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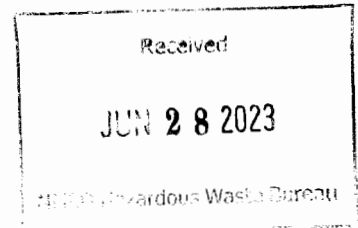


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NNSA-2023-004668



JUN 26 2023



Mr. Ricardo Maestas
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Subject: Submittal of Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, April 2022-March 2023, Sandia National Laboratories, New Mexico, Environmental Protection Agency Identification Number NM5890110518

Dear Mr. Maestas:

The Department of Energy, National Nuclear Security Administration, Sandia Field Office, and National Technology & Engineering Solutions of Sandia, LLC submit the Subject document dated June 2023. This submittal is required by Section 1.4.1 of the Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan and satisfies the requirements listed in Section 4.8.1.

If you have any questions, please contact me at (505) 845-6036 or Dr. Adria Bodour of our staff at (505) 845-6930 or adria.bodour@nnsa.doe.gov.

Sincerely,

Daryl J. Hauck, Ph.D.
Manager

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**Submittal of Mixed Waste Landfill Annual Long-Term
Monitoring & Maintenance Report, April 2022 – March 2023**

Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan

**Sandia National Laboratories
Albuquerque, New Mexico
EPA ID No. NM5890110518**

CERTIFICATION STATEMENT

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

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6/26/2023

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**Sandia
National
Laboratories**

**MIXED WASTE LANDFILL
ANNUAL LONG-TERM MONITORING & MAINTENANCE REPORT
APRIL 2022 – MARCH 2023**

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

JUNE 2023



**U.S. DEPARTMENT OF
ENERGY**



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

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

**MIXED WASTE LANDFILL ANNUAL
LONG-TERM MONITORING & MAINTENANCE REPORT
APRIL 2022 – MARCH 2023**

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, and incorporated into Attachment M of the Sandia National Laboratories Resource Conservation and Recovery Act Facility Permit by reference in March 2016.

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EXECUTIVE SUMMARY

The Mixed Waste Landfill (MWL) at Sandia National Laboratories, New Mexico 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 Final Order No. HWB 04-11(M) State of New Mexico Before the Secretary of the Environment in the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill, Sandia National Laboratories, Bernalillo County, New Mexico, EPA ID# 5890110518 (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 No. HWB 15-18 (P), State of New Mexico Before the Secretary of the Environment in the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID #5890110518, To Determine Corrective Action Complete with Controls at the Mixed Waste Landfill (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 tenth MWL Annual Long-Term Monitoring & Maintenance Report documents monitoring, inspection, maintenance, and repair activities conducted at the MWL during the April 1, 2022 through March 31, 2023 reporting period.

Sampling activities for this reporting period included two semiannual monitoring events each for groundwater and radon. As part of the second semiannual groundwater monitoring event conducted in October 2022, perfluoroalkyl and polyfluoroalkyl substances (PFAS), including perfluorohexane sulfonic acid (PFHxS), perfluorooctane sulfonic acid (PFOS), and perfluorooctanoic acid (PFOA), were added to the groundwater monitoring event. These constituents were included to address the New Mexico Environment Department (NMED) request (NMED July 2021) to evaluate toxic pollutants added to Subsection T of 20.6.2.7 NMAC since January 2014 (i.e., since NMED-approval of the MWL LTMMP). Soil-vapor monitoring was transitioned to an annual frequency in accordance with the LTMMP during the reporting period and was conducted in October 2022. Annual soil-moisture monitoring was conducted in April 2022, annual tritium surface soil sampling was conducted in June 2022, and annual biota sampling was conducted in September 2022. 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 or within 60 days of the inspections.

The Evapotranspirative 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 annual weedy species for limited moisture and nutrients.

Regulatory activities during the reporting period included submittal of the ninth MWL Annual Long-Term Monitoring & Maintenance Report, April 2021 - March 2022 (SNL/NM June 2022) that was approved by the NMED (Shean August 2022). Two submittals of various updated reference documents cited in the LTMMP SAPs were completed within 30 days of the document effective dates (Hauck May 2022 and November 2022) and were received and acknowledged by the NMED (Shean June 2022 and January 2023). The second LTMMP modification request to decommission groundwater monitoring well MWL-MW4 was also submitted to the NMED during this reporting period (Hauck March 2023).

All LTMMP requirements have been met for the April 1, 2022 through March 31, 2023 reporting period. Based upon monitoring, inspection, and maintenance results, the Evapotranspirative Cover and monitoring systems are functioning as designed and site conditions remain protective of human health and the environment.

TABLE OF CONTENTS

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

TABLE OF CONTENTS (Continued)

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

TABLE OF CONTENTS (Continued)

7.2	Laboratory Results.....	7-4
7.2.1	Environmental Sample Results.....	7-5
7.2.2	Field Quality Control Sample Results	7-14
7.2.3	Laboratory Quality Control and Data Quality	7-20
7.2.4	Variances and Non-Conformances.....	7-20
7.3	Hydrogeologic Assessment.....	7-20
8.0	BIOTA MONITORING RESULTS.....	8-1
8.1	Biota Monitoring Field Activities	8-1
8.1.1	Field Quality Control.....	8-1
8.1.2	Waste Management	8-1
8.2	Laboratory Results.....	8-3
8.2.1	Environmental Sample Results.....	8-3
8.2.2	Field Quality Control Sample Results	8-3
8.2.3	Laboratory Quality Control Data Quality	8-7
8.2.4	Variances	8-8
8.3	Data Evaluation and Monitoring Trigger Level.....	8-8
9.0	INSPECTION, MAINTENANCE, AND REPAIR RESULTS.....	9-1
9.1	Final Cover System.....	9-1
9.1.1	Biology Inspection	9-1
9.1.2	ET Cover System/Surface Inspection	9-2
9.2	Storm-Water Diversion Structure Inspection	9-2
9.3	Soil-Vapor Monitoring Network Inspection.....	9-3
9.4	Soil-Moisture Monitoring Network Inspection	9-3
9.5	Groundwater Monitoring Well Network Inspection.....	9-3
9.6	Security Fence Inspection.....	9-3
9.7	ET Cover Maintenance and Supplemental Watering.....	9-4
10.0	REGULATORY ACTIVITIES	10-1
10.1	MWL Regulatory Submittals.....	10-1
10.2	MWL LTMMP Modifications	10-2

TABLE OF CONTENTS (Concluded)

11.0 SUMMARY AND CONCLUSIONS	11-1
11.1 Monitoring Activities	11-1
11.2 Inspections/Maintenance/Repairs Activities	11-2
11.3 Regulatory Activities	11-3
11.4 Conclusions	11-3
12.0 REFERENCES.....	12-1

LIST OF FIGURES

Figure		Page
1-1	Location of the Mixed Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque	1-2
1-2	Location of the Mixed Waste Landfill within Technical Area-III	1-3
2-1	Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover Layers	2-7
2-2	Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover and How it Works	2-8
2-3	Mixed Waste Landfill Engineered Storm-Water Drainage Swale	2-9
3-1	Mixed Waste Landfill Radon Detector Locations	3-2
4-1	Mixed Waste Landfill Tritium Surface Soil Sampling Locations	4-2
5-1	Mixed Waste Landfill Soil-Vapor Monitoring Well Locations	5-2
5-2	PCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports	5-11
5-3	PCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports	5-12
5-4	PCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports	5-13
5-5	PCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports	5-14
5-6	TCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports	5-15
5-7	TCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports	5-16
5-8	TCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports	5-17
5-9	TCE Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports	5-18

LIST OF FIGURES (Concluded)

Figure		Page
5-10	Total VOCs Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports.....	5-19
5-11	Total VOCs Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports.....	5-20
5-12	Total VOCs Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports.....	5-21
5-13	Total VOCs Concentrations vs. Time, Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports.....	5-22
6-1	Mixed Waste Landfill Soil-Moisture Monitoring Locations.....	6-2
6-2	Mixed Waste Landfill MWL-VZ-1 Soil-Moisture Monitoring Results.....	6-4
6-3	Mixed Waste Landfill MWL-VZ-2 Soil-Moisture Monitoring Results.....	6-5
6-4	Mixed Waste Landfill MWL-VZ-3 Soil-Moisture Monitoring Results.....	6-6
7-1	Mixed Waste Landfill Groundwater Monitoring Well Locations.....	7-2
7-2	Nickel Concentrations vs. Time, Mixed Waste Landfill Groundwater Monitoring Wells.....	7-15
7-3	Uranium Concentrations vs. Time, Mixed Waste Landfill Groundwater Monitoring Wells.....	7-16
7-4	Gross Alpha Activity vs. Time, Mixed Waste Landfill Groundwater Monitoring Wells.....	7-17
7-5	Groundwater Level Elevations at Mixed Waste Landfill Groundwater Monitoring Wells.....	7-21
7-6	Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2022.....	7-23
8-1	Mixed Waste Landfill Biota Sampling Locations.....	8-2

LIST OF TABLES

Table		Page
2-1	Mixed Waste Landfill Monitoring Parameters, Frequencies, and Methods.....	2-2
2-2	Mixed Waste Landfill Inspection, Maintenance, and Repair Requirements.....	2-4
3-1	Summary of Radon Results, Mixed Waste Landfill Air Monitoring, Calendar Year 2022	3-3
4-1	Summary of Tritium Results (EPA Method 906.0), Mixed Waste Landfill Surface Soil Monitoring, June 2022.....	4-4
5-1	Summary of Detected VOCs (EPA Method TO-15), Mixed Waste Landfill Soil-Vapor Monitoring, October 2022	5-25
5-2	Summary of Duplicate Samples, Mixed Waste Landfill Soil-Vapor Monitoring, October 2022	5-6
5-3	Summary of Historical PCE Concentrations, Mixed Waste Landfill Soil-Vapor Monitoring.....	5-8
5-4	Summary of Historical TCE Concentrations, Mixed Waste Landfill Soil-Vapor Monitoring	5-9
5-5	Summary of Historical Total VOCs Concentrations, Mixed Waste Landfill Soil-Vapor Monitoring.....	5-10
7-1	Summary of Method Detection Limits for Volatile Organic Compounds (EPA Method 8260D) and Perfluoroalkyl and Polyfluoroalkyl Substances (Method 537.1), Mixed Waste Landfill Groundwater Monitoring, May and October 2022.....	7-6
7-2	Summary of Detected Volatile Organic Compound Results (EPA Method 8260D), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, May and October 2022.....	7-8
7-3	Summary of Cadmium, Chromium, Nickel, and Uranium Results (EPA Method 6020B), Mixed Waste Landfill Groundwater Monitoring, May and October 2022.....	7-9
7-4	Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results, Mixed Waste Landfill Groundwater Monitoring, May and October 2022	7-11

LIST OF TABLES (Concluded)

Table		Page
7-5	Summary of Field Water Quality Measurements, Mixed Waste Landfill Groundwater Monitoring, May and October 2022	7-13
7-6	Summary of Duplicate Sample Results, Mixed Waste Landfill Groundwater Monitoring, May and October 2022	7-18
8-1	Summary of Metals Results (EPA Method 6010D/7471B), Mixed Waste Landfill Biota Monitoring, September 2022	8-4
8-2	Summary of Gamma Spectroscopy Results (EPA Method 901.1), Mixed Waste Landfill Biota Monitoring, September 2022	8-6
8-3	Summary of Duplicate Sample Results, Mixed Waste Landfill Biota Monitoring, September 2022.....	8-7
9-1	Inspection Frequency and Dates Performed, Mixed Waste Landfill, April 2022 – March 2023 Reporting Period	9-2
10-1	Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan Document Submittals, April 2022 through March 2023 Reporting Period	10-1

LIST OF ANNEXES

Annex

Annex A	Mixed Waste Landfill Radon Monitoring Forms and Reports, January – December 2022
Annex B	Mixed Waste Landfill Surface Soil Tritium and Biota Monitoring Forms and Reports, April 2022 – March 2023
Annex C	Mixed Waste Landfill Soil-Vapor Monitoring Forms and Reports, April 2022 – March 2023
Annex D	Mixed Waste Landfill Soil-Moisture Monitoring Forms, April 2022 – March 2023
Annex E	Mixed Waste Landfill Groundwater Monitoring Forms and Reports, April 2022 – March 2023
Annex F	Mixed Waste Landfill Inspection Forms, April 2022 – March 2023
Annex G	Mixed Waste Landfill Biology Report, April 2022 – March 2023

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
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ET	evapotranspirative
FLUTE™	Flexible Liner Underground Technology, Ltd.™
FOP	Field Operating Procedure
ft bgs	feet below ground surface
GEL	GEL Laboratories, LLC.
gpm	gallons per minute
HWB	Hazardous Waste Bureau
KAFB	Kirtland Air Force Base
LTMM	Long-Term Monitoring & Maintenance
LTMMP	Long-Term Monitoring and Maintenance Plan
MDA	minimum detectable activity
MDL	method detection limit
mg/L	milligrams per liter
MWL	Mixed Waste Landfill
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
PCE	tetrachloroethene
PFAS	Perfluoroalkyl and polyfluoroalkyl substances
PFHxS	Perfluorohexane sulfonic acid (
PFOS	perfluorooctane sulfonic acid
PFOA	perfluorooctanoic acid
pCi/L	picocuries per liter
Permit	RCRA Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518
PPE	personal protective equipment
ppmv	parts per million by volume
PQL	practical quantitation limit
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SME	subject matter expert
SNL/NM	Sandia National Laboratories, New Mexico
SWMU	solid waste management unit
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/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. Primary SNL/NM operations are 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 the Albuquerque International Sunport, in the north-central portion of Technical Area-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 U.S. Department of Energy 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, 2022 through March 31, 2023 reporting period. This tenth 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 (SWMU 76) that underwent corrective action in accordance with the following regulatory criteria:

- New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) *Final Order No. HWB 04-11(M), State of New Mexico Before the Secretary of the Environment in the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill, Sandia National Laboratories, Bernalillo County, New Mexico, EPA ID# 5890110518* (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)

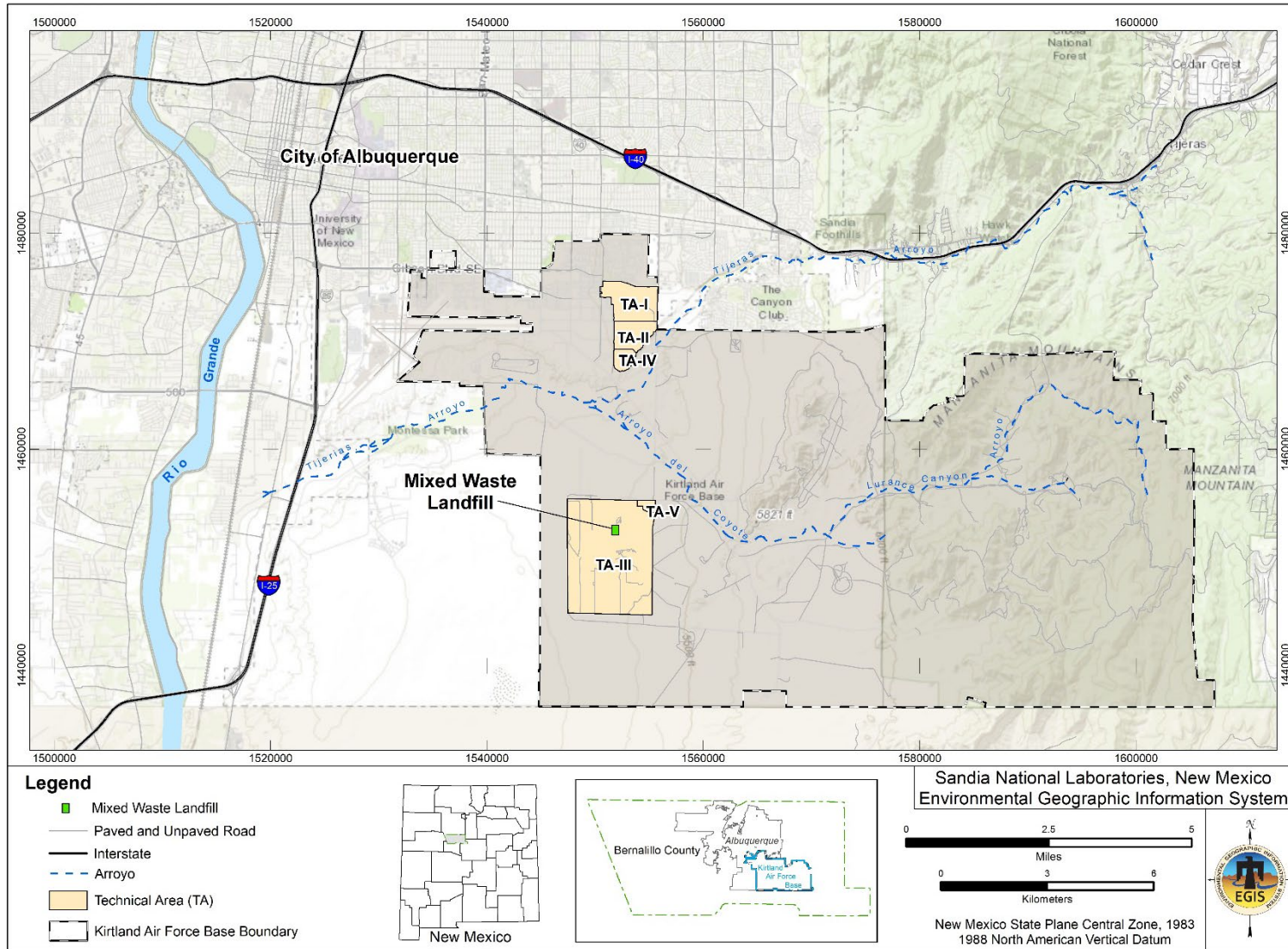


Figure 1-1
Location of the Mixed Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

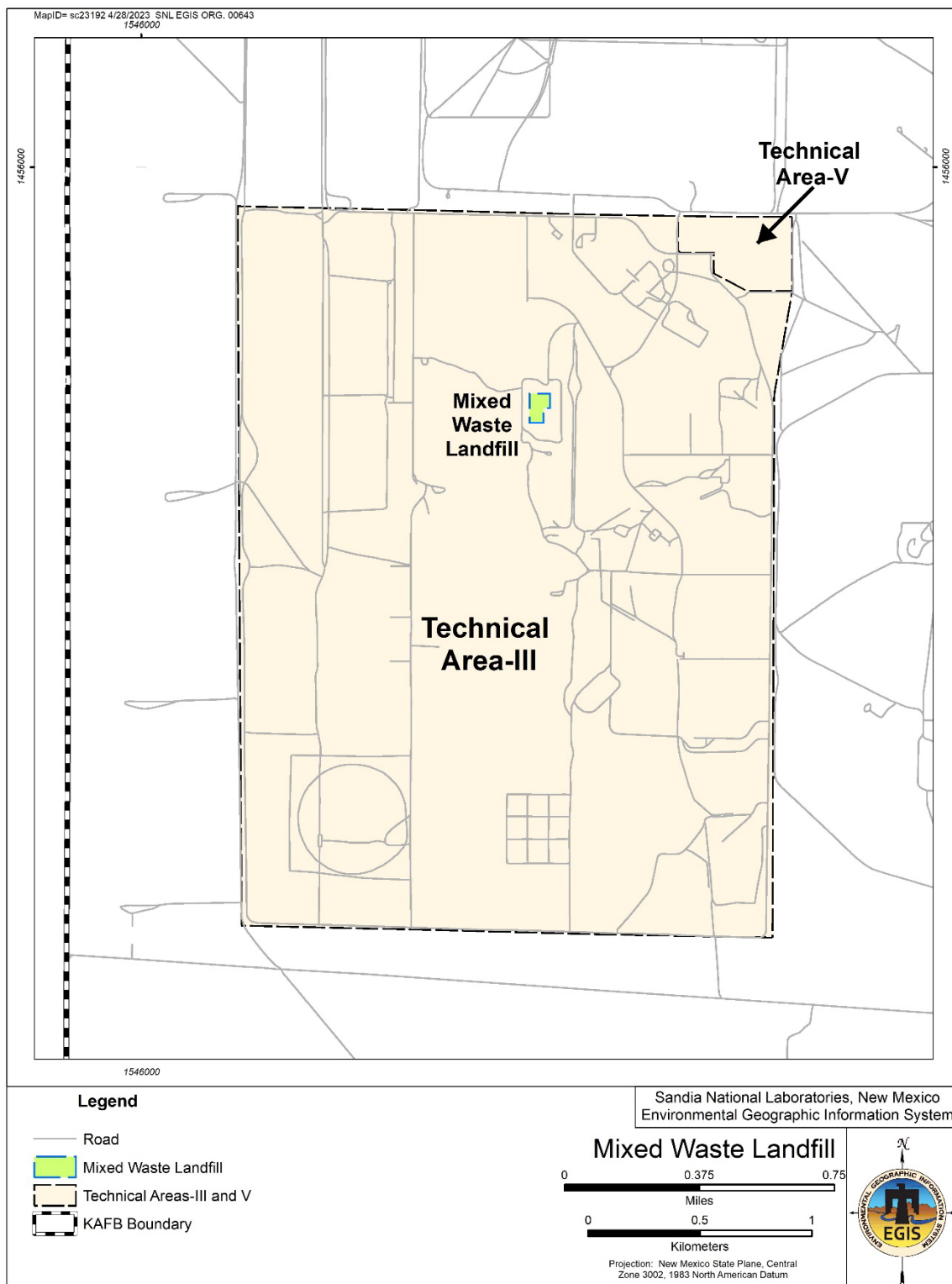


Figure 1-2
Location of the Mixed Waste Landfill within Technical Area-III

On February 12, 2016, the NMED issued the *Final Order No. HWB 15-18 (P), State of New Mexico Before the Secretary of the Environment in the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID #5890110518, To Determine Corrective Action Complete with Controls at the Mixed Waste Landfill* (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 the NMED on January 8, 2014 (Blaine January 2014) and is included by reference in Attachment M of the Permit (Kielling February 2016). Long-term monitoring and maintenance activities 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, 2022 through March 31, 2023 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 soil moisture and soil vapor, 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. Vadose zone soil-vapor monitoring was transitioned to an annual frequency this reporting period after an extended period of semiannual sampling (eight years instead of three years) as a best practice (i.e., higher frequency than required) to help keep the sample port and tubing clear (Section 5.1).

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 current 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 April 1, 2022 through March 31, 2023 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

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

Sampling Media	Monitoring Parameters ^a / Constituents of Concern	Monitoring Frequency ^a	Number of Samples Per Event	Monitoring Locations	Monitoring Method ^b	Comments
Air	Radon-222	Year 1 – Quarterly Year 2 – Quarterly Year 3 – Semiannual Year 4 – Semiannual Year 5 and subsequent years – Annual	17	10 detectors placed at corners and midpoints of perimeter fence 5 detectors placed on completed cover 2 detectors at background locations	Radon detectors (at breathing zone height) capable of long exposure periods; 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 ^a / Constituents of Concern	Monitoring Frequency ^a	Number of Samples Per Event	Monitoring Locations	Monitoring Method ^b	Comments
Groundwater	VOCs, metals ^c , tritium, radon, gamma-emitting radionuclides ^d , and gross alpha/beta activity	Semiannual	4	MWL compliance groundwater monitoring well network: MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9	Sampling and analysis of groundwater samples per LTMMMP Appendix F	Monitoring wells MWL-MW4, MWL-MW5, and MWL-MW6 retained for monitoring groundwater elevation only.
Biota – Surface Soil	Metals ^e and gamma-emitting radionuclides ^f	Annual	Up to 4 (2 each, if they exist)	Variable - ant hills and animal burrows on the 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 ^f in vegetation	Annual	Up to 2 if they exist	Variable - potentially deep-rooted vegetation overlying former disposal areas located during ET Cover inspections, if present	Grab sampling and analysis of vegetation, including the plant and root system per LTMMMP Appendix G	If no potentially deep-rooted plants are present, no samples will be collected.

Notes:

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

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

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

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

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

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

bgs = Below ground surface.

ET = Evapotranspirative.

FLUTE™ = Flexible Liner Underground Technologies, Ltd.™

ft = Foot (feet).

LTMMMP

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

Refer to footnotes at end of table.

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

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

Notes:

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

^bThe transition from quarterly to annual inspections by a staff biologist is based upon meeting successful revegetation criteria as determined by the staff biologist (SNL/NM March 2012), which occurred as of the August 2014 growing season inspection.

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

> = Greater than.

ET = Evapotranspirative.

ft² = Square feet.

MWL = Mixed Waste Landfill.

inspection forms. Example long-term monitoring inspection checklists/forms are contained in the LTMMMP, Appendix I. Results of inspection activities conducted at the MWL during the subject 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 Technical Area-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-water 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 road was improved. The surface of the road was raised, road ditches were installed on each side, and culverts were installed (SNL/NM June 2017). 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).

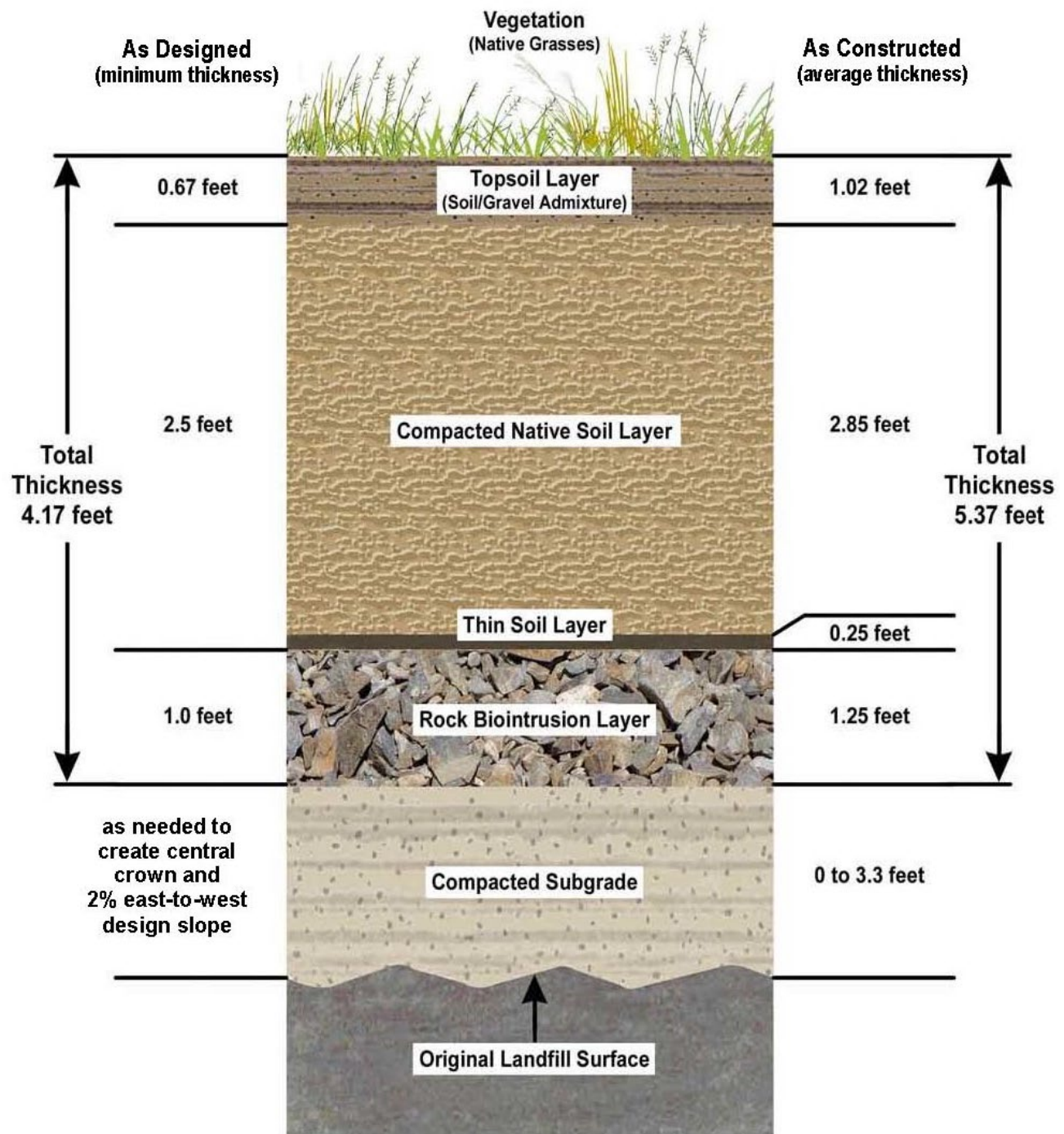


Figure 2-1
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover Layers

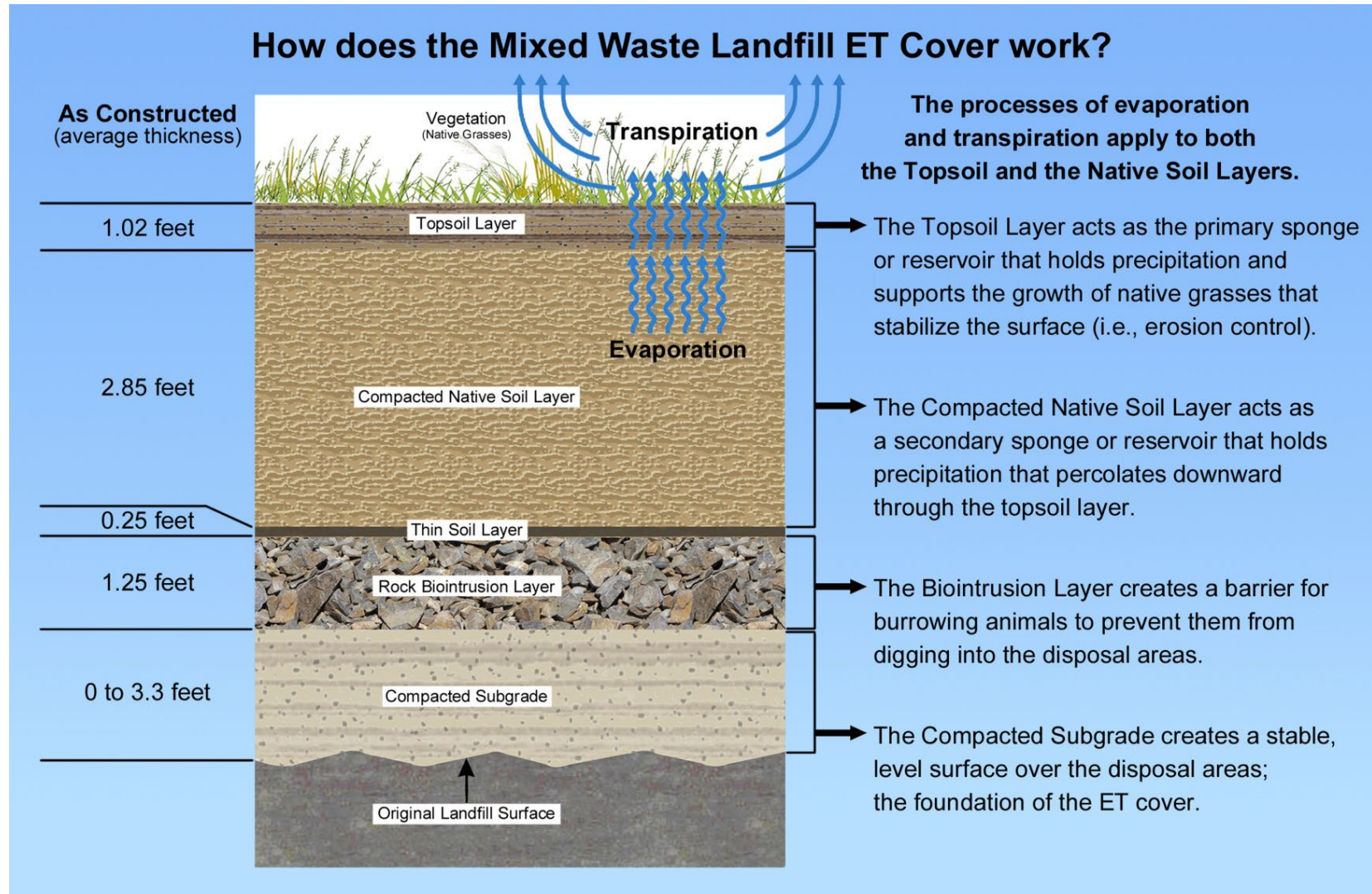


Figure 2-2
Schematic Profile of the Mixed Waste Landfill Evapotranspirative Cover and How it Works

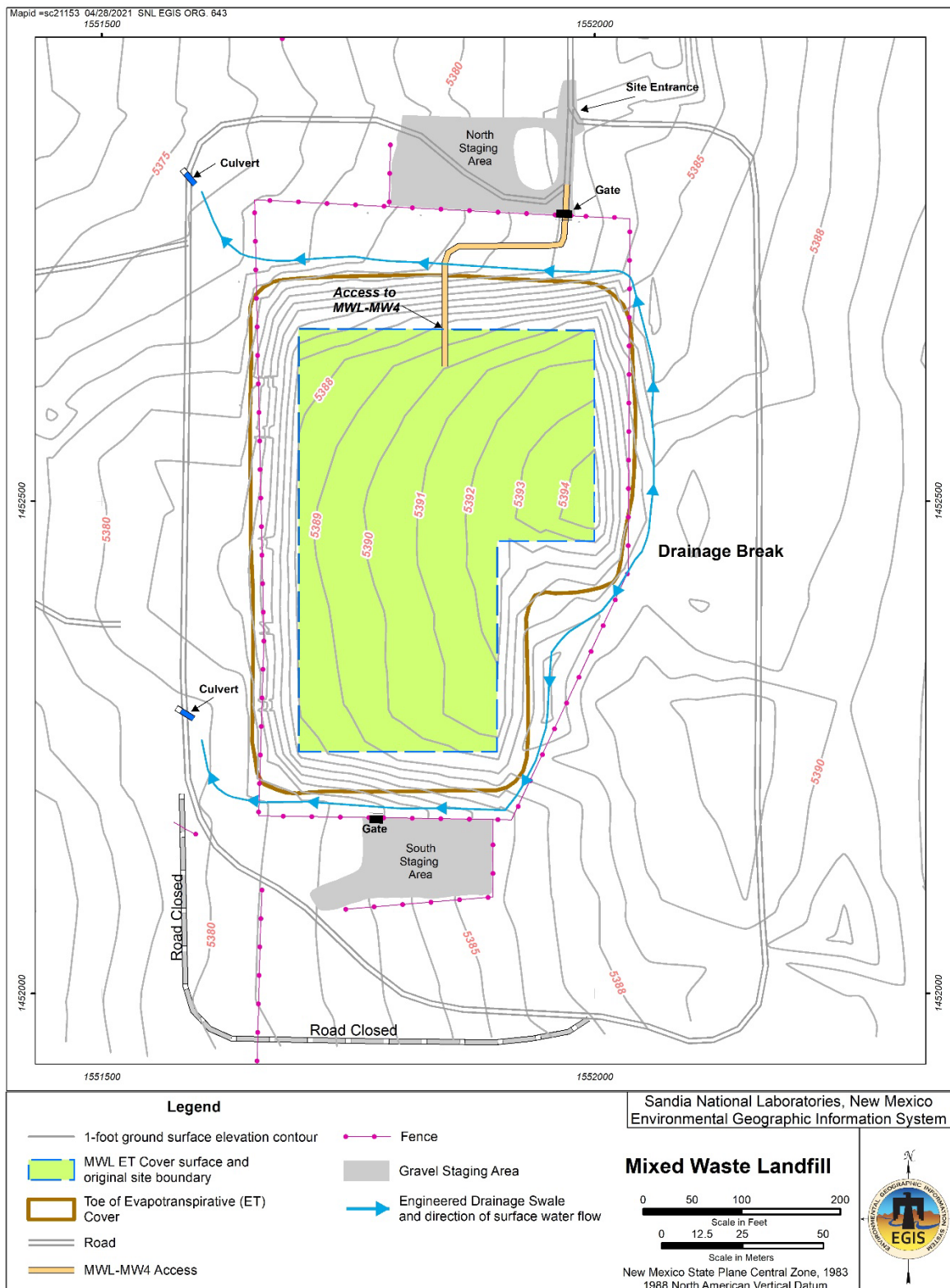


Figure 2-3
Mixed Waste Landfill Engineered Storm-Water Drainage Swale

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

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 more than four 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) 2022, fulfilling the LTMMMP minimum requirement of annual monitoring. Radon monitoring presented for this April 1, 2022 through March 31, 2023 reporting period covers the period January 17, 2022 through January 16, 2023.

The radon air measurements were obtained using alpha-track radon gas detectors manufactured by Radonova (formerly Landauer® Nordic). Radonova introduced Radtrak3® detectors in CY 2022 that replaced the older model Radtrak2® detectors. The Radtrak3® detectors are more sensitive (i.e., lower detection limit) than the Radtrak2® detectors. Radtrak2® detectors were used for the first six-month monitoring event and Radtrak3® detectors were used for the second six-month monitoring event during CY 2022.

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 2022 range of radon air concentrations.

Radon monitoring results were reviewed and evaluated by an SNL/NM Health Physics subject matter expert (SME) and documented in a data evaluation memorandum. The SME data evaluation memoranda, which include the Analysis Request/Chain-of-Custody form (AR/COCs), the laboratory report, and a map showing all monitoring locations, are provided in Annex A. The results of CY 2022 radon monitoring are summarized in Section 3.2.1.

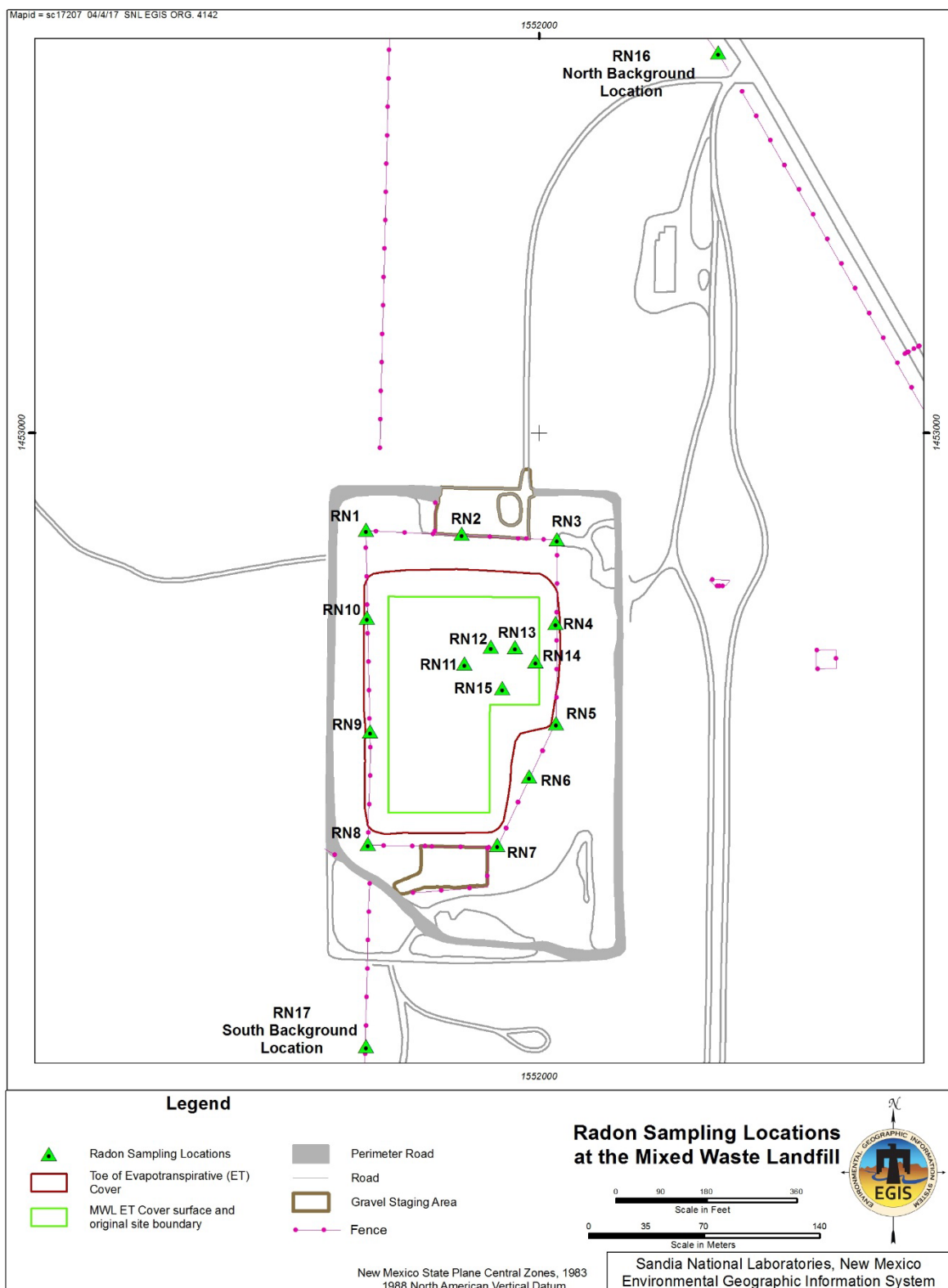


Figure 3-1
Mixed Waste Landfill Radon Detector Locations

Table 3-1
Summary of Radon Results
Mixed Waste Landfill Air Monitoring
Calendar Year 2022

Sample Location ^a	1 st Half CY 2022		2 nd Half CY 2022		CY 2022 Radon Air Concentration Range (pCi/L)	Trigger Level (pCi/L)
	Detector Deployment Date	Detector Collection Date	Detector Deployment Date	Detector Collection Date		
	1/17/2022	7/18/2022	7/18/2022	1/16/2023		
	Semiannual Time-Weighted Average Radon Air Concentration (pCi/L)					
RN1	<0.3 ^b		0.3 ± 0.2		<0.3 to 0.3	4
RN2	0.3 ± 0.1		0.4 ± 0.1		0.3 to 0.4	4
RN3	0.4 ± 0.2		0.3 ± 0.2		0.3 to 0.4	4
RN4	0.3 ± 0.2		0.4 ± 0.1		0.3 to 0.4	4
RN5	0.2 ± 0.1		0.5 ± 0.2		0.2 to 0.5	4
RN6	0.2 ± 0.1		0.4 ± 0.2		0.2 to 0.4	4
RN7	0.4 ± 0.2		0.4 ± 0.2		0.4	4
RN8	0.2 ± 0.1		0.5 ± 0.2		0.2 to 0.5	4
RN9	0.2 ± 0.1		0.5 ± 0.2		0.2 to 0.5	4
RN10	<0.2 ^b		0.4 ± 0.2		<0.2 to 0.4	4
RN11	<0.2 ^b		0.4 ± 0.2		<0.2 to 0.4	NA
RN12	0.6 ± 0.2		0.3 ± 0.2		0.3 to 0.6	NA
RN13	0.6 ± 0.2		0.3 ± 0.2		0.3 to 0.6	NA
RN14	0.2 ± 0.1		0.4 ± 0.2		0.2 to 0.4	NA
RN15	0.3 ± 0.2		0.4 ± 0.2		0.3 to 0.4	NA
RN16	0.2 ± 0.2		0.3 ± 0.2		0.2 to 0.3	NA
RN17	0.4 ± 0.2		0.3 ± 0.2		0.3 to 0.4	NA
RNTB	<0.2 ^b		<0.3 ^b		<0.2 to <0.3	NA

Notes:

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

^bNot 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® (first six-month period) and Radtrak3® (second six-month period) radon detectors were deployed and collected on a semiannual or six-month schedule in CY 2022 at the 17 monitoring locations. The results correspond to the time periods mid-January through mid-July 2022 and mid-July 2022 through mid-January 2023 (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 observed 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 (RN16 and RN17). The trip blank sample is used to confirm detectors were not contaminated during storage and shipment to the analytical laboratory. Two field background samples were collected at areas outside of the MWL, but within Technical Area-III, to confirm natural radon activities in the vicinity of the MWL (Figure 3-1). The two field background sample results were 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 2022. The detectors were submitted to Radonova for analysis. Laboratory reports and contract verification reviews are filed in the SNL/NM Record Center and included in Annex A.

3.2.1 Environmental Sample Results

The compiled semiannual monitoring results are presented in Table 3-1. The CY 2022 range of results for all monitoring locations was less than 0.2 (i.e., not detected) to 0.6 pCi/L. The background location results were 0.2 to 0.3 pCi/L (at RN16) and 0.3 to 0.4 pCi/L (at RN17). 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 two six-month monitoring periods, the trip blank results were non-detections (Table 3-1). These results indicate the other detectors were not exposed to radon during shipping and/or at the laboratory.

The two field background sample results (RN16 and RN17) for the two six-month monitoring periods were similar to the semiannual monitoring 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 the two semiannual or six-month monitoring periods. All data were determined to be acceptable and met the DQOs.

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 monitoring locations during CY 2022. The highest reported CY 2022 result was 0.6 pCi/L at locations RN12 and RN13 (first six-month monitoring period) located on the ET Cover. These results were similar to the background location results and confirm low levels of radon activity in air at the MWL consistent with natural background levels and historical results. These results indicate there were no releases of radon gas associated with sealed radium-226 sources in the disposal areas.

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4.0 TRITIUM SURFACE SOIL MONITORING RESULTS

This chapter presents tritium monitoring field activities (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, analytical laboratory results and a discussion of data quality are presented in Section 4.2, and 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 June 23, 2022, 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 were reviewed and evaluated by an SNL/NM Health Physics SME. Annex B contains the data evaluation memoranda prepared by the Health Physics SME, contract verification and data validation reviews, and AR/COC forms. The June 2022 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 June 23, 2022 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 20 environmental samples or 1 per sample batch sent to the laboratory. The environmental-duplicate sample pair for the June 2022 sampling event was collected at the northeast corner of the ET Cover, tritium monitoring location MWL TS-2NE (Figure 4-1).

4.1.2 Waste Management

Waste generated during sampling activities, which included personal protective equipment (PPE) (i.e., gloves) and decontamination wipes, 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.

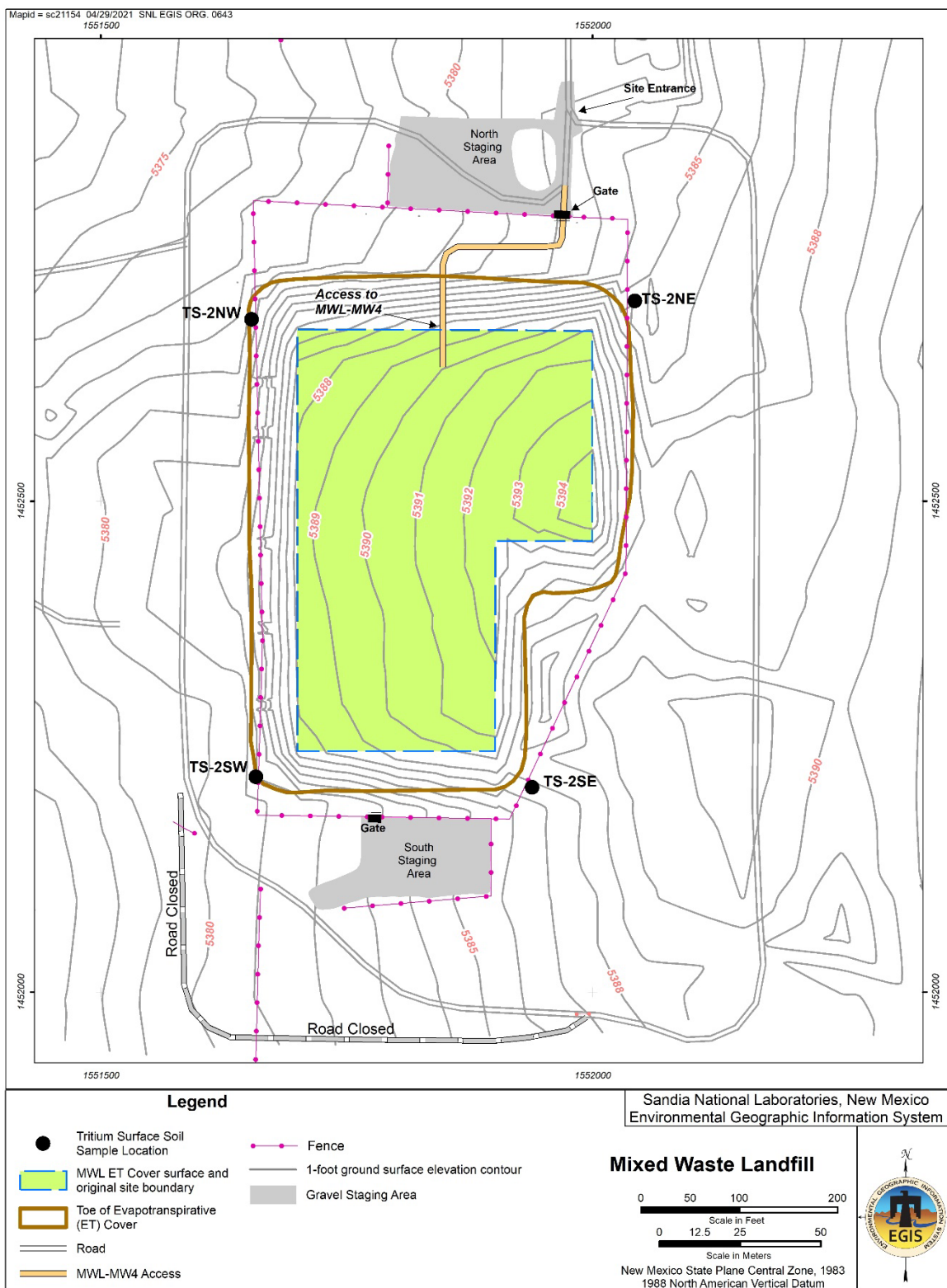


Figure 4-1
Mixed Waste Landfill Tritium Surface Soil Sampling Locations

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 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 considered non-detections. 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 June 2022 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 6.11 to 9.29 percent by mass, and the MDA ranged from 145 pCi/L to 206 pCi/L. The results are consistent with historical results and 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 result 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 the EPA method. 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 2020).

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

4.2.4 Variances

There were no variances from the LTMMMP tritium monitoring requirements.

Table 4-1
Summary of Tritium Results (EPA Method 906.0^a)
Mixed Waste Landfill Surface Soil Monitoring
June 2022

Sample Location	Result (pCi/L)	Percent Soil Moisture	MDA (pCi/L)	Laboratory Qualifier ^b	Validation Qualifier ^b	Trigger Level (pCi/L)
MWL TS-2NW	100	8.54	206	U	BD, FR3	20,000
MWL TS-2SW	106	9.29	145	U	BD, FR3	
MWL TS-2SE	64.9	8.56	145	U	BD, FR3	
MWL TS-2NE	58.9	8.45	148	U	BD, FR3	
MWL TS-2NE (Duplicate)	37.6	6.11	159	U	BD, FR3	

Notes:

^aEPA, 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.

^bLaboratory/Validation Qualifier

Laboratory Qualifier

U = Analyte activity is below the detection limit.

Validation Qualifier

BD = Result that is not statistically different from zero.

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

EPA = U.S. Environmental Protection Agency.

MDA = Minimum detectable activity.

MWL = Mixed Waste Landfill.

pCi/L = Picocuries per liter.

4.3 Data Evaluation and Monitoring Trigger Level

The trigger level for tritium as measured in soil moisture from surface soil samples is 20,000 pCi/L. No June 2022 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 June 2022 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.TM (FLUTETM) multi-sampling-port wells. Each has 5 sampling ports at depths of approximately 50, 100, 200, 300, and 400 ft bgs. The locations of these five soil-vapor monitoring wells are shown in Figure 5-1.

One soil-vapor monitoring event was conducted on October 28, 2022 meeting the LTMMMP annual monitoring requirement for the April 1, 2022 through March 31, 2023 reporting period. Soil-vapor samples were collected from all monitoring well sampling ports. Environmental duplicate samples were collected from two MWL-SV05 sampling ports (100 and 300 ft bgs). Field forms and documentation that address well evacuation, purge volumes, and vacuum pressure readings for each sample container are provided in Annex C.

A semiannual frequency was maintained from 2014 through 2021 (eight years of semiannual events) to ensure all sampling ports remained open and capable of providing representative samples. More frequent purging and sampling helps keep the sample ports and related tubing clear. In accordance with Table 3.1-1 of the LTMMMP, three years of semiannual sampling are required prior to transitioning to annual sampling. The transition to annual sampling occurred during this April 1, 2022 through March 31, 2023 reporting period.

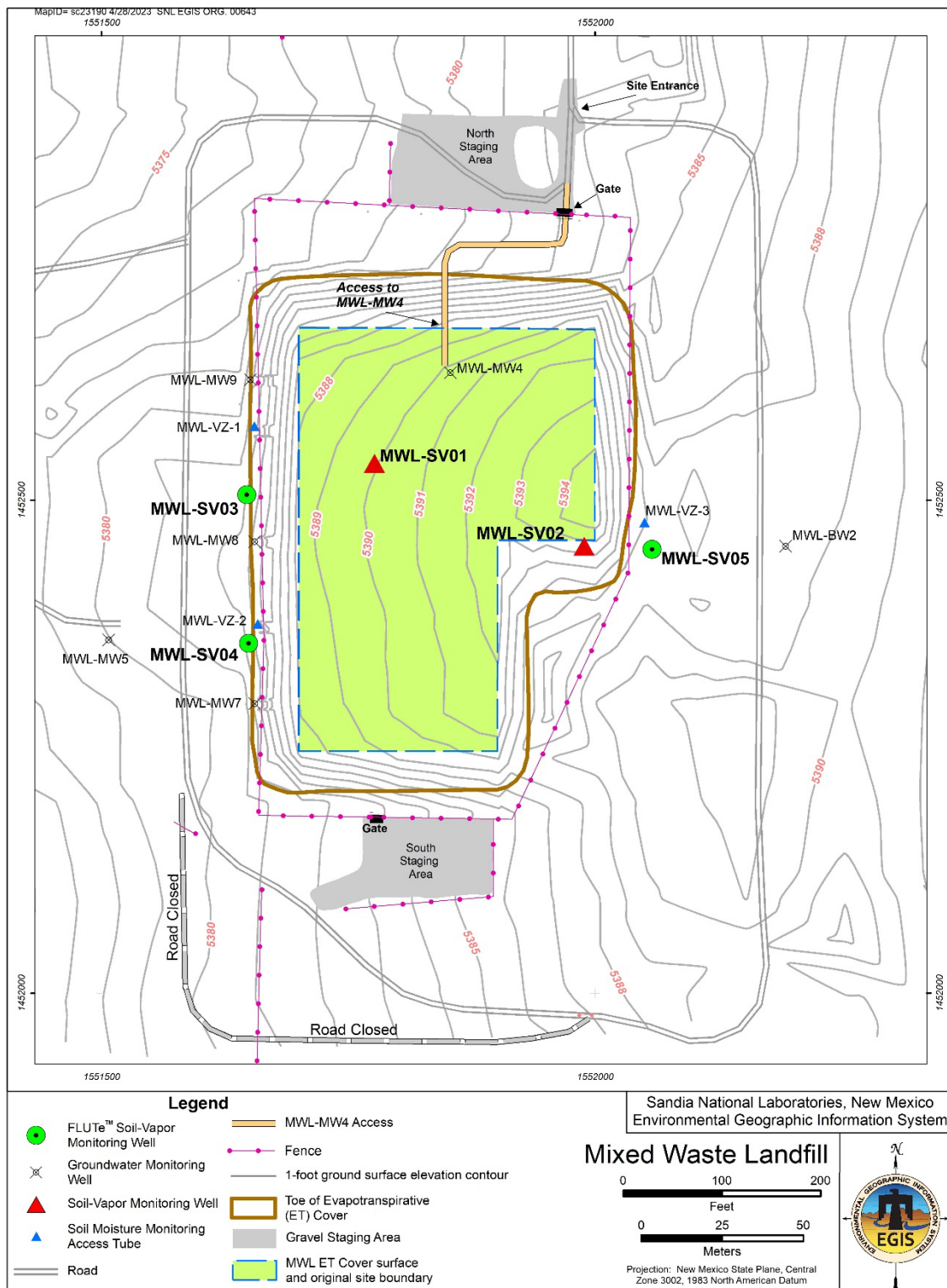


Figure 5-1
Mixed Waste Landfill Soil-Vapor Monitoring Well Locations

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 prior to sampling in accordance with procedures described in field operating procedure (FOP) FOP 08-22, "Soil-Vapor Monitoring" (SNL/NM October 2022) and LTMMP Appendix D. All wells were purged using a dedicated MWL vacuum pump.

5.1.2 Field Quality Control

Field QC samples include environmental duplicate samples (two per 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 October 2022 sampling event included the collection of an environmental-duplicate sample pair from monitoring well MWL-SV05 (sampling ports located at 100 ft bgs and 300 ft bgs). 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 soil-vapor monitoring event. 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, dates of analyses, and data validation reports are filed in the SNL/NM Record Center.

As defined in the LTMMP Section 5.2.3.1, 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 0.300 ppmv and the TCE maximum concentration was 0.190 ppmv; both from the MWL-SV03-400 environmental sample. The maximum Total VOCs concentration was 0.59960 ppmv, also from the MWL-SV03-400 environmental sample. The October 2022 VOC soil-vapor results (i.e., detections reported by the laboratory) are presented in Table 5-1 at the end of this section. Laboratory certificates of analysis that include all analytical results for environmental and field QC samples are provided in Annex C.

5.2.1 Environmental Sample Results

This section summarizes soil-vapor monitoring results for the October 28, 2022 sampling event. A summary of compounds detected is provided below and a summary of historical data (i.e., soil-vapor results collected since implementation of the LTMMP in January 2014) is presented in Section 5.3.

A total of 14 compounds were detected in October 2022 environmental samples after data validation. All of these VOCs, except chloromethane, were also detected in the November 2021 samples. The VOCs acetone and methylene chloride were reported by the laboratory as low-concentration detections above their respective MDLs but were qualified as not detected during validation due to field QC results (Section 5.2.2).

Benzene	1,1-Dichloroethene
Carbon Disulfide	cis-1,2-Dichloroethene
Carbon Tetrachloride	Tetrachloroethene (PCE)
Chloroform	1,1,2-Trichloro-1,2,2-trifluoroethane
Chloromethane	1,1,1-Trichloroethane
Dichlorodifluoromethane	Trichloroethene (TCE)
1,1-Dichloroethane	Trichlorofluoromethane

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 0.034 ppmv (MWL-SV02-41.5) to 0.300 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.027 ppmv (MWL-SV02-41.5) to 0.200 ppmv (MWL-SV05-200). Total VOCs concentrations ranged from 0.19082 ppmv (MWL-SV04-50) to 0.70205 ppmv (MWL-SV05-200). Other VOCs detected in all monitoring wells, generally at lower concentrations, included chloroform; dichlorodifluoromethane; 1,1-dichloroethane; 1,1-dichloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane; and trichlorofluoromethane. The highest sample port VOC concentration was the PCE result of 0.300 ppmv from MWL-SV03-400.

For the three deepest sampling ports of MWL-SV03, MWL-SV04, and MWL-SV05, PCE concentrations ranged from 0.080 ppmv (MWL-SV04-400) to 0.300 ppmv (MWL-SV03-400). TCE concentrations ranged from 0.045 ppmv (MWL-SV04-400) to 0.190 ppmv (MWL-SV03-

400). Total VOCs concentrations ranged from 0.22992 ppmv (MWL-SV04-400) to 0.59960 ppmv (MWL-SV03-400).

5.2.2 Field Quality Control Sample Results

As described in Section 5.1.2, the field QC sampling protocol for the October 2022 sampling event 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 5-2 summarizes results of environmental-duplicate sample pair analyses and the calculated RPD values for the October 2022 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.

The two environmental-duplicate sample pairs collected during the October 2022 sampling event were analyzed for all analytical parameters. The calculated RPDs show good agreement for the environmental-duplicate sample pairs, ranging from less than 1 to 14. An RPD of 50 or less demonstrates acceptable precision of the sampling and analytical processes in accordance with Appendix D of the LTMMP.

A total of five field blank samples were submitted for analysis with the October 2022 environmental samples. Validated VOC detections in field blank samples at very low concentrations include: acetone (4 samples); benzene (1 sample); 2-butanone (3 samples); ethylbenzene (1 sample); 2-hexanone (1 sample); methylene chloride (5 samples); 4-methyl-, 2-pentanone (1 sample); toluene (5 samples); TCE (1 sample); trichlorofluoromethane (1 sample); m,p-xylene (1 sample); and o-xylene (1 sample). No corrective action was required for benzene, 2-butanone, ethylbenzene, 2-hexanone, 4-methyl-, 2-pentanone, toluene, TCE, trichlorofluoromethane, m,p-xylene, or o-xylene since these compounds were not detected in associated environmental samples or were detected at concentrations greater than 5 times the field blank concentration. Acetone results for MWL-SV04-200 and MWL-SV04-400 and the methylene chloride result for MWL-SV05-200 were qualified as not detected during data validation since the environmental sample concentrations were less than the associated field blank QC sample results.

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 comply with the analytical method requirements.

Table 5-2
Summary of Duplicate Samples
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Parameter	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a (%)
	(ppmv)		
Environmental-Duplicate Sample Pair Results			
MWL-SV05-100			
Dichlorodifluoromethane	0.068	0.067	1
1,1-Dichloroethene	0.012	0.012	< 1
Tetrachloroethene	0.081	0.081	< 1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.070	0.069	1
1,1,1-Trichloroethane	0.0096	0.0096	< 1
Trichloroethene	0.10	0.099	1
Trichlorofluoromethane	0.14	0.14	< 1
MWL-SV05-300			
Dichlorodifluoromethane	0.038	0.040	5
1,1-Dichloroethene	0.013	0.014	7
Tetrachloroethene	0.089	0.091	2
1,1,2-Trichloro-1,2,2-trifluoroethane	0.093	0.093	< 1
Trichloroethene	0.071	0.082	14
Trichlorofluoromethane	0.026	0.030	14

Notes:

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

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

where:

R₁ = Analysis result.
R₂ = Duplicate analysis result.

% = Percent.
< = Less than.
ID = Identification.
MWL-SV = Mixed Waste Landfill-soil vapor well.
ppmv = Parts per million by volume.

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 2020). Corrective action was implemented in accordance with the data validation procedure and included qualification of specific results as documented in Table 5-1 and the data validation reviews. The October 2022 environmental sample analytical data were determined to be acceptable and meet the DQOs. Data validation reviews that include AR/COC forms, contract verification reviews, and certificates of analysis are provided in Annex C.

5.2.4 Variances

There were no variances from requirements in the LTMMF identified for the October 2022 soil-vapor monitoring activities.

5.3 Historical Data Evaluation

Tables 5-3, 5-4, and 5-5 summarize the 2022 and historical results for PCE, TCE, and Total VOCs, respectively, which are graphically presented in Figures 5-2 through 5-13. Trigger levels are not shown on the figures due to scale. Each table presents results for the 16 semiannual monitoring events and one annual event conducted since implementation of the LTMMMP in 2014. Key points from the evaluation of the 2014 through 2022 soil-vapor monitoring results are summarized below.

- All individual VOC and Total VOC results for all monitoring well sampling ports are low concentrations (less than 0.600 and 1.150 ppmv, respectively).
- 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.
- The VOC concentrations are generally stable or decreasing over time and indicate the VOC soil-vapor plume is not a threat to groundwater.

Table 5-3
Summary of Historical PCE Concentrations
Mixed Waste Landfill Soil-Vapor Monitoring

Well ID & Sample Port Depth ^a	Sept. 2014 ^b (ppmv)	Oct. 2014 ^b (ppmv)	April 2015 ^b (ppmv)	Oct. 2015 ^b (ppmv)	April 2016 ^b (ppmv)	Oct. 2016 ^b (ppmv)	May 2017 ^b (ppmv)	Oct. 2017 ^b (ppmv)	April 2018 ^b (ppmv)	Oct. 2018 ^b (ppmv)	May 2019 ^b (ppmv)	Oct. 2019 ^b (ppmv)	May 2020 ^b (ppmv)	Nov. 2020 ^b (ppmv)	May 2021 ^b (ppmv)	Nov. 2021 ^b (ppmv)	Oct. 2022 ^b (ppmv)
MWL-SV01-42.5	0.560	0.400	0.460	0.470	0.410	0.450	0.300	0.420	0.370	0.370	0.470	0.210	0.450	0.380	0.260	0.310	0.240
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	0.048	0.061	0.034
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	0.140	0.100	0.120
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	0.210	0.140	0.120
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	0.230	0.170	0.150
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	0.200	0.210	0.210
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	0.320	0.140	0.300
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	0.055	0.053	0.054
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	0.100	0.100	0.096
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	0.110	0.120	0.120
MWL-SV04-300	0.110	0.130	0.110	0.120	0.130	0.130	0.095	0.120	0.098	0.110	0.130	0.110	0.110	0.110	0.110	0.110	0.089
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	0.110	0.097	0.080
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	0.042	0.042	0.038
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	0.069	0.070	0.081
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	0.110	0.110	0.150
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	0.081	0.110	0.091
MWL-SV05-400	0.100	0.110	0.080	0.120	0.110	0.110	0.100	0.092	0.092	0.081	0.100	0.110	0.098	0.084	0.080	0.089	0.097

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.

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

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

ID = Identification.

MWL-SV = Mixed Waste Landfill-soil vapor well.

PCE = Tetrachloroethene.

ppmv = Parts per million by volume.

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

Well ID & Sample Port Depth ^a	Sept. 2014 ^b (ppmv)	Oct. 2014 ^b (ppmv)	April 2015 ^b (ppmv)	Oct. 2015 ^b (ppmv)	April 2016 ^b (ppmv)	Oct. 2016 ^b (ppmv)	May 2017 ^b (ppmv)	Oct. 2017 ^b (ppmv)	April 2018 ^b (ppmv)	Oct. 2018 ^b (ppmv)	May 2019 ^b (ppmv)	Oct. 2019 ^b (ppmv)	May 2020 ^b (ppmv)	Nov. 2020 ^b (ppmv)	May 2021 ^b (ppmv)	Nov. 2021 ^b (ppmv)	Oct. 2022 ^b (ppmv)
MWL-SV01-42.5	0.110	0.090	0.099	0.110	0.091	0.100	0.071	0.086	0.081	0.070	0.100	0.045	0.084	0.081	0.057	0.063	0.042
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	0.044	0.050	0.027
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	0.100	0.090	0.091
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	0.180	0.130	0.110
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	0.220	0.160	0.140
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	0.140	0.170	0.130
MWL-SV03-400	0.290	0.280	0.260	0.350	0.300	0.320	0.250	0.230	0.270	0.230	0.330	0.170	0.220	0.190	0.180	0.120	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	0.045	0.041	0.046
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	0.100	0.096	0.094
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	0.160	0.140	0.150
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	0.079	0.084	0.056
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	0.080	0.053	0.045
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	0.048	0.047	0.043
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	0.087	0.096	0.100
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	0.160	0.160	0.200
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	0.088	0.130	0.082
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	0.067	0.088	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.

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

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

ID = Identification.

MWL-SV = Mixed Waste Landfill-soil vapor well.

ppmv = Parts per million by volume.

TCE = Trichloroethene.

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

Well ID & Sample Port Depth ^a	Sept. 2014 ^b (ppmv)	Oct. 2014 ^b (ppmv)	April 2015 ^b (ppmv)	Oct. 2015 ^b (ppmv)	April 2016 ^b (ppmv)	Oct. 2016 ^b (ppmv)	May 2017 ^b (ppmv)	Oct. 2017 ^b (ppmv)	April 2018 ^b (ppmv)	Oct. 2018 ^b (ppmv)	May 2019 ^b (ppmv)	Oct. 2019 ^b (ppmv)	May 2020 ^b (ppmv)	Nov. 2020 ^b (ppmv)	May 2021 ^b (ppmv)	Nov. 2021 ^b (ppmv)	Oct. 2022 ^b (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	0.58583	0.64320	0.51628
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	0.51844	0.49784	0.37140
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	0.35810	0.31554	0.31085
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	0.59904	0.43953	0.37330
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	0.68124	0.49996	0.46050
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	0.47783	0.54864	0.50265
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	0.55690	0.30104	0.59960
MWL-SV04-50	0.25949	0.26359	0.28424	0.28232	0.30064	0.29728	0.23286	0.25573	0.23944	0.22375	0.25427	0.26788	0.20406	0.21711	0.19377	0.19307	0.19082
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	0.35855	0.36890	0.34923
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	0.51862	0.49749	0.49515
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	0.33209	0.32207	0.27477
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	0.31586	0.25685	0.22992
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	0.29754	0.28619	0.27230
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	0.44363	0.47678	0.48618
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	0.54869	0.57280	0.70205
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	0.35572	0.46944	0.35413
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	0.23766	0.32208	0.29633

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.

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

^b If an environmental duplicate sample was collected, then the maximum concentration of the environmental-duplicate sample pair is shown.

ID = Identification.

MWL-SV = Mixed Waste Landfill-soil vapor well.

ppmv = Parts per million by volume.

VOC = Volatile organic compound.

