

Horn Rapids Landfill Environmental Monitoring Report Calendar Year 2022

Prepared for



March 2023

Prepared by

Parametrix

This Page Intentionally Left Blank

Horn Rapids Landfill Environmental Monitoring Report Calendar Year 2022

Prepared for



City of Richland
Public Works Department
840 Northgate
Richland, WA 99352

Prepared by

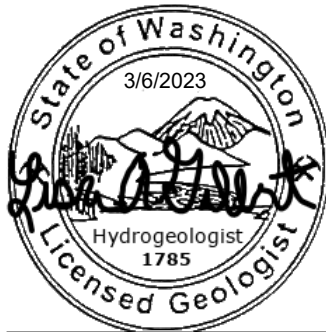
Parametrix
719 2nd Avenue, Suite 200
Seattle, WA 98104
T. 206.394.3700 F. 1.855.542.6353
www.parametrix.com

CITATION

Parametrix. 2023. Horn Rapids Landfill
Environmental Monitoring Report
Calendar Year 2022.
Prepared by Parametrix,
Seattle, Washington.
March 2023.

CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional hydrogeologist licensed to practice as such, is affixed below.



Lisa A. Gilbert

Prepared by Lisa A. Gilbert, LHG

A handwritten signature in blue ink, appearing to read "Mike Brady", written over a horizontal line.

Reviewed by Mike Brady, LHG



CHECKLIST FOR GROUNDWATER REPORTING

Municipal Solid Waste Landfills

WAC 173-351-415

Include a signed, completed copy of this checklist with each quarterly and annual report.

Quarterly groundwater reports shall be submitted to the jurisdictional health department and Ecology within 60 days of receipt of analytical data. Annual groundwater reports shall be submitted to the jurisdictional health department and Ecology by April 1 of each year.

RCW 18.220 requires that groundwater reports are stamped by a licensed geologist or by a professional engineer with the appropriate background in groundwater.

1 st ☐	2 nd ☐	3 rd ☐	4 th ☒	YEAR: <u>2022</u>	Reference (section, subsection)	Included in this report	Location – page # or appendix #
Quarterly Groundwater Reports: 173-351-415 (2) plus the referenced section							
Groundwater monitoring data						☒	Appendix A
Statistical results and/or trends						☒	Page 4-4 to 4-6
Descriptive statistics					420, (1)	☒	Appendix E
Statistical tests					420, (2)	☒	Appendix D
Notification of statistical increase (if applicable)					420, (4)	☒	Page 3-1
Notification of concentrations above GWQs						☒	Tables 3-1 and 3-2
Static water level readings						☒	Appendix G
Potentiometric surface elevation maps depicting flow direction						☒	Appendix G
Flow rate – calculated						☒	Page 5-1
Cation-anion balances					430, (5a)	☒	Appendix F
Explanation of greater than 5% (or 10%) difference if needed					430, (5a)	☒	Page 4-7
Trilinear diagrams					430, (5b)	☒	Appendix F
Leachate analyses (if applicable)						☒	Page 6-1
Data submitted in electronic format for Environmental Information Management System						☒	Submitted
Also, the Department of Ecology requests that you include a complete copy of the lab report with each quarterly report.						☒	Appendix B
Annual Groundwater Reports: 173-351-415 (1) YEAR: 2022							
Summary of statistical results and/or trends						☒	Page 4-4 to 4-6
Summary of groundwater flow rate and direction for the year						☒	Page 5-1
Copy of all potentiometric maps for the year						☒	Appendix G
Summary geochemical evaluation						☒	Page 4-7

Lisa A. Hunt

Signature of Report Author

March 2023

Date

Horn Rapids

Landfill

If you need this publication in an alternate format, please call the Solid Waste & Financial Assistance Program at (360) 407-6900. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

