u>[Signature]</u>	Org.	Date <u>11/12/20</u>	Time <u>725</u>	Received by	Org.	Date	Time																																																																																													
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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. *n/A*

SMO Use

AR/COC

621587

Project Name: MWL LTMMMP  
 Project/Task Manager: Timmie Jackson  
 Project/Task Number: 195122.10.11.08  
 Service Order: CF01-21

Date Samples Shipped: *11/11/20*  
 Carrier/Waybill No. *321867*  
 Lab Contact: Edie Kent/843-769-7385  
 Lab Destination: GEL  
 Contract No.: 1983530

SMO Authorization: *[Signature]*  
 SMO Contact Phone: 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

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
113964	001	MWL-EB 1	NA	11/11/20 11:07	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260B)	010
113964	002	MWL-EB 1	NA	11/11/20 11:08	DIW	AG	500 ml	NaHSO4	G	EB	1,4-DIOXANE (EPA 8270 SIM)	011
113964	003	MWL-EB 1	NA	11/11/20 11:09	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMMP - Cd, Cr, Ni, U	012
113964	004	MWL-EB 1	NA	11/11/20 11:10	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	013
113964	005	MWL-EB 1	NA	11/11/20 11:11	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	014
113964	006	MWL-EB 1	NA	11/11/20 11:12	DIW	AG	250 ml	NONE	G	EB	TRITIUM (EPA 906)	015
113964	007	MWL-EB 1	NA	11/11/20 11:13	DIW	G	2x40 ml	NONE	G	EB	RADON (SM7500 Rn B)	016
113965	001	MWL-TB 5	NA	11/11/20 11:07	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260B)	017

Last Chain: ☐ Yes

Sample Tracking

SMO Use

Special Instructions/QC Requirements:

Conditions on Receipt

Validation Req'd: ☒ Yes

Date Entered:

EDD ☒ YesBackground: ☐ Yes

Entered by:

Turnaround Time ☐ 7-Day\* ☐ 15-Day\* ☒ 30-DayConfirmatory: ☐ Yes

QC inits.:

Negotiated TAT ☐

Sample Team Members

Name	Signature	Init.	Company/Organization/Phone/Cell
William Gibson	<i>[Signature]</i>	<i>WJG</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

Sample Disposal ☐ Return to Client ☒ Disposal by Lab

Return Samples By:

Comments: Trip blanks received from lab with head space.

Lab Use

Relinquished by *[Signature]* Org. *08888* Date *11/11/20* Time *1130*  
 Received by *[Signature]* Org. *00628* Date *11/11/20* Time *1130*  
 Relinquished by *[Signature]* Org. *00628* Date *11/11/20* Time *1200*  
 Received by *[Signature]* Org. *00628* Date *11/12/20* Time *725*

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

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



**AR/COC NUMBER 621586**

## Memorandum

Date: December 16, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621586  
SDG: 527272  
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 06.

### Summary

Four 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 RRF was  $< 0.050$  but  $\geq 0.010$  for 2-butanone. The associated sample results were non-detect and will be **qualified UJ,I4**.
2. The initial calibration intercept was positive and  $>$  the MDL for bromoform. The associated result for sample 527272001 was a detect  $< 3X$  the value of the intercept and will be **qualified J+,I5**.
3. The CCV %Ds were  $> 20\%$  and positive for acetone and bromodichloromethane. The associated results for sample -001 were detects and will be **qualified J+,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. The initial calibration intercept was positive and > the MDL for bromoform. All associated sample results, *except* the bromoform result for sample -001, were non-detect and will not be qualified.

The CCV %Ds were >20% and positive for acetone; bromodichloromethane; 2-butanone; carbon disulfide; cis-1,3-dichloropropylene; 1,1-dichloroethane; 1,2-dichloroethane and vinyl acetate. All associated sample results, *except* the acetone and bromodichloromethane results for sample -001, were non-detect and will not be qualified.

## **Blanks**

No target analytes were detected in any of the blanks except as follows.

Bromodichloromethane and chloroform were detected at > the PQL and acetone, bromoform and dibromochloromethane were detected at ≤ the PQL in FB 4, sample -001, associated with samples -002 and -009. The associated sample results were non-detect and will not be qualified.

Bromodichloromethane and chloroform and were detected at > the PQL and acetone, bromoform and dibromochloromethane were detected at ≤ the PQL in EB 1, sample 527136010 submitted in another SDG and associated with the samples on ARCO 621586. The associated sample results were non-detect and will not be qualified.

## **Surrogates**

All surrogate recoveries met QC acceptance criteria.

## **Internal Standards**

All internal standards met QC acceptance criteria.

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

All MS/MSD recoveries and RPDs met QC acceptance criteria.

It should be noted that the MS/MSD was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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

All LCS acceptance criteria were met except as follows. The %R was > the upper acceptance limit for vinyl acetate. Up to two LCS recovery infractions are allowed since 36 LCS analytes were reported. Therefore, the associated sample results will not be qualified.

## **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. Sample results < the PQL with missing ions or poor ratios were qualified J by the laboratory and were not further qualified during data validation.