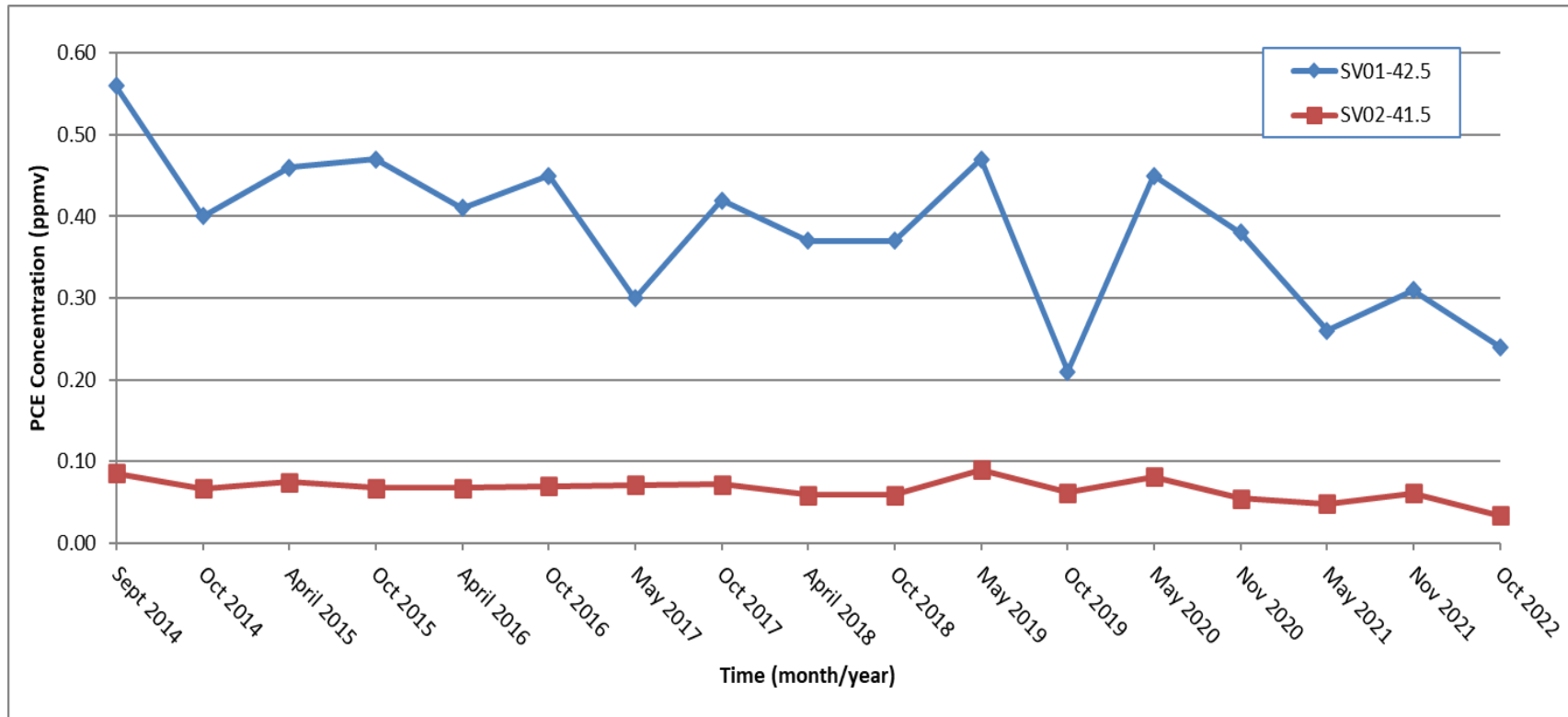


Figure 5-2
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

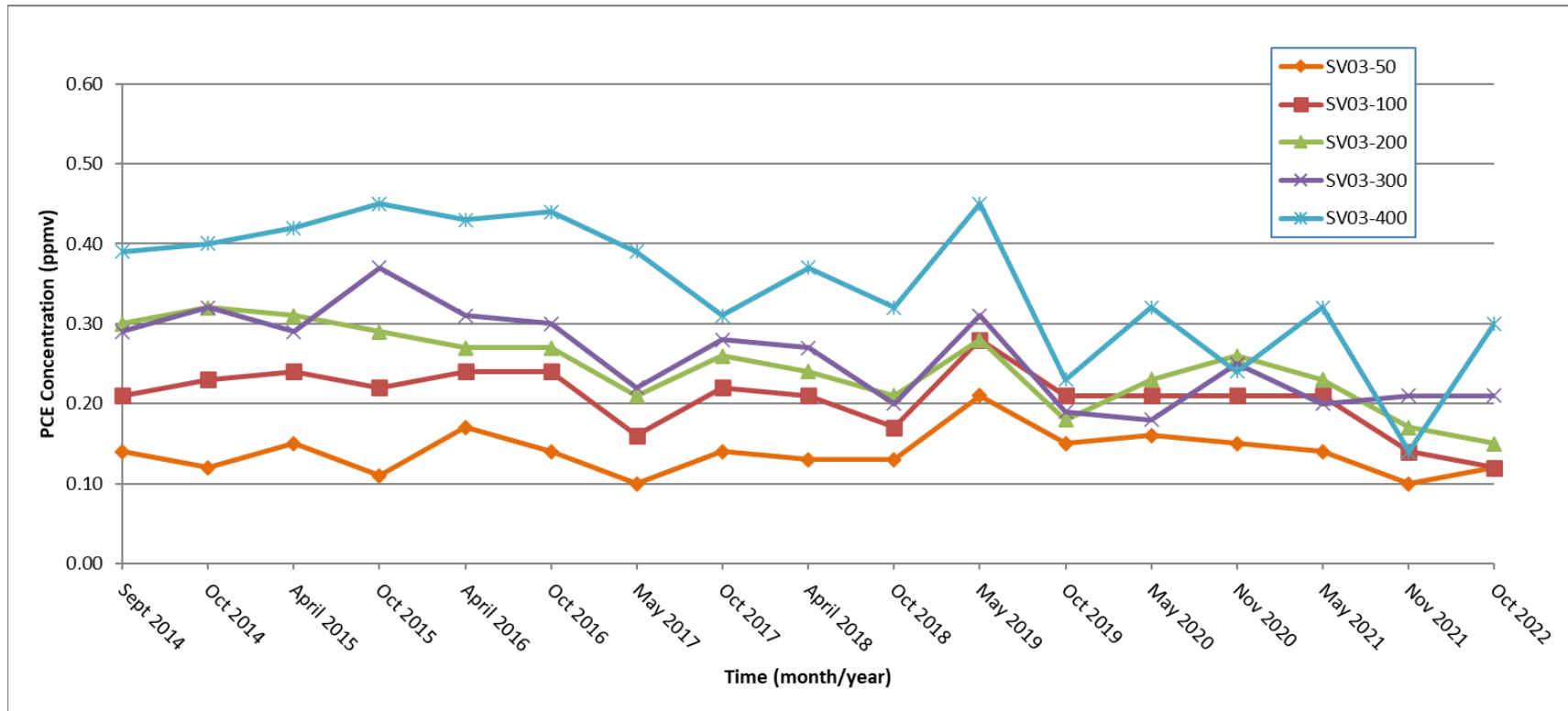


Figure 5-3
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

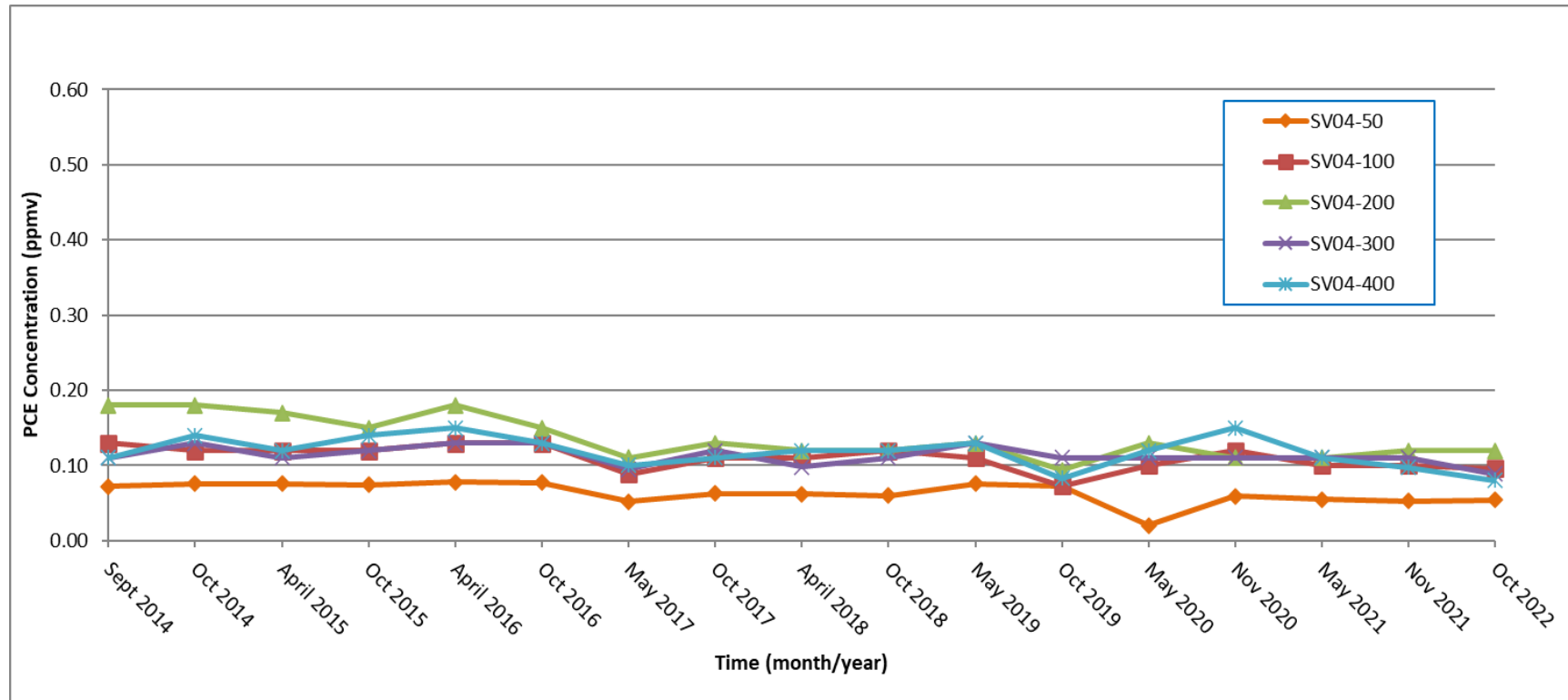


Figure 5-4
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

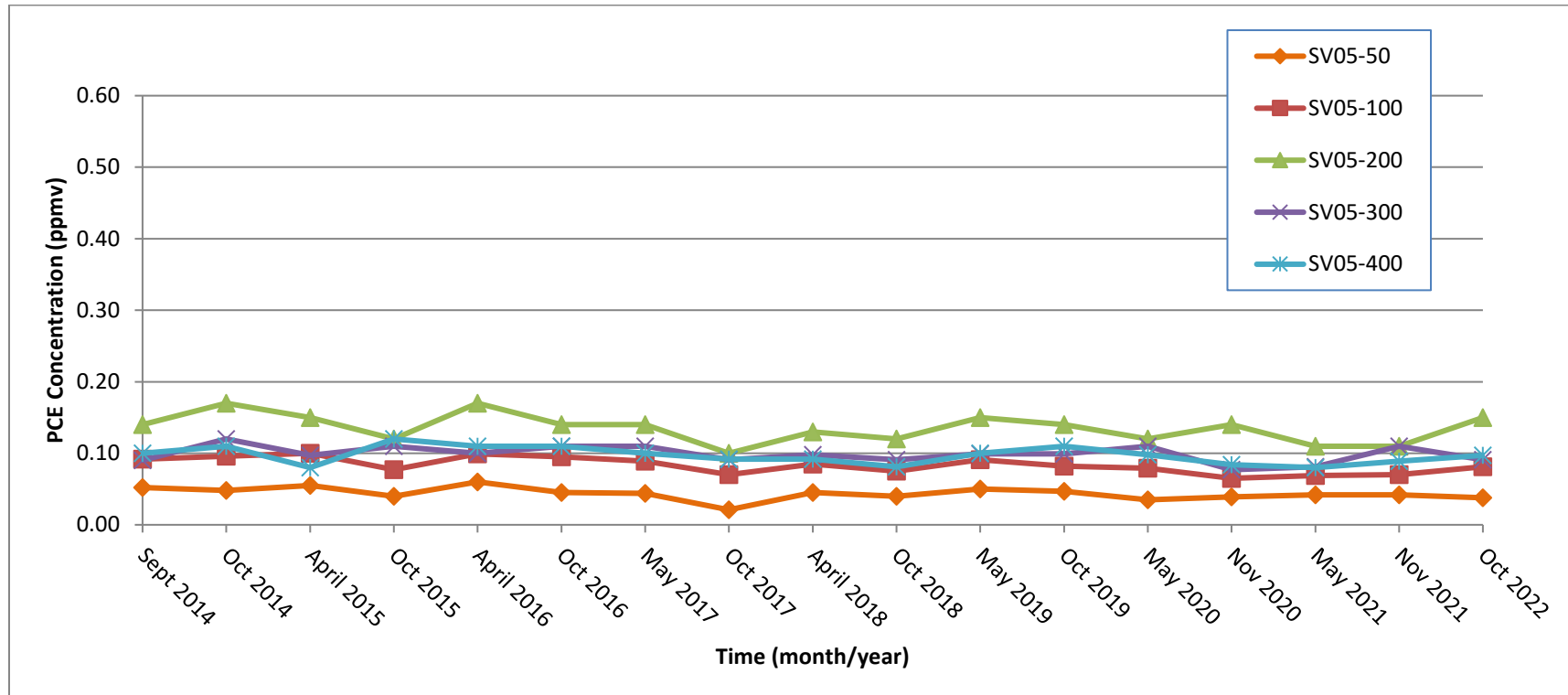


Figure 5-5
PCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

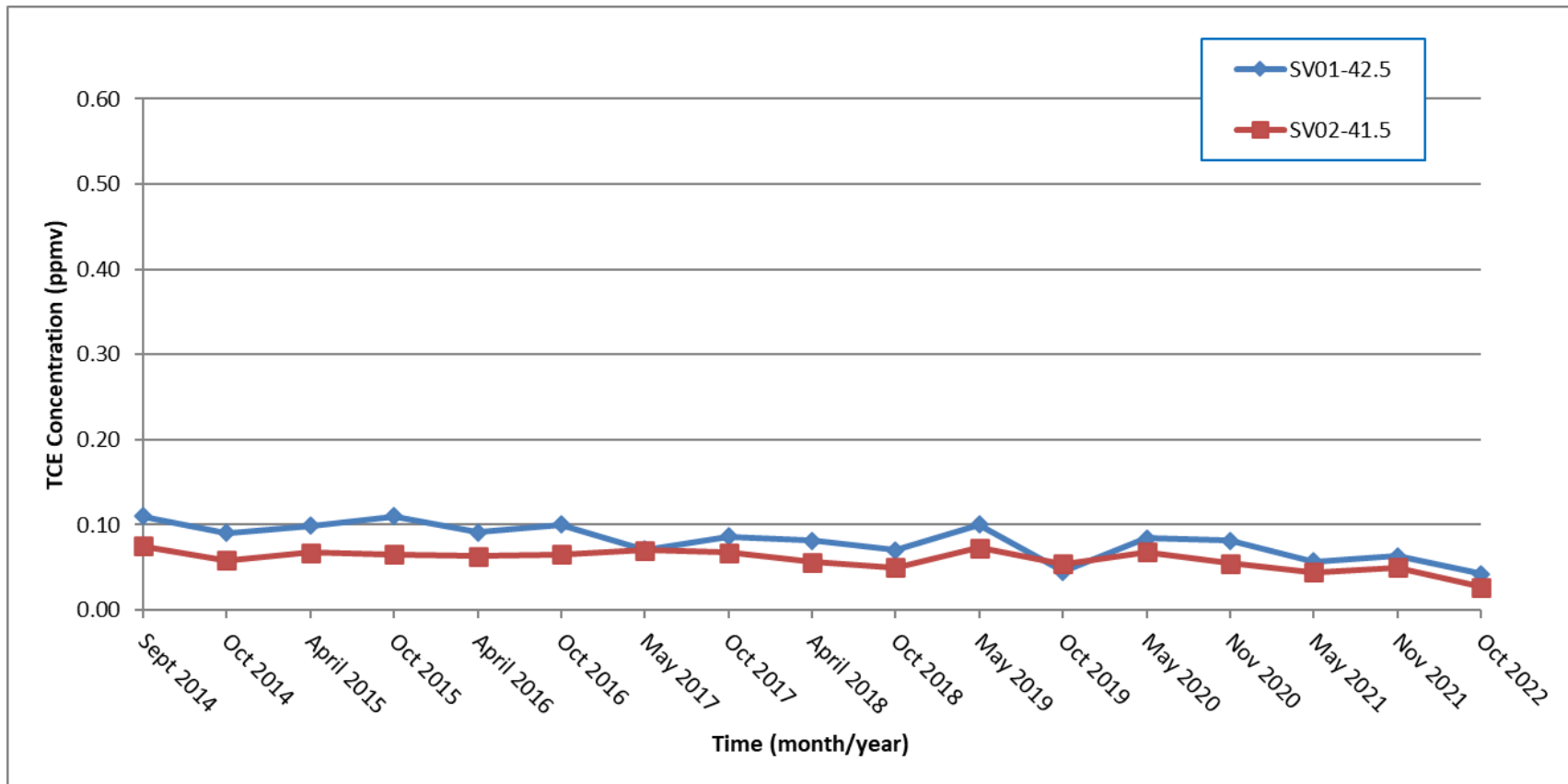


Figure 5-6
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

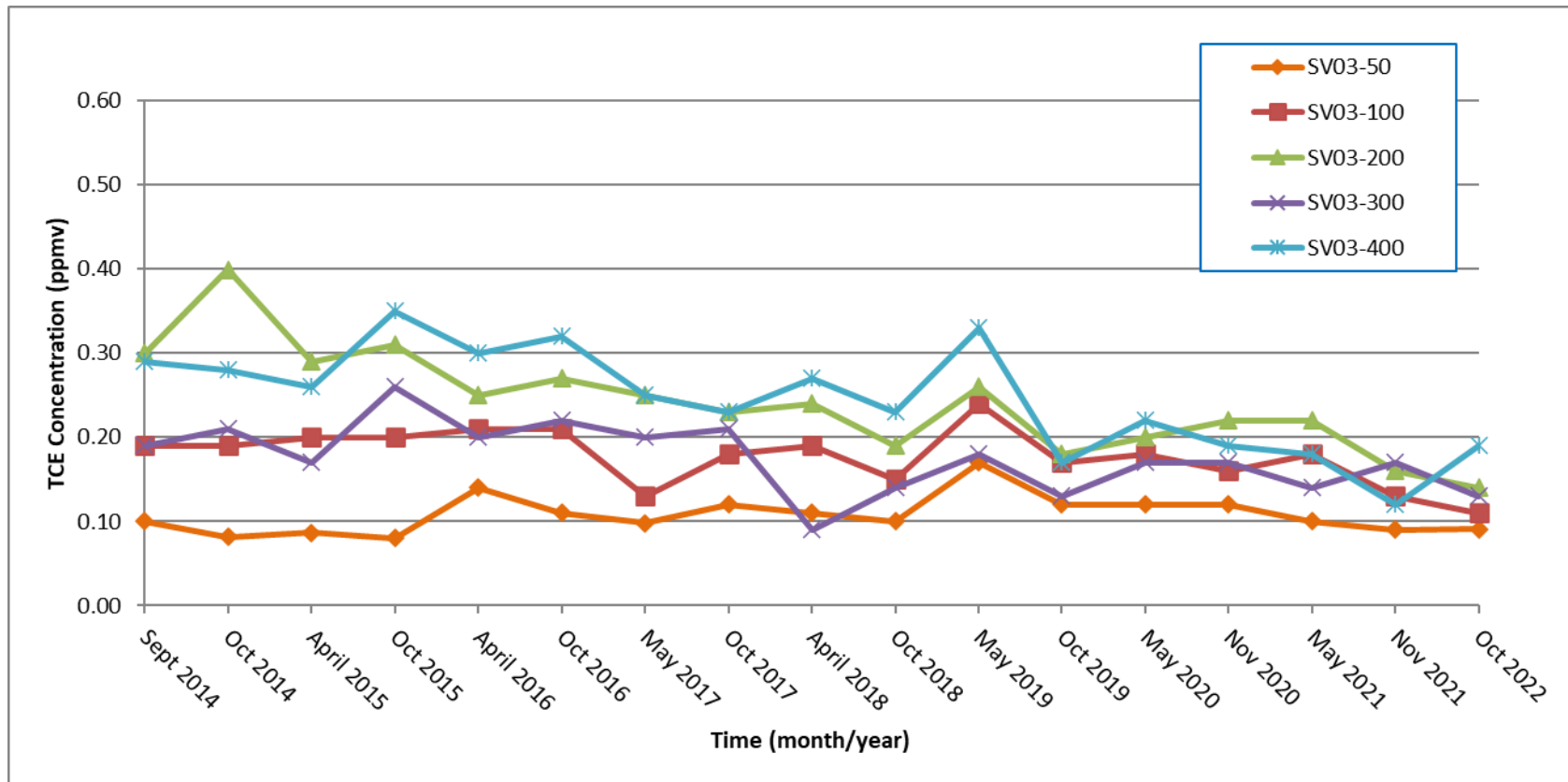


Figure 5-7
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

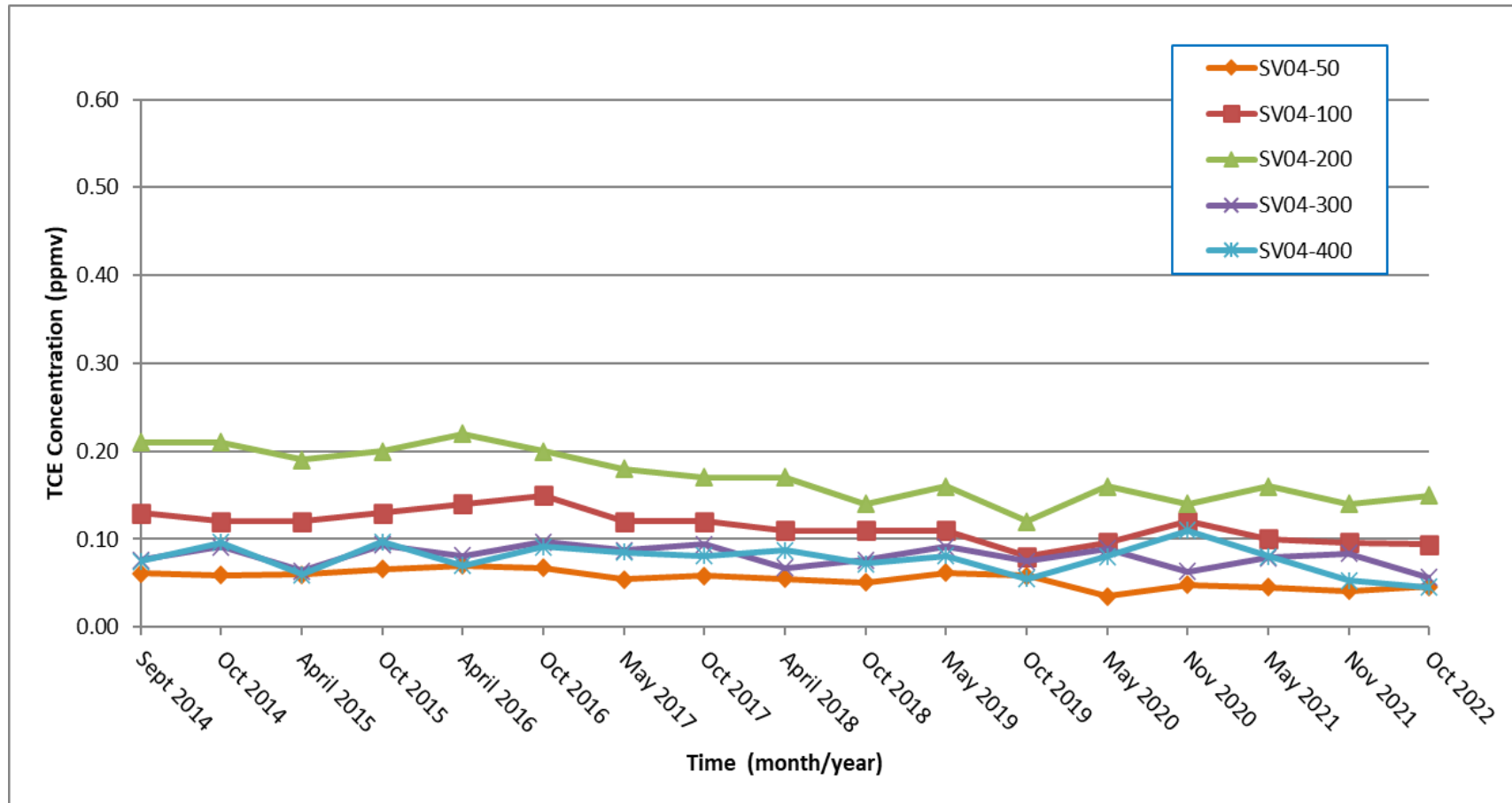


Figure 5-8
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

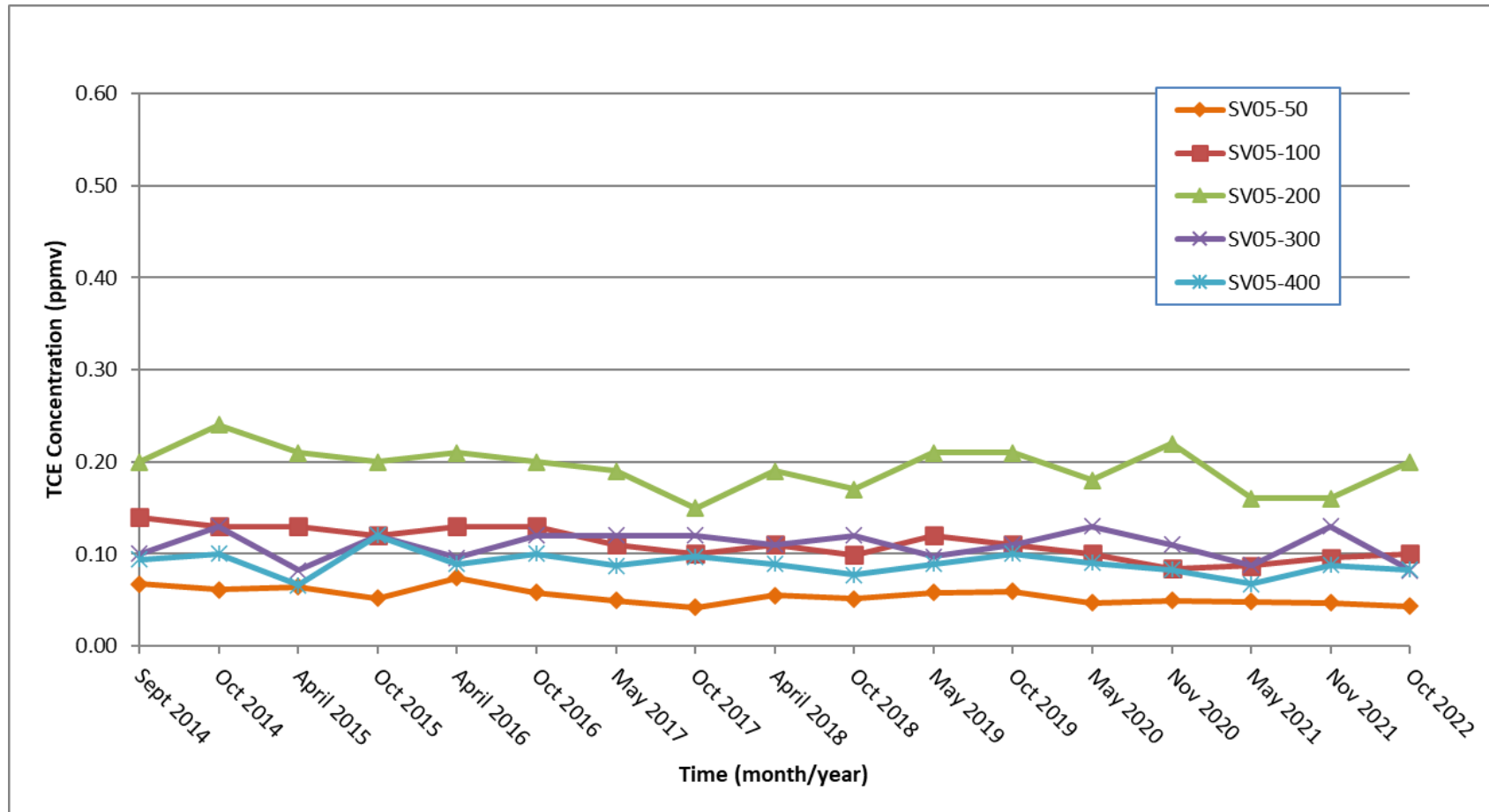


Figure 5-9
TCE Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

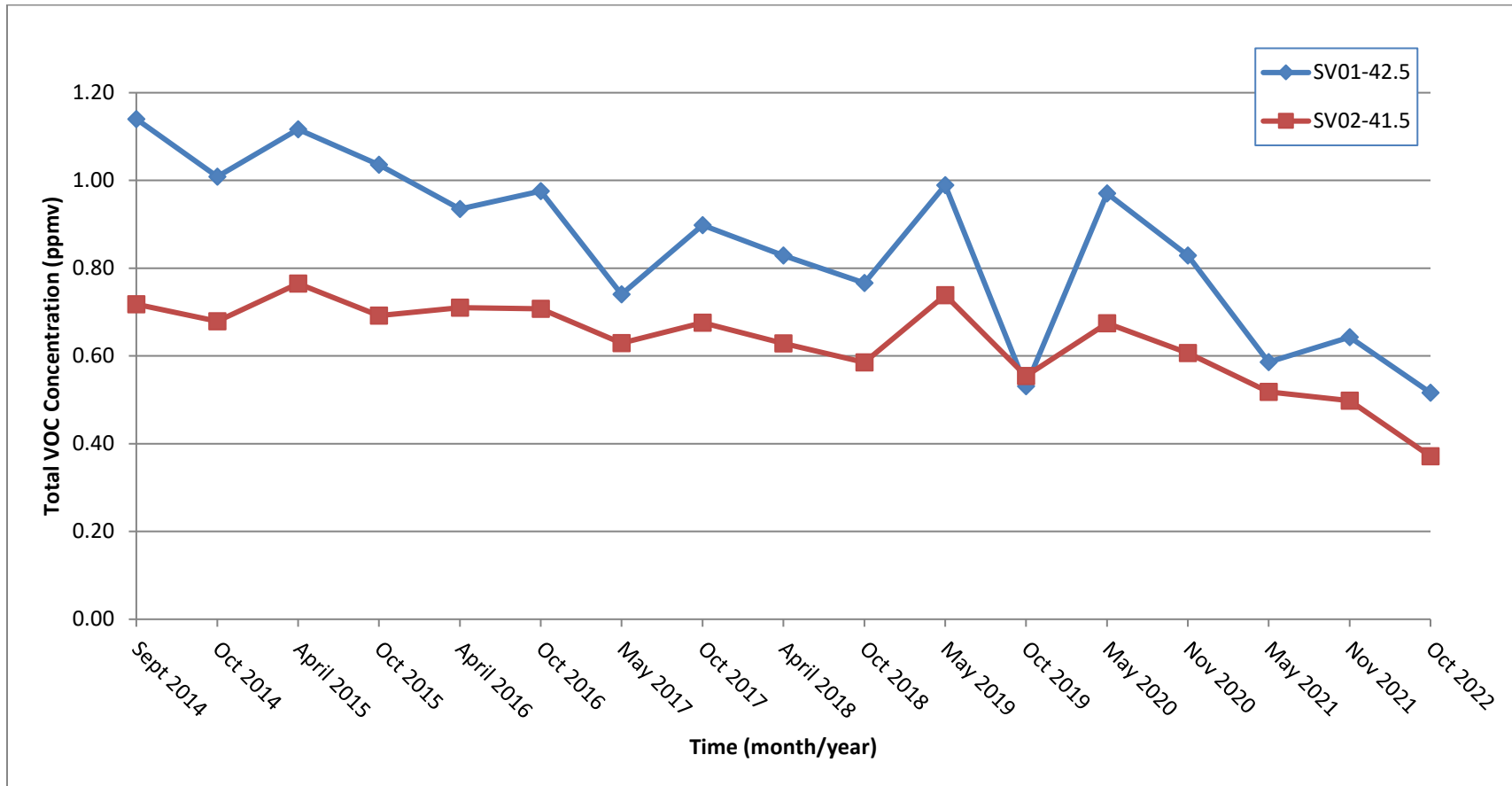


Figure 5-10
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Wells SV01 and SV02 Ports

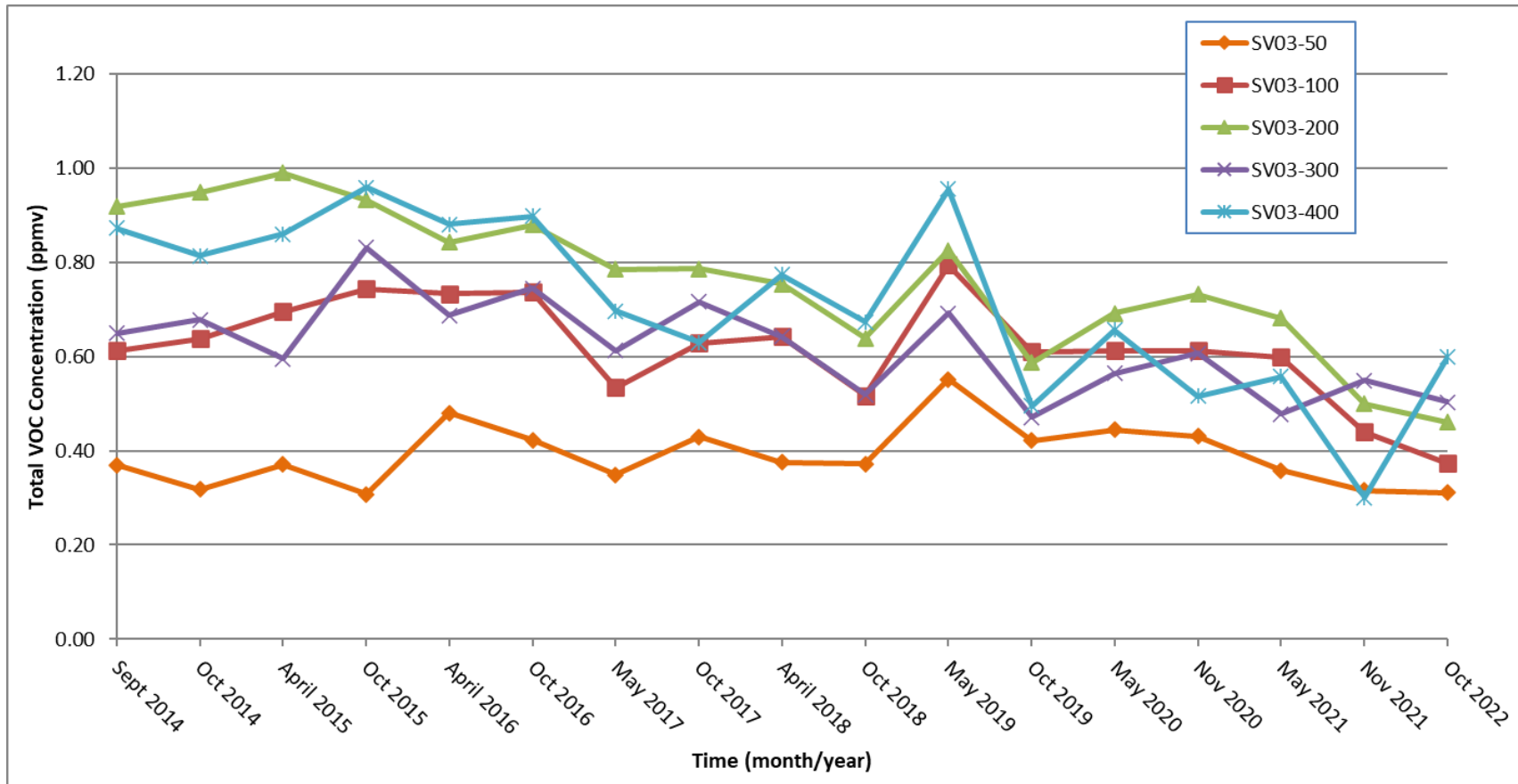


Figure 5-11
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV03 Ports

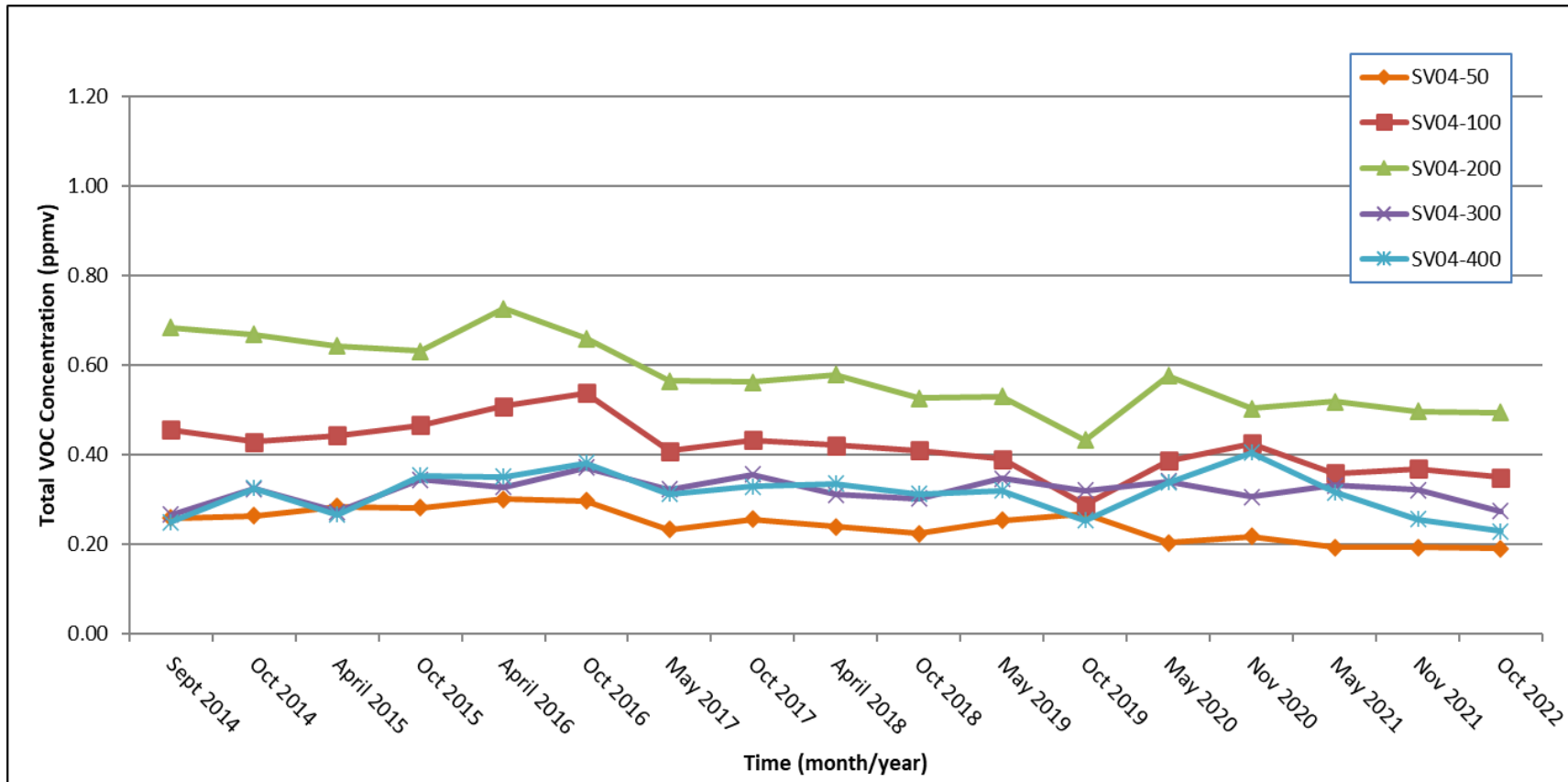


Figure 5-12
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV04 Ports

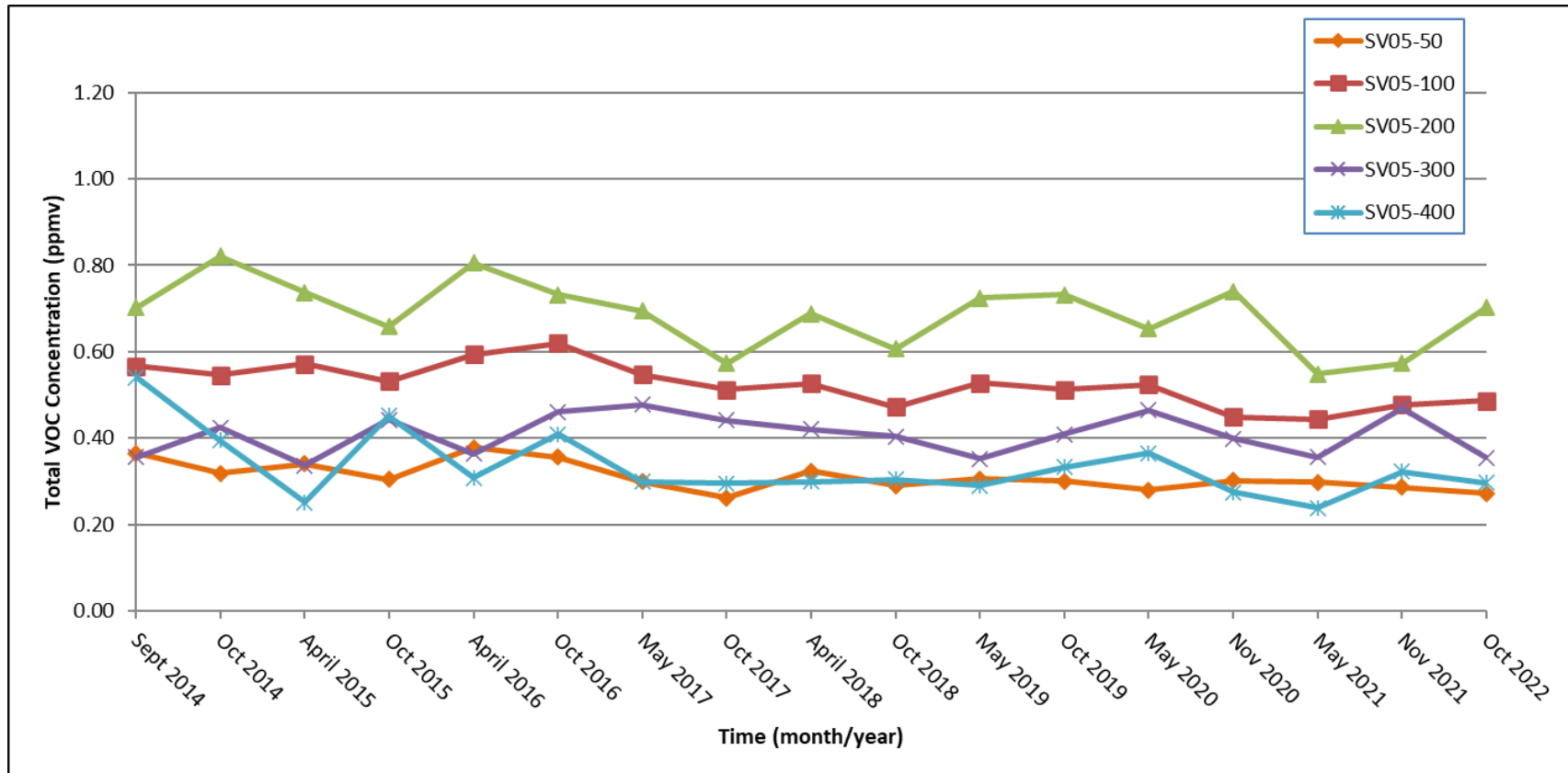


Figure 5-13
Total VOCs Concentrations vs. Time
Mixed Waste Landfill Soil-Vapor Monitoring Well SV05 Ports

Table 5-1
Summary of Detected VOCs – October 2022

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Table 5-1
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV01-42.5 28-Oct-22	Chloroform	0.0097	0.00057	0.0032	--	--
	Dichlorodifluoromethane	0.057	0.00057	0.0032	--	--
	1,1-Dichloroethane	0.0013	0.00045	0.0032	J	--
	1,1-Dichloroethene	0.0028	0.00053	0.0032	J	--
	cis-1,2-Dichloroethene	0.00048	0.00041	0.0032	J	--
	Tetrachloroethene	0.24	0.00049	0.0032	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.037	0.00041	0.0032	--	--
	1,1,1-Trichloroethane	0.016	0.0012	0.0032	--	--
	Trichloroethene	0.042	0.00053	0.0016	--	--
	Trichlorofluoromethane	0.11	0.00045	0.0032	--	--
	Total Organics ^d	0.51628	NA	NA	NA	NA
MWL-SV02-41.5 28-Oct-22	Chloroform	0.0018	0.00058	0.0033	J	--
	Dichlorodifluoromethane	0.059	0.00058	0.0033	--	--
	1,1-Dichloroethane	0.0010	0.00045	0.0033	J	--
	1,1-Dichloroethene	0.0036	0.00054	0.0033	--	--
	Tetrachloroethene	0.034	0.00050	0.0033	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.025	0.00041	0.0033	--	--
	1,1,1-Trichloroethane	0.030	0.0012	0.0033	--	--
	Trichloroethene	0.027	0.00054	0.0017	--	--
	Trichlorofluoromethane	0.19	0.00045	0.0033	--	--
	Total Organics ^d	0.3714	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-50 28-Oct-22	Benzene	0.00023	0.00022	0.0013	J	--
	Carbon tetrachloride	0.00022	0.00022	0.0013	J	--
	Chloroform	0.0015	0.00024	0.0013	--	--
	Dichlorodifluoromethane	0.021	0.00024	0.0013	--	--
	1,1-Dichloroethane	0.0024	0.00018	0.0013	--	--
	1,1-Dichloroethene	0.0067	0.00022	0.0013	--	--
	cis-1,2-Dichloroethene	0.0012	0.00017	0.0013	J	--
	Tetrachloroethene	0.12	0.00020	0.0013	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.044	0.00017	0.0013	--	--
	1,1,1-Trichloroethane	0.0016	0.00049	0.0013	--	--
	Trichloroethene	0.091	0.00022	0.00067	--	--
	Trichlorofluoromethane	0.021	0.00018	0.0013	--	--
	Total Organics ^d	0.31085	NA	NA	NA	NA
MWL-SV03-100 28-Oct-22	Chloroform	0.0019	0.00046	0.0026	J	--
	Dichlorodifluoromethane	0.029	0.00046	0.0026	--	--
	1,1-Dichloroethane	0.0034	0.00036	0.0026	--	--
	1,1-Dichloroethene	0.0087	0.00043	0.0026	--	--
	cis-1,2-Dichloroethene	0.0014	0.00033	0.0026	J	--
	Tetrachloroethene	0.12	0.00040	0.0026	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.068	0.00033	0.0026	--	--
	1,1,1-Trichloroethane	0.0019	0.00096	0.0026	J	--
	Trichloroethene	0.11	0.00043	0.0013	--	--
	Trichlorofluoromethane	0.029	0.00036	0.0026	--	--
	Total Organics ^d	0.3733	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^c (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-200 28-Oct-22	Chloroform	0.0019	0.00046	0.0026	J	--
	Dichlorodifluoromethane	0.035	0.00046	0.0026	--	--
	1,1-Dichloroethane	0.0042	0.00036	0.0026	--	--
	1,1-Dichloroethene	0.012	0.00043	0.0026	--	--
	cis-1,2-Dichloroethene	0.0020	0.00033	0.0026	J	--
	Tetrachloroethene	0.15	0.00040	0.0026	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.085	0.00033	0.0026	--	--
	1,1,1-Trichloroethane	0.0014	0.00096	0.0026	J	--
	Trichloroethene	0.14	0.00043	0.0013	--	--
	Trichlorofluoromethane	0.029	0.00036	0.0026	--	--
	Total Organics ^d	0.4605	NA	NA	NA	NA
MWL-SV03-300 28-Oct-22	Chloroform	0.0011	0.00044	0.0025	J	--
	Dichlorodifluoromethane	0.037	0.00044	0.0025	--	--
	1,1-Dichloroethane	0.0018	0.00034	0.0025	J	--
	1,1-Dichloroethene	0.010	0.00041	0.0025	--	--
	cis-1,2-Dichloroethene	0.00075	0.00031	0.0025	J	--
	Tetrachloroethene	0.21	0.00037	0.0025	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.093	0.00031	0.0025	--	--
	Trichloroethene	0.13	0.00041	0.0012	--	--
	Trichlorofluoromethane	0.019	0.00034	0.0025	--	--
	Total Organics ^d	0.50265	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^c (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV03-400 28-Oct-22	Carbon disulfide	0.0057	0.0011	0.0064	J	--
	Chloroform	0.0016	0.00045	0.0026	J	--
	Dichlorodifluoromethane	0.022	0.00045	0.0026	--	--
	1,1-Dichloroethane	0.0022	0.00035	0.0026	J	--
	1,1-Dichloroethene	0.0097	0.00042	0.0026	--	--
	cis-1,2-Dichloroethene	0.0014	0.00032	0.0026	J	--
	Tetrachloroethene = 20 ppmv	0.30	0.00038	0.0026	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.055	0.00032	0.0026	--	--
	Trichloroethene = 20 ppmv	0.19	0.00042	0.0013	--	--
	Trichlorofluoromethane	0.012	0.00035	0.0026	--	--
	Total Organics = 25 ppmv	0.5996	NA	NA	NA	NA
	Total Organics ^d	0.5996	NA	NA	NA	NA
	Trigger Levels					
MWL-SV04-50 28-Oct-22	Benzene	0.00028	0.00013	0.00083	J	--
	Carbon tetrachloride	0.00022	0.00013	0.00083	J	--
	Chloroform	0.0017	0.00015	0.00083	--	--
	Dichlorodifluoromethane	0.015	0.00015	0.00083	--	--
	1,1-Dichloroethane	0.0011	0.00011	0.00083	--	--
	1,1-Dichloroethene	0.0038	0.00013	0.00083	--	--
	cis-1,2-Dichloroethene	0.00032	0.00010	0.00083	J	--
	Tetrachloroethene	0.054	0.00012	0.00083	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.037	0.00010	0.00083	--	--
	1,1,1-Trichloroethane	0.0064	0.00030	0.00083	--	--
	Trichloroethene	0.046	0.00013	0.00042	--	--
	Trichlorofluoromethane	0.025	0.00011	0.00083	--	--
	Total Organics ^d	0.19082	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^a (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-100 28-Oct-22	Carbon disulfide	0.0020	0.00060	0.0034	J	--
	Carbon tetrachloride	0.00033	0.00022	0.0014	J	--
	Chloroform	0.0020	0.00024	0.0014	--	--
	Dichlorodifluoromethane	0.029	0.00024	0.0014	--	--
	1,1-Dichloroethane	0.0026	0.00019	0.0014	--	--
	1,1-Dichloroethene	0.0099	0.00022	0.0014	--	--
	cis-1,2-Dichloroethene	0.0011	0.00017	0.0014	J	--
	Tetrachloroethene	0.096	0.00021	0.0014	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.067	0.00017	0.0014	--	--
	1,1,1-Trichloroethane	0.0053	0.00050	0.0014	--	--
	Trichloroethene	0.094	0.00022	0.00068	--	--
	Trichlorofluoromethane	0.040	0.00019	0.0014	--	--
	Total Organics ^d	0.34923	NA	NA	NA	NA
MWL-SV04-200 28-Oct-22	Acetone	0.010	0.0095	0.033	J	0.033U
	Benzene	0.00033	0.00022	0.0013	J	--
	Carbon tetrachloride	0.00052	0.00022	0.0013	J	--
	Chloroform	0.0016	0.00023	0.0013	--	--
	Dichlorodifluoromethane	0.043	0.00023	0.0013	--	--
	1,1-Dichloroethane	0.0045	0.00018	0.0013	--	--
	1,1-Dichloroethene	0.019	0.00022	0.0013	--	--
	cis-1,2-Dichloroethene	0.0024	0.00017	0.0013	--	--
	Tetrachloroethene	0.12	0.00020	0.0013	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.11	0.00017	0.0013	--	--
	1,1,1-Trichloroethane	0.0018	0.00048	0.0013	--	--
	Trichloroethene	0.15	0.00022	0.00066	--	--
	Trichlorofluoromethane	0.042	0.00018	0.0013	--	--
	Total Organics ^d	0.49515	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^c (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV04-300 28-Oct-22	Benzene	0.00031	0.00022	0.0014	J	--
	Carbon tetrachloride	0.00029	0.00022	0.0014	J	--
	Chloroform	0.00069	0.00024	0.0014	J	--
	Chloromethane	0.0028	0.0011	0.0034	J	--
	Dichlorodifluoromethane	0.030	0.00024	0.0014	--	--
	1,1-Dichloroethane	0.00062	0.00019	0.0014	J	--
	1,1-Dichloroethene	0.0082	0.00022	0.0014	--	--
	cis-1,2-Dichloroethene	0.00033	0.00017	0.0014	J	--
	Tetrachloroethene	0.089	0.00021	0.0014	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.069	0.00017	0.0014	--	--
	1,1,1-Trichloroethane	0.00053	0.00050	0.0014	J	--
	Trichloroethene	0.056	0.00022	0.00068	--	--
	Trichlorofluoromethane	0.017	0.00019	0.0014	--	--
MWL-SV04-400 28-Oct-22	Total Organics ^d	0.27477	NA	NA	NA	NA
	Acetone	0.013	0.0092	0.032	J	0.032U
	Benzene	0.00049	0.00021	0.0013	J	--
	Carbon disulfide	0.0012	0.00056	0.0032	J	--
	Chloroform	0.00044	0.00023	0.0013	J	--
	Dichlorodifluoromethane	0.023	0.00023	0.0013	--	--
	1,1-Dichloroethane	0.00058	0.00018	0.0013	J	--
	1,1-Dichloroethene	0.0054	0.00021	0.0013	--	--
	cis-1,2-Dichloroethene	0.00034	0.00016	0.0013	J	--
	Tetrachloroethene	0.080	0.00019	0.0013	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.059	0.00016	0.0013	--	--
	1,1,1-Trichloroethane	0.00047	0.00047	0.0013	J	--
	Trichloroethene	0.045	0.00021	0.00064	--	--
	Trichlorofluoromethane	0.014	0.00018	0.0013	--	--
	Total Organics ^d	0.22992	NA	NA	NA	NA

Trigger Levels
Tetrachloroethene = 20 ppmv
Trichloroethene = 20 ppmv
Total Organics = 25 ppmv
Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-50 28-Oct-22	Carbon disulfide	0.0017	0.00051	0.0029	J	--
	Carbon tetrachloride	0.00023	0.00019	0.0012	J	--
	Chloroform	0.0011	0.00020	0.0012	J	--
	Dichlorodifluoromethane	0.042	0.00020	0.0012	--	--
	1,1-Dichloroethane	0.0011	0.00016	0.0012	J	--
	1,1-Dichloroethene	0.0053	0.00019	0.0012	--	--
	cis-1,2-Dichloroethene	0.00037	0.00015	0.0012	J	--
	Tetrachloroethene	0.038	0.00018	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.033	0.00015	0.0012	--	--
	1,1,1-Trichloroethane	0.0085	0.00042	0.0012	--	--
	Trichloroethene	0.043	0.00019	0.00058	--	--
	Trichlorofluoromethane	0.098	0.00016	0.0012	--	--
	Total Organics ^d	0.2723	NA	NA	NA	NA
MWL-SV05-100 28-Oct-22	Carbon tetrachloride	0.00050	0.00020	0.0012	J	--
	Chloroform	0.0018	0.00021	0.0012	--	--
	Dichlorodifluoromethane	0.068	0.00021	0.0012	--	--
	1,1-Dichloroethane	0.0024	0.00017	0.0012	--	--
	1,1-Dichloroethene	0.012	0.00020	0.0012	--	--
	cis-1,2-Dichloroethene	0.00088	0.00015	0.0012	J	--
	Tetrachloroethene	0.081	0.00018	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.070	0.00015	0.0012	--	--
	1,1,1-Trichloroethane	0.0096	0.00044	0.0012	--	--
	Trichloroethene	0.10	0.00020	0.00060	--	--
	Trichlorofluoromethane	0.14	0.00017	0.0012	--	--
	Total Organics ^d	0.48618	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-100 (Duplicate) 28-Oct-22	Carbon tetrachloride	0.00042	0.00020	0.0012	J	--
	Chloroform	0.0019	0.00021	0.0012	--	--
	Dichlorodifluoromethane	0.067	0.00021	0.0012	--	--
	1,1-Dichloroethane	0.0024	0.00017	0.0012	--	--
	1,1-Dichloroethene	0.012	0.00020	0.0012	--	--
	cis-1,2-Dichloroethene	0.00083	0.00015	0.0012	J	--
	Tetrachloroethene	0.081	0.00018	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.069	0.00015	0.0012	--	--
	1,1,1-Trichloroethane	0.0096	0.00044	0.0012	--	--
	Trichloroethene	0.099	0.00020	0.00060	--	--
	Trichlorofluoromethane	0.14	0.00017	0.0012	--	--
	Total Organics ^d	0.48315	NA	NA	NA	NA
MWL-SV05-200 28-Oct-22	Benzene	0.00023	0.00019	0.0012	J	--
	Carbon tetrachloride	0.00082	0.00019	0.0012	J	--
	Chloroform	0.0020	0.00020	0.0012	--	--
	Dichlorodifluoromethane	0.075	0.00020	0.0012	--	--
	1,1-Dichloroethane	0.0043	0.00016	0.0012	--	--
	1,1-Dichloroethene	0.025	0.00019	0.0012	--	--
	cis-1,2-Dichloroethene	0.0015	0.00015	0.0012	--	--
	Methylene chloride	0.0029	0.0020	0.0012	J	0.0058U
	Tetrachloroethene	0.15	0.00018	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.14	0.00015	0.0012	--	--
	1,1,1-Trichloroethane	0.0032	0.00042	0.0012	--	--
	Trichloroethene	0.20	0.00019	0.00058	--	--
	Trichlorofluoromethane	0.10	0.00016	0.0012	--	--
	Total Organics ^d	0.70205	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-300 28-Oct-22	Carbon tetrachloride	0.00069	0.00020	0.0012	J	--
	Chloroform	0.00063	0.00021	0.0012	J	--
	Dichlorodifluoromethane	0.038	0.00021	0.0012	--	--
	1,1-Dichloroethane	0.0010	0.00017	0.0012	J	--
	1,1-Dichloroethene	0.013	0.00020	0.0012	--	--
	cis-1,2-Dichloroethene	0.00036	0.00015	0.0012	J	--
	Tetrachloroethene	0.089	0.00018	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.093	0.00015	0.0012	--	--
	1,1,1-Trichloroethane	0.00071	0.00044	0.0012	J	--
	Trichloroethene	0.071	0.00020	0.00060	--	--
	Trichlorofluoromethane	0.026	0.00017	0.0012	--	--
	Total Organics ^d	0.33339	NA	NA	NA	NA
MWL-SV05-300 (Duplicate) 28-Oct-22	Carbon tetrachloride	0.00065	0.00020	0.0012	J	--
	Chloroform	0.00080	0.00021	0.0012	J	--
	Dichlorodifluoromethane	0.040	0.00021	0.0012	--	--
	1,1-Dichloroethane	0.0012	0.00017	0.0012	--	--
	1,1-Dichloroethene	0.014	0.00020	0.0012	--	--
	cis-1,2-Dichloroethene	0.00038	0.00015	0.0012	J	--
	Tetrachloroethene	0.091	0.00018	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.093	0.00015	0.0012	--	--
	1,1,1-Trichloroethane	0.0011	0.00044	0.0012	J	--
	Trichloroethene	0.082	0.00020	0.00060	--	--
	Trichlorofluoromethane	0.030	0.00017	0.0012	--	--
	Total Organics ^d	0.35413	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 5-1 (Continued)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Well ID/Sample Port	Analyte	Result ^b (ppmv)	MDL ^b (ppmv)	RL ^b (ppmv)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL-SV05-400 28-Oct-22	Benzene	0.00027	0.00019	0.0012	J	--
	Carbon disulfide	0.00069	0.00052	0.0030	J	--
	Carbon tetrachloride	0.00058	0.00019	0.0012	J	--
	Chloroform	0.00075	0.00021	0.0012	J	--
	Dichlorodifluoromethane	0.023	0.00021	0.0012	--	--
	1,1-Dichloroethane	0.0016	0.00016	0.0012	--	--
	1,1-Dichloroethene	0.010	0.00019	0.0012	--	--
	<u>Trigger Levels</u>					
	cis-1,2-Dichloroethene	0.00054	0.00015	0.0012	J	--
	Tetrachloroethene = 20 ppmv	0.097	0.00018	0.0012	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.045	0.00015	0.0012	--	--
	1,1,1-Trichloroethane	0.0019	0.00043	0.0012	--	--
	Trichloroethene = 20 ppmv	0.083	0.00019	0.00060	--	--
	Trichlorofluoromethane	0.032	0.00016	0.0012	--	--
	Total Organics = 25 ppmv	0.29633	NA	NA	NA	NA
Total Organics ^d						

Refer to footnotes at end of table.

Table 5-1 (Concluded)
Summary of Detected VOCs (EPA Method TO-15^a)
Mixed Waste Landfill Soil-Vapor Monitoring
October 2022

Notes:

^aEPA, 1999. "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15, Determination of Volatile Organic Compounds In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry," Center for Environmental Research Information, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

^bResults, MDL, and RL are reported in ppmv.

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

Laboratory Qualifier

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

Validation Qualifier

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

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

EPA = U.S. Environmental Protection Agency.

ID = Identification.

MWL-SV = Mixed Waste Landfill-soil vapor well.

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, 2022 through March 31, 2023 reporting period fulfilling the LTMMMP annual monitoring requirement. The monitoring event was conducted on April 14 and 21, 2022. 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 FOP and the manufacturer's operating manual. A standard count was taken on the days 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.

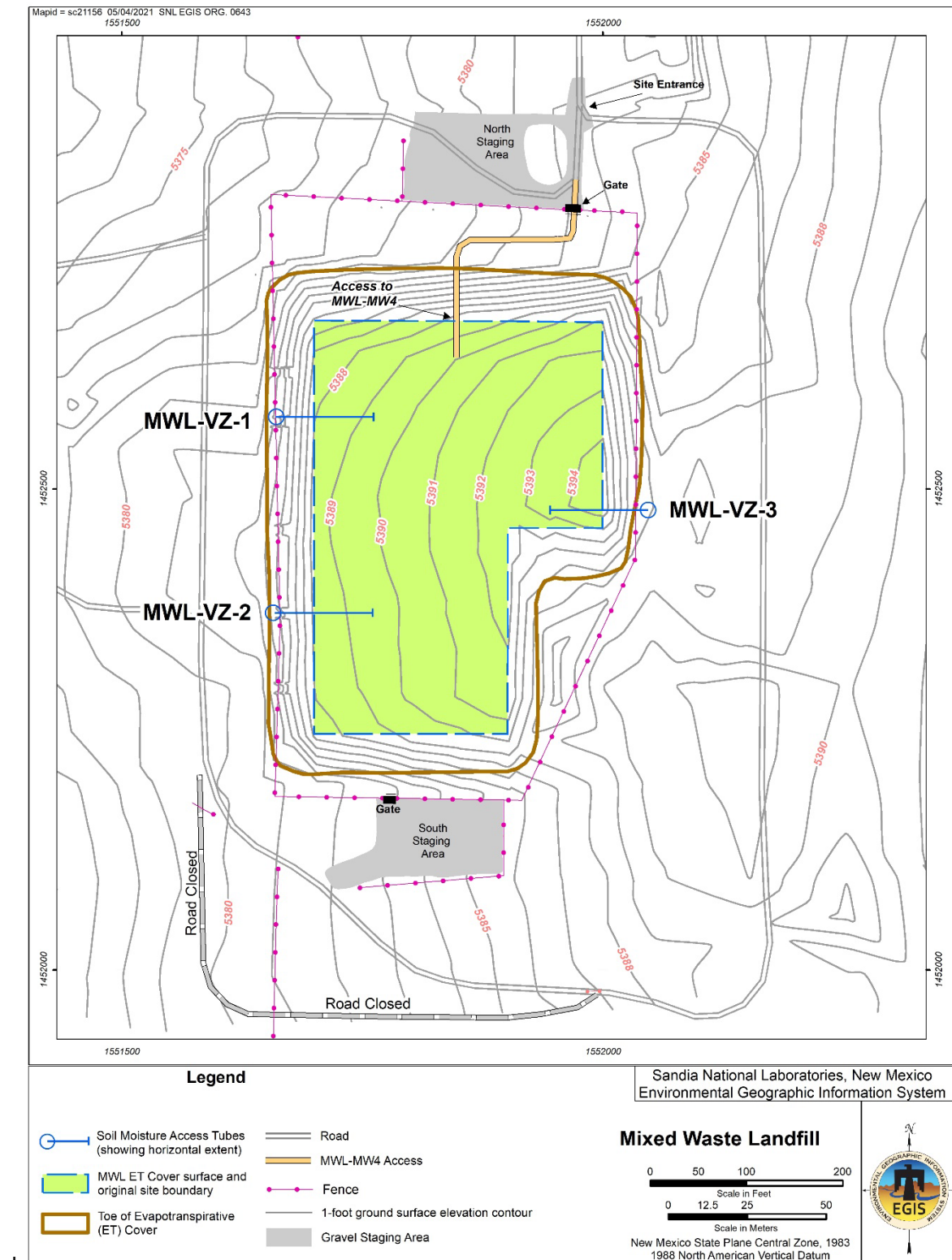


Figure 6-1
Mixed Waste Landfill Soil-Moisture Monitoring Locations

6.2 Monitoring Results

Soil-moisture monitoring data for this reporting period are documented on the MWL Neutron Logging Data Field Form provided in Annex D and 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 2022 annual monitoring event are plotted on these figures along with the baseline soil-moisture content and the trigger level for comparison. The April 2022 results track very closely with the established soil-moisture baseline for the three access tubes and indicate a dry (i.e., low soil-moisture content) 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 (Figures 6-2, 6-3, and 6-4). 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.

During this reporting period, the soil-moisture content measurements for the trigger level depth interval at MWL-VZ-1 ranged from 1.9 to 4.4 percent, compared to 1.7 to 5.6 percent baseline. At MWL-VZ-2 the soil-moisture content ranged from 2.1 to 4.9 percent, compared to 2.1 to 5.5 percent baseline. At MWL-VZ-3 the soil-moisture content ranged from 1.4 to 5.2 percent, compared to 1.8 to 4.5 percent baseline.

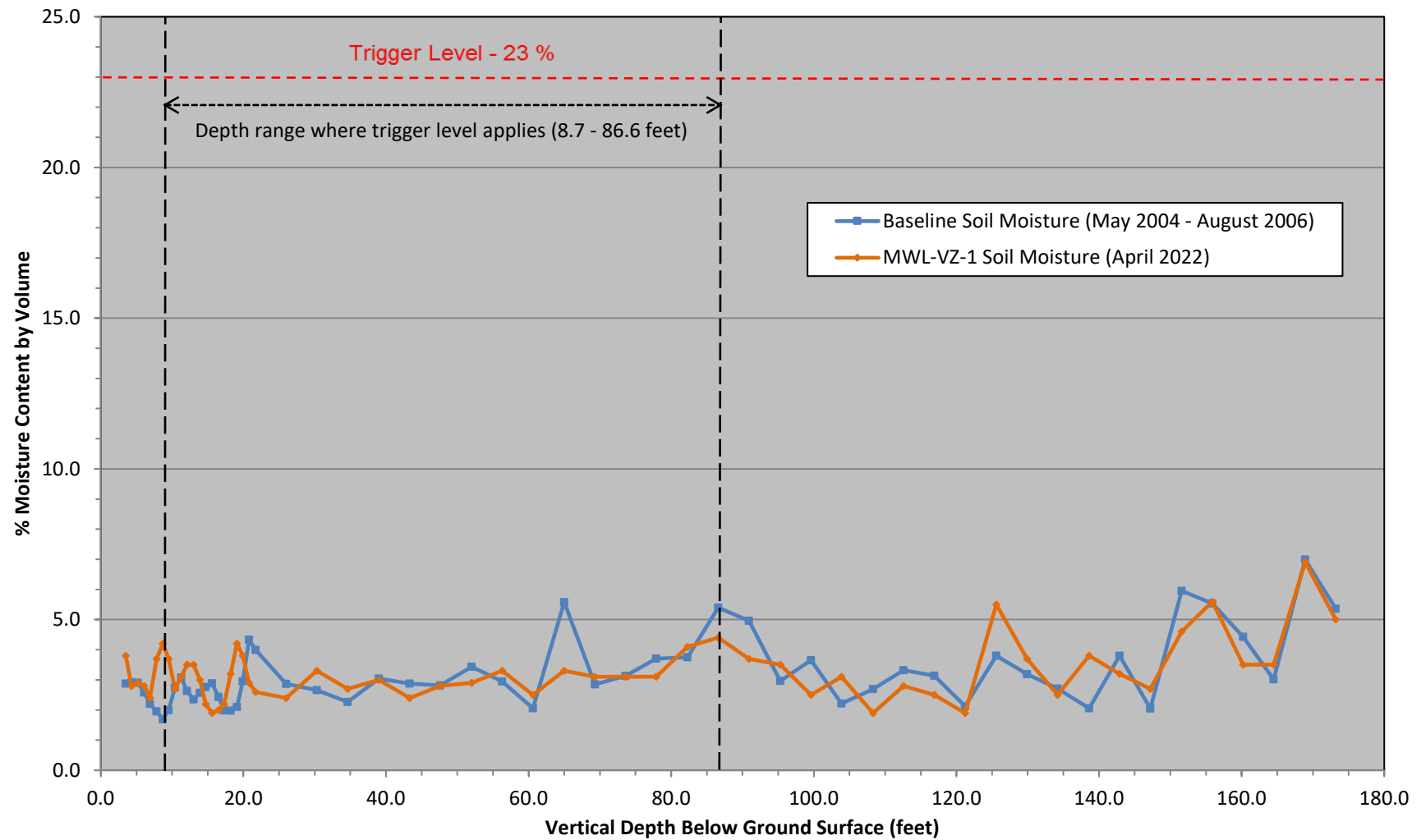


Figure 6-2
Mixed Waste Landfill MWL-VZ-1 Soil-Moisture Monitoring Results

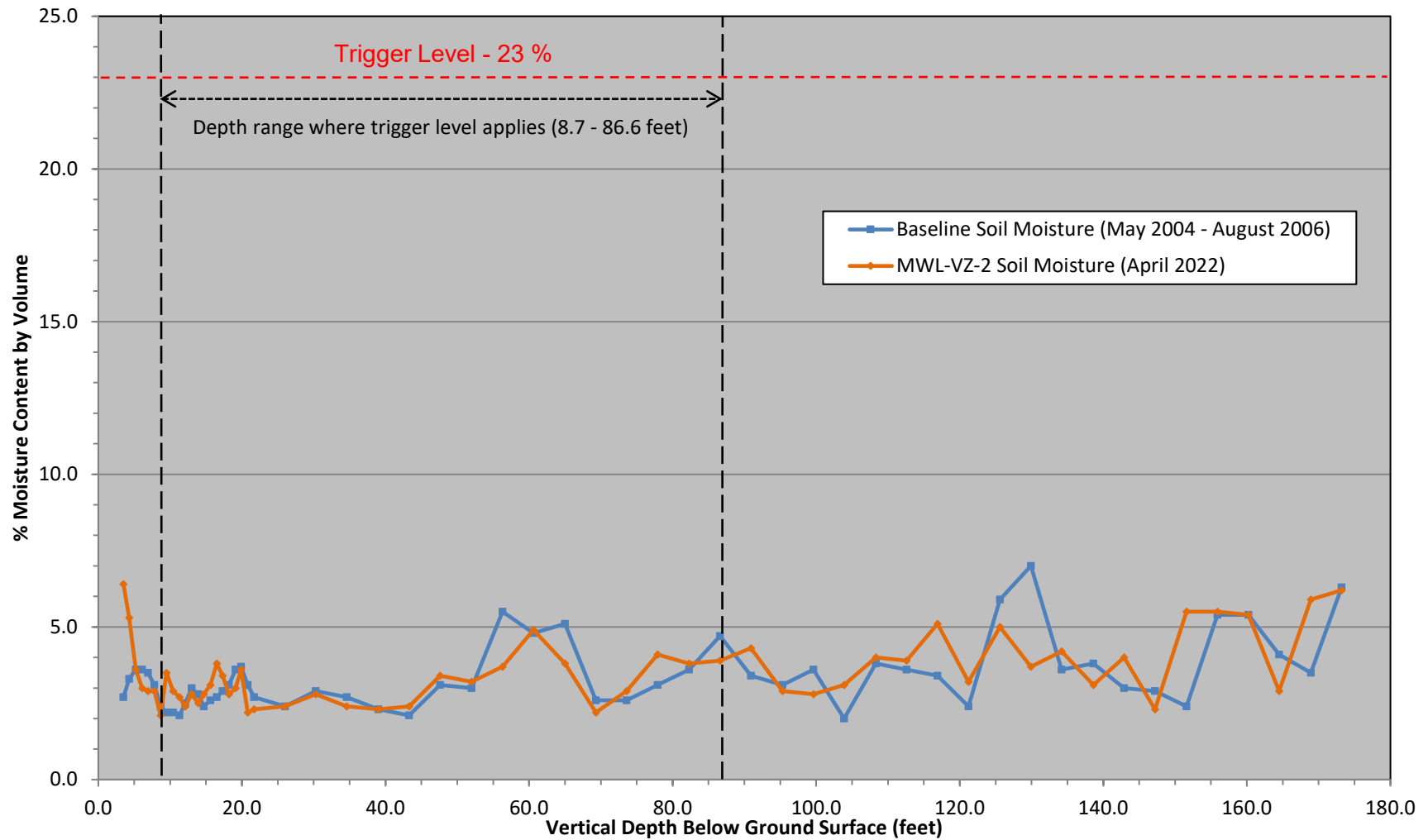


Figure 6-3
Mixed Waste Landfill MWL-VZ-2 Soil-Moisture Monitoring Results

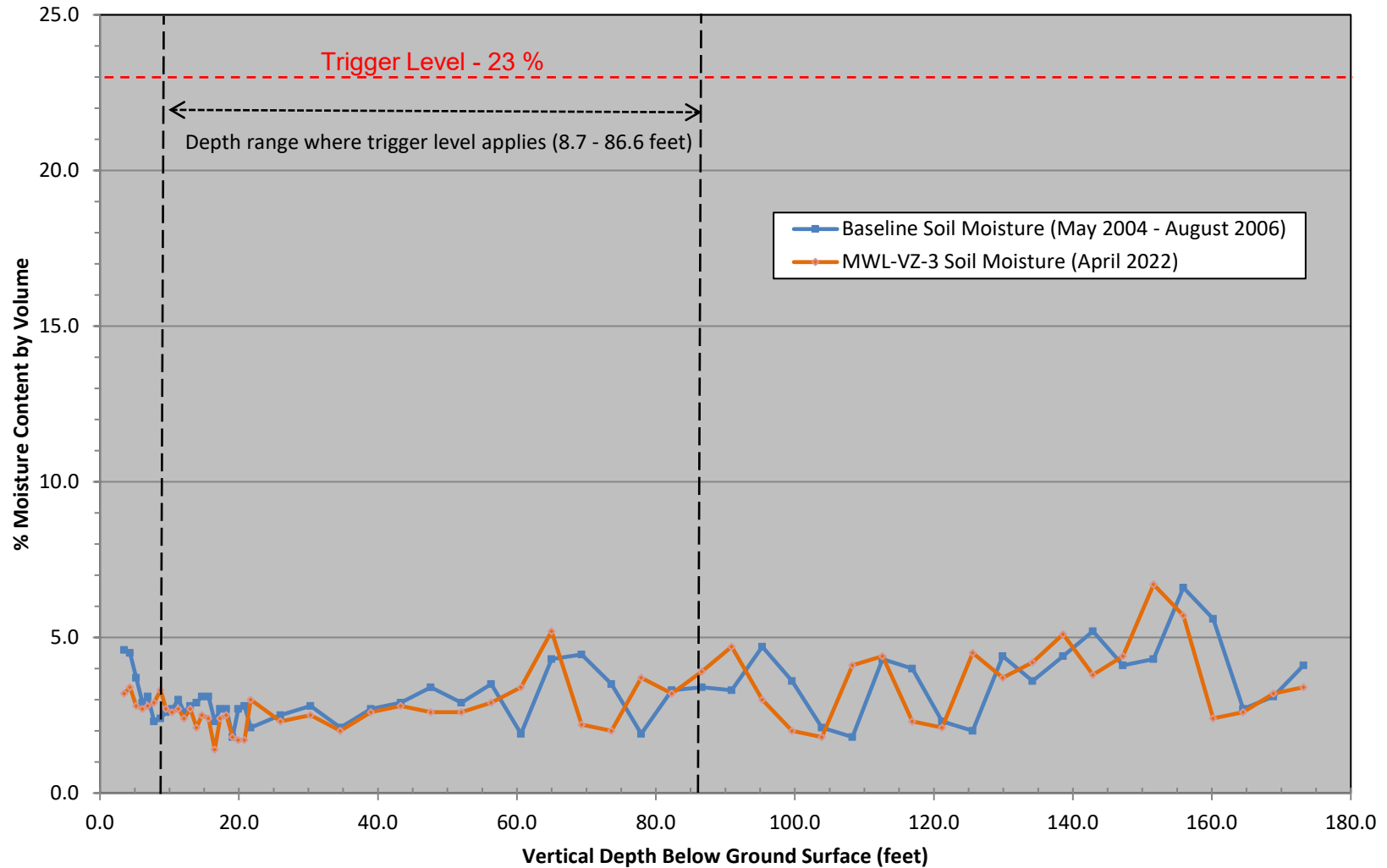


Figure 6-4
Mixed Waste Landfill MWL-VZ-3 Soil-Moisture Monitoring Results

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, 2022 through March 31, 2023 reporting period, fulfilling the LTMMP semiannual monitoring requirement. Environmental 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. In addition, samples were collected during the October 2022 sampling event for three perfluoroalkyl and polyfluoroalkyl substances (PFAS), including perfluorohexane sulfonic acid (PFHxS), perfluorooctane sulfonic acid (PFOS), and perfluorooctanoic acid (PFOA). These constituents were added to the MWL October 2022 groundwater monitoring event to address the NMED request (NMED July 2021) to evaluate toxic pollutants added to Subsection T of 20.6.2.7 NMAC since January 2014 (i.e., since NMED-approval of the MWL LTMMP). Field forms and documentation that address calibration of equipment, well purging, water quality measurements, and equipment decontamination activities are provided in Annex E.

The first sampling event was conducted between May 12 and 18, 2022. An environmental-duplicate sample pair was collected from MWL-BW2.

The second sampling event was conducted between October 20 and 26, 2022. An environmental-duplicate sample pair was collected from MWL-MW7 and additional field QC samples were collected to support the PFAS sampling and analysis effort.

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

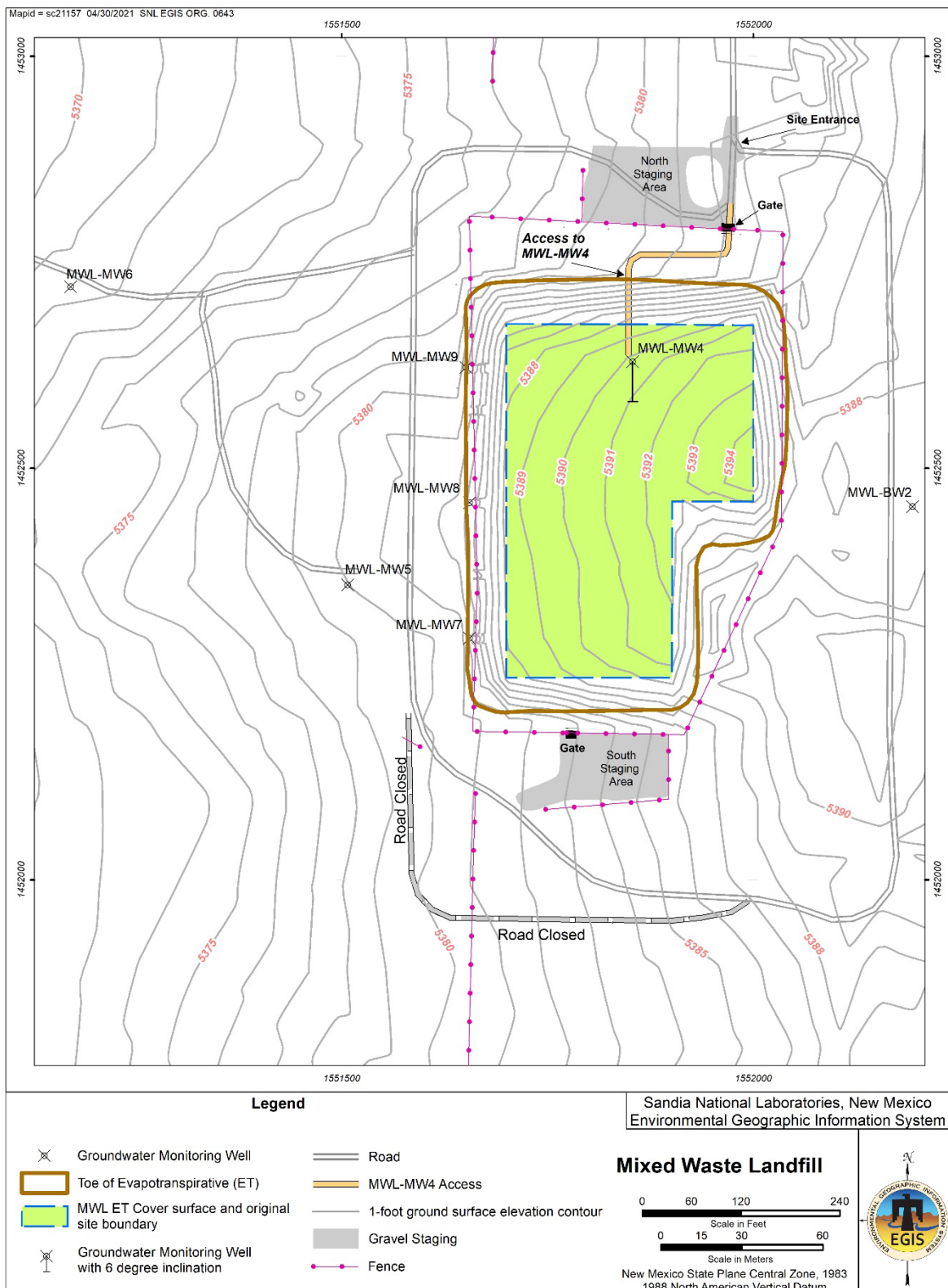


Figure 7-1
Mixed Waste Landfill Groundwater Monitoring Well Locations

one saturated screen volume. Purging continued beyond the minimum purge volume until four stable field measurements for temperature, specific conductivity, potential of hydrogen, and turbidity were obtained. Field measurements for water quality parameters were collected using an In-Situ Incorporated Aqua TROLL® 600 Multiparameter Water Quality Sonde and a HACH™ Model 2100Q portable turbidity meter. Additional water quality measurements included oxidation-reduction potential and dissolved oxygen.

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 0.100 gallons per minute (gpm) at MWL-MW8 to 0.229 gpm at MWL-BW2 for the May 2022 sampling event. The average flow rates ranged from 0.132 gpm at MWL-MW8 to 0.219 gpm at MWL-BW2 for the October 2022 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 samples to reduce variability caused by time and/or sampling mechanics. Duplicate samples were analyzed for the same constituents as the environmental 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 water that was pumped through the sampling system and analyzed for the same constituents as the environmental samples.

Field blank samples were collected and analyzed for VOCs to detect potential sample contamination resulting from ambient field conditions. The field blanks were prepared by pouring deionized 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 environmental samples collected for analysis of VOCs to assess whether contamination of the samples occurred during sampling, transportation, analysis, and/or storage.

The field QC samples were submitted for analysis with the environmental samples. A brief explanation of the field QC sampling protocol for the May and October 2022 sampling events is provided below. Analytical results are presented in Section 7.2.

First Sampling Event – May 12-18, 2022

One environmental duplicate sample was collected at MWL-BW2. One equipment blank sample was collected prior to sampling monitoring well MWL-BW2. Five field blank samples were collected, one at each monitoring well location, and one was collected from the source water used for the equipment decontamination process. Six trip blank samples were submitted with the environmental samples for VOC analysis.

Second Sampling Event – October 20-26, 2022

One environmental duplicate sample was collected at MWL-MW7. Four equipment blank samples were collected prior to sampling each of the four compliance monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). Five field blank samples were collected, one at each monitoring well location and one from the source water used for the equipment decontamination process. Four additional field blank samples were collected using laboratory reagent-grade (ultra-pure water supplied by the laboratory) for PFAS analyses only. Nine trip blank samples were submitted with the environmental 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 229 gallons of wastewater were generated during the May and October 2022 sampling events, for a total of 458 gallons.

PPE and other solid waste generated during May and October 2022 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 (PQLs), dates of analyses, results of QC analyses, and data validation reports are filed in the SNL/NM Record Center.

7.2.1 Environmental Sample Results

This section summarizes groundwater monitoring results for the reporting period. Groundwater monitoring results were compared to historical MWL groundwater monitoring results and LTMMP trigger levels. All results were below applicable LTMMP trigger levels and were comparable to historical MWL groundwater monitoring results. After the general summary provided below, environmental and field QC sample results are presented for the two semiannual monitoring 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 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 summarizes the laboratory MDLs for VOCs and the three PFAS included in the October 2022 analyses. Environmental samples were collected for PFAS for the first time in October 2022. There were no detections of PFHxS, PFOS, and PFOA in the October 2022 environmental samples.

Table 7-1
Summary of Method Detection Limits for Volatile Organic Compounds (EPA Method 8260D^a)
and Perfluoroalkyl and Polyfluoroalkyl Substances (Method 537.1^b)
Mixed Waste Landfill Groundwater Monitoring
May and October 2022

Analyte	Method Detection Limit
Volatile Organic Compounds	
	(µg/L)
1,1,1-Trichloroethane	0.333
1,1,2,2-Tetrachloroethane	0.333
1,1,2-Trichloroethane	0.333
1,1-Dichloroethane	0.333
1,1-Dichloroethene	0.333
1,2-Dichloroethane	0.333
1,2-Dichloropropane	0.333
2-Butanone	1.67
2-Hexanone	1.67
4-Methyl-2-pentanone	1.67
Acetone	1.74
Benzene	0.333
Bromodichloromethane	0.333
Bromoform	0.333
Bromomethane	0.337
Carbon disulfide	1.67
Carbon tetrachloride	0.333
Chlorobenzene	0.333
Chloroethane	0.333
Chloroform	0.333
Chloromethane	0.333
Dibromochloromethane	0.333
Dichlorodifluoromethane	0.355
Ethylbenzene	0.333
Methylene chloride	0.500
Styrene	0.333
Tetrachloroethene	0.333
Toluene	0.333
Trichloroethene	0.333
Vinyl acetate	1.67
Vinyl chloride	0.333
Xylene	1.00
cis-1,2-Dichloroethene	0.333
cis-1,3-Dichloropropene	0.333
trans-1,2-Dichloroethene	0.333
trans-1,3-Dichloropropene	0.333
Perfluoroalkyl & Polyfluoroalkyl Substances (PFAS)	
	(ng/L)
Perfluorohexane sulfonic acid (PFHxS)	0.619 - 0.661
Perfluorooctane sulfonic acid (PFOS)	0.713 - 0.761
Perfluorooctanoic acid (PFOA)	0.619 - 0.661

Notes:

^aEPA, November 1986 (and updates). "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition, Office of Solid Waste and Emergency Response, EPA, Washington, D.C.

^bEPA, March 2020. "Method 537.1, Determination of Selected Per- and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)," EPA/600/R-20/006, Version 2.0, U.S. Environmental Protection Agency, Washington, D.C.

EPA = U.S. Environmental Protection Agency. µg/L = Micrograms per liter.

ng/L = nanograms per liter.

The May and October 2022 VOC results are presented in Table 7-2; the 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 presented in Table 7-4. Table 7-5 summarizes field water quality measurements taken prior to environmental groundwater sample collection.

First Sampling Event – May 12-18, 2022

There were no validated VOC detections in the environmental samples. Methylene chloride was reported at very low concentrations below the PQL in the MWL-BW2 environmental duplicate sample and the MWL-MW7 environmental sample. These results were qualified during data validation as non-detections due to associated trip blank results. There were no other reported detections of VOCs.

Cadmium and chromium were not detected above the associated MDLs. Nickel was detected above the MDL but below the PQL in the MWL-BW2 environmental-duplicate sample pair. Uranium was detected below the LTMMP trigger level in all environmental samples. Uranium concentrations ranged from 0.00713 milligrams per liter (mg/L) at MWL-BW2 (environmental duplicate sample) to 0.00933 mg/L at MWL-MW9. All metals results are consistent with historical MWL groundwater monitoring results and below LTMMP trigger levels.

MWL environmental 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 LTMMP trigger level of 15 pCi/L in all samples ranging from 4.35 pCi/L (MWL-MW9) to 7.12 pCi/L (MWL-BW2 environmental duplicate sample). Gross beta activity ranged from 5.40 pCi/L (MWL-MW8) to 9.14 pCi/L (MWL-BW2 environmental duplicate sample); results are consistent with background levels. Radon-222 was detected in all samples below the LTMMP trigger level of 1,000 pCi/L, with activities ranging from 95.4 pCi/L (MWL-MW7) to 470 pCi/L (MWL-BW2 environmental sample).

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 LTMMP trigger levels.

Second Sampling Event – October 20-26, 2022

Toluene was the only VOC detected in the validated environmental sample results. Acetone and methylene chloride were reported in MWL-BW2 environmental sample and acetone was reported in the MWL-MW7 environmental duplicate sample at very low concentrations below the PQL. These results were qualified as not detected during data validation due to associated trip and field blank sample results, respectively. Toluene was reported in all October 2022 environmental samples at low concentrations. The toluene result for the MWL-MW8 environmental sample was qualified as not detected during data validation due to a similar result in the associated trip blank sample. The toluene results for the other environmental samples were all very low detections between the MDL and PQL and well below the trigger level.

Table 7-2
Summary of Detected Volatile Organic Compound Results (EPA Method 8260D^a),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico
May and October 2022

Well ID	Analyte	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	Trigger Level (µg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
May 2022 Sampling Event							
MWL-BW2 (Duplicate) 12-May-2022	Methylene chloride	0.560	0.500	5.00	3	J	5.0U
MWL-MW7 16-May-2022	Methylene chloride	0.730	0.500	5.00	3	J	5.0U
October 2022 Sampling Event							
MWL-BW2 20-Oct-2022	Acetone	2.09	1.74	5.00	3000	J	5.0U
	Methylene chloride	0.860	0.500	5.00	3	J	5.0UJ
	Toluene	0.880	0.333	1.00	1000	J	--
MWL-MW7 24-Oct-2022	Toluene	0.880	0.333	1.00	1000	J	--
MWL-MW7 (Duplicate) 24-Oct-2022	Acetone	2.11	1.74	5.00	3000	J	5.0U
	Toluene	0.870	0.333	1.00	1000	J	--
MWL-MW8 26-Oct-2022	Toluene	7.93	0.333	1.00	1000	--	7.93U
MWL-MW9 25-Oct-2022	Toluene	0.840	0.333	1.00	1000	J	--

Notes:

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

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

Laboratory Qualifier

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

Validation Qualifier

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

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

ID = Identification.

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

µg/L = Micrograms per liter.

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.

Table 7-3
Summary of Cadmium, Chromium, Nickel, and Uranium Results (EPA Method 6020B^a)
Mixed Waste Landfill Groundwater Monitoring
May and October 2022

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Trigger Level (mg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
May 2022 Sampling Event							
MWL-BW2 12-May-2022	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000736	0.0006	0.002	0.050	J	--
	Uranium	0.00726	0.000067	0.0002	0.015	--	--
MWL-BW2 (Duplicate) 12-May-2022	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000720	0.0006	0.002	0.050	J	--
	Uranium	0.00713	0.000067	0.0002	0.015	--	--
MWL-MW7 16-May-2022	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	0.00738	0.000067	0.0002	0.015	--	--
MWL-MW8 18-May-2022	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	0.00752	0.000067	0.0002	0.015	--	--
MWL-MW9 17-May-2022	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	0.00933	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^a)
Mixed Waste Landfill Groundwater Monitoring
May and October 2022

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Trigger Level (mg/L)	Laboratory Qualifier ^b	Validation Qualifier ^b
October 2022 Sampling Event							
MWL-BW2 20-Oct-2022	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	0.000787	0.0006	0.002	0.050	J	--
	Uranium	0.00687	0.000067	0.0002	0.015	--	--
MWL-MW7 24-Oct-2022	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	0.00319	0.003	0.010	0.043	J	--
	Nickel	0.00186	0.0006	0.002	0.050	J	0.002U
	Uranium	0.00721	0.000067	0.0002	0.015	--	--
MWL-MW7 (Duplicate) 24-Oct-2022	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	0.00311	0.003	0.010	0.043	J	--
	Nickel	0.00192	0.0006	0.002	0.050	J	0.002U
	Uranium	0.00711	0.000067	0.0002	0.015	--	--
MWL-MW8 26-Oct-2022	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	0.00754	0.000067	0.0002	0.015	--	--
MWL-MW9 25-Oct-2022	Cadmium	ND	0.0003	0.001	0.0025	U	--
	Chromium	ND	0.003	0.010	0.043	U	--
	Nickel	ND	0.0006	0.002	0.050	U	--
	Uranium	0.00932	0.000067	0.0002	0.015	--	--

Notes:

^aEPA, November 1986 (and updates). "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd edition, Office of Solid Waste and Emergency Response, EPA, Washington, D.C.

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

Laboratory Qualifier

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

U = Analyte was not detected.

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., PQL) in units of ppmv, in accordance with the data validation process.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

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

mg/L = Milligrams per liter.

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 October 2022

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
May 2022 Sampling Event							
MWL-BW2 12-May-2022	Americium-241	-4.66 ± 7.38	11.1	NE	U	BD	EPA 901.1
	Cesium-137	0.779 ± 1.74	2.80	NE	U	BD	EPA 901.1
	Cobalt-60	-0.287 ± 1.67	3.03	NE	U	BD	EPA 901.1
	Gross Alpha	6.74	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	7.73 ± 0.997	1.32	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	13.0 ± 75.8	138	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	470 ± 128	90.3	1,000 pCi/L	H	J	SM7500-Rn B
MWL-BW2 (Duplicate) 12-May-2022	Americium-241	8.64 ± 15.3	25.3	NE	U	BD	EPA 901.1
	Cesium-137	1.13 ± 3.13	2.95	NE	U	BD	EPA 901.1
	Cobalt-60	-0.813 ± 2.09	3.53	NE	U	BD	EPA 901.1
	Gross Alpha	7.12	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	9.14 ± 1.17	1.52	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	-3.77 ± 74.5	139	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	438 ± 122	90.5	1,000 pCi/L	H	J	SM7500-Rn B
MWL-MW7 16-May-2022	Americium-241	1.68 ± 9.51	15.6	NE	U	BD	EPA 901.1
	Cesium-137	-5.87 ± 4.80	3.26	NE	U	BD	EPA 901.1
	Cobalt-60	0.0379 ± 1.73	3.22	NE	U	BD	EPA 901.1
	Gross Alpha	5.66	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	6.99 ± 1.07	1.44	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	69.9 ± 82.7	137	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	95.4 ± 61.1	92.1	1,000 pCi/L	--	J	SM7500-Rn B
MWL-MW8 18-May-2022	Americium-241	1.68 ± 10.2	17.0	NE	U	BD	EPA 901.1
	Cesium-137	0.537 ± 2.13	3.74	NE	U	BD	EPA 901.1
	Cobalt-60	0.676 ± 2.10	3.91	NE	U	BD	EPA 901.1
	Gross Alpha	4.43	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.40 ± 0.811	1.01	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	24.3 ± 78.3	140	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	158 ± 56.7	64.4	1,000 pCi/L	--	J	SM7500-Rn B
MWL-MW9 17-May-2022	Americium-241	-2.41 ± 18.3	30.0	NE	U	BD	EPA 901.1
	Cesium-137	0.403 ± 2.14	3.83	NE	U	BD	EPA 901.1
	Cobalt-60	-0.320 ± 2.19	4.00	NE	U	BD	EPA 901.1
	Gross Alpha	4.35	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	6.28 ± 0.979	1.33	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	68.8 ± 85.0	142	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	421 ± 112	77.5	1,000 pCi/L	--	--	SM7500-Rn B
October 2022 Sampling Event							
MWL-BW2 20-Oct-2022	Americium-241	-1.17 ± 15.2	23.2	NE	U	BD	EPA 901.1
	Cesium-137	1.75 ± 3.69	3.27	NE	U	BD	EPA 901.1
	Cobalt-60	-1.84 ± 2.53	3.44	NE	U	BD	EPA 901.1
	Gross Alpha	6.60	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	9.05 ± 1.17	1.42	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	52.1 ± 90.8	157	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	345 ± 100	84.1	1,000 pCi/L	--	--	SM7500-Rn B
MWL-MW7 24-Oct-2022	Americium-241	0.571 ± 7.64	13.3	NE	U	BD	EPA 901.1
	Cesium-137	0.327 ± 1.47	2.59	NE	U	BD	EPA 901.1
	Cobalt-60	-1.19 ± 1.63	2.63	NE	U	BD	EPA 901.1
	Gross Alpha	2.95	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	6.98 ± 0.909	1.17	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	16.4 ± 87.8	159	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	142 ± 57.4	70.6	1,000 pCi/L	--	J	SM7500-Rn B

Refer to notes at end of table.

Table 7-4 (Concluded)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results
Mixed Waste Landfill Groundwater Monitoring
May and October 2022

Well ID	Analyte	Result ^a (pCi/L)	MDA ^b (pCi/L)	Trigger Level	Laboratory Qualifier ^c	Validation Qualifier ^c	Analytical Method ^d
October 2022 Sampling Event (continued)							
MWL-MW7 (Duplicate) 26-Oct-2022	Americium-241	-0.263 ± 5.29	9.19	NE	U	BD	EPA 901.1
	Cesium-137	-0.444 ± 1.59	2.57	NE	U	BD	EPA 901.1
	Cobalt-60	0.617 ± 1.47	2.75	NE	U	BD	EPA 901.1
	Gross Alpha	3.81	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.39 ± 0.805	0.988	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	55.9 ± 92.2	158	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	109 ± 52.2	70.8	1,000 pCi/L	--	J	SM7500-Rn B
MWL-MW8 26-Oct-2022	Americium-241	-1.51 ± 9.47	14.1	NE	U	BD	EPA 901.1
	Cesium-137	0.385 ± 3.06	2.93	NE	U	BD	EPA 901.1
	Cobalt-60	0.843 ± 1.68	3.10	NE	U	BD	EPA 901.1
	Gross Alpha	4.50	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.79 ± 0.872	1.19	4 mrem/yr	--	NJ+	EPA 900.0
	Tritium ^f	63.1 ± 94.0	160	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	153 ± 57.2	66.3	1,000 pCi/L	--	J	SM7500-Rn B
MWL-MW9 25-Oct-2022	Americium-241	-0.0705 ± 12.9	20.2	NE	U	BD	EPA 901.1
	Cesium-137	0.308 ± 1.71	2.98	NE	U	BD	EPA 901.1
	Cobalt-60	1.04 ± 1.61	3.03	NE	U	BD	EPA 901.1
	Gross Alpha	4.06	NA	15 pCi/L	NA	None	EPA 900.0
	Gross Beta ^e	5.64 ± 0.948	1.24	4 mrem/yr	--	--	EPA 900.0
	Tritium ^f	59.4 ± 93.0	159	4 mrem/yr	U	BD	EPA 906.0M
	Radon-222	421 ± 107	59.1	1,000 pCi/L	--	--	SM7500-Rn B

Notes:

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

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

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

Laboratory Qualifier

H = Analytical holding time was exceeded.

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 = The associated value is an estimated quantity.

NJ+ = Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.

None = No data validation for corrected gross alpha activity.

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

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

Analytical Method SM7500-Rn B:

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

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

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

EPA = U.S. Environmental Protection Agency.

ID = Identification.

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^a
Mixed Waste Landfill Groundwater Monitoring
May and October 2022

Well ID	Temperature (°C)	SC (µmhos/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (% Sat)	DO (mg/L)
May 2022 Sampling Event							
MWL-BW2	21.41	703.61	153.1	7.37	2.27	26.24	2.16
MWL-MW7	22.96	614.43	176.9	7.54	0.28	75.07	6.06
MWL-MW8	23.14	605.81	169.1	7.49	0.34	40.91	3.11
MWL-MW9	23.85	628.31	143.3	7.45	0.71	14.95	1.17
October 2022 Sampling Event							
MWL-BW2	21.94	694.20	95.2	7.34	1.55	36.75	2.70
MWL-MW7	16.72	463.99	108.6	7.52	0.70	73.02	6.10
MWL-MW8	18.05	483.09	124.6	7.49	0.32	35.31	2.81
MWL-MW9	16.95	470.64	96.1	7.45	0.54	10.53	0.87

Notes:

^aField 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.

µmho/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.

Toluene is a ubiquitous chemical and common laboratory contaminant that has been sporadically detected at very low concentrations in environmental samples from the MWL and other SNL/NM sites. From 2008 through early 2010, SNL/NM personnel performed a comprehensive toluene investigation (SNL/NM October 2010) that was approved by the NMED (Bearzi January 2011). The extensive data and information presented in the report indicated the MWL and other SNL/NM sites were not the source of the toluene detected in environmental samples, which were like those reported in the October 2022 samples. Since groundwater monitoring began under the LTMMP in 2014 there have been no detections of toluene in MWL environmental samples until the October 2022 data set.

Cadmium was not detected above the MDL in any of the environmental samples. Chromium was only detected at low concentrations below the PQL in the MWL-MW7 environmental-duplicate sample pair. Nickel was detected in the MWL-BW2 (environmental sample) and MWL-MW7 (environmental and environmental duplicate samples) at low concentrations between the MDL and PQL. Uranium was detected in all samples at concentrations ranging from 0.00687 mg/L (MWL-BW2) to 0.00932 mg/L (MWL-MW9). All metals results are consistent with historical MWL groundwater monitoring results and are below LTMMP trigger levels.

MWL environmental 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 2.95 pCi/L (MWL-MW7 environmental sample) to 6.60 pCi/L (MWL-BW2). Gross beta activity was detected in all samples ranging from 5.39 pCi/L (MWL-MW7 environmental duplicate sample) to 9.05 pCi/L (MWL-BW2)); 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 109 pCi/L (MWL-MW7 environmental duplicate sample) to 421 pCi/L (MWL-MW9).

All radiological results were reviewed by an SNL/NM Health Physics SME to screen for potential indications of radiological contamination; there were no indications of radiological anomalies in the groundwater sample results. Results are consistent with historical results and 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 have not been exceeded. 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 reflects mostly non-detection results for nickel in the environmental samples from all four compliance monitoring wells.

7.2.2 Field Quality Control Sample Results

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

Table 7-6 summarizes results of environmental-duplicate sample pair results and the calculated RPD values for the May and October 2022 data sets. RPDs were calculated for constituents that exceeded the MDL in the sample pairs. Calculated RPDs show good agreement (i.e., RPD values less than or equal to 20 for VOCs and less than or equal to 35 for metals per LTMMMP Appendix F, Section 2.2) for both sampling events, ranging from 1 to 3.

A discussion of equipment, field, and trip blank results for the May and October 2022 sampling events is provided below.