TABLE OF CONTENTS

1.	INTRODUCTION	1-1
2.	BACKGROUND	2-1
2.1	Horn Rapids Landfill Setting.....	2-1
2.2	Landfill Description	2-1
2.3	Regulatory History	2-2
3.	COMPLIANCE STATUS SUMMARY	3-1
3.1	Groundwater	3-1
3.2	Vadose Zone	3-1
3.3	Landfill Gas.....	3-1
3.4	Leachate.....	3-1
4.	GROUNDWATER MONITORING.....	4-1
4.1	Sampling and Analysis	4-1
4.2	Groundwater Quality Results and Comparison to Criteria.....	4-1
4.3	Groundwater Data Evaluation Approach	4-2
4.4	Time-Series Plots	4-2
4.4.1	Volatile Organic Compounds	4-3
4.4.2	Inorganic Parameters	4-3
4.5	Sen’s Slope Plots and Mann-Kendall Tests	4-4
4.5.1	Volatile Organic Compounds	4-6
4.6	Background Statistics.....	4-6
4.7	Natural Attenuation Parameters	4-6
4.8	Geochemical Evaluation	4-7
4.8.1	Trilinear and Stiff Diagrams	4-7
4.8.2	Cation/Anion Balance Calculations.....	4-7
5.	GROUNDWATER FLOW DIRECTION AND RATE	5-1
5.1	Hydrogeologic Setting.....	5-1
5.2	Groundwater Flow	5-1
6.	VADOSE ZONE MONITORING	6-1
7.	LANDFILL GAS MONITORING.....	7-1
7.1	Landfill Gas Data	7-1
7.2	Historical Landfill Gas Data Trends	7-1

TABLE OF CONTENTS (CONTINUED)

8.	CONCLUSIONS AND RECOMMENDATIONS	8-1
8.1	Conclusions.....	8-1
8.2	Recommendations.....	8-2
9.	REFERENCES	9-1

LIST OF FIGURES

Figure 1-1. Site Plan, Horn Rapids Landfill.....	1-3
Figure 1-2. Monitoring Well Locations, Horn Rapids Landfill	1-4
Figure 7-1. Methane Trends in Landfill Gas Probes, Horn Rapids Landfill	7-2

LIST OF TABLES

Table 3-1. Wells with Parameters above Groundwater Quality Criteria, 2022.....	3-2
Table 3-2. Highest Concentrations of Parameters above Groundwater Quality Criteria, 2022.....	3-3
Table 4-1. Statistically Significant Trends in Volatile Organic Compounds Calculated Using the Sen's Slope and Mann-Kendall Test (1Q2013-4Q2022 and 1Q2018-4Q2022).....	4-5

APPENDICES

A	Groundwater Quality Data Summary Tables
B	Laboratory Data Report and Data Review Memorandum
C	Time-Series Plots
D	Sen's Slope/Mann Kendall Tests
D-1	10-Year Trends
D-2	5-Year Trends
D-3	2-Year Trends
E	Background Statistical Summary
F	Geochemical Evaluation
G	Groundwater Data and Potentiometric Surface Map
H	Landfill Gas Data

ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
BFHD	Benton-Franklin Health District
bgs	below ground surface
City	City of Richland
City Facility	275-acre permitted waste facility, including Landfill
City Property	Contiguous property owned by the City of Richland, including the City Facility (approximately 1,820 total acres)
DCA	dichloroethane
DCE	dichloroethene
DO	dissolved oxygen
Ecology	Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
Expansion	104-acre permitted expansion of the Horn Rapids Landfill located within the City Facility east of the Landfill
ft	feet
FS	Feasibility Study
GWQs	Water Quality Standards for Groundwaters of the State of Washington
Landfill	46-acre permitted area where municipal solid waste (MSW) has been placed within the City Facility
LFG	landfill gas
MCLs	Maximum Contaminant Levels
mg/L	milligrams per liter
MSW	municipal solid waste
MTCA	Model Toxics Control Act
ORP	Oxidation-reduction potential
Permit	Solid Waste Permit
PCE	tetrachloroethene
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
TCE	trichloroethene
TDS	total dissolved solids

ACRONYMS AND ABBREVIATIONS (CONTINUED)

TOC	total organic carbon
UTLs	upper tolerance limits
VC	vinyl chloride
VOC	volatile organic compound
WAC	Washington Administrative Code

1. INTRODUCTION

This report presents the 2022 results of environmental sampling and analysis for groundwater, vadose zone, and landfill gas (LFG) at the Horn Rapids Landfill. The quarterly sampling events were conducted in March, June, September, and December 2022. The most recent vadose zone inspection was conducted in September 2022. The LFG collection system was monitored monthly and the gas probes were monitored quarterly. Groundwater sampling was conducted by Parametrix personnel and gas probe monitoring was conducted by City of Richland Public Works Department (City) personnel in accordance with Operating Permit No. BFHD 19-17 MSWLF issued by the Benton-Franklin Health District (BFHD). The site layout is presented on the Facility Plan (Figure 1-1) and monitoring well and gas probe locations are shown on Figure 1-2.