One TB was submitted with the ARCOC. FB 4 was submitted with ARCOC 621586 and was associated with the samples on the same ARCOC. EB 1 was submitted on ARCOC 621587 in another SDG and was associated with the samples on ARCOC 621586. A field duplicate pair was submitted with ARCOC 621586. 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:** 12/18/2020

## Memorandum

Date: December 16, 2020

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621586  
SDG: 527272  
Laboratory: GEL  
Project/Task: 195122.10.11.08  
Analysis: SVOCs

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 06.

### **Summary**

Two samples were prepared and analyzed with accepted procedures using method SW846 8270D SIM (SVOCs - 1,4-dioxane). All compounds were successfully analyzed. No problems were identified with the data package that resulted in the qualification of data.

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

### **Holding Times**

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

### **Instrument Tune**

All instrument tune requirements were met.

### **Calibration**

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

### **Reporting Limit Verification**

The CMDL (reporting level verification standard) recovery met QC acceptance criteria.

**Blanks**

No target analyte was detected in the method blank or EB.

**Surrogates**

All surrogate recoveries met QC acceptance criteria.

**Internal Standards**

All internal standards met QC acceptance criteria.

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

The MS/MSD met QC acceptance criteria for accuracy and precision.

**Laboratory Control Sample**

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**

EB 1 was submitted on ARCOG 621587 in another SDG and was associated with the samples on ARCOG 621586. A field duplicate pair was submitted with ARCOG 621586. 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:** 12/18/2020

## Memorandum

Date: December 16, 2020  
To: File  
From: Mary Donovan  
Subject: Inorganic Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCO: 621586  
SDG: 527272  
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 06.

### **Summary**

Two 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 except as follows. U was detected at  $\leq$  the PQL in the MB and a bracketing CCB. The associated sample results were detects  $>5X$  the blank concentrations and will not be qualified.

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

The ICP-MS internal standards met QC acceptance criteria.

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

The MS met all QC acceptance criteria.

### **Laboratory Replicate**

The replicate met all QC acceptance criteria.

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

The LCS met all QC acceptance criteria.

### **Detection Limits/Dilutions**

All detection limits were properly reported. The samples were not diluted.

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

Results of the ICS A and AB analyses were not evaluated because the sample concentrations 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**

EB 1 was submitted on ARCO 621587 in another SDG and was associated with the samples on ARCO 621586. A field duplicate pair was submitted with ARCO 621586. 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:** 12/18/2020



## Memorandum

Date: December 16, 2020

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL  
Site: MWL LTMMP  
ARCOC: 621586  
SDG: 527272  
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 06.

### Summary

Two samples were prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec - short list), EPA 900.0 (gross alpha/beta), SM 7500 Rn B (Rn-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

#### Gamma spec and Tritium:

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

#### Rn-222:

1. The sample results which were > the MDA but  $\leq 3X$  the MDA will be **qualified J,FR7**.

### Holding Times and Preservation

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

### Quantification

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

### Calibration

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

### **Blanks**

No target analytes were detected in the blanks at concentrations  $\geq$  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 for tritium and the MS/MSD for gross alpha/beta were performed on samples 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 for gross alpha/beta and tritium were performed on samples 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**

EB 1 was submitted on ARCOG 621587 in another SDG and was associated with the samples on ARCOG 621586. A field duplicate pair was submitted with ARCOG 621586. 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:** 12/18/2020

---



## Sample Findings Summary



AR/COC: 621586

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	113961-004/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	113961-004/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	113961-004/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	113961-004/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
	113962-004/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	113962-004/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	113962-004/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	113962-004/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	113961-006/MWL-MW8	Tritium (10028-17-8)	BD, FR3
	113962-006/MWL-MW8	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	113961-007/MWL-MW8	Radon-222 (14859-67-7)	J, FR7
	113962-007/MWL-MW8	Radon-222 (14859-67-7)	J, FR7
SW846 8260B DOE-AL			
	113960-001/MWL-FB 4	2-Butanone (78-93-3)	UJ, I4
	113960-001/MWL-FB 4	Acetone (67-64-1)	J+, C2
	113960-001/MWL-FB 4	Bromodichloromethane (75-27-4)	J+, C2
	113960-001/MWL-FB 4	Bromoform (75-25-2)	J+, I5
	113961-001/MWL-MW8	2-Butanone (78-93-3)	UJ, I4
	113962-001/MWL-MW8	2-Butanone (78-93-3)	UJ, I4
	113963-001/MWL-TB 4	2-Butanone (78-93-3)	UJ, I4

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

## Sandia Data Validation Summary Worksheet

ARCOG#: 621586	Site/Project: MWL LTMMP	Validation Date: 12/16/2020
SDG #: 527272	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 16	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: 11/12/2020

The ARCOG noted that the trip blank vials were received from the lab with headspace.

ARCOG 621587 included EB 1 submitted in another SDG and was associated with the samples on ARCOG 621586.