First Sampling Event – May 12-18, 2022

The equipment blank sample for the May 2022 sampling event was analyzed for all constituents. Acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane and methylene chloride were detected above laboratory MDLs. No corrective action was necessary since these compounds were not detected in the MWL-BW2 environmental-duplicate sample pair. The equipment blank methylene chloride result was qualified as not detected during data validation since it was reported in the associated trip blank sample at a similar

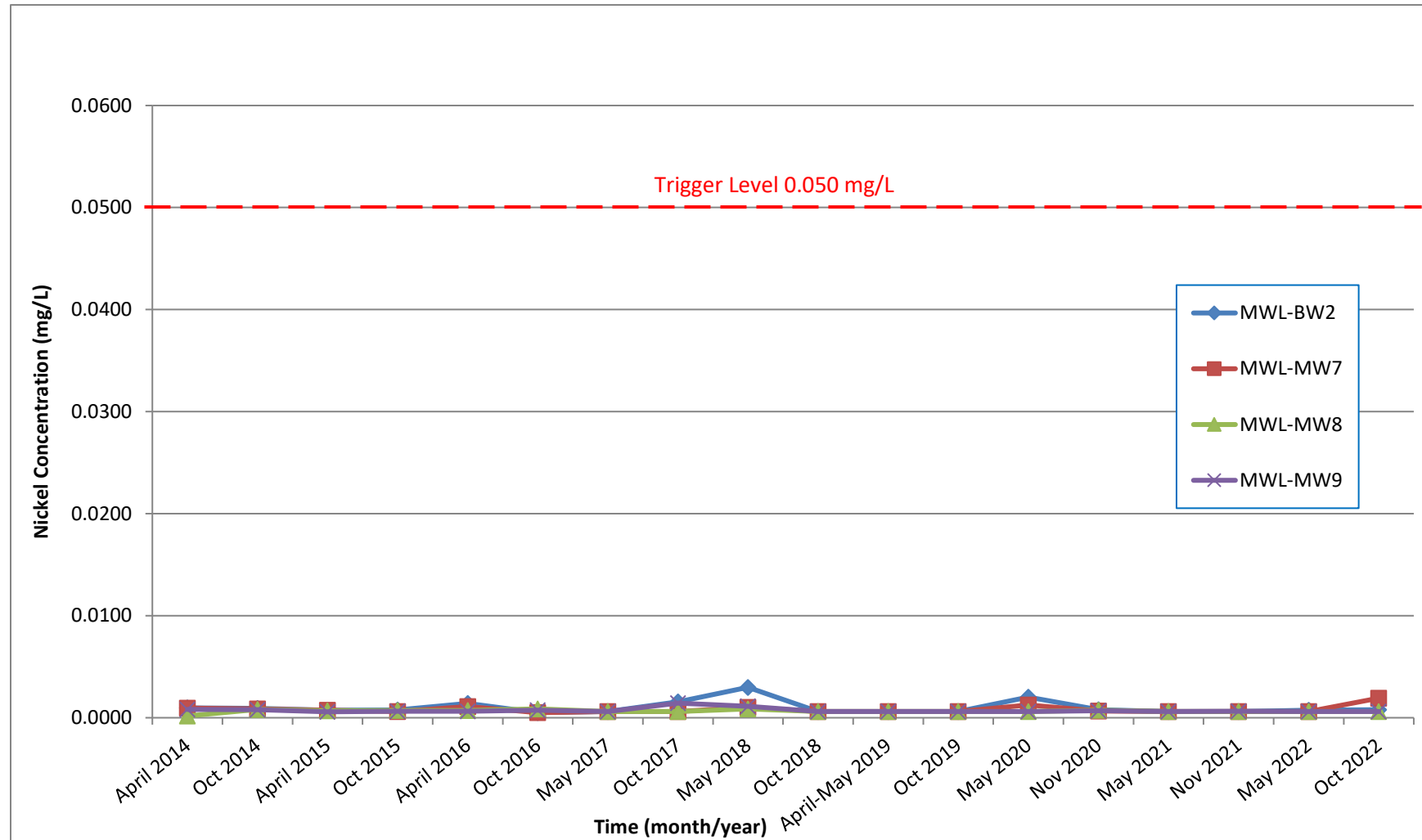


Figure 7-2
Nickel Concentrations vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

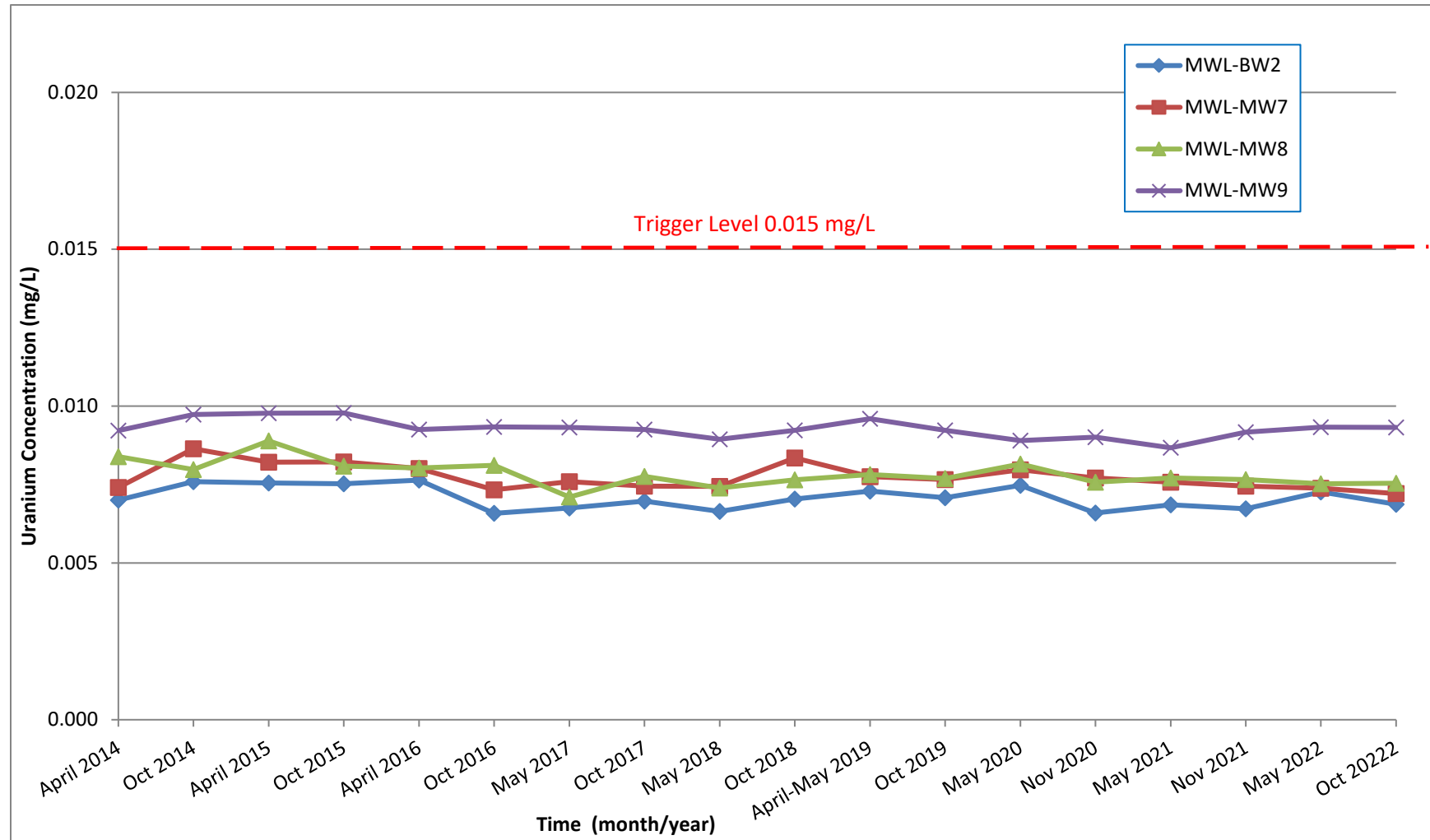


Figure 7-3
Uranium Concentrations vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

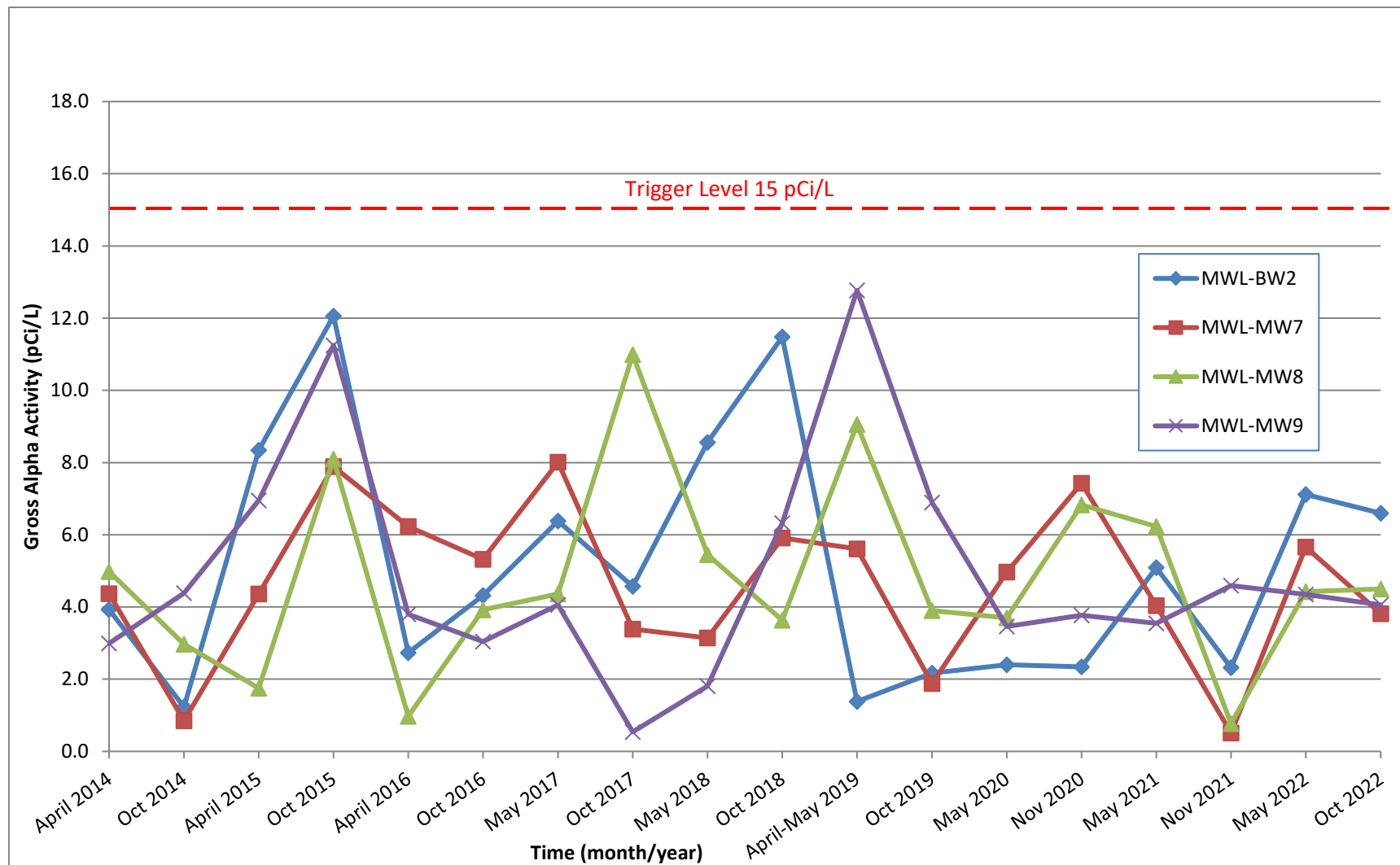


Figure 7-4
Gross Alpha Activity vs. Time
Mixed Waste Landfill Groundwater Monitoring Wells

Table 7-6
Summary of Duplicate Sample Results
Mixed Waste Landfill Groundwater Monitoring
May and October 2022

Well ID/Parameter	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a (%)
May 2022 Sampling Event			
MWL-BW2			
Nickel (mg/L)	0.000736	0.000720	2
Uranium (mg/L)	0.00726	0.00713	2
October 2022 Sampling Event			
MWL-MW7			
Toluene (µg/L)	0.880	0.870	1
Chromium (mg/L)	0.00319	0.00311	3
Nickel (mg/L)	0.00186	0.00192	3
Uranium (mg/L)	0.00721	0.00711	1

Notes:

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

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

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

% = Percent.
ID = Identification.
µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
MWL = Mixed Waste Landfill.

concentration. Due to a shipping delay, the equipment blank VOC sample was received by the laboratory outside the analytical method temperature criteria. All VOC results that were detections above the MDLs were qualified as estimated values with a negative bias and all non-detections (i.e., less than the associated MDLs) were qualified as not usable during data validation. No corrective action was required as there were no VOCs reported above MDLs in the associated environmental samples (i.e., MWL-BW2 environmental-duplicate sample pair). Also due to the shipping delay, the radon-222 equipment blank sample was analyzed outside the analytical method holding time. A second equipment blank sample was collected for radon-222 only on May 17, 2022 prior to sampling MWL-MW9. Radon-222 was reported below the MDA in both equipment blank samples.

Five field blank samples were collected and submitted for VOC analysis during the May 2022 sampling event. Acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, and methylene chloride were detected in the field blank samples. No corrective action was necessary since these compounds were not detected in the associated environmental samples. The one field blank methylene chloride result was qualified as not detected during data validation as explained below.

Methylene chloride was the only VOC detected above the MDL in the six trip blank samples. Methylene chloride was reported below the PQL in the trip blank samples associated with the MWL-BW2 and MWL-MW7 environmental samples and the associated field QC samples (i.e., MWL-BW2 environmental duplicate sample, two field blank samples and one equipment blank sample). In the environmental and field QC samples with reported detections, methylene chloride was qualified as not detected during data validation since the reported concentrations were similar to the trip blank sample concentrations.

Second Sampling Event – October 20-26, 2022

The four equipment blank samples collected prior to sampling each monitoring well were analyzed for all constituents. 1,2-dichloroethane, acetone, bromodichloromethane, 2-butanone, chloroform, dibromochloromethane, methylene chloride, nickel, and gross beta were detected above MDLs or MDA for gross beta. No corrective action was necessary for 1,2-dichloroethane, acetone, bromodichloromethane, 2-butanone, chloroform, dibromochloromethane, methylene chloride, and gross beta since these constituents were not detected in associated environmental samples or were detected at a concentration greater than five times the associated equipment blank concentration or activity. One exception was the MWL-MW8 gross beta result that was a detection greater than the MDA but less than five times the equipment blank activity; it was qualified during data validation as an estimated value with a suspected positive bias. Nickel results for the MWL-MW7 environmental-duplicate sample pair were qualified as not detected during data validation since nickel was reported in both environmental-duplicate sample pair and the equipment blank sample at low concentrations between the MDL and PQL.

Five field blank samples were collected and submitted for VOC and PFAS analysis. Four additional reagent field blank samples (i.e., using water supplied by the laboratory versus the deionized water supplied by a local vendor) were also collected at each well location and analyzed for the three PFAS only (PFHxS, PFOS, and PFOA). The compounds detected in field blank samples that were not qualified as non-detections during data validation due to associated trip blank results included 1,2-dichloroethane, acetone, bromodichloromethane, chloroform, dibromochloromethane, and PFOS. No corrective action was necessary for 1,2-dichloroethane, bromodichloromethane, chloroform, dibromochloromethane, and PFOS since these compounds were not detected in the associated environmental samples. Acetone in the MWL-MW7 environmental duplicate sample was qualified as not detected during data validation since acetone was reported at similar concentrations in the environmental duplicate and field blank samples. The one PFOS detection was in the field blank sample associated with MWL-MW9 (i.e., not the reagent field blank sample).

Acetone was reported in the trip blank samples associated with MWL-BW2 and three equipment blank samples. Methylene chloride was reported below the PQL in trip blank samples associated with MWL-BW2, MWL-MW8, two equipment blank samples, and two field blank samples. Toluene was reported in the trip blank samples associated with MWL-MW8 and two field blank samples. Acetone, methylene chloride, and toluene were qualified as not detected in these environmental and field QC samples during data validation since reported concentrations were either below the PQL or less than two times the trip blank concentrations.

7.2.3 Laboratory Quality Control and Data Quality

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

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 2020). Corrective action was implemented in accordance with the data validation procedure and included the qualification of results as detailed in the previous sections and the data validation reviews. All environmental sample analytical data were determined to be acceptable and meet 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 October 2022 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 change in groundwater elevation at MWL groundwater monitoring wells for the time period 2000 through 2022. Since about 2010, the rate of groundwater elevation decline in all wells has been relatively slow and some wells on the west side of the MWL have shown very small increases in groundwater elevations. The rate of groundwater elevation decline in the

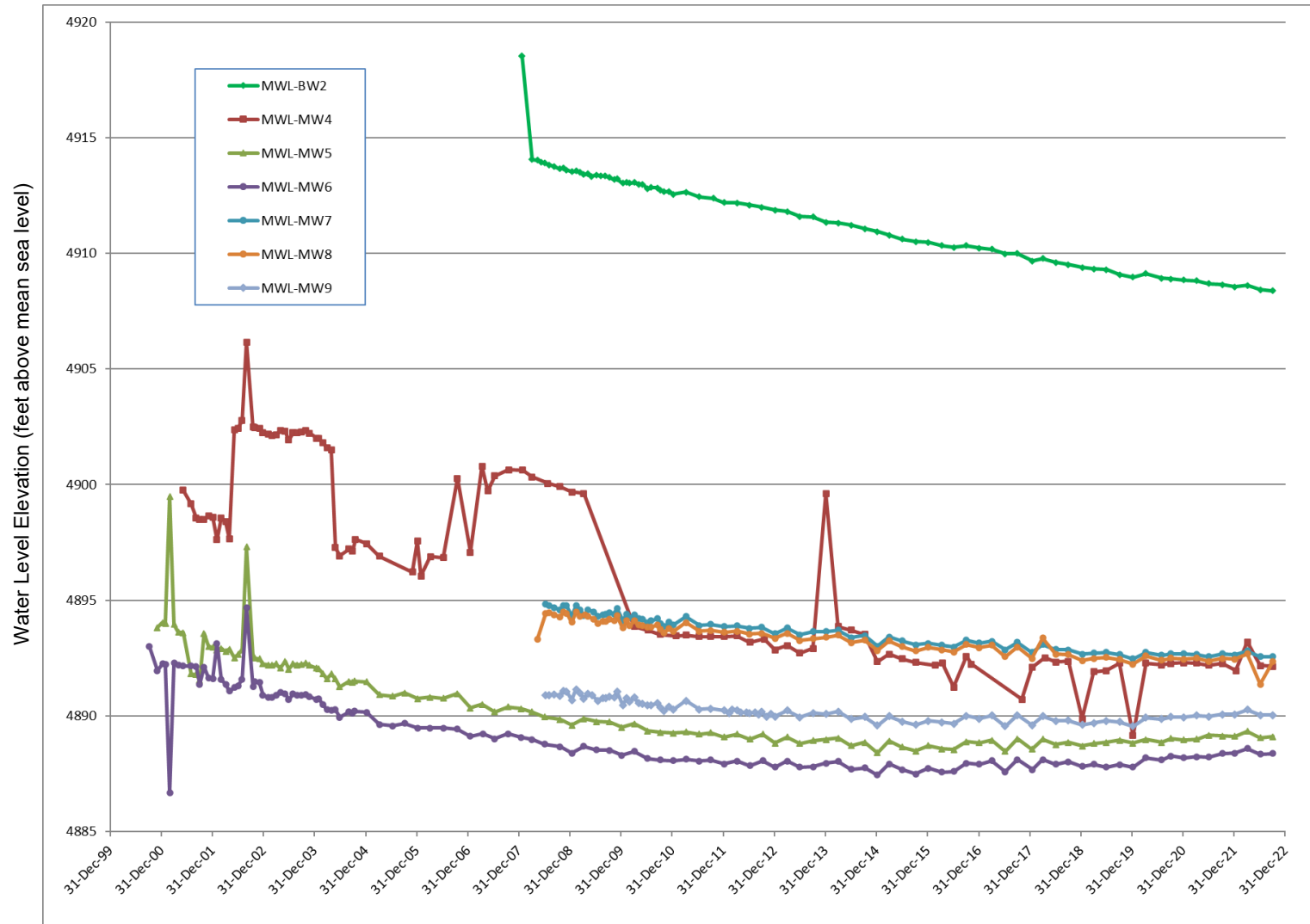


Figure 7-5
Groundwater Level Elevations at Mixed Waste Landfill Groundwater Monitoring Wells

upper screen interval of MWL-MW4 has generally stabilized since April 2010; this well shows more variation due to the strong downward gradient in the Regional Aquifer beneath the MWL and the presence of an inflatable packer between the upper (across the water table) and lower (at least partially within the Ancestral Rio Grande sediments) screen intervals. The overall decline in MWL-BW2, located on the east side of the MWL, reflects a higher rate of decline than observed in the other wells on the western side of the MWL. Monitoring wells on the west side of the MWL (MWL-MW5 through MWL-MW9) have shown a slight increase in the groundwater elevation over the past three years. From October 2021 to October 2022, the groundwater elevation declined in all MWL compliance wells, ranging from -0.26 feet at MWL-BW2 to -0.04 feet at MWL-MW9. Changes were smaller at the other three monitoring wells with different well completions; MWL-MW4 and MWL-MW5 showed a slight decline (-0.05 feet and -0.03 feet, respectively) and MWL-MW6 showed no change. In contrast to more significant decreases observed in the past, these subtle changes are likely due to decreased pumping of ABCWUA production wells to the north.

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. Regional recharge has been affected by extended drought conditions that continued in 2022. 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 2022 potentiometric surface of the Regional Aquifer beneath the MWL. Based upon the potentiometric contours, the hydraulic gradient is to the west-northwest. Measured orthogonally from the potentiometric surface contours, the horizontal gradient for October 2022 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 2022 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 significantly changed over the past nine years and are consistent with previous estimates for horizontal groundwater flow at the water table in the MWL vicinity.

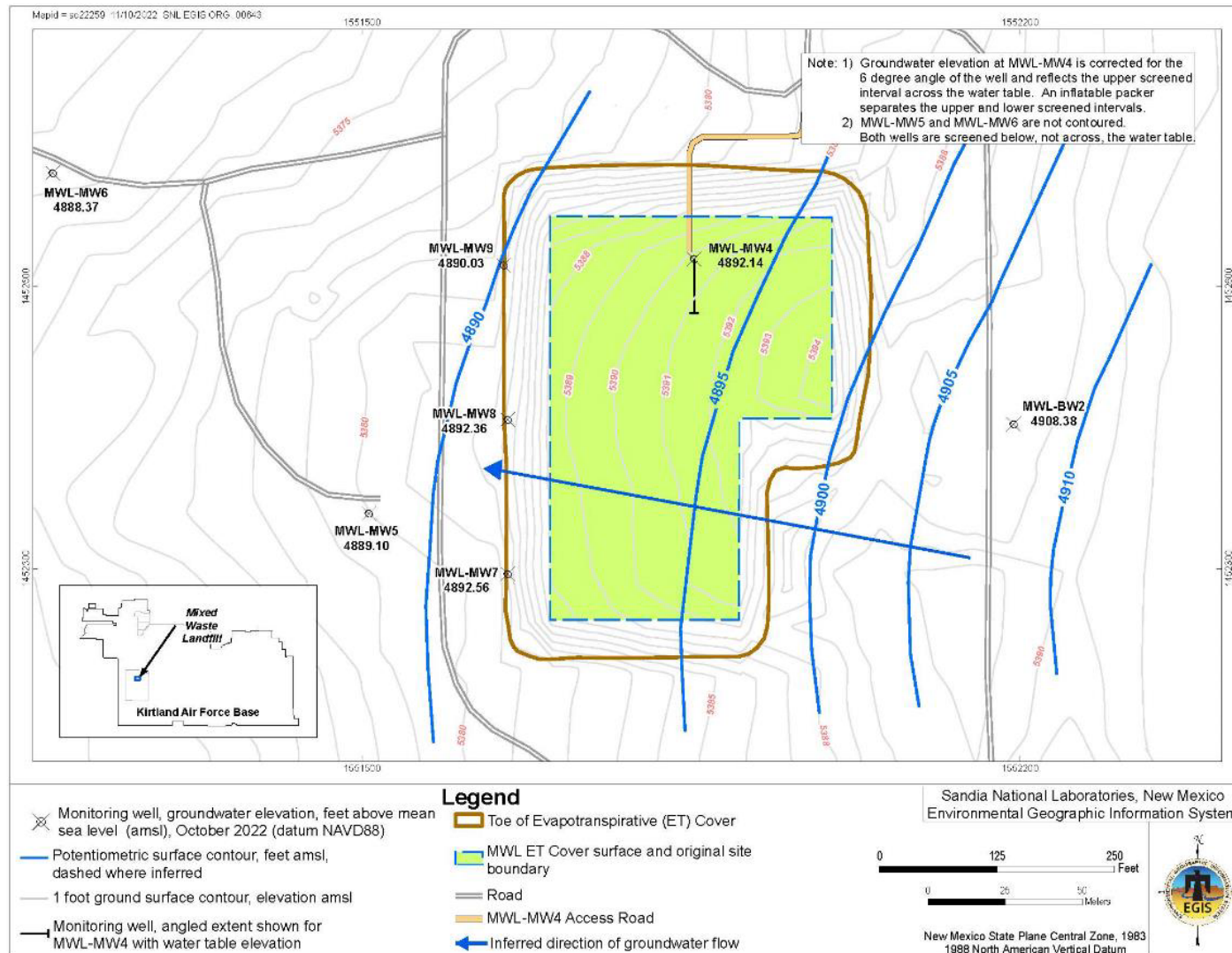


Figure 7-6
Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2022

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8.0 BIOTA MONITORING RESULTS

This chapter presents biota monitoring activities (i.e., sampling and analysis), analytical results, and data evaluation in accordance with MWL LTMMMP Section 3.6 and Appendix 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, 2022 through March 31, 2023 reporting period, fulfilling the LTMMMP annual monitoring requirement. The biota sampling locations were identified during the annual ET Cover Biology Inspection performed on August 22, 2022. The two ant hill sampling locations (MWL AHSS-01-2022 and MWL AHSS-02-2022) are shown in Figure 8-1. 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 were active and provided different locations relative to last year's biota sample locations. Surface soil samples were collected at these locations on September 22, 2022 and were 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-01-2022.

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.

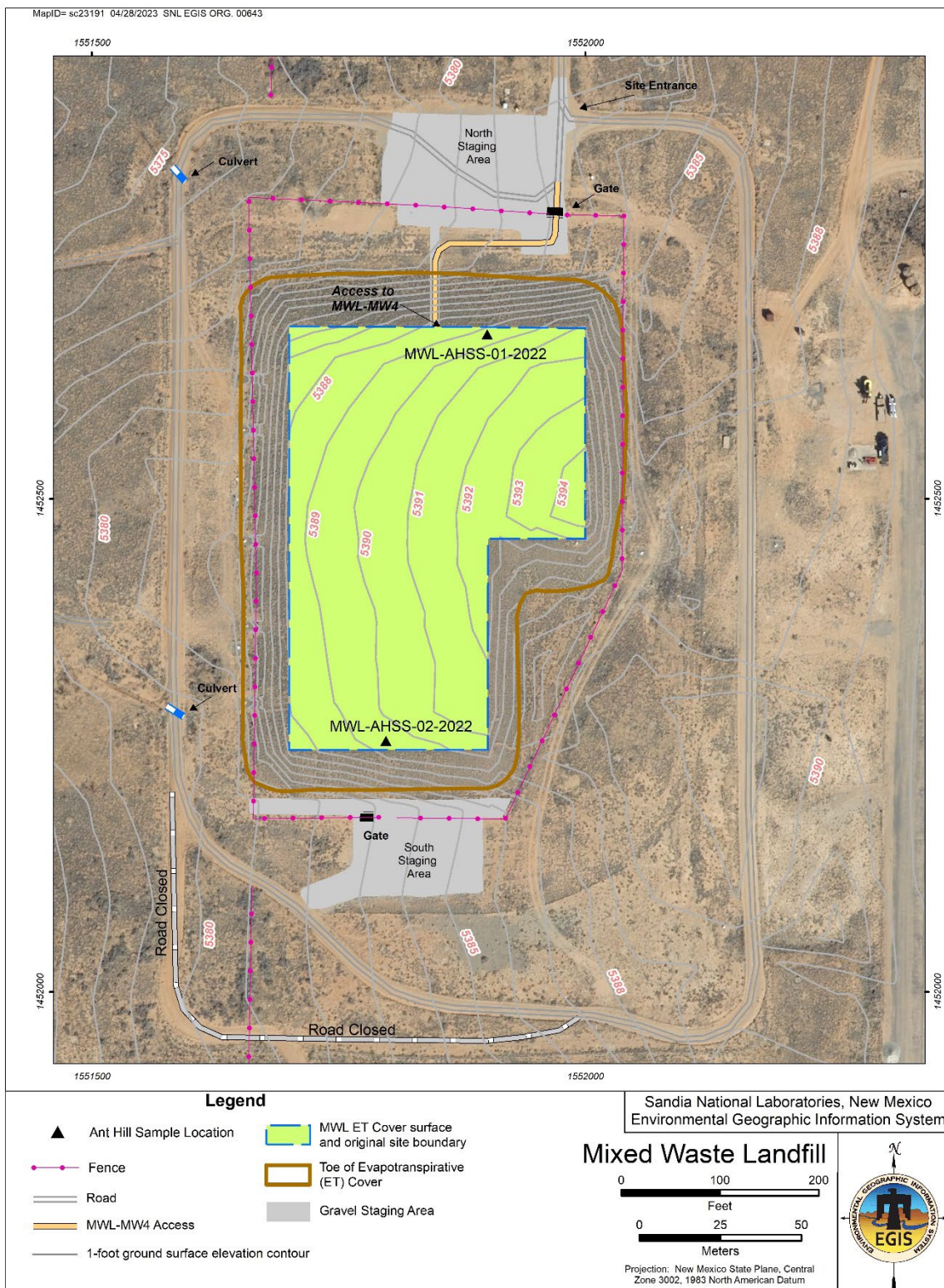


Figure 8-1
Mixed Waste Landfill Biota Sampling Locations

8.2 Laboratory Results

Biota surface soil samples and the duplicate sample 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 the respective trigger levels and NMED-approved background concentrations.

All gamma spectroscopy radionuclide activities were low, below the respective NMED-approved background activities. Six 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 calculated RPD values. An RPD was calculated when metals concentrations in both the environmental and duplicate sample were greater than the reporting limit, and when radionuclides were reported in both the environmental and duplicate samples at activities greater than the MDA. Calculated RPDs for metals and radiological constituents show reasonable agreement for background concentrations, ranging from 2 to 21 for metals and 2 to 41 for radiological constituents (only 1 out of 12 RPD values exceeded 21). As explained in Sections 2.3 and 4.2.1, Appendix G of the LTMMP, more variation in RPD values is expected with a soil matrix and natural variation of background concentrations (metals) and activities (radionuclides). The range of RPDs is acceptable given the very low concentration/activity results that are consistent with background.

Table 8-1
Summary of Metals Results (EPA Method 6010D/7471B^a)
Mixed Waste Landfill Biota Monitoring
September 2022

Sample Location	Parameter	Result (mg/kg)	MDL (mg/kg)	Reporting Limit (mg/kg)	NMED Background ^b (mg/kg)	Trigger Level (mg/kg)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL AHSS-01-2022 22-Sep-2022	Arsenic	2.39	0.474	2.85	5.6	17.7	J	--
	Barium	72.3	0.0949	0.474	130	100,000	N	--
	Beryllium	0.287	0.0949	0.474	0.65	2,260	J	--
	Cadmium	ND	0.0949	0.474	<1	897	U	--
	Chromium	7.17	0.142	0.949	17.3	63.1	*	--
	Cobalt	2.41	0.142	0.474	5.2	20,500	--	--
	Copper	5.69	0.285	1.90	15.4	45,400	--	--
	Lead	5.30	0.313	1.90	21.4	800	BN	--
	Mercury	0.00735	0.00684	0.0204	<0.25	73.6	J	J+, C2
	Nickel	4.92	0.142	0.474	11.5	22,500	B	--
	Selenium	ND	0.474	2.85	<1	5,680	U	--
	Silver	ND	0.0949	0.474	<1	5,680	U	--
	Vanadium	14.3	0.0949	0.474	20.4	5,680	--	--
	Zinc	18.4	0.380	1.90	62	100,000	--	--
MWL AHSS-01-2022 (Duplicate) 22-Sep-2022	Arsenic	2.53	0.475	2.85	5.6	17.7	J	--
	Barium	65.9	0.0951	0.475	130	100,000	N	--
	Beryllium	0.276	0.0951	0.475	0.65	2,260	J	--
	Cadmium	0.121	0.0951	0.475	<1	897	J	--
	Chromium	5.85	0.143	0.951	17.3	63.1	*	--
	Cobalt	2.53	0.143	0.475	5.2	20,500	--	--
	Copper	4.96	0.285	1.90	15.4	45,400	--	--
	Lead	4.30	0.314	1.90	21.4	800	BN	--
	Mercury	0.00815	0.00728	0.0217	<0.25	73.6	J	--
	Nickel	5.20	0.143	0.475	11.5	22,500	B	--
	Selenium	0.955	0.475	2.85	<1	5,680	BJ	2.85U, B
	Silver	ND	0.0951	0.475	<1	5,680	U	--
	Vanadium	12.5	0.0951	0.475	20.4	5,680	--	--
	Zinc	18.8	0.380	1.90	62	100,000	--	--
MWL AHSS-02-2022 22-Sep-2022	Arsenic	2.83	0.483	2.90	5.6	17.7	J	--
	Barium	76.0	0.0965	0.483	130	100,000	N	--
	Beryllium	0.327	0.0965	0.483	0.65	2,260	J	--
	Cadmium	ND	0.0965	0.483	<1	897	U	--
	Chromium	7.11	0.145	0.965	17.3	63.1	*	--
	Cobalt	2.86	0.145	0.483	5.2	20,500	--	--
	Copper	6.38	0.290	1.93	15.4	45,400	--	--
	Lead	5.14	0.319	1.93	21.4	800	BN	--
	Mercury	0.00699	0.00679	0.0203	<0.25	73.6	J	J+, C2
	Nickel	5.73	0.145	0.483	11.5	22,500	B	--
	Selenium	ND	0.483	2.90	<1	5,680	U	--
	Silver	ND	0.0965	0.483	<1	5,680	U	--
	Vanadium	16.6	0.0965	0.483	20.4	5,680	--	--
	Zinc	21.5	0.386	1.93	62	100,000	--	--

Refer to notes at end of table.

Table 8-1 (Concluded)
Summary of Metals Results (EPA Method 6010D/7471B^a)
Mixed Waste Landfill Biota Monitoring
September 2022

Notes:

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

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

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

Laboratory Qualifier

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

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

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

BN = The analyte was found in the method blank above the effective MDL and the result associated with a spike analysis that was outside control limits.

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

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

U = Result less than the MDL.

Validation Qualifier

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

C2 = Continuing calibration percent difference failed high.

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

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

< = Less than.

DOE = U.S. Department of Energy.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

mg/kg = Milligrams per kilogram.

MWL = Mixed Waste Landfill.

ND = Not detected above the MDL.

NMED = New Mexico Environment Department.

RPD = Relative percent difference.

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

Table 8-2
Summary of Gamma Spectroscopy Results (EPA Method 901.1^a)
Mixed Waste Landfill Biota Monitoring
September 2022

Sample Location	Parameter	Result (pCi/g)	MDA (pCi/g)	NMED Background ^b (pCi/g)	Laboratory Qualifier ^c	Validation Qualifier ^c
MWL AHSS-01-2022 22-Sep-2022	Cesium-137	0.0732 ± 0.0275	0.0240	1.5	--	--
	Cobalt-60	0.00333 ± 0.0145	0.0278	NA	U	BD, FR3
	Radium-226	0.740 ± 0.111	0.0452	2.7	--	--
	Thorium-232 ^d	0.913 ± 0.0952	0.0376	1.5	--	--
	Uranium-235	0.139 ± 0.157	0.141	0.18	U	BD, FR3
	Uranium-238	1.64 ± 1.13	0.790	2.3	--	J,FR7
MWL AHSS-01-2022 (Duplicate) 22-Sep-2022	Cesium-137	0.0628 ± 0.0211	0.0176	1.5	--	--
	Cobalt-60	0.00170 ± 0.0106	0.0187	NA	U	BD, FR3
	Radium-226	0.684 ± 0.0798	0.0314	2.7	--	--
	Thorium-232 ^d	0.895 ± 0.116	0.0232	1.5	--	--
	Uranium-235	0.0331 ± 0.0847	0.0804	0.18	U	BD, FR3
	Uranium-238	1.08 ± 0.451	0.225	2.3	--	--
MWL AHSS-02-2022 22-Sep-2022	Cesium-137	0.562 ± 0.0666	0.0287	1.5	--	--
	Cobalt-60	-0.00641 ± 0.0162	0.0285	NA	U	BD, FR3
	Radium-226	0.789 ± 0.106	0.0555	2.7	--	--
	Thorium-232 ^d	0.962 ± 0.101	0.0392	1.5	--	--
	Uranium-235	0.0422 ± 0.0894	0.157	0.18	U	BD, FR3
	Uranium-238	0.916 ± 0.958	0.869	2.3	X	J,FR7

Notes:

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

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

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

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

Laboratory Qualifier

U = Analyte is below detection limit.

X = Uncertain identification for gamma spectroscopy.

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.

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

DOE = U.S. Department of Energy.

EPA = U.S. Environmental Protection Agency.

MDA = Minimum detectable activity.

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
September 2022

Sample Location	Environmental Sample (R ₁)	Duplicate Sample (R ₂)	RPD ^a (%)
MWL AHSS-01-2022 – Metals (mg/kg)			
Barium	72.3	65.9	9
Chromium	7.17	5.85	5
Cobalt	2.41	2.53	5
Copper	5.69	4.96	14
Lead	5.30	4.30	21
Nickel	4.92	5.20	6
Vanadium	14.3	12.5	14
Zinc	18.4	18.8	2
MWL AHSS-01-2022 – Radionuclides (pCi/g)			
Cesium-137	0.0732	0.0628	15
Radium-226	0.740	0.684	8
Thorium-232	0.913	0.895	2
Uranium-238	1.64	1.08	41

Notes:

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

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

where: R₁ = Environmental sample result.

R₂ = Duplicate sample result.

% = Percent.

mg/kg = Milligrams per kilogram.

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. Laboratory QC sample results comply with analytical method and laboratory procedure requirements except as noted below.

The selenium result for MWL AHSS-01-2022 (environmental duplicate sample) was qualified as not detected during data validation detection due to contamination in the method blank above the MDL. Mercury results for environmental samples MWL AHSS-01-2022 (environmental duplicate sample not impacted) and MWL AHSS-02-2022 were qualified with a suspected positive bias due to the continuing calibration percent difference failing high.

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 2020). Corrective action was implemented in accordance with the data validation procedure and included qualification of specific results as documented in Tables 8-1 and 8-2 and the data validation reviews. All environmental sample analytical data were determined to be acceptable and to meet the DQOs. Data validation reviews that include AR/COC forms and contract verification reviews are provided in Annex B.

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 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 (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, 2022 through March 31, 2023 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 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 access controls, 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 22, 2022, 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 43 percent, of which 99 percent was native vegetation. The foliar coverage is dominated by native grasses, with *Galleta* grass comprising approximately 35 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. Seventeen 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 22, 2022 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) in June 2022, December 2022, and March 2023 as 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 2022 – March 2023 Reporting Period

Inspection Type	Frequency	Checklist/Form ^a	Date Performed
ET Cover Biology Inspection	Annual ^b	Biology Inspection Checklist/Form	August 22, 2022
ET Cover Surface Inspection	Quarterly	Cover Inspection Checklist/Form	June 1, 2022
			August 31, 2022
			December 1, 2022
			March 6, 2023
Storm-Water Diversion Structure Inspection ^c	Quarterly	Cover Inspection Checklist/Form	June 1, 2022
			August 31, 2022
			December 1, 2022
			March 6, 2023
Soil-Vapor Monitoring Network Inspection	Annual ^d	Soil-Vapor Monitoring Network Checklist/Form	October 28, 2022
Soil-Moisture Monitoring Network Inspection	Annual ^d	Soil-Moisture Monitoring Network Checklist/Form	April 14 & 21, 2022
Groundwater Monitoring Network Inspection	Semiannual ^d	Groundwater Monitoring Network Checklist/Form	May 12, 2022
			October 20, 2022
Security Fence Inspection ^c	Quarterly	Cover Inspection Checklist/Form	June 1, 2022
			August 31, 2022
			December 1, 2022
			March 6, 2023

Notes:

^aAll reporting period LTMMMP-required inspection forms are provided in Annex F. Best practice monthly supplemental radon monitoring location inspections are provided in Annex A.

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

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

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

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). As previously mentioned, three of the quarterly inspections were supported by the staff biologist as best practice and the August 2022 quarterly inspection was performed during the same general time period as the Annual ET Cover Biology Inspection. 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 were documented on the same Cover Inspection Checklist/Form and 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). The site access road culverts (on the west side of the site), which are shown in Figure 2-3, were also inspected as best practice. The road drainage culverts were cleared of debris during the June 1, 2022 inspection and within 60 days of the March 6, 2023 inspection. No other inspection items required follow-up actions.

9.3 **Soil-Vapor Monitoring Network Inspection**

One inspection of the soil-vapor monitoring network was performed as part of the annual soil-vapor monitoring event 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, 2022 Inspection

Accumulation of dead, windblown tumbleweeds was identified along the perimeter fence. The plant debris was removed by the field technicians at the time of the inspection. One warning sign on the security fence was faded. The sign was replaced by the field technicians on June 2, 2022.

August 31, 2022 Inspection

No inspection items required follow-up actions.

December 1, 2022 Inspection

Accumulation of dead, windblown tumbleweeds was identified along the perimeter fence. The plant debris was removed by the field technicians within 60 days of the inspection.

March 6, 2023 Inspection

Accumulation of dead, windblown tumbleweeds was identified along the perimeter fence. The plant debris was removed within 60 days of the inspection by the ET Cover Maintenance contractor under the supervision of SNL/NM personnel.

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.

Two minor weed control events were conducted during this reporting period that included live and dead, windblown weed removal as well as selective herbicide sterilant application (April 2022 event) to control weed growth in the North and South Staging Areas (Figure 2-3). All removed weed material was loaded in a trailer and disposed offsite by the ET Cover Maintenance contractor. 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 the ET Cover Maintenance contractor under the supervision of SNL/NM personnel.

April 6-7, 2022

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. A total of approximately 9 cubic yards of weed material was removed. In addition, the herbicide sterilant Hyvar® was applied to the MWL North and South Staging Areas in a water-herbicide mixture following the manufacturer's instructions. This annual application of Hyvar® has proven to be very effective at minimizing weed growth in the perimeter staging areas.

September 15-16, 2022

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. A total of approximately 14 cubic yards of weed material was removed.

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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, 2022 through March 31, 2023 reporting period are summarized in Section 10.1. A summary of LTMM modification requests since NMED-approval and implementation in January 2014 are summarized in Section 10.2.

10.1 MWL Regulatory Submittals

Regulatory submittals during this reporting period included the ninth MWL Annual LTMM Report, April 2021 – March 2022 (SNL/NM June 2022) that was approved by the NMED (Shean August 2022). There were also two submittals of various updated reference documents cited in the LTMM SAPs (Hauck May 2022 and November 2022) that were received and acknowledged by the NMED (Shean June 2022 and January 2023). These updates were made to keep the cited reference documents (field, laboratory, and AOPs) current and to reflect ongoing modifications and improvement to support MWL monitoring. These two submittals were made within 30 days of the effective date for the updated reference documents.

All MWL regulatory submittals that occurred during the April 1, 2022 through March 31, 2023 reporting period are summarized in Table 10-1. 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).

Table 10-1
Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan Document Submittals
April 2022 through March 2023 Reporting Period

Date of Submittal ^a	LTMM Requirement	Description of Submittal
June 16, 2022	Section 4.8.1	MWL Annual LTMM Report, April 2021 – March 2022 • Approved in August 2022
May 17, 2022	Appendix C, D, E, F, and G	Updates to three reference documents used by SNL/NM personnel to conduct soil-moisture monitoring, sample management, and contract laboratory quality control activities.
November 10, 2022	Appendix C, D, F, and G	Updates to two reference documents used by SNL/NM personnel to conduct soil-vapor monitoring and sample management activities.
March 30, 2023	Section 1.4.6	Request for Modification 23-024 to the Resource Conservation and Recovery Act Facility Operating Permit, SNL/NM (Second LTMM Modification).

Notes:

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

DOE = U.S. Department of Energy.

LTMM = Long-Term Monitoring and Maintenance.

LTMMMP = Long-Term Monitoring and Maintenance Plan.

MWL = Mixed Waste Landfill.

SNL/NM = Sandia National Laboratories/New Mexico.

10.2 MWL LTMMMP Modifications

The first LTMMMP modification request was submitted to, and approved by, the NMED during the previous reporting period (Hauck December 2021 and Shean February 2022). The Class 1 Permit Modification request included minor changes to monitoring, analytical laboratory QC, inspection forms, and reference documents that update, improve, and streamline monitoring and inspection activities and removed unnecessary documents from the lists of operating procedures in the various LTMMMP SAPs. Changes were also made to update descriptions to current conditions (e.g., name change for SNL/NM management and operating contractor). This first MWL LTMMMP permit modification request took effect upon approval, which was granted on February 16, 2023.

The second LTMMMP modification request was submitted to the NMED during this reporting period (Table 10-1 and Hauck March 2023). The Class 2 Permit Modification request included a request to decommission groundwater monitoring well MWL-MW4. Groundwater monitoring well MWL-MW4 was drilled and installed in late 1992/early 1993 and was an important part of the Phase 2 RCRA Facility Investigation (Peace et al. September 2002). As documented in the MWL LTMMMP, MWL-MW4 was retained for informational purposes and has been used only to obtain periodic groundwater elevation measurements to support the preparation of MWL potentiometric surface maps presented in these annual reports. The U.S. Department of Energy /National Nuclear Security Administration and SNL/NM personnel propose to decommission groundwater monitoring well MWL-MW4 by plugging and abandoning the well in place because the well is no longer needed for compliance monitoring, is not needed for establishing the potentiometric surface of the Regional Aquifer, and may potentially act as a conduit for the downward movement of VOC soil vapor beneath the site. Decommissioning groundwater monitoring well MWL-MW4 does not substantially alter the Permit conditions and does not reduce the protection of human health and the environment. This change was discussed with staff of the NMED on February 9, 2023 prior to submittal at the end of March 2023.

11.0 SUMMARY AND CONCLUSIONS

This chapter presents a summary of MWL LTMMP monitoring, inspection, and maintenance/repair activities performed during the April 1, 2022 through March 31, 2023 reporting period, followed by conclusions based upon these activities and results.

11.1 Monitoring Activities

All monitoring activities for the April 1, 2022 through March 31, 2023 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 2022. The range of radon activity for all monitoring locations was less than 0.2 to 0.6 pCi/L, and the background location results (RN16 and RN17) ranged from 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 June 23, 2022. Reported tritium activities were all non-detections below the MDA, consistent with historical data, and below the trigger level of 20,000 pCi/L. There were no indications of new releases of tritium from the disposal areas.

Soil-Vapor Monitoring

The vadose zone soil-vapor monitoring frequency is annual. Soil-vapor samples were collected in October 2022. A total of 14 VOCs were detected during the October 2022 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 levels 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 for this reporting period were 0.300 ppmv and 0.190 ppmv, respectively. The maximum concentration for Total VOCs at the 400 ft bgs sampling ports was 0.59960 ppmv. All maximum values were from MWL-SV03-400. 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 and slowly diffusing 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 14 & 21, 2022. 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 at all three locations ranged from 1.4 to 5.2 percent, below the 23 percent soil-moisture content by volume trigger level. Soil-moisture monitoring results are consistent with baseline results established prior to ET Cover construction and indicate the ET Cover is performing as designed.

Groundwater Monitoring

The groundwater monitoring frequency is semiannual. environmental samples were collected in May and October 2022. 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 September 22, 2022 at two active ant hill locations on the ET Cover. No animal burrows or potentially deep-rooted plants were identified for sampling during the August 22, 2022 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 22, 2022 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. A faded warning sign was identified during the June 1, 2022 inspection and replaced within 60 days of the inspection. The perimeter fence and site access road drainage culverts were cleared of windblown vegetation either during or with 60 days of the inspections. No other issues were identified requiring maintenance or repairs.

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.

Two minor weed control events were conducted in April and September 2022 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, and removal of windblown tumbleweeds from the perimeter fence, drainage swale, and site access road ditch culverts. In addition, an approved herbicide sterilant was applied to the North and South Staging Areas during the April 2022 maintenance event. These actions were performed as best practice to control annual invasive weed growth and 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, 2022 through March 31, 2023 reporting period included submittal of the ninth MWL Annual LTMM Report, April 2021 – March 2022 (SNL/NM June 2022) that was approved by the NMED (Shean August 2022). Two submittals of various updated reference documents cited in the LTMM SAPs were completed within 30 days of the document effective dates (Hauck May 2022 and November 2022) and were received and acknowledged by the NMED (Shean June 2022 and January 2023). The second LTMM modification request to decommission groundwater monitoring well MWL-MW4 was also submitted to the NMED during this reporting period (Hauck March 2023).

11.4 Conclusions

All required LTMM monitoring, inspection, and maintenance/repair activities for the April 1, 2022 through March 31, 2023 reporting period were performed and documented in this tenth 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 2022

Data Evaluation Memos

Field Forms

Contract Verification Forms

Radon Detector Inspection Forms

Mixed Waste Landfill

Radon Monitoring

January-June 2022 Monitoring Period



date: August 15, 2022

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

from: Kelly Green (0618) kagreen@sandia.gov *Kelly Green*

subject: Review of MWL Radon Air Data – January through June 2022 Semiannual Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the January through June 2022 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[®] detectors. The detectors were deployed at each monitoring location (Figure 1) on January 17, 2022 and were collected on July 18, 2022. 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) #622684 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, at RN10 and RN11) to 0.6 pCi/L (at RN12 and RN13); note that the minimum detectable activity for this data set ranged from <0.2 to <0.3 pCi/L. There were twelve other detections ranging from 0.2 to 0.4 pCi/L. The detectors from the two background locations, RN16 and RN17, had results of 0.2 pCi/L and 0.4 pCi/L, respectively. 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.

KAG, 0618

Attachments:

Analysis Request/Chain of Custody #622684

RADONOVA Radon Monitoring Report 6069747:3 (analytical laboratory results for Radtrak2[®] detectors)

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

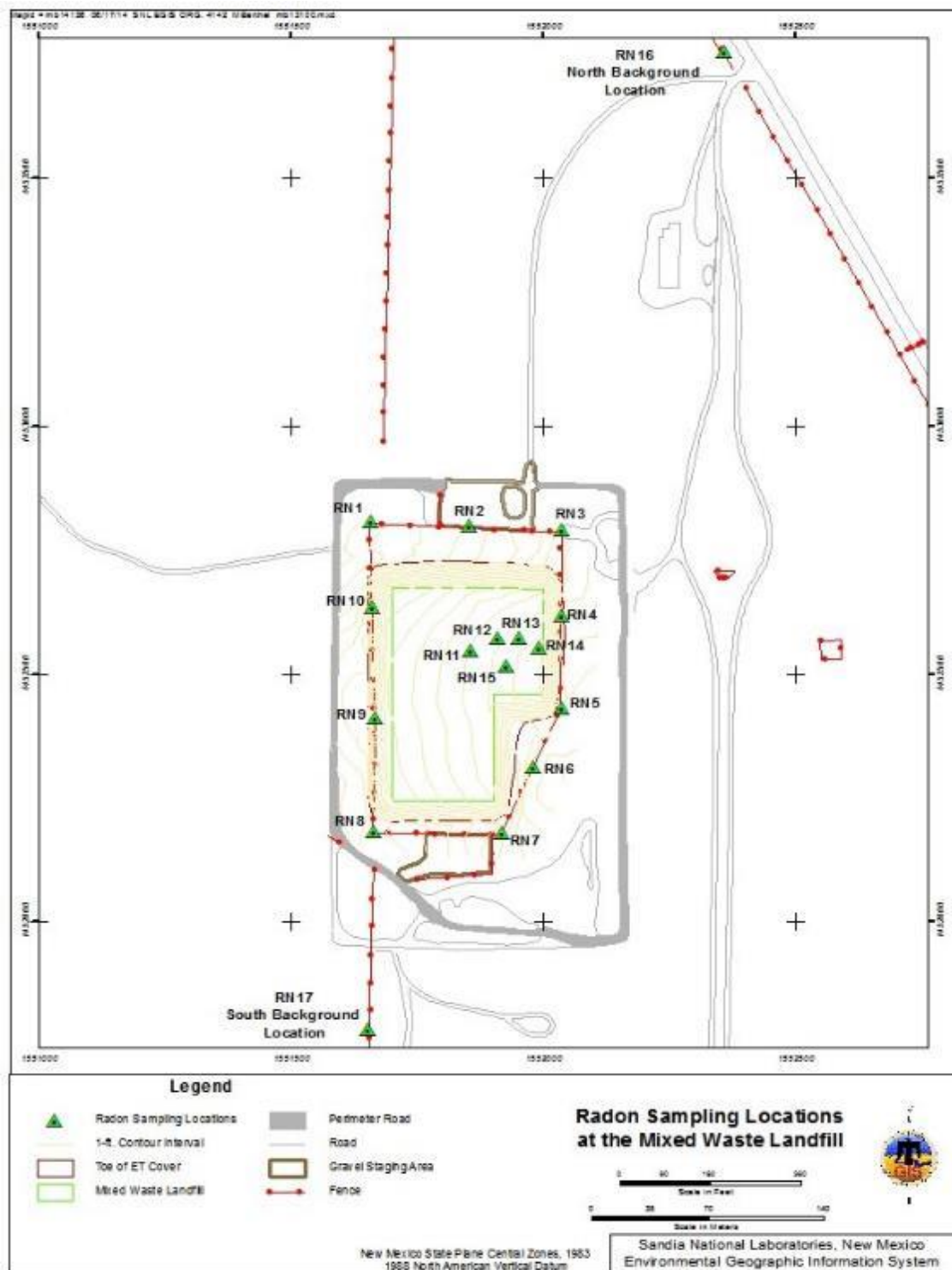


Figure 1. Location of Radon Detectors at the MWL

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.

SMO Use

AR/COC

622684

Project Name: MWL RADON MONITORING		Date Samples Shipped: 7/19/2022		SMO Authorization: <i>CL</i>		<input type="checkbox"/> Waste Characterization						
Project/Task Manager: Robert Ziock		Carrier/Waybill No: 35/119		SMO Contact Phone: Wendy Palencia/505-844-3132		<input type="checkbox"/> RMA						
Project/Task Number: 195122.10.11.08		Lab Contact: Steve Leslie/331-814-2211		Send Report to SMO: Stephanie Montaño/505-284-2553		<input type="checkbox"/> Released by COC No. <input checked="" type="checkbox"/> 4° Celsius						
Service Order: CF378-22		Lab Destination: RADON		Contract No.: 1776616		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
116289	001	✓ RN1/Radtrak2 154087-1	N/A	7/18/22 08:34	AF	N	0 NA	NONE	C	SA	RADON	
116290	001	✓ RN2/Radtrak2 459640-9	N/A	7/18/22 08:35	AF	N	0 NA	NONE	C	SA	RADON	
116291	001	✓ RN3/Radtrak2 719397-2	N/A	7/18/22 08:08	AF	N	0 NA	NONE	C	SA	RADON	
116292	001	✓ RN4/Radtrak2 920766-3	N/A	7/18/22 08:10	AF	N	0 NA	NONE	C	SA	RADON	
116293	001	✓ RN5/Radtrak2 268834-9	N/A	7/18/22 08:12	AF	N	0 NA	NONE	C	SA	RADON	
116294	001	✓ RN6/Radtrak2 541695-3	N/A	7/18/22 08:14	AF	N	0 NA	NONE	C	SA	RADON	
116295	001	✓ RN7/Radtrak2 920899-2	N/A	7/18/22 08:17	AF	N	0 NA	NONE	C	SA	RADON	
116296	001	✓ RN8/Radtrak2 591227-4	N/A	7/18/22 08:28	AF	N	0 NA	NONE	C	SA	RADON	
116297	001	✓ RN9/Radtrak2 750909-4	N/A	7/18/22 08:27	AF	N	0 NA	NONE	C	SA	RADON	
116298	001	✓ RN10/Radtrak2 464855-6	N/A	7/18/22 08:29	AF	N	0 NA	NONE	C	SA	RADON	
Last Chain: <input type="checkbox"/> Yes		Sample Tracking		SMO Use		Special Instructions/QC Requirements:				Conditions on Receipt		
Validation Req'd: <input checked="" type="checkbox"/> Yes		Date Entered:		EDD <input checked="" type="checkbox"/> Yes		Turnaround Time <input type="checkbox"/> 7-Day* <input type="checkbox"/> 15-Day* <input checked="" type="checkbox"/> 30-Day						
Background: <input type="checkbox"/> Yes		Entered by:		Negotiated TAT		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: Detectors were deployed 1/17/2022 to 7/18/2022; 182 days. See attached field form for additional information.						
Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell								
	Danielle Michel	<i>Danielle Michel</i>	dmm	SNL/08854/505-845-7706/505-219-7143								
	Robert Ziock	<i>Robert Ziock</i>	rz	SNL/08888/505-845-0485/505-238-3668								
	Caitlin LaChance	<i>Caitlin LaChance</i>	cl	SNL/00641/505-845-9919								
Relinquished by: <i>Danielle Michel</i>		Org. 2853	Date 7/18/22	Time 1025	Relinquished by: <i>FLB</i>		Org.	Date 7/22/22	Time 5pm			
Received by: <i>FLB</i>		Org. 018	Date 7/18/22	Time 1025	Received by: <i>FLB</i>		Org.	Date 7/26/22	Time 11:00 AM			
Relinquished by: <i>FLB</i>		Org. 018	Date 7/19/22	Time 1015	Relinquished by:		Org.	Date	Time			
Received by: <i>FLB</i>		Org. 7/22	Date 7/22/22	Time 3pm	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

622684

[illegible]

NTESS
Mixed Waste Landfill

RADON MONITORING REPORT

Description of the measurement

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

The detector(s) arrived to Radonova Laboratories **07/22/2022**.
They were measured **07/29/2022**.

Test data have been given by Robert Ziock

Property data and address

MEASURE SITE ADDRESS
AR/COC 622684

BUILDING ID

Test results

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
154087-1 [Radtrak ²]	01/17/2022 – 07/18/2022	RN1		< 0.3 pCi/L
523392-9 [Radtrak ²]	01/17/2022 – 07/18/2022	RN2		0.3 ± 0.1 pCi/L
719397-2 [Radtrak ²]	01/17/2022 – 07/18/2022	RN3		0.4 ± 0.2 pCi/L
920766-3 [Radtrak ²]	01/17/2022 – 07/18/2022	RN4		0.3 ± 0.2 pCi/L
268834-9 [Radtrak ²]	01/17/2022 – 07/18/2022	RN5		0.2 ± 0.1 pCi/L
541695-3 [Radtrak ²]	01/17/2022 – 07/18/2022	RN6		0.2 ± 0.1 pCi/L
920899-2 [Radtrak ²]	01/17/2022 – 07/18/2022	RN7		0.4 ± 0.2 pCi/L
591227-4 [Radtrak ²]	01/17/2022 – 07/18/2022	RN8		0.2 ± 0.1 pCi/L
750909-4 [Radtrak ²]	01/17/2022 – 07/18/2022	RN9		0.2 ± 0.1 pCi/L
464855-6 [Radtrak ²]	01/17/2022 – 07/18/2022	RN10		< 0.2 pCi/L

Comment to the results

This report replaces 6069747:2. Reason: The RNTB detector (728966-3) was originally reported without a start time. Corrected description from "RNTB*" to "RNTB"

Trygve Rønnqvist (Electronically signed)

Signature Radonova Laboratories Laboratory Measurement Specialist

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DISCLAIMER

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RADONOVA INC.

1 EAST 22nd STREET, SUITE 200
LOMBARD, IL 60148
331.814.2200, help@radonova.com

NTESS
Mixed Waste Landfill

RADON MONITORING REPORT

Description of the measurement

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

The detector(s) arrived to Radonova Laboratories **07/22/2022**.
They were measured **07/29/2022**.

Test data have been given by Robert Ziock

Property data and address

MEASURE SITE ADDRESS
AR/COC 622684

BUILDING ID

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	FLOOR	RADON RESULT
477949-2 [Radtrak ²]	01/17/2022 – 07/18/2022	RN11		< 0.2 pCi/L
807259-7 [Radtrak ²]	01/17/2022 – 07/18/2022	RN12		0.6 ± 0.2 pCi/L
467176-4 [Radtrak ²]	01/17/2022 – 07/18/2022	RN13		0.6 ± 0.2 pCi/L
521499-4 [Radtrak ²]	01/17/2022 – 07/18/2022	RN14		0.2 ± 0.1 pCi/L
575013-8 [Radtrak ²]	01/17/2022 – 07/18/2022	RN15		0.3 ± 0.2 pCi/L
298513-3 [Radtrak ²]	01/17/2022 – 07/18/2022	RN16		0.2 ± 0.2 pCi/L
924855-0 [Radtrak ²]	01/17/2022 – 07/18/2022	RN17		0.4 ± 0.2 pCi/L
728966-3 [Radtrak ²]	01/17/2022 – 07/18/2022	RNTB		< 0.2 pCi/L

Comment to the results

This report replaces 6069747:2. Reason: The RNTB detector (728966-3) was originally reported without a start time. Corrected description from "RNTB**" to "RNTB"

Tryggve Rönqvist (Electronically signed)

Signature Radonova Laboratories Laboratory Measurement Specialist

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DISCLAIMER

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RADONOVA INC.

1 EAST 22nd STREET, SUITE 200
LOMBARD, IL 60148
331.814.2200, help@radonova.com

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 ☒ CollectionARCOC #: 622684Detector Type: Radtrak2No. 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	116289	154087-1	1/17/2022	1412	7/18/22	0834	N
RN2	116290	459640-9 523392-9	1/17/2022	1408	7/18/22	0835	N
RN3	116291	719397-2	1/17/2022	1346	7/18/22	0808	N
RN4	116292	920766-3	1/17/2022	1348	7/18/22	0810	N
RN5	116293	268834-9	1/17/2022	1350	7/18/22	0812	N
RN6	116294	541695-3	1/17/2022	1352	7/18/22	0814	N
RN7	116295	920899-2	1/17/2022	1354	7/18/22	0817	N
RN8	116296	591227-4	1/17/2022	1359	7/18/22	0828	N
RN9	116297	750909-4	1/17/2022	1406	7/18/22	0827	N
RN10	116298	464855-6	1/17/2022	1405	7/18/22	0829	N
RN11	116299	477949-2	1/17/2022	1416	7/18/22	0840	N
RN12	116300	807259-7	1/17/2022	1419	7/18/22	0846	N
RN13	116301	467176-4	1/17/2022	1424	7/18/22	0843	N
RN14	116302	521499-4	1/17/2022	1422	7/18/22	0839	N
RN15	116303	575013-8	1/17/2022	1427	7/18/22	0845	N
RN16	116304	298513-3	1/17/2022	1432	7/18/22	0900	N
RN17	116305	924855-0	1/17/2022	1400	7/18/22	0822	N
RNTB**	116306	728966-3	NA	—	7/18/22	0930	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. 622684

Analytical Lab RADONOVA

SDG No. 6069747-1

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	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	N/A		
1.4	Preservative correct for analyses requested	N/A		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

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

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.6	QC batch numbers provided	N/A		
2.7	Dilution factors provided and all dilution levels reported	N/A		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2-sigma error or 1-sigma for bioassay) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	N/A		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

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

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

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 and TO-15) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		

Line No.	Item	Yes	No	Comments
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS 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		

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

5.0 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: 08-03-2022 12:10:00

Closed by: Wendy Palencia Date: 08-03-2022 12:10:00

Mixed Waste Landfill

Radon Monitoring

July-December 2022 Monitoring Period



Sandia National Laboratories

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

Albuquerque, New Mexico 87185-0651

date: February 13, 2023

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

from: Kelly Green (0618) kagreen@[sandia.gov](mailto:kagreen@sandia.gov) *Kelly Green*

subject: Review of MWL Radon Air Data – July through December 2022 Semiannual Monitoring Period

The purpose of this memo is to document my review of the radon air monitoring results for the July through December 2022 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 Radtrak3[®] detectors. The detectors were deployed at each monitoring location (Figure 1) on July 18, 2022 and were collected on January 16, 2023. 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) #623449 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 0.3 picocuries per liter (pCi/L) to 0.5 pCi/L. The detectors from the two background locations, RN16 and RN17, had results of 0.3 pCi/L respectively. 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 result of <0.3 pCi/L was reported for the trip blank (RNTB) indicating the other detectors were not exposed to radon during shipping and/or at the laboratory.

KAG, 0618

Attachments:

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

Analysis Request/Chain of Custody #623449

RADONOVA Radon Monitoring Report 6365682:2 (analytical laboratory results for Radtrak3[®] detectors)

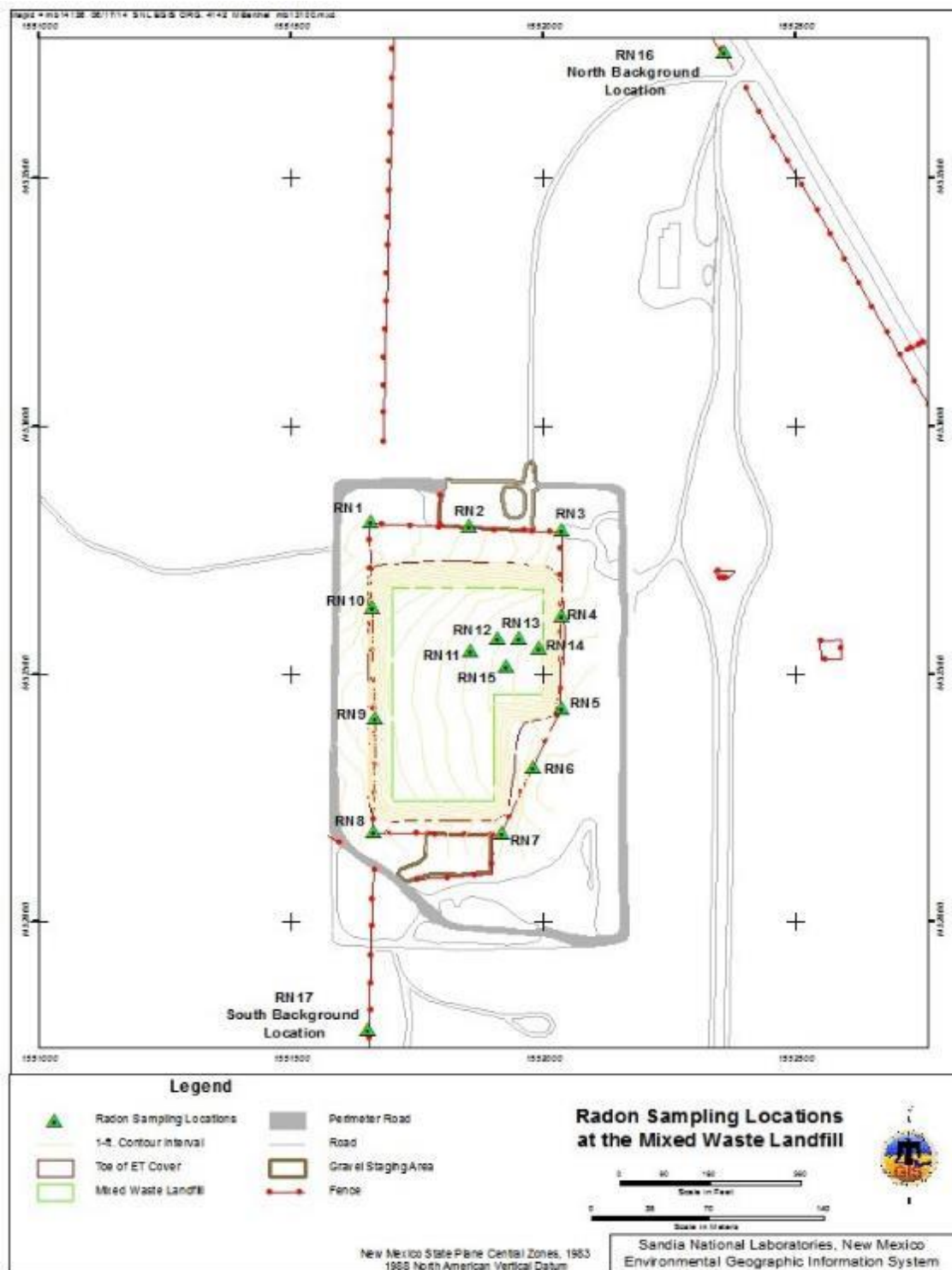


Figure 1. Location of Radon Detectors at the MWL

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

SMO Use

 page 1 of 2
 ARCOG **623449**

Project Name: MWL RADON MONITORING Project Manager: Robert Ziock P/T No: 195122.10.11.08	Date Samples Shipped: <u>1/16/2023</u> SNL Shipper #: <u>361105</u> Lab Contact: Steve Leslie/ 331-814-2200 Lab Destination: RADON Contract No.: 1776616	SMO Authorization: <u>CG</u> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: TA3 Bldg: Room:	Last Chain: No Validation Req'd: No	Turnaround Time: 30 days EDD: Yes	SDG #:

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
118101	✓ 001	RN1/RADTRAK2	NA	01/16/23 09:35	AF	NA	0 NA	None	C	SA	RADON	
118102	✓ 001	RN2/RADTRAK2		01/16/23 09:39	AF	NA	0 NA	None	C	SA	RADON	
118103	✓ 001	RN3/RADTRAK2		01/16/23 09:07	AF	NA	0 NA	None	C	SA	RADON	
118104	✓ 001	RN4		01/16/23 09:09	AF	NA	0 NA	None	C	SA	RADON	
118105	✓ 001	RN5		01/16/23 09:11	AF	NA	0 NA	None	C	SA	RADON	
118106	✓ 001	RN6		01/16/23 09:13	AF	NA	0 NA	None	C	SA	RADON	
118107	✓ 001	RN7		01/16/23 09:15	AF	NA	0 NA	None	C	SA	RADON	
118108	✓ 001	RN8		01/16/23 09:26	AF	NA	0 NA	None	C	SA	RADON	
118109	✓ 001	RN9		01/16/23 09:30	AF	NA	0 NA	None	C	SA	RADON	
118110	✓ 001	RN10		01/16/23 09:33	AF	NA	0 NA	None	C	SA	RADON	

Sample Team Members	Name	Signature
	Danielle Michel	<i>[Signature]</i>
	Wendy Palencia	<i>[Signature]</i>
	Robert Ziock	<i>[Signature]</i>
	Carlin LaChane	<i>[Signature]</i>

Comments: 182 Days of exposure 7/10/22 to 1/10/23

Relinquished by <i>[Signature]</i>	Org. 8888	Date 1/16/23	Time 1055	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. 0618	Date 1/16/23	Time 1055	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. 0618	Date 1/16/23	Time 1110	Relinquished by	Org.	Date	Time
Received by	Org.	Date	Time	Received by	Org.	Date	Time

[illegible]

Receipt initials

Mixed Waste Landfill
NTESS, LLC

RADON MONITORING REPORT

Description of the measurement

The measurement was performed with a closed alpha-track detector (Radtrak²®/Radtrak³®) following the measurement protocols given by AARST/ANSI.

The detector(s) arrived to Radonova Laboratories **01/17/2023**.
They were measured **01/25/2023**.

Test data have been given by NTESS, LLC

Property data and address

MEASURE SITE ADDRESS

BUILDING ID

ARCOC # 623449

Test results

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	DETECTOR TYPE	FLOOR	RADON RESULT
103 143 699 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN1, 118101			0.3 ± 0.2 pCi/L
103 148 219 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN2, 118102			0.4 ± 0.1 pCi/L
103 148 300 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN3, 118103			0.3 ± 0.2 pCi/L
103 159 422 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN4, 118104			0.4 ± 0.1 pCi/L
103 153 458 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN5, 118105			0.5 ± 0.2 pCi/L
103 146 072 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN6, 118106			0.4 ± 0.2 pCi/L
103 155 735 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN7, 118107			0.4 ± 0.2 pCi/L
103 189 429 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN8, 118108			0.5 ± 0.2 pCi/L
103 147 583 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN9, 118109			0.5 ± 0.2 pCi/L
103 160 172 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN10, 118110			0.4 ± 0.2 pCi/L
103 147 203 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN11, 118111			0.4 ± 0.2 pCi/L

Comment to the results

This report replaces 6365682:1. Reason: corrected dates for detector 103148946
Reported results are for detectors delivered with AR/COC # 623449

Trygve Rønnqvist (Electronically signed)

Signature Radonova Laboratories Laboratory Measurement Specialist

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RADONOVA INC.

1 EAST 22nd STREET, SUITE 200
LOMBARD, IL 60148
331.814.2200, help@radonova.com

Mixed Waste Landfill
NTESS, LLC

RADON MONITORING REPORT

Description of the measurement

The measurement was performed with a closed alpha-track detector (Radtrak²®/Radtrak³®) following the measurement protocols given by AARST/ANSI.

The detector(s) arrived to Radonova Laboratories **01/17/2023**.
They were measured **01/25/2023**.

Test data have been given by NTESS, LLC

Property data and address

MEASURE SITE ADDRESS

BUILDING ID
ARCOC # 623449

DETECTOR	MEASUREMENT PERIOD	DESCRIPTION / LOCATION	DETECTOR TYPE	FLOOR	RADON RESULT
103 149 241 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN12, 118112			0.3 ± 0.2 pCi/L
103 148 938 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN13, 118113			0.3 ± 0.2 pCi/L
103 158 606 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN14, 118114			0.4 ± 0.2 pCi/L
103 147 252 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN15, 118115			0.4 ± 0.2 pCi/L
103 159 802 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN16, 118116			0.3 ± 0.2 pCi/L
103 160 065 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RN17, 118117			0.3 ± 0.2 pCi/L
103 148 946 [Radtrak ³ ®]	07/18/2022 – 01/16/2023	RNTB, 118118			< 0.3 pCi/L

Comment to the results

This report replaces 6365682:1. Reason: corrected dates for detector 103148946
Reported results are for detectors delivered with AR/COC # 623449

Tryggve Rönqvist (Electronically signed)

Signature Radonova Laboratories Laboratory Measurement Specialist

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RADONOVA INC.

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LOMBARD, IL 60148
331.814.2200, help@radonova.com

Measurement method: Closed alpha-track detector

The radon measurement was performed with a closed alpha-track detector following the quality assurance guidance given in the AARST/ANSI Measurement Protocols. 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 (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 ± 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. Detector deployment is not performed by Radonova Laboratories. Measurement information such as monitoring period (dates) and placement location is provided to Radonova Laboratories 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

Measurement method versions used when the report was created

ANSI/AARST MAH-2019, Protocol for Conducting Measurements of Radon and Radon Decay Products in Homes

ANSI/AARST MAMF-2017, rev. 1/2021, Protocol for Conducting Measurements of Radon and Radon Decay Products in Multifamily Buildings

ANSI/AARST MALB-2014, rev. 1/2021, Prot. for Conducting Measurements of Radon and Radon Decay Products In Schools and Large Buildings

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 ANSI/AARST 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.

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 hereby certifies that the measurement procedures follows the guidance in accordance with the ANSI/AARST Measurement Protocols 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, NY ELAP ID: 12042,



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LOMBARD, IL 60148

331.814.2200, help@radonova.com

**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: Carlin LaChanceSignature: *Carlin LaChance*☒ Deployment ☒ CollectionARCOC #: 623449Detector Type: Radtrak3No. 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	118101	103143699	7/18/22	0834	1/16/23	0935	104585559
RN2	118102	103148219		0835	1/16/23	0939	105692321
RN3	118103	103148300		0808	1/16/23	0907	104588058
RN4	118104	103159422		0810	1/16/23	0909	104589353
RN5	118105	103153458		0812		0911	1049916538
RN6	118106	103146072		0814		0913	1045916820
RN7	118107	103155735		0817		0915	104587787
RN8	118108	103189429		0828		0926	104560727
RN9	118109	103147583		0827		0930	104564281
RN10	118110	103160172		0829		0933	1045910914
RN11	118111	103147203		0840	0944	0945	1045912498
RN12	118112	103149241		0846		0942	104586177
RN13	118113	103148938		0843		0945	104557616
RN14	118114	103158606		0839		0948	1045913322
RN15	118115	103147252		0845		0951	104586722
RN16	118116	103159802		0909		0959	104593421
RN17	118117	103160065		0822		0922	104594957
RNTB**	118118	103148946	NA	—	1/16/23	1024	

*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.

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

Name: Danielle MichelSignature: *Danielle Michel*

Activity (check all that apply):

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RN9	118109	103147583		0827		0930	104564281
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Contract Verification Form (CVR)

Project Leader ZIOCK

Project Name MWL RADON MONITORING

Project/Task No. 195122_10.11.08

ARCOC No. 623449

Analytical Lab RADONOVA

SDG No. 6365682-1

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	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	N/A		
1.4	Preservative correct for analyses requested	N/A		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		

2.0 Analytical Laboratory Report

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

Line No.	Item	Complete?		If no, explain
		Yes	No	
2.6	QC batch numbers provided	N/A		
2.7	Dilution factors provided and all dilution levels reported	N/A		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2-sigma error or 1-sigma for bioassay) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	N/A		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

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

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

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 and TO-15) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		

Line No.	Item	Yes	No	Comments
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS 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		

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

5.0 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: 02-13-2023 11:31:00

Closed by: Wendy Palencia Date: 02-13-2023 11:31:00

Mixed Waste Landfill
Radon Detector Inspection Forms

January-December 2022 Monitoring Period

Mixed Waste Landfill Radon Detector Inspection Form

Date: 1/17/2022Name: Danielle MichelSignature: [Signature]Name: Carlin LaChanceSignature: [Signature]

Are detectors being collected? <input checked="" type="checkbox"/> Yes <input 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: 2/1/2022Name: Danielle MickelSignature: Danielle MickelName: Robert ZickSignature: Robert ZickAre 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.	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	
RN2	
RN3	
RN4	
RN5	
RN6	
RN7	
RN8	
RN9	
RN10	
RN11	
RN12	
RN13	
RN14	
RN15	
RN16	
RN17	

**Mixed Waste Landfill
Radon Detector Inspection Form**

Date: 3/1/2022Name: Danielle MichelSignature: [Signature]Name: Caitlin LaChanceSignature: [Signature]Name: Robert ZickSignature: [Signature]Are detectors being collected? ☐ Yes ☒ NoDetector Type: Radtrak 2

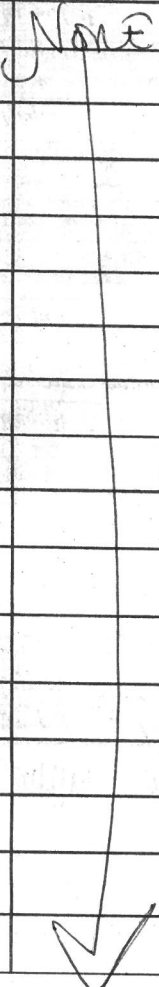
Radon Monitoring Frequency:

☐ Quarterly☒ Semiannually☐ Annually

Radon Monitoring Location Inspection Parameters (Yes or No)																	
	RN1	RN2	RN3	RN4	RN5	RN6	RN7	RN8	RN9	RN10	RN11	RN12	RN13	RN14	RN15	RN16	RN17
1a. Monitoring location identification labeling.	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: 4/5/2022
 Name: Danielle Michel
 Name: Robert Zick

Signature: Dale M. H.
 Signature: Robert Zick

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

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

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

**Mixed Waste Landfill
Radon Detector Inspection Form**

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

**Mixed Waste Landfill
Radon Detector Inspection Form**

Date: 5/2/2022
 Name: Danielle Nickel
 Name: Robert Ziock

Signature: Danielle Nickel
 Signature: 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	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	<i>None</i>
RN2	
RN3	
RN4	
RN5	
RN6	
RN7	
RN8	
RN9	
RN10	
RN11	
RN12	
RN13	
RN14	
RN15	
RN16	
RN17	

**Mixed Waste Landfill
Radon Detector Inspection Form**

Date: 6/1/2022
 Name: Danielle Michel
 Name: Robert Zook

Signature: Danielle Michel
 Signature: Robert Zook

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	X	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	X	X	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	X	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	X	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:

7/18/2022

Name:

Dawid Michel

Signature:



Name:

Robert Eick

Signature:



Carlin LaChance

Are detectors being collected? ☒ Yes ☐ No

Detector Type:

Radtrak3

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	Cobwebs observed and removed
RN12	None
RN13	
RN14	
RN15	
RN16	
RN17	✓

**Mixed Waste Landfill
Radon Detector Inspection Form**

Date: 8/1/2022
 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>Radtrak3</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	X	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2b. Action Required.	N	N	N	N	N	X	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	X	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: 9/1/2022Name: Danielle MichelSignature: [Signature]Name: Robert ZockSignature: [Signature]Name: Carlin LaChanceSignature: [Signature]Are detectors being collected? ☐ Yes ☒ NoDetector Type: Radtrak 3

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

Name: <u>Muelle Michel</u>		Name:
Name: <u>Robert Zick</u>		Name:
Date: <u>10/10/22</u>		
Detector Type: <u>Radtrak3</u>		Detectors being collected: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
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**

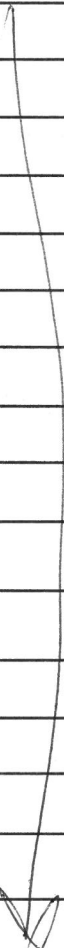
Name: <u>Danielle Michel</u>	Name: <u>Carlin Le Chance</u>
Name: <u>Robert Ziock</u>	Name:

Date: <u>11/2/22</u>	Detectors being collected: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Detector Type: <u>Radtrak 3</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	<div style="font-size: 2em; font-family: cursive;">None</div> 
RN2	
RN3	
RN4	
RN5	
RN6	
RN7	
RN8	
RN9	
RN10	
RN11	
RN12	
RN13	
RN14	
RN15	
RN16	
RN17	

Mixed Waste Landfill Radon Detector Inspection Form

Name: <u>Danielle Niche</u>	Name:
Name: <u>Robert Zoch</u>	Name:

Date: <u>12/6/22</u>	Detectors being collected: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Detector Type: <u>Radtrak3</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	X	Y	Y	Y	Y	Y	Y	Y	Y	Y	X	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	X	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	X	X	Y	Y	Y	Y	Y	X	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	X	X	X	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	<i>None</i>
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 2022-March 2023**

Data Evaluation Memo (tritium monitoring only)

Data Validation Reports

Contract Verification Forms

Mixed Waste Landfill
Surface Soil Tritium Monitoring
June 2022 Sampling Event



date: January 26, 2023

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

from: Kelly Green (0618) kagreen@sandia.gov *Kelly Green*

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

The purpose of this memo is to document my review of the surface soil tritium monitoring results for the June 23, 2022 sample event. My review includes evaluation of the results and supporting documentation relative to the data quality objective (DQO) and monitoring objectives specified in the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (Appendix G, *Tritium and Biota Sampling and Analysis Plan for the Mixed Waste Landfill*). All data was reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data." All data are determined as acceptable and reported quality control measures appear adequate.

Summary of Tritium Results (EPA Method 906.0^a)
Mixed Waste Landfill Surface Soil Monitoring
June 23, 2022

Sample Location	Result (pCi/L)	MDA (pCi/L)	Percent Soil Moisture	Laboratory Qualifier	Validation Qualifier	Trigger Level (pCi/L)
MWL TS-2NW	100 ± 123	206	8.54	U	BD, FR3	20,000
MWL TS-2SW	106 ± 90.8	145	9.29	U	BD, FR3	
MWL TS-2SE	-31.1 ± 73.5	145	8.56	U	BD, FR3	
MWL TS-2NE	58.9 ± 86.5	148	8.45	U	BD, FR3	
MWL TS-2NE (Duplicate)	37.6 ± 89.6	159	6.11	U	BD, FR3	

Notes:

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

BD = Result is below the MDA.

EPA = U.S. Environmental Protection Agency.

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

MDA = Minimum detectable activity.

MDL = Method detection limit.

MWL = Mixed Waste Landfill.

pCi/L = Picocuries per liter.

TPU = Total Propagated Uncertainty.

U = Analyzed for but undetected.

The June 2022 results were all non-detections below the minimum detectable activity, which is consistent with the August 2021 monitoring results (MWL Annual LTMM Report, June 2022), historical MWL surface soil tritium results, and below the trigger level of 20,000 picocuries per liter.

cc: CFRC



Memorandum

Date: January 26, 2023
To: File
From: Linda Thal
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623478
SDG: 584626
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.

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

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.

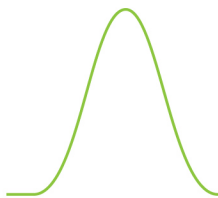
Quantification

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 required.

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/Laboratory Control Sample Duplicate (LCS/LCSD)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits (DLs) were met.

Other QC

A field duplicate pair was submitted on ARCOG 623478. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan

Level: I

Date: 01/26/2023



Sample Findings Summary



AR/COC: 623478

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
GL-RAD-A-002			
	118174-001/MWL TS-2NW	Tritium (10028-17-8)	BD, FR3
	118175-001/MWL TS-2SW	Tritium (10028-17-8)	BD, FR3
	118176-001/MWL TS-2SE	Tritium (10028-17-8)	BD, FR3
	118177-001/MWL TS-2NE	Tritium (10028-17-8)	BD, FR3
	118178-001/MWL TS-2NE	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#: 623478	Site/Project: MWL LTMMP	Validation Date: 01/26/23
SDG #: 584626	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: 06/23/2022

Validated by:

L. Thal

Sandia Radiochemistry Worksheet

ARCOC #(s): 623478	SDG #: 584626	Matrix: Soil
Laboratory Sample IDs: 584626 – see below		
Method/Batch #s: GL-RAD-A-002 (Tritium)/2285454 Samples -001 though -005		
Method/Batch #s: ASTM D 2216 Modified (%M)/2284753		
Method/Batch #s:		

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDA	LCS %R	LCSD %R	LCS/ LCSD RPD	MS %R	MSD %R	MS/ MSD RER	Lab Rep. RER	MS/ MSD RPD	
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 apply to samples < the MDA including where one result is > the MDA and the other < MDA.