The following terminology related to the Horn Rapids Landfill has been developed, as further described in Section 2:

- City Facility: 275-acre permitted waste site, including landfill, customer transfer station, and compost facility on a parcel dedicated to these uses
- Landfill: 46-acre permitted area where municipal solid waste (MSW) has been placed since the 1970's within the City Facility
- City Property: Contiguous property owned by the City of Richland, including the City Facility (approximately 1,820 total acres), most of which is being marketed for various forms of development
- Expansion: 104-acre lined expansion of the Horn Rapids Landfill located within the City Facility east of the Landfill

This Page Intentionally Left Blank

FILE: PS3820004P04T02F1-1 LAYOUT: F1-1 PATH: U:\PSO\Projects\Clients\3820-004 HornRapid2011EM\99Sect\CADD\555-3820-004\Phase 04\Task 02\Figures\GWMonResult(2017) PLOTTED BY: purgubut DATE: Tuesday, September 6, 2022 4:10:56 PM

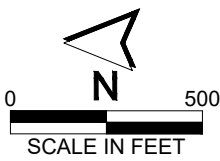
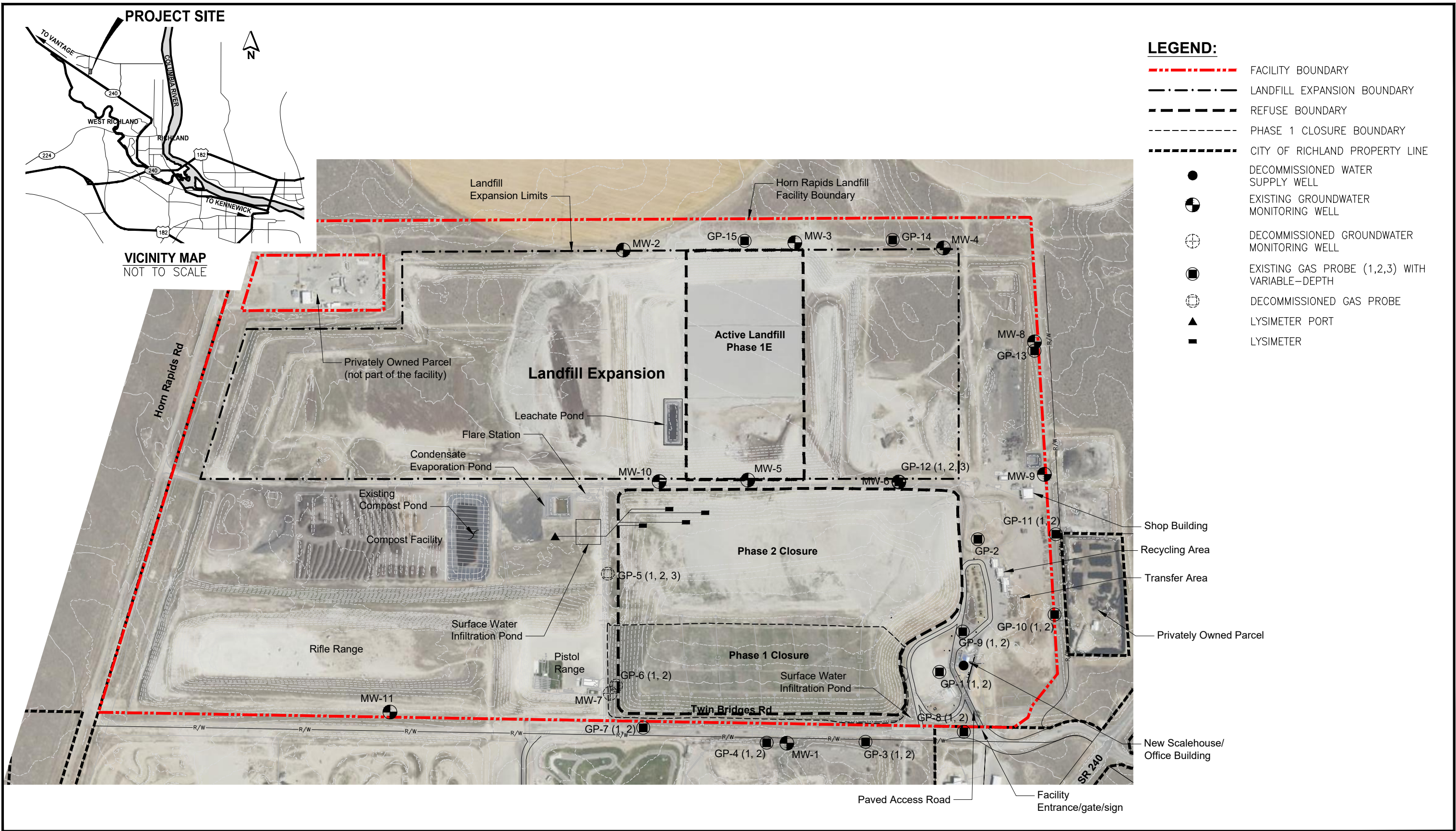