Validated by:

*Mary A. Donovan*

## Sandia Organic Worksheet (GC/MS VOC)

ARCOG #(s): 621586	SDG: 527272	Matrix: Aqueous
Laboratory Sample IDs: 527272001, -002, -009, -016		
Method/Batch #s: <b>8260B</b> 2066367	Tuning (pass/fail):pass	TICs Required? (yes/no):no

[illegible][illegible][illegible]

Comments: HTs OK.  
ICAL VOA3.I 10/29/2020 Linear: Bromoform  
MS/MSD on SNL sample 527136002

## Sandia Organic Worksheet (GC/MS SVOC)

ARCOC #: 621586	SDG:527272	Matrix: Aqueous
Laboratory Sample IDs: 527272003, -010		
Method/Batch #s: <b>3535A/8270D SIM</b> 2062805/2062807	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)			Calibration				MB	5X MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	CMDL	EB1 527136 -011		
			Int.	RF/ Slope	RSD/r <sup>2</sup>	(ICV)/ CCV %D										
None																
Surrogate Recovery Outliers																
Sample ID	1,4-Dioxane-d8		Sample ID	1,4-Dioxane-d8												
MB	66															
IS Outliers																
	Tetrahydrofuran-d8															
Sample ID	Area	RT	Area		RT	Area		RT	Area		RT	Area		RT	Area	RT
none																

Comments: GC/MS SIM with solid phase extraction.

Samples preserved with NaHSO<sub>4</sub> to a pH ≤ 4 have 28 days to extraction. RSD 20%. ICV/CCV 20%. CMDL/end CCV 50%.

HT OK. Samples -003 and -010 pH 1 = 3

MS/MSD on sample -003

ICAL MSD6.I 11/01/2020, linear

Sandia Inorganic Metals Worksheet

ARCOG #(s): 621586	SDG #(s): 527272	Matrix: Aqueous
Laboratory Sample IDs: 527272004, -011		
Method/Batch #s: <b>3005A/6020B</b> : 2062858/2062859		

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	EB 1 527136 -012	
	Int. ug/L	R <sup>2</sup>	ICV	CCV	ICB ug/L	CCB ug/L											
U	NA	✓	✓	✓	✓	0.096J	0.000083J	0.00048	✓	✓	✓	✓	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. Matrix QC on -004.  
Al, Ca, Fe, Mg < 100mg/l





# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

527272

SDG: 527272

Internal Lab

Batch No. *n/a*

SMO Use

Page 1 of 2

AR/COC **621586**

Project Name: MWL LTMMMP  
 Project/Task Manager: Timmie Jackson  
 Project/Task Number: 195122.10.11.08  
 Service Order: CF01-21

Date Samples Shipped: *11/12/20*  
 Carrier/Waybill No. *321921*  
 Lab Contact: Edie Kent/843-769-7385  
 Lab Destination: GEL  
 Contract No.: 1983530

SMO Authorization: *[Signature]*  
 SMO Contact Phone: 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

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
113960	001	MWL-FB 4	NA	11/12/20 09:46	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260B)	001
113961	001	MWL-MW8	497	11/12/20 09:56	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260B)	002
113961	002	MWL-MW8	497	11/12/20 09:58	GW	AG	500 ml	NaHSO4	G	SA	1,4-DIOXANE (EPA 8270 SIM)	003
113961	003	MWL-MW8	497	11/12/20 10:00	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	004
113961	004	MWL-MW8	497	11/12/20 10:02	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	005
113961	005	MWL-MW8	497	11/12/20 10:04	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	006
113961	006	MWL-MW8	497	11/12/20 10:06	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	007
113961	007	MWL-MW8	497	11/12/20 10:08	GW	G	2x40 ml	NONE	G	SA	RADON (SM7500 Rn B)	008
113962	001	MWL-MW8	497	11/12/20 09:57	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMMP (SW846-8260B)	009
113962	002	MWL-MW8	497	11/12/20 09:59	GW	AG	500 ml	NaHSO4	G	DU	1,4-DIOXANE (EPA 8270 SIM)	010

Last Chain: ☒ YesValidation Req'd: ☒ YesBackground: ☐ YesConfirmatory: ☐ Yes

Sample Tracking

SMO Use

Special Instructions/QC Requirements:

EDD ☒ YesTurnaround Time ☐ 7-Day\* ☐ 15-Day\* ☒ 30-DayNegotiated TAT ☐Sample Disposal ☐ Return to Client ☒ Disposal by Lab

Return Samples By:

Comments: Trip blanks received from lab with head space.

Conditions on Receipt

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
	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 *[Signature]* Org. *00888* Date *11/12/20* Time *1050*Received by *[Signature]* Org. *00628* Date *11/12/20* Time *1050*Relinquished by *[Signature]* Org. *00628* Date *11/12/20* Time *1150*Received by *[Signature]* Org. *00628* Date *11/13/20* Time *720*

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

AOP 95-16

Page 2 of 2

[illegible]

## **CONTRACT VERIFICATION REVIEW FORMS**

### **Mixed Waste Landfill Groundwater Monitoring**

**November 2020**

Note: The forms in this section include AR/COC numbers for environmental and quality control samples; the AR/COC forms are provided in the Data Validation Reports in this annex.