Tritium: DUP/MS on -001

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

 page 1 of 1
 ARCO 623478

SMO Use

Project Name: MWL LTMMP 10/4/22 Project Manager: Timmie Jackson P/T No: 195122.10.11.08 Robert Ziock	Date Samples Shipped: 6/30/22 SNL Shipper #: 350257 Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: [Signature] SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room: N/A	Last Chain: No Validation Req'd: No	Turnaround Time: 30 days EDD: Yes	SDG #: 584626

Sample No	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample Id
118174	001	MWL TS-2NW	NA	6/23/2022 10:34	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	001
118175	001	MWL TS-2SW		10:28	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	002
118176	001	MWL TS-2SE		10:22	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	003
118177	001	MWL TS-2NE		10:10	SOIL	P	2x1 L	None	G	SA	TRITIUM (EPA 906)	004
118178	001	MWL TS-2NE		10:10	SOIL	P	2x1 L	None	G	DU	TRITIUM (EPA 906)	005

Sample Team Members	Name	Signature	Comments:
	Danielle Michel	[Signature]	
	Michael Mitchell	[Signature]	
	Robert Ziock	[Signature]	

Relinquished by [Signature]	Org. 0003	Date 6/23/22	Time 10:45	Relinquished by	Org.	Date	Time
Received by [Signature]	Org. 0618	Date 6/23/22	Time 10:45	Received by	Org.	Date	Time
Relinquished by [Signature]	Org. 0618	Date 6/30/22	Time 0800	Relinquished by	Org.	Date	Time
Received by [Signature]	Org.	Date 7/14/22	Time 9:05	Received by	Org.	Date	Time

Contract Verification Form (CVR)

Project Leader Robert Ziock

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOC No. 623478

Analytical Lab GEL

SDG No. 584626

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	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	X		
2.8	Data reported in appropriate units and using correct significant figures	X		
2.9	Radiochemistry analysis uncertainty (2-sigma error or 1-sigma for bioassay) and tracer recovery (if applicable) reported	X		
2.10	Narrative provided	X		
2.11	TAT met	X		
2.12	Holding times met	X		
2.13	Contractual qualifiers provided	X		
2.14	All requested result and TIC (if requested) data provided	X		

3.0 Data Quality Evaluation

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

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

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 and TO-15) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Instrument run logs provided	N/A		

Line No.	Item	Yes	No	Comments
4.2	GC/HPLC (8330, 8082, 9070A, and 8010) a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3	HRGC/HRMS (1668 and 8290) a) 12-hour tune check provided	N/A		
	b) Initial calibration provided	N/A		
	c) Continuing calibration provided	N/A		
	d) Internal standard performance data provided	N/A		
	e) Labeled compound recovery data provided	N/A		
	f) RRTs for samples and standards provided	N/A		
	g) Ion abundance ratios for samples and standards provided	N/A		
	h) Instrument run logs provided	N/A		
4.4	LC/MS/MS (6850, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS 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		

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

5.0 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

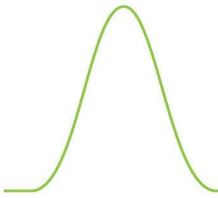
Reviewed by: Daniel John Ferraro Date: 07-28-2022 09:11:00

Closed by: Daniel John Ferraro Date: 07-28-2022 09:11:00

Mixed Waste Landfill

Biota Monitoring

September 2022 Sampling Event



Memorandum

Date: October 25, 2022

To: File

From: Mary Donovan

Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMMP
ARCOC: 623669
SDG: 594227
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 soil 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-AES:

1. Se was detected at \leq the PQL in the MB. The associated result for sample 594227006 was a detect \leq the PQL and will be **qualified 2.85U,B**; non-detect at the PQL.

CVAA:

1. In a CCV associated with samples -002 and -004, the %D was $>110\%$ but $\leq 125\%$ for Hg. The associated sample results were detects and will be **qualified J+,C2**.

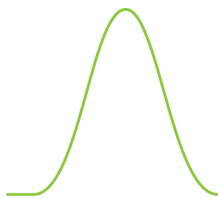
Data are acceptable and reported QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times and Preservation

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

ICP-MS Instrument Tune

An instrument tune was not a method requirement.



Calibration

All initial and continuing calibration criteria met QC acceptance criteria except as noted above in the Summary section.

Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

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

ICP-AES:

Pb, Ni and Se were detected at \leq the PQL in the MB. The associated sample results for Pb and Ni were detects $>$ the PQL and $>5X$ the MB value and will not be qualified. The Se results for samples -002 and -004 were non-detect and will not be qualified.

Ni and Ag were detected at \leq the PQL in a bracketing CCB. The associated sample results for Ni were detects $>$ the PQL and $>5X$ the CCB value and will not be qualified. The associated sample results for Ag were non-detect 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

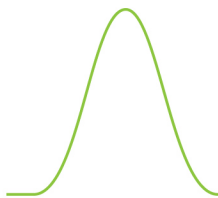
The replicates met all QC acceptance criteria. The replicate RPD was $>20\%$ for Cr. Because the samples were soils, an RPD limit of 35% was used to evaluate the results based on professional judgment.

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

ICP Serial Dilution

The serial dilutions met all QC criteria.

Other QC

One set of field duplicate samples was submitted on the ARCOG. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Linda Thal

Level: I

Date: 10/26/2022

Memorandum

Date: October 26, 2022
To: File
From: Mary Donovan
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623669
SDG: 594227
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 soil samples were prepared and analyzed with approved procedures using method DOE HASL 300, 4.5.2.3/Ga-01-R (gamma spec). Problems were identified with the data package that resulted in the qualification of data.

Gamma spec:

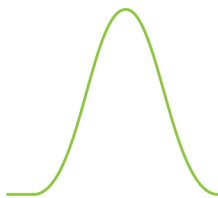
1. The sample results that were either $<$ the associated 2-sigma TPU or $<$ the associated MDA will be **qualified BD,FR3**.
2. The Th-234 and U-238 results for sample 594227003 were rejected by the laboratory due to the peaks not meeting identification criteria and will be **qualified R,Z2**.
3. The Ra-224 results for all samples were rejected by the laboratory due to interference and will be **qualified R,Z2**.
4. 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 blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

Tracer/carriers were not required.

Matrix Spike (MS)

An MS is not required for gamma spec.

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

One set of field duplicate samples was submitted on the ARCOG. There are no “required” review criteria for field duplicate or triplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Linda Thal

Level: I

Date: 10/26/2022



Sample Findings Summary



AR/COC: 623669

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE HASL 300, 4.5.2.3/Ga-			
	118591-001/MWL AHSS-01-2022	Americium-241 (14596-10-2)	BD, FR3
	118591-001/MWL AHSS-01-2022	Beryllium-7 (13966-02-4)	BD, FR3
	118591-001/MWL AHSS-01-2022	Bismuth-212 (14913-49-6)	J, FR7
	118591-001/MWL AHSS-01-2022	Cobalt-60 (10198-40-0)	BD, FR3
	118591-001/MWL AHSS-01-2022	Neptunium-237 (13994-20-2)	BD, FR3
	118591-001/MWL AHSS-01-2022	Radium-223 (15623-45-7)	BD, FR3
	118591-001/MWL AHSS-01-2022	Radium-224 (13233-32-4)	R, Z2
	118591-001/MWL AHSS-01-2022	Sodium-22 (13966-32-0)	BD, FR3
	118591-001/MWL AHSS-01-2022	Thorium-227 (15623-47-9)	BD, FR3
	118591-001/MWL AHSS-01-2022	Thorium-231 (14932-40-2)	BD, FR3
	118591-001/MWL AHSS-01-2022	Thorium-234 (15065-10-8)	J, FR7
	118591-001/MWL AHSS-01-2022	Uranium-235 (15117-96-1)	BD, FR3
	118591-001/MWL AHSS-01-2022	Uranium-238 (7440-61-1)	J, FR7
	118592-001/MWL AHSS-02-2022	Americium-241 (14596-10-2)	BD, FR3
	118592-001/MWL AHSS-02-2022	Beryllium-7 (13966-02-4)	J, FR7

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	118592-001/MWL AHSS-02-2022	Cobalt-60 (10198-40-0)	BD, FR3
	118592-001/MWL AHSS-02-2022	Neptunium-237 (13994-20-2)	BD, FR3
	118592-001/MWL AHSS-02-2022	Radium-223 (15623-45-7)	BD, FR3
	118592-001/MWL AHSS-02-2022	Radium-224 (13233-32-4)	R, Z2
	118592-001/MWL AHSS-02-2022	Sodium-22 (13966-32-0)	BD, FR3
	118592-001/MWL AHSS-02-2022	Thorium-227 (15623-47-9)	BD, FR3
	118592-001/MWL AHSS-02-2022	Thorium-231 (14932-40-2)	BD, FR3
	118592-001/MWL AHSS-02-2022	Thorium-234 (15065-10-8)	R, Z2
	118592-001/MWL AHSS-02-2022	Uranium-235 (15117-96-1)	BD, FR3
	118592-001/MWL AHSS-02-2022	Uranium-238 (7440-61-1)	R, Z2
	118593-001/MWL AHSS-01-2022	Americium-241 (14596-10-2)	BD, FR3
	118593-001/MWL AHSS-01-2022	Beryllium-7 (13966-02-4)	J, FR7
	118593-001/MWL AHSS-01-2022	Cobalt-60 (10198-40-0)	BD, FR3
	118593-001/MWL AHSS-01-2022	Neptunium-237 (13994-20-2)	BD, FR3
	118593-001/MWL AHSS-01-2022	Radium-223 (15623-45-7)	BD, FR3
	118593-001/MWL AHSS-01-2022	Radium-224 (13233-32-4)	R, Z2
	118593-001/MWL AHSS-01-2022	Sodium-22 (13966-32-0)	BD, FR3
	118593-001/MWL AHSS-01-2022	Thorium-227 (15623-47-9)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	118593-001/MWL AHSS-01-2022	Thorium-231 (14932-40-2)	BD, FR3
	118593-001/MWL AHSS-01-2022	Uranium-235 (15117-96-1)	BD, FR3
SW846 3050B/6010D			
	118593-002/MWL AHSS-01-2022	Selenium (7782-49-2)	2.85U, B
SW846 7471B			
	118591-002/MWL AHSS-01-2022	Mercury (7439-97-6)	J+, C2
	118592-002/MWL AHSS-02-2022	Mercury (7439-97-6)	J+, C2

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

Sandia Data Validation Summary Worksheet

ARCOG#: 623669	Site/Project: MWL LTMMP	Validation Date: 10/25/2022
SDG #: 594227	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Soil	# of Samples: 6	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

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

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

Comments: Collected: 09/22/2022

Validated by:

Mary A. Donovan

Sandia Inorganic Metals Worksheet

ARCOC #(s): 623669	SDG #(s): 594227	Matrix: Soil
Laboratory Sample IDs: 594227002, -004, -006		
Method/Batch #s: 3050B/6010D 2321049(prepare)/2321050 7471B 2325774(prepare)/2325777		

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	PS %R	5X CCB ug/L	
	Int. µg/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L												
Pb	NA	✓	✓	✓	✓	✓	0.389J	1.95	✓	✓	✓	✓	NA	NA	✓	NA	NA	
Ni	NA	✓	✓	✓	✓	2.04J	0.170J	0.85	✓	✓	✓	✓	NA	NA	✓	NA	10.2	
Se	NA	✓	✓	✓	✓	✓	0.680J	3.4	✓	✓	✓	✓	NA	NA	✓	NA	NA	
Ag	NA	✓	✓	✓	✓	1.26J	✓	NA	✓	✓	✓	✓	NA	NA	✓	NA	6.3	
Cr	NA	✓	✓	✓	✓	✓	✓	NA	✓	✓	32.5	✓	NA	NA	✓	NA	NA	
Hg	✓	✓	✓	117 ¹	✓	✓	✓	NA	✓	✓	✓	NA	NA	NA	✓	NA	NA	

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

Comments: HTs OK. MS/DUP/SD performed on -002

Al, Ca, Fe and Mg < ICSA in all samples

¹Associated with samples -002 and -004

Comments: HTs OK. DUP on -001. Data rejected due to peaks not meeting identification criteria: Th-234 and U-238 -003, Am-241 DUP, U-235 MB Data rejected because results considered a false positive due to interference: Ra-224 -001, -003, -005, DUP

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

page 1 of 1
ARCO 623669

Project Name: MWL LTMMMP Project Manager: Mike Mitchell P/T No: 195122.10.11.08		Date Samples Shipped: <u>9/22/22</u> SNL Shipper #: <u>354995</u> Lab Contact: Zachary Worham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530		SMO Authorization: <u>CE</u> SMO Contact Phone: Wendy Palencia/505.844.3132		Waste Characterization: No RMA: No 4° Celsius: Yes	
TA: TA3 Bldg: Room:		Last Chain: No Validation Req'd: Yes		Turnaround Time: 30 days EDD: Yes		SDG #: <u>594227</u>	

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
118591	✓ 001	MWL AHSS-01-2022	NA	9/22/22 0830	SOIL	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	001
118591	✓ 002	MWL AHSS-01-2022		↓	SOIL	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470)+Be, Co, Cu, Ni, V, Zn	002
118592	✓ 001	MWL AHSS-02-2022		0830	SOIL	P	250 ml	None	G	SA	GAMMA SPEC (EPA 901)	003
118592	✓ 002	MWL AHSS-02-2022		↓	SOIL	P	250 ml	None	G	SA	METALS, RCRA (SW846-6020/7470)+Be, Co, Cu, Ni, V, Zn	004
118593	✓ 001	MWL AHSS-01-2022		0830	SOIL	P	250 ml	None	G	DU	GAMMA SPEC (EPA 901)	005
118593	✓ 002	MWL AHSS-01-2022	↓	↓	SOIL	P	250 ml	None	G	DU	METALS, RCRA (SW846-6020/7470)+Be, Co, Cu, Ni, V, Zn	006

Sample Team Members	Name	Signature	Comments:
	Martin Baez	[Signature]	
	Caitlin LaChance	[Signature]	
	Danielle Michel	[Signature]	
	Robert Ziock	[Signature]	

Relinquished by <u>[Signature]</u> Org. <u>8888</u> Date <u>9/22/22</u> Time <u>0850</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u> Org. <u>0618</u> Date <u>9/22/22</u> Time <u>0850</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u> Org. <u>0618</u> Date <u>9/22/22</u> Time <u>0920</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u> Org. <u> </u> Date <u>9/23/22</u> Time <u>905</u>	Received by	Org.	Date	Time

Contract Verification Form (CVR)

Project Leader Mike Mitchell

Project Name MWL LTMP

Project/Task No. 195122_10.11.08

ARCOG No. 623669

Analytical Lab GEL

SDG No. 594227

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	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	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	1205200208 (118591-002DUP) Chromium 32.5% (0%-20%). Data reported and qualified appropriately.

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	1205200206 (MB) Lead 0.389 mg/kg, Nickel 0.170 mg/kg, and Selenium 0.680 mg/kg. Data reported and qualified appropriately.
	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, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS only)	N/A		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 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: Daniel John Ferraro Date: 10-25-2022 13:33:00

Closed by: Daniel John Ferraro Date: 10-25-2022 13:33:00

ANNEX C

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

April 2022-March 2023

Field Forms

Sample Summary Sheet

Data Validation Reports

Contract Verification Forms

Certificates of Analysis

Field Sampling Forms

Mixed Waste Landfill

Long-Term Monitoring and Maintenance

Soil-Vapor Monitoring

Form Title	Corresponding Procedure
Soil Vapor Sampling Form	FOP 08-22
Analysis Request and Chain of Custody*	LOP 94-03 / AOP 95-16

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

Field Sampling Forms

October 2022

Soil-Vapor Monitoring

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	Flow Rate (cuft)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB1	10/28/22	1137	34000690	NA	-25	-6	ARCOL 623813 UPN 118906
MWL-SV01-42.5	10/28/22	1201	NA	10.0	NA	NA	
	↓	↓	↓	↓	↓	↓	
1A ↓	↓	1203	09976	NA	-26	-6	118907 ARCOL 623814
MWL-FB2	10/28/22	1141	34001132	NA	-26	-6	UPN 118908
MWL-SV02-41.5	10/28/22	1153	NA	10.0	NA	NA	
	↓	↓	↓	↓	↓	↓	
1A ↓	↓	1154 1155	34000009	NA	-26	-6	118909
							NMED Split Sampling All SVM Wells

surface elevation ~ 5390 fms/

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	Flow Rate (cft)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB3	10/28/22	0832	09839	NA	118910 -27-23	-6	APCOC = 623815 UPN 118910
MWL-SV03-50	10/28/22	0833	NA	8.0	NA	NA	
		↓	↓	↓	↓	↓	
	↓	0839	↓	↓	↓	↓	
SA	↓	0840	11195	NA	-24	-6	118911
MWL-SV03-100	10/28/22	0843	NA	10.0	NA	NA	
		↓	↓	↓	↓	↓	
	↓	0844	↓	↓	↓	↓	
SA	↓	0845	34002107	NA	-25	-6	118912
MWL-SV03-200	10/28/22	0848	NA	10.0	NA	NA	
		↓	↓	↓	↓	↓	
	↓	0849	↓	↓	↓	↓	
SA	↓	0850	34002027	NA	-24	-6	118913
MWL-SV03-300	10/28/22	0853	NA	20.0	NA	NA	
		↓	↓	↓	↓	↓	
	↓	0853	↓	↓	↓	↓	
SA	↓	0856	7963	NA	-24	-6	118914
MWL-SV03-400	10/28/22	0902	NA	20.0	NA	NA	
		↓	↓	↓	↓	↓	
	↓	0903	↓	↓	↓	↓	
SA	↓	0919	34000257	NA	-24	-6	S/OU 118915

Surface elevation: 5381.8 fams1

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	Flow Rate (cft)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB4	10/28/22	0950	12207	NA	-23	-6	ARCOL 623816 UPN 118916
MWL-SV04-50	10/28/22	0955	NA	8.0	NA	NA	
		↓	↓	↓	↓	↓	
		0956	↓	↓	↓	↓	
SA	↓	1008	12221	NA	-24	-6	slow SA fill 118917
MWL-SV04-100	10/28/22	1012	NA	10.0	NA	NA	
		↓	↓	↓	↓	↓	
		1013	↓	↓	↓	↓	
SA	↓	1015	10968	NA	-24	-6	118918
MWL-SV04-200	10/28/22	1016	NA	15.0	NA	NA	
		↓	↓	↓	↓	↓	
		1017	↓	↓	↓	↓	
SA	↓	1025	11973	NA	-23	-6	slow SA fill 118919
MWL-SV04-300	10/28/22	1029	NA	15.0	NA	NA	
		↓	↓	↓	↓	↓	
		1030	↓	↓	↓	↓	
SA	↓	1032	09592	NA	-24	-6	118920
MWL-SV04-400	10/28/22	1034	NA	15.0	NA	NA	
		↓	↓	↓	↓	↓	
		1035	↓	↓	↓	↓	
SA	↓	1037	11221	NA	-25	-6	118921

surface elevation ~ 5382 fams)

Soil Vapor Sampling Log Form

Location	Date	Time	Canister #	Flow Rate (cuf)	Initial Canister Vacuum (PSI)	Ending Canister Vacuum (PSI)	Comments
MWL-FB5	10/28/22	1053	12109	NA	-24	-6	UPN 42101 623817 118922
MWL-SV05-50	10/28/22	1058	NA	10.0	NA	NA	
		↓	↓	↓	↓	↓	
		1059	↓	↓	↓	↓	
SA	↓	1100	34002008	NA	-26	-6	118923
MWL-SV05-100	10/28/22	1102	NA	15.0	NA	NA	
		↓	↓	↓	↓	↓	
		1103	↓	↓	↓	↓	
		1105	8259	NA	-25	-6	SA 118924
	↓	1105	10411	NA	-25	-6	DU 118925
MWL-SV05-200	10/28/22	1108	NA	15.0	NA	NA	
		↓	↓	↓	↓	↓	
		1109	↓	↓	↓	↓	
	↓	1111	34000896	NA	-26	-6	118926
MWL-SV05-300	10/28/22	1115	NA	15.0	NA	NA	
		↓	↓	↓	↓	↓	
		1116	↓	↓	↓	↓	
		1118	12219	NA	-26	-6	SA 118927
	↓	1118	8130	NA	-26	-6	DU 118928

surface elevation ~ 5389 ftmsl

Soil Vapor Sampling Log Form

[illegible]

surface elevation ~ 5389 fmsl

**SUMMARY SHEET FOR
OCTOBER 2022 SOIL-VAPOR SAMPLES**

Sample Summary for MWL Soil Vapor Monitoring
FY23 1st Quarter

Well ID	Sample Date	Sample ID / Port	SUMMA Number	ARCOC	Sample Number	Sample Type	Associated Field Blank (ARCOC #/Sample #)	Comments
Mixed Waste Landfill Soil Vapor Monitoring: Project Task Number 195122.10.11.08 / Service Order Number CF 01-23								
MWL-SV01	28-Oct-22	MWL-SV01-42.5	09976	623813	118907	Environmental	623813 / 118906	
		MWL-FB 1	34000690		118906	Field QC	n/a	Ultra Pure N2
MWL-SV02	28-Oct-22	MWL-SV02-41.5	34000009	623814	118909	Environmental	623814 / 118908	
		MWL-FB 2	34001132		118908	Field QC	n/a	Ultra Pure N2
MWL-SV03	28-Oct-22	MWL-SV03-50	11195	623815	118911	Environmental	623815 / 118910	
		MWL-SV03-100	34002107		118912	Environmental		
		MWL-SV03-200	34002027		118913	Environmental		
		MWL-SV03-300	7963		118914	Environmental		
		MWL-SV03-400	34000257		118915	Environmental		
		MWL-FB 3	09839		118910	Field QC	n/a	Ultra Pure N2
MWL-SV04	28-Oct-22	MWL-SV04-50	12221	623816	118917	Environmental	623816 / 118916	
		MWL-SV04-100	10968		118918	Environmental		
		MWL-SV04-200	11973		118919	Environmental		
		MWL-SV04-300	09592		118920	Environmental		
		MWL-SV04-400	11221		118921	Environmental		
		MWL-FB 4	12207		118916	Field QC	n/a	Ultra Pure N2
MWL-SV05	28-Oct-22	MWL-SV05-50	34002008	623817	118923	Environmental	623817 / 118922	
		MWL-SV05-100	8259		118924	Environmental		
		MWL-SV05-100	10411		118925	Duplicate		
		MWL-SV05-200	34000896		118926	Environmental		
		MWL-SV05-300	12219		118927	Environmental		
		MWL-SV05-300	8130		118928	Duplicate		
		MWL-SV05-400	34000426		118929	Environmental		
		MWL-FB 5	12109		118922	Field QC	n/a	Ultra Pure N2

DATA VALIDATION REPORTS FOR ENVIRONMENTAL SAMPLES

MIXED WASTE LANDFILL

SOIL-VAPOR MONITORING

OCTOBER 2022

AR/COC NUMBERS 623813, 623814, 623815, 623816, 623817

Memorandum

Date: November 29, 2022

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623813, 623814, 623815, 623816 and 623817
SDG: 140-29549
Laboratory: Eurofins 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 06.

Summary

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

1. Acetone was detected at > the PQL in FB4, sample 140-29549-11 associated with samples -12 through -16. The associated results for samples -14 and -16 were detects \leq the PQL and will be **qualified U,B2**; non-detect at their associated PQLs.
2. Methylene chloride was detected at > the PQL in FB5, sample -17 associated with samples -18 through -24. The associated result for sample -21 was a detect \leq the PQL and will be **qualified U,B2**; non-detect at its associated PQL.

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 follows.

For the initial calibration associated with samples -2, -4, -7, -8, -9, -10 and -18 thru -23, the intercept was > the MDL and positive for bromoform. The associated sample results were non-detect and will not be qualified.

For the CCV associated with samples -1, -3, -5, -6, -11 through -17 and -24, the CCV %D was >20% and positive for vinyl acetate. The associated sample results were non-detect and will not be qualified.

For the CCV associated with samples -2, -4, -7, -8, -9 and -10, the %Ds were >20% and positive for bromomethane, chloroethane, chloromethane, vinyl chloride and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The associated sample results were non-detect and will not be qualified.

For the CCV associated with samples -18 through -23, the %Ds were >20% and positive for hexachlorobutadiene, bromomethane, chloroethane, chloromethane, vinyl chloride and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The associated sample results were non-detect and will not be qualified.

Blanks

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

Benzene, 2-butanone, ethylbenzene, trichloroethene, trichlorofluoromethane, m,p-xylene and o-xylene were detected at \leq the PQL and acetone, methylene chloride and toluene were detected at > the PQL in FB1, sample -1 associated with sample -2. The trichloroethene and trichlorofluoromethane results for sample -2 were > the PQL and >5X the FB values and will not be qualified. All remaining associated sample results were non-detect and will not be qualified.

Methylene chloride and toluene were detected at \leq the PQL in FB2, sample -3 associated with sample -4. The associated sample results were non-detect and will not be qualified.

Acetone, methylene chloride and toluene were detected at \leq the PQL in FB3, sample -5 associated with samples -6 through -10. The associated sample results were non-detect and will not be qualified.

Toluene and 4-methyl-2-pentanone were detected at \leq the PQL and acetone, 2-butanone, 2-hexanone and methylene chloride were detected at > the PQL in FB4, sample -11 associated with samples -12 through -16. All associated sample results, *except* the acetone results for samples -14 and -16, were non-detect and will not be qualified.

Toluene and 2-butanone were detected at \leq the PQL and acetone and methylene chloride were detected at > the PQL in FB5, sample -17 associated with samples -18 through -24. All associated sample results, *except* the methylene chloride result for sample -21, 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)/ Laboratory Control Sample Duplicate (LCSD)

The LCS/LCSD for all batches met QC acceptance criteria for accuracy and precision with the following exceptions.

For the LCS/LCSD associated with samples -2, -4, -7, -8, -9 and -10, the %Rs were > the upper acceptance limit for bromomethane, chloroethane, chloromethane, vinyl chloride and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The associated sample results were non-detect and will not be qualified.

For the LCS and/or LCSD associated with samples -18 through -23, the %Rs were > the upper acceptance limit for benzyl chloride; 1,2-dichlorobenzene; 1,2,4-trimethylbenzene; hexachlorobutadiene; bromomethane; chloroethane; chloromethane; vinyl chloride and 1,2-dichloro-1,1,2,2-tetrafluoroethane. The associated sample results were non-detect and will not be qualified.

Laboratory Replicate

The 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 (1.77X); -2 (1.62X); -3 (1.63X); -4 (1.65X); -5 (1.75X); -6 (1.68X); -7 (1.65X); -8 (1.65X); -9 (1.56X); -10 (1.60X); -11 (1.67X); -12 (1.66X); -13 (1.71X); -14 (1.66X); -15 (1.71X); -16 (1.61); -17 (1.62X); -18 (1.46X); -19 (1.50X); -20 (1.51X); -21 (1.46X); -22 (1.50X); -23 (1.50X) and -24 (1.49X).

MDLs, PQLs and sample results were further adjusted for sample volume used during analysis.

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.

Five FBs were submitted, one for each ARCOC.

Two field duplicate pairs were submitted with ARCOC 623817. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.
No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 11/30/2022



Sample Findings Summary



AR/COC: 623813, 623814, 623815, 623816, 623817

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
TO15_LL_PF			
	118919-001/MWL-SV04-200	ACETONE (67-64-1)	0.033U, B2
	118921-001/MWL-SV04-400	ACETONE (67-64-1)	0.032U, B2
	118926-001/MWL-SV05-200	METHYLENE CHLORIDE (75-09-2)	0.0058U, B2

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

Sandia Data Validation Summary Worksheet

ARCOG#: 623813, 623814, 623815, 623816 and 623817	Site/Project: MWL LTMMP	Validation Date: 11/28/2022
SDG #: 140-29549	Laboratory: Eurofins Knoxville	Validator: Linda Thal
Matrix: Air	# of Samples: 24	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input type="checkbox"/> Metals <input type="checkbox"/> Genchem <input type="checkbox"/> Rad		

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

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

<u>Comments:</u> Collected 10/28/2022
<u>Validated by:</u>

Sandia Organic Worksheet (GC/MS VOC)

ARCO #s: 623813, 623814, 623815, 623816 and 623817	SDG: 140-29549	Matrix: Air
Laboratory Sample IDs: 140-29549 -1 through -24		
Method/Batch #s: TO-15 /67335 (samples -1, -3, -5; -6, -11 thru -17, -24); 67336(samples -2, -4, -7, -8, -9, -10); 67370 (samples -18 thru -23)	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB ppm v/v	5X (10X) MB	LCS/ LCSD %R	Lab. REP RPD	FB 1 -1	FB 2 -3	FB 3 -5	FB 4 -11	FB 5 -17
	Int.	RF/ Slope	RSD/ r ²	(ICV)/ CCV %D									
MR 67335 samples -1, -3, -5; -6, -11 thru -17, -24								-6					
Vinyl acetate	NA	✓	✓	+39	✓	NA	✓	✓	✓	✓	✓	✓	✓
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	0.0026	✓	0.0012J	0.026	0.0031
Benzene	NA	✓	✓	✓	✓	NA	✓	✓	0.000019J	✓	✓	✓	✓
2-Butanone	NA	✓	✓	✓	✓	NA	✓	✓	0.0004J	✓	✓	0.0025	0.0003J
2-Hexanone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	0.00025	✓
4-Methyl-2-pentanone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	0.00011J	✓
Ethylbenzene	NA	✓	✓	✓	✓	NA	✓	✓	0.000016J	✓	✓	✓	✓
Methylene chloride	NA	✓	✓	✓	✓	NA	✓	✓	0.00086	0.0004J	0.0002J	0.00043	0.00046
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	0.00038	0.000024J	0.000062J	0.000045J	0.000027J
Trichloroethene	NA	✓	✓	✓	✓	NA	✓	✓	0.000017J	✓	✓	✓	✓
Trichlorofluoromethane	NA	✓	✓	✓	✓	NA	✓	✓	0.000026J	✓	✓	✓	✓
m,p-Xylene	NA	✓	✓	✓	✓	NA	✓	✓	0.000057J	✓	✓	✓	✓
o-Xylene	NA	✓	✓	✓	✓	NA	✓	✓	0.000025J	✓	✓	✓	✓
MG 67336 samples -2, -4, -7, -8, -9, -10								-2					
Bromomethane	NA	✓	✓	+65	✓	NA	165/163	✓					
Chloroethane	NA	✓	✓	+50	✓	NA	150/148	✓					
Chloromethane	NA	✓	✓	+44	✓	NA	144/155	✓					
1,2-Dichloro-1,1,2,2-tetrafluoroethane	NA	✓	✓	+50	✓	NA	150/159	✓					
Vinyl chloride	NA	✓	✓	+53	✓	NA	153/157	✓					
Bromoform	+0.000076	✓	✓	✓	✓	NA	✓	✓					
MG 67370 (samples -18 thru -23)								-23					
Bromoform	+0.000076	✓	✓	✓	✓	NA	✓	✓					
Benzyl chloride	✓	✓	✓	✓	✓	NA	✓/131	✓					
1,2-Dichlorobenzene	NA	✓	✓	✓	✓	NA	✓/132	✓					
1,2,4-Trimethylbenzene	NA	✓	✓	✓	✓	NA	✓/133	✓					
Hexachlorobutadiene	NA	✓	✓	+40	✓	NA	✓/145	✓					
Bromomethane	NA	✓	✓	+89	✓	NA	189/183	✓					
Chloroethane	NA	✓	✓	+54	✓	NA	153/151	✓					

Chloromethane	NA	✓	✓	+59	✓	NA	159/154	✓					
1,2-Dichloro-1,1,2,2-tetrafluoroethane	NA	✓	✓	+86	✓	NA	186/173	✓					
Vinyl chloride	NA	✓	✓	+61	✓	NA	161/156	✓					

Surrogate Recovery Outliers

Sample ID	BFB %R												
None													

IS Outliers

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

Comments: HTs OK. 24-hour tune check. ICAL/ICV/CCV 30%. LCS limits - lab limits. RPD 25%

MB detects compared to on-column results. FB detects compared to final results.

67335: MB, LCS/LCSD, -6 DUP, samples -1, -3, -5; -6, -11 thru -17, -24. ICAL MR 11/07-08/2022. All linear

67336: MB, LCS/LCSD, -2 DUP, samples -2, -4, -7, -8, -9, -10. ICAL MG 11/09/2022 Linear: Bromoform; 1,3,5-trimethylbenzene < mdl. QuadF: Benzyl chloride

67370: MB, LCS/LCSD, -23 DUP, samples -18 thru -23 (FDs -19/-20 and -22/-23). ICAL MG 11/09/2022





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

SMO Use

page 1 of 1
ARCO C 623813

Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: <u>04/30/2022</u> SNL Shipper #: <u>352928</u> Lab Contact: Jamie McKinney/ 865-291-3006 Lab Destination: EKX Contract No.: 1636780	SMO Authorization: <u>AC</u> SMO Contact Phone: Wendy Palencia/505.844.3132	ARCO# 623813 Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: Yes Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #:

[illegible]

Sample Team Members	Name	Signature	Comments: Elevation and Ambient pressure provided on attached forms. Canister No. and Sample No. on attached forms. 28 cans 1 gauge
	William Gibson		
	Robert Lynch		
	Zachary Tenorio		
	Timmie Jackson		

Relinquished by <i>3/18/22</i>	Org. <i>4888</i>	Date <i>10-31-22</i>	Time <i>8:50</i>	Relinquished by	Org.	Date	Time
Received by <i>Chadley</i>	Org. <i>4888</i>	Date <i>10/31/22</i>	Time <i>0850</i>	Received by	Org.	Date	Time
Relinquished by <i>Chadley</i>	Org. <i>4888</i>	Date <i>10/31/22</i>	Time <i>1115</i>	Relinquished by	Org.	Date	Time
Received by	Org.	Date	Time	Received by <i>D-27-22</i>	Org. <i>ETAC</i>	Date <i>11.05.22</i>	Time <i>0930</i>



140-29549 Chain of Custody

SMO Use

ARCOC 623814 page 1 of 1


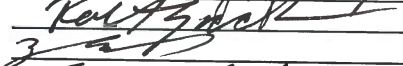
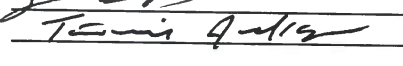

[illegible]

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

ARCO **623815**

Project Name: MWL LTMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08		Date Samples Shipped: <u>10/31/22</u> SNL Shipper #: <u>352968</u> Lab Contact: Jamie McKinney/ 865-291-3006 Lab Destination: EKX Contract No.: 1636780		SMO Authorization: <u>CE</u> SMO Contact Phone: Wendy Palencia/505.844.3132		Waste Characterization: No RMA: No 4° Celsius: Yes	
TA: Bldg: Room:		Last Chain: No Validation Req'd: Yes		Turnaround Time: 30 days EDD: Yes		SDG #:	

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
118910	✓ 001	MWL-FB 3	0	10/28/22 08:32	UPN	SUMN	6 L	None	G	FB	VOC (TO-15)	
118911	✓ 001	MWL-SV03-50	50	10/28/22 08:40	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118912	✓ 001	MWL-SV03-100	100	10/28/22 08:45	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118913	✓ 001	MWL-SV03-200	200	10/28/22 08:50	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118914	✓ 001	MWL-SV03-300	300	10/28/22 08:56	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118915	✓ 001	MWL-SV03-400	400	10/28/22 09:19	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	

Sample Team Members	Name	Signature	Comments: Elevation and Ambient pressure provided on attached forms. Canister No. and Sample No. on attached forms.
	William Gibson		
	Robert Lynch		
	Zachary Tenorio		
Timmie Jackson			

Relinquished by <u>2</u>	Org. <u>8888</u> Date <u>10/31/22</u> Time <u>8:50</u>	Relinquished by	Org.	Date	Time
Received by <u>William Gibson</u>	Org. <u>0618</u> Date <u>10/31/22</u> Time <u>0850</u>	Received by	Org.	Date	Time
Relinquished by <u>William Gibson</u>	Org. <u>0618</u> Date <u>10/31/22</u> Time <u>1115</u>	Relinquished by	Org.	Date	Time
Received by	Org. Date Time	Received by <u>William Gibson</u>	Org. <u>0618</u> Date <u>11.08.22</u> Time <u>0930</u>		

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

SMO Use

 page 1 of 1
 ARCO 623816

Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08		Date Samples Shipped: 10/31/22 SNL Shipper #: 352968 Lab Contact: Jamie McKinney/ 865-291-3006 Lab Destination: EKX Contract No.: 1636780		SMO Authorization: CLE SMO Contact Phone: Wendy Palencia/505.844.3132		Waste Characterization: No RMA: No 4° Celsius: Yes	
TA: Bldg: Room:		Last Chain: No Validation Req'd: Yes		Turnaround Time: 30 days EDD: Yes		SDG #:	

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
118916	✓ 001	MWL-FB 4	0	10/28/22 09:50	UPN	SUMN	6 L	None	G	FB	VOC (TO-15)	
118917	✓ 001	MWL-SV04-50	50	10/28/22 10:08	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118918	✓ 001	MWL-SV04-100	100	10/28/22 10:15	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118919	✓ 001	MWL-SV04-200	200	10/28/22 10:25	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118920	✓ 001	MWL-SV04-300	300	10/28/22 10:32	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118921	✓ 001	MWL-SV04-400	400	10/28/22 10:37	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	

Sample Team Members	Name	Signature	Comments: Elevation and Ambient pressure provided on attached forms. Canister No. and Sample No. on attached form.
	William Gibson	<i>William Gibson</i>	
	Zachary Tenorio	<i>Zachary Tenorio</i>	
	Robert Lynch	<i>Robert Lynch</i>	
	Timmie Jackson	<i>Timmie Jackson</i>	

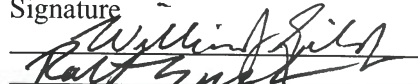
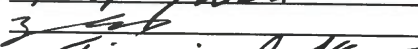

Relinquished by <i>William Gibson</i>	Org. 8888	Date 10/31/22	Time 8:50	Relinquished by	Org.	Date	Time
Received by <i>William Gibson</i>	Org. 0618	Date 10/31/22	Time 0850	Received by	Org.	Date	Time
Relinquished by <i>William Gibson</i>	Org. 0618	Date 10/31/22	Time 1115	Relinquished by	Org.	Date	Time
Received by <i>William Gibson</i>	Org.	Date	Time	Received by <i>William Gibson</i>	Org. 0618	Date 11-08-22	Time 0930

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

page 1 of 1
ARCO 623817

Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08		Date Samples Shipped: <u>10/3/22</u> SNL Shipper #: <u>356968</u> Lab Contact: Jamie McKinney/ 865-291-3006 Lab Destination: EKK Contract No.: 1636780		SMO Authorization: <u>CC</u> SMO Contact Phone: Wendy Palencia/505.844.3132		Waste Characterization: No RMA: No 4° Celsius: Yes	
TA: Bldg: Room:		Last Chain: No Validation Req'd: Yes		Turnaround Time: 30 days EDD: Yes		SDG #:	

Sample No	Frac-tion	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample Id
118922	✓ 001	MWL-FB 5	0	10/28/22 10:53	UPN	SUMN	6 L	None	G	FB	VOC (TO-15)	
118923	✓ 001	MWL-SV05-50	50	10/28/22 11:00	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118924	✓ 001	MWL-SV05-100	100	10/28/22 11:05	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118925	✓ 001	MWL-SV05-100	100	10/28/22 11:05	SG	SUMN	6 L	None	G	DU	VOC (TO-15)	
118926	✓ 001	MWL-SV05-200	200	10/28/22 11:11	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118927	✓ 001	MWL-SV05-300	300	10/28/22 11:18	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	
118928	✓ 001	MWL-SV05-300	300	10/28/22 11:18	SG	SUMN	6 L	None	G	DU	VOC (TO-15)	
118929	✓ 001	MWL-SV05-400	400	10/28/22 11:25	SG	SUMN	6 L	None	G	SA	VOC (TO-15)	

Sample Team Members	Name	Signature	Comments: Elevation and Ambient pressure provided on attached forms. Canister No. and Sample No, on attached forms.
	William Gibson		
	Robert Lynch		
	Zachary Tenorio		

Relinquished by <u>3</u>	Org. <u>8888</u> Date <u>10/31/22</u> Time <u>8:50</u>	Relinquished by	Org.	Date	Time
Received by <u>Theresa C</u>	Org. <u>0618</u> Date <u>10/31/22</u> Time <u>0850</u>	Received by	Org.	Date	Time
Relinquished by <u>Christina Chag</u>	Org. <u>0618</u> Date <u>10/31/22</u> Time <u>1115</u>	Relinquished by	Org.	Date	Time
Received by	Org. Date Time	Received by <u>20 D D</u>	Org. <u>BE TAKEN</u> Date <u>11-08-22</u> Time <u>0930</u>		

CONTRACT VERIFICATION REVIEW FORMS

Mixed Waste Landfill Soil-Vapor Monitoring

October 2022

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.

AR/COC Number	Sample Type
623813	Environmental & Quality Control
623814	Environmental & Quality Control
623815	Environmental & Quality Control
623816	Environmental & Quality Control
623817	Environmental & Quality Control

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL-LTMMP

Project/Task No. 195122_10.11.08

ARCOC No. 623813, 623814, 623815, 623816 & 623817

Analytical Lab EKX

SDG No. 140-29549-1

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	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	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	Bromomethane, chloroethane, chloromethane, 1,2-dichloro-1,1,2,2-tetrafluoroethane and vinyl chloride failed recover limits for LCS/LCD (batch140-67336). Benzyl chloride, bromomethane, chloroethane, chloromethane, 1,2-dichloro-1,1,2,2-tetrafluoroethane, 1,2-dichlorobenzene, 1,2,4-trimethylbenzene, vinyl chloride and hexachlorobutadiene failed recover limits for LCS/LCD (batch140-67370).
	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		Sample duplicates reported and met for each batch

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		
	b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Several analytes detected in FBs
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 and TO-15) a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		Several analytes recovered above the upper control limit in the CCV (batch 67336 and 67370)
	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, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS 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		

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

5.0 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: 11-28-2022 12:40:00

Closed by: Wendy Palencia Date: 11-28-2022 12:40:00

Certificates of Analysis

Mixed Waste Landfill

October 2022 Soil-Vapor Samples

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118906-001/MWL-FB1

Lab Sample ID: 140-29549-1

Date Collected: 10/28/22 11:37

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.0026		0.0022	0.00063	ppm v/v			11/14/22 18:19	1.77
Benzene	0.000019	J	0.000089	0.000014	ppm v/v			11/14/22 18:19	1.77
Benzyl chloride	ND		0.00018	0.000042	ppm v/v			11/14/22 18:19	1.77
Bromodichloromethane	ND		0.000089	0.000020	ppm v/v			11/14/22 18:19	1.77
Bromoform	ND		0.000089	0.000030	ppm v/v			11/14/22 18:19	1.77
Bromomethane	ND		0.000089	0.000024	ppm v/v			11/14/22 18:19	1.77
2-Butanone (MEK)	0.00040	J	0.00044	0.000081	ppm v/v			11/14/22 18:19	1.77
Carbon disulfide	ND		0.00022	0.000039	ppm v/v			11/14/22 18:19	1.77
Carbon tetrachloride	ND		0.000089	0.000014	ppm v/v			11/14/22 18:19	1.77
Chlorobenzene	ND		0.000089	0.000024	ppm v/v			11/14/22 18:19	1.77
Chloroethane	ND		0.000089	0.000035	ppm v/v			11/14/22 18:19	1.77
Chloroform	ND		0.000089	0.000015	ppm v/v			11/14/22 18:19	1.77
Chloromethane	ND		0.00022	0.000073	ppm v/v			11/14/22 18:19	1.77
Dibromochloromethane	ND		0.000089	0.000015	ppm v/v			11/14/22 18:19	1.77
1,2-Dibromoethane (EDB)	ND		0.000089	0.000013	ppm v/v			11/14/22 18:19	1.77
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000089	0.000013	ppm v/v			11/14/22 18:19	1.77
1,2-Dichlorobenzene	ND		0.000089	0.000034	ppm v/v			11/14/22 18:19	1.77
1,3-Dichlorobenzene	ND		0.000089	0.000018	ppm v/v			11/14/22 18:19	1.77
1,4-Dichlorobenzene	ND		0.000089	0.000018	ppm v/v			11/14/22 18:19	1.77
Dichlorodifluoromethane	ND		0.000089	0.000015	ppm v/v			11/14/22 18:19	1.77
1,1-Dichloroethane	ND		0.000089	0.000012	ppm v/v			11/14/22 18:19	1.77
1,2-Dichloroethane	ND		0.000089	0.000011	ppm v/v			11/14/22 18:19	1.77
1,1-Dichloroethene	ND		0.000089	0.000014	ppm v/v			11/14/22 18:19	1.77
cis-1,2-Dichloroethene	ND		0.000089	0.000011	ppm v/v			11/14/22 18:19	1.77
trans-1,2-Dichloroethene	ND		0.000089	0.000014	ppm v/v			11/14/22 18:19	1.77
1,2-Dichloropropane	ND		0.000089	0.000011	ppm v/v			11/14/22 18:19	1.77
cis-1,3-Dichloropropene	ND		0.000089	0.000021	ppm v/v			11/14/22 18:19	1.77
trans-1,3-Dichloropropene	ND		0.000089	0.000022	ppm v/v			11/14/22 18:19	1.77
Ethylbenzene	0.000016	J	0.000089	0.000014	ppm v/v			11/14/22 18:19	1.77
4-Ethyltoluene	ND		0.00018	0.000023	ppm v/v			11/14/22 18:19	1.77
Hexachlorobutadiene	ND		0.00044	0.000035	ppm v/v			11/14/22 18:19	1.77
2-Hexanone	ND		0.00022	0.000060	ppm v/v			11/14/22 18:19	1.77
4-Methyl-2-pentanone (MIBK)	ND		0.00022	0.000060	ppm v/v			11/14/22 18:19	1.77
Methylene Chloride	0.00086		0.00044	0.00015	ppm v/v			11/14/22 18:19	1.77
Styrene	ND		0.000089	0.000027	ppm v/v			11/14/22 18:19	1.77
1,1,2,2-Tetrachloroethane	ND		0.000089	0.000015	ppm v/v			11/14/22 18:19	1.77
Tetrachloroethene	ND		0.000089	0.000013	ppm v/v			11/14/22 18:19	1.77
Toluene	0.00038		0.00013	0.000025	ppm v/v			11/14/22 18:19	1.77
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000089	0.000011	ppm v/v			11/14/22 18:19	1.77
1,2,4-Trichlorobenzene	ND		0.00044	0.000039	ppm v/v			11/14/22 18:19	1.77
1,1,1-Trichloroethane	ND		0.000089	0.000032	ppm v/v			11/14/22 18:19	1.77
1,1,2-Trichloroethane	ND		0.000089	0.000017	ppm v/v			11/14/22 18:19	1.77
Trichloroethene	0.000017	J	0.000044	0.000014	ppm v/v			11/14/22 18:19	1.77
Trichlorofluoromethane	0.000026	J	0.000089	0.000012	ppm v/v			11/14/22 18:19	1.77
1,2,4-Trimethylbenzene	ND		0.000089	0.000022	ppm v/v			11/14/22 18:19	1.77
1,3,5-Trimethylbenzene	ND		0.00018	0.000072	ppm v/v			11/14/22 18:19	1.77
Vinyl acetate	ND		0.00044	0.000031	ppm v/v			11/14/22 18:19	1.77
Vinyl chloride	ND		0.000044	0.000029	ppm v/v			11/14/22 18:19	1.77

Eurofins Knoxville

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMP

Job ID: 140-29549-1

Client Sample ID: 118906-001/MWL-FB1

Lab Sample ID: 140-29549-1

Date Collected: 10/28/22 11:37

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.000057	J	0.000089	0.000032	ppm v/v			11/14/22 18:19	1.77
o-Xylene	0.000025	J	0.000089	0.000017	ppm v/v			11/14/22 18:19	1.77
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140					11/14/22 18:19	1.77

Client Sample ID: 118907-001/MWL-SV01-42.5

Lab Sample ID: 140-29549-2

Date Collected: 10/28/22 12:03

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.081	0.023	ppm v/v			11/12/22 16:52	1.62
Benzene	ND		0.0032	0.00053	ppm v/v			11/12/22 16:52	1.62
Benzyl chloride	ND		0.0065	0.0015	ppm v/v			11/12/22 16:52	1.62
Bromodichloromethane	ND		0.0032	0.00073	ppm v/v			11/12/22 16:52	1.62
Bromoform	ND		0.0032	0.0011	ppm v/v			11/12/22 16:52	1.62
Bromomethane	ND	*+	0.0032	0.00089	ppm v/v			11/12/22 16:52	1.62
2-Butanone (MEK)	ND		0.016	0.0030	ppm v/v			11/12/22 16:52	1.62
Carbon disulfide	ND		0.0081	0.0014	ppm v/v			11/12/22 16:52	1.62
Carbon tetrachloride	ND		0.0032	0.00053	ppm v/v			11/12/22 16:52	1.62
Chlorobenzene	ND		0.0032	0.00089	ppm v/v			11/12/22 16:52	1.62
Chloroethane	ND	*+	0.0032	0.0013	ppm v/v			11/12/22 16:52	1.62
Chloroform	0.0097		0.0032	0.00057	ppm v/v			11/12/22 16:52	1.62
Chloromethane	ND	*+	0.0081	0.0027	ppm v/v			11/12/22 16:52	1.62
Dibromochloromethane	ND		0.0032	0.00057	ppm v/v			11/12/22 16:52	1.62
1,2-Dibromoethane (EDB)	ND		0.0032	0.00049	ppm v/v			11/12/22 16:52	1.62
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0032	0.00049	ppm v/v			11/12/22 16:52	1.62
1,2-Dichlorobenzene	ND		0.0032	0.0013	ppm v/v			11/12/22 16:52	1.62
1,3-Dichlorobenzene	ND		0.0032	0.00065	ppm v/v			11/12/22 16:52	1.62
1,4-Dichlorobenzene	ND		0.0032	0.00065	ppm v/v			11/12/22 16:52	1.62
Dichlorodifluoromethane	0.057		0.0032	0.00057	ppm v/v			11/12/22 16:52	1.62
1,1-Dichloroethane	0.0013	J	0.0032	0.00045	ppm v/v			11/12/22 16:52	1.62
1,2-Dichloroethane	ND		0.0032	0.00041	ppm v/v			11/12/22 16:52	1.62
1,1-Dichloroethene	0.0028	J	0.0032	0.00053	ppm v/v			11/12/22 16:52	1.62
cis-1,2-Dichloroethene	0.00048	J	0.0032	0.00041	ppm v/v			11/12/22 16:52	1.62
trans-1,2-Dichloroethene	ND		0.0032	0.00053	ppm v/v			11/12/22 16:52	1.62
1,2-Dichloropropane	ND		0.0032	0.00041	ppm v/v			11/12/22 16:52	1.62
cis-1,3-Dichloropropene	ND		0.0032	0.00077	ppm v/v			11/12/22 16:52	1.62
trans-1,3-Dichloropropene	ND		0.0032	0.00081	ppm v/v			11/12/22 16:52	1.62
Ethylbenzene	ND		0.0032	0.00053	ppm v/v			11/12/22 16:52	1.62
4-Ethyltoluene	ND		0.0065	0.00085	ppm v/v			11/12/22 16:52	1.62
Hexachlorobutadiene	ND		0.016	0.0013	ppm v/v			11/12/22 16:52	1.62
2-Hexanone	ND		0.0081	0.0022	ppm v/v			11/12/22 16:52	1.62
4-Methyl-2-pentanone (MIBK)	ND		0.0081	0.0022	ppm v/v			11/12/22 16:52	1.62
Methylene Chloride	ND		0.016	0.0057	ppm v/v			11/12/22 16:52	1.62
Styrene	ND		0.0032	0.00097	ppm v/v			11/12/22 16:52	1.62
1,1,2,2-Tetrachloroethane	ND		0.0032	0.00057	ppm v/v			11/12/22 16:52	1.62

Eurofins Knoxville

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118907-001/MWL-SV01-42.5

Lab Sample ID: 140-29549-2

Date Collected: 10/28/22 12:03

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.24		0.0032	0.00049	ppm v/v			11/12/22 16:52	1.62
Toluene	ND		0.0049	0.00093	ppm v/v			11/12/22 16:52	1.62
1,1,2-Trichloro-1,2,2-trifluoroethane	0.037		0.0032	0.00041	ppm v/v			11/12/22 16:52	1.62
1,2,4-Trichlorobenzene	ND		0.016	0.0014	ppm v/v			11/12/22 16:52	1.62
1,1,1-Trichloroethane	0.016		0.0032	0.0012	ppm v/v			11/12/22 16:52	1.62
1,1,2-Trichloroethane	ND		0.0032	0.00061	ppm v/v			11/12/22 16:52	1.62
Trichloroethene	0.042		0.0016	0.00053	ppm v/v			11/12/22 16:52	1.62
Trichlorofluoromethane	0.11		0.0032	0.00045	ppm v/v			11/12/22 16:52	1.62
1,2,4-Trimethylbenzene	ND		0.0032	0.00081	ppm v/v			11/12/22 16:52	1.62
1,3,5-Trimethylbenzene	ND		0.0065	0.0026	ppm v/v			11/12/22 16:52	1.62
Vinyl acetate	ND		0.016	0.0011	ppm v/v			11/12/22 16:52	1.62
Vinyl chloride	ND	+	0.0016	0.0011	ppm v/v			11/12/22 16:52	1.62
m,p-Xylene	ND		0.0032	0.0012	ppm v/v			11/12/22 16:52	1.62
o-Xylene	ND		0.0032	0.00061	ppm v/v			11/12/22 16:52	1.62
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	79		60 - 140					11/12/22 16:52	1.62

Client Sample ID: 118908-001/MWL-FB2

Lab Sample ID: 140-29549-3

Date Collected: 10/28/22 11:41

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.00058	ppm v/v			11/14/22 19:10	1.63
Benzene	ND		0.00082	0.000013	ppm v/v			11/14/22 19:10	1.63
Benzyl chloride	ND		0.00016	0.000039	ppm v/v			11/14/22 19:10	1.63
Bromodichloromethane	ND		0.00082	0.000018	ppm v/v			11/14/22 19:10	1.63
Bromoform	ND		0.00082	0.000028	ppm v/v			11/14/22 19:10	1.63
Bromomethane	ND		0.00082	0.000022	ppm v/v			11/14/22 19:10	1.63
2-Butanone (MEK)	ND		0.00041	0.000074	ppm v/v			11/14/22 19:10	1.63
Carbon disulfide	ND		0.00020	0.000036	ppm v/v			11/14/22 19:10	1.63
Carbon tetrachloride	ND		0.00082	0.000013	ppm v/v			11/14/22 19:10	1.63
Chlorobenzene	ND		0.00082	0.000022	ppm v/v			11/14/22 19:10	1.63
Chloroethane	ND		0.00082	0.000033	ppm v/v			11/14/22 19:10	1.63
Chloroform	ND		0.00082	0.000014	ppm v/v			11/14/22 19:10	1.63
Chloromethane	ND		0.00020	0.000067	ppm v/v			11/14/22 19:10	1.63
Dibromochloromethane	ND		0.00082	0.000014	ppm v/v			11/14/22 19:10	1.63
1,2-Dibromoethane (EDB)	ND		0.00082	0.000012	ppm v/v			11/14/22 19:10	1.63
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00082	0.000012	ppm v/v			11/14/22 19:10	1.63
1,2-Dichlorobenzene	ND		0.00082	0.000032	ppm v/v			11/14/22 19:10	1.63
1,3-Dichlorobenzene	ND		0.00082	0.000016	ppm v/v			11/14/22 19:10	1.63
1,4-Dichlorobenzene	ND		0.00082	0.000016	ppm v/v			11/14/22 19:10	1.63
Dichlorodifluoromethane	ND		0.00082	0.000014	ppm v/v			11/14/22 19:10	1.63
1,1-Dichloroethane	ND		0.00082	0.000011	ppm v/v			11/14/22 19:10	1.63
1,2-Dichloroethane	ND		0.00082	0.000010	ppm v/v			11/14/22 19:10	1.63
1,1-Dichloroethene	ND		0.00082	0.000013	ppm v/v			11/14/22 19:10	1.63

Eurofins Knoxville

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118908-001/MWL-FB2

Lab Sample ID: 140-29549-3

Date Collected: 10/28/22 11:41

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.000082	0.000010	ppm v/v			11/14/22 19:10	1.63
trans-1,2-Dichloroethene	ND		0.000082	0.000013	ppm v/v			11/14/22 19:10	1.63
1,2-Dichloropropane	ND		0.000082	0.000010	ppm v/v			11/14/22 19:10	1.63
cis-1,3-Dichloropropene	ND		0.000082	0.000019	ppm v/v			11/14/22 19:10	1.63
trans-1,3-Dichloropropene	ND		0.000082	0.000020	ppm v/v			11/14/22 19:10	1.63
Ethylbenzene	ND		0.000082	0.000013	ppm v/v			11/14/22 19:10	1.63
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/14/22 19:10	1.63
Hexachlorobutadiene	ND		0.00041	0.000033	ppm v/v			11/14/22 19:10	1.63
2-Hexanone	ND		0.00020	0.000055	ppm v/v			11/14/22 19:10	1.63
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000055	ppm v/v			11/14/22 19:10	1.63
Methylene Chloride	0.00040	J	0.00041	0.00014	ppm v/v			11/14/22 19:10	1.63
Styrene	ND		0.000082	0.000024	ppm v/v			11/14/22 19:10	1.63
1,1,2,2-Tetrachloroethane	ND		0.000082	0.000014	ppm v/v			11/14/22 19:10	1.63
Tetrachloroethene	ND		0.000082	0.000012	ppm v/v			11/14/22 19:10	1.63
Toluene	0.000024	J	0.00012	0.000023	ppm v/v			11/14/22 19:10	1.63
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000082	0.000010	ppm v/v			11/14/22 19:10	1.63
1,2,4-Trichlorobenzene	ND		0.00041	0.000036	ppm v/v			11/14/22 19:10	1.63
1,1,1-Trichloroethane	ND		0.000082	0.000030	ppm v/v			11/14/22 19:10	1.63
1,1,2-Trichloroethane	ND		0.000082	0.000015	ppm v/v			11/14/22 19:10	1.63
Trichloroethene	ND		0.000041	0.000013	ppm v/v			11/14/22 19:10	1.63
Trichlorofluoromethane	ND		0.000082	0.000011	ppm v/v			11/14/22 19:10	1.63
1,2,4-Trimethylbenzene	ND		0.000082	0.000020	ppm v/v			11/14/22 19:10	1.63
1,3,5-Trimethylbenzene	ND		0.00016	0.000066	ppm v/v			11/14/22 19:10	1.63
Vinyl acetate	ND		0.00041	0.000029	ppm v/v			11/14/22 19:10	1.63
Vinyl chloride	ND		0.000041	0.000026	ppm v/v			11/14/22 19:10	1.63
m,p-Xylene	ND		0.000082	0.000030	ppm v/v			11/14/22 19:10	1.63
o-Xylene	ND		0.000082	0.000015	ppm v/v			11/14/22 19:10	1.63
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140					11/14/22 19:10	1.63

Client Sample ID: 118909-001/MWL-SV02-41.5

Lab Sample ID: 140-29549-4

Date Collected: 10/28/22 11:55

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.083	0.024	ppm v/v			11/12/22 17:42	1.65
Benzene	ND		0.0033	0.00054	ppm v/v			11/12/22 17:42	1.65
Benzyl chloride	ND		0.0066	0.0016	ppm v/v			11/12/22 17:42	1.65
Bromodichloromethane	ND		0.0033	0.00074	ppm v/v			11/12/22 17:42	1.65
Bromoform	ND		0.0033	0.0011	ppm v/v			11/12/22 17:42	1.65
Bromomethane	ND	*+	0.0033	0.00091	ppm v/v			11/12/22 17:42	1.65
2-Butanone (MEK)	ND		0.017	0.0030	ppm v/v			11/12/22 17:42	1.65
Carbon disulfide	ND		0.0083	0.0014	ppm v/v			11/12/22 17:42	1.65
Carbon tetrachloride	ND		0.0033	0.00054	ppm v/v			11/12/22 17:42	1.65
Chlorobenzene	ND		0.0033	0.00091	ppm v/v			11/12/22 17:42	1.65
Chloroethane	ND	*+	0.0033	0.0013	ppm v/v			11/12/22 17:42	1.65

Eurofins Knoxville

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118909-001/MWL-SV02-41.5

Lab Sample ID: 140-29549-4

Date Collected: 10/28/22 11:55

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.0018	J	0.0033	0.00058	ppm v/v			11/12/22 17:42	1.65
Chloromethane	ND	*+	0.0083	0.0027	ppm v/v			11/12/22 17:42	1.65
Dibromochloromethane	ND		0.0033	0.00058	ppm v/v			11/12/22 17:42	1.65
1,2-Dibromoethane (EDB)	ND		0.0033	0.00050	ppm v/v			11/12/22 17:42	1.65
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0033	0.00050	ppm v/v			11/12/22 17:42	1.65
1,2-Dichlorobenzene	ND		0.0033	0.0013	ppm v/v			11/12/22 17:42	1.65
1,3-Dichlorobenzene	ND		0.0033	0.00066	ppm v/v			11/12/22 17:42	1.65
1,4-Dichlorobenzene	ND		0.0033	0.00066	ppm v/v			11/12/22 17:42	1.65
Dichlorodifluoromethane	0.059		0.0033	0.00058	ppm v/v			11/12/22 17:42	1.65
1,1-Dichloroethane	0.0010	J	0.0033	0.00045	ppm v/v			11/12/22 17:42	1.65
1,2-Dichloroethane	ND		0.0033	0.00041	ppm v/v			11/12/22 17:42	1.65
1,1-Dichloroethene	0.0036		0.0033	0.00054	ppm v/v			11/12/22 17:42	1.65
cis-1,2-Dichloroethene	ND		0.0033	0.00041	ppm v/v			11/12/22 17:42	1.65
trans-1,2-Dichloroethene	ND		0.0033	0.00054	ppm v/v			11/12/22 17:42	1.65
1,2-Dichloropropane	ND		0.0033	0.00041	ppm v/v			11/12/22 17:42	1.65
cis-1,3-Dichloropropene	ND		0.0033	0.00078	ppm v/v			11/12/22 17:42	1.65
trans-1,3-Dichloropropene	ND		0.0033	0.00083	ppm v/v			11/12/22 17:42	1.65
Ethylbenzene	ND		0.0033	0.00054	ppm v/v			11/12/22 17:42	1.65
4-Ethyltoluene	ND		0.0066	0.00087	ppm v/v			11/12/22 17:42	1.65
Hexachlorobutadiene	ND		0.017	0.0013	ppm v/v			11/12/22 17:42	1.65
2-Hexanone	ND		0.0083	0.0022	ppm v/v			11/12/22 17:42	1.65
4-Methyl-2-pentanone (MIBK)	ND		0.0083	0.0022	ppm v/v			11/12/22 17:42	1.65
Methylene Chloride	ND		0.017	0.0058	ppm v/v			11/12/22 17:42	1.65
Styrene	ND		0.0033	0.00099	ppm v/v			11/12/22 17:42	1.65
1,1,2,2-Tetrachloroethane	ND		0.0033	0.00058	ppm v/v			11/12/22 17:42	1.65
Tetrachloroethene	0.034		0.0033	0.00050	ppm v/v			11/12/22 17:42	1.65
Toluene	ND		0.0050	0.00095	ppm v/v			11/12/22 17:42	1.65
1,1,2-Trichloro-1,2,2-trifluoroethane	0.025		0.0033	0.00041	ppm v/v			11/12/22 17:42	1.65
1,2,4-Trichlorobenzene	ND		0.017	0.0014	ppm v/v			11/12/22 17:42	1.65
1,1,1-Trichloroethane	0.030		0.0033	0.0012	ppm v/v			11/12/22 17:42	1.65
1,1,2-Trichloroethane	ND		0.0033	0.00062	ppm v/v			11/12/22 17:42	1.65
Trichloroethene	0.027		0.0017	0.00054	ppm v/v			11/12/22 17:42	1.65
Trichlorofluoromethane	0.19		0.0033	0.00045	ppm v/v			11/12/22 17:42	1.65
1,2,4-Trimethylbenzene	ND		0.0033	0.00083	ppm v/v			11/12/22 17:42	1.65
1,3,5-Trimethylbenzene	ND		0.0066	0.0027	ppm v/v			11/12/22 17:42	1.65
Vinyl acetate	ND		0.017	0.0012	ppm v/v			11/12/22 17:42	1.65
Vinyl chloride	ND	*+	0.0017	0.0011	ppm v/v			11/12/22 17:42	1.65
m,p-Xylene	ND		0.0033	0.0012	ppm v/v			11/12/22 17:42	1.65
o-Xylene	ND		0.0033	0.00062	ppm v/v			11/12/22 17:42	1.65

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		60 - 140		11/12/22 17:42	1.65

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118910-001/MWL-FB3

Lab Sample ID: 140-29549-5

Date Collected: 10/28/22 08:32

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.0012	J	0.0022	0.00062	ppm v/v			11/14/22 20:02	1.75
Benzene	ND		0.000088	0.000014	ppm v/v			11/14/22 20:02	1.75
Benzyl chloride	ND		0.00018	0.000042	ppm v/v			11/14/22 20:02	1.75
Bromodichloromethane	ND		0.000088	0.000020	ppm v/v			11/14/22 20:02	1.75
Bromoform	ND		0.000088	0.000030	ppm v/v			11/14/22 20:02	1.75
Bromomethane	ND		0.000088	0.000024	ppm v/v			11/14/22 20:02	1.75
2-Butanone (MEK)	ND		0.00044	0.000080	ppm v/v			11/14/22 20:02	1.75
Carbon disulfide	ND		0.00022	0.000038	ppm v/v			11/14/22 20:02	1.75
Carbon tetrachloride	ND		0.000088	0.000014	ppm v/v			11/14/22 20:02	1.75
Chlorobenzene	ND		0.000088	0.000024	ppm v/v			11/14/22 20:02	1.75
Chloroethane	ND		0.000088	0.000035	ppm v/v			11/14/22 20:02	1.75
Chloroform	ND		0.000088	0.000015	ppm v/v			11/14/22 20:02	1.75
Chloromethane	ND		0.00022	0.000072	ppm v/v			11/14/22 20:02	1.75
Dibromochloromethane	ND		0.000088	0.000015	ppm v/v			11/14/22 20:02	1.75
1,2-Dibromoethane (EDB)	ND		0.000088	0.000013	ppm v/v			11/14/22 20:02	1.75
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000088	0.000013	ppm v/v			11/14/22 20:02	1.75
1,2-Dichlorobenzene	ND		0.000088	0.000034	ppm v/v			11/14/22 20:02	1.75
1,3-Dichlorobenzene	ND		0.000088	0.000018	ppm v/v			11/14/22 20:02	1.75
1,4-Dichlorobenzene	ND		0.000088	0.000018	ppm v/v			11/14/22 20:02	1.75
Dichlorodifluoromethane	ND		0.000088	0.000015	ppm v/v			11/14/22 20:02	1.75
1,1-Dichloroethane	ND		0.000088	0.000012	ppm v/v			11/14/22 20:02	1.75
1,2-Dichloroethane	ND		0.000088	0.000011	ppm v/v			11/14/22 20:02	1.75
1,1-Dichloroethene	ND		0.000088	0.000014	ppm v/v			11/14/22 20:02	1.75
cis-1,2-Dichloroethene	ND		0.000088	0.000011	ppm v/v			11/14/22 20:02	1.75
trans-1,2-Dichloroethene	ND		0.000088	0.000014	ppm v/v			11/14/22 20:02	1.75
1,2-Dichloropropane	ND		0.000088	0.000011	ppm v/v			11/14/22 20:02	1.75
cis-1,3-Dichloropropene	ND		0.000088	0.000021	ppm v/v			11/14/22 20:02	1.75
trans-1,3-Dichloropropene	ND		0.000088	0.000022	ppm v/v			11/14/22 20:02	1.75
Ethylbenzene	ND		0.000088	0.000014	ppm v/v			11/14/22 20:02	1.75
4-Ethyltoluene	ND		0.00018	0.000023	ppm v/v			11/14/22 20:02	1.75
Hexachlorobutadiene	ND		0.00044	0.000035	ppm v/v			11/14/22 20:02	1.75
2-Hexanone	ND		0.00022	0.000059	ppm v/v			11/14/22 20:02	1.75
4-Methyl-2-pentanone (MIBK)	ND		0.00022	0.000059	ppm v/v			11/14/22 20:02	1.75
Methylene Chloride	0.00020	J	0.00044	0.00015	ppm v/v			11/14/22 20:02	1.75
Styrene	ND		0.000088	0.000026	ppm v/v			11/14/22 20:02	1.75
1,1,2,2-Tetrachloroethane	ND		0.000088	0.000015	ppm v/v			11/14/22 20:02	1.75
Tetrachloroethene	ND		0.000088	0.000013	ppm v/v			11/14/22 20:02	1.75
Toluene	0.00062	J	0.00013	0.000025	ppm v/v			11/14/22 20:02	1.75
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000088	0.000011	ppm v/v			11/14/22 20:02	1.75
1,2,4-Trichlorobenzene	ND		0.00044	0.000038	ppm v/v			11/14/22 20:02	1.75
1,1,1-Trichloroethane	ND		0.000088	0.000032	ppm v/v			11/14/22 20:02	1.75
1,1,2-Trichloroethane	ND		0.000088	0.000016	ppm v/v			11/14/22 20:02	1.75
Trichloroethene	ND		0.000044	0.000014	ppm v/v			11/14/22 20:02	1.75
Trichlorofluoromethane	ND		0.000088	0.000012	ppm v/v			11/14/22 20:02	1.75
1,2,4-Trimethylbenzene	ND		0.000088	0.000022	ppm v/v			11/14/22 20:02	1.75
1,3,5-Trimethylbenzene	ND		0.00018	0.000071	ppm v/v			11/14/22 20:02	1.75
Vinyl acetate	ND		0.00044	0.000031	ppm v/v			11/14/22 20:02	1.75
Vinyl chloride	ND		0.000044	0.000028	ppm v/v			11/14/22 20:02	1.75

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118910-001/MWL-FB3

Lab Sample ID: 140-29549-5

Date Collected: 10/28/22 08:32

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.000088	0.000032	ppm v/v			11/14/22 20:02	1.75
o-Xylene	ND		0.000088	0.000016	ppm v/v			11/14/22 20:02	1.75
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140					11/14/22 20:02	1.75

Client Sample ID: 118911-001/MWL-SV03-50

Lab Sample ID: 140-29549-6

Date Collected: 10/28/22 08:40

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.0096	ppm v/v			11/14/22 22:28	1.68
Benzene	0.00023	J	0.0013	0.00022	ppm v/v			11/14/22 22:28	1.68
Benzyl chloride	ND		0.0027	0.00064	ppm v/v			11/14/22 22:28	1.68
Bromodichloromethane	ND		0.0013	0.00030	ppm v/v			11/14/22 22:28	1.68
Bromoform	ND		0.0013	0.00045	ppm v/v			11/14/22 22:28	1.68
Bromomethane	ND		0.0013	0.00037	ppm v/v			11/14/22 22:28	1.68
2-Butanone (MEK)	ND		0.0067	0.0012	ppm v/v			11/14/22 22:28	1.68
Carbon disulfide	ND		0.0034	0.00059	ppm v/v			11/14/22 22:28	1.68
Carbon tetrachloride	0.00022	J	0.0013	0.00022	ppm v/v			11/14/22 22:28	1.68
Chlorobenzene	ND		0.0013	0.00037	ppm v/v			11/14/22 22:28	1.68
Chloroethane	ND		0.0013	0.00054	ppm v/v			11/14/22 22:28	1.68
Chloroform	0.0015		0.0013	0.00024	ppm v/v			11/14/22 22:28	1.68
Chloromethane	ND		0.0034	0.0011	ppm v/v			11/14/22 22:28	1.68
Dibromochloromethane	ND		0.0013	0.00024	ppm v/v			11/14/22 22:28	1.68
1,2-Dibromoethane (EDB)	ND		0.0013	0.00020	ppm v/v			11/14/22 22:28	1.68
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0013	0.00020	ppm v/v			11/14/22 22:28	1.68
1,2-Dichlorobenzene	ND		0.0013	0.00052	ppm v/v			11/14/22 22:28	1.68
1,3-Dichlorobenzene	ND		0.0013	0.00027	ppm v/v			11/14/22 22:28	1.68
1,4-Dichlorobenzene	ND		0.0013	0.00027	ppm v/v			11/14/22 22:28	1.68
Dichlorodifluoromethane	0.021		0.0013	0.00024	ppm v/v			11/14/22 22:28	1.68
1,1-Dichloroethane	0.0024		0.0013	0.00018	ppm v/v			11/14/22 22:28	1.68
1,2-Dichloroethane	ND		0.0013	0.00017	ppm v/v			11/14/22 22:28	1.68
1,1-Dichloroethene	0.0067		0.0013	0.00022	ppm v/v			11/14/22 22:28	1.68
cis-1,2-Dichloroethene	0.0012	J	0.0013	0.00017	ppm v/v			11/14/22 22:28	1.68
trans-1,2-Dichloroethene	ND		0.0013	0.00022	ppm v/v			11/14/22 22:28	1.68
1,2-Dichloropropane	ND		0.0013	0.00017	ppm v/v			11/14/22 22:28	1.68
cis-1,3-Dichloropropene	ND		0.0013	0.00032	ppm v/v			11/14/22 22:28	1.68
trans-1,3-Dichloropropene	ND		0.0013	0.00034	ppm v/v			11/14/22 22:28	1.68
Ethylbenzene	ND		0.0013	0.00022	ppm v/v			11/14/22 22:28	1.68
4-Ethyltoluene	ND		0.0027	0.00035	ppm v/v			11/14/22 22:28	1.68
Hexachlorobutadiene	ND		0.0067	0.00054	ppm v/v			11/14/22 22:28	1.68
2-Hexanone	ND		0.0034	0.00091	ppm v/v			11/14/22 22:28	1.68
4-Methyl-2-pentanone (MIBK)	ND		0.0034	0.00091	ppm v/v			11/14/22 22:28	1.68
Methylene Chloride	ND		0.0067	0.0024	ppm v/v			11/14/22 22:28	1.68
Styrene	ND		0.0013	0.00040	ppm v/v			11/14/22 22:28	1.68
1,1,2,2-Tetrachloroethane	ND		0.0013	0.00024	ppm v/v			11/14/22 22:28	1.68

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118911-001/MWL-SV03-50

Lab Sample ID: 140-29549-6

Date Collected: 10/28/22 08:40

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.12		0.0013	0.00020	ppm v/v			11/14/22 22:28	1.68
Toluene	ND		0.0020	0.00039	ppm v/v			11/14/22 22:28	1.68
1,1,2-Trichloro-1,2,2-trifluoroethane	0.044		0.0013	0.00017	ppm v/v			11/14/22 22:28	1.68
1,2,4-Trichlorobenzene	ND		0.0067	0.00059	ppm v/v			11/14/22 22:28	1.68
1,1,1-Trichloroethane	0.0016		0.0013	0.00049	ppm v/v			11/14/22 22:28	1.68
1,1,2-Trichloroethane	ND		0.0013	0.00025	ppm v/v			11/14/22 22:28	1.68
Trichloroethene	0.091		0.00067	0.00022	ppm v/v			11/14/22 22:28	1.68
Trichlorofluoromethane	0.021		0.0013	0.00018	ppm v/v			11/14/22 22:28	1.68
1,2,4-Trimethylbenzene	ND		0.0013	0.00034	ppm v/v			11/14/22 22:28	1.68
1,3,5-Trimethylbenzene	ND		0.0027	0.0011	ppm v/v			11/14/22 22:28	1.68
Vinyl acetate	ND		0.0067	0.00047	ppm v/v			11/14/22 22:28	1.68
Vinyl chloride	ND		0.00067	0.00044	ppm v/v			11/14/22 22:28	1.68
m,p-Xylene	ND		0.0013	0.00049	ppm v/v			11/14/22 22:28	1.68
o-Xylene	ND		0.0013	0.00025	ppm v/v			11/14/22 22:28	1.68
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		60 - 140					11/14/22 22:28	1.68

Client Sample ID: 118912-001/MWL-SV03-100

Lab Sample ID: 140-29549-7

Date Collected: 10/28/22 08:45

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.066	0.019	ppm v/v			11/12/22 19:21	1.65
Benzene	ND		0.0026	0.00043	ppm v/v			11/12/22 19:21	1.65
Benzyl chloride	ND		0.0053	0.0013	ppm v/v			11/12/22 19:21	1.65
Bromodichloromethane	ND		0.0026	0.00059	ppm v/v			11/12/22 19:21	1.65
Bromoform	ND		0.0026	0.00089	ppm v/v			11/12/22 19:21	1.65
Bromomethane	ND	*+	0.0026	0.00073	ppm v/v			11/12/22 19:21	1.65
2-Butanone (MEK)	ND		0.013	0.0024	ppm v/v			11/12/22 19:21	1.65
Carbon disulfide	ND		0.0066	0.0012	ppm v/v			11/12/22 19:21	1.65
Carbon tetrachloride	ND		0.0026	0.00043	ppm v/v			11/12/22 19:21	1.65
Chlorobenzene	ND		0.0026	0.00073	ppm v/v			11/12/22 19:21	1.65
Chloroethane	ND	*+	0.0026	0.0011	ppm v/v			11/12/22 19:21	1.65
Chloroform	0.0019	J	0.0026	0.00046	ppm v/v			11/12/22 19:21	1.65
Chloromethane	ND	*+	0.0066	0.0022	ppm v/v			11/12/22 19:21	1.65
Dibromochloromethane	ND		0.0026	0.00046	ppm v/v			11/12/22 19:21	1.65
1,2-Dibromoethane (EDB)	ND		0.0026	0.00040	ppm v/v			11/12/22 19:21	1.65
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0026	0.00040	ppm v/v			11/12/22 19:21	1.65
1,2-Dichlorobenzene	ND		0.0026	0.0010	ppm v/v			11/12/22 19:21	1.65
1,3-Dichlorobenzene	ND		0.0026	0.00053	ppm v/v			11/12/22 19:21	1.65
1,4-Dichlorobenzene	ND		0.0026	0.00053	ppm v/v			11/12/22 19:21	1.65
Dichlorodifluoromethane	0.029		0.0026	0.00046	ppm v/v			11/12/22 19:21	1.65
1,1-Dichloroethane	0.0034		0.0026	0.00036	ppm v/v			11/12/22 19:21	1.65
1,2-Dichloroethane	ND		0.0026	0.00033	ppm v/v			11/12/22 19:21	1.65
1,1-Dichloroethene	0.0087		0.0026	0.00043	ppm v/v			11/12/22 19:21	1.65

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118912-001/MWL-SV03-100

Lab Sample ID: 140-29549-7

Date Collected: 10/28/22 08:45

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.0014	J	0.0026	0.00033	ppm v/v			11/12/22 19:21	1.65
trans-1,2-Dichloroethene	ND		0.0026	0.00043	ppm v/v			11/12/22 19:21	1.65
1,2-Dichloropropane	ND		0.0026	0.00033	ppm v/v			11/12/22 19:21	1.65
cis-1,3-Dichloropropene	ND		0.0026	0.00063	ppm v/v			11/12/22 19:21	1.65
trans-1,3-Dichloropropene	ND		0.0026	0.00066	ppm v/v			11/12/22 19:21	1.65
Ethylbenzene	ND		0.0026	0.00043	ppm v/v			11/12/22 19:21	1.65
4-Ethyltoluene	ND		0.0053	0.00069	ppm v/v			11/12/22 19:21	1.65
Hexachlorobutadiene	ND		0.013	0.0011	ppm v/v			11/12/22 19:21	1.65
2-Hexanone	ND		0.0066	0.0018	ppm v/v			11/12/22 19:21	1.65
4-Methyl-2-pentanone (MIBK)	ND		0.0066	0.0018	ppm v/v			11/12/22 19:21	1.65
Methylene Chloride	ND		0.013	0.0046	ppm v/v			11/12/22 19:21	1.65
Styrene	ND		0.0026	0.00079	ppm v/v			11/12/22 19:21	1.65
1,1,2,2-Tetrachloroethane	ND		0.0026	0.00046	ppm v/v			11/12/22 19:21	1.65
Tetrachloroethene	0.12		0.0026	0.00040	ppm v/v			11/12/22 19:21	1.65
Toluene	ND		0.0040	0.00076	ppm v/v			11/12/22 19:21	1.65
1,1,2-Trichloro-1,2,2-trifluoroethane	0.068		0.0026	0.00033	ppm v/v			11/12/22 19:21	1.65
1,2,4-Trichlorobenzene	ND		0.013	0.0012	ppm v/v			11/12/22 19:21	1.65
1,1,1-Trichloroethane	0.0019	J	0.0026	0.00096	ppm v/v			11/12/22 19:21	1.65
1,1,2-Trichloroethane	ND		0.0026	0.00050	ppm v/v			11/12/22 19:21	1.65
Trichloroethene	0.11		0.0013	0.00043	ppm v/v			11/12/22 19:21	1.65
Trichlorofluoromethane	0.029		0.0026	0.00036	ppm v/v			11/12/22 19:21	1.65
1,2,4-Trimethylbenzene	ND		0.0026	0.00066	ppm v/v			11/12/22 19:21	1.65
1,3,5-Trimethylbenzene	ND		0.0053	0.0021	ppm v/v			11/12/22 19:21	1.65
Vinyl acetate	ND		0.013	0.00092	ppm v/v			11/12/22 19:21	1.65
Vinyl chloride	ND	*+	0.0013	0.00086	ppm v/v			11/12/22 19:21	1.65
m,p-Xylene	ND		0.0026	0.00096	ppm v/v			11/12/22 19:21	1.65
o-Xylene	ND		0.0026	0.00050	ppm v/v			11/12/22 19:21	1.65
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	83		60 - 140					11/12/22 19:21	1.65

Client Sample ID: 118913-001/MWL-SV03-200

Lab Sample ID: 140-29549-8

Date Collected: 10/28/22 08:50

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.066	0.019	ppm v/v			11/12/22 20:11	1.65
Benzene	ND		0.0026	0.00043	ppm v/v			11/12/22 20:11	1.65
Benzyl chloride	ND		0.0053	0.0013	ppm v/v			11/12/22 20:11	1.65
Bromodichloromethane	ND		0.0026	0.00059	ppm v/v			11/12/22 20:11	1.65
Bromoform	ND		0.0026	0.00089	ppm v/v			11/12/22 20:11	1.65
Bromomethane	ND	*+	0.0026	0.00073	ppm v/v			11/12/22 20:11	1.65
2-Butanone (MEK)	ND		0.013	0.0024	ppm v/v			11/12/22 20:11	1.65
Carbon disulfide	ND		0.0066	0.0012	ppm v/v			11/12/22 20:11	1.65
Carbon tetrachloride	ND		0.0026	0.00043	ppm v/v			11/12/22 20:11	1.65
Chlorobenzene	ND		0.0026	0.00073	ppm v/v			11/12/22 20:11	1.65

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118913-001/MWL-SV03-200

Lab Sample ID: 140-29549-8

Date Collected: 10/28/22 08:50

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	*+	0.0026	0.0011	ppm v/v			11/12/22 20:11	1.65
Chloroform	0.0019	J	0.0026	0.00046	ppm v/v			11/12/22 20:11	1.65
Chloromethane	ND	*+	0.0066	0.0022	ppm v/v			11/12/22 20:11	1.65
Dibromochloromethane	ND		0.0026	0.00046	ppm v/v			11/12/22 20:11	1.65
1,2-Dibromoethane (EDB)	ND		0.0026	0.00040	ppm v/v			11/12/22 20:11	1.65
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0026	0.00040	ppm v/v			11/12/22 20:11	1.65
1,2-Dichlorobenzene	ND		0.0026	0.0010	ppm v/v			11/12/22 20:11	1.65
1,3-Dichlorobenzene	ND		0.0026	0.00053	ppm v/v			11/12/22 20:11	1.65
1,4-Dichlorobenzene	ND		0.0026	0.00053	ppm v/v			11/12/22 20:11	1.65
Dichlorodifluoromethane	0.035		0.0026	0.00046	ppm v/v			11/12/22 20:11	1.65
1,1-Dichloroethane	0.0042		0.0026	0.00036	ppm v/v			11/12/22 20:11	1.65
1,2-Dichloroethane	ND		0.0026	0.00033	ppm v/v			11/12/22 20:11	1.65
1,1-Dichloroethene	0.012		0.0026	0.00043	ppm v/v			11/12/22 20:11	1.65
cis-1,2-Dichloroethene	0.0020	J	0.0026	0.00033	ppm v/v			11/12/22 20:11	1.65
trans-1,2-Dichloroethene	ND		0.0026	0.00043	ppm v/v			11/12/22 20:11	1.65
1,2-Dichloropropane	ND		0.0026	0.00033	ppm v/v			11/12/22 20:11	1.65
cis-1,3-Dichloropropene	ND		0.0026	0.00063	ppm v/v			11/12/22 20:11	1.65
trans-1,3-Dichloropropene	ND		0.0026	0.00066	ppm v/v			11/12/22 20:11	1.65
Ethylbenzene	ND		0.0026	0.00043	ppm v/v			11/12/22 20:11	1.65
4-Ethyltoluene	ND		0.0053	0.00069	ppm v/v			11/12/22 20:11	1.65
Hexachlorobutadiene	ND		0.013	0.0011	ppm v/v			11/12/22 20:11	1.65
2-Hexanone	ND		0.0066	0.0018	ppm v/v			11/12/22 20:11	1.65
4-Methyl-2-pentanone (MIBK)	ND		0.0066	0.0018	ppm v/v			11/12/22 20:11	1.65
Methylene Chloride	ND		0.013	0.0046	ppm v/v			11/12/22 20:11	1.65
Styrene	ND		0.0026	0.00079	ppm v/v			11/12/22 20:11	1.65
1,1,2,2-Tetrachloroethane	ND		0.0026	0.00046	ppm v/v			11/12/22 20:11	1.65
Tetrachloroethene	0.15		0.0026	0.00040	ppm v/v			11/12/22 20:11	1.65
Toluene	ND		0.0040	0.00076	ppm v/v			11/12/22 20:11	1.65
1,1,2-Trichloro-1,2,2-trifluoroethane	0.085		0.0026	0.00033	ppm v/v			11/12/22 20:11	1.65
1,2,4-Trichlorobenzene	ND		0.013	0.0012	ppm v/v			11/12/22 20:11	1.65
1,1,1-Trichloroethane	0.0014	J	0.0026	0.00096	ppm v/v			11/12/22 20:11	1.65
1,1,2-Trichloroethane	ND		0.0026	0.00050	ppm v/v			11/12/22 20:11	1.65
Trichloroethene	0.14		0.0013	0.00043	ppm v/v			11/12/22 20:11	1.65
Trichlorofluoromethane	0.029		0.0026	0.00036	ppm v/v			11/12/22 20:11	1.65
1,2,4-Trimethylbenzene	ND		0.0026	0.00066	ppm v/v			11/12/22 20:11	1.65
1,3,5-Trimethylbenzene	ND		0.0053	0.0021	ppm v/v			11/12/22 20:11	1.65
Vinyl acetate	ND		0.013	0.00092	ppm v/v			11/12/22 20:11	1.65
Vinyl chloride	ND	*+	0.0013	0.00086	ppm v/v			11/12/22 20:11	1.65
m,p-Xylene	ND		0.0026	0.00096	ppm v/v			11/12/22 20:11	1.65
o-Xylene	ND		0.0026	0.00050	ppm v/v			11/12/22 20:11	1.65