Figure 1-1
Horn Rapids Landfill
Facility Plan

FILE: BL3820007P01T01F1-2 LAYOUT: F1-2 PATH: U:\PSO\Projects\Clients\3820-City of Richland\553-3820-007 HornRapidsAssessMen\995vcs\CADD\FIGURES PLOTTED BY: purgobut DATE: Friday, August 27, 2021 12:21:30 PM



Parametrix DATE: August 27, 2021 FILE: BL3820007P01T01F1-2



Legend:

- Decommissioned Water Supply Well
- ◐ Existing Groundwater Monitoring Well
- ⊕ Decommissioned Groundwater Monitoring Well

- ◼ Existing Gas Probe
- ⊕ Decommissioned Gas Probe

- Facility Boundary
- City of Richland Property Line
- Refuse Boundary
- Phase 1 Closure Boundary

Figure 1-2
Groundwater Monitoring Well and
Gas Probe Locations
Horn Rapids Landfill

2. BACKGROUND

2.1 Horn Rapids Landfill Setting

The Horn Rapids Landfill is owned and operated by the City. It is located northwest of and within the city limits of Richland, Washington in an area bounded by Twin Bridges Road on the west, Horn Rapids Road on the north, and State Route 240 on the south.

The Horn Rapids Landfill is located within the southwest quadrant of a larger 275-acre parcel of City-owned property (City Facility) that includes the 46-acre existing landfill (Landfill) permitted for disposal of MSW, a support facility, a 9-acre composting facility, a customer service transfer station that includes a small household hazardous waste receiving area, and the 104-acre landfill Expansion, which began operation in the fall of 2020.

The City also owns contiguous property (City Property) to the west, south and east of the City Facility (a total of approximately 1,820 total acres), with the exception of several small privately-owned parcels, two located along the southwest corner of the City Facility, and one in the northeast corner of the City Facility. East of the City Facility are circle-irrigated agricultural fields used to grow alfalfa hay, corn, and potatoes. The City Property immediately west of the City Facility has been developed as an off-road vehicle (ORV) park, which includes a road-racing track and a motocross track facility. The remaining City Property south and southeast of the Landfill is undeveloped. Figure 1-2 shows the portion of the City Property that includes the groundwater monitoring wells.

The Facility Plan (Figure 1-1) shows the City Facility boundary, the Landfill and other City Facility features, and monitoring locations including gas probes, groundwater monitoring wells, and lysimeters. The area within the City Facility east of the currently permitted 46 acres is the Horn Rapids Landfill Expansion (Expansion). A new scale house/office building has recently been constructed near the City Facility entrance and began operation in November 2020.

2.2 Landfill Description

The Landfill began receiving MSW in 1974. The Landfill historically accepted only municipal wastes and was initially developed by placing waste into a series of north-south oriented trenches in the Phase 1 western portion of the Landfill. The waste depths in the trenches ranged from 12 to 30 feet (ft).

The Landfill (refuse) boundary is shown on Figure 1-1. Phase 1 (the western portion) of the Landfill was closed in 2011. From 2005 to 2010, Phase 1 of the Landfill was filled and graded to the closure grading plan. During the 2011 construction season, Phase 1 closure was installed over the western portion of the Landfill, which included installation of an active LFG system.

MSW was accepted in Phase 2 of the Landfill through September 2020 and is now being placed in lined Phase 1E of the Expansion. The 104-acre, Horn Rapids Landfill Expansion is located east of the Landfill. Closure of the Phase 2 Landfill began with LFG extraction well installations in 2021 and is expected to have closure cover installed in 2023.

Leachate generated at Phase 1E is being collected via a network of perforated pipes installed above the liner and transmitted to a leachate storage and evaporation pond located north of Phase 1E (see Figure 1-1).

2.3 Regulatory History

The Horn Rapids Landfill was originally permitted under Washington Administrative Code (WAC) 173-301, and currently operates under the Criteria for Municipal Solid Waste Landfills, WAC 173-351 and the current Solid Waste Permit (Permit) issued by the BFHD. Groundwater monitoring has been performed at the Landfill since 1987 and is currently documented in quarterly and annual groundwater monitoring reports in accordance with WAC 173-351.