<b>AR/COC Number</b>	<b>Sample Type</b>
621583	Environmental & Quality Control
621584	Environmental & Quality Control
621585	Environmental & Quality Control
621586	Environmental & Quality Control
621587	Quality Control

## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621583

Analytical Lab GEL

SDG No. 526843

*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	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		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromoform, bromodichloromethane, chloroform and dibromochloromethane detected in MWL-FB 1
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

#### 4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 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	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: 12-11-2020 13:19:00

Closed by: Wendy Palencia Date: 12-11-2020 13:19:00



## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621584

Analytical Lab GEL

SDG No. 526995

*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		X	1, 4-Dioxane-d8 failed recovery limits for MS/MSD (QC1204691660/662)
	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		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromoform, bromodichloromethane, chloroform and dibromochloromethane detected in MWL-FB 2
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

#### 4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 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	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: 12-14-2020 11:24:00

Closed by: Wendy Palencia Date: 12-14-2020 11:24:00

## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621585 &amp; 621587

Analytical Lab GEL

SDG No. 527136

*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	Vinyl acetate failed recovery limits for LCS (QC1204702171)
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	1, 4-Dioxane-d8 failed recovery limits for MSD (QC1204693027)
	c) Matrix spike recovery data reported and met		X	1, 4-Dioxane failed recovery limits for MSD (QC1204693027)
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		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromodichloromethane, chloroform and dibromochloromethane detected in MWL-FB 3. Acetone, bromodichloromethane, bromoform, chloroform and dibromochloromethane detected MWL-EB 1.
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

#### 4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 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	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: 12-15-2020 09:27:00

Closed by: Wendy Palencia Date: 12-15-2020 09:27:00

## Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122\_10.11.08

ARCOC No. 621586

Analytical Lab GEL

SDG No. 527272

*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	Vinyl acetate failed recovery limits for LCS (QC1204702171)
	b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	1, 4-Dioxane-d8 outside recovery limits in method blank (QC1204694219)
	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	Uranium detected in method blank (QC1204694340)
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, bromodichloromethane, bromoform, chloroform and dibromochloromethane detected in MWL-FB 4
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	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		
	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	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: 12-16-2020 11:23:00

Closed by: Wendy Palencia Date: 12-16-2020 11:23:00

## **ANNEX F**

### **Mixed Waste Landfill Inspection Forms**

**April 2020-March 2021**

**Soil-Vapor Monitoring Network**

**Soil-Moisture Monitoring Network**

**Groundwater Monitoring Network**

**Cover Inspection**

**Biology Inspection**

**Note: Radon monitoring system inspection forms are provided in Annex A**



# Mixed Waste Landfill Soil-Vapor Monitoring Network Checklist/Form

1. Date of Inspection 05/11/20
2. Time of Inspection 0815
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

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

Copy to: SNL/NM Records Center

**Mixed Waste Landfill  
Soil-Vapor Monitoring Network Checklist/Form**

1. Date of Inspection 11-13-20  
 2. Time of Inspection 0835  
 3. Name of Inspector Zach Teronio

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**

<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                     

Original to: Mixed Waste Landfill Operating Record

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# Mixed Waste Landfill Soil-Moisture Monitoring Network Checklist/Form

1. Date of Inspection 4/9/2020 & 4/15/2020
2. Time of Inspection 1400 & 1317
3. Name of Inspector Robert Ziack

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



Original to: Mixed Waste Landfill Operating Record

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# Mixed Waste Landfill

## Groundwater Monitoring Network Checklist/Form

1. Date of Inspection 05/04/20
2. Time of Inspection 0804
3. Name of Inspector Robert Lynch

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

<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**

Note Number	Description
1	Baroballs installed on all wells

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

**Additional Comments:**

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Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



# Mixed Waste Landfill Groundwater Monitoring Network Checklist/Form

1. Date of Inspection 11-09-20
2. Time of Inspection 0815
3. Name of Inspector Zach Terorid

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**

Note Number	Description
1	Baro Ball installed on sample 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



Original to: Mixed Waste Landfill Operating Record

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# Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection June 1, 2020
2. Time of Inspection 09:00-09:45
3. Name of Inspector Robert Fick, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

## I. COVER SYSTEM [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft <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	

## II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

<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 Esch Date action completed June 1, 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:**

1. Wind-blown plant debris removed from security fence at time of inspection. By 6/1/2020

Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



*date:* June 22, 2020

*to:* Mike Mitchell (08854)  
Robert Ziock (08854)

*from:* Jennifer Payne (00643) [jjpayne@sandia.gov](mailto:jjpayne@sandia.gov)

*subject:* **June 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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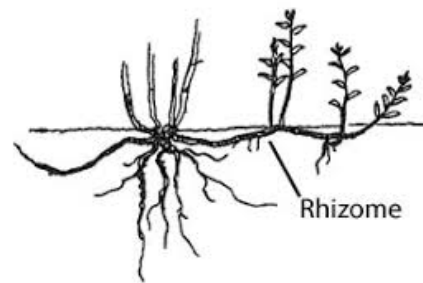
**ET Covers Observations and Recommendations**

The biology quarterly evaluation of the three ET Covers was conducted on June 8, 2020.