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	80		60 - 140		11/12/22 20:11	1.65

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118914-001/MWL-SV03-300

Lab Sample ID: 140-29549-9

Date Collected: 10/28/22 08:56

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.062	0.018	ppm v/v			11/12/22 21:00	1.56
Benzene	ND		0.0025	0.00041	ppm v/v			11/12/22 21:00	1.56
Benzyl chloride	ND		0.0050	0.0012	ppm v/v			11/12/22 21:00	1.56
Bromodichloromethane	ND		0.0025	0.00056	ppm v/v			11/12/22 21:00	1.56
Bromoform	ND		0.0025	0.00084	ppm v/v			11/12/22 21:00	1.56
Bromomethane	ND	*+	0.0025	0.00069	ppm v/v			11/12/22 21:00	1.56
2-Butanone (MEK)	ND		0.012	0.0023	ppm v/v			11/12/22 21:00	1.56
Carbon disulfide	ND		0.0062	0.0011	ppm v/v			11/12/22 21:00	1.56
Carbon tetrachloride	ND		0.0025	0.00041	ppm v/v			11/12/22 21:00	1.56
Chlorobenzene	ND		0.0025	0.00069	ppm v/v			11/12/22 21:00	1.56
Chloroethane	ND	*+	0.0025	0.0010	ppm v/v			11/12/22 21:00	1.56
Chloroform	0.0011	J	0.0025	0.00044	ppm v/v			11/12/22 21:00	1.56
Chloromethane	ND	*+	0.0062	0.0021	ppm v/v			11/12/22 21:00	1.56
Dibromochloromethane	ND		0.0025	0.00044	ppm v/v			11/12/22 21:00	1.56
1,2-Dibromoethane (EDB)	ND		0.0025	0.00037	ppm v/v			11/12/22 21:00	1.56
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0025	0.00037	ppm v/v			11/12/22 21:00	1.56
1,2-Dichlorobenzene	ND		0.0025	0.00097	ppm v/v			11/12/22 21:00	1.56
1,3-Dichlorobenzene	ND		0.0025	0.00050	ppm v/v			11/12/22 21:00	1.56
1,4-Dichlorobenzene	ND		0.0025	0.00050	ppm v/v			11/12/22 21:00	1.56
Dichlorodifluoromethane	0.037		0.0025	0.00044	ppm v/v			11/12/22 21:00	1.56
1,1-Dichloroethane	0.0018	J	0.0025	0.00034	ppm v/v			11/12/22 21:00	1.56
1,2-Dichloroethane	ND		0.0025	0.00031	ppm v/v			11/12/22 21:00	1.56
1,1-Dichloroethene	0.010		0.0025	0.00041	ppm v/v			11/12/22 21:00	1.56
cis-1,2-Dichloroethene	0.00075	J	0.0025	0.00031	ppm v/v			11/12/22 21:00	1.56
trans-1,2-Dichloroethene	ND		0.0025	0.00041	ppm v/v			11/12/22 21:00	1.56
1,2-Dichloropropane	ND		0.0025	0.00031	ppm v/v			11/12/22 21:00	1.56
cis-1,3-Dichloropropene	ND		0.0025	0.00059	ppm v/v			11/12/22 21:00	1.56
trans-1,3-Dichloropropene	ND		0.0025	0.00062	ppm v/v			11/12/22 21:00	1.56
Ethylbenzene	ND		0.0025	0.00041	ppm v/v			11/12/22 21:00	1.56
4-Ethyltoluene	ND		0.0050	0.00066	ppm v/v			11/12/22 21:00	1.56
Hexachlorobutadiene	ND		0.012	0.0010	ppm v/v			11/12/22 21:00	1.56
2-Hexanone	ND		0.0062	0.0017	ppm v/v			11/12/22 21:00	1.56
4-Methyl-2-pentanone (MIBK)	ND		0.0062	0.0017	ppm v/v			11/12/22 21:00	1.56
Methylene Chloride	ND		0.012	0.0044	ppm v/v			11/12/22 21:00	1.56
Styrene	ND		0.0025	0.00075	ppm v/v			11/12/22 21:00	1.56
1,1,2,2-Tetrachloroethane	ND		0.0025	0.00044	ppm v/v			11/12/22 21:00	1.56
Tetrachloroethene	0.21		0.0025	0.00037	ppm v/v			11/12/22 21:00	1.56
Toluene	ND		0.0037	0.00072	ppm v/v			11/12/22 21:00	1.56
1,1,2-Trichloro-1,2,2-trifluoroethane	0.093		0.0025	0.00031	ppm v/v			11/12/22 21:00	1.56
1,2,4-Trichlorobenzene	ND		0.012	0.0011	ppm v/v			11/12/22 21:00	1.56
1,1,1-Trichloroethane	ND		0.0025	0.00090	ppm v/v			11/12/22 21:00	1.56
1,1,2-Trichloroethane	ND		0.0025	0.00047	ppm v/v			11/12/22 21:00	1.56
Trichloroethene	0.13		0.0012	0.00041	ppm v/v			11/12/22 21:00	1.56
Trichlorofluoromethane	0.019		0.0025	0.00034	ppm v/v			11/12/22 21:00	1.56
1,2,4-Trimethylbenzene	ND		0.0025	0.00062	ppm v/v			11/12/22 21:00	1.56
1,3,5-Trimethylbenzene	ND		0.0050	0.0020	ppm v/v			11/12/22 21:00	1.56
Vinyl acetate	ND		0.012	0.00087	ppm v/v			11/12/22 21:00	1.56
Vinyl chloride	ND	*+	0.0012	0.00081	ppm v/v			11/12/22 21:00	1.56

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMP

Job ID: 140-29549-1

Client Sample ID: 118914-001/MWL-SV03-300

Lab Sample ID: 140-29549-9

Date Collected: 10/28/22 08:56

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.0025	0.00090	ppm v/v			11/12/22 21:00	1.56
o-Xylene	ND		0.0025	0.00047	ppm v/v			11/12/22 21:00	1.56
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		60 - 140					11/12/22 21:00	1.56

Client Sample ID: 118915-001/MWL-SV03-400

Lab Sample ID: 140-29549-10

Date Collected: 10/28/22 09:19

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.064	0.018	ppm v/v			11/12/22 21:50	1.6
Benzene	ND		0.0026	0.00042	ppm v/v			11/12/22 21:50	1.6
Benzyl chloride	ND		0.0051	0.0012	ppm v/v			11/12/22 21:50	1.6
Bromodichloromethane	ND		0.0026	0.00058	ppm v/v			11/12/22 21:50	1.6
Bromoform	ND		0.0026	0.00086	ppm v/v			11/12/22 21:50	1.6
Bromomethane	ND	*+	0.0026	0.00070	ppm v/v			11/12/22 21:50	1.6
2-Butanone (MEK)	ND		0.013	0.0023	ppm v/v			11/12/22 21:50	1.6
Carbon disulfide	0.0057	J	0.0064	0.0011	ppm v/v			11/12/22 21:50	1.6
Carbon tetrachloride	ND		0.0026	0.00042	ppm v/v			11/12/22 21:50	1.6
Chlorobenzene	ND		0.0026	0.00070	ppm v/v			11/12/22 21:50	1.6
Chloroethane	ND	*+	0.0026	0.0010	ppm v/v			11/12/22 21:50	1.6
Chloroform	0.0016	J	0.0026	0.00045	ppm v/v			11/12/22 21:50	1.6
Chloromethane	ND	*+	0.0064	0.0021	ppm v/v			11/12/22 21:50	1.6
Dibromochloromethane	ND		0.0026	0.00045	ppm v/v			11/12/22 21:50	1.6
1,2-Dibromoethane (EDB)	ND		0.0026	0.00038	ppm v/v			11/12/22 21:50	1.6
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0026	0.00038	ppm v/v			11/12/22 21:50	1.6
1,2-Dichlorobenzene	ND		0.0026	0.00099	ppm v/v			11/12/22 21:50	1.6
1,3-Dichlorobenzene	ND		0.0026	0.00051	ppm v/v			11/12/22 21:50	1.6
1,4-Dichlorobenzene	ND		0.0026	0.00051	ppm v/v			11/12/22 21:50	1.6
Dichlorodifluoromethane	0.022		0.0026	0.00045	ppm v/v			11/12/22 21:50	1.6
1,1-Dichloroethane	0.0022	J	0.0026	0.00035	ppm v/v			11/12/22 21:50	1.6
1,2-Dichloroethane	ND		0.0026	0.00032	ppm v/v			11/12/22 21:50	1.6
1,1-Dichloroethene	0.0097		0.0026	0.00042	ppm v/v			11/12/22 21:50	1.6
cis-1,2-Dichloroethene	0.0014	J	0.0026	0.00032	ppm v/v			11/12/22 21:50	1.6
trans-1,2-Dichloroethene	ND		0.0026	0.00042	ppm v/v			11/12/22 21:50	1.6
1,2-Dichloropropane	ND		0.0026	0.00032	ppm v/v			11/12/22 21:50	1.6
cis-1,3-Dichloropropene	ND		0.0026	0.00061	ppm v/v			11/12/22 21:50	1.6
trans-1,3-Dichloropropene	ND		0.0026	0.00064	ppm v/v			11/12/22 21:50	1.6
Ethylbenzene	ND		0.0026	0.00042	ppm v/v			11/12/22 21:50	1.6
4-Ethyltoluene	ND		0.0051	0.00067	ppm v/v			11/12/22 21:50	1.6
Hexachlorobutadiene	ND		0.013	0.0010	ppm v/v			11/12/22 21:50	1.6
2-Hexanone	ND		0.0064	0.0017	ppm v/v			11/12/22 21:50	1.6
4-Methyl-2-pentanone (MIBK)	ND		0.0064	0.0017	ppm v/v			11/12/22 21:50	1.6
Methylene Chloride	ND		0.013	0.0045	ppm v/v			11/12/22 21:50	1.6
Styrene	ND		0.0026	0.00077	ppm v/v			11/12/22 21:50	1.6
1,1,2,2-Tetrachloroethane	ND		0.0026	0.00045	ppm v/v			11/12/22 21:50	1.6

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118915-001/MWL-SV03-400

Lab Sample ID: 140-29549-10

Date Collected: 10/28/22 09:19

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.30		0.0026	0.00038	ppm v/v			11/12/22 21:50	1.6
Toluene	ND		0.0038	0.00074	ppm v/v			11/12/22 21:50	1.6
1,1,2-Trichloro-1,2,2-trifluoroethane	0.055		0.0026	0.00032	ppm v/v			11/12/22 21:50	1.6
1,2,4-Trichlorobenzene	ND		0.013	0.0011	ppm v/v			11/12/22 21:50	1.6
1,1,1-Trichloroethane	ND		0.0026	0.00093	ppm v/v			11/12/22 21:50	1.6
1,1,2-Trichloroethane	ND		0.0026	0.00048	ppm v/v			11/12/22 21:50	1.6
Trichloroethene	0.19		0.0013	0.00042	ppm v/v			11/12/22 21:50	1.6
Trichlorofluoromethane	0.012		0.0026	0.00035	ppm v/v			11/12/22 21:50	1.6
1,2,4-Trimethylbenzene	ND		0.0026	0.00064	ppm v/v			11/12/22 21:50	1.6
1,3,5-Trimethylbenzene	ND		0.0051	0.0021	ppm v/v			11/12/22 21:50	1.6
Vinyl acetate	ND		0.013	0.00090	ppm v/v			11/12/22 21:50	1.6
Vinyl chloride	ND	+	0.0013	0.00083	ppm v/v			11/12/22 21:50	1.6
m,p-Xylene	ND		0.0026	0.00093	ppm v/v			11/12/22 21:50	1.6
o-Xylene	ND		0.0026	0.00048	ppm v/v			11/12/22 21:50	1.6
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		60 - 140					11/12/22 21:50	1.6

Client Sample ID: 118916-001/MWL-FB4

Lab Sample ID: 140-29549-11

Date Collected: 10/28/22 09:50

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.026		0.0021	0.00059	ppm v/v			11/14/22 20:53	1.67
Benzene	ND		0.000084	0.000014	ppm v/v			11/14/22 20:53	1.67
Benzyl chloride	ND		0.00017	0.000040	ppm v/v			11/14/22 20:53	1.67
Bromodichloromethane	ND		0.000084	0.000019	ppm v/v			11/14/22 20:53	1.67
Bromoform	ND		0.000084	0.000028	ppm v/v			11/14/22 20:53	1.67
Bromomethane	ND		0.000084	0.000023	ppm v/v			11/14/22 20:53	1.67
2-Butanone (MEK)	0.0025		0.00042	0.000076	ppm v/v			11/14/22 20:53	1.67
Carbon disulfide	ND		0.00021	0.000037	ppm v/v			11/14/22 20:53	1.67
Carbon tetrachloride	ND		0.000084	0.000014	ppm v/v			11/14/22 20:53	1.67
Chlorobenzene	ND		0.000084	0.000023	ppm v/v			11/14/22 20:53	1.67
Chloroethane	ND		0.000084	0.000033	ppm v/v			11/14/22 20:53	1.67
Chloroform	ND		0.000084	0.000015	ppm v/v			11/14/22 20:53	1.67
Chloromethane	ND		0.00021	0.000069	ppm v/v			11/14/22 20:53	1.67
Dibromochloromethane	ND		0.000084	0.000015	ppm v/v			11/14/22 20:53	1.67
1,2-Dibromoethane (EDB)	ND		0.000084	0.000013	ppm v/v			11/14/22 20:53	1.67
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000084	0.000013	ppm v/v			11/14/22 20:53	1.67
1,2-Dichlorobenzene	ND		0.000084	0.000032	ppm v/v			11/14/22 20:53	1.67
1,3-Dichlorobenzene	ND		0.000084	0.000017	ppm v/v			11/14/22 20:53	1.67
1,4-Dichlorobenzene	ND		0.000084	0.000017	ppm v/v			11/14/22 20:53	1.67
Dichlorodifluoromethane	ND		0.000084	0.000015	ppm v/v			11/14/22 20:53	1.67
1,1-Dichloroethane	ND		0.000084	0.000011	ppm v/v			11/14/22 20:53	1.67
1,2-Dichloroethane	ND		0.000084	0.000010	ppm v/v			11/14/22 20:53	1.67
1,1-Dichloroethene	ND		0.000084	0.000014	ppm v/v			11/14/22 20:53	1.67

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118916-001/MWL-FB4

Lab Sample ID: 140-29549-11

Date Collected: 10/28/22 09:50

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.000084	0.000010	ppm v/v			11/14/22 20:53	1.67
trans-1,2-Dichloroethene	ND		0.000084	0.000014	ppm v/v			11/14/22 20:53	1.67
1,2-Dichloropropane	ND		0.000084	0.000010	ppm v/v			11/14/22 20:53	1.67
cis-1,3-Dichloropropene	ND		0.000084	0.000020	ppm v/v			11/14/22 20:53	1.67
trans-1,3-Dichloropropene	ND		0.000084	0.000021	ppm v/v			11/14/22 20:53	1.67
Ethylbenzene	ND		0.000084	0.000014	ppm v/v			11/14/22 20:53	1.67
4-Ethyltoluene	ND		0.00017	0.000022	ppm v/v			11/14/22 20:53	1.67
Hexachlorobutadiene	ND		0.00042	0.000033	ppm v/v			11/14/22 20:53	1.67
2-Hexanone	0.00025		0.00021	0.000056	ppm v/v			11/14/22 20:53	1.67
4-Methyl-2-pentanone (MIBK)	0.00011	J	0.00021	0.000056	ppm v/v			11/14/22 20:53	1.67
Methylene Chloride	0.00043		0.00042	0.00015	ppm v/v			11/14/22 20:53	1.67
Styrene	ND		0.000084	0.000025	ppm v/v			11/14/22 20:53	1.67
1,1,2,2-Tetrachloroethane	ND		0.000084	0.000015	ppm v/v			11/14/22 20:53	1.67
Tetrachloroethene	ND		0.000084	0.000013	ppm v/v			11/14/22 20:53	1.67
Toluene	0.000045	J	0.00013	0.000024	ppm v/v			11/14/22 20:53	1.67
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000084	0.000010	ppm v/v			11/14/22 20:53	1.67
1,2,4-Trichlorobenzene	ND		0.00042	0.000037	ppm v/v			11/14/22 20:53	1.67
1,1,1-Trichloroethane	ND		0.000084	0.000030	ppm v/v			11/14/22 20:53	1.67
1,1,2-Trichloroethane	ND		0.000084	0.000016	ppm v/v			11/14/22 20:53	1.67
Trichloroethene	ND		0.000042	0.000014	ppm v/v			11/14/22 20:53	1.67
Trichlorofluoromethane	ND		0.000084	0.000011	ppm v/v			11/14/22 20:53	1.67
1,2,4-Trimethylbenzene	ND		0.000084	0.000021	ppm v/v			11/14/22 20:53	1.67
1,3,5-Trimethylbenzene	ND		0.00017	0.000068	ppm v/v			11/14/22 20:53	1.67
Vinyl acetate	ND		0.00042	0.000029	ppm v/v			11/14/22 20:53	1.67
Vinyl chloride	ND		0.000042	0.000027	ppm v/v			11/14/22 20:53	1.67
m,p-Xylene	ND		0.000084	0.000030	ppm v/v			11/14/22 20:53	1.67
o-Xylene	ND		0.000084	0.000016	ppm v/v			11/14/22 20:53	1.67
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140					11/14/22 20:53	1.67

Client Sample ID: 118917-001/MWL-SV04-50

Lab Sample ID: 140-29549-12

Date Collected: 10/28/22 10:08

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.0059	ppm v/v			11/14/22 23:54	1.66
Benzene	0.00028	J	0.00083	0.00013	ppm v/v			11/14/22 23:54	1.66
Benzyl chloride	ND		0.0017	0.00039	ppm v/v			11/14/22 23:54	1.66
Bromodichloromethane	ND		0.00083	0.00019	ppm v/v			11/14/22 23:54	1.66
Bromoform	ND		0.00083	0.00028	ppm v/v			11/14/22 23:54	1.66
Bromomethane	ND		0.00083	0.00023	ppm v/v			11/14/22 23:54	1.66
2-Butanone (MEK)	ND		0.0042	0.00076	ppm v/v			11/14/22 23:54	1.66
Carbon disulfide	ND		0.0021	0.00036	ppm v/v			11/14/22 23:54	1.66
Carbon tetrachloride	0.00022	J	0.00083	0.00013	ppm v/v			11/14/22 23:54	1.66
Chlorobenzene	ND		0.00083	0.00023	ppm v/v			11/14/22 23:54	1.66
Chloroethane	ND		0.00083	0.00033	ppm v/v			11/14/22 23:54	1.66

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118917-001/MWL-SV04-50

Lab Sample ID: 140-29549-12

Date Collected: 10/28/22 10:08

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.0017		0.00083	0.00015	ppm v/v			11/14/22 23:54	1.66
Chloromethane	ND		0.0021	0.00068	ppm v/v			11/14/22 23:54	1.66
Dibromochloromethane	ND		0.00083	0.00015	ppm v/v			11/14/22 23:54	1.66
1,2-Dibromoethane (EDB)	ND		0.00083	0.00012	ppm v/v			11/14/22 23:54	1.66
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.00083	0.00012	ppm v/v			11/14/22 23:54	1.66
1,2-Dichlorobenzene	ND		0.00083	0.00032	ppm v/v			11/14/22 23:54	1.66
1,3-Dichlorobenzene	ND		0.00083	0.00017	ppm v/v			11/14/22 23:54	1.66
1,4-Dichlorobenzene	ND		0.00083	0.00017	ppm v/v			11/14/22 23:54	1.66
Dichlorodifluoromethane	0.015		0.00083	0.00015	ppm v/v			11/14/22 23:54	1.66
1,1-Dichloroethane	0.0011		0.00083	0.00011	ppm v/v			11/14/22 23:54	1.66
1,2-Dichloroethane	ND		0.00083	0.00010	ppm v/v			11/14/22 23:54	1.66
1,1-Dichloroethene	0.0038		0.00083	0.00013	ppm v/v			11/14/22 23:54	1.66
cis-1,2-Dichloroethene	0.00032	J	0.00083	0.00010	ppm v/v			11/14/22 23:54	1.66
trans-1,2-Dichloroethene	ND		0.00083	0.00013	ppm v/v			11/14/22 23:54	1.66
1,2-Dichloropropane	ND		0.00083	0.00010	ppm v/v			11/14/22 23:54	1.66
cis-1,3-Dichloropropene	ND		0.00083	0.00020	ppm v/v			11/14/22 23:54	1.66
trans-1,3-Dichloropropene	ND		0.00083	0.00021	ppm v/v			11/14/22 23:54	1.66
Ethylbenzene	ND		0.00083	0.00013	ppm v/v			11/14/22 23:54	1.66
4-Ethyltoluene	ND		0.0017	0.00022	ppm v/v			11/14/22 23:54	1.66
Hexachlorobutadiene	ND		0.0042	0.00033	ppm v/v			11/14/22 23:54	1.66
2-Hexanone	ND		0.0021	0.00056	ppm v/v			11/14/22 23:54	1.66
4-Methyl-2-pentanone (MIBK)	ND		0.0021	0.00056	ppm v/v			11/14/22 23:54	1.66
Methylene Chloride	ND		0.0042	0.0015	ppm v/v			11/14/22 23:54	1.66
Styrene	ND		0.00083	0.00025	ppm v/v			11/14/22 23:54	1.66
1,1,2,2-Tetrachloroethane	ND		0.00083	0.00015	ppm v/v			11/14/22 23:54	1.66
Tetrachloroethene	0.054		0.00083	0.00012	ppm v/v			11/14/22 23:54	1.66
Toluene	ND		0.0012	0.00024	ppm v/v			11/14/22 23:54	1.66
1,1,2-Trichloro-1,2,2-trifluoroethane	0.037		0.00083	0.00010	ppm v/v			11/14/22 23:54	1.66
1,2,4-Trichlorobenzene	ND		0.0042	0.00036	ppm v/v			11/14/22 23:54	1.66
1,1,1-Trichloroethane	0.0064		0.00083	0.00030	ppm v/v			11/14/22 23:54	1.66
1,1,2-Trichloroethane	ND		0.00083	0.00016	ppm v/v			11/14/22 23:54	1.66
Trichloroethene	0.046		0.00042	0.00013	ppm v/v			11/14/22 23:54	1.66
Trichlorofluoromethane	0.025		0.00083	0.00011	ppm v/v			11/14/22 23:54	1.66
1,2,4-Trimethylbenzene	ND		0.00083	0.00021	ppm v/v			11/14/22 23:54	1.66
1,3,5-Trimethylbenzene	ND		0.0017	0.00067	ppm v/v			11/14/22 23:54	1.66
Vinyl acetate	ND		0.0042	0.00029	ppm v/v			11/14/22 23:54	1.66
Vinyl chloride	ND		0.00042	0.00027	ppm v/v			11/14/22 23:54	1.66
m,p-Xylene	ND		0.00083	0.00030	ppm v/v			11/14/22 23:54	1.66
o-Xylene	ND		0.00083	0.00016	ppm v/v			11/14/22 23:54	1.66

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140		11/14/22 23:54	1.66

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118918-001/MWL-SV04-100

Lab Sample ID: 140-29549-13

Date Collected: 10/28/22 10:15

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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			11/15/22 00:37	1.71
Benzene	ND		0.0014	0.00022	ppm v/v			11/15/22 00:37	1.71
Benzyl chloride	ND		0.0027	0.00065	ppm v/v			11/15/22 00:37	1.71
Bromodichloromethane	ND		0.0014	0.00031	ppm v/v			11/15/22 00:37	1.71
Bromoform	ND		0.0014	0.00046	ppm v/v			11/15/22 00:37	1.71
Bromomethane	ND		0.0014	0.00038	ppm v/v			11/15/22 00:37	1.71
2-Butanone (MEK)	ND		0.0068	0.0012	ppm v/v			11/15/22 00:37	1.71
Carbon disulfide	0.0020	J	0.0034	0.00060	ppm v/v			11/15/22 00:37	1.71
Carbon tetrachloride	0.00033	J	0.0014	0.00022	ppm v/v			11/15/22 00:37	1.71
Chlorobenzene	ND		0.0014	0.00038	ppm v/v			11/15/22 00:37	1.71
Chloroethane	ND		0.0014	0.00055	ppm v/v			11/15/22 00:37	1.71
Chloroform	0.0020		0.0014	0.00024	ppm v/v			11/15/22 00:37	1.71
Chloromethane	ND		0.0034	0.0011	ppm v/v			11/15/22 00:37	1.71
Dibromochloromethane	ND		0.0014	0.00024	ppm v/v			11/15/22 00:37	1.71
1,2-Dibromoethane (EDB)	ND		0.0014	0.00021	ppm v/v			11/15/22 00:37	1.71
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00021	ppm v/v			11/15/22 00:37	1.71
1,2-Dichlorobenzene	ND		0.0014	0.00053	ppm v/v			11/15/22 00:37	1.71
1,3-Dichlorobenzene	ND		0.0014	0.00027	ppm v/v			11/15/22 00:37	1.71
1,4-Dichlorobenzene	ND		0.0014	0.00027	ppm v/v			11/15/22 00:37	1.71
Dichlorodifluoromethane	0.029		0.0014	0.00024	ppm v/v			11/15/22 00:37	1.71
1,1-Dichloroethane	0.0026		0.0014	0.00019	ppm v/v			11/15/22 00:37	1.71
1,2-Dichloroethane	ND		0.0014	0.00017	ppm v/v			11/15/22 00:37	1.71
1,1-Dichloroethene	0.0099		0.0014	0.00022	ppm v/v			11/15/22 00:37	1.71
cis-1,2-Dichloroethene	0.0011	J	0.0014	0.00017	ppm v/v			11/15/22 00:37	1.71
trans-1,2-Dichloroethene	ND		0.0014	0.00022	ppm v/v			11/15/22 00:37	1.71
1,2-Dichloropropane	ND		0.0014	0.00017	ppm v/v			11/15/22 00:37	1.71
cis-1,3-Dichloropropene	ND		0.0014	0.00032	ppm v/v			11/15/22 00:37	1.71
trans-1,3-Dichloropropene	ND		0.0014	0.00034	ppm v/v			11/15/22 00:37	1.71
Ethylbenzene	ND		0.0014	0.00022	ppm v/v			11/15/22 00:37	1.71
4-Ethyltoluene	ND		0.0027	0.00036	ppm v/v			11/15/22 00:37	1.71
Hexachlorobutadiene	ND		0.0068	0.00055	ppm v/v			11/15/22 00:37	1.71
2-Hexanone	ND		0.0034	0.00092	ppm v/v			11/15/22 00:37	1.71
4-Methyl-2-pentanone (MIBK)	ND		0.0034	0.00092	ppm v/v			11/15/22 00:37	1.71
Methylene Chloride	ND		0.0068	0.0024	ppm v/v			11/15/22 00:37	1.71
Styrene	ND		0.0014	0.00041	ppm v/v			11/15/22 00:37	1.71
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00024	ppm v/v			11/15/22 00:37	1.71
Tetrachloroethene	0.096		0.0014	0.00021	ppm v/v			11/15/22 00:37	1.71
Toluene	ND		0.0021	0.00039	ppm v/v			11/15/22 00:37	1.71
1,1,2-Trichloro-1,2,2-trifluoroethane	0.067		0.0014	0.00017	ppm v/v			11/15/22 00:37	1.71
1,2,4-Trichlorobenzene	ND		0.0068	0.00060	ppm v/v			11/15/22 00:37	1.71
1,1,1-Trichloroethane	0.0053		0.0014	0.00050	ppm v/v			11/15/22 00:37	1.71
1,1,2-Trichloroethane	ND		0.0014	0.00026	ppm v/v			11/15/22 00:37	1.71
Trichloroethene	0.094		0.00068	0.00022	ppm v/v			11/15/22 00:37	1.71
Trichlorofluoromethane	0.040		0.0014	0.00019	ppm v/v			11/15/22 00:37	1.71
1,2,4-Trimethylbenzene	ND		0.0014	0.00034	ppm v/v			11/15/22 00:37	1.71
1,3,5-Trimethylbenzene	ND		0.0027	0.0011	ppm v/v			11/15/22 00:37	1.71
Vinyl acetate	ND		0.0068	0.00048	ppm v/v			11/15/22 00:37	1.71
Vinyl chloride	ND		0.00068	0.00044	ppm v/v			11/15/22 00:37	1.71

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMP

Job ID: 140-29549-1

Client Sample ID: 118918-001/MWL-SV04-100

Lab Sample ID: 140-29549-13

Date Collected: 10/28/22 10:15

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.0014	0.00050	ppm v/v			11/15/22 00:37	1.71
o-Xylene	ND		0.0014	0.00026	ppm v/v			11/15/22 00:37	1.71
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		60 - 140					11/15/22 00:37	1.71

Client Sample ID: 118919-001/MWL-SV04-200

Lab Sample ID: 140-29549-14

Date Collected: 10/28/22 10:25

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.010	J	0.033	0.0095	ppm v/v			11/15/22 01:19	1.66
Benzene	0.00033	J	0.0013	0.00022	ppm v/v			11/15/22 01:19	1.66
Benzyl chloride	ND		0.0027	0.00063	ppm v/v			11/15/22 01:19	1.66
Bromodichloromethane	ND		0.0013	0.00030	ppm v/v			11/15/22 01:19	1.66
Bromoform	ND		0.0013	0.00045	ppm v/v			11/15/22 01:19	1.66
Bromomethane	ND		0.0013	0.00037	ppm v/v			11/15/22 01:19	1.66
2-Butanone (MEK)	ND		0.0066	0.0012	ppm v/v			11/15/22 01:19	1.66
Carbon disulfide	ND		0.0033	0.00058	ppm v/v			11/15/22 01:19	1.66
Carbon tetrachloride	0.00052	J	0.0013	0.00022	ppm v/v			11/15/22 01:19	1.66
Chlorobenzene	ND		0.0013	0.00037	ppm v/v			11/15/22 01:19	1.66
Chloroethane	ND		0.0013	0.00053	ppm v/v			11/15/22 01:19	1.66
Chloroform	0.0016		0.0013	0.00023	ppm v/v			11/15/22 01:19	1.66
Chloromethane	ND		0.0033	0.0011	ppm v/v			11/15/22 01:19	1.66
Dibromochloromethane	ND		0.0013	0.00023	ppm v/v			11/15/22 01:19	1.66
1,2-Dibromoethane (EDB)	ND		0.0013	0.00020	ppm v/v			11/15/22 01:19	1.66
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0013	0.00020	ppm v/v			11/15/22 01:19	1.66
1,2-Dichlorobenzene	ND		0.0013	0.00051	ppm v/v			11/15/22 01:19	1.66
1,3-Dichlorobenzene	ND		0.0013	0.00027	ppm v/v			11/15/22 01:19	1.66
1,4-Dichlorobenzene	ND		0.0013	0.00027	ppm v/v			11/15/22 01:19	1.66
Dichlorodifluoromethane	0.043		0.0013	0.00023	ppm v/v			11/15/22 01:19	1.66
1,1-Dichloroethane	0.0045		0.0013	0.00018	ppm v/v			11/15/22 01:19	1.66
1,2-Dichloroethane	ND		0.0013	0.00017	ppm v/v			11/15/22 01:19	1.66
1,1-Dichloroethene	0.019		0.0013	0.00022	ppm v/v			11/15/22 01:19	1.66
cis-1,2-Dichloroethene	0.0024		0.0013	0.00017	ppm v/v			11/15/22 01:19	1.66
trans-1,2-Dichloroethene	ND		0.0013	0.00022	ppm v/v			11/15/22 01:19	1.66
1,2-Dichloropropane	ND		0.0013	0.00017	ppm v/v			11/15/22 01:19	1.66
cis-1,3-Dichloropropene	ND		0.0013	0.00032	ppm v/v			11/15/22 01:19	1.66
trans-1,3-Dichloropropene	ND		0.0013	0.00033	ppm v/v			11/15/22 01:19	1.66
Ethylbenzene	ND		0.0013	0.00022	ppm v/v			11/15/22 01:19	1.66
4-Ethyltoluene	ND		0.0027	0.00035	ppm v/v			11/15/22 01:19	1.66
Hexachlorobutadiene	ND		0.0066	0.00053	ppm v/v			11/15/22 01:19	1.66
2-Hexanone	ND		0.0033	0.00090	ppm v/v			11/15/22 01:19	1.66
4-Methyl-2-pentanone (MIBK)	ND		0.0033	0.00090	ppm v/v			11/15/22 01:19	1.66
Methylene Chloride	ND		0.0066	0.0023	ppm v/v			11/15/22 01:19	1.66
Styrene	ND		0.0013	0.00040	ppm v/v			11/15/22 01:19	1.66
1,1,2,2-Tetrachloroethane	ND		0.0013	0.00023	ppm v/v			11/15/22 01:19	1.66

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118919-001/MWL-SV04-200

Lab Sample ID: 140-29549-14

Date Collected: 10/28/22 10:25

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.12		0.0013	0.00020	ppm v/v			11/15/22 01:19	1.66
Toluene	ND		0.0020	0.00038	ppm v/v			11/15/22 01:19	1.66
1,1,2-Trichloro-1,2,2-trifluoroethane	0.11		0.0013	0.00017	ppm v/v			11/15/22 01:19	1.66
1,2,4-Trichlorobenzene	ND		0.0066	0.00058	ppm v/v			11/15/22 01:19	1.66
1,1,1-Trichloroethane	0.0018		0.0013	0.00048	ppm v/v			11/15/22 01:19	1.66
1,1,2-Trichloroethane	ND		0.0013	0.00025	ppm v/v			11/15/22 01:19	1.66
Trichloroethene	0.15		0.00066	0.00022	ppm v/v			11/15/22 01:19	1.66
Trichlorofluoromethane	0.042		0.0013	0.00018	ppm v/v			11/15/22 01:19	1.66
1,2,4-Trimethylbenzene	ND		0.0013	0.00033	ppm v/v			11/15/22 01:19	1.66
1,3,5-Trimethylbenzene	ND		0.0027	0.0011	ppm v/v			11/15/22 01:19	1.66
Vinyl acetate	ND		0.0066	0.00046	ppm v/v			11/15/22 01:19	1.66
Vinyl chloride	ND		0.00066	0.00043	ppm v/v			11/15/22 01:19	1.66
m,p-Xylene	ND		0.0013	0.00048	ppm v/v			11/15/22 01:19	1.66
o-Xylene	ND		0.0013	0.00025	ppm v/v			11/15/22 01:19	1.66
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		60 - 140					11/15/22 01:19	1.66

Client Sample ID: 118920-001/MWL-SV04-300

Lab Sample ID: 140-29549-15

Date Collected: 10/28/22 10:32

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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			11/15/22 02:01	1.71
Benzene	0.00031	J	0.0014	0.00022	ppm v/v			11/15/22 02:01	1.71
Benzyl chloride	ND		0.0027	0.00065	ppm v/v			11/15/22 02:01	1.71
Bromodichloromethane	ND		0.0014	0.00031	ppm v/v			11/15/22 02:01	1.71
Bromoform	ND		0.0014	0.00046	ppm v/v			11/15/22 02:01	1.71
Bromomethane	ND		0.0014	0.00038	ppm v/v			11/15/22 02:01	1.71
2-Butanone (MEK)	ND		0.0068	0.0012	ppm v/v			11/15/22 02:01	1.71
Carbon disulfide	ND		0.0034	0.00060	ppm v/v			11/15/22 02:01	1.71
Carbon tetrachloride	0.00029	J	0.0014	0.00022	ppm v/v			11/15/22 02:01	1.71
Chlorobenzene	ND		0.0014	0.00038	ppm v/v			11/15/22 02:01	1.71
Chloroethane	ND		0.0014	0.00055	ppm v/v			11/15/22 02:01	1.71
Chloroform	0.00069	J	0.0014	0.00024	ppm v/v			11/15/22 02:01	1.71
Chloromethane	0.0028	J	0.0034	0.0011	ppm v/v			11/15/22 02:01	1.71
Dibromochloromethane	ND		0.0014	0.00024	ppm v/v			11/15/22 02:01	1.71
1,2-Dibromoethane (EDB)	ND		0.0014	0.00021	ppm v/v			11/15/22 02:01	1.71
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0014	0.00021	ppm v/v			11/15/22 02:01	1.71
1,2-Dichlorobenzene	ND		0.0014	0.00053	ppm v/v			11/15/22 02:01	1.71
1,3-Dichlorobenzene	ND		0.0014	0.00027	ppm v/v			11/15/22 02:01	1.71
1,4-Dichlorobenzene	ND		0.0014	0.00027	ppm v/v			11/15/22 02:01	1.71
Dichlorodifluoromethane	0.030		0.0014	0.00024	ppm v/v			11/15/22 02:01	1.71
1,1-Dichloroethane	0.00062	J	0.0014	0.00019	ppm v/v			11/15/22 02:01	1.71
1,2-Dichloroethane	ND		0.0014	0.00017	ppm v/v			11/15/22 02:01	1.71
1,1-Dichloroethene	0.0082		0.0014	0.00022	ppm v/v			11/15/22 02:01	1.71

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118920-001/MWL-SV04-300

Lab Sample ID: 140-29549-15

Date Collected: 10/28/22 10:32

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.00033	J	0.0014	0.00017	ppm v/v			11/15/22 02:01	1.71
trans-1,2-Dichloroethene	ND		0.0014	0.00022	ppm v/v			11/15/22 02:01	1.71
1,2-Dichloropropane	ND		0.0014	0.00017	ppm v/v			11/15/22 02:01	1.71
cis-1,3-Dichloropropene	ND		0.0014	0.00032	ppm v/v			11/15/22 02:01	1.71
trans-1,3-Dichloropropene	ND		0.0014	0.00034	ppm v/v			11/15/22 02:01	1.71
Ethylbenzene	ND		0.0014	0.00022	ppm v/v			11/15/22 02:01	1.71
4-Ethyltoluene	ND		0.0027	0.00036	ppm v/v			11/15/22 02:01	1.71
Hexachlorobutadiene	ND		0.0068	0.00055	ppm v/v			11/15/22 02:01	1.71
2-Hexanone	ND		0.0034	0.00092	ppm v/v			11/15/22 02:01	1.71
4-Methyl-2-pentanone (MIBK)	ND		0.0034	0.00092	ppm v/v			11/15/22 02:01	1.71
Methylene Chloride	ND		0.0068	0.0024	ppm v/v			11/15/22 02:01	1.71
Styrene	ND		0.0014	0.00041	ppm v/v			11/15/22 02:01	1.71
1,1,2,2-Tetrachloroethane	ND		0.0014	0.00024	ppm v/v			11/15/22 02:01	1.71
Tetrachloroethene	0.089		0.0014	0.00021	ppm v/v			11/15/22 02:01	1.71
Toluene	ND		0.0021	0.00039	ppm v/v			11/15/22 02:01	1.71
1,1,2-Trichloro-1,2,2-trifluoroethane	0.069		0.0014	0.00017	ppm v/v			11/15/22 02:01	1.71
1,2,4-Trichlorobenzene	ND		0.0068	0.00060	ppm v/v			11/15/22 02:01	1.71
1,1,1-Trichloroethane	0.00053	J	0.0014	0.00050	ppm v/v			11/15/22 02:01	1.71
1,1,2-Trichloroethane	ND		0.0014	0.00026	ppm v/v			11/15/22 02:01	1.71
Trichloroethene	0.056		0.00068	0.00022	ppm v/v			11/15/22 02:01	1.71
Trichlorofluoromethane	0.017		0.0014	0.00019	ppm v/v			11/15/22 02:01	1.71
1,2,4-Trimethylbenzene	ND		0.0014	0.00034	ppm v/v			11/15/22 02:01	1.71
1,3,5-Trimethylbenzene	ND		0.0027	0.0011	ppm v/v			11/15/22 02:01	1.71
Vinyl acetate	ND		0.0068	0.00048	ppm v/v			11/15/22 02:01	1.71
Vinyl chloride	ND		0.00068	0.00044	ppm v/v			11/15/22 02:01	1.71
m,p-Xylene	ND		0.0014	0.00050	ppm v/v			11/15/22 02:01	1.71
o-Xylene	ND		0.0014	0.00026	ppm v/v			11/15/22 02:01	1.71
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140					11/15/22 02:01	1.71

Client Sample ID: 118921-001/MWL-SV04-400

Lab Sample ID: 140-29549-16

Date Collected: 10/28/22 10:37

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.013	J	0.032	0.0092	ppm v/v			11/15/22 02:44	1.61
Benzene	0.00049	J	0.0013	0.00021	ppm v/v			11/15/22 02:44	1.61
Benzyl chloride	ND		0.0026	0.00061	ppm v/v			11/15/22 02:44	1.61
Bromodichloromethane	ND		0.0013	0.00029	ppm v/v			11/15/22 02:44	1.61
Bromoform	ND		0.0013	0.00043	ppm v/v			11/15/22 02:44	1.61
Bromomethane	ND		0.0013	0.00035	ppm v/v			11/15/22 02:44	1.61
2-Butanone (MEK)	ND		0.0064	0.0012	ppm v/v			11/15/22 02:44	1.61
Carbon disulfide	0.0012	J	0.0032	0.00056	ppm v/v			11/15/22 02:44	1.61
Carbon tetrachloride	ND		0.0013	0.00021	ppm v/v			11/15/22 02:44	1.61
Chlorobenzene	ND		0.0013	0.00035	ppm v/v			11/15/22 02:44	1.61

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118921-001/MWL-SV04-400

Lab Sample ID: 140-29549-16

Date Collected: 10/28/22 10:37

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.0013	0.00052	ppm v/v			11/15/22 02:44	1.61
Chloroform	0.00044	J	0.0013	0.00023	ppm v/v			11/15/22 02:44	1.61
Chloromethane	ND		0.0032	0.0011	ppm v/v			11/15/22 02:44	1.61
Dibromochloromethane	ND		0.0013	0.00023	ppm v/v			11/15/22 02:44	1.61
1,2-Dibromoethane (EDB)	ND		0.0013	0.00019	ppm v/v			11/15/22 02:44	1.61
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0013	0.00019	ppm v/v			11/15/22 02:44	1.61
1,2-Dichlorobenzene	ND		0.0013	0.00050	ppm v/v			11/15/22 02:44	1.61
1,3-Dichlorobenzene	ND		0.0013	0.00026	ppm v/v			11/15/22 02:44	1.61
1,4-Dichlorobenzene	ND		0.0013	0.00026	ppm v/v			11/15/22 02:44	1.61
Dichlorodifluoromethane	0.023		0.0013	0.00023	ppm v/v			11/15/22 02:44	1.61
1,1-Dichloroethane	0.00058	J	0.0013	0.00018	ppm v/v			11/15/22 02:44	1.61
1,2-Dichloroethane	ND		0.0013	0.00016	ppm v/v			11/15/22 02:44	1.61
1,1-Dichloroethene	0.0054		0.0013	0.00021	ppm v/v			11/15/22 02:44	1.61
cis-1,2-Dichloroethene	0.00034	J	0.0013	0.00016	ppm v/v			11/15/22 02:44	1.61
trans-1,2-Dichloroethene	ND		0.0013	0.00021	ppm v/v			11/15/22 02:44	1.61
1,2-Dichloropropane	ND		0.0013	0.00016	ppm v/v			11/15/22 02:44	1.61
cis-1,3-Dichloropropene	ND		0.0013	0.00031	ppm v/v			11/15/22 02:44	1.61
trans-1,3-Dichloropropene	ND		0.0013	0.00032	ppm v/v			11/15/22 02:44	1.61
Ethylbenzene	ND		0.0013	0.00021	ppm v/v			11/15/22 02:44	1.61
4-Ethyltoluene	ND		0.0026	0.00034	ppm v/v			11/15/22 02:44	1.61
Hexachlorobutadiene	ND		0.0064	0.00052	ppm v/v			11/15/22 02:44	1.61
2-Hexanone	ND		0.0032	0.00087	ppm v/v			11/15/22 02:44	1.61
4-Methyl-2-pentanone (MIBK)	ND		0.0032	0.00087	ppm v/v			11/15/22 02:44	1.61
Methylene Chloride	ND		0.0064	0.0023	ppm v/v			11/15/22 02:44	1.61
Styrene	ND		0.0013	0.00039	ppm v/v			11/15/22 02:44	1.61
1,1,2,2-Tetrachloroethane	ND		0.0013	0.00023	ppm v/v			11/15/22 02:44	1.61
Tetrachloroethene	0.080		0.0013	0.00019	ppm v/v			11/15/22 02:44	1.61
Toluene	ND		0.0019	0.00037	ppm v/v			11/15/22 02:44	1.61
1,1,2-Trichloro-1,2,2-trifluoroethane	0.059		0.0013	0.00016	ppm v/v			11/15/22 02:44	1.61
1,2,4-Trichlorobenzene	ND		0.0064	0.00056	ppm v/v			11/15/22 02:44	1.61
1,1,1-Trichloroethane	0.00047	J	0.0013	0.00047	ppm v/v			11/15/22 02:44	1.61
1,1,2-Trichloroethane	ND		0.0013	0.00024	ppm v/v			11/15/22 02:44	1.61
Trichloroethene	0.045		0.00064	0.00021	ppm v/v			11/15/22 02:44	1.61
Trichlorofluoromethane	0.014		0.0013	0.00018	ppm v/v			11/15/22 02:44	1.61
1,2,4-Trimethylbenzene	ND		0.0013	0.00032	ppm v/v			11/15/22 02:44	1.61
1,3,5-Trimethylbenzene	ND		0.0026	0.0010	ppm v/v			11/15/22 02:44	1.61
Vinyl acetate	ND		0.0064	0.00045	ppm v/v			11/15/22 02:44	1.61
Vinyl chloride	ND		0.00064	0.00042	ppm v/v			11/15/22 02:44	1.61
m,p-Xylene	ND		0.0013	0.00047	ppm v/v			11/15/22 02:44	1.61
o-Xylene	ND		0.0013	0.00024	ppm v/v			11/15/22 02:44	1.61

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		60 - 140		11/15/22 02:44	1.61

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118922-001/MWL-FB5

Lab Sample ID: 140-29549-17

Date Collected: 10/28/22 10:53

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.0031		0.0020	0.00058	ppm v/v			11/14/22 21:46	1.62
Benzene	ND		0.000081	0.000013	ppm v/v			11/14/22 21:46	1.62
Benzyl chloride	ND		0.00016	0.000038	ppm v/v			11/14/22 21:46	1.62
Bromodichloromethane	ND		0.000081	0.000018	ppm v/v			11/14/22 21:46	1.62
Bromoform	ND		0.000081	0.000027	ppm v/v			11/14/22 21:46	1.62
Bromomethane	ND		0.000081	0.000022	ppm v/v			11/14/22 21:46	1.62
2-Butanone (MEK)	0.00030	J	0.00041	0.000074	ppm v/v			11/14/22 21:46	1.62
Carbon disulfide	ND		0.00020	0.000035	ppm v/v			11/14/22 21:46	1.62
Carbon tetrachloride	ND		0.000081	0.000013	ppm v/v			11/14/22 21:46	1.62
Chlorobenzene	ND		0.000081	0.000022	ppm v/v			11/14/22 21:46	1.62
Chloroethane	ND		0.000081	0.000032	ppm v/v			11/14/22 21:46	1.62
Chloroform	ND		0.000081	0.000014	ppm v/v			11/14/22 21:46	1.62
Chloromethane	ND		0.00020	0.000067	ppm v/v			11/14/22 21:46	1.62
Dibromochloromethane	ND		0.000081	0.000014	ppm v/v			11/14/22 21:46	1.62
1,2-Dibromoethane (EDB)	ND		0.000081	0.000012	ppm v/v			11/14/22 21:46	1.62
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.000081	0.000012	ppm v/v			11/14/22 21:46	1.62
1,2-Dichlorobenzene	ND		0.000081	0.000031	ppm v/v			11/14/22 21:46	1.62
1,3-Dichlorobenzene	ND		0.000081	0.000016	ppm v/v			11/14/22 21:46	1.62
1,4-Dichlorobenzene	ND		0.000081	0.000016	ppm v/v			11/14/22 21:46	1.62
Dichlorodifluoromethane	ND		0.000081	0.000014	ppm v/v			11/14/22 21:46	1.62
1,1-Dichloroethane	ND		0.000081	0.000011	ppm v/v			11/14/22 21:46	1.62
1,2-Dichloroethane	ND		0.000081	0.000010	ppm v/v			11/14/22 21:46	1.62
1,1-Dichloroethene	ND		0.000081	0.000013	ppm v/v			11/14/22 21:46	1.62
cis-1,2-Dichloroethene	ND		0.000081	0.000010	ppm v/v			11/14/22 21:46	1.62
trans-1,2-Dichloroethene	ND		0.000081	0.000013	ppm v/v			11/14/22 21:46	1.62
1,2-Dichloropropane	ND		0.000081	0.000010	ppm v/v			11/14/22 21:46	1.62
cis-1,3-Dichloropropene	ND		0.000081	0.000019	ppm v/v			11/14/22 21:46	1.62
trans-1,3-Dichloropropene	ND		0.000081	0.000020	ppm v/v			11/14/22 21:46	1.62
Ethylbenzene	ND		0.000081	0.000013	ppm v/v			11/14/22 21:46	1.62
4-Ethyltoluene	ND		0.00016	0.000021	ppm v/v			11/14/22 21:46	1.62
Hexachlorobutadiene	ND		0.00041	0.000032	ppm v/v			11/14/22 21:46	1.62
2-Hexanone	ND		0.00020	0.000055	ppm v/v			11/14/22 21:46	1.62
4-Methyl-2-pentanone (MIBK)	ND		0.00020	0.000055	ppm v/v			11/14/22 21:46	1.62
Methylene Chloride	0.00046		0.00041	0.00014	ppm v/v			11/14/22 21:46	1.62
Styrene	ND		0.000081	0.000024	ppm v/v			11/14/22 21:46	1.62
1,1,2,2-Tetrachloroethane	ND		0.000081	0.000014	ppm v/v			11/14/22 21:46	1.62
Tetrachloroethene	ND		0.000081	0.000012	ppm v/v			11/14/22 21:46	1.62
Toluene	0.000027	J	0.00012	0.000023	ppm v/v			11/14/22 21:46	1.62
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.000081	0.000010	ppm v/v			11/14/22 21:46	1.62
1,2,4-Trichlorobenzene	ND		0.00041	0.000035	ppm v/v			11/14/22 21:46	1.62
1,1,1-Trichloroethane	ND		0.000081	0.000029	ppm v/v			11/14/22 21:46	1.62
1,1,2-Trichloroethane	ND		0.000081	0.000015	ppm v/v			11/14/22 21:46	1.62
Trichloroethene	ND		0.000041	0.000013	ppm v/v			11/14/22 21:46	1.62
Trichlorofluoromethane	ND		0.000081	0.000011	ppm v/v			11/14/22 21:46	1.62
1,2,4-Trimethylbenzene	ND		0.000081	0.000020	ppm v/v			11/14/22 21:46	1.62
1,3,5-Trimethylbenzene	ND		0.00016	0.000066	ppm v/v			11/14/22 21:46	1.62
Vinyl acetate	ND		0.00041	0.000028	ppm v/v			11/14/22 21:46	1.62
Vinyl chloride	ND		0.000041	0.000026	ppm v/v			11/14/22 21:46	1.62

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118922-001/MWL-FB5

Lab Sample ID: 140-29549-17

Date Collected: 10/28/22 10:53

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.000081	0.000029	ppm v/v			11/14/22 21:46	1.62
o-Xylene	ND		0.000081	0.000015	ppm v/v			11/14/22 21:46	1.62
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140					11/14/22 21:46	1.62

Client Sample ID: 118923-001/MWL-SV05-50

Lab Sample ID: 140-29549-18

Date Collected: 10/28/22 11:00

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.029	0.0083	ppm v/v			11/15/22 20:36	1.46
Benzene	ND		0.0012	0.00019	ppm v/v			11/15/22 20:36	1.46
Benzyl chloride	ND	*+	0.0023	0.00055	ppm v/v			11/15/22 20:36	1.46
Bromodichloromethane	ND		0.0012	0.00026	ppm v/v			11/15/22 20:36	1.46
Bromoform	ND		0.0012	0.00039	ppm v/v			11/15/22 20:36	1.46
Bromomethane	ND	*+	0.0012	0.00032	ppm v/v			11/15/22 20:36	1.46
2-Butanone (MEK)	ND		0.0058	0.0011	ppm v/v			11/15/22 20:36	1.46
Carbon disulfide	0.0017	J	0.0029	0.00051	ppm v/v			11/15/22 20:36	1.46
Carbon tetrachloride	0.00023	J	0.0012	0.00019	ppm v/v			11/15/22 20:36	1.46
Chlorobenzene	ND		0.0012	0.00032	ppm v/v			11/15/22 20:36	1.46
Chloroethane	ND	*+	0.0012	0.00047	ppm v/v			11/15/22 20:36	1.46
Chloroform	0.0011	J	0.0012	0.00020	ppm v/v			11/15/22 20:36	1.46
Chloromethane	ND	*+	0.0029	0.00096	ppm v/v			11/15/22 20:36	1.46
Dibromochloromethane	ND		0.0012	0.00020	ppm v/v			11/15/22 20:36	1.46
1,2-Dibromoethane (EDB)	ND		0.0012	0.00018	ppm v/v			11/15/22 20:36	1.46
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0012	0.00018	ppm v/v			11/15/22 20:36	1.46
1,2-Dichlorobenzene	ND	*+	0.0012	0.00045	ppm v/v			11/15/22 20:36	1.46
1,3-Dichlorobenzene	ND		0.0012	0.00023	ppm v/v			11/15/22 20:36	1.46
1,4-Dichlorobenzene	ND		0.0012	0.00023	ppm v/v			11/15/22 20:36	1.46
Dichlorodifluoromethane	0.042		0.0012	0.00020	ppm v/v			11/15/22 20:36	1.46
1,1-Dichloroethane	0.0011	J	0.0012	0.00016	ppm v/v			11/15/22 20:36	1.46
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/15/22 20:36	1.46
1,1-Dichloroethene	0.0053		0.0012	0.00019	ppm v/v			11/15/22 20:36	1.46
cis-1,2-Dichloroethene	0.00037	J	0.0012	0.00015	ppm v/v			11/15/22 20:36	1.46
trans-1,2-Dichloroethene	ND		0.0012	0.00019	ppm v/v			11/15/22 20:36	1.46
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/15/22 20:36	1.46
cis-1,3-Dichloropropene	ND		0.0012	0.00028	ppm v/v			11/15/22 20:36	1.46
trans-1,3-Dichloropropene	ND		0.0012	0.00029	ppm v/v			11/15/22 20:36	1.46
Ethylbenzene	ND		0.0012	0.00019	ppm v/v			11/15/22 20:36	1.46
4-Ethyltoluene	ND		0.0023	0.00031	ppm v/v			11/15/22 20:36	1.46
Hexachlorobutadiene	ND	*+	0.0058	0.00047	ppm v/v			11/15/22 20:36	1.46
2-Hexanone	ND		0.0029	0.00079	ppm v/v			11/15/22 20:36	1.46
4-Methyl-2-pentanone (MIBK)	ND		0.0029	0.00079	ppm v/v			11/15/22 20:36	1.46
Methylene Chloride	ND		0.0058	0.0020	ppm v/v			11/15/22 20:36	1.46
Styrene	ND		0.0012	0.00035	ppm v/v			11/15/22 20:36	1.46
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00020	ppm v/v			11/15/22 20:36	1.46

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118923-001/MWL-SV05-50

Lab Sample ID: 140-29549-18

Date Collected: 10/28/22 11:00

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.038		0.0012	0.00018	ppm v/v			11/15/22 20:36	1.46
Toluene	ND		0.0018	0.00034	ppm v/v			11/15/22 20:36	1.46
1,1,2-Trichloro-1,2,2-trifluoroethane	0.033		0.0012	0.00015	ppm v/v			11/15/22 20:36	1.46
1,2,4-Trichlorobenzene	ND		0.0058	0.00051	ppm v/v			11/15/22 20:36	1.46
1,1,1-Trichloroethane	0.0085		0.0012	0.00042	ppm v/v			11/15/22 20:36	1.46
1,1,2-Trichloroethane	ND		0.0012	0.00022	ppm v/v			11/15/22 20:36	1.46
Trichloroethene	0.043		0.00058	0.00019	ppm v/v			11/15/22 20:36	1.46
Trichlorofluoromethane	0.098		0.0012	0.00016	ppm v/v			11/15/22 20:36	1.46
1,2,4-Trimethylbenzene	ND	+	0.0012	0.00029	ppm v/v			11/15/22 20:36	1.46
1,3,5-Trimethylbenzene	ND		0.0023	0.00095	ppm v/v			11/15/22 20:36	1.46
Vinyl acetate	ND		0.0058	0.00041	ppm v/v			11/15/22 20:36	1.46
Vinyl chloride	ND	+	0.00058	0.00038	ppm v/v			11/15/22 20:36	1.46
m,p-Xylene	ND		0.0012	0.00042	ppm v/v			11/15/22 20:36	1.46
o-Xylene	ND		0.0012	0.00022	ppm v/v			11/15/22 20:36	1.46
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		60 - 140					11/15/22 20:36	1.46

Client Sample ID: 118924-001/MWL-SV05-100

Lab Sample ID: 140-29549-19

Date Collected: 10/28/22 11:05

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.030	0.0086	ppm v/v			11/15/22 21:25	1.5
Benzene	ND		0.0012	0.00020	ppm v/v			11/15/22 21:25	1.5
Benzyl chloride	ND	+	0.0024	0.00057	ppm v/v			11/15/22 21:25	1.5
Bromodichloromethane	ND		0.0012	0.00027	ppm v/v			11/15/22 21:25	1.5
Bromoform	ND		0.0012	0.00041	ppm v/v			11/15/22 21:25	1.5
Bromomethane	ND	+	0.0012	0.00033	ppm v/v			11/15/22 21:25	1.5
2-Butanone (MEK)	ND		0.0060	0.0011	ppm v/v			11/15/22 21:25	1.5
Carbon disulfide	ND		0.0030	0.00053	ppm v/v			11/15/22 21:25	1.5
Carbon tetrachloride	0.00050	J	0.0012	0.00020	ppm v/v			11/15/22 21:25	1.5
Chlorobenzene	ND		0.0012	0.00033	ppm v/v			11/15/22 21:25	1.5
Chloroethane	ND	+	0.0012	0.00048	ppm v/v			11/15/22 21:25	1.5
Chloroform	0.0018		0.0012	0.00021	ppm v/v			11/15/22 21:25	1.5
Chloromethane	ND	+	0.0030	0.00099	ppm v/v			11/15/22 21:25	1.5
Dibromochloromethane	ND		0.0012	0.00021	ppm v/v			11/15/22 21:25	1.5
1,2-Dibromoethane (EDB)	ND		0.0012	0.00018	ppm v/v			11/15/22 21:25	1.5
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	+	0.0012	0.00018	ppm v/v			11/15/22 21:25	1.5
1,2-Dichlorobenzene	ND	+	0.0012	0.00047	ppm v/v			11/15/22 21:25	1.5
1,3-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/15/22 21:25	1.5
1,4-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/15/22 21:25	1.5
Dichlorodifluoromethane	0.068		0.0012	0.00021	ppm v/v			11/15/22 21:25	1.5
1,1-Dichloroethane	0.0024		0.0012	0.00017	ppm v/v			11/15/22 21:25	1.5
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/15/22 21:25	1.5
1,1-Dichloroethene	0.012		0.0012	0.00020	ppm v/v			11/15/22 21:25	1.5

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118924-001/MWL-SV05-100

Lab Sample ID: 140-29549-19

Date Collected: 10/28/22 11:05

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.00088	J	0.0012	0.00015	ppm v/v			11/15/22 21:25	1.5
trans-1,2-Dichloroethene	ND		0.0012	0.00020	ppm v/v			11/15/22 21:25	1.5
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/15/22 21:25	1.5
cis-1,3-Dichloropropene	ND		0.0012	0.00029	ppm v/v			11/15/22 21:25	1.5
trans-1,3-Dichloropropene	ND		0.0012	0.00030	ppm v/v			11/15/22 21:25	1.5
Ethylbenzene	ND		0.0012	0.00020	ppm v/v			11/15/22 21:25	1.5
4-Ethyltoluene	ND		0.0024	0.00032	ppm v/v			11/15/22 21:25	1.5
Hexachlorobutadiene	ND	*+	0.0060	0.00048	ppm v/v			11/15/22 21:25	1.5
2-Hexanone	ND		0.0030	0.00081	ppm v/v			11/15/22 21:25	1.5
4-Methyl-2-pentanone (MIBK)	ND		0.0030	0.00081	ppm v/v			11/15/22 21:25	1.5
Methylene Chloride	ND		0.0060	0.0021	ppm v/v			11/15/22 21:25	1.5
Styrene	ND		0.0012	0.00036	ppm v/v			11/15/22 21:25	1.5
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00021	ppm v/v			11/15/22 21:25	1.5
Tetrachloroethene	0.081		0.0012	0.00018	ppm v/v			11/15/22 21:25	1.5
Toluene	ND		0.0018	0.00035	ppm v/v			11/15/22 21:25	1.5
1,1,2-Trichloro-1,2,2-trifluoroethane	0.070		0.0012	0.00015	ppm v/v			11/15/22 21:25	1.5
1,2,4-Trichlorobenzene	ND		0.0060	0.00053	ppm v/v			11/15/22 21:25	1.5
1,1,1-Trichloroethane	0.0096		0.0012	0.00044	ppm v/v			11/15/22 21:25	1.5
1,1,2-Trichloroethane	ND		0.0012	0.00023	ppm v/v			11/15/22 21:25	1.5
Trichloroethene	0.10		0.00060	0.00020	ppm v/v			11/15/22 21:25	1.5
Trichlorofluoromethane	0.14		0.0012	0.00017	ppm v/v			11/15/22 21:25	1.5
1,2,4-Trimethylbenzene	ND	*+	0.0012	0.00030	ppm v/v			11/15/22 21:25	1.5
1,3,5-Trimethylbenzene	ND		0.0024	0.00098	ppm v/v			11/15/22 21:25	1.5
Vinyl acetate	ND		0.0060	0.00042	ppm v/v			11/15/22 21:25	1.5
Vinyl chloride	ND	*+	0.00060	0.00039	ppm v/v			11/15/22 21:25	1.5
m,p-Xylene	ND		0.0012	0.00044	ppm v/v			11/15/22 21:25	1.5
o-Xylene	ND		0.0012	0.00023	ppm v/v			11/15/22 21:25	1.5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		60 - 140					11/15/22 21:25	1.5

Client Sample ID: 118925-001/MWL-SV05-100

Lab Sample ID: 140-29549-20

Date Collected: 10/28/22 11:05

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.030	0.0086	ppm v/v			11/15/22 22:14	1.51
Benzene	ND		0.0012	0.00020	ppm v/v			11/15/22 22:14	1.51
Benzyl chloride	ND	*+	0.0024	0.00057	ppm v/v			11/15/22 22:14	1.51
Bromodichloromethane	ND		0.0012	0.00027	ppm v/v			11/15/22 22:14	1.51
Bromoform	ND		0.0012	0.00041	ppm v/v			11/15/22 22:14	1.51
Bromomethane	ND	*+	0.0012	0.00033	ppm v/v			11/15/22 22:14	1.51
2-Butanone (MEK)	ND		0.0060	0.0011	ppm v/v			11/15/22 22:14	1.51
Carbon disulfide	ND		0.0030	0.00053	ppm v/v			11/15/22 22:14	1.51
Carbon tetrachloride	0.00042	J	0.0012	0.00020	ppm v/v			11/15/22 22:14	1.51
Chlorobenzene	ND		0.0012	0.00033	ppm v/v			11/15/22 22:14	1.51

Eurofins Knoxville

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118925-001/MWL-SV05-100

Lab Sample ID: 140-29549-20

Date Collected: 10/28/22 11:05

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	*+	0.0012	0.00048	ppm v/v			11/15/22 22:14	1.51
Chloroform	0.0019		0.0012	0.00021	ppm v/v			11/15/22 22:14	1.51
Chloromethane	ND	*+	0.0030	0.0010	ppm v/v			11/15/22 22:14	1.51
Dibromochloromethane	ND		0.0012	0.00021	ppm v/v			11/15/22 22:14	1.51
1,2-Dibromoethane (EDB)	ND		0.0012	0.00018	ppm v/v			11/15/22 22:14	1.51
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0012	0.00018	ppm v/v			11/15/22 22:14	1.51
1,2-Dichlorobenzene	ND	*+	0.0012	0.00047	ppm v/v			11/15/22 22:14	1.51
1,3-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/15/22 22:14	1.51
1,4-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/15/22 22:14	1.51
Dichlorodifluoromethane	0.067		0.0012	0.00021	ppm v/v			11/15/22 22:14	1.51
1,1-Dichloroethane	0.0024		0.0012	0.00017	ppm v/v			11/15/22 22:14	1.51
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/15/22 22:14	1.51
1,1-Dichloroethene	0.012		0.0012	0.00020	ppm v/v			11/15/22 22:14	1.51
cis-1,2-Dichloroethene	0.00083	J	0.0012	0.00015	ppm v/v			11/15/22 22:14	1.51
trans-1,2-Dichloroethene	ND		0.0012	0.00020	ppm v/v			11/15/22 22:14	1.51
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/15/22 22:14	1.51
cis-1,3-Dichloropropene	ND		0.0012	0.00029	ppm v/v			11/15/22 22:14	1.51
trans-1,3-Dichloropropene	ND		0.0012	0.00030	ppm v/v			11/15/22 22:14	1.51
Ethylbenzene	ND		0.0012	0.00020	ppm v/v			11/15/22 22:14	1.51
4-Ethyltoluene	ND		0.0024	0.00032	ppm v/v			11/15/22 22:14	1.51
Hexachlorobutadiene	ND	*+	0.0060	0.00048	ppm v/v			11/15/22 22:14	1.51
2-Hexanone	ND		0.0030	0.00082	ppm v/v			11/15/22 22:14	1.51
4-Methyl-2-pentanone (MIBK)	ND		0.0030	0.00082	ppm v/v			11/15/22 22:14	1.51
Methylene Chloride	ND		0.0060	0.0021	ppm v/v			11/15/22 22:14	1.51
Styrene	ND		0.0012	0.00036	ppm v/v			11/15/22 22:14	1.51
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00021	ppm v/v			11/15/22 22:14	1.51
Tetrachloroethene	0.081		0.0012	0.00018	ppm v/v			11/15/22 22:14	1.51
Toluene	ND		0.0018	0.00035	ppm v/v			11/15/22 22:14	1.51
1,1,2-Trichloro-1,2,2-trifluoroethane	0.069		0.0012	0.00015	ppm v/v			11/15/22 22:14	1.51
1,2,4-Trichlorobenzene	ND		0.0060	0.00053	ppm v/v			11/15/22 22:14	1.51
1,1,1-Trichloroethane	0.0096		0.0012	0.00044	ppm v/v			11/15/22 22:14	1.51
1,1,2-Trichloroethane	ND		0.0012	0.00023	ppm v/v			11/15/22 22:14	1.51
Trichloroethene	0.099		0.00060	0.00020	ppm v/v			11/15/22 22:14	1.51
Trichlorofluoromethane	0.14		0.0012	0.00017	ppm v/v			11/15/22 22:14	1.51
1,2,4-Trimethylbenzene	ND	*+	0.0012	0.00030	ppm v/v			11/15/22 22:14	1.51
1,3,5-Trimethylbenzene	ND		0.0024	0.00098	ppm v/v			11/15/22 22:14	1.51
Vinyl acetate	ND		0.0060	0.00042	ppm v/v			11/15/22 22:14	1.51
Vinyl chloride	ND	*+	0.00060	0.00039	ppm v/v			11/15/22 22:14	1.51
m,p-Xylene	ND		0.0012	0.00044	ppm v/v			11/15/22 22:14	1.51
o-Xylene	ND		0.0012	0.00023	ppm v/v			11/15/22 22:14	1.51

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		60 - 140		11/15/22 22:14	1.51

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118926-001/MWL-SV05-200

Lab Sample ID: 140-29549-21

Date Collected: 10/28/22 11:11

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.029	0.0083	ppm v/v			11/15/22 23:03	1.46
Benzene	0.00023	J	0.0012	0.00019	ppm v/v			11/15/22 23:03	1.46
Benzyl chloride	ND	*+	0.0023	0.00055	ppm v/v			11/15/22 23:03	1.46
Bromodichloromethane	ND		0.0012	0.00026	ppm v/v			11/15/22 23:03	1.46
Bromoform	ND		0.0012	0.00039	ppm v/v			11/15/22 23:03	1.46
Bromomethane	ND	*+	0.0012	0.00032	ppm v/v			11/15/22 23:03	1.46
2-Butanone (MEK)	ND		0.0058	0.0011	ppm v/v			11/15/22 23:03	1.46
Carbon disulfide	ND		0.0029	0.00051	ppm v/v			11/15/22 23:03	1.46
Carbon tetrachloride	0.00082	J	0.0012	0.00019	ppm v/v			11/15/22 23:03	1.46
Chlorobenzene	ND		0.0012	0.00032	ppm v/v			11/15/22 23:03	1.46
Chloroethane	ND	*+	0.0012	0.00047	ppm v/v			11/15/22 23:03	1.46
Chloroform	0.0020		0.0012	0.00020	ppm v/v			11/15/22 23:03	1.46
Chloromethane	ND	*+	0.0029	0.00096	ppm v/v			11/15/22 23:03	1.46
Dibromochloromethane	ND		0.0012	0.00020	ppm v/v			11/15/22 23:03	1.46
1,2-Dibromoethane (EDB)	ND		0.0012	0.00018	ppm v/v			11/15/22 23:03	1.46
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0012	0.00018	ppm v/v			11/15/22 23:03	1.46
1,2-Dichlorobenzene	ND	*+	0.0012	0.00045	ppm v/v			11/15/22 23:03	1.46
1,3-Dichlorobenzene	ND		0.0012	0.00023	ppm v/v			11/15/22 23:03	1.46
1,4-Dichlorobenzene	ND		0.0012	0.00023	ppm v/v			11/15/22 23:03	1.46
Dichlorodifluoromethane	0.075		0.0012	0.00020	ppm v/v			11/15/22 23:03	1.46
1,1-Dichloroethane	0.0043		0.0012	0.00016	ppm v/v			11/15/22 23:03	1.46
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/15/22 23:03	1.46
1,1-Dichloroethene	0.025		0.0012	0.00019	ppm v/v			11/15/22 23:03	1.46
cis-1,2-Dichloroethene	0.0015		0.0012	0.00015	ppm v/v			11/15/22 23:03	1.46
trans-1,2-Dichloroethene	ND		0.0012	0.00019	ppm v/v			11/15/22 23:03	1.46
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/15/22 23:03	1.46
cis-1,3-Dichloropropene	ND		0.0012	0.00028	ppm v/v			11/15/22 23:03	1.46
trans-1,3-Dichloropropene	ND		0.0012	0.00029	ppm v/v			11/15/22 23:03	1.46
Ethylbenzene	ND		0.0012	0.00019	ppm v/v			11/15/22 23:03	1.46
4-Ethyltoluene	ND		0.0023	0.00031	ppm v/v			11/15/22 23:03	1.46
Hexachlorobutadiene	ND	*+	0.0058	0.00047	ppm v/v			11/15/22 23:03	1.46
2-Hexanone	ND		0.0029	0.00079	ppm v/v			11/15/22 23:03	1.46
4-Methyl-2-pentanone (MIBK)	ND		0.0029	0.00079	ppm v/v			11/15/22 23:03	1.46
Methylene Chloride	0.0029	J	0.0058	0.0020	ppm v/v			11/15/22 23:03	1.46
Styrene	ND		0.0012	0.00035	ppm v/v			11/15/22 23:03	1.46
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00020	ppm v/v			11/15/22 23:03	1.46
Tetrachloroethene	0.15		0.0012	0.00018	ppm v/v			11/15/22 23:03	1.46
Toluene	ND		0.0018	0.00034	ppm v/v			11/15/22 23:03	1.46
1,1,2-Trichloro-1,2,2-trifluoroethane	0.14		0.0012	0.00015	ppm v/v			11/15/22 23:03	1.46
1,2,4-Trichlorobenzene	ND		0.0058	0.00051	ppm v/v			11/15/22 23:03	1.46
1,1,1-Trichloroethane	0.0032		0.0012	0.00042	ppm v/v			11/15/22 23:03	1.46
1,1,2-Trichloroethane	ND		0.0012	0.00022	ppm v/v			11/15/22 23:03	1.46
Trichloroethene	0.20		0.00058	0.00019	ppm v/v			11/15/22 23:03	1.46
Trichlorofluoromethane	0.10		0.0012	0.00016	ppm v/v			11/15/22 23:03	1.46
1,2,4-Trimethylbenzene	ND	*+	0.0012	0.00029	ppm v/v			11/15/22 23:03	1.46
1,3,5-Trimethylbenzene	ND		0.0023	0.00095	ppm v/v			11/15/22 23:03	1.46
Vinyl acetate	ND		0.0058	0.00041	ppm v/v			11/15/22 23:03	1.46
Vinyl chloride	ND	*+	0.00058	0.00038	ppm v/v			11/15/22 23:03	1.46

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMP

Job ID: 140-29549-1

Client Sample ID: 118926-001/MWL-SV05-200

Lab Sample ID: 140-29549-21

Date Collected: 10/28/22 11:11

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m,p-Xylene	ND		0.0012	0.00042	ppm v/v			11/15/22 23:03	1.46
o-Xylene	ND		0.0012	0.00022	ppm v/v			11/15/22 23:03	1.46
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	81		60 - 140					11/15/22 23:03	1.46

Client Sample ID: 118927-001/MWL-SV05-300

Lab Sample ID: 140-29549-22

Date Collected: 10/28/22 11:18

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.030	0.0086	ppm v/v			11/15/22 23:52	1.5
Benzene	ND		0.0012	0.00020	ppm v/v			11/15/22 23:52	1.5
Benzyl chloride	ND	*+	0.0024	0.00057	ppm v/v			11/15/22 23:52	1.5
Bromodichloromethane	ND		0.0012	0.00027	ppm v/v			11/15/22 23:52	1.5
Bromoform	ND		0.0012	0.00041	ppm v/v			11/15/22 23:52	1.5
Bromomethane	ND	*+	0.0012	0.00033	ppm v/v			11/15/22 23:52	1.5
2-Butanone (MEK)	ND		0.0060	0.0011	ppm v/v			11/15/22 23:52	1.5
Carbon disulfide	ND		0.0030	0.00053	ppm v/v			11/15/22 23:52	1.5
Carbon tetrachloride	0.00069	J	0.0012	0.00020	ppm v/v			11/15/22 23:52	1.5
Chlorobenzene	ND		0.0012	0.00033	ppm v/v			11/15/22 23:52	1.5
Chloroethane	ND	*+	0.0012	0.00048	ppm v/v			11/15/22 23:52	1.5
Chloroform	0.00063	J	0.0012	0.00021	ppm v/v			11/15/22 23:52	1.5
Chloromethane	ND	*+	0.0030	0.00099	ppm v/v			11/15/22 23:52	1.5
Dibromochloromethane	ND		0.0012	0.00021	ppm v/v			11/15/22 23:52	1.5
1,2-Dibromoethane (EDB)	ND		0.0012	0.00018	ppm v/v			11/15/22 23:52	1.5
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	*+	0.0012	0.00018	ppm v/v			11/15/22 23:52	1.5
1,2-Dichlorobenzene	ND	*+	0.0012	0.00047	ppm v/v			11/15/22 23:52	1.5
1,3-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/15/22 23:52	1.5
1,4-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/15/22 23:52	1.5
Dichlorodifluoromethane	0.038		0.0012	0.00021	ppm v/v			11/15/22 23:52	1.5
1,1-Dichloroethane	0.0010	J	0.0012	0.00017	ppm v/v			11/15/22 23:52	1.5
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/15/22 23:52	1.5
1,1-Dichloroethene	0.013		0.0012	0.00020	ppm v/v			11/15/22 23:52	1.5
cis-1,2-Dichloroethene	0.00036	J	0.0012	0.00015	ppm v/v			11/15/22 23:52	1.5
trans-1,2-Dichloroethene	ND		0.0012	0.00020	ppm v/v			11/15/22 23:52	1.5
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/15/22 23:52	1.5
cis-1,3-Dichloropropene	ND		0.0012	0.00029	ppm v/v			11/15/22 23:52	1.5
trans-1,3-Dichloropropene	ND		0.0012	0.00030	ppm v/v			11/15/22 23:52	1.5
Ethylbenzene	ND		0.0012	0.00020	ppm v/v			11/15/22 23:52	1.5
4-Ethyltoluene	ND		0.0024	0.00032	ppm v/v			11/15/22 23:52	1.5
Hexachlorobutadiene	ND	*+	0.0060	0.00048	ppm v/v			11/15/22 23:52	1.5
2-Hexanone	ND		0.0030	0.00081	ppm v/v			11/15/22 23:52	1.5
4-Methyl-2-pentanone (MIBK)	ND		0.0030	0.00081	ppm v/v			11/15/22 23:52	1.5
Methylene Chloride	ND		0.0060	0.0021	ppm v/v			11/15/22 23:52	1.5
Styrene	ND		0.0012	0.00036	ppm v/v			11/15/22 23:52	1.5
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00021	ppm v/v			11/15/22 23:52	1.5

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118927-001/MWL-SV05-300

Lab Sample ID: 140-29549-22

Date Collected: 10/28/22 11:18

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.089		0.0012	0.00018	ppm v/v			11/15/22 23:52	1.5
Toluene	ND		0.0018	0.00035	ppm v/v			11/15/22 23:52	1.5
1,1,2-Trichloro-1,2,2-trifluoroethane	0.093		0.0012	0.00015	ppm v/v			11/15/22 23:52	1.5
1,2,4-Trichlorobenzene	ND		0.0060	0.00053	ppm v/v			11/15/22 23:52	1.5
1,1,1-Trichloroethane	0.00071	J	0.0012	0.00044	ppm v/v			11/15/22 23:52	1.5
1,1,2-Trichloroethane	ND		0.0012	0.00023	ppm v/v			11/15/22 23:52	1.5
Trichloroethene	0.071		0.00060	0.00020	ppm v/v			11/15/22 23:52	1.5
Trichlorofluoromethane	0.026		0.0012	0.00017	ppm v/v			11/15/22 23:52	1.5
1,2,4-Trimethylbenzene	ND	+	0.0012	0.00030	ppm v/v			11/15/22 23:52	1.5
1,3,5-Trimethylbenzene	ND		0.0024	0.00098	ppm v/v			11/15/22 23:52	1.5
Vinyl acetate	ND		0.0060	0.00042	ppm v/v			11/15/22 23:52	1.5
Vinyl chloride	ND	+	0.00060	0.00039	ppm v/v			11/15/22 23:52	1.5
m,p-Xylene	ND		0.0012	0.00044	ppm v/v			11/15/22 23:52	1.5
o-Xylene	ND		0.0012	0.00023	ppm v/v			11/15/22 23:52	1.5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		60 - 140					11/15/22 23:52	1.5

Client Sample ID: 118928-001/MWL-SV05-300

Lab Sample ID: 140-29549-23

Date Collected: 10/28/22 11:18

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.030	0.0086	ppm v/v			11/16/22 08:12	1.5
Benzene	ND		0.0012	0.00020	ppm v/v			11/16/22 08:12	1.5
Benzyl chloride	ND	+	0.0024	0.00057	ppm v/v			11/16/22 08:12	1.5
Bromodichloromethane	ND		0.0012	0.00027	ppm v/v			11/16/22 08:12	1.5
Bromoform	ND		0.0012	0.00041	ppm v/v			11/16/22 08:12	1.5
Bromomethane	ND	+	0.0012	0.00033	ppm v/v			11/16/22 08:12	1.5
2-Butanone (MEK)	ND		0.0060	0.0011	ppm v/v			11/16/22 08:12	1.5
Carbon disulfide	ND		0.0030	0.00053	ppm v/v			11/16/22 08:12	1.5
Carbon tetrachloride	0.00065	J	0.0012	0.00020	ppm v/v			11/16/22 08:12	1.5
Chlorobenzene	ND		0.0012	0.00033	ppm v/v			11/16/22 08:12	1.5
Chloroethane	ND	+	0.0012	0.00048	ppm v/v			11/16/22 08:12	1.5
Chloroform	0.00080	J	0.0012	0.00021	ppm v/v			11/16/22 08:12	1.5
Chloromethane	ND	+	0.0030	0.00099	ppm v/v			11/16/22 08:12	1.5
Dibromochloromethane	ND		0.0012	0.00021	ppm v/v			11/16/22 08:12	1.5
1,2-Dibromoethane (EDB)	ND		0.0012	0.00018	ppm v/v			11/16/22 08:12	1.5
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	+	0.0012	0.00018	ppm v/v			11/16/22 08:12	1.5
1,2-Dichlorobenzene	ND	+	0.0012	0.00047	ppm v/v			11/16/22 08:12	1.5
1,3-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/16/22 08:12	1.5
1,4-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/16/22 08:12	1.5
Dichlorodifluoromethane	0.040		0.0012	0.00021	ppm v/v			11/16/22 08:12	1.5
1,1-Dichloroethane	0.0012		0.0012	0.00017	ppm v/v			11/16/22 08:12	1.5
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/16/22 08:12	1.5
1,1-Dichloroethene	0.014		0.0012	0.00020	ppm v/v			11/16/22 08:12	1.5

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Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMP

Job ID: 140-29549-1

Client Sample ID: 118928-001/MWL-SV05-300

Lab Sample ID: 140-29549-23

Date Collected: 10/28/22 11:18

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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	0.00038	J	0.0012	0.00015	ppm v/v			11/16/22 08:12	1.5
trans-1,2-Dichloroethene	ND		0.0012	0.00020	ppm v/v			11/16/22 08:12	1.5
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/16/22 08:12	1.5
cis-1,3-Dichloropropene	ND		0.0012	0.00029	ppm v/v			11/16/22 08:12	1.5
trans-1,3-Dichloropropene	ND		0.0012	0.00030	ppm v/v			11/16/22 08:12	1.5
Ethylbenzene	ND		0.0012	0.00020	ppm v/v			11/16/22 08:12	1.5
4-Ethyltoluene	ND		0.0024	0.00032	ppm v/v			11/16/22 08:12	1.5
Hexachlorobutadiene	ND	*+	0.0060	0.00048	ppm v/v			11/16/22 08:12	1.5
2-Hexanone	ND		0.0030	0.00081	ppm v/v			11/16/22 08:12	1.5
4-Methyl-2-pentanone (MIBK)	ND		0.0030	0.00081	ppm v/v			11/16/22 08:12	1.5
Methylene Chloride	ND		0.0060	0.0021	ppm v/v			11/16/22 08:12	1.5
Styrene	ND		0.0012	0.00036	ppm v/v			11/16/22 08:12	1.5
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00021	ppm v/v			11/16/22 08:12	1.5
Tetrachloroethene	0.091		0.0012	0.00018	ppm v/v			11/16/22 08:12	1.5
Toluene	ND		0.0018	0.00035	ppm v/v			11/16/22 08:12	1.5
1,1,2-Trichloro-1,2,2-trifluoroethane	0.093		0.0012	0.00015	ppm v/v			11/16/22 08:12	1.5
1,2,4-Trichlorobenzene	ND		0.0060	0.00053	ppm v/v			11/16/22 08:12	1.5
1,1,1-Trichloroethane	0.0011	J	0.0012	0.00044	ppm v/v			11/16/22 08:12	1.5
1,1,2-Trichloroethane	ND		0.0012	0.00023	ppm v/v			11/16/22 08:12	1.5
Trichloroethene	0.082		0.00060	0.00020	ppm v/v			11/16/22 08:12	1.5
Trichlorofluoromethane	0.030		0.0012	0.00017	ppm v/v			11/16/22 08:12	1.5
1,2,4-Trimethylbenzene	ND	*+	0.0012	0.00030	ppm v/v			11/16/22 08:12	1.5
1,3,5-Trimethylbenzene	ND		0.0024	0.00098	ppm v/v			11/16/22 08:12	1.5
Vinyl acetate	ND		0.0060	0.00042	ppm v/v			11/16/22 08:12	1.5
Vinyl chloride	ND	*+	0.00060	0.00039	ppm v/v			11/16/22 08:12	1.5
m,p-Xylene	ND		0.0012	0.00044	ppm v/v			11/16/22 08:12	1.5
o-Xylene	ND		0.0012	0.00023	ppm v/v			11/16/22 08:12	1.5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	85		60 - 140					11/16/22 08:12	1.5

Client Sample ID: 118929-001/MWL-SV05-400

Lab Sample ID: 140-29549-24

Date Collected: 10/28/22 11:25

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.030	0.0085	ppm v/v			11/15/22 03:28	1.49
Benzene	0.00027	J	0.0012	0.00019	ppm v/v			11/15/22 03:28	1.49
Benzyl chloride	ND		0.0024	0.00057	ppm v/v			11/15/22 03:28	1.49
Bromodichloromethane	ND		0.0012	0.00027	ppm v/v			11/15/22 03:28	1.49
Bromoform	ND		0.0012	0.00040	ppm v/v			11/15/22 03:28	1.49
Bromomethane	ND		0.0012	0.00033	ppm v/v			11/15/22 03:28	1.49
2-Butanone (MEK)	ND		0.0060	0.0011	ppm v/v			11/15/22 03:28	1.49
Carbon disulfide	0.00069	J	0.0030	0.00052	ppm v/v			11/15/22 03:28	1.49
Carbon tetrachloride	0.00058	J	0.0012	0.00019	ppm v/v			11/15/22 03:28	1.49
Chlorobenzene	ND		0.0012	0.00033	ppm v/v			11/15/22 03:28	1.49

Eurofins Knoxville

Client Sample Results

Client: Sandia National Laboratories
Project/Site: MWL LTMMMP

Job ID: 140-29549-1

Client Sample ID: 118929-001/MWL-SV05-400

Lab Sample ID: 140-29549-24

Date Collected: 10/28/22 11:25

Matrix: Air

Date Received: 11/08/22 09:30

Sample Container: Summa Canister 6L

Method: EPA 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		0.0012	0.00048	ppm v/v			11/15/22 03:28	1.49
Chloroform	0.00075	J	0.0012	0.00021	ppm v/v			11/15/22 03:28	1.49
Chloromethane	ND		0.0030	0.00098	ppm v/v			11/15/22 03:28	1.49
Dibromochloromethane	ND		0.0012	0.00021	ppm v/v			11/15/22 03:28	1.49
1,2-Dibromoethane (EDB)	ND		0.0012	0.00018	ppm v/v			11/15/22 03:28	1.49
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.0012	0.00018	ppm v/v			11/15/22 03:28	1.49
1,2-Dichlorobenzene	ND		0.0012	0.00046	ppm v/v			11/15/22 03:28	1.49
1,3-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/15/22 03:28	1.49
1,4-Dichlorobenzene	ND		0.0012	0.00024	ppm v/v			11/15/22 03:28	1.49
Dichlorodifluoromethane	0.023		0.0012	0.00021	ppm v/v			11/15/22 03:28	1.49
1,1-Dichloroethane	0.0016		0.0012	0.00016	ppm v/v			11/15/22 03:28	1.49
1,2-Dichloroethane	ND		0.0012	0.00015	ppm v/v			11/15/22 03:28	1.49
1,1-Dichloroethene	0.010		0.0012	0.00019	ppm v/v			11/15/22 03:28	1.49
cis-1,2-Dichloroethene	0.00054	J	0.0012	0.00015	ppm v/v			11/15/22 03:28	1.49
trans-1,2-Dichloroethene	ND		0.0012	0.00019	ppm v/v			11/15/22 03:28	1.49
1,2-Dichloropropane	ND		0.0012	0.00015	ppm v/v			11/15/22 03:28	1.49
cis-1,3-Dichloropropene	ND		0.0012	0.00028	ppm v/v			11/15/22 03:28	1.49
trans-1,3-Dichloropropene	ND		0.0012	0.00030	ppm v/v			11/15/22 03:28	1.49
Ethylbenzene	ND		0.0012	0.00019	ppm v/v			11/15/22 03:28	1.49
4-Ethyltoluene	ND		0.0024	0.00031	ppm v/v			11/15/22 03:28	1.49
Hexachlorobutadiene	ND		0.0060	0.00048	ppm v/v			11/15/22 03:28	1.49
2-Hexanone	ND		0.0030	0.00080	ppm v/v			11/15/22 03:28	1.49
4-Methyl-2-pentanone (MIBK)	ND		0.0030	0.00080	ppm v/v			11/15/22 03:28	1.49
Methylene Chloride	ND		0.0060	0.0021	ppm v/v			11/15/22 03:28	1.49
Styrene	ND		0.0012	0.00036	ppm v/v			11/15/22 03:28	1.49
1,1,2,2-Tetrachloroethane	ND		0.0012	0.00021	ppm v/v			11/15/22 03:28	1.49
Tetrachloroethene	0.097		0.0012	0.00018	ppm v/v			11/15/22 03:28	1.49
Toluene	ND		0.0018	0.00034	ppm v/v			11/15/22 03:28	1.49
1,1,2-Trichloro-1,2,2-trifluoroethane	0.045		0.0012	0.00015	ppm v/v			11/15/22 03:28	1.49
1,2,4-Trichlorobenzene	ND		0.0060	0.00052	ppm v/v			11/15/22 03:28	1.49
1,1,1-Trichloroethane	0.0019		0.0012	0.00043	ppm v/v			11/15/22 03:28	1.49
1,1,2-Trichloroethane	ND		0.0012	0.00022	ppm v/v			11/15/22 03:28	1.49
Trichloroethene	0.083		0.00060	0.00019	ppm v/v			11/15/22 03:28	1.49
Trichlorofluoromethane	0.032		0.0012	0.00016	ppm v/v			11/15/22 03:28	1.49
1,2,4-Trimethylbenzene	ND		0.0012	0.00030	ppm v/v			11/15/22 03:28	1.49
1,3,5-Trimethylbenzene	ND		0.0024	0.00097	ppm v/v			11/15/22 03:28	1.49
Vinyl acetate	ND		0.0060	0.00042	ppm v/v			11/15/22 03:28	1.49
Vinyl chloride	ND		0.00060	0.00039	ppm v/v			11/15/22 03:28	1.49
m,p-Xylene	ND		0.0012	0.00043	ppm v/v			11/15/22 03:28	1.49
o-Xylene	ND		0.0012	0.00022	ppm v/v			11/15/22 03:28	1.49

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140		11/15/22 03:28	1.49

ANNEX D

Mixed Waste Landfill Soil-Moisture Monitoring Forms

April 2022-March 2023

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 Ziock</i>	Standard Count: <i>670/6559</i>	Chi: <i>1.303/0.977</i>			
Name: <i>Danielle Mirel</i>	Previous Count: <i>NA</i>	Count Time: 30 seconds			
Notes: <i>Carlin Lalhane</i> <i>1st Standard Count taken on 4/14/2022</i> <i>2nd Standard Count taken on 4/21/2022</i>					
Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Winch Counter Reading (ft)	VZ-3 Counts (E Side)	VZ-2 Counts (SW Corner)	VZ-1 Counts (NW Corner)
			Date/Time	Date/Time	Date/Time
			<i>4-14-2022/10:36</i>	<i>4-21-22/09:40</i>	<i>4-21-22/10:37</i>
0.0	0	0	<i>845</i>	<i>2093</i>	<i>2240</i>
0.9	1	9999	<i>2373</i>	<i>2723</i>	<i>2326</i>
1.7	2	9998	<i>2701</i>	<i>3073</i>	<i>2205</i>
2.6	3	9997	<i>2694</i>	<i>2852</i>	<i>2200</i>
3.5	4	9996	<i>1987</i>	<i>3110</i>	<i>2176</i>
4.3	5	9995	<i>2083</i>	<i>2715</i>	<i>1809</i>
5.2	6	9994	<i>1853</i>	<i>2106</i>	<i>1826</i>
6.1	7	9993	<i>1806</i>	<i>1875</i>	<i>1786</i>
6.9	8	9992	<i>1835</i>	<i>1836</i>	<i>1639</i>
7.8	9	9991	<i>1870</i>	<i>1824</i>	<i>2141</i>
8.7	10	9990	<i>2024</i>	<i>1547</i>	<i>2298</i>
9.5	11	9989	<i>1813</i>	<i>2049</i>	<i>2116</i>
10.4	12	9988	<i>1758</i>	<i>1824</i>	<i>1767</i>
11.3	13	9987	<i>1806</i>	<i>1751</i>	<i>1912</i>
12.1	14	9986	<i>1693</i>	<i>1642</i>	<i>2055</i>
13.0	15	9985	<i>1817</i>	<i>1812</i>	<i>2043</i>
13.9	16	9984	<i>1563</i>	<i>1704</i>	<i>1864</i>
14.7	17	9983	<i>1723</i>	<i>1790</i>	<i>1561</i>
15.6	18	9982	<i>1681</i>	<i>1917</i>	<i>1451</i>
16.5	19	9981	<i>1304</i>	<i>2187</i>	<i>1511</i>
17.3	20	9980	<i>1704</i>	<i>2005</i>	<i>1587</i>
18.2	21	9979	<i>1723</i>	<i>1798</i>	<i>1953</i>
19.1	22	9978	<i>1453</i>	<i>1889</i>	<i>2330</i>
19.9	23	9977	<i>1438</i>	<i>2085</i>	<i>2186</i>
20.8	24	9976	<i>1430</i>	<i>1596</i>	<i>1820</i>
21.7	25	9975	<i>1930</i>	<i>1615</i>	<i>1730</i>

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.