Concentrations of volatile organic compounds (VOCs) were detected above the WAC 173-200-040 Groundwater Quality Criteria, including tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride (VC), in groundwater monitoring wells MW-5 and MW-6 installed in 1998 (Shannon & Wilson 1998). By letter dated February 18, 2000, the City notified BFHD and Washington Department of Ecology (Ecology) that statistically significant increases in groundwater contaminants were confirmed during monitoring activities and that the increase in concentration would be addressed through a formal corrective action process under the Model Toxics Control Act (MTCA). Ecology sent the City a MTCA Early Notice letter on March 6, 2000, and the Horn Rapids Landfill was placed on Ecology's Confirmed or Suspected Contaminated Sites list for groundwater contamination (Facility/Site No. 308).

In order to comply with MTCA requirements, the City chose to conduct a MTCA independent cleanup of the groundwater by performing a Remedial Investigation (RI) and Feasibility Study (FS). From 2001 through 2004, the City performed an independent, two-phased RI (Shaw Environmental Inc. 2003, 2004), and in 2004, they performed a LFG pilot study/FS (Shaw EMCON/OWT, Inc. 2005). The RI determined that LFG is the likely source of the VOCs impacting groundwater. A LFG extraction system was designed (Parametrix 2005) based on pilot study results that showed LFG extraction would effectively remove VOCs from the subsurface, and closure, which will include an LFG extraction system, is being implemented in two phases.

Between 2005 and 2010, Phase 1 (the western portion of the Landfill) was filled and graded to approved closure grading plans (EMCON 1999; Parametrix 2006, 2008, 2011) and was closed in 2011 (Parametrix 2011, 2012a, 2012b) as an independent remedial action in accordance with WAC 173-340. The Phase 1 closure included a final cover and gas collection system consisting of in-refuse wells, collection manifold and laterals, a condensate manhole, and a flare station. The gas collection system was activated in September 2011 to prevent subsurface LFG migration beyond the Landfill perimeter and to remove VOCs from groundwater beneath the Landfill. The collection system has operated 24 hours a day since startup. Phase 2 (the eastern portion of the Landfill) was filled to grade in September 2020. Closure began with LFG well installations in 2021 and 2022 and cover installation is expected to occur in 2023.

In 2013, Ecology requested that additional activities be conducted to comply with the assessment monitoring requirements of WAC 173-351-440. Assessment monitoring is required whenever statistical increases and concentrations above the criteria in WAC 173-200, Water Quality Standards for Groundwaters of the State of Washington, have been detected for one or more of the constituents listed in WAC 173-351 Appendix I. The following activities were completed:

- During the first quarter of 2014, in addition to the Landfill monitoring wells, samples were collected from an additional monitoring well (W-1) located on the east side of the Weidle neighborhood, south of and more than a mile from the Landfill (Parametrix 2014). Although well W-1 is located in a direction that is not downgradient of the Landfill, the sample was collected to confirm that the Landfill was not impacting drinking water wells in the Weidle neighborhood. The groundwater quality data did not indicate any impacts from the Landfill.

- Testing for WAC 173-351 Appendix III parameters has been conducted annually in phases beginning in 2014. Initially, testing included one well near the active cell and one well at the City Facility boundary in the second quarter of each year. The tested wells were MW-6 and MW-9 (2014), MW-5 and MW-8 (2015), and MW-4 and MW-10 (2016). The results of the testing did not detect any Appendix III compounds other than the VOCs identified during the RI. Therefore, beginning in 2017, annual testing for the additional Appendix III parameters is being conducted on a rotating schedule at one of the three wells located closest to the Landfill (MW-5, MW-6, and MW-10), or at wells MW-4, MW-8, and MW-9 located at the City Facility boundary. Testing was conducted at well MW-6 in 2017, MW-10 in 2018, MW-5 in 2019, MW-9 in 2020, MW-8 in 2021, and MW-4 in 2022.

In July 2017, the City entered into an Agreed Order (No. DE 13717) with Ecology in accordance with MTCA to complete a RI/FS. A Remedial Investigation Work Plan (Parametrix 2017d) was approved by Ecology (Ecology 2017) and Phases 1 and 2 of the Work Plan were completed in November 2017 (Parametrix 2018) and November 2018 (Parametrix 2019), respectively. Phase 1 consisted of a push probe investigation to evaluate the furthest extent of the contamination directly downgradient from the central portion of the contaminant plume, and Phase 2 consisted of installing permanent groundwater monitoring well MW-12 at a location beyond the area of impact to be used as a sentinel well for the assessment monitoring program.