**CAMU**

- The ET Cover looks very good overall. Native bunchgrasses are green and there is a very low presence of weeds on the cover.
- I anticipate weeds to become established by next year where the swale earth disturbance is occurring, unless a sterilant or pre-emergent is applied.
- At the base of the cover on the east side there are some patches of silverleaf nightshade (*Solanum elaeagnifolium*). I'll share some information about this species, so that you will have it available for future management consideration. I will continue to monitor these patches. This is not an urgent issue but worth some discussion.

- Silverleaf nightshade is a prickly perennial plant native to Baja California and parts of Mexico that is toxic when consumed. Although it is not listed as a noxious weed in New Mexico, it is listed in 46 states. It can be very invasive, but I have also observed it to not spread widely when it occurs in a well-established native vegetation community. Due to where it is located at the CWL, it could continue to spread into the bare dirt areas. Eradication can be difficult due to the extremely deep taproot and deep, aggressive rhizomes that can sprout many above ground plants each year. The most effective control technique is to dig up as much of the root system as possible. It's pretty much impossible to get the entire root system, but repeatedly removing as much of the above and below ground parts of the plant as possible can eventually weaken and kill it. A sterilant may be effective against it, but pre-emergent herbicides are not effective because it is a perennial with very aggressive rhizomes



## CWL

- The native grasses appear very healthy, displaying a lot of green foliage.
- The weed removal event was extremely good, only a minor presence of the yellow-flowered plant was observed.
- A surprisingly moderate amount of Russian thistle was observed to be present across the cover. This is quite surprising due to the two rounds of pre-emergent applied prior to the warm season.
  - I believe a more effective pre-emergent herbicide against Russian thistle would be Esplanade, whose active ingredient is Indaziflam. Indaziflam does not carry a bee precaution according to the UC IPM. Esplanade is a newer herbicide and to date it is pretty much the only effective herbicide against cheatgrass, a notoriously difficult weed to control. Cheatgrass seeds lie on top of the soil and Esplanade intercepts the root extension after germination, when the seed extends down into the soil, instead of up through the soil. I believe this method of interfering with root extension would also be more effective with the large seeds of Russian thistle, which are more likely to be on top of the soil. Bayer Vegetation Management highlights Esplanade as being very effective against Russian thistle. The main issue with Esplanade as a pre-emergent at Sandia may be working with SNL Facilities to have it listed as an approved herbicide. Since it is a



newer herbicide it may not currently be approved. An added bonus is that it provides 8 months of control.

<https://www.environmentalscience.bayer.us/vegetation-management/industrial-vegetation-management/products/esplanade-200-sc>

<https://www.environmentalscience.bayer.us/-/media/PRFUnitedStates/Documents/Resource-Library/Product-Labels/Esplanade-200-SC.ashx>

<https://www.environmentalscience.bayer.us/-/media/prfunitestates/documents/resource-library/white-paper/esplanade-200sc-stewardship-guide-for-natural-areas.ashx>

## MWL

- The ET Cover is in excellent condition. The mature native bunchgrasses are green and appear very healthy. There appears to be an increase of black grama grass (*Bouteloua eriopoda*) across the cover. From an ecology perspective, this is excellent because it's an important perennial native grass that reproduces primarily by stolons due to a low ratio of viable seeds. This indicates that this species of grass is very healthy on the cover, and able to reproduce more broadly across the cover.
- The south portion of the cover had small Russian thistle plants dispersed across it. Based on the numbers of plants, I think it would be good to plan to apply a pre-emergent across at least the southern portion of the cover. Or, hand remove them during this summer or fall.
- On the north portion of the cover surrounding the pink pinflag is a patch of silverleaf nightshade. This is the same plant species discussed in the CAMU section of this memo. I'll also continue to monitor this patch on the MWL.

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  
Cover Inspection Checklist/Form**

1. Date of Inspection September 2, 2020
2. Time of Inspection 09:45 ~ 10:25
3. Name of Inspector Robert Frank, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

**I. COVER SYSTEM [Quarterly]**

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft <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	

**II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]**

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Mixed Waste Landfill  
Cover Inspection Checklist/Form (continued)**

<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.	<i>12/12/2020</i> <i>yes</i> <i>NA</i>	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 Zook Date action completed 9/2/2020

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

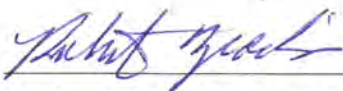
Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

**Additional Comments:**

1. Wind-blown plant debris removed at time  
of inspection, 9/2/2020

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 12/1/2020
2. Time of Inspection 11:15-12:02
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	yes	1

**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	2
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 12/1/2020  
Action (Note Number) 2 assigned to Robert Ziak Date action completed 12/1/2020  
Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_  
Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_  
Action (Note Number) \_\_\_\_\_ assigned to \_\_\_\_\_ Date action completed \_\_\_\_\_

**Additional Comments:**

Action item #1, 2 completed at time of the  
inspection. By 12/1/2020

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Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



*date:* December 15, 2020

*to:* Mike Mitchell (08854)  
Robert Ziock (08854)

*from:* Jennifer Payne (00643) [jjpayne@sandia.gov](mailto:jjpayne@sandia.gov)

*subject:* **December 2020 MWL Quarterly Inspection 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 Cover Observations and Recommendations**

The biology quarterly evaluation of the MWL ET Cover was conducted on December 1, 2020.