Mixed Waste Landfill Neutron Logging Data Field Form

Vertical Depth Below Ground Surface (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	1641	1668	1669
30.3	35	9965	1714	1762	1993
34.6	40	9960	1531	1662	1768
39.0	45	9955	1770	1614	1881
43.3	50	9950	1837	1650	1648
47.6	55	9945	1751	2005	1798
52.0	60	9940	1771	1946	1819
56.3	65	9935	1865	2141	1995
60.6	70	9930	2077	2559	1682
65.0	75	9925	2737	2156	1967
69.3	80	9920	1598	1570	1922
73.6	85	9915	1527	1828	1900
77.9	90	9910	2168	2268	1907
82.3	95	9905	1997	2187	2287
86.6	100	9900	2241	2217	2394
90.9	105	9895	2554	2347	2126
95.3	110	9890	1898	1849	2045
99.6	115	9885	1523	1799	1692
103.9	120	9880	1455	1914	1912
108.3	125	9875	2344	2225	1457
112.6	130	9870	2454	2197	1816
116.9	135	9865	1661	2661	1707
121.2	140	9860	1575	1949	1483
125.6	145	9855	2471	2596	2804
129.9	150	9850	2192	2133	2117
134.2	155	9845	2366	2300	1685
138.6	160	9840	2724	1909	2153
142.9	165	9835	2198	2234	1947
147.2	170	9830	2459	1633	1761
151.6	175	9825	3304	2803	2454
155.9	180	9820	2938	2808	2838
160.2	185	9815	1686	2766	2065
164.5	190	9810	1755	1830	2057
168.9	195	9805	1995	2934	3329
173.2	200	9800	2078	3059	2613

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Mixed Waste Landfill

Soil-Moisture Monitoring

Soil-Moisture Monitoring Results Tables

Table D-1
VZ-1 Soil-Moisture Monitoring Results
April 2022

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2022	Baseline Average (2004-2006)	Difference between Baseline Average & April 2022	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	3.8	2.9	0.9	NA
4.3	5	2.8	2.9	-0.1	NA
5.2	6	2.9	2.9	0.0	NA
6.1	7	2.8	2.6	0.2	NA
6.9	8	2.4	2.2	0.2	NA
7.8	9	3.7	1.9	1.8	NA
8.7	10	4.2	1.7	2.5	23
9.5	11	3.7	2.0	1.7	23
10.4	12	2.7	2.7	0.0	23
11.3	13	3.1	3.1	0.0	23
12.1	14	3.5	2.6	0.9	23
13.0	15	3.5	2.4	1.1	23
13.9	16	3.0	2.6	0.4	23
14.7	17	2.2	2.8	-0.6	23
15.6	18	1.9	2.9	-1.0	23
16.5	19	2.0	2.4	-0.4	23
17.3	20	2.2	2.0	0.2	23
18.2	21	3.2	2.0	1.2	23
19.1	22	4.2	2.1	2.1	23
19.9	23	3.8	3.0	0.8	23
20.8	24	2.9	4.3	-1.4	23
21.7	25	2.6	4.0	-1.4	23
26.0	30	2.4	2.9	-0.5	23
30.3	35	3.3	2.7	0.6	23
34.6	40	2.7	2.3	0.4	23
39.0	45	3.0	3.0	0.0	23
43.3	50	2.4	2.9	-0.5	23
47.6	55	2.8	2.8	0.0	23
52.0	60	2.9	3.4	-0.5	23
56.3	65	3.3	2.9	0.4	23

Table D-1 (Concluded)
VZ-1 Soil-Moisture Monitoring Results
April 2022

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2022	Baseline Average (2004-2006)	Difference between Baseline Average & April 2022	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	2.5	2.1	0.4	23
65.0	75	3.3	5.6	-2.3	23
69.3	80	3.1	2.8	0.3	23
73.6	85	3.1	3.1	0.0	23
77.9	90	3.1	3.7	-0.6	23
82.3	95	4.1	3.7	0.4	23
86.6	100	4.4	5.4	-1.0	23
90.9	105	3.7	5.0	-1.3	NA
95.3	110	3.5	3.0	0.5	NA
99.6	115	2.5	3.6	-1.1	NA
103.9	120	3.1	2.2	0.9	NA
108.3	125	1.9	2.7	-0.8	NA
112.6	130	2.8	3.3	-0.5	NA
116.9	135	2.5	3.1	-0.6	NA
121.2	140	1.9	2.1	-0.2	NA
125.6	145	5.5	3.8	1.7	NA
129.9	150	3.7	3.2	0.5	NA
134.2	155	2.5	2.7	-0.2	NA
138.6	160	3.8	2.1	1.7	NA
142.9	165	3.2	3.8	-0.6	NA
147.2	170	2.7	2.0	0.7	NA
151.6	175	4.6	6.0	-1.4	NA
155.9	180	5.6	5.5	0.1	NA
160.2	185	3.5	4.4	-0.9	NA
164.5	190	3.5	3.0	0.5	NA
168.9	195	6.9	7.0	-0.1	NA
173.2	200	5.0	5.4	-0.4	NA
	Average	3.3	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 2022

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2022	Baseline Average (2004-2006)	Difference between Baseline Average & April 2022	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	6.4	2.7	3.7	NA
4.3	5	5.3	3.3	2.0	NA
5.2	6	3.6	3.6	0.0	NA
6.1	7	3.0	3.6	-0.6	NA
6.9	8	2.9	3.5	-0.6	NA
7.8	9	2.9	3.1	-0.2	NA
8.7	10	2.1	2.4	-0.3	23
9.5	11	3.5	2.2	1.3	23
10.4	12	2.9	2.2	0.7	23
11.3	13	2.7	2.1	0.6	23
12.1	14	2.4	2.5	-0.1	23
13.0	15	2.8	3.0	-0.2	23
13.9	16	2.5	2.8	-0.3	23
14.7	17	2.8	2.4	0.4	23
15.6	18	3.1	2.6	0.5	23
16.5	19	3.8	2.7	1.1	23
17.3	20	3.4	2.9	0.5	23
18.2	21	2.8	3.1	-0.3	23
19.1	22	3.0	3.6	-0.6	23
19.9	23	3.6	3.7	-0.1	23
20.8	24	2.2	3.1	-0.9	23
21.7	25	2.3	2.7	-0.4	23
26.0	30	2.4	2.4	0.0	23
30.3	35	2.8	2.9	-0.1	23
34.6	40	2.4	2.7	-0.3	23
39.0	45	2.3	2.3	0.0	23
43.3	50	2.4	2.1	0.3	23
47.6	55	3.4	3.1	0.3	23
52.0	60	3.2	3.0	0.2	23
56.3	65	3.7	5.5	-1.8	23

Table D-2 (Concluded)
VZ-2 Soil-Moisture Monitoring Results
April 2022

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2022	Baseline Average (2004-2006)	Difference between Baseline Average & April 2022	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	4.9	4.8	0.1	23
65.0	75	3.8	5.1	-1.3	23
69.3	80	2.2	2.6	-0.4	23
73.6	85	2.9	2.6	0.3	23
77.9	90	4.1	3.1	1.0	23
82.3	95	3.8	3.6	0.2	23
86.6	100	3.9	4.7	-0.8	23
90.9	105	4.3	3.4	0.9	NA
95.3	110	2.9	3.1	-0.2	NA
99.6	115	2.8	3.6	-0.8	NA
103.9	120	3.1	2.0	1.1	NA
108.3	125	4.0	3.8	0.2	NA
112.6	130	3.9	3.6	0.3	NA
116.9	135	5.1	3.4	1.7	NA
121.2	140	3.2	2.4	0.8	NA
125.6	145	5.0	5.9	-0.9	NA
129.9	150	3.7	7.0	-3.3	NA
134.2	155	4.2	3.6	0.6	NA
138.6	160	3.1	3.8	-0.7	NA
142.9	165	4.0	3.0	1.0	NA
147.2	170	2.3	2.9	-0.6	NA
151.6	175	5.5	2.4	3.1	NA
155.9	180	5.5	5.4	0.1	NA
160.2	185	5.4	5.4	0.0	NA
164.5	190	2.9	4.1	-1.2	NA
168.9	195	5.9	3.5	2.4	NA
173.2	200	6.2	6.3	-0.1	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 2022

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2022	Baseline Average (2004-2006)	Difference between Baseline Average & April 2022	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
3.5	4	3.2	4.6	-1.4	NA
4.3	5	3.4	4.5	-1.1	NA
5.2	6	2.8	3.7	-0.9	NA
6.1	7	2.7	2.9	-0.2	NA
6.9	8	2.8	3.1	-0.3	NA
7.8	9	2.9	2.3	0.6	NA
8.7	10	3.3	2.4	0.9	23
9.5	11	2.7	2.6	0.1	23
10.4	12	2.6	2.7	-0.1	23
11.3	13	2.7	3.0	-0.3	23
12.1	14	2.4	2.6	-0.2	23
13.0	15	2.7	2.8	-0.1	23
13.9	16	2.1	2.9	-0.8	23
14.7	17	2.5	3.1	-0.6	23
15.6	18	2.4	3.1	-0.7	23
16.5	19	1.4	2.3	-0.9	23
17.3	20	2.4	2.7	-0.3	23
18.2	21	2.5	2.7	-0.2	23
19.1	22	1.8	1.8	0.0	23
19.9	23	1.7	2.7	-1.0	23
20.8	24	1.7	2.8	-1.1	23
21.7	25	3.0	2.1	0.9	23
26.0	30	2.3	2.5	-0.2	23
30.3	35	2.5	2.8	-0.3	23
34.6	40	2.0	2.1	-0.1	23
39.0	45	2.6	2.7	-0.1	23
43.3	50	2.8	2.9	-0.1	23
47.6	55	2.6	3.4	-0.8	23
52.0	60	2.6	2.9	-0.3	23
56.3	65	2.9	3.5	-0.6	23

Table D-3 (Concluded)
VZ-3 Soil-Moisture Monitoring Results
April 2022

Vertical Depth Below Ground Surface (ft)	Linear Depth Along Casing (ft)	Collection Period April 2022	Baseline Average (2004-2006)	Difference between Baseline Average & April 2022	Soil-Moisture Trigger Level (% content by volume)
		Soil-Moisture (% content by volume)			
60.6	70	3.4	1.9	1.5	23
65.0	75	5.2	4.3	0.9	23
69.3	80	2.2	4.5	-2.3	23
73.6	85	2.0	3.5	-1.5	23
77.9	90	3.7	1.9	1.8	23
82.3	95	3.2	3.3	-0.1	23
86.6	100	3.9	3.4	0.5	23
90.9	105	4.7	3.3	1.4	NA
95.3	110	3.0	4.7	-1.7	NA
99.6	115	2.0	3.6	-1.6	NA
103.9	120	1.8	2.1	-0.3	NA
108.3	125	4.1	1.8	2.3	NA
112.6	130	4.4	4.3	0.1	NA
116.9	135	2.3	4.0	-1.7	NA
121.2	140	2.1	2.3	-0.2	NA
125.6	145	4.5	2.0	2.5	NA
129.9	150	3.7	4.4	-0.7	NA
134.2	155	4.2	3.6	0.6	NA
138.6	160	5.1	4.4	0.7	NA
142.9	165	3.8	5.2	-1.4	NA
147.2	170	4.4	4.1	0.3	NA
151.6	175	6.7	4.3	2.4	NA
155.9	180	5.7	6.6	-0.9	NA
160.2	185	2.4	5.6	-3.2	NA
164.5	190	2.6	2.7	-0.1	NA
168.9	195	3.2	3.1	0.1	NA
173.2	200	3.4	4.1	-0.7	NA
	Average	3.0	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 2022-March 2023

Field Forms

Sample Summary Sheet

Data Validation Reports

Contract Verification Forms

Field Sampling Forms
Mixed Waste Landfill
Long-Term Monitoring and Maintenance
Groundwater Monitoring

Form Title	Corresponding Procedure
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 / AOP 95-16

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

Field Sampling Forms

May 2022 Groundwater Monitoring

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

SNL/NM Project Name: MWL		
Well ID: MWL-BW2	Date: 05/12/22	Date:
Pump Method: Portable	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)
481.93	0835	Start	-----	-----	-----	-----	-----	-----	-----
484.22	0908	5	20.03	687.97	149.1	7.32	0.47	14.17	1.20
485.04	0928	10	20.18	683.21	136.2	7.33	1.67	11.08	0.94
486.34	0949	15	21.01	700.59	127.7	7.32	2.16	10.12	0.84
487.09	1001	18	20.91	702.62	127.4	7.32	1.97	12.92	1.08
487.65	1010	20	21.11	704.70	141.3	7.32	1.98	14.85	1.23
488.14	1019	22	21.30	709.99	131.5	7.33	2.52	17.37	1.44
488.69	1028	24	21.48	681.56	137.8	7.34	2.65	24.81	2.05
488.91	1037	26	21.08	701.57	138.1	7.35	2.45	25.99	2.17
489.35	1041	27	21.30	706.19	135.3	7.35	2.24	28.94	2.39
489.54	1046	28	21.21	704.43	136.0	7.37	2.30	29.98	2.49
489.69	1051	29	21.38	705.02	134.1	7.36	2.05	28.03	2.31
489.88	1056	30	21.41	703.61	153.1	7.37	2.27	26.24	2.16
	1057	Sampling →							

Comments:

~ 1.5 gals purged from tubing @ 0845

FB Lot# 041422

SNL/NM Project Name: MWL		
Well ID: MWL-MW7	Date: 05/16/22	Date:
Pump Method: Portable	Pump Depth: 496'	

[illegible]

~ 1.5 gals purged from tubing @ 0852

smokey and hazy due to wild fires.

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

SNL/NM Project Name: MWL		
Well ID: MWL-MW9	Date: 05/17/22	Date:
Pump Method: Portable	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)
491.21	0833	Start	-----	-----	-----	-----	-----	-----	-----
493.26	0906	2	22.24	503.69	171.7	7.45	0.27	26.38	2.12
494.05	0922	4	22.12	597.56	177.3	7.45	0.34	20.24	1.62
494.37	0930	5	22.33	597.34	166.1	7.45	0.30	18.62	1.49
494.68	0938	6	22.22	595.14	162.4	7.45	0.37	17.29	1.39
494.91	0947	7	22.75	598.49	152.5	7.46	0.35	17.12	1.36
495.11	0954	8	22.90	604.21	152.5	7.46	0.45	15.23	1.21
495.32	1003	9	23.82	622.93	149.6	7.45	0.69	15.10	1.20
495.36	1013	10	24.07	625.59	145.1	7.45	0.60	14.06	1.09
495.36	1023	11	24.01	622.62	146.1	7.44	0.92	12.04	0.94
495.37	1026	11.25	24.08	626.79	145.2	7.45	0.89	15.48	1.18
495.38	1029	11.50	24.03	620.97	143.1	7.45	0.91	16.94	1.32
495.39	1032	11.75	23.85	628.31	143.3	7.45	0.71	14.95	1.17
	1033	Sampling →							

Comments:

~ 1.5 gals purged from tubing @ 0849

SNL/NM Project Name: MWL		
Well ID: MWL-MW8	Date: 05/18/22	Date:
Pump Method: Portable	Pump Depth: 497'	

[illegible]

~ 1.5 gals purged from tubing @ 0847

495.30' @ 1032

GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG

Page 1 of 2

SNL/NM Project Name: MWL						
Calibrations done by: R Lynch				Date: 05/12/22		
Make & Model: In-Situ Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (SN): NA						
pH Calibration/Check						
pH Calibrated to (std): NA				pH sloped to (std): NA		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	0629	4.00	23.84	7.00	23.84	10.00
2. Time (24 hr):	1315	4.01	24.38	6.99	24.42	10.01
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	1GK093		1GK095		1GI516	
Expiration Date.:	NOV/23		NOV/23		SEP/23	
SC Calibration/Check				ORP Calibration/Check		
Reference Value: 1413 uS/cm @ 25 C				Reference Value: 220 mV		
	Value	Temp		Value	Temp	
1. Time (24 hr):	0625	1379.5	23.78	1. Time (24 hr):	0635	220.0
2. Time (24 hr):	1314	1381.7	24.40	2. Time (24 hr):	1321	219.8
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	1GJ701		Expiration Date.:	OCT/22		Standard Lot No.:
				SEP/22		
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time (24 hr):	0622	81.59	27.03			
2. Time (24 hr):	1313	81.72	27.70			
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: 05/12/22	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 21090D000519	
Reference Value	10	20	100	800
Standard Lot No.	A1215R	A1215R	A1205	A1243
1. Time (24 hr): 0621	10.1	19.8	101	813
2. Time (24 hr): 1312	10.2	19.9	100	815
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: MWL						
Calibrations done by: R Lynch				Date: 05/16/22		
Make & Model: In-Situ Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (SN): NA						
pH Calibration/Check						
pH Calibrated to (std): NA				pH sloped to (std): NA		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	0630	4.01	23.82	7.00	23.79	10.01
2. Time (24 hr):	1252	4.02	24.40	7.01	24.39	10.02
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	1GK093		1GK095		1GI516	
Expiration Date.:	NOV/23		NOV/23		SEP/23	
SC Calibration/Check				ORP Calibration/Check		
Reference Value: 1413 uS/cm @ 25 C				Reference Value: 220 mV		
	Value	Temp		Value	Temp	
1. Time (24 hr):	0629	1369.8	23.71	1. Time (24 hr):	0628	219.5
2. Time (24 hr):	1257	1371.5	24.35	2. Time (24 hr):	1257	219.8
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	1GJ701	Expiration Date.:	OCT/22	Standard Lot No.:	1GL278	Expiration Date.:
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time (24 hr):	0627	81.75	28.27			
2. Time (24 hr):	1250	81.80	28.20			
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: 05/16/22	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 21090D000519	
Reference Value	10	20	100	800
Standard Lot No.	A1215R	A1215R	A1205	A1243
1. Time (24 hr): 0626	10.1	20.3	102	817
2. Time (24 hr): 1249	10.0	20.2	101	819
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: MWL						
Calibrations done by: R Lynch				Date: 05/17/22		
Make & Model: In-Situ Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (SN): NA						
pH Calibration/Check						
pH Calibrated to (std): NA				pH sloped to (std): NA		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	0634	4.00	23.69	7.02	23.60	10.00
2. Time (24 hr):	1309	4.01	24.51	7.01	24.49	10.01
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	1GK093		1GK095		1GI516	
Expiration Date.:	NOV/23		NOV/23		SEP/23	
SC Calibration/Check				ORP Calibration/Check		
Reference Value: 1413 uS/cm @ 25 C				Reference Value: 220 mV		
	Value	Temp		Value	Temp	
1. Time (24 hr):	0631	1387.3	23.57	1. Time (24 hr):	0630	221.1
2. Time (24 hr):	1308	1390.1	24.40	2. Time (24 hr):	1316	220.8
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	1GJ701	Expiration Date.:	OCT/22	Standard Lot No.:	1GL278	Expiration Date.:
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time (24 hr):	0629	81.61	27.80			
2. Time (24 hr):	1307	81.10	28.02			
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: 05/17/22	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 21090D000519	
Reference Value	10	20	100	800
Standard Lot No.	A1215R	A1215R	A1205	A1243
1. Time (24 hr): 0628	10.0	19.9	102	818
2. Time (24 hr): 1306	9.99	20.1	100	816
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: MWL						
Calibrations done by: R Lynch				Date: 05/18/22		
Make & Model: In-Situ Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571025						
Other (SN): NA						
pH Calibration/Check						
pH Calibrated to (std): NA			pH sloped to (std): NA			
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	0634	4.01	23.81	7.02	23.88	10.03
2. Time (24 hr):	1353	4.00	24.90	7.01	24.85	10.04
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	1GK093		1GK095		1GI516	
Expiration Date.:	NOV/23		NOV/23		SEP/23	
SC Calibration/Check			ORP Calibration/Check			
Reference Value: 1413 uS/cm @ 25 C			Reference Value: 220 mV			
	Value	Temp		Value	Temp	
1. Time (24 hr):	0633	1389.6	23.80	1. Time (24 hr):	0632	220.8
2. Time (24 hr):	1352	1397.4	24.83	2. Time (24 hr):	1359	219.6
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	1GJ701	Expiration Date.:	OCT/22	Standard Lot No.:	1GL278	Expiration Date.:
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time (24 hr):	0631	81.19	26.65			
2. Time (24 hr):	1351	81.35	26.67			
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: 05/18/22	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 21090D000519	
Reference Value	10	20	100	800
Standard Lot No.	A1215R	A1215R	A1205	A1243
1. Time (24 hr): 0630	9.98	20.2	100	816
2. Time (24 hr): 1350	10.0	20.1	101	818
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: MWL	Monitoring Well ID #: MWL Pre Decon	Date: 5/11/2022 Date:
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1807B-950	Water Level Indicator ID #: 362721	
Personnel Performing Decontamination:		
Zach Tenorio Print Name:	 Initial:	
Denisha Sanchez Print Name:	 Initial:	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 03/02/22 - 4/14/22	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L1L0 Expiration Date: 11/22



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Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: MWL	Monitoring Well ID #: MWL-BW2	Date: 5/12/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1807B-950	Water Level Indicator ID #: 362721	
Personnel Performing Decontamination:		
Robert Lynch Print Name: _____	 Initial: _____	
Denisha Sanchez Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 04/14/22 _____ _____	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: liquinox Lot Number: L1L0 Expiration Date: 11/22



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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: 5/16/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1807B-950	Water Level Indicator ID #: 362721	
Personnel Performing Decontamination:		
Robert Lynch Print Name: _____	 Initial: _____	
Denisha Sancel/hez Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 04/14/22 _____ _____	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L1L0 Expiration Date: 11/22



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Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: MWL	Monitoring Well ID #: MWL-MW9	Date: 5/17/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1807B-950	Water Level Indicator ID #: 362721	
Personnel Performing Decontamination:		
Robert Lynch Print Name: _____	 Initial: _____	
Denisha Sanchez Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 04/14/22 _____ _____	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L1F9 Expiration Date: 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.

Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: MWL	Monitoring Well ID #: MWL-MW8	Date: 5/18/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1807B-950	Water Level Indicator ID #: 362721	
Personnel Performing Decontamination:		
Robert Lynch Print Name: _____	 Initial: _____	
Denisha Sanchez Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 04/14/22 - 05/07/22 _____ _____	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L1F9 Expiration Date: 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
May 2022 Groundwater Samples

**Sample Summary for Mixed Waste Landfill Groundwater Monitoring
May 2022**

Sample ID	Sample Date	ARCOC	Sample Number	Sample Type	Associated Equipment Blank (ARCOC #/Sample #)	Associated Trip Blank (ARCOC #/ Sample #)	Associated Field Blank (ARCOC #/ Sample #)	Comments
GEL Analytical Data: Project Task # 195122.10.11.08, Service Order # CF01-22								
MWL-BW2	12-May-22	623291	117658	Environmental	623290 / 117655	623291 / 117660	623291 / 117657	
MWL-BW2	12-May-22	623291	117659	Duplicate	623290 / 117655	623291 / 117660	623291 / 117657	
MWL-MW7	16-May-22	623292	117662	Environmental	n/a	623292 / 117663	623292 / 117661	
MWL-MW8	18-May-22	623295	117667	Environmental	n/a	623295 / 117668	623295 / 117666	
MWL-MW9	17-May-22	623294	117670	Environmental	623294 / 118054	623294 / 117671	623294 / 117669	Equipment blank sample - radon only
MWL-EB1	11-May-22	623290	117655	Equipment Blank	n/a	623290 / 117656	n/a	Equipment blank sample prior to MWL-BW2.
MWL-EB2	17-May-22	623294	118054	Equipment Blank	n/a	n/a	n/a	Equipment blank sample prior to MWL-MW9. Radon only.
MWL-FB1	12-May-22	623291	117657	Field Blank	n/a	623291 / 117660	n/a	at MWL-BW2
MWL-FB2	16-May-22	623292	117661	Field Blank	n/a	623292 / 117663	n/a	at MWL-MW7
MWL-FB3	17-May-22	623294	117669	Field Blank	n/a	623294 / 117671	n/a	at MWL-MW9
MWL-FB4	18-May-22	623295	117666	Field Blank	n/a	623295 / 117668	n/a	at MWL-MW8
MWL-DIWQC	17-May-22	623293	117664	Field Blank	n/a	623293 / 117665	n/a	DI source water for equipment decontamination

Data Validation Reports For Environmental Samples

Groundwater Monitoring

May 2022

AR/COC NUMBER 623290

Memorandum

Date: June 22, 2022
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623290
SDG: 579613
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

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

1. The samples were received at a temperature $>10^{\circ}$ C. The associated sample results that were detects will be **qualified J,TP3** and those that were non-detect will be **qualified R,TP3**.
2. The initial calibration RRF was <0.050 but ≥ 0.010 for 2-butanone. The associated sample results were non-detect and will be **qualified UJ,I4**.
3. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for bromoform. The associated result for sample 579613001 was a detect and will be **qualified J,I3**.
4. Methylene chloride was detected at \leq the PQL in TB 1, sample -007, associated with sample -001. The associated sample result was a detect \leq the PQL and will be **qualified 5.0U,B1**; 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 except as noted above in the Summary section.

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows.

The initial calibration %RSD was >15% but ≤40% for bromoform. The associated result for sample -007 was non-detect and since no other calibration infractions occurred, will not be qualified.

The CCV %D was >20% with positive bias for vinyl acetate. The associated sample results were non-detect and will not be qualified.

Blanks

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

Bromoform was detected at ≤ the PQL and acetone, bromodichloromethane, chloroform and dibromochloromethane were detected at > the PQL in EB 1, sample -001 submitted on ARCO 623290 in this SDG and associated with samples on ARCO 623291 submitted in another SDG. No data from this SDG will be qualified.

Methylene chloride was also detected at ≤ the PQL in EB 1 but the EB result was qualified non-detect due to TB contamination and will not be applied to the associated field sample 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.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

A TB was submitted on ARCOG 623290. EB 1 was submitted on ARCOG 623290 in this SDG and was associated with the samples on ARCOG 623291 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: Mary Donovan **Level:** I **Date:** 06/22/2022

Memorandum

Date: June 22, 2022
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623290
SDG: 579613
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.

It should be noted that the MS analysis was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Replicate

The replicate met all QC acceptance criteria.

It should be noted that the replicate analysis was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

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 Al, Mg, Fe and Ca were < those in the ICS solutions.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

It should be noted that the serial dilution was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Other QC

EB 1 was submitted on ARCOG 623290 in this SDG and was associated with the sample on ARCOG 623291 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/22/2022

Memorandum

Date: June 22, 2022

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623290
SDG: 579613
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/SW846 9310 (gross alpha/beta), SM 7500 Rn B (Rn-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

All analyses:

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

Rn-222:

1. The sample was analyzed >1X but ≤2X past the method specified holding time. The associated sample result was < the associated MDA and will be **qualified BD,H1**.

Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times except as noted above in the Summary section 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 required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS and/or MSD for tritium and gross alpha/beta were performed on an SNL sample of similar matrix from another SDG. No sample results 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 an SNL sample of similar matrix from another SDG. No sample results will be qualified.

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

The LCS and/or LCSD met QC acceptance criteria.

Detection Limits/Dilutions

The sample was not diluted. All required detection limits were met.

Other QC

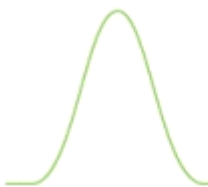
EB 1 was submitted on ARCOG 623290 in this SDG and was associated with the samples on ARCOG 623291 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/22/2022



Sample Findings Summary



AR/COC: 623290

Page 1 of 4

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	117655-004/MWL-EB 1	ALPHA (12587-46-1)	BD, FR3
	117655-004/MWL-EB 1	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	117655-003/MWL-EB 1	Americium-241 (14596-10-2)	BD, FR3
	117655-003/MWL-EB 1	Cesium-137 (10045-97-3)	BD, FR3
	117655-003/MWL-EB 1	Cobalt-60 (10198-40-0)	BD, FR3
	117655-003/MWL-EB 1	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	117655-005/MWL-EB 1	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	117655-006/MWL-EB 1	Radon-222 (14859-67-7)	BD, H1,FR3
SW846 8260D			
	117655-001/MWL-EB 1	1,1,1-Trichloroethane (71-55-6)	R, TP3
	117655-001/MWL-EB 1	1,1,2,2-Tetrachloroethane (79-34-5)	R, TP3
	117655-001/MWL-EB 1	1,1,2-Trichloroethane (79-00-5)	R, TP3
	117655-001/MWL-EB 1	1,1-Dichloroethane (75-34-3)	R, TP3
	117655-001/MWL-EB 1	1,1-Dichloroethylene (75-35-4)	R, TP3
	117655-001/MWL-EB 1	1,2-Dichloroethane (107-06-2)	R, TP3
	117655-001/MWL-EB 1	1,2-Dichloropropane (78-87-5)	R, TP3
	117655-001/MWL-EB 1	2-Butanone (78-93-3)	R, TP3,I4
	117655-001/MWL-EB 1	2-Hexanone (591-78-6)	R, TP3
	117655-001/MWL-EB 1	4-Methyl-2-pentanone (108-10-1)	R, TP3
	117655-001/MWL-EB 1	Acetone (67-64-1)	J-, TP3
	117655-001/MWL-EB 1	Benzene (71-43-2)	R, TP3
	117655-001/MWL-EB 1	Bromodichloromethane (75-27-4)	J-, TP3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	117655-001/MWL-EB 1	Bromoform (75-25-2)	J-, TP3,I3
	117655-001/MWL-EB 1	Bromomethane (74-83-9)	R, TP3
	117655-001/MWL-EB 1	Carbon disulfide (75-15-0)	R, TP3
	117655-001/MWL-EB 1	Carbon tetrachloride (56-23-5)	R, TP3
	117655-001/MWL-EB 1	Chlorobenzene (108-90-7)	R, TP3
	117655-001/MWL-EB 1	Chloroethane (75-00-3)	R, TP3
	117655-001/MWL-EB 1	Chloroform (67-66-3)	J-, TP3
	117655-001/MWL-EB 1	Chloromethane (74-87-3)	R, TP3
	117655-001/MWL-EB 1	cis-1,2-Dichloroethylene (156-59-2)	R, TP3
	117655-001/MWL-EB 1	cis-1,3-Dichloropropylene (10061-01-5)	R, TP3
	117655-001/MWL-EB 1	Dibromochloromethane (124-48-1)	J-, TP3
	117655-001/MWL-EB 1	Dichlorodifluoromethane (75-71-8)	R, TP3
	117655-001/MWL-EB 1	Ethylbenzene (100-41-4)	R, TP3
	117655-001/MWL-EB 1	Methylene chloride (75-09-2)	5.0UJ, TP3,B1
	117655-001/MWL-EB 1	Styrene (100-42-5)	R, TP3
	117655-001/MWL-EB 1	Tetrachloroethylene (127-18-4)	R, TP3
	117655-001/MWL-EB 1	Toluene (108-88-3)	R, TP3
	117655-001/MWL-EB 1	trans-1,2-Dichloroethylene (156-60-5)	R, TP3
	117655-001/MWL-EB 1	trans-1,3-Dichloropropylene (10061-02-6)	R, TP3
	117655-001/MWL-EB 1	Trichloroethylene (79-01-6)	R, TP3
	117655-001/MWL-EB 1	Vinyl acetate (108-05-4)	R, TP3
	117655-001/MWL-EB 1	Vinyl chloride (75-01-4)	R, TP3
	117655-001/MWL-EB 1	Xylenes (total) (1330-20-7)	R, TP3
	117656-001/MWL-TB 1	1,1,1-Trichloroethane (71-55-6)	R, TP3
	117656-001/MWL-TB 1	1,1,2,2-Tetrachloroethane (79-34-5)	R, TP3
	117656-001/MWL-TB 1	1,1,2-Trichloroethane (79-00-5)	R, TP3
	117656-001/MWL-TB 1	1,1-Dichloroethane (75-34-3)	R, TP3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	117656-001/MWL-TB 1	1,1-Dichloroethylene (75-35-4)	R, TP3
	117656-001/MWL-TB 1	1,2-Dichloroethane (107-06-2)	R, TP3
	117656-001/MWL-TB 1	1,2-Dichloropropane (78-87-5)	R, TP3
	117656-001/MWL-TB 1	2-Butanone (78-93-3)	R, TP3,I4
	117656-001/MWL-TB 1	2-Hexanone (591-78-6)	R, TP3
	117656-001/MWL-TB 1	4-Methyl-2-pentanone (108-10-1)	R, TP3
	117656-001/MWL-TB 1	Acetone (67-64-1)	R, TP3
	117656-001/MWL-TB 1	Benzene (71-43-2)	R, TP3
	117656-001/MWL-TB 1	Bromodichloromethane (75-27-4)	R, TP3
	117656-001/MWL-TB 1	Bromoform (75-25-2)	R, TP3
	117656-001/MWL-TB 1	Bromomethane (74-83-9)	R, TP3
	117656-001/MWL-TB 1	Carbon disulfide (75-15-0)	R, TP3
	117656-001/MWL-TB 1	Carbon tetrachloride (56-23-5)	R, TP3
	117656-001/MWL-TB 1	Chlorobenzene (108-90-7)	R, TP3
	117656-001/MWL-TB 1	Chloroethane (75-00-3)	R, TP3
	117656-001/MWL-TB 1	Chloroform (67-66-3)	R, TP3
	117656-001/MWL-TB 1	Chloromethane (74-87-3)	R, TP3
	117656-001/MWL-TB 1	cis-1,2-Dichloroethylene (156-59-2)	R, TP3
	117656-001/MWL-TB 1	cis-1,3-Dichloropropylene (10061-01-5)	R, TP3
	117656-001/MWL-TB 1	Dibromochloromethane (124-48-1)	R, TP3
	117656-001/MWL-TB 1	Dichlorodifluoromethane (75-71-8)	R, TP3
	117656-001/MWL-TB 1	Ethylbenzene (100-41-4)	R, TP3
	117656-001/MWL-TB 1	Methylene chloride (75-09-2)	J-, TP3
	117656-001/MWL-TB 1	Styrene (100-42-5)	R, TP3
	117656-001/MWL-TB 1	Tetrachloroethylene (127-18-4)	R, TP3
	117656-001/MWL-TB 1	Toluene (108-88-3)	R, TP3
	117656-001/MWL-TB 1	trans-1,2-Dichloroethylene (156-60-5)	R, TP3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	117656-001/MWL-TB 1	trans-1,3-Dichloropropylene (10061-02-6)	R, TP3
	117656-001/MWL-TB 1	Trichloroethylene (79-01-6)	R, TP3
	117656-001/MWL-TB 1	Vinyl acetate (108-05-4)	R, TP3
	117656-001/MWL-TB 1	Vinyl chloride (75-01-4)	R, TP3
	117656-001/MWL-TB 1	Xylenes (total) (1330-20-7)	R, TP3

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

Sandia Data Validation Summary Worksheet

ARCOG#: 623290	Site/Project: MWL LTMMP	Validation Date: 06/22/2022
SDG #: 579613	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 7	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
117655-001 MWL-EB 1	579613001	8260D	11° C	05/11/2022	05/18/2022	05/18/2022	Yes	No
117656-001 MWL-TB 1	579613007	8260D	11° C	05/11/2022	05/18/2022	05/18/2022	Yes	No
117655-006 MWL-EB 1	579613006	SM7500 Rn B	✓	05/11/2022	05/17/2022	05/17/2022	Yes	No

Comments: Collected: 05/11/2022

The ARCOG noted that the trip blank vials were received from the lab with headspace.

EB 1 was submitted on ARCOG 623290 in this SDG and was associated with samples on ARCOG 623291 submitted in another SDG

Validated by:



Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 623290	SDG: 579613	Matrix: Aqueous
Laboratory Sample IDs: 579613001, -007		
Method/Batch #s: 8260D 2267654	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 1 -007	5X (10X) TB	EB 1 -001	5X (10X) EB
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
Acetone	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	6.27	(62.7)
Methylene chloride	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	1.23J	(12.3)	0.84J	NA
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	5.45	27.3
Bromoform	NA	✓	17	✓	✓	NA	✓	✓	✓	✓	✓	✓	0.82J	4.1
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	23.6	118
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	3.75	18.8
2-Butanone	NA	0.027	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Vinyl acetate	NA	✓	✓	+28	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA

Surrogate Recovery Outliers

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

IS Outliers

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

Comments: HTs OK. Temp >10° C
 MS/MSD on SNL sample 579819002
 ICAL VOA6.1 03/07/22 Linear: Acetone, Methylene chloride

Sandia Inorganic Metals Worksheet

ARCOC #(s): 623290	SDG #(s): 579613	Matrix: Aqueous
Laboratory Sample IDs: 579613002		
Method/Batch #s: 3005A/6020B :2265749/2265750		

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 -002	
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L											
none																	

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

Comments: HTs OK
ICPMS: MS/DUP/SD performed on SNL sample 579819003.
ICS NA

<p>Comments: HTs OK except Rn-222 > 96 hours but <192 hours</p> <p>Note: No precision criteria apply to samples < the MDA including where one result is > the MDA and the other < MDA.</p> <p>Gross A/B: DUP, MS/MSD on SNL 579819005. Parent sample 151mL; DUP 150ml; MS/MSD 50.2/51ml; 3X dilution.</p> <p>GS: DUP on SNL sample 579819004</p> <p>Rn-222: LCS/LCSD, DUP on SNL sample 579819007.</p> <p>Tritium: DUP/MS on SNL 579819006</p>

SMO 2012-ARCO (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

 page 1 of 1
 ARCO 623290

Project Name: MWL LTMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08		Date Samples Shipped: 5/11/2022 SNL Shipper #: 347609 Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530		SMO Authorization: [Signature] SMO Contact Phone: Wendy Palencia/505.844.3132		Waste Characterization: No RMA: No 4° Celsius: Yes	
TA: Bldg: Room:		Last Chain: No Validation Req'd: Yes		Turnaround Time: 30 days EDD: Yes		SDG #: 579613	

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
117655 ✓	001	MWL-EB1	0	05/11/22 09:30	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMP (SW846-8260D)	001
117655 ✓	002	MWL-EB1	0	05/11/22 09:31	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMP - Cd, Cr, Ni, U	002
117655 ✓	003	MWL-EB1	0	05/11/22 09:32	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	003
117655 ✓	004	MWL-EB1	0	05/11/22 09:34	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	004
117655 ✓	005	MWL-EB1	0	05/11/22 09:35	DIW	AG	250 ml	None	G	EB	TRITIUM (EPA 906)	005
117655 ✓	006	MWL-EB1	0	05/11/22 09:36	DIW	G	2x40 ml	None	G	EB	RADON (SM7500 Rn B)	006
117656 ✓	001	MWL-TB1	0	05/11/22 09:30	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260D)	007

Sample Team Members	Name	Signature	Comments: Trip blanks received from lab with headspace.
	William Gibson	[Signature]	
	Robert Lynch	[Signature]	
	Denisha Sanchez	[Signature]	
Zachary Tenorio		[Signature]	

Relinquished by 3	Org. 8888	Date 5/11/22	Time 1010	Relinquished by	Org.	Date	Time
Received by [Signature]	Org. 0618	Date 5/11/22	Time 1010	Received by	Org.	Date	Time
Relinquished by [Signature]	Org. 0618	Date 5/11/22	Time 1105	Relinquished by	Org.	Date	Time
Received by [Signature]	Org.	Date 5/13/22	Time 1135	Received by	Org.	Date	Time

AR/COC NUMBER 623291

Memorandum

Date: June 27, 2022
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOG: 623291
SDG: 579819
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 8260D (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 ≥ 0.010 for 2-butanone. The associated sample results were non-detect and will be **qualified UJ,I4**.
2. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for bromoform. The associated result for sample 579819001 was a detect and will be **qualified J,I3**.
3. Methylene chloride was detected at \leq the PQL in TB2, sample -014, associated with samples -001, -002 and -008. The associated result for sample -008 was a detect \leq the PQL and will be **qualified 5.0U,B1**; non-detect at the PQL.

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

Holding Times and Preservation

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

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows.

The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for bromoform. All associated sample results, *except* the result for sample -001, were non-detect and since no other calibration infractions occurred for this compound, will not be qualified.

The CCV %D was $>20\%$ with positive bias for vinyl acetate. The associated sample results were non-detect and will not be qualified.

Blanks

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

Bromoform and acetone were detected at \leq the PQL and bromodichloromethane, chloroform and dibromochloromethane were detected at $>$ the PQL in FB1, sample -001, associated with samples -002 and -008. The associated sample results were non-detect and will not be qualified.

Methylene chloride was detected at \leq the PQL in TB2, sample -014, associated with samples -001, -002 and -008. The associated results for samples -001 and -002 were non-detect and will not be qualified.

Bromoform was detected at \leq the PQL and acetone, bromodichloromethane, chloroform and dibromochloromethane were detected at $>$ the PQL in EB 1, sample 579613001 submitted on ARCOG 623290 in another SDG and associated with samples on ARCOG 623291 submitted in this SDG. The associated sample results were non-detect and will not be qualified.

Methylene chloride was also detected at \leq the PQL in EB 1 but the EB result was qualified non-detect due to TB contamination and will not be applied to the associated field sample results.

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

A TB and an FB were submitted on ARCOC 623291 and were associated with the samples on the same ARCOC. EB 1 was submitted on ARCOC 623290 in another SDG and was associated with the samples on ARCOC 623291 submitted in this SDG. A field duplicate pair was submitted on ARCOC 623291. 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: Mary Donovan **Level:** I **Date:** 06/28/2022

Memorandum

Date: June 28, 2022
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623291
SDG: 579819
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 Al, Mg, Fe and Ca were < those in the ICS solutions.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

EB 1 was submitted on ARCOG 623290 in another SDG and was associated with the samples on ARCOG 623291 submitted in this SDG. A field duplicate pair was submitted on ARCOG 623291. 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: 06/28/2022

Memorandum

Date: June 28, 2022

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623291
SDG: 579819
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/SW846 9310 (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:

1. The sample results that were < the associated 2-sigma TPU and/or < the associated MDA will be **qualified BD,FR3**.
2. The K-40 result for sample 579819004 was \geq the MDA but <3X the MDA and will be **qualified J,FR7**.

Tritium:

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

Rn-222:

1. The samples were analyzed >1X but \leq 2X past the method specified holding time. The associated sample results were \geq the MDA and will be **qualified J,H1**.

Holding Times and Preservation

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

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 required.

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/Laboratory Control Sample Duplicate (LCS/LCSD)

The LCS and/or LCSD met QC acceptance criteria.

Detection Limits/Dilutions

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

Other QC

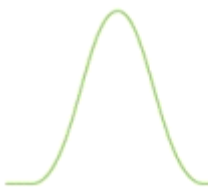
EB 1 was submitted on ARCOG 623290 in another SDG and was associated with the samples on ARCOG 623291 submitted in this SDG. A field duplicate pair was submitted on ARCOG 623291. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/28/2022



Sample Findings Summary



AR/COC: 623291

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	117658-003/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	117658-003/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3
	117658-003/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	117658-003/MWL-BW2	Potassium-40 (13966-00-2)	J, FR7
	117659-003/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	117659-003/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3
	117659-003/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	117659-003/MWL-BW2	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	117658-005/MWL-BW2	Tritium (10028-17-8)	BD, FR3
	117659-005/MWL-BW2	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	117658-006/MWL-BW2	Radon-222 (14859-67-7)	J, H1
	117659-006/MWL-BW2	Radon-222 (14859-67-7)	J, H1
SW846 8260D			
	117657-001/MWL-FB1	2-Butanone (78-93-3)	UJ, I4
	117657-001/MWL-FB1	Bromoform (75-25-2)	J, I3
	117658-001/MWL-BW2	2-Butanone (78-93-3)	UJ, I4
	117659-001/MWL-BW2	2-Butanone (78-93-3)	UJ, I4
	117659-001/MWL-BW2	Methylene chloride (75-09-2)	5.0U, B1
	117660-001/MWL-TB2	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#: 623291	Site/Project: MWL LTMMP	Validation Date: 06/27/2022
SDG #: 579819	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 14	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
117658-006 MWL-BW2	579819007	SM 7500 Rn B	✓	5/12/22 10:59	5/17/22 06:25	5/17/22 06:25	Yes	No
117659-006 MWL-BW2	579819013	SM 7500 Rn B	✓	5/12/22 11:00	5/17/22 06:41	5/17/22 06:41	Yes	No

Comments: Collected: 05/12/2022

The ARCOG noted that the trip blank vials were received from the lab with headspace.

EB 1 was submitted on ARCOG 623290 in another SDG and was associated with samples on ARCOG 623291 submitted in this SDG

Validated by:



Sandia Organic Worksheet (GC/MS VOC)

ARCOG #(s): 623291	SDG: 579819	Matrix: Aqueous
Laboratory Sample IDs: 579819001, -002, -008, -014		
Method/Batch #s: 8260D 2267654	Tuning (pass/fail): pass	TICs Required? (yes/no): no

[illegible][illegible][illegible]

Comments: HTs OK.
MS/MSD on -002
ICAL VOA6.I 03/07/22 Linear: Acetone, Methylene chloride

Sandia Inorganic Metals Worksheet

ARCOG #(s): 623291	SDG #(s): 579819	Matrix: Aqueous
Laboratory Sample IDs: 579819003, -009		
Method/Batch #s: 3005A/6020B : 2265749/2265750		

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 579613 -002	
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L											
none																	

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

Comments: HTs OK
ICPMS: MS/DUP/SD performed on -003
ICS NA

<p>Comments: HTs OK except Rn-222 > 96 hours but <192 hours</p> <p>Note: No precision criteria apply to samples < the MDA including where one result is > the MDA and the other < MDA.</p> <p>Gross A/B: DUP, MS/MSD -005. Parent sample 151mL; DUP 150ml; MS/MSD 50.2/51ml; 3X dilution.</p> <p>GS: DUP on -004</p> <p>Rn-222: LCS/LCSD, DUP on -007.</p> <p>Tritium: DUP/MS on -006</p>
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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

 page 1 of 2
 ARCO **623291**

SMO Use Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08		Date Samples Shipped: <u>5/12/2022</u> SNL Shipper #: <u>347615</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530		SMO Authorization: <u>[Signature]</u> SMO Contact Phone: Wendy Palencia/505.844.3132		Waste Characterization: No RMA: No 4° Celsius: Yes						
TA: Bldg: Room:		Last Chain: No Validation Req'd: Yes		Turnaround Time: 30 days EDD: Yes		SDG #: <u>579819</u>						
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
117657	✓ 001	MWL-FB1	0	05/12/22 10:21	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260D)	<u>001</u>
117658	✓ 001	MWL-BW2	496	05/12/22 10:57	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260D)	<u>002</u>
117658	✓ 002	MWL-BW2	496	05/12/22 11:01	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	<u>003</u>
117658	✓ 003	MWL-BW2	496	05/12/22 11:03	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<u>004</u>
117658	✓ 004	MWL-BW2	496	05/12/22 11:05	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<u>005</u>
117658	✓ 005	MWL-BW2	496	05/12/22 11:07	GW	AG	250 ml	None	G	SA	TRITIUM (EPA 906)	<u>006</u>
117658	✓ 006	MWL-BW2	496	05/12/22 10:59	GW	G	2x40 ml	None	G	SA	RADON (SM7500 Rn B)	<u>007</u>
117659	✓ 001	MWL-BW2	496	05/12/22 10:58	GW	G	3x40 ml	HCl	G	DU	VOC-LTMMMP (SW846-8260D)	<u>008</u>
117659	✓ 002	MWL-BW2	496	05/12/22 11:02	GW	P	500 ml	HNO3	G	DU	METALS, LTMMMP - Cd, Cr, Ni, U	<u>009</u>
117659	✓ 003	MWL-BW2	496	05/12/22 11:04	GW	P	1 L	HNO3	G	DU	GAMMA SPEC, SHORT LIST (EPA 901)	<u>010</u>
Sample Team Members William Gibson Robert Lynch Denisha Sanchez Zachary Tenorio		Signature <u>[Signatures]</u>		Comments: Trip blanks received from lab with headspace.								
Relinquished by <u>[Signature]</u>		Org. <u>8888</u> Date <u>5-12-22</u> Time <u>1146</u>		Relinquished by		Org.		Date		Time		
Received by <u>[Signature]</u>		Org. <u>0618</u> Date <u>5/12/22</u> Time <u>1148</u>		Received by		Org.		Date		Time		
Relinquished by <u>[Signature]</u>		Org. <u>0618</u> Date <u>5/12/22</u> Time <u>1230</u>		Relinquished by		Org.		Date		Time		
Received by <u>[Signature]</u>		Org. Date <u>5/13/22</u> Time <u>735</u>		Received by		Org.		Date		Time		

AR/COC NUMBER 623292

Memorandum

Date: June 28, 2022
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623292
SDG: 580112
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 8260D (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 ≥ 0.010 for 2-butanone. The associated sample results were non-detect and will be **qualified UJ,I4**.
2. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for bromoform. The associated result for sample 580112001 was a detect and will be **qualified J,I3**.
3. Methylene chloride was detected at \leq the PQL in TB3, sample -008, associated with samples -001 and -002. The associated sample results were detects \leq the PQL and will be **qualified 5.0U,B1**; non-detect at the PQL.

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

Holding Times and Preservation

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

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows.

The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for bromoform. The associated results for samples -002 and -008 were non-detect and since no other calibration infractions occurred for this compound, will not be qualified.

The CCV %D was $>20\%$ with positive bias for vinyl acetate. The associated sample results were non-detect and will not be qualified.

Blanks

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

Bromoform and acetone were detected at \leq the PQL and bromodichloromethane, chloroform and dibromochloromethane were detected at $>$ the PQL in FB2, sample -001 associated with sample -002. The associated sample results were non-detect and will not be qualified.

Methylene chloride was also detected at \leq the PQL in FB2 but the FB result was qualified non-detect due to TB contamination and will not be applied to the associated field sample 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.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

A TB was submitted on ARCOC 623292. FB2 was submitted on ARCOC 623292 and was associated with the field 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: Mary Donovan

Level: I

Date: 06/28/2022

Memorandum

Date: June 28, 2022
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623292
SDG: 580112
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 Al, Mg, Fe and Ca were < those in the ICS solutions.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/28/2022

Memorandum

Date: June 28, 2022

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623292
SDG: 580112
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/SW846 9310 (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 that were < the associated 2-sigma TPU and/or < the associated MDA will be **qualified BD,FR3**.

Rn-222:

1. The sample result was \geq the associated 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.

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 required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS and/or MSD for tritium and gross alpha/beta were performed on an SNL sample of similar matrix from another SDG. No sample results will be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met. It should be noted that the replicate analyses for all target analytes *except* gamma spec were performed on SNL samples of similar matrix from other SDGs. No sample results will be qualified.

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

The LCS and/or LCSD met QC acceptance criteria.

Detection Limits/Dilutions

The sample was not diluted. All required detection limits were met.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 06/28/2022



Sample Findings Summary



AR/COC: 623292

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	117662-003/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	117662-003/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	117662-003/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	117662-003/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	117662-005/MWL-MW7	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	117662-006/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
SW846 8260D			
	117661-001/MWL-FB2	2-Butanone (78-93-3)	UJ, I4
	117661-001/MWL-FB2	Bromoform (75-25-2)	J, I3
	117661-001/MWL-FB2	Methylene chloride (75-09-2)	5.0U, B1
	117662-001/MWL-MW7	2-Butanone (78-93-3)	UJ, I4
	117662-001/MWL-MW7	Methylene chloride (75-09-2)	5.0U, B1
	117663-001/MWL-TB3	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#: 623292	Site/Project: MWL LTMMP	Validation Date: 06/28/2022
SDG #: 580112	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 8	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

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

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

Comments: Collected: 05/16/2022

The ARCOG noted that the trip blank vials were received from the lab with headspace.

Validated by:



Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 623292	SDG: 580112	Matrix: Aqueous
Laboratory Sample IDs: 580112001, -002, -008		
Method/Batch #s: 8260D 2267654	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	FB2 -001	5X (10X) FB	TB3 -008	5X (10X) TB
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
Acetone	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	3.43J	(34.3)	✓	NA
Methylene chloride	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.77J	NA	0.84J	(8.4)
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	5.52	27.6	✓	NA
Bromoform	NA	✓	17	✓	✓	NA	✓	✓	✓	✓	0.86J	4.3	✓	NA
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	24.8	124	✓	NA
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	3.87	19.4	✓	NA
2-Butanone	NA	0.027	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Vinyl acetate	NA	✓	✓	+28	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA

Surrogate Recovery Outliers

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

IS Outliers

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

Comments: HTs OK.

MS/MSD on SNL sample 579819002

ICAL VOA6.I 03/07/22 Linear: Acetone, Methylene chloride

Sandia Inorganic Metals Worksheet

ARCOC #(s): 623292	SDG #(s): 580112	Matrix: Aqueous
Laboratory Sample IDs: 580112003		
Method/Batch #s: 3005A/6020B : 2267427/2267428		

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 ²	ICV	CCV	ICB ug/L	CCB ug/L											
none																	

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

Comments: HTs OK
ICPMS: MS/DUP/SD performed on -003.
ICS NA

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

Tritium: DUP/MS on SNL 579819006

SMO 2012-ARCOG (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY



AOP 95-16




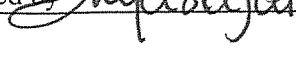
 page 1 of 1
 ARCOG **623292**

SMO Use

Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: <u>5/16/22</u> SNL Shipper #: <u>347806</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: <u>CG</u> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: No Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: <u>580112</u>

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
117661 ✓	001	MWL-FB2	0	05/16/22 09:47	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260D)	001
117662 ✓	001	MWL-MW7	496	05/16/22 10:07	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260D)	002
117662 ✓	002	MWL-MW7	496	05/16/22 10:09	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	003
117662 ✓	003	MWL-MW7	496	05/16/22 10:10	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
117662 ✓	004	MWL-MW7	496	05/16/22 10:11	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
117662 ✓	005	MWL-MW7	496	05/16/22 10:12	GW	AG	250 ml	None	G	SA	TRITIUM (EPA 906)	006
117662 ✓	006	MWL-MW7	496	05/16/22 10:08	GW	G	2x40 ml	None	G	SA	RADON (SM7500 Rn B)	007
117663 ✓	001	MWL-TB3	0	05/16/22 09:47	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260D)	008

Sample Team Members	Name	Signature	Comments: Trip blanks received from lab with headspace.
	Robert Lynch		
	Denisha Sanchez		

Relinquished by 	Org. 8888	Date 5-16-22	Time 1045	Relinquished by	Org.	Date	Time
Received by 	Org. 0618	Date 5/16/22	Time 1045	Received by	Org.	Date	Time
Relinquished by 	Org. 0618	Date 5/16/22	Time 1130	Relinquished by	Org.	Date	Time
Received by 	Org.	Date 5/17/22	Time 910	Received by	Org.	Date	Time

AR/COC NUMBERS 623293, 623294

Memorandum

Date: June 22, 2022
To: File
From: Mary Donovan
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623293 and 623294
SDG: 580227
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 8260D (VOCs). 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 580227005, the intercepts were negative with absolute values > the MDL but $\leq 3X$ the MDL for acetone, chloromethane and methylene chloride. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. For the ICAL associated with sample -005, the intercept was negative with an absolute value > the MDL but $\leq 3X$ the MDL for methylene chloride. The associated sample result was 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.

For the ICAL calibration associated with all samples *except* sample -005, the intercepts were positive and > the MDL for bromodichloromethane; cis-1,3-dichloropropylene; trans-1,3-dichloropropylene; 2-hexanone; dibromochloromethane; styrene and bromoform. The associated sample results were either non-detect or detects >3X the value of the intercept and will not be qualified.

For the ICAL calibration associated with sample -005, the intercepts were positive and > the MDL for trans-1,3-dichloropropylene; 2-hexanone; dibromochloromethane and bromoform. The associated sample results were non-detect and will not be qualified.

For the CCV associated with sample -005, the %D was >20% with positive bias for bromomethane. The associated sample result was non-detect and will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as follows.

Bromodichloromethane, chloroform and dibromochloromethane were detected at > the PQL in the DIWQC sample, sample -001. No field sample results were qualified.

Bromodichloromethane, chloroform and dibromochloromethane were detected at > the PQL in FB3, sample -004, associated with sample -005. 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

TBs were submitted on both ARCOCs. A DIWQC sample was submitted on ARCOC 623293 and was the DI source water for equipment decontamination. FB3 was submitted on ARCOC 623294 and was associated with the field 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: 06/28/2022

Memorandum

Date: June 23, 2022
To: File
From: Mary Donovan
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623293 and 623294
SDG: 580227
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 a CCB bracketing the samples. The associated sample results were either non-detect or a detect $>$ the PQL and $>5X$ the CCB value and will not be qualified.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met all QC acceptance criteria.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

ICP Interference Check Sample (ICS A and AB)

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

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

A DIWQC sample was submitted on ARCO 623293 and was the DI source water for equipment decontamination.

No other specific issues that affect data quality were identified.

Reviewed by: Linda Thal

Level: I

Date: 06/28/2022

Memorandum

Date: June 23, 2022

To: File

From: Mary Donovan

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623294
SDG: 580227
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/SW846 9310 (gross alpha/beta) and EPA 906.0 modified (tritium) and two samples were prepared and analyzed with approved procedures using method SM 7500 Rn B (Rn-222). Problems were identified with the data package that resulted in the qualification of data.

Gamma spec, Tritium and Rn-222:

1. The sample results that were < the associated 2-sigma TPU and/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 required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS and/or MSD for tritium and gross alpha/beta were performed on an SNL sample of similar matrix from another SDG. No sample results will be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met. It should be noted that the replicate analyses for all target analytes *except* Rn-222 were performed on SNL samples of similar matrix from other SDGs. No sample results will be qualified.

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

The LCS and/or LCSD met QC acceptance criteria.

Detection Limits/Dilutions

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

Other QC

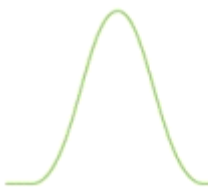
EB2 was submitted for Rn-222 analysis on ARCOC 623294 and was associated with sample 580227010 on the same ARCOC.

No other specific issues that affect data quality were identified.

Reviewed by: Linda Thal

Level: I

Date: 06/28/2022



Sample Findings Summary



AR/COC: 623293, 623294

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	117670-003/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	117670-003/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3
	117670-003/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	117670-003/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	117670-005/MWL-MW9	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	118054-001/MWL-EB2	Radon-222 (14859-67-7)	BD, FR3
SW846 8260D			
	117664-001/MWL-DIWQC	Acetone (67-64-1)	UJ, I5
	117664-001/MWL-DIWQC	Chloromethane (74-87-3)	UJ, I5
	117664-001/MWL-DIWQC	Methylene chloride (75-09-2)	UJ, I5
	117665-001/MWL-TB4	Acetone (67-64-1)	UJ, I5
	117665-001/MWL-TB4	Chloromethane (74-87-3)	UJ, I5
	117665-001/MWL-TB4	Methylene chloride (75-09-2)	UJ, I5
	117669-001/MWL-FB3	Acetone (67-64-1)	UJ, I5
	117669-001/MWL-FB3	Chloromethane (74-87-3)	UJ, I5
	117669-001/MWL-FB3	Methylene chloride (75-09-2)	UJ, I5
	117670-001/MWL-MW9	Methylene chloride (75-09-2)	UJ, I5
	117671-001/MWL-TB5	Acetone (67-64-1)	UJ, I5
	117671-001/MWL-TB5	Chloromethane (74-87-3)	UJ, I5
	117671-001/MWL-TB5	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#: 623293 and 623294	Site/Project: MWL LTMMP	Validation Date: 06/22/2022
SDG #: 580227	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 12	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: 05/17/2022

The ARCOCs noted that the trip blank vials were received from the lab with headspace.

EB2 was submitted on ARCOG 623294 for Rn-222 analysis only and was associated with the field sample on the same ARCOG.

Validated by:

Mary A. Donovan

Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 623293 and 623294	SDG: 580227	Matrix: Aqueous
Laboratory Sample IDs: 580227001, -003, -004, -005*, -011		
Method/Batch #s: 8260D 2268130	Tuning (pass/fail): pass	TICs Required? (yes/no): no

Analyte (outliers)	Calibration				MB	5X (10X) MB	LCS %R	MS %R	MSD %R	MS/ MSD RPD	TB 4 -003 TB5 -011	DIW QC -001	FB3 -004	5X (10X) FB3
	Int.	RF/ Slope	RSD/ r ²	(ICV)/CCV %D										
ICAL VOA2.I 03/31/22														
Bromodichloromethane	+0.51	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	5.44	5.24	26.2
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	23.8	23.2	116
Dibromochloromethane	+0.70	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	3.55	3.53	17.4
Chloromethane	-0.85	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Acetone	-4.81	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Methylene chloride	-1.15	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
cis-1,3-Dichloropropylene	+0.50	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
trans-1,3-Dichloropropylene	+0.46	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
2-Hexanone	+2.78	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Styrene	+0.65	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Bromoform	+1.00	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
*ICAL VOA2.I 05/21/22														
Methylene chloride	-0.52	✓	✓	✓	✓	NA	✓	✓	✓	✓				
trans-1,3-Dichloropropylene	+0.37	✓	✓	✓	✓	NA	✓	✓	✓	✓				
2-Hexanone	+1.94	✓	✓	✓	✓	NA	✓	✓	✓	✓				
Dibromochloromethane	+0.37	✓	✓	✓	✓	NA	✓	✓	✓	✓				
Bromoform	+0.82	✓	✓	✓	✓	NA	✓	✓	✓	✓				
Bromomethane	NA	✓	✓	+22	✓	NA	✓	✓	✓	✓				
Surrogate Recovery Outliers														
Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R		Sample ID	1,2-DCA-d4 %R	Toluene-d8 %R	BFB %R						
None														
IS Outliers														
	FBZ		Chl-d5		1,4-DCB-d4									
Sample ID	Area	RT	Area	RT	Area	RT								
None														

Comments: HTs OK.

MS/MSD on sample -005

Samples -001, -003, -004 and -011 - ICAL VOA2.I 03/31/22 Linear: Dichlorodifluoromethane; Chloromethane; Acetone; Methylene chloride; Bromodichloromethane; cis-1,3-Dichloropropylene; trans-1,3-Dichloropropylene; 2-Hexanone; Dibromochloromethane; Styrene; Bromoform

Sample -005, MS, MSD - ICAL VOA2.I 05/21/22 Linear: Dichlorodifluoromethane; Vinyl chloride; Acetone; Methylene chloride; trans-1,3-Dichloropropylene; 2-Hexanone; Dibromochloromethane; Bromoform

Sandia Inorganic Metals Worksheet

ARCOC #(s): 623293 and 623294	SDG #(s): 580227	Matrix: Aqueous
Laboratory Sample IDs: 580227002, -006		
Method/Batch #s: 3005A/6020B :2267589/2267590		

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	DIWQC -002	
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L											
U	NA	✓	✓	✓	✓	0.146J	✓	0.0007	✓	✓	✓	✓	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
ICPMS: MS/DUP/SD performed on sample -006.
ICS NA

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDC	LCS %R	LCSD %R	LCS/ LCSD RPD	MS %R	MSD %R	MS/ MSD RER	Lab Rep. RER	Rep RPD	EB2 -012
none													
Tracer/Carrier Recovery Outliers													
Sample ID	Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	
NA													

Note: No precision criteria apply to samples < the MDA including where one result is > the MDA and the other < MDA.


GS: DUP on SNL sample 580112004

Rn-222: LCS/LCSD, DUP on sample -010


Tritium: DUP/MS on SNL 579819006

SMO Use

ARCOOC 623293

Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: 5/17/22 SNL Shipper #: 347878 Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization:  SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: No Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: 580227

[illegible]

Sample Team Members	Name	Signature	Comments: Trip blanks received from lab with head space.
	Robert Lynch		
	Denisha Sanchez		

Relinquished by <u>[Signature]</u> Org. <u>8888</u> Date <u>5-17-22</u> Time <u>1130</u>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <u>[Signature]</u> Org. <u>0018</u> Date <u>5/17/22</u> Time <u>1130</u>	Received by _____ Org. _____ Date _____ Time _____
Relinquished by <u>[Signature]</u> Org. <u>0018</u> Date <u>5/17/22</u> Time <u>1130</u>	Relinquished by _____ Org. _____ Date _____ Time _____
Received by <u>[Signature]</u> Org. _____ Date <u>5/18/22</u> Time <u>930</u>	Received by _____ Org. _____ Date _____ Time _____

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

page 1 of 1
ARCOC **623294**

SMO Use		ARCOC	
Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08		Date Samples Shipped: <u>5/17/22</u> SNL Shipper #: <u>347878</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	
SMO Authorization: <u>[Signature]</u> SMO Contact Phone: Wendy Palencia/505.844.3132		Waste Characterization: No RMA: No 4° Celsius: Yes	
TA: Bldg: Room:		Last Chain: No Validation Req'd: Yes	
Turnaround Time: 30 days EDD: Yes		SDG #: <u>580227</u>	

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
117669	✓ 001	MWL-FB3	0	05/17/22 09:11	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260D)	<u>004</u>
117670	✓ 001	MWL-MW9	497	05/17/22 09:13	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260D)	<u>005</u>
117670	✓ 002	MWL-MW9	497	05/17/22 09:14	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	<u>006</u>
117670	✓ 003	MWL-MW9	497	05/17/22 09:15	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	<u>007</u>
117670	✓ 004	MWL-MW9	497	05/17/22 09:16	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	<u>008</u>
117670	✓ 005	MWL-MW9	497	05/17/22 09:17	GW	AG	250 ml	None	G	SA	TRITIUM (EPA 906)	<u>009</u>
117670	✓ 006	MWL-MW9	497	05/17/22 09:12	GW	G	2x40 ml	None	G	SA	RADON (SM7500 Rn B)	<u>010</u>
117671	✓ 001	MWL-TB5	0	05/17/22 09:11	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260D)	<u>011</u>
118054	✓ 001	MWL-EB2	0	05/17/22 08:40	DIW	G	2x40 ml	None	G	EB	RADON (SM7500 Rn B)	<u>012</u>

Sample Team Members	Name	Signature	Comments: Trip blanks received from lab with head space.
	Robert Lynch	<u>[Signature]</u>	
	Denisha Sanchez	<u>[Signature]</u>	

Relinquished by <u>[Signature]</u> Org. <u>8888</u> Date <u>5-17-22</u> Time <u>1130</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u> Org. <u>0618</u> Date <u>5/17/22</u> Time <u>1130</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u> Org. <u>0618</u> Date <u>5/17/22</u> Time <u>1330</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u> Org. <u>0618</u> Date <u>5/18/22</u> Time <u>930</u>	Received by	Org.	Date	Time

AR/COC NUMBER 623295

Memorandum

Date: June 23, 2022

To: File

From: Mary Donovan

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623295
SDG: 580366
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 8260D (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 ≥ 0.010 for 2-butanone. The associated sample results were non-detect and will be **qualified UJ,I4**.
2. The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for bromoform. The associated result for sample 580366001 was a detect and will be **qualified J,I3**.

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

Holding Times and Preservation

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

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows.

The initial calibration %RSD was $>15\%$ but $\leq 40\%$ for bromoform. The associated results for samples -002 and -008 were non-detect and since no other calibration infractions occurred for these compounds, will not be qualified.

The CCV %D was $>20\%$ with positive bias for vinyl acetate. The associated sample results were non-detect and will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as follows.

Bromoform was detected at \leq the PQL and bromodichloromethane, chloroform and dibromochloromethane were detected at $>$ the PQL in FB4, 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

A TB was submitted on ARCO 623295. FB4 was submitted on ARCO 623295 and was associated with the field sample on the same ARCO.

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: 06/28/2022

Memorandum

Date: June 23, 2022
To: File
From: Mary Donovan
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623295
SDG: 580366
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 Al, Mg, Fe and Ca were < those in the ICS 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: 06/28/2022

Memorandum

Date: June 23, 2022

To: File

From: Mary Donivan

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623295
SDG: 580366
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/SW846 9310 (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 that were < the associated 2-sigma TPU and/or < the associated MDA will be **qualified BD,FR3**.

Rn-222:

1. The associated result for sample 580366007 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 required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. It should be noted that the MS and/or MSD for tritium and gross alpha/beta were performed on an SNL sample of similar matrix from another SDG. No sample results 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 sample results will be qualified.

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

The LCS and/or LCSD met QC acceptance criteria.

Detection Limits/Dilutions

The sample was not diluted. All required detection limits were met.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Linda Thal

Level: I

Date: 06/28/2022



Sample Findings Summary



AR/COC: 623295

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	117667-003/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	117667-003/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	117667-003/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	117667-003/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	117667-005/MWL-MW8	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	117667-006/MWL-MW8	Radon-222 (14859-67-7)	J, FR7
SW846 8260D			
	117666-001/MWL-FB4	2-Butanone (78-93-3)	UJ, I4
	117666-001/MWL-FB4	Bromoform (75-25-2)	J, I3
	117667-001/MWL-MW8	2-Butanone (78-93-3)	UJ, I4
	117668-001/MWL-TB6	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#: 623295	Site/Project: MWL LTMMP	Validation Date: 06/23/2022
SDG #: 580366	Laboratory: GEL Laboratories, LLC	Validator: Mary Donovan
Matrix: Aqueous	# of Samples: 8	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad		

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

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

Comments: Collected: 05/18/2022

The ARCOG noted that the trip blank vials were received from the lab with headspace.

Validated by:

Mary A. Donovan

Sandia Inorganic Metals Worksheet

ARCOC #(s): 623295	SDG #(s): 580366	Matrix: Aqueous
Laboratory Sample IDs: 580366003		
Method/Batch #s: 3005A/6020B :2267988/2267989		

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 ²	ICV	CCV	ICB ug/L	CCB ug/L											
none																	

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

Comments: HTs OK
ICPMS: MS/DUP/SD performed on sample -003.
ICS NA

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

Note: No precision criteria apply to samples < the MDA including where one result is > the MDA and the other < MDA.

Gross A/B: DUP, MS/MSD on SNL 579819005. Parent sample 151mL; DUP 150ml; MS/MSD 50.2/51ml; 3X dilution.

GS: DUP on SNL sample 580112004

Rn-222: LCS/LCSD, DUP on SNL sample 580227010

Tritium: DUP/MS on SNL 579819006

SMO 2012-ARCO (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

page 1 of 1
ARCO 623295

Project Name: MWL LTMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08		Date Samples Shipped: 5/18/2022 SNL Shipper #: 342982 Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530		SMO Authorization: <i>[Signature]</i> SMO Contact Phone: Wendy Palencia/505.844.3132		Waste Characterization: No RMA: No 4° Celsius: Yes	
TA: Bldg: Room:		Last Chain: Yes Validation Req'd: Yes		Turnaround Time: 30 days EDD: Yes		SDG #: 580366	

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
117666	001	MWL-FB4	0	05/18/22 09:51	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260D)	001
117667	001	MWL-MW8	497	05/18/22 10:18	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260D)	002
117667	002	MWL-MW8	497	05/18/22 10:20	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	003
117667	003	MWL-MW8	497	05/18/22 10:21	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
117667	004	MWL-MW8	497	05/18/22 10:22	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
117667	005	MWL-MW8	497	05/18/22 10:23	GW	AG	250 ml	None	G	SA	TRITIUM (EPA 906)	006
117667	006	MWL-MW8	497	05/18/22 10:19	GW	G	2x40 ml	None	G	SA	RADON (SM7500 Rn B)	007
117668	001	MWL-TB6	0	05/18/22 09:51	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260D)	008

Sample Team Members	Name	Signature	Comments: Trip blanks received from lab with head space.
	Robert Lynch	<i>[Signature]</i>	
	Denisha Sanchez	<i>[Signature]</i>	

Relinquished by <i>[Signature]</i>	Org. 8888	Date 5-18-22	Time 1100	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. 0618	Date 5-18-22	Time 1100	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. 0618	Date 5/18/22	Time 1200	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date 5/19/22	Time 725	Received by	Org.	Date	Time

Contract Verification Review Forms
Mixed Waste Landfill Groundwater Monitoring
May 2022

AR/COC Number	Sample Type
623290	Quality Control
623291	Environmental & Quality Control
623292	Environmental & Quality Control
623293	Quality Control
623294	Environmental & Quality Control
623295	Environmental & Quality Control

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.