The draft RI Report was submitted to Ecology in January 2021 (Parametrix 2021a) and included quarterly groundwater and LFG monitoring data collected through Second Quarter 2020. The 2021 draft RI Report expanded upon the findings of the previous RI that showed groundwater impacts were primarily related to LFG migration. The updated RI showed the areal extent of groundwater contamination did not extend beyond 500 feet from the City Facility boundary and that nearby groundwater sources had not been impacted. The draft RI Report developed a preliminary list of Indicator Hazardous Substances (IHS) to be further evaluated in the FS under WAC 173-340-703 that consist of total arsenic, 1,1-dichloroethane, bromodichloromethane, chloroform, cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, and vinyl chloride. The draft RI Report also indicated the likely cleanup remedy to be the planned Phase 2 closure and LFG removal combined with monitored natural attenuation of the groundwater contamination.

Ecology's comments on the draft RI Report (Ecology 2022) included the opinion that the extent of VOCs in groundwater is not fully delineated. This conclusion was based in part on the increasing trends in some VOCs observed over the past 5 years in wells MW-3 and MW-4 located along the eastern City Facility boundary, particularly in consideration of the more easterly flow direction observed over the past few years. The City has agreed to develop a work plan evaluating current flow directions and describing an approach for additional delineation.

Following the completion of the final RI Report, a FS report will be prepared in accordance with the MTCA Agreed Order. It is anticipated that the FS will focus on the Phase 2 closure and LFG control as the likely cleanup remedy. Phase 2 closure will be completed in 2023 with installation of the landfill cover and activation of the LFG extraction system. The Phase 2 closure is expected to further reduce the source of VOCs to groundwater and address the increasing trends observed in wells near the City Facility boundary.

This Page Intentionally Left Blank

3. COMPLIANCE STATUS SUMMARY

The compliance status with respect to the requirements of WAC 173-351 and the Permit is described below for groundwater, vadose zone, and LFG monitoring.

3.1 Groundwater

As summarized in Table 3-1, parameters in groundwater wells were detected during 2022 at concentrations above *Water Quality Standards for Groundwaters of the State of Washington* (GWQSS, WAC 173-200), and *State Drinking Water Regulations* (Maximum Contaminant Levels [MCLs], WAC 246-290). Summaries of the 2022 groundwater monitoring data are provided in Table A-1 (WAC 173-351 Appendix I and II parameters) located in Appendix A.

Table 3-2 summarizes the highest 2022 concentration exceeding criteria in upgradient (MW-1, MW-11) or cross gradient (MW-2) wells, and downgradient wells along the edge of the Landfill (MW-5, M-6, and MW-10), along the City Facility boundary (MW-3, MW-4, MW-8, and MW-9), and on City Property (MW-12).

3.2 Vadose Zone

A permit modification was granted by BFHD (2017) and beginning in 2017, the vadose zone ports have been checked annually during the third quarter. The ports were checked during the Third Quarter of 2022, and a small amount of leachate was found in Port-4 that was sufficient to collect a sample to be tested for VOCs.

3.3 Landfill Gas

No methane was detected above the regulatory limit of 5 percent in 2022 except at GP-12-1 adjacent to the Phase 2 closure. The results at GP-12-1 are similar to the previous four quarters. The extent of LFG migration has remained in close proximity to the perimeter of the Landfill and concentrations have not exceeded the 5 percent by volume regulatory action limit at the City Facility boundary.

3.4 Leachate

Samples from the Expansion leachate storage and evaporation pond (referred to as the Leachate Pond) were collected and analyzed for WAC 173-351 Appendix I and II parameters for the first time during Second Quarter 2022 (see Parametrix 2022b). The results are shown in Table A-1 in Appendix A. The only VOC detected in the Leachate Pond sample was a low concentration of toluene, and toluene was not detected in the groundwater samples. In the future, Leachate Pond sampling will be conducted annually during the first quarter.