- Overall, the MWL is in excellent condition and the entire ET cover is looking great. The native bunchgrasses look healthy and still display a very small amount green at their bases, showing that they are still partially photosynthesizing and haven't fully entered winter dormancy yet.
- Burrow entrances were observed, but none were 4 inches or greater in diameter.
- A series of 5 small burrow entrances were observed in a north-south alignment on the cover, located to the southwest of the dogleg. These entrances appear to all connect to the same underground small mammal burrow. This is evidenced by a noticeable crack in the soil in alignment with the entrances and a pinflag probing into a vacuous subsurface space that extended beyond the length of the pin up to the flag, at least 18 inches. With the crushed biointrusion layer in place on the cover and the small size of the burrowing mammals, in my professional opinion there is no concern about small animals burrowing down to the waste level.

cc: Customer Funded Records Center  
Ecology Library

## Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection March 1, 2021
2. Time of Inspection 13:20 - 14:05
3. Name of Inspector Robert Bick, Danielle Michael

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 Zick Date action completed 3/8/2021

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. BGI removed plant debris from security  
fence. M3 3/8/2021

Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



*date:* March 16, 2021

*to:* Mike Mitchell (08888)  
Robert Ziock (08888)

*from:* Jennifer Payne (00643) [jjpayne@sandia.gov](mailto:jjpayne@sandia.gov)

*subject:* **MWL March 2021 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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The biology quarterly evaluation of the Mixed Waste Landfill was conducted on March 11, 2021.

Observations

- Currently the MWL looks excellent. The mature native grass community appears to be very healthy while in winter dormancy.
- No biological concerns observed at this time.

Recommendations

- No recommendations at the time of this inspection.



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  
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 LTMMP.

<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: Sixteen active and one 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 continues to be similar to that of the surrounding area vegetation.

- Low weed presence on the MWL Cover.

- The mature native grasses display healthy green leaves, indicating a good amount of photosynthetic activity that is commiserate with the amount of monsoon moisture that the area received this summer. The grasses mirror the health of the native grasses surrounding the MWL at this time.

- A few lizards and an active dove nest with eggs were observed on the MWL cover at the time of the inspection. Four pinflags were placed at distance, centered on the nest, to indicate its location. Any personnel requiring access were instructed to remain at a distance from the nest, which is federally protected under the Migratory Bird Treaty Act. The use of the MWL cover by wildlife continues to show that the cover is recognized by wildlife as part of the local area ecology.

Biological Aspects Map -- [note: sketch map to locate specific features described above will be attached as appropriate]

Inspector's Signature: \_\_\_\_\_



Date: August 18, 2020

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**ANNEX G**

**Mixed Waste Landfill  
Biology Report**

**April 2020-March 2021**

## **2020-2021 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, 2020-March 31, 2021) 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 2020 growing season and reporting period, expand on the inspection results, if appropriate, and provide recommendations for future ET Cover vegetation monitoring and maintenance. The annual Biology Inspection of the ET Cover was conducted on August 18, 2020. 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 2020, and March 2021) 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

## **2020-2021 Mixed Waste Landfill Biology Report**

2014 growing season inspection, which provided confirmation that all successful revegetation criteria had been met (SNL/NM June 2015).

Percentage of vegetative cover of each plant 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 2020 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. For this reason, the following discussion of meteorological conditions includes the last three months of CY 2019.

Table 1 provides meteorological data for CY 2020. Meteorological data for the first three months of CY 2021 are provided in Table 2 to provide meteorological data for the entire time period of this report. The CY 2021 data will be discussed in the 2021-2022 Annual LTMM Report. A 25-year data set (1995-2019) provides the reference mean monthly meteorological data; this updated data set adds the five recent years of data to the previous 20-year data set.

Meteorological conditions during the nine months preceding the 2020 monsoon season were favorable for the health of perennial native vegetation. Precipitation for the months of October 2019 through June 2020 exceeded the mean precipitation for this period. Total precipitation for this period was 5.42 inches, which is 16 percent (%) above normal and 0.73 inches above the mean precipitation of 4.69 inches. Four of these nine months received above average precipitation. In November 2019 1.73 inches of precipitation occurred, which is 1.32 inches above the mean for the month. This November precipitation timing was very beneficial for perennial vegetation, as it was lower intensity precipitation that permeates the soil better than typical high-intensity monsoon rains. And with higher relative humidity during the cool season, evaporative losses are much lower which allows moisture to saturate deeply into the soil column.