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOG No. 623290

Analytical Lab GEL

SDG No. 579613

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	X		
1.2	Container type(s) correct for analyses requested	X		
1.3	Sample volume adequate for # and types of analyses requested	X		
1.4	Preservative correct for analyses requested	X		
1.5	Custody records continuous and complete	X		
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X		
1.7	Date samples received	X		
1.8	Condition upon receipt information provided	X		Samples received at lab out of temperature specs due to FedEx delay

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	Radon sample 117655-006 analyzed past holding time
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, bromodichloromethane, bromoform, chloroform, dibromochloromethane and methylene chloride detected in MWL-EB 1. Methylene chloride detected in MWL-TB 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		All CCV limits not met
	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, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS only)	N/A		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 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: 06-21-2022 08:23:00

Closed by: Wendy Palencia Date: 06-21-2022 08:23:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOC No. 623291

Analytical Lab GEL

SDG No. 579819

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	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	Radon samples 117658-006, 117659-006 and sample duplicate analyzed past holding time
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, bromodichloromethane, bromoform, chloroform and dibromochloromethane detected in MWL-FB 1. Methylene chloride detected in MWL-TB2.
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		All CCV limits not met
	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, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS only)	N/A		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
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Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 06-21-2022 09:57:00

Closed by: Wendy Palencia Date: 06-21-2022 09:57:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOC No. 623292

Analytical Lab GEL

SDG No. 580112

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	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, bromodichloromethane, bromoform, chloroform, dibromochloromethane and methylene chloride detected in MWL-FB 2. Methylene chloride detected in MWL-TB3.
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		All CCV limits not met
	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, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS only)	N/A		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
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Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 06-21-2022 10:52:00

Closed by: Wendy Palencia Date: 06-21-2022 10:52:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOG No. 623293 & 623294

Analytical Lab GEL

SDG No. 580227

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	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	Bromodichloromethane, chloroform and dibromochloromethane detected in MWL-DIWQC and MWL-FB3
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	X		
3.8	Narrative included, correct, and complete	X		
3.9	Second column confirmation data provided for methods 8330 (high explosives), pesticides/PCBs 8081 and 8082 and herbicides 8151.	N/A		

4.0 Calibration and Validation Documentation

Line No.	Item	Yes	No	Comments
4.1	GC/MS (8260 and 8270 and TO-15) a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		All CCV limits not met
	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, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS only)	N/A		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
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Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 06-21-2022 14:34:00

Closed by: Wendy Palencia Date: 06-21-2022 14:34:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOC No. 623295

Analytical Lab GEL

SDG No. 580366

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	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	Bromodichloromethane, bromoform, chloroform, dibromochloromethane detected in MWL-FB4
3.6	Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"- analysis done beyond the holding time; "h" - analysis done beyond the extraction/preparation holding time; "N" - result associated with spike analysis outside control limits	X		
3.7	Narrative addresses planchet flaming for gross alpha/beta	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		All CCV limits not met
	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, 8330, 537 and 1633) 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		
	g) Isotope dilution/EIS performance data provided (PFAS only)	N/A		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
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Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 06-21-2022 14:54:00

Closed by: Wendy Palencia Date: 06-21-2022 14:54:00

Field Sampling Forms

October 2022 Groundwater Monitoring

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

SNL/NM Project Name: MWL		
Well ID: MWL-BW2	Date: 10/20/22	Date:
Pump Method: Portable	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)
482.68	0835	Start	-----	-----	-----	-----	-----	-----	-----
485.06	0903	5	19.35	658.77	142.7	7.30	0.38	10.77	0.84
486.04	0923	10	19.75	661.90	131.7	7.31	0.50	10.49	0.81
487.41	0944	15	20.49	677.41	99.9	7.30	0.90	11.04	0.84
488.20	0957	18	20.63	679.98	97.4	7.30	1.47	16.49	1.25
488.68	1006	20	20.74	680.10	104.2	7.31	1.93	20.82	1.58
489.02	1015	22	21.08	684.68	106.0	7.32	2.90	28.73	2.15
489.31	1027	24	21.32	686.70	109.4	7.33	2.97	35.46	2.65
489.55	1038	26	21.50	687.69	107.8	7.34	1.83	35.10	2.60
489.62	1044	27	21.25	682.06	101.7	7.34	1.59	34.22	2.55
489.70	1050	28	21.47	685.19	98.6	7.35	1.33	36.71	2.73
489.78	1056	29	21.78	690.93	96.5	7.35	1.31	36.79	2.72
489.81	1102	30	21.94	694.20	95.2	7.34	1.55	36.75	2.70
	1103	Sampling →							

Comments:

~1.5 gals purged from tubing @ 0845

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

SNL/NM Project Name: MWL		
Well ID: MWL-MW7	Date: 10/24/22	Date:
Pump Method: Portable	Pump Depth: 496'	

PURGE MEASUREMENTS

Depth to Water (ft)	Time (24 hr)	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)
490.31	0839	Start	-----	-----	-----	-----	-----	-----	-----
491.29	0900	1	14.22	435.73	187.7	7.28	2.41	70.94	6.24
491.49	0906	2	15.42	450.28	159.9	7.35	1.92	73.71	6.31
491.78	0911	3	15.82	451.30	141.0	7.42	1.24	73.09	6.21
491.96	0916	4	16.01	456.82	127.7	7.45	1.82	73.43	6.22
492.12	0921	5	16.53	461.53	121.4	7.48	1.58	73.67	6.17
492.24	0925	6	16.91	467.86	106.5	7.49	1.23	74.24	6.17
492.32	0930	7	17.09	469.24	113.2	7.50	1.17	74.14	6.14
492.41	0935	8	17.04	469.28	111.4	7.51	0.98	73.82	6.12
492.46	0940	9	16.96	468.59	109.6	7.52	1.05	73.58	6.11
492.51	0945	10	16.72	463.99	108.6	7.52	0.70	73.02	6.10
	0946	Sampling →							

Comments:

~1.5 gals purged from tubing @ 0854

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

SNL/NM Project Name: MWL		
Well ID: MWL-MW9	Date: 10/25/22	Date:
Pump Method: Portable	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)
491.72	0838	Start--	-----	-----	-----	-----	-----	-----	-----
493.32	0857	1	17.75	474.11	160.8	7.33	0.37	18.91	1.53
493.81	0905	2	17.97	471.62	138.4	7.39	0.49	18.25	1.48
494.28	0912	3	17.85	472.52	129.1	7.41	0.37	19.08	1.55
494.69	0919	4	17.10	463.77	122.8	7.42	0.48	19.22	1.58
495.11	0925	5	16.84	461.58	114.3	7.43	0.41	17.14	1.42
495.44	0933	6	16.52	459.03	110.8	7.44	0.46	14.94	1.25
495.67	0941	7	16.68	461.87	108.1	7.44	0.76	14.88	1.24
495.89	0949	8	17.31	473.65	104.5	7.44	0.76	13.08	1.07
496.04	0957	9	16.68	467.67	100.7	7.44	1.03	10.62	1.00
496.18	1005	10	16.95	470.64	96.1	7.45	0.54	10.53	0.87
	1006	Sampling →							

Comments:

~1.5 gals purged from tubing @ 0852

GROUNDWATER SAMPLE COLLECTION FIELD EQUIPMENT CHECK LOG**Page 1 of 2**

SNL/NM Project Name: MWL						
Calibrations done by: R Lynch				Date: 10/20/22		
Make & Model: <u>In-Situ Aqua Troll 600</u>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <u>571114</u>						
Other (SN): <u>NA</u>						
pH Calibration/Check						
pH Calibrated to (std): NA				pH sloped to (std): NA		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	<u>0634</u>	<u>4.00</u>	<u>21.50</u>	<u>7.02</u>	<u>21.33</u>	<u>10.05</u>
2. Time (24 hr):	<u>1352</u>	<u>3.99</u>	<u>21.62</u>	<u>7.01</u>	<u>21.42</u>	<u>10.04</u>
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	<u>2GF467</u>		<u>2GG910</u>		<u>2GG708</u>	
Expiration Date.:	<u>JUN/24</u>		<u>JUL/24</u>		<u>JUL/24</u>	
SC Calibration/Check			ORP Calibration/Check			
Reference Value: 1413 uS/cm @ 25 C			Reference Value: 220 mV			
	Value	Temp		Value	Temp	
1. Time (24 hr):	<u>0632</u>	<u>1320.7</u>	<u>21.65</u>	1. Time (24 hr):	<u>0631</u>	<u>220.0</u>
2. Time (24 hr):	<u>1350</u>	<u>1322.4</u>	<u>21.70</u>	2. Time (24 hr):	<u>1359</u>	<u>219.9</u>
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	<u>2GF1263</u>		Expiration Date.:		<u>JUN/23</u>	
			Standard Lot No.:		<u>2GG952</u>	
			Expiration Date.:		<u>APR/23</u>	
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.		Atmospheric Pressure in Hg			
1. Time (24 hr):	<u>0641</u>	<u>87.96</u>	<u>25.36</u>			
2. Time (24 hr):	<u>1351</u>	<u>85.81</u>	<u>25.54</u>			
3. Time (24 hr):						
4. Time (24 hr):						

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

SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 10/20/22	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 21090D000589	
Reference Value	10	20	100	800
Standard Lot No.	A1215R	A1215R	A1205	A1243
1. Time (24 hr): 0630	10.1	20.2	101	798
2. Time (24 hr): 1350	10.0	20.1	10.2	799
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: MWL						
Calibrations done by: R Lynch				Date: 10/24/22		
Make & Model: In-Situ Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571114						
Other (SN): NA						
pH Calibration/Check						
pH Calibrated to (std): NA				pH sloped to (std): NA		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	0618	4.00	21.44	7.02	21.46	10.02
2. Time (24 hr):	1347	3.99	21.51	7.02	21.55	10.03
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	2GF467		2GG910		2GG708	
Expiration Date.:	JUN/24		JUL/24		JUL/24	
SC Calibration/Check				ORP Calibration/Check		
Reference Value: 1413 uS/cm @ 25 C				Reference Value: 220 mV		
	Value	Temp		Value	Temp	
1. Time (24 hr):	0617	1330.5	21.85	1. Time (24 hr):	0625	219.6
2. Time (24 hr):	1346	1327.9	21.61	2. Time (24 hr):	1355	220.5
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	2GF1263		Expiration Date.:	JUN/23		Standard Lot No.:
						2GG952
						Expiration Date.:
						APR/23
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.			Atmospheric Pressure in Hg		
1. Time (24 hr):	0616	83.49		25.82		
2. Time (24 hr):	1345	84.45		25.78		
3. Time (24 hr):						
4. Time (24 hr):						

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

SNL/NM Project Name: MWL				
Calibration done by: R Lynch			Date: 10/24/22	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 21090D000589	
Reference Value	10	20	100	800
Standard Lot No.	A1215R	A1215R	A1205	A1243
1. Time (24 hr): 0615	9.99	20.2	99.9	801
2. Time (24 hr): 1344	10.0	20.1	101	799
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: <u>MWL</u>						
Calibrations done by: <u>R Lynch</u>				Date: <u>10/25/22</u>		
Make & Model: <u>In-Situ Aqua Troll 600</u>						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: <u>571114</u>						
Other (SN): <u>NA</u>						
pH Calibration/Check						
pH Calibrated to (std): <u>NA</u>				pH sloped to (std): <u>NA</u>		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	<u>0630</u>	<u>3.98</u>	<u>21.40</u>	<u>7.01</u>	<u>21.50</u>	<u>10.03</u>
2. Time (24 hr):	<u>1303</u>	<u>3.98</u>	<u>21.51</u>	<u>7.02</u>	<u>21.61</u>	<u>10.04</u>
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	<u>2GF467</u>		<u>2GG910</u>		<u>2GG708</u>	
Expiration Date.:	<u>JUN/24</u>		<u>JUL/24</u>		<u>JUL/24</u>	
SC Calibration/Check				ORP Calibration/Check		
Reference Value: <u>1413 uS/cm @ 25 C</u>				Reference Value: <u>220 mV</u>		
	Value	Temp		Value	Temp	
1. Time (24 hr):	<u>0628</u>	<u>1319.7</u>	<u>21.44</u>	1. Time (24 hr):	<u>0627</u>	<u>219.8</u>
2. Time (24 hr):	<u>1302</u>	<u>1322.0</u>	<u>21.47</u>	2. Time (24 hr):	<u>1309</u>	<u>220.3</u>
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	<u>2GF1263</u>		Expiration Date.:	<u>JUN/23</u>		Standard Lot No.:
						<u>2GG952</u>
						Expiration Date.:
						<u>APR/23</u>
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.			Atmospheric Pressure in Hg		
1. Time (24 hr):	<u>0626</u>	<u>84.47</u>		<u>25.75</u>		
2. Time (24 hr):	<u>1301</u>	<u>86.58</u>		<u>25.34</u>		
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: 10/25/22	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 21090D000589	
Reference Value	10	20	100	800
Standard Lot No.	A1215R	A1215R	A1205	A1243
1. Time (24 hr): 0625	10.1	20.2	101	297
2. Time (24 hr): 1300	10.0	20.2	100	796
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: MWL						
Calibrations done by: R Lynch				Date: 10/26/22		
Make & Model: In-Situ Aqua Troll 600						
Sonde (S/N) with DO, Ec, pH, ORP, and temperature probes: 571114						
Other (SN): NA						
pH Calibration/Check						
pH Calibrated to (std): NA				pH sloped to (std): NA		
Reference value:	4.00		7.00		10.00	
	Value	Temp	Value	Temp	Value	Temp
1. Time (24 hr):	0620	3.98	21.49	7.02	21.55	10.03
2. Time (24 hr):	1257	4.00	21.82	7.01	21.77	10.02
3. Time (24 hr):						
4. Time (24 hr):						
Standard Lot No.:	2GF467		2GG910		2GG708	
Expiration Date.:	JUN/24		JUL/24		JUL/24	
SC Calibration/Check				ORP Calibration/Check		
Reference Value: 1413 uS/cm @ 25 C				Reference Value: 220 mV		
	Value	Temp		Value	Temp	
1. Time (24 hr):	0619	1339.4	22.41	1. Time (24 hr):	0628	220.6
2. Time (24 hr):	1256	1320.1	21.76	2. Time (24 hr):	1306	220.3
3. Time (24 hr):				3. Time (24 hr):		
4. Time (24 hr):				4. Time (24 hr):		
Standard Lot No.:	2GF1263		Expiration Date.:	JUN/23		Standard Lot No.:
				APR/23		
DO Calibration/Check						
Calibration Value:	81% air saturation @ 5200 ft.			Atmospheric Pressure in Hg		
1. Time (24 hr):	0619	83.96		25.49		
2. Time (24 hr):	1255	84.36		25.06		
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: 10/26/22	
TURBIDIMETER				
Make & Model: HACH 2100Q			Serial No. S/N 21090D000589	
Reference Value	10	20	100	800
Standard Lot No.	A1215R	A1215R	A1205	A1243
1. Time (24 hr): <i>0618</i>	<i>10.1</i>	<i>19.9</i>	<i>101</i>	<i>802</i>
2. Time (24 hr): <i>1254</i>	<i>10.0</i>	<i>20.1</i>	<i>99.9</i>	<i>799</i>
3. Time (24 hr):				
4. Time (24 hr):				
Comments:				

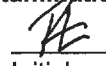
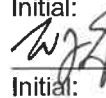
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Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: MWL	Monitoring Well ID #: MWL Pre Decon and Prep	Date: 10/19/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1806BP-1031	Water Level Indicator ID #: 518985	
Personnel Performing Decontamination:		
Denisha Sanchez Print Name: _____	 Initial: _____	
Zach Tenorio Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 08/28/22 _____ _____	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L2C2 Expiration Date: 03/24


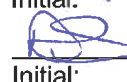
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Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: MWL	Monitoring Well ID #: MWL-BW2	Date: 10/20/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1806BP-1031	Water Level Indicator ID #: 518985	
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		
Deionized Water Source: Culligan Lot Number: 09/23/22	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L2C2 Expiration Date: 03/24



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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: 10/24/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1806BP-1031	Water Level Indicator ID #: 518985	
Personnel Performing Decontamination:		
William Gibson Print Name: _____	 Initial: _____	
Denisha Sanchez Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 09/23/22 _____ _____	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L2C2 Expiration Date: 03/24

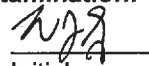
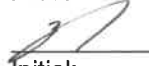
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Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: MWL	Monitoring Well ID #: MWL-MW9	Date: 10/25/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03. <i>New Pump</i>		
Pump and Tubing Bundle ID #: 1807BP-1033	Water Level Indicator ID #: 518985	
Personnel Performing Decontamination:		
Robert Lynch Print Name: _____	 Initial: _____	
Zach Tenorio Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 09/23/22 _____ _____	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L2C2 Expiration Date: 03/24

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Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

SNL/NM Project Name: MWL	Monitoring Well ID #: MWL-MW8	Date: 10/26/2022 Date: _____
The following equipment was decontaminated at completion of sampling activities in accordance with FOP-05-03.		
Pump and Tubing Bundle ID #: 1807BP-1033	Water Level Indicator ID #: 518985	
Personnel Performing Decontamination:		
William Gibson Print Name: _____	 Initial: _____	
Zach Tenorio Print Name: _____	 Initial: _____	
Condition of Equipment		
Pump: Excellent	Tubing Bundle: Excellent	Water Level Indicator: Excellent
List of Decontamination Materials		
Deionized Water Source: Culligan Lot Number: 09/23/22 _____ _____	HNO₃ Grade: NA UN #: NA Manufacturer: NA Lot Number: NA	Detergent Manufacturer: Liquinox Lot Number: L2C2 Expiration Date: 03/24

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Summary Sheet For
October 2022 Groundwater Samples

**Sample Summary for Mixed Waste Landfill Groundwater Monitoring
October 2022**

Sample ID	Sample Date	ARCOC	Sample Number	Sample Type	Associated Equipment Blank (ARCOC #/Sample #)	Associated Trip Blank (ARCOC # / Sample #)	Associated VOC Field Blank (ARCOC # / Sample #)	Associated PFAS Field Blank (ARCOC # / Sample #)	Associated PFAS Field Reagent Blank (ARCOC # / Sample #)	Comments
GEL Analytical Data: Project Task # 195122.10.11.08, Service Order # CF01-22										
MWL-BW2	20-Oct-22	623820	118933	Environmental	623819 / 118931	623820 / 118935	623820 / 118934	623820 / 118934	623820 / 118936	
MWL-MW7	24-Oct-22	623822	118941	Environmental	623821 / 118937	623822 / 118943	623822 / 118939	623822 / 118939	623822 / 118940	
MWL-MW7	24-Oct-22	623822	118942	Duplicate	623821 / 118937	623822 / 118943	623822 / 118939	623822 / 118939	623822 / 118940	
MWL-MW8	26-Oct-22	623827	118956	Environmental	623825 / 118950	623827 / 118957	623827 / 118954	623827 / 118954	623827 / 118955	
MWL-MW9	25-Oct-22	623824	118948	Environmental	623823 / 118944	623824 / 118949	623824 / 118946	623824 / 118946	623824 / 118947	
MWL-EB 1	19-Oct-22	623819	118931	Equipment Blank	n/a	623819 / 118932	n/a	n/a	n/a	Equipment blank sample prior to MWL-BW2.
MWL-EB2	20-Oct-22	623821	118937	Equipment Blank	n/a	623821 / 118938	n/a	n/a	n/a	Equipment blank sample prior to MWL-MW7.
MWL-EB 3	24-Oct-22	623823	118944	Equipment Blank	n/a	623823 / 118945	n/a	n/a	n/a	Equipment blank sample prior to MWL-MW9.
MWL-EB 4	25-Oct-22	623825	118950	Equipment Blank	n/a	623825 / 118951	n/a	n/a	n/a	Equipment blank sample prior to MWL-MW8.
MWL-FB1	20-Oct-22	623820	118934	VOC Field Blank	n/a	623820 / 118935	n/a	n/a	n/a	at MWL-BW2.
MWL-FB2	20-Oct-22	623820	118934	PFAS Field Blank	n/a	n/a	n/a	n/a	n/a	at MWL-BW2.
MWL-FB 3	24-Oct-22	623822	118939	VOC Field Blank	n/a	623822 / 118943	n/a	n/a	n/a	at MWL-MW7
MWL-FB 4	24-Oct-22	623822	118939	PFAS Field Blank	n/a	n/a	n/a	n/a	n/a	at MWL-MW7
MWL-FB 5	25-Oct-22	623824	118946	VOC Field Blank	n/a	623824 / 118949	n/a	n/a	n/a	at MWL-MW9
MWL-FB 6	25-Oct-22	623824	118946	PFAS Field Blank	n/a	n/a	n/a	n/a	n/a	at MWL-MW9
MWL-FB 7	26-Oct-22	623827	118954	VOC Field Blank	n/a	623827 / 118957	n/a	n/a	n/a	at MWL-MW8
MWL-FB 8	26-Oct-22	623827	118954	PFAS Field Blank	n/a	n/a	n/a	n/a	n/a	at MWL-MW8
MWL-FRB 1	20-Oct-22	623820	118936	Field Reagent Blank	n/a	n/a	n/a	n/a	n/a	at MWL-BW2
MWL-FRB 2	24-Oct-22	623822	118940	Field Reagent Blank	n/a	n/a	n/a	n/a	n/a	at MWL-MW7
MWL-FRB 3	25-Oct-22	623824	118947	Field Reagent Blank	n/a	n/a	n/a	n/a	n/a	at MWL-MW9
MWL-FRB 4	26-Oct-22	623827	118955	Field Reagent Blank	n/a	n/a	n/a	n/a	n/a	at MWL-MW8
MWL-DIWQC	26-Oct-22	623826	118952	Field Blank	n/a	623826 / 118953	n/a	n/a	n/a	DI source water for equipment decontamination

Data Validation Reports For Environmental Samples

Groundwater Monitoring

October 2022

AR/COC NUMBER 623819



Memorandum

Date: November 22, 2022

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623819
SDG: 597547
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

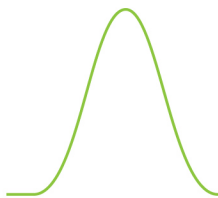
Two samples were prepared and analyzed with accepted procedures using method EPA 8260D (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration RRF was < 0.050 but ≥ 0.010 for 2-butanone. The associated result for sample 597547001 was a detect and will be **qualified J,I4**. The associated result for sample -008 was non-detect and will be **qualified UJ,I4**.
2. The initial calibration %RSD was $> 15\%$ but $\leq 40\%$ for methylene chloride. The associated sample results were detects and will be **qualified J,I3**.
3. Methylene chloride and acetone were detected at \leq the PQL in TB 1, sample -008, associated with sample -001. The methylene chloride result for sample -001 was a detect \leq the PQL and will be **qualified 5.0U,B1**; non-detect at the PQL. The acetone result for sample -001 was a detect $>$ the PQL but $\leq 10X$ the TB value and will be **qualified J+,B1**.

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.

Blanks

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

Bromodichloromethane; dibromochloromethane; 1,2-dichloroethane and 2-butanone were detected at \leq the PQL and acetone and chloroform were detected at $>$ the PQL in EB 1, sample -001 submitted on ARCO 623819 in this SDG and associated with the samples on ARCO 623820 submitted in another SDG. No sample results from this SDG will be qualified.

Methylene chloride was also detected at \leq the PQL in the EB but was qualified non-detect due to TB contamination and will not be applied to the associated sample results.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

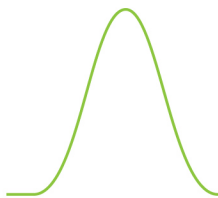
All MS/MSD recoveries and RPDs met QC acceptance criteria.

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

The analysis of the LCS serves as a matrix-specific measure of accuracy for the TB and EB. The LCS met QC acceptance criteria and no data will be qualified.

There was no matrix-specific replicate analysis for the TB and EB. However, based on professional judgement, no sample results 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.

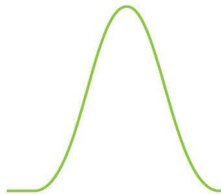
Other QC

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

A TB was submitted on the ARCOC. EB 1 was submitted on ARCOC 623819 in this SDG and was associated with the samples on ARCOC 623820 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/16/2022



Memorandum

Date: December 1, 2022

To: File

From: Linda Thal

Subject: LC/MS/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623819
SDG: 597547
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: PFAS

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 EPA 537.1 (PFAS, drinking water). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The recoveries for surrogates 13C2-PFHxA and 13C3-PFPrOPrA were <70% but $\geq 10\%$ for sample 597547002. The associated sample results were non-detect and will be **qualified UJ,S2**,

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

Holding Times and Preservation

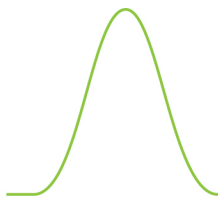
The sample was extracted and analyzed within the prescribed holding times and as properly preserved.

Instrument Performance Checks

All instrument mass calibration verifications were within QC acceptance criteria.

Ion Transitions

The ion transitions specified in QSM Table B-15 were used for analysis. It should be noted that an ion transition summary was not provided in the data package. The ion transitions provided in the raw data were reviewed for validation.



Calibration

All initial and continuing calibration acceptance criteria were met.

Instrument Sensitivity Check (ISC)/Limit of Quantitation (LOQ) Check

All ISC/LOQ recoveries met QC acceptance criteria.

Ion Ratios

All ion ratios were within QC acceptance limits. It should be noted that an ion ratio summary was not provided for the standards or QC samples in the data package. The ion ratios provided in the raw data were reviewed for validation.

Extracted Internal Standards

All extracted internal standards met QC acceptance criteria.

Surrogates

All surrogate recoveries were within QC acceptance limits except as noted above in the Summary section.

Blanks

No target analytes were detected in any of the blanks.

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

The LCS analyses met QC acceptance criteria. The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB in this SDG.

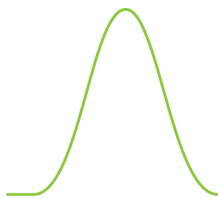
Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses were not performed with the sample in this data package. An LCS/LCSD pair was analyzed to provide precision data. Since the sample was a blank, no data will be qualified.

Reporting Limits (RLs)

All limits of quantitation (LOQs) and detection limits (DLs) were properly reported. The sample was not diluted.

Other QC

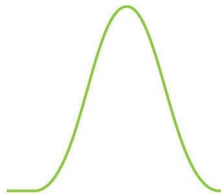


The client was notified that the samples were analyzed by EPA 537.1 (PFAS, drinking water) instead of method EPA 537.1 Modified.

EB 1 was submitted on ARCOG 623918 and was associated with the sample on ARCOG 623820.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/16/2022



Memorandum

Date: November 22, 2022
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMMP
ARCOC: 623819
SDG: 597547
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

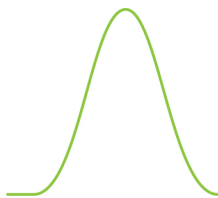
The ICP-MS tune met QC acceptance criteria.

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)

An MS was not analyzed. Since the sample was an EB, no data will be qualified.

Laboratory Replicate

A replicate was not analyzed. The LCS/LCSD was assessed for precision.

Laboratory Control Sample (LCS)

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

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, Al, Mg and Fe were < the ICS values.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

EB 1 was submitted on ARCOG 623819 in this SDG and was associated with the samples on ARCOG 623820 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/16/2022

Memorandum

Date: November 22, 2022 and December 15, 2022

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623819
SDG: 597547 and 602159
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/SW846 9310 (gross alpha/beta), SM 7500 Rn B (Radon-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

Gross alpha/beta:

1. The original results for sample 597547005 were reported with values > the MDA for gross alpha and gross beta. At the client's request the sample was re-logged and reanalyzed as 602159001 and the original results were not confirmed. The results for sample 602159001 will be used for data validation and the original sample results will be **qualified R,X1**.

Gamma Spec:

1. The Cs-137 result for sample -004 was rejected by the laboratory due to the peak not meeting identification criteria and will be **qualified R,Z2**.

All analyses:

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

Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times.

Quantification

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

Calibration

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

Blanks

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

Tracer/Carrier Recovery

Tracer/carriers were not required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria.

It should be noted that the original MS/MSD analyses for gross alpha/beta and the MS for tritium were performed on an SNL sample from another SDG. No sample results will be qualified.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB. The LCS met QC acceptance criteria and 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 from other SDGs. No sample results will be qualified.

For all target analytes *except* Rn-22 and the re-analysis for gross alpha-beta, there was no matrix-specific replicate analysis for the EB. However, based on professional judgement, no sample results will be qualified.

A sample replicate was not reported for Rn-222. The LCS/LCSD was assessed for precision.

The LCS/LCSD met precision criteria for the re-analysis for gross alpha/beta.

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

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

Detection Limits/Dilutions

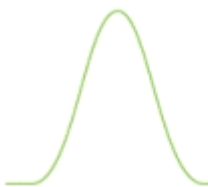
The sample was not diluted. All required detection limits (DLs) were met.

Other QC

EB 1 was submitted on ARCO 623819 in this SDG and was associated with the samples on ARCO 623820 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/16/2022



Sample Findings Summary



AR/COC: 623819

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 537.1			
	118931-002/MWL-EB 1	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118931-002/MWL-EB 1	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118931-002/MWL-EB 1	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
EPA 900.0/SW846 9310			
	118931-005/MWL-EB 1	ALPHA (12587-46-1)	R, X1
	118931-005/MWL-EB 1	BETA (12587-47-2)	R, X1
	118931-R05/MWL-EB 1	ALPHA (12587-46-1)	BD, FR3
	118931-R05/MWL-EB 1	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	118931-004/MWL-EB 1	Americium-241 (14596-10-2)	BD, FR3
	118931-004/MWL-EB 1	Cesium-137 (10045-97-3)	R, Z2
	118931-004/MWL-EB 1	Cobalt-60 (10198-40-0)	BD, FR3
	118931-004/MWL-EB 1	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	118931-006/MWL-EB 1	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	118931-007/MWL-EB 1	Radon-222 (14859-67-7)	BD, FR3
SW846 8260D			
	118931-001/MWL-EB 1	2-Butanone (78-93-3)	J, I4
	118931-001/MWL-EB 1	Acetone (67-64-1)	J+, B1
	118931-001/MWL-EB 1	Methylene chloride (75-09-2)	5.0UJ, B1,I3
	118932-001/MWL-TB 1	2-Butanone (78-93-3)	UJ, I4
	118932-001/MWL-TB 1	Methylene chloride (75-09-2)	J, I3

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

Sandia Data Validation Summary Worksheet

ARCOG#: 623819	Site/Project: MWL LTMMP	Validation Date: 11/22/2022
SDG #: 597547 and 602159 (gross alpha/beta only)	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 8	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad <input checked="" type="checkbox"/> Other: PFAS		

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

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

Comments: Collected: 10/19/2022

The ARCOG noted that the trip blank vials were received from the lab with headspace.

EB 1 was submitted on ARCOG 623819 in this SDG and was associated with the samples on ARCOG 623820 submitted in another SDG.

Sample 118931-002 was submitted for PFAS analysis by Method 537.1 Mod., but was incorrectly logged in and analyzed by Method 537.1.

Sample 118931-005 was re-logged and reanalyzed as sample 118931-R05 in SDG 602159 for gross alpha/beta, per client request.

Validated by:



Sandia Organic Worksheet (GC/MS VOC)

ARCO #s: 623819	SDG: 597547	Matrix: Aqueous
Laboratory Sample IDs: 597547001, -008		
Method/Batch #s: 8260D 2335788	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	EB 1 -001	5X (10X) EB	TB 1 -008	5X (10X) TB
	Int.	RF/ Slope	RSD /r ²	(ICV)/CCV %D										
1,2-Dichloroethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.56J	2.8	✓	NA
2-Butanone	NA	0.021	✓	✓	✓	NA	✓	✓	✓	✓	2.58J	(25.8)	✓	NA
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	6.23	(62.3)	2.23J	(22.3)
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.95J	4.75	✓	NA
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	3.8	19	✓	NA
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.75J	3.75	✓	NA
Methylene chloride	NA	✓	18	✓	✓	NA	✓	✓	✓	✓	0.82J	NA	1.05J	(10.5)

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. MWL LTMMP TAL.
MS/MSD on SNL sample 597711001
ICAL VOA2.I 10/26/22 All avg RF

SNL LCMSMS Worksheet (PFAS)

ARCOC: 623819	SDG: 597547	Method: EPA 537.1 Drinking water	Matrix: Aqueous	Lab Sample IDs: 597547002
Batch #s: 2336913 (prep)/ 2336916				

Mass Calibration: ☒ Pass ☐ Fail
 Acquisition Rate: ☒ Pass ☐ Fail
 Ion Transitions: ☒ Pass ☐ Fail
 ENVI-Carb Cleanup: ☒ Yes ☐ No

Analyte (outliers)		Calibration (QSM)					Method Blank (≤1/2 LOQ)	5X Blank	LCS %R	LCSD %R	LCS/ LCSD RPD ≤30%	EB 1 -002	
		RSD/ r ² ≤20% ≥0.99	Cal. Std Rec'y 70- 130%	RTs Set	ISC (LOQ) %D ±30%	ICV/ CCV %D ±30%							
None													
Ion Ratios (lab limits or 50-150%)						EIS/Isotope Dilution (IDA) Outliers (lab limits or 50-150% and within 0.4min)							
Sample	Compound	Ratio				Sample ID	IDA	%R					
None						None							
Signal to Noise Outliers (Stage 4) (≥10 for quant ions and ≥3 for conf ions)						RT outliers (Stage 4) (±0.4 minutes of ICAL midpoint or CCV)							
Sample ID	Compound	S/N				Sample ID	Compound	RT					
NA						NA							
Surrogates (70-130%)													
Sample ID	13C2-PFHxA	13C2-PFDA	d5-NEtFOSAA	13C3-PFPrOPrA									
-002	29	✓	✓	32									

Comments: HTs OK. PF 0.01995
 ICAL LCMSMS9 11/02/22 All linear through zero, Isotope Dilution
 No Ion Transition Summary; ion transitions on quant reports
 No Ion Ratio Summary; ion ratios reported on quant reports, but not calculated

Sandia Inorganic Metals Worksheet

ARCOG #(s): 623819	SDG #(s): 597547	Matrix: Aqueous
Laboratory Sample IDs: 597547003		
Method/Batch #s: 3005A/6020B :2331871/2331872		

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)	LL CCV %R	PS %R	EB 1 -003	
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L												
none																		

IS Outliers 60-125%				IS Outliers 80-120%			
Sample ID	%Recovery	%Recovery	%Recovery	CCV/CCB ID	%Recovery	%Recovery	%Recovery
none				CCB 18:17	Sc 79.5%		
					(Cr, Ni)		

Comments: HTs OK.
ICPMS: LCS/LCSD, SD on -003.
Ca, Mg, Al, Fe < ICSA.

Sandia Radiochemistry Worksheet

ARCOC #(s): 623819	SDG #: 597547 and 602159 ¹	Matrix: Aqueous
Laboratory Sample IDs: 597547 and 602159 ¹ – see below		
Method/Batch #s: EPA 901.1 (gamma spec)/2336537 Sample -004		
Method/Batch #s: EPA 900.0/SW846 9310 (gross A/B)/2334732 and ¹ 2349364 Sample 597547005 and ¹ 602159001		
Method/Batch #s: EPA 906.0 Modified (Tritium)/2336102 Sample -006		
Method/Batch #s: SM 7500 Rn B (Rn-222)/2332005 Sample -007		

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDA	LCS %R	LCSD %R	LCS/ LCSD RPD	MS %R	MSD %R	MS/ MSD RER	Lab Rep. RER	MS/ MSD RPD	EB 1
Gross alpha	NA	NA	✓	NA	✓	NA	NA	✓	✓	✓	✓	NA	2.27
Gross beta	NA	NA	✓	NA	✓	NA	NA	✓	✓	✓	✓	NA	1.73
Gross beta ¹	NA	NA	✓	NA	✓	✓	10.3	NA	NA	NA	1.03	NA	✓
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 apply to samples < the MDA including where one result is > the MDA and the other < MDA.

Gross A/B: DUP, MS/MSD on SNL 597711005. Parent sample 152mL; DUP 150mL; MS/MSD 54.2/53mL; 2.8X dilution.

Sample -007 did not meet required DL for gross alpha/beta due to low sample volume.

¹Sample 597547005 was re-analyzed as 602159001 for gross A/B due to results > the MDA in the original analysis. The re-analyzed sample results were accepted for data validation. LCS/LCSD. RER met acceptance criteria of <1.0. The samples were not flamed. The gross alpha results were < the MDA and will not be qualified.

GS: DUP on SNL 597711004. Cs-137 result for sample -004 considered a false positive due to the peak not meeting the identification criteria.

Tritium: DUP/MS on SNL 597711006

Rn-222: LCS/LCSD

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

SMO Use

 page 1 of 1
 ARCO 623819

Project Name: MWL LTMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: 10/19/2022 SNL Shipper #: 356357 Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: <i>[Signature]</i> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: No Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: 597547

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
118931	001	MWL-EB 1	0	10/19/22 09:03	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMP (SW846-8260D)	001
118931	002	MWL-EB 1	0	10/19/22 09:02	DIW	P	2x250 ml	None	G	EB	PFAS (EPA 537 Mod)	002
118931	003	MWL-EB 1	0	10/19/22 09:04	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMP - Cd, Cr, Ni, U	003
118931	004	MWL-EB 1	0	10/19/22 09:05	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	004
118931	005	MWL-EB 1	0	10/19/22 09:06	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	005
118931	006	MWL-EB 1	0	10/19/22 09:07	DIW	AG	250 ml	None	G	EB	TRITIUM (EPA 906)	006
118931	007	MWL-EB 1	0	10/19/22 09:08	DIW	G	2x40 ml	None	G	EB	RADON (SM7500 Rn B)	007
118932	001	MWL-TB 1	0	10/19/22 09:03	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260D)	008

Sample Team Members	Name	Signature	Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.
	William Gibson	<i>[Signature]</i>	
	Robert Lynch	<i>[Signature]</i>	
	Denisha Sanchez	<i>[Signature]</i>	
	Zachary Tenorio	<i>[Signature]</i>	

Relinquished by <i>[Signature]</i>	Org. 5888	Date 10/19/22	Time 0940	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org. 0618	Date 10/19/22	Time 0940	Received by	Org.	Date	Time
Relinquished by <i>[Signature]</i>	Org. 0618	Date 10/19/22	Time 1040	Relinquished by	Org.	Date	Time
Received by <i>[Signature]</i>	Org.	Date 10/20/22	Time 750	Received by	Org.	Date	Time

AR/COC NUMBERS 623820, 623821



Memorandum

Date: December 1, 2022

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623820 and 623821
SDG: 597711
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.

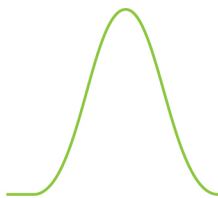
Summary

Five samples were prepared and analyzed with accepted procedures using method EPA 8260D (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 ≥ 0.010 for 2-butanone. The associated sample results were non-detect and will be **qualified UJ,I4**.
2. The initial calibration %RSD was $> 15\%$ but $\leq 40\%$ for methylene chloride. The associated sample results were detects and will be **qualified J,I3**.
3. Methylene chloride and acetone were detected at \leq the PQL in TB 2, sample 597711010, associated with samples -001 and -008. The associated sample results were detects \leq the PQL and will be **qualified 5.0U,B1**; non-detect at the PQL.
4. Methylene chloride and acetone were detected at \leq the PQL in TB 3, sample -019, associated with sample -012. The methylene chloride result for sample -012 was a detect \leq the PQL and will be **qualified 5.0U,B1**; non-detect at the PQL. The acetone result for sample -012 was a detect $>$ the PQL but $< 10X$ the TB value and will be **qualified J+,B1**.

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.

Blanks

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

Bromodichloromethane, dibromochloromethane and 1,2-dichloroethane were detected at \leq the PQL and chloroform was detected at $>$ the PQL in FB 1, sample -008 associated with the sample -001. The associated sample results were non-detect and will not be qualified.

Methylene chloride and acetone were also detected at \leq the PQL in FB 1 but were qualified non-detect due to TB contamination and will not be applied to the associated field sample result.

Bromodichloromethane; dibromochloromethane 1,2-dichloroethane and 2-butanone were detected at \leq the PQL and chloroform was detected at $>$ the PQL in EB 1, sample 597547001 submitted on ARCOC 623819 in another SDG and associated with the sample -001 in this SDG. The associated sample results were non-detect and will not be qualified.

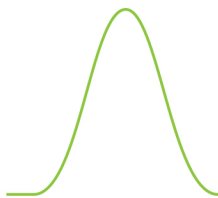
Acetone was also detected at $>$ the PQL in EB 1. The associated result for sample -001 was already qualified non-detect due to TB contamination and will not be further qualified.

Methylene chloride was also detected at \leq the PQL in EB 1 but was qualified non-detect due to TB contamination and will not be applied to the associated sample result.

Bromodichloromethane and dibromochloromethane were detected at \leq the PQL and chloroform and acetone were detected at $>$ the PQL in EB2, sample -012 submitted on ARCOC 623821 in this SDG and associated with the samples on ARCOC 623822 submitted in another SDG. No data from this SDG will be qualified.

Methylene chloride was also detected at \leq the PQL in EB2 but was qualified non-detect due to TB contamination and will not be applied to the associated field sample results.

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.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the FB, TBs and EB. The LCS met QC acceptance criteria and no data will be qualified.

There was no matrix-specific replicate analysis for the FB, TBs and EB. However, based on professional judgement, 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.

A TB was submitted on each ARCOC. FB 1 was submitted on ARCOC 623820 and was associated with the sample on the same ARCOC. EB 1 was submitted on ARCOC 623819 in another SDG and was associated with the samples on ARCOC 623820 submitted in this SDG. EB2 was submitted on ARCOC 623821 in this SDG and was associated with the samples on ARCOC 623822 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan

Level: I

Date: 12/16/2022



Memorandum

Date: December 2, 2022

To: File

From: Linda Thal

Subject: LC/MS/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623820 and 623821
SDG: 597547
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: PFAS

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 537.1 (PFAS, drinking water). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The recoveries for surrogates 13C2-PFHxA and 13C3-PFPrOPrA were <70% but $\geq 10\%$ for samples 597711009, -011 and -013. The associated sample results were non-detect and will be **qualified UJ,S2**.
2. An MS/MSD was not performed due to limited sample volume. The associated results for sample -002 were non-detect and should be **qualified UJ,MS1** due to lack of matrix-specific accuracy data.

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

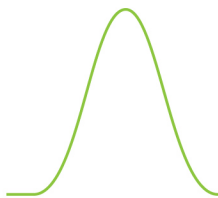
Holding Times and Preservation

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

Instrument Performance Checks

All instrument mass calibration verifications were within QC acceptance criteria.

Ion Transitions



The ion transitions specified in QSM Table B-15 were used for analysis. It should be noted that an ion transition summary was not provided in the data package. The ion transitions provided in the raw data were reviewed for validation.

Calibration

All initial and continuing calibration acceptance criteria were met.

Instrument Sensitivity Check (ISC)/Limit of Quantitation (LOQ) Check

All ISC/LOQ recoveries met QC acceptance criteria.

Ion Ratios

All ion ratios were within QC acceptance limits. It should be noted that an ion ratio summary was not provided for the standards or QC samples in the data package. The ion ratios provided in the raw data were reviewed for validation.

Extracted Internal Standards

All extracted internal standards met QC acceptance criteria.

Surrogates

All surrogate recoveries were within QC acceptance limits except as noted above in the Summary section.

Blanks

No target analytes were detected in any of the blanks.

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

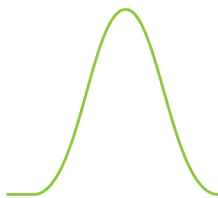
The LCS/LCSD analyses met QC acceptance criteria. The analysis of the LCS/LCSD serves as a matrix-specific measure of accuracy and precision for the EB, FB and FRB in this SDG.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS or MSD were not performed with the sample in this data package as noted above in the Summary section.

An LCS/LCSD pair was analyzed to provide precision data.

Reporting Limits (RLs)



All limits of quantitation (LOQs) and detection limits (DLs) were properly reported. The samples were not diluted.

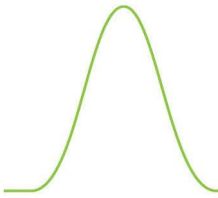
Other QC

The client was notified that the samples were analyzed using method EPA 537.1 (PFAS, Drinking Water) instead of method EPA 537.1 Modified.

FB2 and FRB 1 were submitted on ARCOG 623820 and were associated with the sample on the same ARCOG. EB 1 was submitted on ARCOG 623919 in another SDG and was associated with the sample on ARCOG 623820 submitted in this SDG. EB2 was submitted on ARCOG 623821 in this SDG and was associated with the sample on ARCOG 623822 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/16/2022



Memorandum

Date: December 1, 2022

To: File

From: Linda Thal

Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMMP
ARCOC: 623820 and 623821
SDG: 597711
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

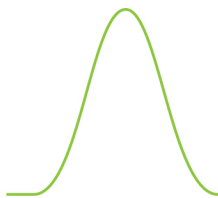
The ICP-MS tune met QC acceptance criteria.

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 with the following exception.

Ni was detected at \leq the PQL in EB2, sample 597711014, submitted on ARCOG 623821 in this SDG and associated with the samples on ARCOG 623822 submitted in another SDG. No data from this SDG will be qualified.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met QC acceptance criteria.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB. The LCS met QC acceptance criteria and no data will be qualified.

Laboratory Replicate

The sample replicate met QC acceptance criteria.

There was no matrix-specific replicate analysis for the EB. However, based on professional judgement, no data will be qualified.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

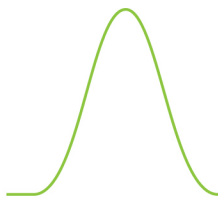
ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the sample concentrations for Ca, Al, Mg and Fe were $<$ the ICS values.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC



EB 1 was submitted on ARCOG 623819 in another SDG and was associated with the samples on ARCOG 623820 submitted in this SDG. EB2 was submitted on ARCOG 623821 in this SDG and was associated with the samples on ARCOG 623822 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/16/2022

Memorandum

Date: December 1, 2022

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623820 and 623821
SDG: 597711
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/SW846 9310 (gross alpha/beta), SM 7500 Rn B (Radon-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

All analyses *except* gross beta:

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

Gross beta:

1. The gross beta result for sample 597711016 was \geq the MDA but <3X the MDA and will be **qualified J,FR7**.

Holding Times and Preservation

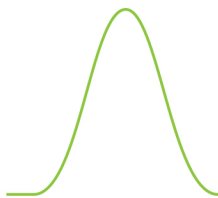
The samples were prepared and analyzed within the prescribed holding times.

Quantification

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

Calibration

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



Blanks

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

Gross beta was detected at \geq the MDA and 2-sigma TPU in EB2, sample -016 submitted on ARCOC 623821 and associated with the samples on ARCOC 623822 submitted in another SDG. No data from this SDG will be qualified.

Tracer/Carrier Recovery

Tracer/carriers were not required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB. The LCS met QC acceptance criteria and no data will be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

For all target analytes *except* Rn-22, there was no matrix-specific replicate analysis for the EB. However, based on professional judgement, no sample results will be qualified.

The Rn-222 LCS/LCSD met precision criteria for the EB.

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

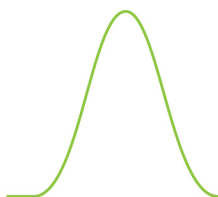
The LCS and/or LCSD met QC acceptance criteria for accuracy and precision.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits (DLs) were met.

Other QC

EB 1 was submitted on ARCOC 623819 in another SDG and was associated with the samples on ARCOC 623820 submitted in this SDG. EB2 was submitted on ARCOC 623821 in this SDG and was associated with the samples on ARCOC 623822 submitted in another SDG.

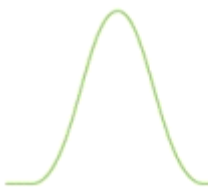


No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/16/2022



Sample Findings Summary



AR/COC: 623820, 623821

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 537.1			
	118933-002/MWL-BW2	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, MS1
	118933-002/MWL-BW2	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, MS1
	118933-002/MWL-BW2	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, MS1
	118934-002/MWL-FB 2	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118934-002/MWL-FB 2	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118934-002/MWL-FB 2	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118936-001/MWL-FRB1	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118936-001/MWL-FRB1	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118936-001/MWL-FRB1	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118937-002/MWL-EB2	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118937-002/MWL-EB2	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118937-002/MWL-EB2	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
EPA 900.0/SW846 9310			
	118937-005/MWL-EB2	ALPHA (12587-46-1)	BD, FR3
	118937-005/MWL-EB2	BETA (12587-47-2)	J, FR7
EPA 901.1			
	118933-004/MWL-BW2	Americium-241 (14596-10-2)	BD, FR3
	118933-004/MWL-BW2	Cesium-137 (10045-97-3)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	118933-004/MWL-BW2	Cobalt-60 (10198-40-0)	BD, FR3
	118933-004/MWL-BW2	Potassium-40 (13966-00-2)	BD, FR3
	118937-004/MWL-EB2	Americium-241 (14596-10-2)	BD, FR3
	118937-004/MWL-EB2	Cesium-137 (10045-97-3)	BD, FR3
	118937-004/MWL-EB2	Cobalt-60 (10198-40-0)	BD, FR3
	118937-004/MWL-EB2	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	118933-006/MWL-BW2	Tritium (10028-17-8)	BD, FR3
	118937-006/MWL-EB2	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	118937-007/MWL-EB2	Radon-222 (14859-67-7)	BD, FR3
SW846 8260D			
	118933-001/MWL-BW2	2-Butanone (78-93-3)	UJ, I4
	118933-001/MWL-BW2	Acetone (67-64-1)	5.0U, B1
	118933-001/MWL-BW2	Methylene chloride (75-09-2)	5.0UJ, B1,I3
	118934-001/MWL-FB 1	2-Butanone (78-93-3)	UJ, I4
	118934-001/MWL-FB 1	Acetone (67-64-1)	5.0U, B1
	118934-001/MWL-FB 1	Methylene chloride (75-09-2)	5.0UJ, B1,I3
	118935-001/MWL-TB 2	2-Butanone (78-93-3)	UJ, I4
	118935-001/MWL-TB 2	Methylene chloride (75-09-2)	J, I3
	118937-001/MWL-EB2	2-Butanone (78-93-3)	UJ, I4
	118937-001/MWL-EB2	Acetone (67-64-1)	J+, B1
	118937-001/MWL-EB2	Methylene chloride (75-09-2)	5.0UJ, B1,I3
	118938-001/MWL-TB 3	2-Butanone (78-93-3)	UJ, I4
	118938-001/MWL-TB 3	Methylene chloride (75-09-2)	J, I3

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

Sandia Data Validation Summary Worksheet

ARCOG#: 623820 and 623821	Site/Project: MWL LTMMP	Validation Date: 12/01/2022
SDG #: 597711	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 19	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 <input checked="" type="checkbox"/> Other: PFAS		

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

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

Comments: Collected: 10/20/2022

The ARCOGs noted that the trip blank vials were received from the lab with headspace.

EB 1 was submitted on ARCOG 623819 in another SDG and was associated with the samples on ARCOG 623820 submitted in this SDG.

EB2 was submitted on ARCOG 623821 in this SDG and was associated with the samples on ARCOG 623822 submitted in another SDG.

Samples 118933-002, 118934-002, 118936-001 and 118937-002 were submitted for PFAS analysis by Method 537.1 Mod., but were incorrectly logged in and analyzed by Method 537.1.

Validated by:



Sandia Organic Worksheet (GC/MS VOC)

ARCO #s): 623820 and 623821	SDG: 597711	Matrix: Aqueous
Laboratory Sample IDs: 597711001, -008, -010, -012, -019		
Method/Batch #s: 8260D 2335788	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	EB 1 597547 -001	EB2 -012	FB 1 -008	TB 2 ¹ -010 TB 3 ² -019
	Int.	RF/ Slope	RSD /r ²	(ICV)/CCV %D										
1,2-Dichloroethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.56J	✓	0.44J	✓
2-Butanone	NA	0.021	✓	✓	✓	NA	✓	✓	✓	✓	2.58J	✓	✓	✓
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	6.23	7.98	2.47J	2.97J ¹ 2.45J ²
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.95J	0.97J	0.8J	✓
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	3.8	3.51	3.04	✓
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.75J	0.79J	0.71J	✓
Methylene chloride	NA	✓	18	✓	✓	NA	✓	✓	✓	✓	0.82J	0.86J	0.93J	1.1J ¹ 1.12J ²

Surrogate Recovery Outliers

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

IS Outliers

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

Comments: HTs OK. MWL LTMMP TAL.
MS/MSD on -001
ICAL VOA2.I 10/26/22 All avg RF

SNL LCMSMS Worksheet (PFAS)

ARCOC: 623820 and 623821	SDG: 597711	Method: EPA 537.1 Drinking water	Matrix: Aqueous	Lab Sample IDs: 597711002, -009, -011, -013
Batch #s: 2336913 (prep)/ 2336916				

Mass Calibration: ☒ Pass ☐ Fail
 Acquisition Rate: ☒ Pass ☐ Fail
 Ion Transitions: ☒ Pass ☐ Fail
 ENVI-Carb Cleanup: ☒ Yes ☐ No

Analyte (outliers)	Calibration (QSM)						MB (≤1/2 LOQ)	5X MB	LCS/ LCSD %R	LCS/ LCSD RPD ≤30%	EB 1 597547 -002	EB2 -013	FB2 -009 FRB 1 -011
	RSD/ r ² ≤20% ≥0.99	Cal. Std Rec'y 70- 130%	RTs Set	ISC (LOQ) %D ±30%	ICV/ CCV %D ±30%	Inst Blanks (≤1/2 LOQ)							
None													
Ion Ratios (lab limits or 50-150%)						EIS/Isotope Dilution (IDA) Outliers (lab limits or 50-150% and within 0.4min)							
Sample	Compound	Ratio				Sample ID	IDA	%R					
N						None							
Signal to Noise Outliers (Stage 4) (≥10 for quant ions and ≥3 for conf ions)						RT outliers (Stage 4) (±0.4 minutes of ICAL midpoint or CCV)							
Sample ID	Compound	S/N				Sample ID	Compound	RT					
NA						NA							
Surrogates (70-130%)													
Sample ID	13C2-PFHxA	13C2-PFDA	d5-NEtFOSAA	13C3-PFPrOPrA									
-009	23	✓	✓	26									
-011	39	✓	✓	46									
-013	29	✓	✓	30									

Comments: HTs OK. LCS/LCSD insufficient sample for MS.
 ICAL LCMSMS9 11/02/22 All linear through zero, Isotope Dilution
 No Ion Transition Summary; ion transitions on quant reports
 No Ion Ratio Summary; ion ratios reported on quant reports, but not calculated

Sandia Inorganic Metals Worksheet

ARCOG #(s): 623820 and 623821	SDG #(s): 597711	Matrix: Aqueous
Laboratory Sample IDs: 597711003, -014		
Method/Batch #s: 3005A/6020B :2332695/2332696		

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)	LL CCV %R	PS %R	EB 1 597547 -003	EB2 -014
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L												
Ni	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	NA	✓	NA	✓	0.000614J

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

Comments: HTs OK.
ICPMS: MS/DUP/SD on -003.
Ca, Mg, Al, Fe < ICSA.

<p>Comments: HTs OK. EB 1 being re-analyzed for gross alpha/beta</p> <p>Note: No precision criteria apply to samples < the MDA including where one result is > the MDA and the other < MDA.</p> <p>Gross A/B: DUP, MS/MSD on -005. Parent sample 152mL; DUP 150ml; MS/MSD 54.2/53ml; 2.8X dilution.</p> <p>GS: DUP on -004.</p> <p>Tritium: DUP/MS on -006</p> <p>Rn-222: LCS/LCSD, DUP -007</p>

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

page 1 of 2
ARCO 623820

Project Name: MWL LTMMP
Project Manager: Timmie Jackson
P/T No: 195122.10.11.08

Date Samples Shipped: 10/20/22
SNL Shipper #: 356489
Lab Contact: Zachary Worsham/ 843-300-4224
Lab Destination: GEL
Contract No.: 1983530

SMO Authorization: *OK*
SMO Contact Phone: Wendy Palencia/505.844.3132

Waste Characterization: No
RMA: No
4° Celsius: Yes

TA: Bldg: Room:

Last Chain: No
Validation Req'd: Yes

Turnaround Time: 30 days
EDD: Yes

SDG #: 597711

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
118933	001	MWL-BW2	496	10/20/22 11:05	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260D)	001
118933	002	MWL-BW2	496	10/20/22 11:03	GW	P	2x250 ml	None	G	SA	PFAS (EPA 537 Mod)	002
118933	003	MWL-BW2	496	10/20/22 11:07	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	003
118933	004	MWL-BW2	496	10/20/22 11:09	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	004
118933	005	MWL-BW2	496	10/20/22 11:12	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	005
118933	006	MWL-BW2	496	10/20/22 11:15	GW	AG	250 ml	None	G	SA	TRITIUM (EPA 906)	006
118933	007	MWL-BW2	496	10/20/22 11:17	GW	G	2x40 ml	None	G	SA	RADON (SM7500 Rn B)	007
118934	001	MWL-FB1	0	10/20/22 10:24	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260D)	008
118934	002	MWL-FB2	0	10/20/22 10:20	DIW	P	2x250 ml	None	G	FB	PFAS (EPA 537 Mod)	009
118935	001	MWL-TB2	0	10/20/22 10:24	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260D)	010

Sample Team Members	Name	Signature	Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.
	William Gibson	<i>William Gibson</i>	
	Robert Lynch	<i>Robert Lynch</i>	
	Denisha Sanchez	<i>Denisha Sanchez</i>	
	Zachary Tenorio	<i>Zachary Tenorio</i>	

Relinquished by <i>Denisha Sanchez</i>	Org. 8888	Date 10-20-22	Time 1230	Relinquished by	Org.	Date	Time
Received by <i>William Gibson</i>	Org. 0018	Date 10/20/22	Time 1230	Received by	Org.	Date	Time
Relinquished by <i>William Gibson</i>	Org. 0018	Date 10/20/22	Time 1300	Relinquished by	Org.	Date	Time
Received by <i>William Gibson</i>	Org.	Date 10/21/22	Time 725	Received by	Org.	Date	Time

page 2 of 2
ARCOC **623820**

[illegible]

Receipt initials

Handwritten signature

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

SMO Use

ARCO 623821

Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: <u>10/20/22</u> SNL Shipper #: <u>356489</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: <u>[Signature]</u> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: No Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: <u>597711</u>

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
118937	001	MWL-EB2	0	10/20/22 12:18	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260D)	012
118937	002	MWL-EB2	0	10/20/22 12:17	DIW	P	2x250 ml	None	G	EB	PFAS (EPA 537 Mod)	013
118937	003	MWL-EB2	0	10/20/22 12:19	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMMP - Cd, Cr, Ni, U	014
118937	004	MWL-EB2	0	10/20/22 12:20	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	015
118937	005	MWL-EB2	0	10/20/22 12:22	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	016
118937	006	MWL-EB2	0	10/20/22 12:24	DIW	AG	250 ml	None	G	EB	TRITIUM (EPA 906)	017
118937	007	MWL-EB2	0	10/20/22 12:25	DIW	G	2x40 ml	None	G	EB	RADON (SM7500 Rn B)	018
118938	001	MWL-TB 3	0	10/20/22 12:18	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260D)	019

Sample Team Members	Name	Signature	Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.
	William Gibson	<u>[Signature]</u>	
	Robert Lynch	<u>[Signature]</u>	
	Denisha Sanchez	<u>[Signature]</u>	
	Zachary Tenorio	<u>[Signature]</u>	

Relinquished by <u>[Signature]</u>	Org. <u>5888</u> Date <u>10-20-22</u> Time <u>12:30</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>0618</u> Date <u>10/20/22</u> Time <u>12:30</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>0618</u> Date <u>10/20/22</u> Time <u>1:30</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. Date <u>10/21/22</u> Time <u>7:25</u>	Received by	Org.	Date	Time

AR/COC NUMBERS 623822, 623823



Memorandum

Date: December 16, 2022
To: File
From: Linda Thal
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623822 and 623823
SDG: 598056
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

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

1. The initial calibration intercepts were negative and $>$ the MDL but $\leq 3X$ the MDL for methylene chloride and bromomethane. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. Acetone was detected at \leq the PQL in FB 3, sample 598056001, associated with samples -004 and -011. The associated result for sample -011 was a detect \leq the PQL and will be **qualified 5.0U,B2**; non-detect at the PQL.

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

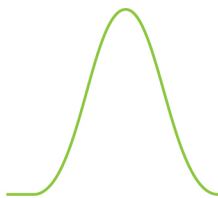
Holding Times and Preservation

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 dichlorodifluoromethane. The associated sample results were non-detect and will not be qualified.

The CCV %Ds were $>20\%$ with positive bias for chloromethane, vinyl chloride, bromomethane, chloroethane, vinyl acetate and 1,1-dichloroethylene. The associated sample results were non-detect and will not be qualified.

Blanks

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

Acetone, bromodichloromethane and dibromochloromethane were detected at \leq the PQL and chloroform was detected at $>$ the PQL in FB 3, sample -001 associated with the samples -004 and -011. All associated sample results, *except* the acetone result for sample -011, were non-detect and will not be qualified.

Bromodichloromethane and dibromochloromethane were detected at \leq the PQL and acetone and chloroform were detected at $>$ the PQL in EB2, sample 597711012 submitted on ARCOC 623821 in another SDG and associated with samples -004 and -011 submitted on ARCOC 623822 in this SDG. The acetone result for sample -011 was already qualified non-detect due to FB contamination and will not be further qualified. All remaining associated sample results were non-detect and will not be qualified.

Bromodichloromethane; dibromochloromethane 1,2-dichloroethane and 2-butanone were detected at \leq the PQL and acetone and chloroform were detected at $>$ the PQL in EB 3, sample 598056019 submitted on ARCOC 623823 in this SDG and associated with the samples on ARCOC 623824 submitted in another SDG. No data from this SDG will be qualified.

Surrogates

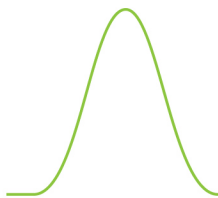
All surrogate recoveries met QC acceptance criteria.

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 with the following exception. The MS recovery for vinyl chloride was $>$ the upper acceptance limit. The associated sample results were non-detect and will not be qualified.



The analysis of the LCS serves as a matrix-specific measure of accuracy for the FB, TBs and EB. The LCS met QC acceptance criteria and no data will be qualified.

There was no matrix-specific replicate analysis for the FB, TBs and EB. However, based on professional judgement, no data will be qualified.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met except as follows. The LCS recoveries for chloromethane and vinyl chloride were > the upper acceptance limit. 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

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

A TB was submitted on each ARCOC. FB 3 was submitted on ARCOC 623822 and was associated with the samples on the same ARCOC. EB2 was submitted on ARCOC 623821 in another SDG and was associated with the samples on ARCOC 623822 submitted in this SDG. EB 3 was submitted on ARCOC 623823 in this SDG and was associated with the samples on ARCOC 623824 submitted in another SDG. A field duplicate pair was submitted on ARCOC 623822. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/19/2022



Memorandum

Date: December 16, 2022

To: File

From: Linda Thal

Subject: LC/MS/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623822 and 623823
SDG: 598056
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: PFAS

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 537.1 (PFAS, drinking water). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The recoveries for surrogates 13C2-PFHxA and 13C3-PFPrOPrA were $<70\%$ but $\geq 10\%$ for samples 598056002, -003 and -020. The associated sample results were non-detect and will be **qualified UJ,S2**.
2. An MS/MSD was not performed due to limited sample volume. The associated results for samples -005 and -012 were non-detect and should be **qualified UJ,MS1** due to lack of matrix-specific accuracy data.

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

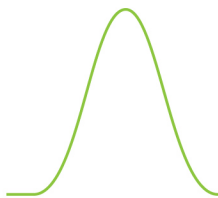
Holding Times and Preservation

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

Instrument Performance Checks

All instrument mass calibration verifications were within QC acceptance criteria.

Ion Transitions



The ion transitions specified in QSM Table B-15 were used for analysis. It should be noted that an ion transition summary was not provided in the data package. The ion transitions provided in the raw data were reviewed for validation.

Calibration

All initial and continuing calibration acceptance criteria were met.

Instrument Sensitivity Check (ISC)/Limit of Quantitation (LOQ) Check

All ISC/LOQ recoveries met QC acceptance criteria.

Ion Ratios

All ion ratios were within QC acceptance limits. It should be noted that an ion ratio summary was not provided for the standards or QC samples in the data package. The ion ratios provided in the raw data were reviewed for validation.

Extracted Internal Standards

All extracted internal standards met QC acceptance criteria.

Surrogates

All surrogate recoveries were within QC acceptance limits except as noted above in the Summary section.

Blanks

No target analytes were detected in any of the blanks.

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

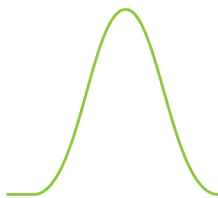
The LCS/LCSD analyses met QC acceptance criteria. The analysis of the LCS/LCSD serves as a matrix-specific measure of accuracy and precision for the EB, FB and FRB in this SDG.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS or MSD were not performed with the samples in this data package as noted above in the Summary section.

An LCS/LCSD pair was analyzed to provide precision data.

Reporting Limits (RLs)



All limits of quantitation (LOQs) and detection limits (DLs) were properly reported. The samples were not diluted.

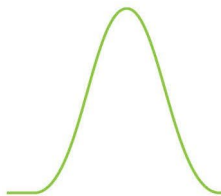
Other QC

The client was notified that the samples were analyzed using method EPA 537.1 (PFAS, Drinking Water) instead of method EPA 537.1 Modified.

FB 4 and FRB 2 were submitted on ARCOC 623822 and were associated with the samples on the same ARCOC. EB2 was submitted on ARCOC 623821 in another SDG and was associated with the samples on ARCOC 623822 submitted in this SDG. EB 3 was submitted on ARCOC 623823 in this SDG and was associated with the samples on ARCOC 623824 submitted in another SDG. A field duplicate pair was submitted on ARCOC 623822. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/19/2022



Memorandum

Date: December 16, 2022

To: File

From: Linda Thal

Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMMP
ARCOC: 623822 and 623823
SDG: 598056
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 method EPA 6020B (ICP-MS). Data were reported for all required analytes. Problems were identified with the data package that resulted in the qualification of data.

1. Ni was detected at \leq the PQL in EB 2, sample 597711014, submitted on ARCO 623821 in another SDG and associated with samples 598056006 and -013 submitted on ARCO 623822 in this SDG. The associated sample results were detects \leq the PQL and will be **qualified 0.002U,B2**; non-detect at the PQL.

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

Holding Times and Preservation

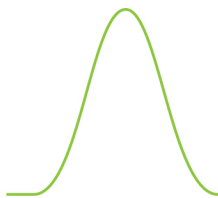
The samples were prepared and analyzed within the prescribed holding times and were properly preserved.

ICP-MS Instrument Tune

The ICP-MS tune met QC acceptance criteria.

Calibration

All initial and continuing calibration criteria met QC acceptance criteria.



Reporting Limit Verification

All LLCCV recoveries met QC acceptance criteria.

Blanks

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

Ni was detected at \leq the PQL in EB 3, sample -021, submitted on ARCO 623823 in this SDG and associated with the samples on ARCO 623824 submitted in another SDG. No data from this SDG will be qualified.

ICP -MS Internal Standards

The ICP-MS internal standards met QC acceptance criteria.

Matrix Spike (MS)

The MS met QC acceptance criteria.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB. The LCS met QC acceptance criteria and no data will be qualified.

Laboratory Replicate

The sample replicate met QC acceptance criteria.

There was no matrix-specific replicate analysis for the EB. However, based on professional judgement, no data will be qualified.

Laboratory Control Sample (LCS)

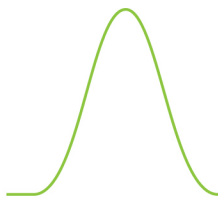
The LCS met QC acceptance criteria.

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, Al, Mg and Fe were $<$ the ICS values.



ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

EB2 was submitted on ARCOC 623821 in another SDG and was associated with the samples on ARCOC 623822 submitted in this SDG. EB 3 was submitted on ARCOC 623823 in this SDG and was associated with the samples on ARCOC 623824 submitted in another SDG. A field duplicate pair was submitted on ARCOC 623822. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/19/2022



Memorandum

Date: December 16, 2022
To: File
From: Linda Thal
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623822 and 623823
SDG: 598056
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 methods EPA 901.1 (gamma spec - short list), EPA 900.0/SW846 9310 (gross alpha/beta), SM 7500 Rn B (Radon-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

All analyses *except* gross beta:

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

Gross beta and Rn-222:

1. The sample results that were \geq the MDA but $<3X$ the MDA will be **qualified J,FR7**.

Holding Times and Preservation

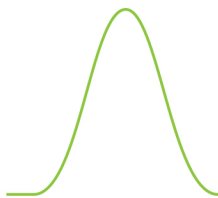
The samples were prepared and analyzed within the prescribed holding times.

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 with the following exceptions.

Gross beta was detected at \geq the MDA and 2-sigma TPU in EB2, sample 597711016 submitted on ARCOC 623821 in another SDG and associated with samples 598056008 and -015 submitted on ARCOC 623822 in this SDG. The associated sample results were detects $>5X$ the EB value and will not be qualified.

Gross beta was detected at \geq the MDA and 2-sigma TPU in EB 3, sample -023 submitted on ARCOC 623823 in this SDG and associated with samples on ARCOC 623824 submitted in another SDG. No data from this SDG will be qualified.

Tracer/Carrier Recovery

Tracer/carriers were not required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. The MS and/or MSD were performed on SNL samples of similar matrix from another SDG. No data will be qualified.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB. The LCS met QC acceptance criteria and no data will be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met. The replicate analyses for all target analytes except Rn-222 were performed on SNL samples of similar matrix from another SDG. No data will be qualified.

For all target analytes *except* Rn-22, there was no matrix-specific replicate analysis for the EB. However, based on professional judgement, no sample results will be qualified.

The Rn-222 LCS/LCSD met precision criteria for the EB.

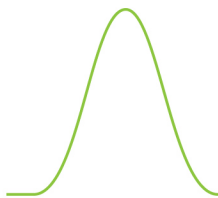
Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

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

Detection Limits/Dilutions

The samples were not diluted. All required detection limits (DLs) were met.

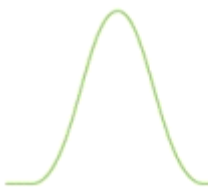
Other QC



EB2 was submitted on ARCO 623821 in another SDG and was associated with the samples on ARCO 623822 submitted in this SDG. EB 3 was submitted on ARCO 623823 in this SDG and was associated with the samples on ARCO 623824 submitted in another SDG. A field duplicate pair was submitted on ARCO 623822. There are no “required” review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/19/2022



Sample Findings Summary



AR/COC: 623822, 623823

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 537.1			
	118939-002/MWL-FB 4	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118939-002/MWL-FB 4	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118939-002/MWL-FB 4	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118940-001/MWL-FRB 2	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118940-001/MWL-FRB 2	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118940-001/MWL-FRB 2	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118941-002/MWL-MW7	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, MS1
	118941-002/MWL-MW7	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, MS1
	118941-002/MWL-MW7	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, MS1
	118942-002/MWL-MW7	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, MS1
	118942-002/MWL-MW7	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, MS1
	118942-002/MWL-MW7	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, MS1
	118944-002/MWL-EB 3	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118944-002/MWL-EB 3	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118944-002/MWL-EB 3	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
EPA 900.0/SW846 9310			

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	118944-005/MWL-EB 3	ALPHA (12587-46-1)	BD, FR3
	118944-005/MWL-EB 3	BETA (12587-47-2)	J, FR7
EPA 901.1			
	118941-004/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	118941-004/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	118941-004/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	118941-004/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
	118942-004/MWL-MW7	Americium-241 (14596-10-2)	BD, FR3
	118942-004/MWL-MW7	Cesium-137 (10045-97-3)	BD, FR3
	118942-004/MWL-MW7	Cobalt-60 (10198-40-0)	BD, FR3
	118942-004/MWL-MW7	Potassium-40 (13966-00-2)	BD, FR3
	118944-004/MWL-EB 3	Americium-241 (14596-10-2)	BD, FR3
	118944-004/MWL-EB 3	Cesium-137 (10045-97-3)	BD, FR3
	118944-004/MWL-EB 3	Cobalt-60 (10198-40-0)	BD, FR3
	118944-004/MWL-EB 3	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	118941-006/MWL-MW7	Tritium (10028-17-8)	BD, FR3
	118942-006/MWL-MW7	Tritium (10028-17-8)	BD, FR3
	118944-006/MWL-EB 3	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	118941-007/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
	118942-007/MWL-MW7	Radon-222 (14859-67-7)	J, FR7
	118944-007/MWL-EB 3	Radon-222 (14859-67-7)	BD, FR3
SW846 3005A/6020B			
	118941-003/MWL-MW7	Nickel (7440-02-0)	0.002U, B2
	118942-003/MWL-MW7	Nickel (7440-02-0)	0.002U, B2
SW846 8260D			
	118939-001/MWL-FB 3	Bromomethane (74-83-9)	UJ, I5
	118939-001/MWL-FB 3	Methylene chloride (75-09-2)	UJ, I5
	118941-001/MWL-MW7	Bromomethane (74-83-9)	UJ, I5

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	118941-001/MWL-MW7	Methylene chloride (75-09-2)	UJ, I5
	118942-001/MWL-MW7	Acetone (67-64-1)	5.0U, B2
	118942-001/MWL-MW7	Bromomethane (74-83-9)	UJ, I5
	118942-001/MWL-MW7	Methylene chloride (75-09-2)	UJ, I5
	118943-001/MWL-TB 4	Bromomethane (74-83-9)	UJ, I5
	118943-001/MWL-TB 4	Methylene chloride (75-09-2)	UJ, I5
	118944-001/MWL-EB 3	Bromomethane (74-83-9)	UJ, I5
	118944-001/MWL-EB 3	Methylene chloride (75-09-2)	UJ, I5
	118945-001/MWL-TB 5	Bromomethane (74-83-9)	UJ, I5
	118945-001/MWL-TB 5	Methylene chloride (75-09-2)	UJ, I5

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

Sandia Data Validation Summary Worksheet

ARCOG#: 623822 and 623823	Site/Project: MWL LTMMP	Validation Date: 12/16/2022
SDG #: 598056	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 26	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 <input checked="" type="checkbox"/> Other: PFAS		

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

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

Comments: Collected: 10/24/2022

The ARCOGs noted that the trip blank vials were received from the lab with headspace.

EB 3 was submitted on ARCOG 623823 in this SDG and was associated with the samples on ARCOG 623824 submitted in another SDG.

EB2 was submitted on ARCOG 623821 in another SDG and was associated with the samples on ARCOG 623822 submitted in this SDG.

Samples 118939-002, 118940-001, 118941-002, 118942-002 and 118944-002 were submitted for PFAS analysis by Method 537.1 Mod., but were incorrectly logged in and analyzed by Method 537.1.

Validated by: 

Sandia Organic Worksheet (GC/MS VOC)

ARCO #s: 623822 and 623823	SDG: 598056	Matrix: Aqueous
Laboratory Sample IDs: 598056001, -004, -011, -018, -019, -026		
Method/Batch #s: 8260D 2336528	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	EB 3 -019	EB2 597711 -012	FB 3 -001	TB 4 -018 TB 5 -026
	Int.	RF/ Slope	RSD /r ²	(ICV)/CCV %D										
1,2-Dichloroethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.48J	✓	✓	✓
2-Butanone	NA		✓	✓	✓	NA	✓	✓	✓	✓	4.52J	✓	✓	✓
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	9.18	7.98	3.65J	✓
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.76J	0.97J	0.65J	✓
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	3.02	3.51	3.18	✓
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.060J	0.79J	0.49J	✓
Methylene chloride	-0.96	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	0.86J	✓	✓
Chloromethane	NA	✓	✓	+58	✓	NA	158	✓	✓	✓	✓	✓	✓	✓
Vinyl chloride	NA	✓	✓	+85	✓	NA	185	147	✓	✓	✓	✓	✓	✓
Dichlorodifluoromethane	+0.52	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Bromomethane	-0.73	✓	✓	+38	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Chloroethane	NA	✓	✓	+28	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
1,1-Dichloroethylene	NA	✓	✓	+24	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Vinyl acetate	NA	✓	✓	+21	✓	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. MWL LTMMP TAL.

MS/MSD on -004

ICAL VOA6.I 10/14/22 Linear: Dichlorodifluoromethane, bromomethane, methylene chloride

SNL LCMSMS Worksheet (PFAS)

ARCOC: 623822 and 623823	SDG: 598056	Method: EPA 537.1 Drinking water	Matrix: Aqueous	Lab Sample IDs: 598056002, -003, -005, -012, -020
Batch #s: 2336913 (prep)/ 2336916				

Mass Calibration: ☒ Pass ☐ Fail
 Acquisition Rate: ☒ Pass ☐ Fail
 Ion Transitions: ☒ Pass ☐ Fail
 ENVI-Carb Cleanup: ☒ Yes ☐ No

Analyte (outliers)	Calibration (<i>QSM</i>)						MB ($\leq 1/2$ LOQ)	5X MB	LCS/ LCSD %R	LCS/ LCSD RPD $\leq 30\%$	EB 3 -020	EB2 597711 -013	FB 4 -002 FRB 2 -003
	RSD/ r ² $\leq 20\%$ ≥ 0.99	Cal. Std Rec'y 70- 130%	RTs Set	ISC (LOQ) %D $\pm 30\%$	ICV/ CCV %D $\pm 30\%$	Inst Blanks ($\leq 1/2$ LOQ)							
None													
Ion Ratios (<i>lab limits or 50-150%</i>)						EIS/Isotope Dilution (IDA) Outliers (<i>lab limits or 50-150% and within 0.4min</i>)							
Sample	Compound	Ratio				Sample ID	IDA	%R					
None						None							
Signal to Noise Outliers (Stage 4) (≥ 10 for quant ions and ≥ 3 for conf ions)						RT outliers (Stage 4) (± 0.4 minutes of ICAL midpoint or CCV)							
Sample ID	Compound	S/N				Sample ID	Compound	RT					
NA						NA							
Surrogates (70-130%)													
Sample ID	13C2-PFHxA	13C2-PFDA	d5-NEtFOSAA	13C3-PFPrOPrA									
-002	18	✓	✓	19									
-003	20	✓	✓	24									
-020	30	✓	✓	30									

Comments: HTs OK. LCS/LCSD insufficient sample for MS.
 ICAL LCMSMS9 11/02/22 All linear through zero, Isotope Dilution
 No Ion Transition Summary; ion transitions on quant reports
 No Ion Ratio Summary; ion ratios reported on quant reports, but not calculated
 Cal Std %Rs from raw data

Sandia Inorganic Metals Worksheet

ARCOG #(s): 623822 and 623823	SDG #(s): 598056	Matrix: Aqueous
Laboratory Sample IDs: 598056006, -013, -021		
Method/Batch #s: 3005A/6020B :2333658/2333659		

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)	LL CCV %R	PS %R	EB 3 -021	EB2 597711 -014
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L												
Ni	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	NA	✓	NA	0.000821J	0.000614J

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

Comments: HTs OK.
ICPMS: MS/DUP/SD on -006.
Ca, Mg, Al, Fe < ICSA.

Comments: HTs OK. Note: No precision criteria apply to samples < the MDA including where one result is > the MDA and the other < MDA. Gross A/B: DUP, MS/MSD on SNL sample 597711005. Parent sample 152mL; DUP 150ml; MS/MSD 54.2/53ml; 2.8X dilution. GS: DUP on SNL sample 597711004. Tritium: DUP/MS on SNL sample 597711006 Rn-222: LCS/LCSD, DUP -010

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

page 1 of 2
ARCO 623822

SMO Use

Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: <u>Oct 24, 2022</u> SNL Shipper #: <u>356525</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: <u>CC</u> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: No Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: <u>598056</u>

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
118939	✓ 001	MWL-FB 3	0	10/24/22 09:23	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260D)	001
118939	✓ 002	MWL-FB 4	0	10/24/22 09:24	DIW	P	2x250 ml	None	G	FB	PFAS (EPA 537 Mod)	002
118940	✓ 001	MWL-FRB 2	0	10/24/22 09:26	DIW	P	2x250 ml	None	G	FRB	PFAS (EPA 537 Mod)	003
118941	✓ 001	MWL-MW7	496	10/24/22 09:48	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260D)	004
118941	✓ 002	MWL-MW7	496	10/24/22 09:46	GW	P	2x250 ml	None	G	SA	PFAS (EPA 537 Mod)	005
118941	✓ 003	MWL-MW7	496	10/24/22 09:50	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	006
118941	✓ 004	MWL-MW7	496	10/24/22 09:52	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	007
118941	✓ 005	MWL-MW7	496	10/24/22 09:54	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	008
118941	✓ 006	MWL-MW7	496	10/24/22 09:56	GW	AG	250 ml	None	G	SA	TRITIUM (EPA 906)	009
118941	✓ 007	MWL-MW7	496	10/24/22 09:58	GW	G	2x40 ml	None	G	SA	RADON (SM7500 Rn B)	010

Sample Team Members	Name	Signature	Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.
	William Gibson	<u>William Gibson</u>	
	Robert Lynch	<u>Robert Lynch</u>	
	Zachary Tenorio	<u>Zachary Tenorio</u>	
	Denisha Sanchez	<u>Denisha Sanchez</u>	

Relinquished by <u>[Signature]</u>	Org. <u>8888</u>	Date <u>10-24-22</u>	Time <u>1125</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>0618</u>	Date <u>10-25-22</u>	Time <u>1125</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>0618</u>	Date <u>10-24-22</u>	Time <u>1200</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org.	Date <u>10-25-22</u>	Time <u>1010</u>	Received by	Org.	Date	Time

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

page 2 of 2
ARCO 623822

Project Name: MWL LTMMMP

598056

[illegible]

Receipt initials

62

SMO 2012-ARCO (4-2012)

AOP 95-16

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

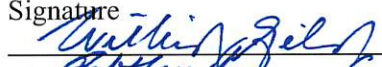
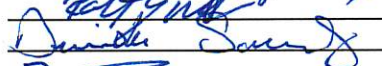

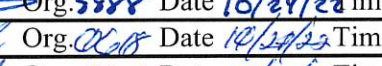
page 1 of 1

ARCO 623823

SMO Use

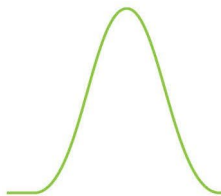
Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: <u>Oct 24, 2022</u> SNL Shipper #: <u>352565</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: <u>CE</u> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: No Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: <u>598056</u>

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
118944 ✓	001	MWL-EB 3	0	10/24/22 10:53	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260D)	019
118944 ✓	002	MWL-EB 3	0	10/24/22 10:51	DIW	P	2x250 ml	None	G	EB	PFAS (EPA 537 Mod)	020
118944 ✓	003	MWL-EB 3	0	10/24/22 10:54	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMMP - Cd, Cr, Ni, U	021
118944 ✓	004	MWL-EB 3	0	10/24/22 10:55	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	022
118944 ✓	005	MWL-EB 3	0	10/24/22 10:56	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	023
118944 ✓	006	MWL-EB 3	0	10/24/22 10:57	DIW	AG	250 ml	None	G	EB	TRITIUM (EPA 906)	024
118944 ✓	007	MWL-EB 3	0	10/24/22 10:58	DIW	G	2x40 ml	None	G	EB	RADON (SM7500 Rn B)	025
118945 ✓	001	MWL-TB 5	0	10/24/22 10:53	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260D)	026

Sample Team Members	Name	Signature	Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.
	William Gibson		
	Robert Lynch		
	Denisha Sanchez		
	Zachary Tenorio		

Relinquished by <u>3</u>	Org. <u>5888</u>	Date <u>10/24/22</u>	Time <u>11:25</u>	Relinquished by	Org.	Date	Time
Received by <u>CE</u>	Org. <u>0618</u>	Date <u>10/24/22</u>	Time <u>11:25</u>	Received by	Org.	Date	Time
Relinquished by <u>CE</u>	Org. <u>0618</u>	Date <u>10/24/22</u>	Time <u>12:00</u>	Relinquished by	Org.	Date	Time
Received by <u>Shirley Jones</u>	Org.	Date <u>10/25/22</u>	Time <u>10:10</u>	Received by	Org.	Date	Time

AR/COC NUMBER 623824



Memorandum

Date: December 20, 2022

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623824
SDG: 598175
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 8260D (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercepts were negative and $>$ the MDL but $\leq 3X$ the MDL for methylene chloride and bromomethane. The associated sample results were non-detect and will be **qualified UJ,15**.

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

Holding Times and Preservation

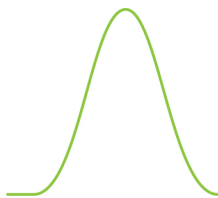
The samples were analyzed within the prescribed holding time and were properly preserved.

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 dichlorodifluoromethane. The associated sample results were non-detect and will not be qualified.

The CCV %Ds were $>20\%$ with positive bias for chloromethane, vinyl chloride, bromomethane, chloroethane, vinyl acetate and 1,1-dichloroethylene. The associated sample results were non-detect and will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as follows.

Bromodichloromethane and dibromochloromethane were detected at \leq the PQL and acetone and chloroform were detected at $>$ the PQL in FB 5, sample 598175001 associated with sample -004. The associated sample results were non-detect and will not be qualified.

Bromodichloromethane; dibromochloromethane 1,2-dichloroethane and 2-butanone were detected at \leq the PQL and acetone and chloroform were detected at $>$ the PQL in EB 3, sample 598056019 submitted on ARCO 623823 in another SDG and associated with the sample on ARCO 623824 submitted in this SDG. 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)

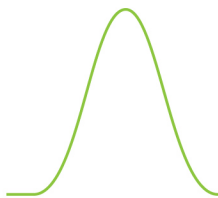
All MS/MSD recoveries and RPDs met QC acceptance criteria with the following exception. The MS recovery for vinyl chloride was $>$ the upper acceptance limit. The associated sample results were non-detect and will not be qualified.

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.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the FB and TB. The LCS met QC acceptance criteria and no data will be qualified.

There was no matrix-specific replicate analysis for the FB and TB. However, based on professional judgement, no data will be qualified.

Laboratory Control Sample (LCS)



All LCS acceptance criteria were met except as follows. The LCS recoveries for chloromethane and vinyl chloride were > the upper acceptance limit. 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.

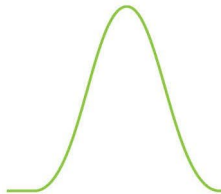
Other QC

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

A TB was submitted on the ARCOC. FB 5 was submitted on ARCOC 623824 and was associated with the sample on the same ARCOC. EB 3 was submitted on ARCOC 623823 in another SDG and was associated with the sample on ARCOC 623824 submitted in this SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/21/2022



Memorandum

Date: December 20, 2022

To: File

From: Linda Thal

Subject: LC/MS/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623824
SDG: 598175
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: PFAS

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 537.1 (PFAS, drinking water). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The recoveries for surrogates 13C2-PFHxA and 13C3-PFPrOPrA were $<70\%$ but $\geq 10\%$ for samples 598175002 and -003. The PFOS result for sample -002 was a detect and will be **qualified J-,S2** and the remaining associated sample results were non-detect and will be **qualified UJ,S2**.
2. An MS/MSD was not performed due to limited sample volume. The associated results for sample -005 were non-detect and should be **qualified UJ,MS1** due to lack of matrix-specific accuracy data.

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

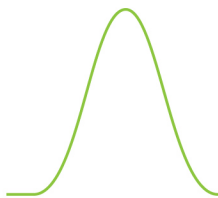
Holding Times and Preservation

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

Instrument Performance Checks

All instrument mass calibration verifications were within QC acceptance criteria.

Ion Transitions



The ion transitions specified in QSM Table B-15 were used for analysis. It should be noted that an ion transition summary was not provided in the data package. The ion transitions provided in the raw data were reviewed for validation.

Calibration

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

The PFOA %D was >30% with positive bias for the CCV preceding sample -005. The associated sample result was non-detect and will not be qualified.

Instrument Sensitivity Check (ISC)/Limit of Quantitation (LOQ) Check

All ISC/LOQ recoveries met QC acceptance criteria except as follows.

The PFOA %D was >30% with positive bias for the ISC preceding all samples. The associated sample results were non-detect and will not be qualified.

Ion Ratios

All ion ratios were within QC acceptance limits. It should be noted that an ion ratio summary was not provided for the standards or QC samples in the data package. The ion ratios provided in the raw data were reviewed for validation.

Extracted Internal Standards

All extracted internal standards met QC acceptance criteria.

Surrogates

All surrogate recoveries were within QC acceptance limits except as noted above in the Summary section.

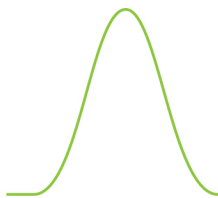
Blanks

No target analytes were detected in any of the blanks except as follows.

PFOS was detected at \leq the PQL in FB 6, sample -002 associated with sample -005. The associated sample result was non-detect and will not be qualified.

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

The LCS/LCSD analyses met QC acceptance criteria. The analysis of the LCS/LCSD serves as a matrix-specific measure of accuracy and precision for the FB and FRB in this SDG.



Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS or MSD were not performed with the sample in this data package as noted above in the Summary section.

An LCS/LCSD pair was analyzed to provide precision data.

Reporting Limits (RLs)

All limits of quantitation (LOQs) and detection limits (DLs) were properly reported. The samples were not diluted.

Other QC

The client was notified that the samples were analyzed using method EPA 537.1 (PFAS, Drinking Water) instead of method EPA 537.1 Modified.

FB 6 and FRB 3 were submitted on ARCOG 623824 and were associated with the sample on the same ARCOG. EB 3 was submitted on ARCOG 623823 in another SDG and was associated with the sample on ARCOG 623824 submitted in this SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/21/2022



Memorandum

Date: December 20, 2022
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMMP
ARCOC: 623824
SDG: 598175
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

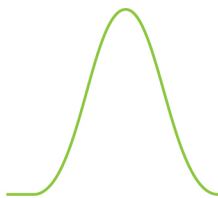
The ICP-MS tune met QC acceptance criteria.

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 except as follows.

Ni was detected at \leq the PQL in EB 3, sample 598056021, submitted on ARCO 623823 in another SDG and associated with the sample on ARCO 623824 submitted in this SDG. The associated sample result was 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 QC acceptance criteria.

Laboratory Replicate

The sample replicate met QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met 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, Al, Mg and Fe were $<$ the ICS values.

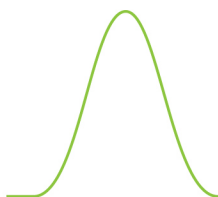
ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

EB 3 was submitted on ARCO 623823 in another SDG and was associated with the sample on ARCO 623824 submitted in this SDG.

No other specific issues that affect data quality were identified.



Reviewed by: Mary Donovan

Level: I

Date: 12/21/2022

Memorandum

Date: December 20, 2022

To: File

From: Linda Thal

Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623824
SDG: 598175
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/SW846 9310 (gross alpha/beta), SM 7500 Rn B (Radon-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

Gamma spec and tritium:

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

Holding Times and Preservation

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

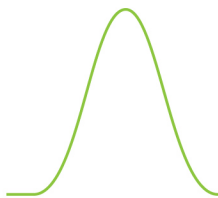
Quantification

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

Calibration

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

Blanks



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

Gross beta was detected at \geq the MDA and 2-sigma TPU in EB 3, sample 598056023 submitted on ARCO 623823 in another SDG and associated with the sample on ARCO 623824 submitted in this SDG. The associated sample result was a detect $>5X$ the EB value and will not be qualified.

Tracer/Carrier Recovery

Tracer/carriers were not required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. The MS and/or MSD 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. 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/Laboratory Control Sample Duplicate (LCS/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 (DLs) were met.

Other QC

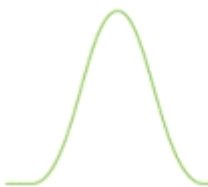
EB 3 was submitted on ARCO 623823 in another SDG and was associated with the sample on ARCO 623824 submitted in this SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/21/2022



Sample Findings Summary



AR/COC: 623824

Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 537.1			
	118946-002/MWL-FB 6	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118946-002/MWL-FB 6	Perfluorooctanesulfonate (PFOS) (1763-23-1)	J-, S2
	118946-002/MWL-FB 6	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118947-001/MWL-FRB 3	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118947-001/MWL-FRB 3	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118947-001/MWL-FRB 3	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118948-002/MWL-MW9	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, MS1
	118948-002/MWL-MW9	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, MS1
	118948-002/MWL-MW9	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, MS1
EPA 901.1			
	118948-004/MWL-MW9	Americium-241 (14596-10-2)	BD, FR3
	118948-004/MWL-MW9	Cesium-137 (10045-97-3)	BD, FR3
	118948-004/MWL-MW9	Cobalt-60 (10198-40-0)	BD, FR3
	118948-004/MWL-MW9	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	118948-006/MWL-MW9	Tritium (10028-17-8)	BD, FR3
SW846 8260D			
	118946-001/MWL-FB 5	Bromomethane (74-83-9)	UJ, I5
	118946-001/MWL-FB 5	Methylene chloride (75-09-2)	UJ, I5
	118948-001/MWL-MW9	Bromomethane (74-83-9)	UJ, I5

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	118948-001/MWL-MW9	Methylene chloride (75-09-2)	UJ, I5
	118949-001/MWL-TB 6	Bromomethane (74-83-9)	UJ, I5
	118949-001/MWL-TB 6	Methylene chloride (75-09-2)	UJ, I5

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

Sandia Data Validation Summary Worksheet

ARCOG#: 623824	Site/Project: MWL LTMMP	Validation Date: 12/20/2022
SDG #: 598175	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 11	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 <input checked="" type="checkbox"/> Other: PFAS		

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

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

Comments: Collected: 10/25/2022

The ARCOG noted that the trip blank vials were received from the lab with headspace.

EB 3 was submitted on ARCOG 623823 in another SDG and was associated with the samples on ARCOG 623824 submitted in this SDG.

Samples 118946-002, 118947-001 and 118948-002 were submitted for PFAS analysis by Method 537.1 Mod., but were incorrectly logged in and analyzed by Method 537.1.