Table 3-1. Wells with Parameters above Groundwater Quality Criteria, 2022

Parameter	GWQS		MCL	
	Upgradient or Cross Gradient	Downgradient	Upgradient or Cross Gradient	Downgradient
FIELD PARAMETERS				
pH		MW-5, MW-6		
Conductivity			MW-1, MW-11	MW-5, MW-6, MW-8, MW-9, MW-10
INORGANICS				
Arsenic	MW-1, MW-2, MW-11	MW-3 through MW-6, MW-8 through MW-10, MW-12		
Chromium	MW-2			
Iron	MW-11	MW-6	MW-11	MW-6
Manganese		MW-5, MW-6		MW-5, MW-6
Nitrate	MW-2, MW-11	MW-8	MW-2, MW-11	MW-8
Sulfate	MW-11		MW-11	
Total Dissolved Solids (TDS)	MW-1, MW-11	MW-3, MW-4, MW-5, MW-6, MW-8, MW-9, MW-10	MW-1, MW-11	MW-3, MW-4, MW-5, MW-6, MW-8, MW-9, MW-10
VOCS				
1,1-Dichloroethane (1,1-DCA)		MW-4, MW-5, MW-6, MW-9, MW-10, MW-12		
Bromodichloromethane		MW-8		
Chloroform		MW-3, MW-8		
Tetrachloroethene (PCE)	MW-1	MW-5, MW-6, MW-9, MW-10	MW-1	MW-5, MW-6, MW-9, MW-10
Trichloroethene (TCE)		MW-5, MW-6, MW-9, MW-10		MW-5, MW-6
Vinyl Chloride (VC)		MW-4 MW-5, MW-6, MW-10		

MW-1 and MW-11 are upgradient from the Landfill; MW-2 is cross-gradient from the Landfill

GWQS = Water quality standards for groundwaters of the State of Washington (WAC 173-200).

Table 3-2. Highest Concentrations of Parameters above Groundwater Quality Criteria, 2022

Parameter	Units	GWQS	MCL	Highest 2022 Observed Concentration Above Criteria						City Property (MW-12)
				Upgradient or Cross Gradient (MW-1, -2, -11)	Downgradient					
					Adjacent to Landfill (MW-5, -6, -10)		City Facility Boundary (MW -3, -4, -8, -9)			
					Concentration	Well	Concentration	Well	Concentration	
FIELD PARAMETERS										
pH		6.5-7.5				6.29	MW-6			
Conductivity	µmhos/cm	NA	700	1,844	MW-11	1,325	MW-10	1,112	MW-9	
INORGANICS										
Arsenic	mg/L	0.00005	0.01	0.0048	MW-11	0.0033	MW-5	0.0094	MW-8	0.0083
Chromium	mg/L	0.015	0.1	0.22	MW-2					
Iron	mg/L	0.3	0.3	0.33	MW-11	0.51	MW-6			
Manganese	mg/L	0.05	0.05			0.39	MW-5			
Nitrate	mg/L	10	10	41	MW-11			22	MW-8	
Sulfate	mg/L	250	250	360	MW-11					
Total Dissolved Solids (TDS)	mg/L	500	500	1,400	MW-11	910	MW-10	720	MW-8, MW-9	
VOCS										
1,1-Dichloroethane (1,1-DCA)	µg/L	1	NA			5.4	MW-10	5.4	MW-4	1.7
Bromodichloromethane	µg/L	0.3	80					0.89	MW-8	
Chloroform	µg/L	7	80					14	MW-8	
Tetrachloroethene (PCE)	µg/L	0.8	5	6.0	MW-1	24	MW-6	13	MW-9	
Trichloroethene (TCE)	µg/L	3	5			12	MW-6	4.7	MW-9	
Vinyl Chloride (VC)	µg/L	0.02	2			2.0	MW-6	0.038	MW-4	

MW-1 and MW-11 are upgradient from the Landfill; MW-2 is cross-gradient from the Landfill

GWQS = Water quality standards for groundwaters of the State of Washington (WAC 173-200).

MCL = Maximum Contaminant Level (WAC 246-290)

This Page Intentionally Left Blank

4. GROUNDWATER MONITORING

This report includes the following information for the 2022 groundwater monitoring, per the Permit and the quarterly and annual reporting requirements delineated in WAC 173-351-415 (1) and (2):

- Laboratory report for the Fourth Quarter 2022 (Appendix B).
- Field measurements and analytical laboratory results for the sampling period (Appendix A).
- Statistical calculations and summaries, including Sen's slope/Mann Kendall tests for trend, (Appendix D); and background groundwater quality statistical summary (Appendix E).
- Notification of results that exceed concentrations above GWQs (Tables 3-1 and 3-2).
- Cation-anion balances, trilinear diagram, and stiff diagram (Appendix F).
- Static water level measurements for each monitoring well and potentiometric surface elevation map depicting groundwater flow rate and direction (Appendix G).

In addition, the report contains the following information required by the Permit and BFHD correspondence:

- Time-series plots for all constituents tested (Appendix C).
- LFG data (Appendix H).

4.1 Sampling and Analysis

Groundwater samples were collected from eleven monitoring wells (MW-1 through MW-6, MW-8 through MW-12) in accordance with the Quality Assurance Project Plan (QAPP) (Parametrix 2017a).