## 2020-2021 Mixed Waste Landfill Biology Report

**Table 1**  
**Summary of 2020 Meteorological Data at the Mixed Waste Landfill<sup>a</sup>**

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	
Year	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	
Temperature (°F)													Annual <sup>b</sup>
Monthly Mean	38.6	41.3	51.1	59.2	70.2	76.6	79.2	80.2	69.6	57.9	50.5	36.8	59.3
25-year Temp Means	37.7	42.1	49.3	56.0	65.7	75.7	76.8	74.8	69.3	58.0	46.6	37.3	57.4
Precipitation (Inches)													Annual <sup>c</sup>
Monthly Total	0.30	0.60	0.35	0.71	0.01	0.64	2.25	0.55	0.61	0.13	0.12	0.15	6.42
25-year Precip Means	0.39	0.43	0.50	0.52	0.34	0.52	1.72	1.46	0.99	0.95	0.47	0.57	8.86
Relative Humidity (%)													Annual <sup>b</sup>
Monthly Mean	51.9	51.2	43.2	27.6	22.5	24.8	37.7	31.9	34.0	28.4	39.0	43.7	36.3
25-year RH Means	51.1	44.5	35.8	30.7	27.2	25.3	40.6	44.3	42.3	42.6	45.0	53.4	40.2
Wind (Miles/hour)													Annual <sup>b</sup>
Monthly Mean	7.0	8.9	9.2	9.4	10.1	9.0	8.2	7.5	8.8	7.9	7.9	6.6	8.5
25-year Wind Means	6.9	8.2	9.1	10.3	9.9	9.7	8.4	7.9	8.0	7.9	7.1	6.7	8.3

<sup>a</sup>Information Source: SNL/NM Meteorological Monitoring Program.

<sup>b</sup>Values provided are averages of the monthly data.

<sup>c</sup>Values provided are totals of the monthly data.

% = Percent.

°F = Fahrenheit.

RH = Relative humidity.

SNL/NM = Sandia National Laboratories/New Mexico.



## 2020-2021 Mixed Waste Landfill Biology Report

**Table 2**  
**Summary of January-March 2021 Meteorological Data at the Mixed Waste Landfill<sup>a</sup>**

Month	January	February	March
<b>Temperature (°F)</b>			
Monthly Mean	37.9	52.9	60.6
25-year Temperature Means	37.7	42.1	49.3
<b>Precipitation (Inches)</b>			
Monthly Total	0.13	0.26	0.31
25-year Precipitation Means	0.39	0.43	0.50
<b>Relative Humidity (%)</b>			
Monthly Mean	46.3	41.8	34.4
25-year Relative Humidity Means	51.1	44.5	35.8
<b>Wind (Miles/hour)</b>			
Monthly Mean	7.7	8.8	9.5
25-year Wind Speed Means	6.9	8.2	9.1

<sup>a</sup>Information Source: SNL/NM Meteorological Monitoring Network. Data presented is not validated, i.e., it is preliminary. These data will be validated, presented, and discussed in the June 2022 MWL Annual LTMM Report.

## 2020-2021 Mixed Waste Landfill Biology Report

### *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 30, 2021, the area was categorized as “Extreme Drought” according to the U.S. Drought Monitor (U.S. Drought Monitor March 2021). Total precipitation in 2020 was 6.42 inches, 28% below the 25-year annual mean of 8.86 inches.

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 2020 monsoon season experienced below normal precipitation (as established by the 25-year mean) and relative humidity. The MWL area received 3.41 inches of rain during this timeframe, which is 0.76 inches, or 18%, below the mean monsoon season rainfall of 4.17 inches. July received 0.53 inches above the mean precipitation for the month, but August and September received less than their respective means. Above normal precipitation in July had a lasting beneficial soil moisture effect into August when the Annual Biological Inspection was conducted. The average relative humidity for the 3-month monsoon timeframe was 34.5% versus the 25-year mean of 42.4%; approximately 19% below normal, mirroring the below average monsoon precipitation.

This dry trend continued October through December 2020, with well-below normal precipitation. The August-December 2020 precipitation total was 1.56 inches, this is 65% below the 25-year mean of 4.44 inches for this 5-month period. Only 0.40 inches of precipitation fell during the final three months of this timeframe, causing further drying of soils after a below normal monsoon season. January-March 2021 continued to be drier than normal with only 0.70 inches of precipitation, 47% less than the average of 1.32 inches.

Average relative humidity for August-December was 35.4%, below the 25-year mean of 45.5% for these five months. A 22% reduction in average relative humidity for this 5-month period is significant. Lower relative humidity for an extended time period can cause considerable plant stress. Relative humidity is the amount of water vapor present in air. Lower relative humidity increases plant moisture loss when plants open their stomata to intake carbon dioxide and release oxygen during photosynthesis. Reduced relative humidity stresses non-irrigated vegetation because plants lose more water to the environment during gas exchange. When coupled with reduced precipitation resulting in low soil moisture, plants can weaken. 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).

The 2020 monthly and annual wind speed means were very close to 25-year monthly and annual means. All monthly wind means were within 1.0 miles per hour of their respective 25-year means.