Validated by:



Sandia Organic Worksheet (GC/MS VOC)

ARCOC #(s): 623824	SDG: 598175	Matrix: Aqueous
Laboratory Sample IDs: 598175001, -004, -011		
Method/Batch #s: 8260D 2336528	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	EB 3 598056 -019	FB 5 -001	TB 6 -011	
	Int.	RF/ Slope	RSD /r ²	(ICV)/CCV %D										
1,2-Dichloroethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.48J	✓	✓	
2-Butanone	NA		✓	✓	✓	NA	✓	✓	✓	✓	4.52J	✓	✓	
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	9.18	5.78	✓	
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.76J	0.68J	✓	
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	3.02	3.22	✓	
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.060J	0.50J	✓	
Methylene chloride	-0.96	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	
Chloromethane	NA	✓	✓	+58	✓	NA	158	✓	✓	✓	✓	✓	✓	
Vinyl chloride	NA	✓	✓	+85	✓	NA	185	147	✓	✓	✓	✓	✓	
Dichlorodifluoromethane	+0.52	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	
Bromomethane	-0.73	✓	✓	+38	✓	NA	✓	✓	✓	✓	✓	✓	✓	
Chloroethane	NA	✓	✓	+28	✓	NA	✓	✓	✓	✓	✓	✓	✓	
1,1-Dichloroethylene	NA	✓	✓	+24	✓	NA	✓	✓	✓	✓	✓	✓	✓	
Vinyl acetate	NA	✓	✓	+21	✓	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. MWL LTMMP TAL.

MS/MSD on SNL sample 598056004

ICAL VOA6.I 10/14/22 Linear: Dichlorodifluoromethane, bromomethane, methylene chloride

SNL LCMSMS Worksheet (PFAS)

ARCOC: 623824	SDG: 598175	Method: EPA 537.1 Drinking water	Matrix: Aqueous	Lab Sample IDs: 598175002, -003, -005
Batch #s: 2337543 (prep)/ 2337544 (-002, -003) and 2338333(prep)/2338334 (-005) ¹				

Mass Calibration: ☒ Pass ☐ Fail
 Acquisition Rate: ☒ Pass ☐ Fail
 Ion Transitions: ☒ Pass ☐ Fail
 ENVI-Carb Cleanup: ☒ Yes ☐ No

Analyte (outliers)	Calibration (QSM)						MB (≤1/2 LOQ)	5X MB	LCS/ LCSD %R	LCS/ LCSD RPD ≤30%	EB 3 598056 -020	FB 6 -002	FRB 3 -003
	RSD/ r ² ≤20% ≥0.99	Cal. Std Rec'y 70- 130%	RTs Set	ISC (LOQ) %D ±30%	ICV/ CCV %D ±30%	Inst Blanks (≤1/2 LOQ)							
PFOS	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	0.768J	✓
PFOA	✓	✓	✓	+35	+35 ¹	✓	✓	NA	✓	✓	✓	✓	✓
Ion Ratios (lab limits or 50-150%)						EIS/Isotope Dilution (IDA) Outliers (lab limits or 50-150% and within 0.4min)							
Sample	Compound	Ratio				Sample ID	IDA	%R					
None						None							
Signal to Noise Outliers (Stage 4) (≥10 for quant ions and ≥3 for conf ions)						RT outliers (Stage 4) (±0.4 minutes of ICAL midpoint or CCV)							
Sample ID	Compound	S/N				Sample ID	Compound	RT					
NA						NA							
Surrogates (70-130%)													
Sample ID	13C2-PFHxA	13C2-PFDA	d5-NEtFOSAA	13C3-PFPrOPrA									
-002	19	✓	✓	22									
-003	27	✓	✓	31									

Comments: HTs OK. Tune 05/12/22

2337543 (prep)/ 2337544 (-002, -003) LCS/LCSD ok samples are blanks

2338333(prep)/2338334 (-005) LCS/LCSD insufficient sample for MS.

ICAL LCMSMS9 11/02/22 All linear through zero, Isotope Dilution

No Ion Transition Summary; ion transitions on quant reports

No Ion Ratio Summary; ion ratios reported on quant reports, but not calculated

Cal Std %Rs from raw data

Sandia Inorganic Metals Worksheet

ARCOG #(s): 623824	SDG #(s): 598175	Matrix: Aqueous
Laboratory Sample IDs: 598175006		
Method/Batch #s: 3005A/6020B :2333909/2333910		

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)	LL CCV %R	PS %R	EB 3 598056 -021	X5
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L												
Ni	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA	NA	✓	NA	0.000821J	0.0041

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

Comments: HTs OK.
ICPMS: MS/DUP/SD on -006.
Ca, Mg, Al, Fe < ICSA.

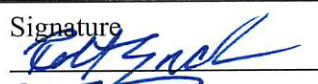
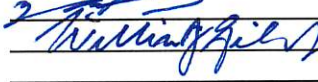
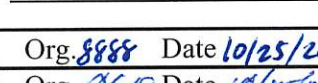
Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDA	LCS %R	LCSD %R	LCS/ LCSD RPD	MS/ MSD %R	MS/ MSD RER	MS/ MSD RPD	Lab Rep. RER	EB 3 598056 -023	X5
Gross beta	NA	NA	✓	NA	✓	NA	NA	✓	✓	NA	✓	0.709J	3.55
Tracer/Carrier Recovery Outliers													
Sample ID	Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	
NA													

Revised 7/2015

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

598175

 page 1 of 2
 ARCO 623824

Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08				Date Samples Shipped: <u>Oct 25, 2022</u> SNL Shipper #: <u>352721</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530				SMO Authorization: <u>CC</u> SMO Contact Phone: Wendy Palencia/505.844.3132				Waste Characterization: No RMA: No 4° Celsius: Yes			
TA: Bldg: Room:				Last Chain: No Validation Req'd: Yes				Turnaround Time: 30 days EDD: Yes				SDG #: <u>598175</u>			
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			
118946	✓ 001	MWL-FB 5	0	10/25/22 09:24	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMMP (SW846-8260D)	001			
118946	✓ 002	MWL-FB 6	0	10/25/22 09:20	DIW	P	2x250 ml	None	G	FB	PFAS (EPA 537 Mod)	002			
118947	✓ 001	MWL-FRB 3	0	10/25/22 09:22	DIW	P	2x250 ml	None	G	FRB	PFAS (EPA 537 Mod)	003			
118948	✓ 001	MWL-MW9	497	10/25/22 10:07	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMMP (SW846-8260D)	004			
118948	✓ 002	MWL-MW9	497	10/25/22 10:06	GW	P	2x250 ml	None	G	SA	PFAS (EPA 537 Mod)	005			
118948	✓ 003	MWL-MW9	497	10/25/22 10:08	GW	P	500 ml	HNO3	G	SA	METALS, LTMMMP - Cd, Cr, Ni, U	006			
118948	✓ 004	MWL-MW9	497	10/25/22 10:10	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	007			
118948	✓ 005	MWL-MW9	497	10/25/22 10:12	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	008			
118948	✓ 006	MWL-MW9	497	10/25/22 10:14	GW	AG	250 ml	None	G	SA	TRITIUM (EPA 906)	009			
118948	✓ 007	MWL-MW9	497	10/25/22 10:15	GW	G	2x40 ml	None	G	SA	RADON (SM7500 Rn B)	010			
Sample Team Members	Name Robert Lynch Zachary Tenorio William Gibson		Signature   		Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.										
Relinquished by <u>3</u>		Org. <u>8888</u>	Date <u>10/25/22</u>	Time <u>1140</u>	Relinquished by		Org.	Date	Time						
Received by <u>Michael Chen</u>		Org. <u>0618</u>	Date <u>10/25/22</u>	Time <u>1140</u>	Received by		Org.	Date	Time						
Relinquished by <u>Michael Chen</u>		Org. <u>0618</u>	Date <u>10/25/22</u>	Time <u>1200</u>	Relinquished by		Org.	Date	Time						
Received by <u>HB</u>		Org.	Date <u>10/26/22</u>	Time <u>745</u>	Received by		Org.	Date	Time						

CC

AR/COC NUMBER 623825



Memorandum

Date: December 20, 2022

To: File

From: Linda Thal

Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623825
SDG: 598176
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

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

1. The initial calibration intercepts were negative and $>$ the MDL but $\leq 3X$ the MDL for methylene chloride and bromomethane. The associated sample results were non-detect and will be **qualified UJ,I5**.
2. Acetone was detected at \leq the PQL in TB 7, sample 598176008 associated with sample -001. The associated sample result was a detect $>$ the PQL but $\leq 10X$ the TB value and will be **qualified J+,B1**.

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

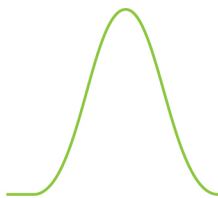
Holding Times and Preservation

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 dichlorodifluoromethane. The associated sample results were non-detect and will not be qualified.

The CCV %Ds were $>20\%$ with positive bias for chloromethane, vinyl chloride, bromomethane, chloroethane, vinyl acetate and 1,1-dichloroethylene. The associated sample results were non-detect and will not be qualified.

Blanks

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

Bromodichloromethane and dibromochloromethane were detected at \leq the PQL and acetone and chloroform were detected at $>$ the PQL in EB 4, sample -001 submitted on ARCO 623825 in this SDG and associated with samples on ARCO 623827 submitted in another SDG. No data from 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)

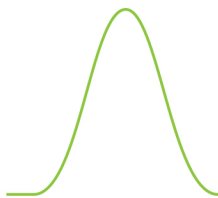
All MS/MSD recoveries and RPDs met QC acceptance criteria with the following exception. The MS recovery for vinyl chloride was $>$ the upper acceptance limit. The associated sample results were blanks and will not be qualified.

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.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB and TB. The LCS met QC acceptance criteria and no data will be qualified.

There was no matrix-specific replicate analysis for the EB and TB. However, based on professional judgement, no data will be qualified.

Laboratory Control Sample (LCS)



All LCS acceptance criteria were met except as follows. The LCS recoveries for chloromethane and vinyl chloride were > the upper acceptance limit. 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

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

A TB was submitted on the ARCOC. EB 4 was submitted on ARCOC 623825 in this SDG and was associated with the samples on ARCOC 623827 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/21/2022



Memorandum

Date: December 20, 2022

To: File

From: Linda Thal

Subject: LC/MS/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623825
SDG: 598176
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: PFAS

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 EPA 537.1 (PFAS, drinking water). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The recoveries for surrogates 13C2-PFHxA and 13C3-PFPrOPrA were <70% but $\geq 10\%$ for sample 598176002. The associated sample results were non-detect and will be **qualified UJ,S2**.

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

Holding Times and Preservation

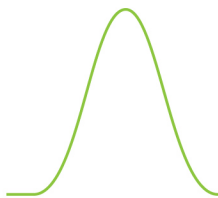
The sample was extracted and analyzed within the prescribed holding times and was properly preserved.

Instrument Performance Checks

All instrument mass calibration verifications were within QC acceptance criteria.

Ion Transitions

The ion transitions specified in QSM Table B-15 were used for analysis. It should be noted that an ion transition summary was not provided in the data package. The ion transitions provided in the raw data were reviewed for validation.



Calibration

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

The CCV %D was >30% with positive bias for PFOA. The associated sample result was non-detect and will not be qualified.

Instrument Sensitivity Check (ISC)/Limit of Quantitation (LOQ) Check

All ISC/LOQ recoveries met QC acceptance criteria except as follows.

The ISC %D was >30% with positive bias for PFOA. The associated sample result was non-detect and will not be qualified.

Ion Ratios

All ion ratios were within QC acceptance limits. It should be noted that an ion ratio summary was not provided for the standards or QC samples in the data package. The ion ratios provided in the raw data were reviewed for validation.

Extracted Internal Standards

All extracted internal standards met QC acceptance criteria.

Surrogates

All surrogate recoveries were within QC acceptance limits except as noted above in the Summary section.

Blanks

No target analytes were detected in any of the blanks.

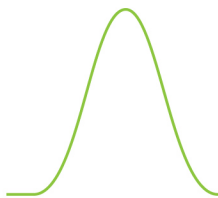
Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD)

The LCS/LCSD analyses met QC acceptance criteria. The analysis of the LCS/LCSD serves as a matrix-specific measure of accuracy and precision for the EB in this SDG.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS or MSD were not performed with the sample in this data package. Since the only sample was a blank, no data will be qualified.

Reporting Limits (RLs)



All limits of quantitation (LOQs) and detection limits (DLs) were properly reported. The sample was not diluted.

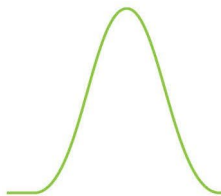
Other QC

The client was notified that the sample was analyzed using method EPA 537.1 (PFAS, Drinking Water) instead of method EPA 537.1 Modified.

EB 4 was submitted on ARCOG 623825 in this SDG and was associated with the samples on ARCOG 623827 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/21/2022



Memorandum

Date: December 20, 2022
To: File
From: Linda Thal
Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMMP
ARCOC: 623825
SDG: 598176
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

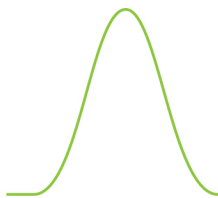
The ICP-MS tune met QC acceptance criteria.

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 QC acceptance criteria. It should be noted that the MS was performed on an SNL sample from another SDG. No data will be qualified.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB. The LCS met QC acceptance criteria and no data will be qualified.

Laboratory Replicate

The sample replicate met QC acceptance criteria. It should be noted that the replicate was performed on an SNL sample from another SDG. No data will be qualified.

There was no matrix-specific replicate analysis for the EB. However, based on professional judgement, no data will be qualified.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted.

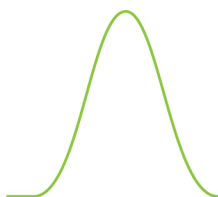
ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the sample concentrations for Ca, Al, Mg and Fe were < the ICS values.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria. It should be noted that the serial dilution was performed on an SNL sample from another SDG. No data will be qualified.

Other QC



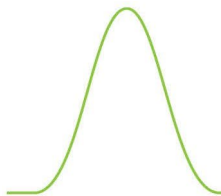
EB 4 was submitted on ARCO 623825 in this SDG and was associated with the samples on ARCO 623827 submitted in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/21/2022



Memorandum

Date: December 20, 2022
To: File
From: Linda Thal
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623825
SDG: 598176
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/SW846 9310 (gross alpha/beta), SM 7500 Rn B (Radon-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

All analyses *except* gross beta:

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

Gross Beta:

1. The sample result was \geq the MDA but $<3X$ the MDA and will be **qualified J,FR7**.

Holding Times and Preservation

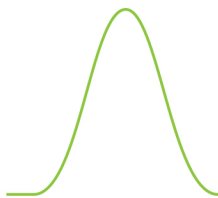
The sample was prepared and analyzed within the prescribed holding times.

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 with the following exceptions.

Gross beta was detected at \geq the MDA and 2-sigma TPU in EB 4, sample 598176005 submitted on ARCO 623825 in this SDG and associated with the sample on ARCO 623827 submitted in another SDG. No data from this SDG will be qualified.

Tracer/Carrier Recovery

Tracer/carriers were not required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. The MS and/or MSD were performed on SNL samples of similar matrix from another SDG. No data will be qualified.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the EB. The LCS met QC acceptance criteria and no data will be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met. The replicate analyses for all target analytes were performed on SNL samples of similar matrix from other SDGs. No data will be qualified.

For all target analytes *except* Rn-22, there was no matrix-specific replicate analysis for the EB. However, based on professional judgement, no sample results will be qualified.

The Rn-222 LCS/LCSD met precision criteria for the EB.

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

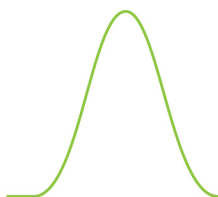
The LCS and/or LCSD met QC acceptance criteria for accuracy and/or precision.

Detection Limits/Dilutions

The samples were not diluted. All required detection limits (DLs) were met.

Other QC

EB 4 was submitted on ARCO 6238235 in this SDG and was associated with the sample on ARCO 623827 submitted in another SDG.

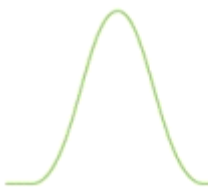


No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/21/2022



Sample Findings Summary



AR/COC: 623825

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 537.1			
	118950-002/MWL-EB 4	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118950-002/MWL-EB 4	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118950-002/MWL-EB 4	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
EPA 900.0/SW846 9310			
	118950-005/MWL-EB 4	ALPHA (12587-46-1)	BD, FR3
	118950-005/MWL-EB 4	BETA (12587-47-2)	J, FR7
EPA 901.1			
	118950-004/MWL-EB 4	Americium-241 (14596-10-2)	BD, FR3
	118950-004/MWL-EB 4	Cesium-137 (10045-97-3)	BD, FR3
	118950-004/MWL-EB 4	Cobalt-60 (10198-40-0)	BD, FR3
	118950-004/MWL-EB 4	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	118950-006/MWL-EB 4	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	118950-007/MWL-EB 4	Radon-222 (14859-67-7)	BD, FR3
SW846 8260D			
	118950-001/MWL-EB 4	Acetone (67-64-1)	J+, B1
	118950-001/MWL-EB 4	Bromomethane (74-83-9)	UJ, I5
	118950-001/MWL-EB 4	Methylene chloride (75-09-2)	UJ, I5
	118951-001/MWL-TB 7	Bromomethane (74-83-9)	UJ, I5
	118951-001/MWL-TB 7	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#: 623825	Site/Project: MWL LTMMP	Validation Date: 12/20/2022
SDG #: 598176	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 8	CVR present: Yes
ARCOG(s) present: Yes	Sample Container Integrity: OK	
Analysis Type: <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Genchem <input checked="" type="checkbox"/> Rad <input checked="" type="checkbox"/> Other: PFAS		

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

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

Comments: Collected: 10/25/2022

The ARCOG noted that the trip blank vials were received from the lab with headspace.

EB 4 was submitted on ARCOG 623825 in this SDG and was associated with the samples on ARCOG 623827 submitted in another SDG.

Sample 118950-002 was submitted for PFAS analysis by Method 537.1 Mod., but was incorrectly logged in and analyzed by Method 537.1.

Validated by:



Sandia Organic Worksheet (GC/MS VOC)

ARCO #s: 623825	SDG: 598176	Matrix: Aqueous
Laboratory Sample IDs: 598176001, -008		
Method/Batch #s: 8260D 2336528	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	EB 4 -001	X5 (X10)	TB 7 -008	(X10)
	Int.	RF/ Slope	RSD /r ²	(ICV)/CCV %D										
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	5.18	(51.8)	2.1J	(21)
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.65J	3.25	✓	NA
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	2.78	13.9	✓	NA
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.44J	2.2	✓	NA
Methylene chloride	-0.96	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Chloromethane	NA	✓	✓	+58	✓	NA	158	✓	✓	✓	✓	✓	✓	NA
Vinyl chloride	NA	✓	✓	+85	✓	NA	185	147	✓	✓	✓	✓	✓	NA
Dichlorodifluoromethane	+0.52	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Bromomethane	-0.73	✓	✓	+38	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Chloroethane	NA	✓	✓	+28	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
1,1-Dichloroethylene	NA	✓	✓	+24	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA
Vinyl acetate	NA	✓	✓	+21	✓	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. MWL LTMMP TAL.

MS/MSD on SNL sample 598056004

ICAL VOA6.I 10/14/22 Linear: Dichlorodifluoromethane, bromomethane, methylene chloride

SNL LCMSMS Worksheet (PFAS)

ARCOC: 623825	SDG: 598176	Method: EPA 537.1 Drinking water	Matrix: Aqueous	Lab Sample IDs: 598176002
Batch #s: 2338333(prepare)/2338334				

Mass Calibration: ☒ Pass ☐ Fail
 Acquisition Rate: ☒ Pass ☐ Fail
 Ion Transitions: ☒ Pass ☐ Fail
 ENVI-Carb Cleanup: ☒ Yes ☐ No

Analyte (outliers)	Calibration (QSM)						MB (≤1/2 LOQ)	5X MB	LCS/ LCSD %R	LCS/ LCSD RPD ≤30%	EB 4 -002		
	RSD/ r ² ≤20% ≥0.99	Cal. Std Rec'y 70- 130%	RTs Set	ISC (LOQ) %D ±30%	ICV/ CCV %D ±30%	Inst Blanks (≤1/2 LOQ)							
PFOA	✓	✓	✓	35	35	✓	✓	NA	✓	✓	✓		
Ion Ratios (lab limits or 50-150%)						EIS/Isotope Dilution (IDA) Outliers (lab limits or 50-150% and within 0.4min)							
Sample	Compound	Ratio				Sample ID	IDA	%R					
None						None							
Signal to Noise Outliers (Stage 4) (≥10 for quant ions and ≥3 for conf ions)						RT outliers (Stage 4) (±0.4 minutes of ICAL midpoint or CCV)							
Sample ID	Compound	S/N				Sample ID	Compound	RT					
NA						NA							
Surrogates (70-130%)													
Sample ID	13C2-PFHxA	13C2-PFDA	d5-NEtFOSAA	13C3-PFPrOPrA									
-002	23	✓	✓	24									

Comments: HTs OK. Tune 05/12/22
 2338333(prepare)/2338334 LCS/LCSD OK sample is a blank
 ICAL LCMSMS9 11/02/22 All linear through zero, Isotope Dilution
 No Ion Transition Summary; ion transitions on quant reports
 No Ion Ratio Summary; ion ratios reported on quant reports, but not calculated
 Cal Std %Rs from raw data

Sandia Inorganic Metals Worksheet

ARCOG #(s): 623825	SDG #(s): 598176	Matrix: Aqueous
Laboratory Sample IDs: 598176003		
Method/Batch #s: 3005A/6020B :2333909/2333910		

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)	LL CCV %R	PS %R	EB 4 -003	X5
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L												
none																		

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

Comments: HTs OK.
ICPMS: MS/DUP/SD on SNL sample 598175006.
Ca, Mg, Al, Fe < ICSA.

Analyte (outliers)	Control Freq.	Control Eval.	Method Blank	5X Blank or 5X MDA	LCS %R	LCSD %R	LCS/ LCSD RPD	MS/ MSD %R	MS/ MSD RER	MS/ MSD RPD	Lab Rep. RER	EB 4 -005	X5
Gross beta	NA	NA	✓	NA	✓	NA	NA	✓	✓	NA	✓	1.4J	7.0
Tracer/Carrier Recovery Outliers													
Sample ID	Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	Sample ID			Tracer/Carrier	%R	
NA													

Revised 7/2015

SMO 2012-ARCO (4-2012)

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

598176

AOP 95-16

 page 1 of 1
 ARCO 623825

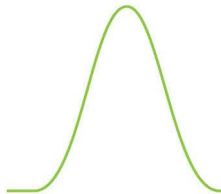
Project Name: MWL LTMMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: <u>Oct 25, 2022</u> SNL Shipper #: <u>350721</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: <u>CE</u> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: No Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: <u>598176</u>

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
118950	✓ 001	MWL-EB 4	0	10/25/22 11:13	DIW	G	3x40 ml	HCl	G	EB	VOC-LTMMMP (SW846-8260D)	001
118950	✓ 002	MWL-EB 4	0	10/25/22 11:12	DIW	P	2x250 ml	None	G	EB	PFAS (EPA 537 Mod)	002
118950	✓ 003	MWL-EB 4	0	10/25/22 11:14	DIW	P	500 ml	HNO3	G	EB	METALS, LTMMMP - Cd, Cr, Ni, U	003
118950	✓ 004	MWL-EB 4	0	10/25/22 11:15	DIW	P	1 L	HNO3	G	EB	GAMMA SPEC, SHORT LIST (EPA 901)	004
118950	✓ 005	MWL-EB 4	0	10/25/22 11:16	DIW	P	1 L	HNO3	G	EB	GROSS-ALPHA/BETA (EPA 900)	005
118950	✓ 006	MWL-EB 4	0	10/25/22 11:17	DIW	AG	250 ml	None	G	EB	TRITIUM (EPA 906)	006
118950	✓ 007	MWL-EB 4	0	10/25/22 11:18	DIW	G	2x40 ml	None	G	EB	RADON (SM7500 Rn B)	007
118951	✓ 001	MWL-TB 7	0	10/25/22 11:13	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMMP (SW846-8260D)	008

Sample Team Members William Gibson Robert Lynch Zachary Tenorio	Signature <u>William Gibson</u> <u>Robert Lynch</u> <u>Zachary Tenorio</u>	Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.
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Relinquished by <u>[Signature]</u>	Org. <u>5888</u>	Date <u>10/25/22</u>	Time <u>11:40</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>0018</u>	Date <u>10/25/22</u>	Time <u>11:40</u>	Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>0018</u>	Date <u>10/25/22</u>	Time <u>12:00</u>	Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org.	Date <u>10/26/22</u>	Time <u>7:45</u>	Received by	Org.	Date	Time

AR/COC NUMBERS 623826, 623827



Memorandum

Date: December 21, 2022

To: File

From: Linda Thal

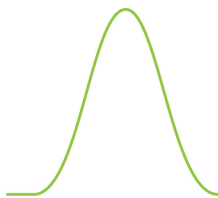
Subject: GC/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCO: 623826 and 623827
SDG: 598360
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: VOCs

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 8260D (VOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The initial calibration intercept was negative and $>$ the MDL but $\leq 3X$ the MDL for methylene chloride. The associated result for sample 598360012 was non-detect and will be **qualified UJ,I5**. All remaining associated sample results were detects $< 3X$ the absolute value of the intercept and will be **qualified J-I5**.
2. The initial calibration %RSDs were $> 15\%$ but $\leq 40\%$ and the CCV %Ds were $> 20\%$ but $\leq 40\%$ with negative bias for carbon disulfide and dichlorodifluoromethane. The associated sample results were non-detect and will be **qualified UJ,I3,C3**.
3. Methylene chloride was detected at \leq the PQL in TB 8, sample -008 associated with sample -001 and in TB 9, sample -019 associated with samples -009 and -012. The associated results for samples -001 and -009 were detects \leq the PQL and will be **qualified 5.0U,B1**; non-detect at the PQL.
4. Toluene was detected at $>$ the PQL in TB 8, sample -008 associated with sample -001 and in TB 9, sample -019 associated with samples -009 and -012. The associated sample results were detects $>$ the PQL but $\leq 2X$ the TB values and will be **qualified U,B1**; non-detect at the reported values.
5. The MS/MSD relative percent difference (RPD) was $> 20\%$ for dichlorodifluoromethane. The associated sample results were non-detect and will be **qualified UJ,MS5**.



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 ICV %D was >20% and positive for dichlorodifluoromethane. The associated sample results were non-detect and will not be qualified.

The CCV %D was >20% but \leq 40% with negative bias for chloromethane. The associated sample results were non-detect and since no other calibration infractions occurred, will not be qualified.

Blanks

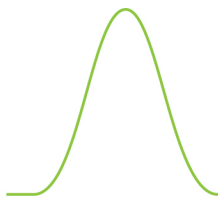
No target analytes were detected in any of the blanks except as noted above in the Summary section and as follows.

Methylene chloride was detected at \leq the PQL in TB 9, sample -019 associated with samples -009 and -012. The associated result for sample -012 was non-detect and will not be qualified.

Bromodichloromethane and dibromochloromethane were detected at \leq the PQL and acetone and chloroform were detected at > the PQL in EB 4, sample 598176001 submitted on ARCO 623825 in another SDG and associated with samples on ARCO 623827 submitted in this SDG. The associated sample results were non-detect and will not be qualified.

Bromodichloromethane and dibromochloromethane were detected at \leq the PQL and acetone and chloroform were detected at > the PQL in FB 7, sample -009 associated with sample -012. The associated sample results were non-detect and will not be qualified. Methylene chloride and toluene were also detected in FB 7 but were qualified non-detect due to TB contamination and were not applied to the associated sample results.

Bromodichloromethane and dibromochloromethane were detected at \leq the PQL and acetone and chloroform were detected at > the PQL in the DIWQC sample, sample -001 not associated with any field samples.



Methylene chloride and toluene were also detected in the DIWQC sample but were qualified non-detect due to TB contamination.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD recoveries and RPDs met QC acceptance criteria except as noted above in the Summary section.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the FB, TBs and DIWQC sample. The LCS met QC acceptance criteria and no data will be qualified.

There was no matrix-specific replicate analysis for the FB, TBs and DIWQC sample. However, based on professional judgement, 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)

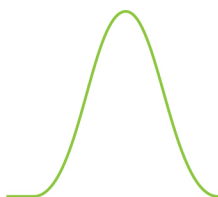
TIC reports were not required.

Other QC

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

A TB was submitted on each ARCOC. EB 4 was submitted on ARCOC 623825 in another SDG and was associated with the sample on ARCOC 623827 submitted in this SDG. FB 7 was submitted on ARCOC 623827 and was associated with the sample on the same ARCOC. A DIWQC sample was submitted on ARCOC 623826 and was the DI source water for equipment decontamination.

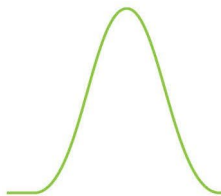
No other specific issues that affect data quality were identified.



Reviewed by: Mary Donovan

Level: I

Date: 12/22/2022



Memorandum

Date: December 21, 2022

To: File

From: Linda Thal

Subject: LC/MS/MS Organic Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623826 and 623827
SDG: 598360
Laboratory: GEL
Project/Task: 195122.10.11.08
Analysis: PFAS

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 537.1 (PFAS, drinking water). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1. The recoveries for surrogates 13C2-PFHxA and 13C3-PFPrOPrA were <70% but $\geq 10\%$ for samples 598360002, -010 and -011. The associated sample results were non-detect and will be **qualified UJ,S2**.
2. An MS or MSD were not performed due to limited sample volume. The associated results for sample -013 were non-detect and will be **qualified UJ,MS1**.

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

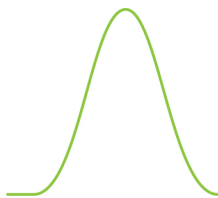
Holding Times and Preservation

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

Instrument Performance Checks

All instrument mass calibration verifications were within QC acceptance criteria.

Ion Transitions



The ion transitions specified in QSM Table B-15 were used for analysis. It should be noted that an ion transition summary was not provided in the data package. The ion transitions provided in the raw data were reviewed for validation.

Calibration

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

The CCV %D was >30% with positive bias for PFOA. The associated sample results were non-detect and will not be qualified.

Instrument Sensitivity Check (ISC)/Limit of Quantitation (LOQ) Check

All ISC/LOQ recoveries met QC acceptance criteria except as follows.

The ISC %D was >30% with positive bias for PFOA. The associated sample results were non-detect and will not be qualified.

Ion Ratios

All ion ratios were within QC acceptance limits. It should be noted that an ion ratio summary was not provided for the standards or QC samples in the data package. The ion ratios provided in the raw data were reviewed for validation.

Extracted Internal Standards

All extracted internal standards met QC acceptance criteria.

Surrogates

All surrogate recoveries were within QC acceptance limits except as noted above in the Summary section.

Blanks

No target analytes were detected in any of the blanks.

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

The LCS/LCSD analyses met QC acceptance criteria. The analysis of the LCS/LCSD serves as a matrix-specific measure of accuracy and precision for the FB, FRB and DIWQC sample in this SDG.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS or MSD were not performed as noted above in the Summary section.

Reporting Limits (RLs)

All limits of quantitation (LOQs) and detection limits (DLs) were properly reported. The samples were not diluted.

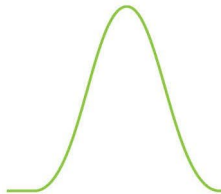
Other QC

The client was notified that the samples were analyzed using method EPA 537.1 (PFAS, Drinking Water) instead of method EPA 537.1 Modified.

EB 4 was submitted on ARCOG 623825 in another SDG and was associated with the sample on ARCOG 623827 submitted in this SDG. An FB and an FRB were submitted on ARCOG 623827 and were associated with the sample on the same ARCOG. A DIWQC sample was submitted on ARCOG 623826 and was the DI source water for equipment decontamination.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan **Level:** I **Date:** 12/22/2022



Memorandum

Date: December 21, 2022

To: File

From: Linda Thal

Subject: Inorganic Data Review and Validation – SNL
Site: MWL LTMMMP
ARCOC: 623826 and 623827
SDG: 598360
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

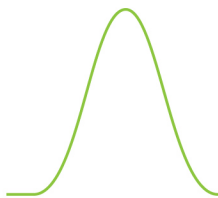
The ICP-MS tune met QC acceptance criteria.

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 QC acceptance criteria.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the DIWQC sample. The LCS met QC acceptance criteria and no data will be qualified.

Laboratory Replicate

The sample replicate met QC acceptance criteria.

There was no matrix-specific replicate analysis for the DIWQC sample. However, based on professional judgement, no data will be qualified.

Laboratory Control Sample (LCS)

The LCS met 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)

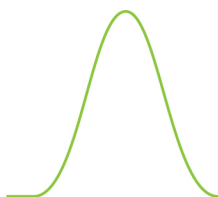
Results of the ICS A and AB analyses were not evaluated because the sample concentrations for Ca, Al, Mg and Fe were < the ICS values.

ICP Serial Dilution

The serial dilution met all QC acceptance criteria.

Other QC

EB 4 was submitted on ARCOG 623825 in another SDG and was associated with the sample on ARCOG 623827 submitted in this SDG. A DIWQC sample was submitted on ARCOG 623826 and was the DI source water for equipment decontamination.

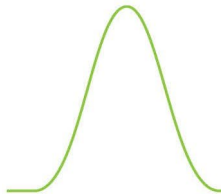


No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/22/2022



Memorandum

Date: December 21, 2022
To: File
From: Linda Thal
Subject: Radiochemical Data Review and Validation – SNL
Site: MWL LTMMP
ARCOC: 623826 and 623827
SDG: 598360
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/SW846 9310 (gross alpha/beta), SM 7500 Rn B (Radon-222) and EPA 906.0 modified (tritium). Problems were identified with the data package that resulted in the qualification of data.

All analyses:

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

Radon-222:

1. The result for sample 598360018 was \geq the MDA but $<3X$ the MDA and will be **qualified J,FR7**.

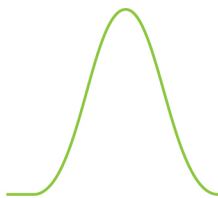
Gross beta:

1. Gross beta was detected at $>$ the associated 2-sigma TPU and/or $>$ the associated MDA in EB 4, sample 598176005, submitted on ARCO 623825 in another SDG, and associated with sample 598360016, submitted on ARCO 623827 in this SDG. The associated sample result was a detect $\leq 5X$ the EB value and will be **qualified NJ+,B2**.

Holding Times and Preservation

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

Quantification



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

Calibration

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

Blanks

No target analytes were detected in the blanks at concentrations \geq the MDA and 2-sigma TPU except as noted above in the Summary section.

Tracer/Carrier Recovery

Tracer/carriers were not required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS and/or MSD met QC acceptance criteria. The MS and/or MSD were performed on SNL samples of similar matrix from another SDG. No data will be qualified.

The analysis of the LCS serves as a matrix-specific measure of accuracy for the DIWQC sample. The LCS met QC acceptance criteria and no data will be qualified.

Laboratory Replicate

All replicate error ratio acceptance criteria were met. The replicate analyses for all target analytes *except* Rn-22 were performed on SNL samples of similar matrix from another SDG. No data will be qualified.

For all target analytes *except* Rn-22, there was no matrix-specific replicate analysis for the DIWQC sample. However, based on professional judgement, no sample results will be qualified.

The Rn-222 LCS/LCSD met precision criteria for the DIWQC sample.

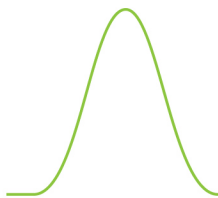
Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

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 (DLs) were met.

Other QC



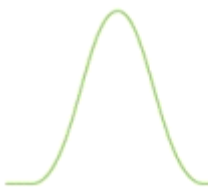
EB 4 was submitted on ARCOG 623825 in another SDG and was associated with the sample on ARCOG 623827 submitted in this SDG. A DIWQC sample was submitted on ARCOG 623826 and was the DI source water for equipment decontamination.

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donovan

Level: I

Date: 12/22/2022



Sample Findings Summary



AR/COC: 623826, 623827

Page 1 of 3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 537.1			
	118952-002/MWL-DIWQC	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118952-002/MWL-DIWQC	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118952-002/MWL-DIWQC	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118954-002/MWL-FB 8	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118954-002/MWL-FB 8	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118954-002/MWL-FB 8	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118955-001/MWL-FRB 4	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, S2
	118955-001/MWL-FRB 4	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, S2
	118955-001/MWL-FRB 4	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, S2
	118956-002/MWL-MW8	Perfluorohexanesulfonate (PFHxS) (355-46-4)	UJ, MS1
	118956-002/MWL-MW8	Perfluorooctanesulfonate (PFOS) (1763-23-1)	UJ, MS1
	118956-002/MWL-MW8	Perfluorooctanoic acid (PFOA) (335-67-1)	UJ, MS1
EPA 900.0/SW846 9310			
	118952-005/MWL-DIWQC	ALPHA (12587-46-1)	BD, FR3
	118952-005/MWL-DIWQC	BETA (12587-47-2)	BD, FR3
	118956-005/MWL-MW8	BETA (12587-47-2)	NJ+, B2
EPA 901.1			
	118952-004/MWL-DIWQC	Americium-241 (14596-10-2)	BD, FR3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	118952-004/MWL-DIWQC	Cesium-137 (10045-97-3)	BD, FR3
	118952-004/MWL-DIWQC	Cobalt-60 (10198-40-0)	BD, FR3
	118952-004/MWL-DIWQC	Potassium-40 (13966-00-2)	BD, FR3
	118956-004/MWL-MW8	Americium-241 (14596-10-2)	BD, FR3
	118956-004/MWL-MW8	Cesium-137 (10045-97-3)	BD, FR3
	118956-004/MWL-MW8	Cobalt-60 (10198-40-0)	BD, FR3
	118956-004/MWL-MW8	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	118952-006/MWL-DIWQC	Tritium (10028-17-8)	BD, FR3
	118956-006/MWL-MW8	Tritium (10028-17-8)	BD, FR3
SM 7500 Rn B			
	118952-007/MWL-DIWQC	Radon-222 (14859-67-7)	BD, FR3
	118956-007/MWL-MW8	Radon-222 (14859-67-7)	J, FR7
SW846 8260D			
	118952-001/MWL-DIWQC	Carbon disulfide (75-15-0)	UJ, I3,C3
	118952-001/MWL-DIWQC	Dichlorodifluoromethane (75-71-8)	UJ, I3,C3,MS5
	118952-001/MWL-DIWQC	Methylene chloride (75-09-2)	5.0UJ, B1,I5
	118952-001/MWL-DIWQC	Toluene (108-88-3)	6.2U, B1
	118953-001/MWL-TB 8	Carbon disulfide (75-15-0)	UJ, I3,C3
	118953-001/MWL-TB 8	Dichlorodifluoromethane (75-71-8)	UJ, I3,C3,MS5
	118953-001/MWL-TB 8	Methylene chloride (75-09-2)	J-, I5
	118954-001/MWL-FB 7	Carbon disulfide (75-15-0)	UJ, I3,C3
	118954-001/MWL-FB 7	Dichlorodifluoromethane (75-71-8)	UJ, I3,C3,MS5
	118954-001/MWL-FB 7	Methylene chloride (75-09-2)	5.0UJ, B1,I5
	118954-001/MWL-FB 7	Toluene (108-88-3)	6.56U, B1
	118956-001/MWL-MW8	Carbon disulfide (75-15-0)	UJ, I3,C3
	118956-001/MWL-MW8	Dichlorodifluoromethane (75-71-8)	UJ, I3,C3,MS5
	118956-001/MWL-MW8	Methylene chloride (75-09-2)	UJ, I5
	118956-001/MWL-MW8	Toluene (108-88-3)	7.93U, B1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	118957-001/MWL-TB 9	Carbon disulfide (75-15-0)	UJ, I3,C3
	118957-001/MWL-TB 9	Dichlorodifluoromethane (75-71-8)	UJ, I3,C3,MS5
	118957-001/MWL-TB 9	Methylene chloride (75-09-2)	J-, I5

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

Sandia Data Validation Summary Worksheet

ARCOG#: 623826 and 623827	Site/Project: MWL LTMMP	Validation Date: 12/21/2022
SDG #: 598360	Laboratory: GEL Laboratories, LLC	Validator: Linda Thal
Matrix: Aqueous	# of Samples: 19	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 <input checked="" type="checkbox"/> Other: PFAS		

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

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

Comments: Collected: 10/26/2022

The ARCOGs noted that the trip blank vials were received from the lab with headspace.

EB 4 was submitted on ARCOG 623825 in another SDG and was associated with the samples on ARCOG 623827 submitted in this SDG.

Sample 118952-002, 118954-002, 118955-001 and 118956-002 were submitted for PFAS analysis by Method 537.1 Mod., but were incorrectly logged in and analyzed by Method 537.1.

Validated by:



Sandia Organic Worksheet (GC/MS VOC)

ARCO #s: 623826 and 623827	SDG: 598360	Matrix: Aqueous
Laboratory Sample IDs: 598360001, -008, -009, -012, -019		
Method/Batch #s: 8260D 2338298	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	EB 4 598176 -001	DIW QC -001	FB 7 -009	TB 8 ¹ -008 TB 9 ² -019
	Int.	RF/ Slope	RSD /r ²	(ICV)/CCV %D										
Acetone	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	5.18	5.92	6.5	✓
Bromodichloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.65J	0.99J	0.94J	✓
Chloroform	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	2.78	3.57	3.39	✓
Dibromochloromethane	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	0.44J	0.78J	0.73J	✓
Methylene chloride	-0.82	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	0.50J	0.63J	0.77J ¹ 0.84J ²
Toluene	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	6.2	6.56	6.47 ¹ 6.67 ²
Carbon disulfide	NA	✓	19	-24	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
Dichlorodifluoromethane	NA	✓	16	(+35), -25	✓	NA	✓	✓	✓	26	✓	✓	✓	✓
Chloromethane	NA	✓	✓	-24	✓	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. MWL LTMMP TAL.
MS/MSD on -012
ICAL VOA4.I 10/28/22 Linear: Methylene chloride

SNL LCMSMS Worksheet (PFAS)

ARCOC: 623826 and 623827	SDG: 598360	Method: EPA 537.1 Drinking water	Matrix: Aqueous	Lab Sample IDs: 598360002, -010, -011, -013
Batch #s: 2338333(prepare)/2338334				

Mass Calibration: ☒ Pass ☐ Fail
 Acquisition Rate: ☒ Pass ☐ Fail
 Ion Transitions: ☒ Pass ☐ Fail
 ENVI-Carb Cleanup: ☒ Yes ☐ No

Analyte (outliers)	Calibration (QSM)						MB (≤1/2 LOQ)	5X MB	LCS/ LCSD %R	LCS/ LCSD RPD ≤30%	EB 4 598176 -002	FB 8 -010 FRB 4 -011	DIW QC -002
	RSD/ r ² ≤20% ≥0.99	Cal. Std Rec'y 70- 130%	RTs Set	ISC (LOQ) %D ±30%	ICV/ CCV %D ±30%	Inst Blanks (≤1/2 LOQ)							
PFOA	✓	✓	✓	35	35	✓	✓	NA	✓	✓	✓	✓	✓
Ion Ratios (lab limits or 50-150%)						EIS/Isotope Dilution (IDA) Outliers (lab limits or 50-150% and within 0.4min)							
Sample	Compound	Ratio				Sample ID	IDA	%R					
None						None							
Signal to Noise Outliers (Stage 4) (≥10 for quant ions and ≥3 for conf ions)						RT outliers (Stage 4) (±0.4 minutes of ICAL midpoint or CCV)							
Sample ID	Compound	S/N				Sample ID	Compound	RT					
NA						NA							
Surrogates (70-130%)													
Sample ID	13C2-PFHxA	13C2-PFDA	d5-NEtFOSAA	13C3-PFPrOPrA									
-002	23	✓	✓	26									
-010	28	✓	✓	30									
-011	14	✓	✓	16									

Comments: HTs OK. Tune 05/12/22
 2338333(prepare)/2338334 LCS/LCSD
 ICAL LCMSMS9 11/02/22 All linear through zero, Isotope Dilution
 No Ion Transition Summary; ion transitions on quant reports
 No Ion Ratio Summary; ion ratios reported on quant reports, but not calculated
 Cal Std %Rs from raw data

Sandia Inorganic Metals Worksheet

ARCOG #(s): 623826 and 623827	SDG #(s): 598360	Matrix: Aqueous
Laboratory Sample IDs: 598360003, -014		
Method/Batch #s: 3005A/6020B :2335037/2335038		

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)	LL CCV %R	PS %R	EB 4 598176 -003	DIWQC -003
	Int. ug/L	R ²	ICV	CCV	ICB ug/L	CCB ug/L												
none																		

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

Comments: HTs OK.
ICPMS: MS/DUP/SD on -014
Ca, Mg, Al, Fe < ICSA.

Comments: HTs OK. Note: No precision criteria apply to samples < the MDA including where one result is > the MDA and the other < MDA. Gross A/B: DUP, MS/MSD on SNL sample 597711005. Parent sample 152mL; DUP 150ml; MS/MSD 54.2/53ml; 2.8X dilution. GS: DUP on SNL sample 597711004. Tritium: DUP/MS on SNL sample 597711006 Rn-222: LCS/LCSD, DUP on -018
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CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

page 1 of 1
ARCOG **623826**

SMO Use

Project Name: MWL LTMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: <u>10/26/22</u> SNL Shipper #: <u>352787</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: <u>CL</u> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: No Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: <u>598360</u>

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
118952 ✓	001	MWL-DIWQC	0	10/26/22 09:19	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260D)	001
118952 ✓	002	MWL-DIWQC	0	10/26/22 09:18	DIW	P	2x250 ml	None	G	FB	PFAS (EPA 537 Mod)	002
118952 ✓	003	MWL-DIWQC	0	10/26/22 09:20	DIW	P	500 ml	HNO3	G	FB	METALS, LTMMP - Cd, Cr, Ni, U	003
118952 ✓	004	MWL-DIWQC	0	10/26/22 09:21	DIW	P	1 L	HNO3	G	FB	GAMMA SPEC, SHORT LIST (EPA 901)	004
118952 ✓	005	MWL-DIWQC	0	10/26/22 09:22	DIW	P	1 L	HNO3	G	FB	GROSS-ALPHA/BETA (EPA 900)	005
118952 ✓	006	MWL-DIWQC	0	10/26/22 09:23	DIW	AG	250 ml	None	G	FB	TRITIUM (EPA 906)	006
118952 ✓	007	MWL-DIWQC	0	10/26/22 09:24	DIW	G	2x40 ml	None	G	FB	RADON (SM7500 Rn B)	007
118953 ✓	001	MWL-TB 8	0	10/26/22 09:19	DIW	G	3x40 ml	HCl	G	TB	VOC-LTMMP (SW846-8260D)	008

Sample Team Members	Name	Signature	Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.
	William Gibson	<u>William Gibson</u>	
	Robert Lynch	<u>Robert Lynch</u>	
	Zachary Tenorio	<u>Zachary Tenorio</u>	

Relinquished by <u>William Gibson</u>	Org. <u>3888</u>	Date <u>10/26/22</u>	Time <u>1056</u>	Relinquished by	Org.	Date	Time
Received by <u>William Gibson</u>	Org. <u>0618</u>	Date <u>10/26/22</u>	Time <u>1058</u>	Received by	Org.	Date	Time
Relinquished by <u>William Gibson</u>	Org. <u>0618</u>	Date <u>10/26/22</u>	Time <u>1130</u>	Relinquished by	Org.	Date	Time
Received by <u>William Gibson</u>	Org.	Date <u>10/27/22</u>	Time <u>755</u>	Received by	Org.	Date	Time

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

page 1 of 2
ARCO 623827

SMO Use

Project Name: MWL LTMMP Project Manager: Timmie Jackson P/T No: 195122.10.11.08	Date Samples Shipped: <u>10/26/22</u> SNL Shipper #: <u>352 789</u> Lab Contact: Zachary Worsham/ 843-300-4224 Lab Destination: GEL Contract No.: 1983530	SMO Authorization: <u>CE</u> SMO Contact Phone: Wendy Palencia/505.844.3132	Waste Characterization: No RMA: No 4° Celsius: Yes
TA: Bldg: Room:	Last Chain: Yes Validation Req'd: Yes	Turnaround Time: 30 days EDD: Yes	SDG #: <u>598360</u>

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
118954	✓ 001	MWL-FB 7	0	10/26/22 09:37	DIW	G	3x40 ml	HCl	G	FB	VOC-LTMMP (SW846-8260D)	009
118954	✓ 002	MWL-FB 8	0	10/26/22 09:35	DIW	P	2x250 ml	None	G	FB	PFAS (EPA 537 Mod)	010
118955	✓ 001	MWL-FRB 4	0	10/26/22 09:36	DIW	P	2x250 ml	None	G	FRB	PFAS (EPA 537 Mod)	011
118956	✓ 001	MWL-MW8	497	10/26/22 10:08	GW	G	3x40 ml	HCl	G	SA	VOC-LTMMP (SW846-8260D)	012
118956	✓ 002	MWL-MW8	497	10/26/22 10:07	GW	P	2x250 ml	None	G	SA	PFAS (EPA 537 Mod)	013
118956	✓ 003	MWL-MW8	497	10/26/22 10:09	GW	P	500 ml	HNO3	G	SA	METALS, LTMMP - Cd, Cr, Ni, U	014
118956	✓ 004	MWL-MW8	497	10/26/22 10:11	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	015
118956	✓ 005	MWL-MW8	497	10/26/22 10:13	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	016
118956	✓ 006	MWL-MW8	497	10/26/22 10:15	GW	AG	250 ml	None	G	SA	TRITIUM (EPA 906)	017
118956	✓ 007	MWL-MW8	497	10/26/22 10:16	GW	G	2x40 ml	None	G	SA	RADON (SM7500 Rn B)	018

Sample Team Members	Name William Gibson Zachary Tenorio Robert Lynch	Signature <u>William Gibson</u> <u>Zachary Tenorio</u> <u>Robert Lynch</u>	Comments: Report three PFAS compounds (PFHxS, PFOS, and PFOA) on COA. Trip blanks received from lab with head space.
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Relinquished by <u>3/22</u>	Org. <u>8888</u> Date <u>10/26/22</u> Time <u>1050</u>	Relinquished by	Org.	Date	Time
Received by <u>Chadwick, Chay</u>	Org. <u>0618</u> Date <u>10/26/22</u> Time <u>1050</u>	Received by	Org.	Date	Time
Relinquished by <u>Chadwick, Chay</u>	Org. <u>0618</u> Date <u>10/26/22</u> Time <u>1130</u>	Relinquished by	Org.	Date	Time
Received by <u>IFB</u>	Org. <u>10</u> Date <u>27/22</u> Time <u>755</u>	Received by	Org.	Date	Time

Project Name: MWL LTMMMP

Contract Verification Review Forms
Mixed Waste Landfill Groundwater Monitoring
October 2022

AR/COC Number	Sample Type
623819	Quality Control
623820	Environmental & Quality Control
623821	Quality Control
623822	Environmental & Quality Control
623823	Quality Control
623824	Environmental & Quality Control
623825	Quality Control
623826	Quality Control
623827	Environmental & Quality Control

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.

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOC No. 623819

Analytical Lab GEL

SDG No. 597547

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	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	13C3_PFPPrOPrA and perfluoro-n-[1, 2-13C2] hexanoic acid failed recovery limits for MWL-EB 1
	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	1,2-Dichloroethane, 2-butanone, acetone, bromodichloromethane, chloroform, dibromochloromethane, methylene chloride and alpha/beta detected in MWL-EB 1. Acetone and methylene chloride detected in MWL-TB 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, 8330, 537 and 1633) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) CRI provided	N/A		
	d) Internal standard performance data provided	X		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
	g) Isotope dilution/EIS performance data provided (PFAS only)	X		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 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: 11-21-2022 09:19:00

Closed by: Wendy Palencia Date: 11-21-2022 09:19:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOG No. 623820 & 623821

Analytical Lab GEL

SDG No. 597711

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	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	13C3_PFPPrOPrA and perfluoro-n-[1, 2-13C2] hexanoic acid failed recovery limits for MWL-FB2, MWL-FRB 1 and MWL-EB2
	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	1,2-Dichloroethane, acetone, bromodichloromethane, chloroform, dibromochloromethane and methylene chloride detected in MWL-FB 1. Acetone, bromodichloromethane, chloroform, dibromochloromethane, methylene chloride, nickel and beta detected in MWL-EB 2. Acetone and methylene chloride detected in MWL-TB 2 and MWL-TB 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, 8330, 537 and 1633) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) CRI provided	N/A		
	d) Internal standard performance data provided	X		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
	g) Isotope dilution/EIS performance data provided (PFAS only)	X		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 Problem Resolution

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

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

Were deficiencies unresolved? ☐ Yes ☒ No

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

Reviewed by: Wendy Palencia Date: 11-21-2022 15:29:00

Closed by: Wendy Palencia Date: 11-21-2022 15:29:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOG No. 623822 & 623823

Analytical Lab GEL

SDG No. 598056

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	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 and vinyl chloride failed recovery limits for LCS (1205232980)
	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	Vinyl chloride failed recovery limits for PS (1205232982)
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. 1,2-Dichloroethane, 2-butanone, acetone, bromodichloromethane, chloroform, dibromochloromethane, nickel and gross beta detected in MWL-EB 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		All CCV limits not met
	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, 8330, 537 and 1633) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) CRI provided	N/A		
	d) Internal standard performance data provided	X		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
	g) Isotope dilution/EIS performance data provided (PFAS only)	X		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 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: 11-29-2022 09:23:00

Closed by: Wendy Palencia Date: 11-29-2022 09:23:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOG No. 623824

Analytical Lab GEL

SDG No. 598175

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	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 and vinyl chloride failed recovery limits for LCS (1205232980)
	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	Vinyl chloride failed recovery limits for PS (1205232982)
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 5. PFOS detected in MWL-FB 6.
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		All CCV limits not met
	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, 8330, 537 and 1633) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) CRI provided	N/A		
	d) Internal standard performance data provided	X		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	X		
	g) Isotope dilution/EIS performance data provided (PFAS only)	N/A		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 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: 11-29-2022 11:02:00

Closed by: Wendy Palencia Date: 11-29-2022 11:02:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOC No. 623825

Analytical Lab GEL

SDG No. 598176

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	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 and vinyl chloride failed recovery limits for LCS (1205232980)
	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	Vinyl chloride failed recovery limits for PS (1205232982)
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, dibromochloromethane and gross beta detected in MWL-EB 4. Acetone detected in MWL-TB 7.
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		All CCV limits not met
	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, 8330, 537 and 1633) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) CRI provided	N/A		
	d) Internal standard performance data provided	X		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
	g) Isotope dilution/EIS performance data provided (PFAS only)	X		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 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: 11-29-2022 11:48:00

Closed by: Wendy Palencia Date: 11-29-2022 11:48:00

Contract Verification Form (CVR)

Project Leader JACKSON

Project Name MWL LTMMMP

Project/Task No. 195122_10.11.08

ARCOG No. 623826 & 623827

Analytical Lab GEL

SDG No. 598360

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	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	RPD between MS/MSD outside acceptance range for dichlorodifluoromethane (QC1205236287/288)
	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, dibromochloromethane, methylene chloride and toluene detected in MWL-DIWQC and MWL-FB 7. Methylene chloride and toluene detected in MWL-TB 8 and MWL-TB 9.
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		All CCV limits not met
	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, 8330, 537 and 1633) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) CRI provided	N/A		
	d) Internal standard performance data provided	X		
	e) Chlorine isotope ratios provided (perchlorate only)	N/A		
	f) ICS provided (perchlorate only)	N/A		
	g) Isotope dilution/EIS performance data provided (PFAS only)	X		
4.5	Inorganics (metals) a) Initial calibration provided	X		
	b) Continuing calibration provided	X		
	c) ICP interference check sample data provided	X		
	d) ICP serial dilution provided	X		

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

5.0 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: 11-29-2022 13:21:00

Closed by: Wendy Palencia Date: 11-29-2022 13:21:00

ANNEX F

Mixed Waste Landfill Inspection Forms

April 2022-March 2023

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 10-28-22
2. Time of Inspection 0800
3. Name of Inspector Zach Tenorio

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. SOIL-VAPOR MONITORING LOCATIONS [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	yes	no	
B. Well cover caps in need of repair/maintenance.	yes	no	
C. Well casing or sampling ports in need of repair/maintenance.	yes	no	
D. Monitoring location and sampling ports properly labeled.	yes	no	
E. Locks in need of cleaning or replacement.	yes	no	
II. SAMPLING EQUIPMENT [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	yes	no	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	yes	no	
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Soil-Vapor Monitoring Network Checklist/Form (Continued)**

NOTES

Note Number	Description

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature *3A*

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Soil-Moisture Monitoring Network Checklist/Form

1. Date of Inspection April 14 & 21, 2022
2. Time of Inspection 10:36, 09:40
3. Name of Inspector Robert Zick

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. SOIL-MOSITURE MONITORING LOCATIONS [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
F. Concrete pads, bollards, and protective casings in need of repair/maintenance.	yes	No	
G. Access tube cover caps in need of repair/maintenance.	yes	No	
H. Access tube casing in need of repair/maintenance.	yes	No	
I. Monitoring location properly labeled.	yes	No	
J. Locks in need of cleaning or replacement.	yes	No	
II. SAMPLING EQUIPMENT [Semiannually or Annually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Neutron probe in need of repair/maintenance.	yes	No	
B. Cable reel or cable in need of repair/maintenance.	yes	No	
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Soil-Moisture Monitoring Network Checklist/Form (Continued)**

NOTES

Note Number	Description

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Groundwater Monitoring Network Checklist/Form

1. Date of Inspection 05/12/22
2. Time of Inspection 0831
3. Name of Inspector Zach Tenorio

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. GROUNDWATER MONITORING LOCATIONS [Semiannually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	yes	no	
B. Well cover caps in need of repair/maintenance.	yes	no	1
C. Well casing in need of repair/maintenance.	yes	no	
D. Monitoring well properly labeled.	yes	no	
E. Locks in need of cleaning or replacement.	yes	no	
II. GROUNDWATER SAMPLING EQUIPMENT [Semiannually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	yes	no	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	yes	no	
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Groundwater Monitoring Network Checklist/Form (Continued)**

NOTES

Note Number	Description
1	Baro Ball installed on all wells

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature  _____

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Groundwater Monitoring Network Checklist/Form

1. Date of Inspection 10-20-22
2. Time of Inspection 0825
3. Name of Inspector Zach Tenorio

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required.

I. GROUNDWATER MONITORING LOCATIONS [Semiannually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Concrete pads, bollards, and protective casings in need of repair/maintenance.	Yes	NO	
B. Well cover caps in need of repair/maintenance.	yes	NO	1
C. Well casing in need of repair/maintenance.	Yes	NO	
D. Monitoring well properly labeled.	yes	NO	
E. Locks in need of cleaning or replacement.	yes	NO	
II. GROUNDWATER SAMPLING EQUIPMENT [Semiannually]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Sampling pump in need of repair/maintenance.	yes	NO	
B. Sampling assembly (e.g., tubing, gauges, and valves) in need of repair/maintenance.	yes	NO	
III. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

Mixed Waste Landfill
Groundwater Monitoring Network Checklist/Form (Continued)

NOTES

Note Number	Description
1	Baro-Ball installed at all wells

Action (Note Number) _____ assigned to _____ Date action completed _____
 Action (Note Number) _____ assigned to _____ Date action completed _____
 Action (Note Number) _____ assigned to _____ Date action completed _____
 Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature 

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection June 1, 2022
2. Time of Inspection 0945-1025
3. Name of Inspector Robert Ziack, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

I. COVER SYSTEM [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
F. Potentially deep-rooted plants present. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	yes	1

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	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	yes	3
F. Survey monuments in vicinity of MWL visible.	yes	No	
IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

NOTES

Note Number	Description
1.	Wind-blown plant debris in drainage culverts.
2.	Wind-blown plant debris on security fence.
3.	One warning sign is faded and needs to be replaced.

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1. assigned to Robert Zöck Date action completed June 1, 2022

Action (Note Number) 2. assigned to Robert Zöck Date action completed June 1, 2022

Action (Note Number) 3. assigned to Robert Zöck Date action completed June 2, 2022

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
the inspection.

2. Wind-blown plant debris removed at time of
the inspection.

3. Warning sign replaced on June 2, 2022.

Inspector's Signature Robert Zöck

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



date: June 22, 2022

to: Mike Mitchell (08854)
Robert Ziock (08854)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **June 2022 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://ecoticket-ng.sandia.gov/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://ecoticket-ng.sandia.gov/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".

ET Cover Observations and Recommendations

The biology quarterly evaluation of the MWL ET Cover was conducted on June 13, 2022.

- Overall, the MWL vegetation appeared to be in good health at the time of the inspection. The native bunchgrasses on the cover continue to mimic the surrounding native vegetation spacing, density, and level of photosynthesis. Most of the bunchgrasses on the cover and in the KAFB and TA3 area have not yet begun to grow new warm season green grass blades. KAFB has experienced prolonged drought and was in Extreme Drought according to the U.S. Drought Monitor at the time of the inspection.

Native grasses are excellent at optimizing their energy resources and only expend energy producing new foliage when adequate soil moisture is available during the warm season. Native bunchgrasses can maintain a low metabolic state for an extended amount of time, drawing a very low amount of energy from their extensive root systems to maintain their below ground structures. This adaptation of native plant species allows them to survive under prolonged

drought conditions. Although the above ground portions of native bunchgrasses may not display plant life activity, the mature soil-stabilizing root systems are very healthy and poised to send out new growth as soon as adequate soil moisture becomes available. The new seasonal growth that develops in response to warm season rainfall enables photosynthesis, which replenishes energy stores in the root systems.

- No weeds were observed.

cc: Customer Funded Records Center
Ecology Library
Matt Baumann

Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection August 31, 2022
2. Time of Inspection 11:50 - 12:15
3. Name of Inspector Robert Ziolk, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

I. COVER SYSTEM [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
F. Potentially deep-rooted plants present. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	No	
B. Fence wires and posts in need of repair/maintenance.	yes	No	
C. Gates in need of oiling/repair/maintenance.	yes	No	
D. Locks in need of cleaning or replacement.	yes	No	
E. Warning signs in need of repair or replacement.	yes	No	
F. Survey monuments in vicinity of MWL visible.	yes	No	
IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	No	No	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

NOTES

Note Number	Description

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

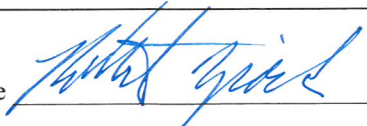
Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center

**Mixed Waste Landfill
Cover Inspection Checklist/Form**

1. Date of Inspection December 1, 2022
2. Time of Inspection 11:02-11:42
3. Name of Inspector Robert Zöck, Danielle Michel

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

I. COVER SYSTEM [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
F. Potentially deep-rooted plants present. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	

II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]

<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	No	

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	1
B. Fence wires and posts in need of repair/maintenance.	yes	No	
C. Gates in need of oiling/repair/maintenance.	yes	No	
D. Locks in need of cleaning or replacement.	yes	No	
E. Warning signs in need of repair or replacement.	yes	No	
F. Survey monuments in vicinity of MWL visible.	yes	No	
IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	NA	NA	

Mixed Waste Landfill Cover Inspection Checklist/Form (continued)

NOTES

[illegible]

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1 assigned to Robert Zook Date action completed 12/15/2022

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Action (Note Number) _____ assigned to _____ Date action completed _____

Additional Comments:

1. Wind-blown plant debris was removed
from security fence on December 15, 2022.
RZ

Inspector's Signature



Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



date: December 9, 2022

to: Mike Mitchell (08854)
Robert Ziock (08854)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **December 2022 MWL Quarterly Biology Inspection**

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".

ET Cover Observations and Recommendations

The biology quarterly evaluation of the MWL ET Cover was conducted on December 9, 2022.

- Overall, the native vegetation community on the MWL cover appears to be in excellent condition and the ET cover looks great overall. Nothing unexpected was observed.
- The native bunchgrasses appear to be healthy and in the same condition as observed during the August inspection except the grass leaves have dried out, they are no longer green and photosynthesizing. After full seed development in the summer, the leaves of warm season perennial bunchgrasses begin to dry out in the summer heat in preparation for winter dormancy. During winter dormancy the bunchgrasses remain alive using resources stored in their roots and the base of their stems.
- The fence surrounding the cover was clear of tumbleweeds, as was the cover.

cc: Customer Funded Records Center
Ecology Library

Mixed Waste Landfill Cover Inspection Checklist/Form

1. Date of Inspection March 6, 2023
2. Time of Inspection 0939-0959
3. Name of Inspector Robert Zick, Danielle Michel, Caitlin LaChance

Provide explanatory notes for each parameter not inspected or each action required. Include any maintenance or repair required in notes section at the end of this form.

I. COVER SYSTEM [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Visible settlement of the soil cover in excess of 6 inches.	yes	No	
B. Erosion of the soil cover in excess of 6 inches deep.	yes	No	
C. Evidence of water ponding on the MWL cover surface in excess of 100 square feet.	yes	No	
D. Animal intrusion burrows in excess of 4 inches in diameter. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
E. Contiguous areas of no vegetation greater than 200 ft ² . Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
F. Potentially deep-rooted plants present. Note: During period when the Biology Inspection is occurring quarterly, this inspection requirement will be covered on the Biology Inspection Checklist/Form.	yes	No	
II. SURFACE-WATER (STORM-WATER) DIVERSION STRUCTURES [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Channel or sidewall erosion in excess of 6 inches deep.	yes	No	
B. Channel sediment accumulation in excess of 6 inches deep.	yes	No	
C. Debris that blocks more than 1/3 of the channel width.	yes	yes	1

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

III. SECURITY FENCE [Quarterly]			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
A. Accumulation of wind-blown plants and debris.	yes	yes	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	
IV. PREVIOUS DEFICIENCIES			
<i>Inspection Parameter</i>	<i>Parameter Inspected (Yes or No)</i>	<i>Action Required (Yes or No)</i>	<i>Note Number</i>
Uncorrected/undocumented previous deficiencies.	No	No	

NOTES

[illegible]

**Mixed Waste Landfill
Cover Inspection Checklist/Form (continued)**

Action (Note Number) 1. assigned to Robert Ziak Date action completed 4/7/2023

Action (Note Number) 2. assigned to Robert Ziak Date action completed 4/7/2023

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:

1,2 - Windblown plant debris removed from
drainage features and security fence
by B&I/Yellowstone.

Inspector's Signature

Robert Ziak

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



date: March 22, 2023

to: Mike Mitchell (08888)
Robert Ziock (08888)

from: Jennifer Payne (00643) jjpayne@sandia.gov

subject: **MWL March 2023 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".

The biology quarterly evaluation of the Mixed Waste Landfill was conducted on March 15, 2023.

Observations

- Currently the MWL looks excellent. The mature native grass community appears to be very healthy while in winter dormancy. Some of the native bunchgrasses are displaying a very small amount of green at their bases, this is the earliest sign that warm season growth is prepared to begin.
- Three different species of annual plants have established basal rosettes; these annual plants were observed to be scattered across the cover. Positive identification of these three species was not possible from the basal rosettes.
- 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 on my cell 218-1815, or email at jjpayne@sandia.gov.

cc: Customer Funded Records Center
Ecology Library
Matt Baumann

Mixed Waste Landfill Biology Inspection Checklist/Form for the MWL Cover

Approximate vegetative coverage (actively photosynthesizing*): 43 %

Approximate percent native vegetation of the total vegetative cover: 99 %

Listed below are the main plant species identified as growing on the MWL cover and the percentage of the cover populated by each species.

<u>Scientific Name</u>	<u>Common Name (optional)</u>	<u>% of Cover¹</u>
<u>Pleuraphis jamesii</u>	<u>Galleta grass</u>	<u>35 %</u>
<u>Bouteloua gracilis</u>	<u>Blue grama</u>	<u>1 %</u>
<u>Sporobolus flexuosus</u>	<u>Mesa dropseed</u>	<u>1 %</u>
<u>Bouteloua eriopoda</u>	<u>Black grama</u>	<u>5 %</u>
<u>Sporobolus cryptandrus</u>	<u>Sand dropseed</u>	<u>1 %</u>
<u>Salsola tragus</u>	<u>Russian thistle</u>	<u>< 0.5 %</u>
<u>Xanthisma spinulosum</u>	<u>Spiny goldenweed</u>	<u>< 0.5 %</u>
<u>Sporobolus contractus</u>	<u>Spike dropseed</u>	<u>< 0.5 %</u>
<u>Kallstroemia californica</u>	<u>California caltrop</u>	<u>< 0.5 %</u>
<u>Sphaeralcea angustifolia</u>	<u>Narrowleaf globemallow</u>	<u>< 0.5 %</u>
<u>Tidestromia lanuginosa</u>	<u>Wooly tidestromia</u>	<u>< 0.5 %</u>
<u>Solanum elaeagnifolium</u>	<u>Silverleaf nightshade</u>	<u>< 0.5 %</u>
<u>Opuntia phaeacantha</u>	<u>Brown-spined prickly pear</u>	<u>< 0.5 %</u>
<u>Euphorbia exstipulata</u>	<u>Square-seed spurge</u>	<u>< 0.5 %</u>

Notes:

* Living plants per Section 4.1 of the MWL LTMMP.

¹ Percentage of total MWL Cover populated by living plants of these species. All species observed to be present at less than 0.5% are not calculated into the total vegetative coverage.

Mixed Waste Landfill
Biology Inspection Checklist/Form for the MWL Cover
(continued)

Are there any contiguous areas of no vegetation greater than 200 square feet? (Approximately 14 x 14 ft)? No

If "Yes," mark such areas on a map and attach to this checklist. Address actions and schedule to improve such area(s) in the notes section below.

Are there any very deeply rooted (roots greater than 8 feet deep at maturity) plant species present on the cover? No

If "Yes," describe the plant(s) and their general distribution. Address actions and schedule to remove plant(s) from the cover in the notes section below.

Notes: _____

Inspection for Animal and Insect Intrusion into MWL Cover

Are any burrows present on the cover? 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: Seventeen 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.

Mixed Waste Landfill
Biology Inspection Checklist/Form for the MWL Cover
(continued)

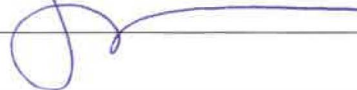
Notes (continued):

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. Many of the grasses had set seed for the year at the time of inspection.
- An aspect of mirroring the varied age adjacent native plant communities is some of the older, large galleta bunch grasses, or portions of them, were again observed to have died occasionally across the MWL cover.
- A few biological soil crusts were again observed on the MWL cover. Biological soil crusts are most often composed of fungi, lichens, cyanobacteria, bryophytes, and algae in varying proportions. These communities of living organisms grow on the soil surface in arid and semi-arid environments and perform important ecological roles including soil stabilization, nitrogen fixation, trapping soil moisture, and providing sheltered areas for plants to germinate and grow.
- Extremely few weeds were observed on MWL Cover. Although the presence of silverleaf nightshade remains low on the MWL, it is the only weed that was observed to be more abundant than in previous years. Over the past 5 years this weed has gradually been becoming more common in central New Mexico. This species is expected to continue to expand moderately across the MWL, its numbers kept in check by the existing establishment of native grasses across the top and sides of the cover. Herbicide is not effective against this weed, only continual hand removal.
- Butterflies, grasshoppers, dragonflies, and lizards were observed on the MWL cover at the time of the inspection.

Biological Aspects Map -- [note: sketch map to locate specific features described above will be attached as appropriate]

Inspector's Signature: _____

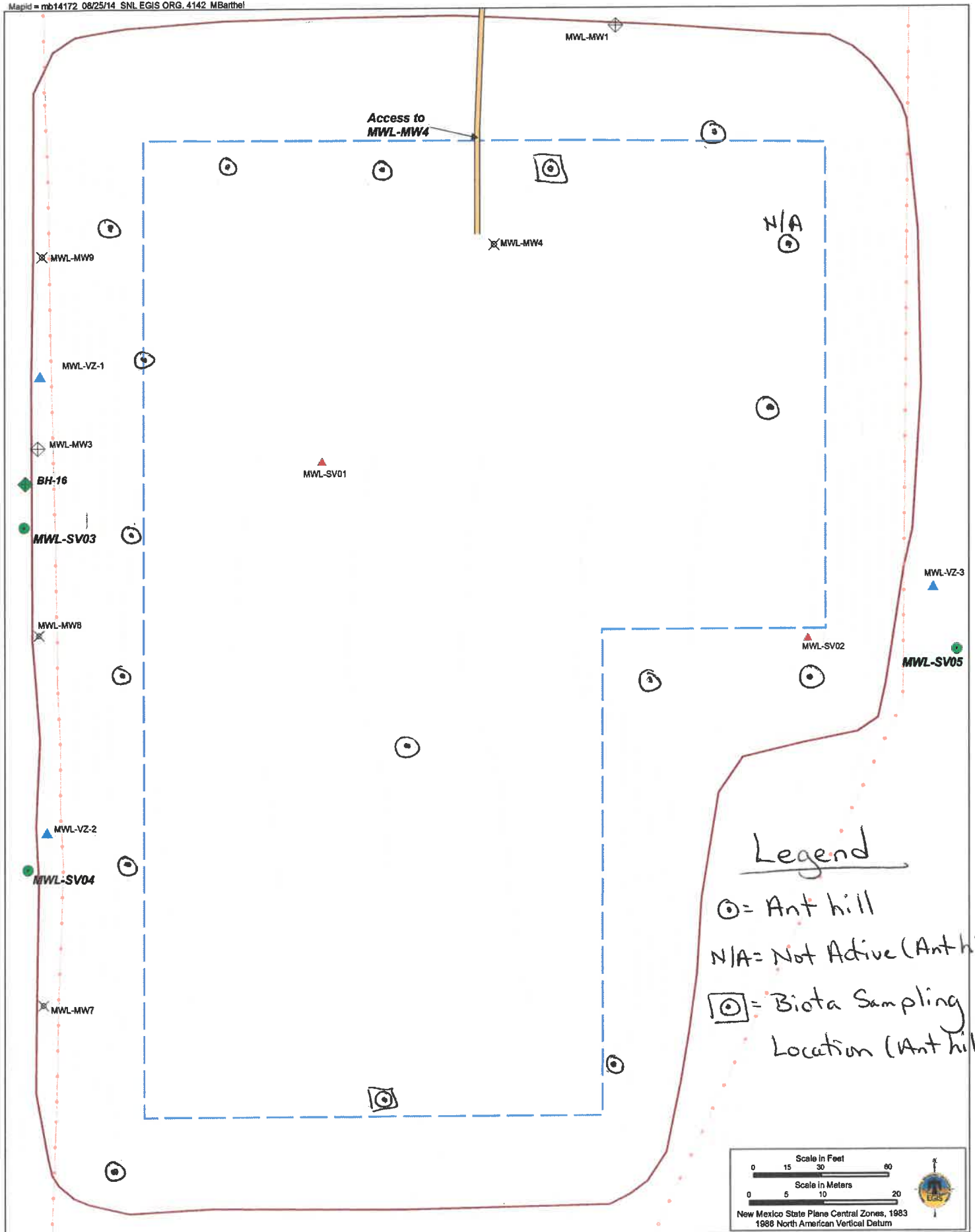


Date: August 22, 2022

Time: 1:15PM – 2:55PM

Original to: Mixed Waste Landfill Operating Record

Copy to: SNL/NM Records Center



MWL Biological Inspection Map - August 22, 2022

ANNEX G

**Mixed Waste Landfill
Biology Report**

April 2022-March 2023

April 2022 - March 2023 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, 2022-March 31, 2023) 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 2022 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 22, 2022. 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 2022, and March 2023) 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. Native grass species 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 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 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 2014 growing season inspection, which provided confirmation that all successful revegetation criteria had been met (SNL/NM June 2015).

April 2022 - March 2023 Mixed Waste Landfill Biology Report

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 2022 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 generally been characterized by below average precipitation and warmer than average temperatures across the seasons.

Precipitation, relative humidity, wind speed, and temperature all impact soil moisture and plant growth. These meteorological factors are presented in the local meteorological discussion below. They are integrated into the U. S. Drought Monitor status (briefly summarized in the two following paragraphs), which is a very useful tool that provides a regularly updated snapshot summary of soil moisture and plant stress. Table 1 and 2 at the end of this report provide local SNL Technical Area III meteorological data for the period preceding and including the CY 2022 growing season. A 25-year data set (1995-2019) provides the reference mean monthly meteorological data and is included in Table 1 and 2 for comparison; these data are hereafter referred to as the “average.” Meteorological data for the January through March 2023 period will be presented and discussed in the June 2024 MWL Annual LTMM Report.

The U.S. Drought Monitor provides a simple but robust insight into the meteorological conditions affecting the local vegetation. It is a weekly updated map that shows the parts of the U.S. in drought and breaks them into categories depending on severity. This weekly map is produced jointly by the National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of Agriculture (USDA), and the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln. The map authors synthesize varied drought indicator data sources to create a snapshot of current drought conditions. Data sources include climatological inputs, soil moisture indicators, hydrologic data, and contributions from a nationwide network of more than 450 scientific observers.

At the time of the 2022 Biology Inspection, the MWL area drought status was “D2 Severe Drought.” This status indicates crops are impacted and the native vegetation is likely under significant stress.

Soil moisture content 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. In arid and semiarid climates such as New Mexico, plant functions such

April 2022 - March 2023 Mixed Waste Landfill Biology Report

as growth and photosynthesis are limited by low soil moisture conditions (Xu January 2011). For this reason, monitoring the ET Cover vegetation and local meteorological conditions throughout the year is important. The following brief discussion of meteorological conditions includes the last three months of CY 2021.

Precipitation and Relative Humidity

Extremely dry meteorological conditions dominated the nine months (October 2021 through June 2022) preceding the 2022 monsoon season (July through September 2022). October 2021 through May 2022 was an eight-month period of significantly below average precipitation and relative humidity, with only 1.38 inches of precipitation, 67% below the eight-month average of 4.17 inches, and no precipitation recorded in April and May 2022. March and June 2022 were the only non-monsoonal months with above average precipitation, with June recording 2.13 inches, 1.61 inches above the average of 0.52 inches. The October 2021 through June 2022 precipitation total was 1.18 inches below average. Relative humidity was also generally lower than average during this nine-month timeframe.

The North American Monsoon season is July through September and is an important feature of New Mexico's summer climate and growing season. Monsoonal moisture typically provides approximately half of the annual precipitation in the Kirtland Air Force Base area. Total precipitation during the 2022 monsoon season was 3.79 inches, 0.38 inches below the average of 4.17 inches. However, when the month of June is added to the range, the total precipitation for June through September 2022 was 5.92 inches, 1.23 inches above the average of 4.69 inches for the four-month period. Relative humidity was above average in August and September, but slightly below average in July.

During the last three months of 2022, October and December experienced more precipitation than average, with drier than average conditions in November. Total precipitation in 2022 was 9.84 inches, 10% above the annual average of 8.86 inches.

Temperature and Wind Speeds

In CY 2022 the monthly mean temperature was 58.1°F, this was 0.7°F above the 25-year annual mean of 57.4°F. The monthly mean temperature for six months in 2022 exceeded their 25-year monthly means, with a maximum variation of +4.6°F in May.

The 2022 monthly and annual wind speed means were very close or the same as the 25-year monthly and annual means. All monthly wind means were within 1.0 miles per hour of their respective 25-year means, except for May (1.9 miles per hour difference). The 2022 annual mean and 25-year means were the same (8.3 miles per hour).

4.0 August 22, 2022 Inspection Results

The August 22, 2022 MWL ET Cover Biology Inspection occurred during the warm New Mexico growing season after the monsoon rains had begun. Inspection during the growing season allows for the most accurate assessment of living plant coverage because the greatest amount of photosynthesis occurs during this time of the year.

April 2022 - March 2023 Mixed Waste Landfill Biology Report

The August 2022 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) as shown in the photographs of the ET Cover taken during the August 22, 2022 inspection presented at the end of this report. The approximate foliar coverage of living plants was 43%, 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 (35% foliar coverage) and black grama as the next most prominent native grass (5% foliar coverage). 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. At the time of inspection many of the grasses had set seed for the year. Similar to last year, some of the older, large galleta bunch grasses, or parts of them, had died and black grama (5% foliar coverage) continues to propagate across the cover. This is significant because black grama grass is an important climax species of New Mexico grasslands, a final successional species in grassland development. Overall there was a very low presence of weed species, less than last year. Silverleaf night shade continues to be present but is being controlled through routine weed removal events.

No small animal burrows were observed on the MWL ET Cover during the August 2022 Biology Inspection. Seventeen active ant hills were observed across the ET Cover on both the side-slopes and cover surface, two of which were selected for biota surface soil sampling based on current ant activity and to obtain samples from different locations than last year's sampling locations. No potentially deep-rooted plants were observed on the ET Cover in 2022. Biota sampling activities and results are presented in Chapter 8 of this MWL Annual LTMM Report.

Butterflies, grasshoppers, dragonflies, and lizards were observed on the MWL ET Cover at the time of the inspection. This observation is consistent with previous biology inspection observations and indicates that wildlife recognizes the MWL Cover as native habitat.

5.0 Cover Maintenance

The successional development of the native grasses on the ET Cover has benefited greatly from best practice maintenance activities designed to minimize invasive weed growth. ET Cover best practice maintenance activities performed in CY 2022 are presented in Section 9.7 of this MWL Annual LTMM Report and were performed in response to inspections, general site conditions, and recommendations by the staff biologist. The two minor maintenance events conducted in April and September 2022 were designed to achieve the long-term goal of establishing a healthy, self-sustaining native grass community on the ET Cover by reducing competition with weedy species for limited moisture and nutrients. This work included removal of live and dead weeds from the ET Cover, the perimeter fence, the storm-water diversion drainage, and other perimeter areas. In

April 2022 - March 2023 Mixed Waste Landfill Biology Report

addition, an annual application of an herbicide sterilant (Hyvar®) to the North and South Staging Areas was performed (April 2022).

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.

Routine, minor weed removal events will be needed during the April 2022 – March 2023 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. If present, live annual weedy species on the MWL ET Cover and perimeter should also be removed during the growing season weed removal events if they pose a threat to the established native grasses. Silverleaf nightshade and Russian thistle are expected to be the primary focus of live weed removal efforts in 2023. Sterilant herbicide application (Hyvar®) over the past several years has been very effective at weed control for the North and South Staging Areas (graveled areas); this practice should be continued at the annual frequency recommended by the manufacturer. Given the effectiveness of Esplanade® at the Chemical Waste Landfill (a pre-emergent herbicide that is more environmentally friendly), it should be considered as an alternative to the Hyvar® as an environmental stewardship best practice. 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 amount of weed seeds on the ET Cover and competition from the future growth of invasive plants.

The application of a pre-emergent herbicide should be considered for the ET Cover and perimeter fence area in the future to prevent the germination of the current weed seed bank and seeds dropped by windblown weeds caught in the fence each year. Given the low abundance of annual weedy species on the ET Cover in CY 2022 and the foliar coverage of mature native bunch grasses, this is not a critical weed control measure at this time but should be kept in mind if weed growth increases significantly in this area.

Based upon experience since initial seeding of the ET Cover in 2009, maintenance 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.

April 2022 - March 2023 Mixed Waste Landfill Biology Report

8.0 References

Bearzi, J.P. (New Mexico Environment Department), December 2008. Letter to K. Davis (U.S. Department of Energy) and F. Nimick (Sandia Corporation), "Conditional Approval, Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005, Sandia National Laboratories NM5890110518, SNL-05-025." December 22, 2008.

Sandia National Laboratories/New Mexico (SNL/NM), March 2012. "Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill," Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 2015. "Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, January – March 2015," Sandia National Laboratories, Albuquerque, New Mexico.

U. S. Drought Monitor (August 2022)

Accessed August 2021.

<http://droughtmonitor.unl.edu/>

April 2022 - March 2023 Mixed Waste Landfill Biology Report

Table 1
October-December 2021 Meteorological Data Summary for the Mixed Waste Landfill^a

Month	October	November	December	
Temperature (°F)				3-Month Avg
Monthly Mean	58.8	52.2	43.4	51.5
25-year Temp Means	58.0	46.6	37.3	47.3
Precipitation (Inches)				3-Month Total
Monthly Total	0.06	0.16	0.29	0.51
25-year Precip Means	0.95	0.47	0.57	1.99
Relative Humidity (RH) (%)				3-Month Avg
Monthly Mean	36.5	35.7	41.5	37.9
25-year RH Means	42.6	45.0	53.4	47.0
Wind (Miles/hour)				3-Month Avg
Monthly Mean	7.8	6.0	7.0	6.9
25-year Wind Means	7.9	7.1	6.7	7.2

^aInformation Source: SNL/NM Meteorological Monitoring Program.

% = Percent.

°F = Fahrenheit.

RH = Relative humidity.

SNL/NM = Sandia National Laboratories/New Mexico.

April 2022 - March 2023 Mixed Waste Landfill Biology Report

Table 2
Summary of 2022 Meteorological Data at the Mixed Waste Landfill^a

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	
Year	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	
Temperature (°F)													Annual ^b
Monthly Mean	39.5	38.3	48.2	59.9	70.3	75.6	79.7	74.7	72.1	56.1	43.0	39.5	58.1
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 ^c
Monthly Total	0.04	0.07	0.76	0.0	0.0	2.13	1.1	2.37	0.32	1.92	0.38	0.75	9.84
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 ^b
Monthly Mean	46.8	40.4	34.4	18.9	15.0	37.7	40.1	50.5	42.6	55.1	42.4	53.0	39.7
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 ^b
Monthly Mean	7.0	7.7	8.2	11.2	11.8	8.7	7.7	8.0	7.8	7.9	7.5	6.3	8.3
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

^aInformation Source: SNL/NM Meteorological Monitoring Program.

^bValues provided are averages of the monthly data.

^cValues provided are totals of the monthly data.

% = Percent.

°F = Fahrenheit.

RH = Relative humidity.

SNL/NM = Sandia National Laboratories/New Mexico

August 22, 2022 Mixed Waste Landfill Biology Inspection Photographs



Looking north from approximate center of ET Cover



Looking west from approximate center of ET Cover

August 22, 2022 Mixed Waste Landfill Biology Inspection Photographs



Looking south from approximate center of ET Cover



Looking east from approximate center of ET Cover

August 22, 2022 Mixed Waste Landfill Biology Inspection Photographs



North Slope of ET Cover: facing west from the upper eastern portion of slope



West Slope of ET Cover: looking south from northern end

August 22, 2022 Mixed Waste Landfill Biology Inspection Photographs



South Slope of ET Cover: looking east from the western end



East slope of ET Cover: facing north from south of the dogleg

August 22, 2022 Mixed Waste Landfill Biology Inspection Photographs



Northwest corner of ET Cover: facing center of cover



Southwest corner of ET Cover: facing center of cover

August 22, 2022 Mixed Waste Landfill Biology Inspection Photographs



Southeast corner of ET Cover: facing center of cover



Northeast corner of ET Cover: facing center of cover

August 22, 2022 Mixed Waste Landfill Biology Inspection Photographs



Harvester ant collecting galleta grass seed on the MWL Cover



Silverleaf nightshade weed and native bunchgrasses