## 2020-2021 Mixed Waste Landfill Biology Report

### *Temperature*

Average monthly temperature for October 2019 through June 2020 was 1.4 degrees Fahrenheit (°F) warmer than the respective 25-year mean monthly average. Average annual temperature for 2020 was 59.3°F, 1.9°F above the 25-year annual mean of 57.4°F. The average annual temperature for 2020 was 3.2% above the mean.

In CY 2020 the MWL experienced 96.6 degrees of temperature variability, with a low of 6.8°F in February and a high of 103.4°F in July. In comparing mean monthly temperatures, nine months in 2020 exceeded their 25-year monthly means. Five of these warmer months exceeded their respective means by 2.4°F or greater: April +3.2°F, May +4.5°F, July +2.4°F, August +5.4°F, and November +3.9°F. Of note for sustained plant stress is the +5.4°F difference for August (80.2°F versus 74.8°F).

### **4.0 August 2020 Inspection Results**

The August 18, 2020 MWL ET Cover Biology Inspection occurred during the warm New Mexico growing season after the monsoon rains had begun. The growing season inspections allow the most accurate assessment of living plant coverage because the greatest amount of photosynthesis occurs during this time of the year.

The August 2020 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 mature 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 displayed healthy green leaves, indicating a good amount of photosynthetic activity. The native grass community on the ET Cover mirrored the appearance of the native grass community surrounding the MWL, including the very low presence of occasional weed species.

No small animal burrows were observed on the MWL ET Cover during the August 2020 Biology Inspection. Sixteen active 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 August 2020 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 2020. Biota sampling activities and results are presented in Chapter 8 of this MWL Annual LTMM Report.

A few lizards and an active dove nest with eggs were observed on the ET Cover. This observation is consistent with previous biology inspection observations that wildlife recognizes the MWL Cover as native habitat. Any personnel requiring access were instructed to remain at a distance from the nest. The nest location was marked by pin flags that were placed at a distance and centered on the nest. Mourning doves are protected under the Migratory Bird Treaty Act. The nest was periodically monitored by the SNL staff biologist until the young fledged, then the flags were removed.

### **5.0 Cover Maintenance**

Five minor weed control events were conducted during this reporting period in April, May, July, and October-November 2020 and March 2021 that included live and windblown, dead weed removal from the ET Cover, the perimeter fence and 3-foot area outside the fence, the area between the north toe of the ET Cover and the north fence, the western perimeter area between the fence and access road, the area surrounding all perimeter monitoring well erosion control features, and the perimeter drainage (i.e., swale on the east, north, and south sides of the ET Cover). Debris and weeds were also cleared from all the access road drainage culvert inlets and outlets during all maintenance events except for the July 2020 event.

The April 2020 weed control activities included the application of a pre-emergent herbicide, Prodiamine 65 WDG, to the areas surrounding the eastern and western perimeter monitoring well locations, the area between the north toe of the ET Cover and the north fence, the 3-foot area outside the perimeter fence, and the area from the western fence line up slope approximately 80 feet on to the ET Cover. The herbicide was applied to these areas where more prevalent weed growth has been observed in the past. The sterilant Hyvar was applied to the north and south staging areas. Prodiamine 65 WDG and Hyvar are approved for use at SNL/NM, were applied following the manufacturer's instructions, and do not carry a bee precaution rating according to the University of California Integrated Pest Management. During the March 2020 maintenance event thorny shrubs along the outside perimeter of the west fence were cut near the ground surface and a root killing herbicide (Garlon 4) was applied to the stump of the shrub. These shrubs have deep root systems and were removed to prevent their spread up onto the ET Cover.

The objective of this best practice work is to promote the health of the existing native grasses on the ET Cover and perimeter area by reducing competition with weedy species for limited moisture and nutrients and to minimize future maintenance. This ET Cover maintenance work is presented in Section 9.7 of this MWL Annual LTMM Report.

### **6.0 Recommendations**

The MWL ET Cover Biology Inspections will continue on an annual frequency and be conducted in August or September. As a best practice, the SNL staff biologist will continue to support quarterly ET Cover inspections, document observations, and provide recommendations to maintain the ecological health and integrity of the ET Cover.

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Routine, minor weed removal events will likely be needed during the April 2021 – March 2022 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 upon 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, mature native grasses in a relatively short period of time. Successful revegetation requirements were met in 5 years after initial seeding; this is a process that could take 50 years or more without active seeding and maintenance activities.

### **8.0 References**

Bearzi, J.P. (New Mexico Environment Department), December 2008. Letter to K. Davis (U.S. Department of Energy) and F. Nimick (Sandia Corporation), "Conditional Approval, Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005, Sandia National Laboratories NM5890110518, SNL-05-025." December 22, 2008.

Sandia National Laboratories/New Mexico (SNL/NM), March 2012. "Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill," Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 2015. "Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, January – March 2015," Sandia National Laboratories, Albuquerque, New Mexico.

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North portion of the cover from approximate center of ET cover



West portion of the cover from approximate center of ET cover



South portion of the cover from approximate center of ET cover



East portion of the cover from approximate center of ET cover

**Figure 1 August 18, 2020 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 south from north of the dogleg bend

**Figure 2 August 18, 2020 MWL ET Cover Photographs – Cover Side Slopes**