Groundwater samples were collected with dedicated sampling pumps using a low-flow purging technique. Water purged from each well was placed in the evaporation ponds. Samples to be tested for dissolved metals were filtered in the field through 0.45-micron filters. A duplicate sample (MW-21) was collected during each quarterly event.

The groundwater samples were analyzed for the constituents identified in Appendix I and Appendix II of WAC 173-351-990, and for additional natural attenuation parameters added as part of the RI (Shaw Environmental, Inc. 2003). Laboratory analyses were conducted by Eurofins Seattle in Tacoma, Washington, with the exception of nitrate analyses that were conducted by Energy Northwest in Richland, Washington.

Samples were collected at well MW-4 during the Second Quarter 2022 and analyzed for the additional Appendix III parameters of WAC 173-351-990.

4.2 Groundwater Quality Results and Comparison to Criteria

Laboratory reports for the First, Second, and Third Quarter 2022 were presented in previous reports (Parametrix 2022a, b, d). The laboratory report for the Fourth Quarter 2022 is provided in Appendix B. The data were evaluated with respect to the data validation criteria described in the QAPP, and a memorandum is provided in Appendix B.

Tables A-1 (WAC 173-351 Appendix I and II parameters) in Appendix A provide a summary of the 2022 groundwater monitoring results. The groundwater results are compared to the *Water Quality Standards*

for *Groundwaters of the State of Washington* (GWQs; WAC 173-200) and *State Drinking Water Regulations* (Maximum Contaminant Levels [MCLs], WAC 246-290).

None of the additional WAC 173-351 Appendix III parameters (Table A-2) were detected in the samples collected from MW-4 during the Second Quarter.

4.3 Groundwater Data Evaluation Approach

Statistical analysis procedures for evaluation of groundwater monitoring data collected at the Horn Rapids Landfill are outlined in the QAPP (Parametrix 2017a) and are summarized in the following paragraphs. The procedures were developed in accordance with U.S. Environmental Protection Agency (EPA's) *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities -Unified Guidance* (Unified Guidance; EPA 2009) as recommended in Ecology guidance documents (Ecology 2012).

Prior to 2016, quarterly reports included comparison of the downgradient well data to Upper Tolerance Limits (UTLs) calculated based on background data for upgradient well MW-1 (Parametrix 2016). Statistically significant increases over background have been identified in the monitoring wells downgradient of the Landfill. As described in Section 2.2, a remedy is in progress and data are now being collected to assess the effectiveness of closure activities on mitigating the existing groundwater contamination. Therefore, the statistical approach has been modified to reflect assessment monitoring approaches outlined in the QAPP and described in the following paragraphs.

Corrective action in the form of final Landfill closure construction is not anticipated to be completed until 2023, and it is not expected that the VOC source will be fully controlled until that time. Data will continue to be collected from groundwater wells to assess trends during implementation of closure construction. Monitoring wells in close proximity to the eastern edge of the Landfill (MW-5, MW-6, and MW-10) that have shown significant impacts will continue to be monitored for evidence that the LFG system is affecting VOCs that are impacting groundwater. Wells at the City Facility boundary (MW-3, MW-4, MW-8, and MW-9) will continue to be monitored to assess the degree of attenuation of VOCs.

During the period prior to final closure, the statistical evaluation approach for these wells will consist of evaluating trends qualitatively using time-series plots and quantitatively using Sen's slope and Mann-Kendall tests. Once closure is complete, statistical evaluation procedures appropriate for corrective action monitoring will be conducted at wells along the City Facility boundary that are currently impacted (wells MW-3, MW-4, MW-8, and MW-9) and well MW-12 further downgradient on City Property.

4.4 Time-Series Plots

Time-series plots are presented in Appendix C for constituents with concentrations exceeding groundwater quality criteria or that historically exceeded UTLs. The observed trends are discussed separately in the following sections for VOCs and inorganic parameters. In the case where a parameter is tested for but not detected, the "concentration" of that parameter is plotted as one-half of the detection limit and a hollow symbol is shown. The data are separated into two groups, one group with wells along the edge of the Phase 2 Closure (MW-5, MW-6, former well MW-7 (historical data), and MW-10), and a second group with wells along the City Facility boundary (MW-2, MW-3, MW-4, MW-8 and MW-9) and well MW-12 on further downgradient City Property. Upgradient wells MW-1 and MW-11, and VOC data for leachate port samples are included on both sets of plots.

4.4.1 Volatile Organic Compounds

VOCs are an unambiguous indicator of landfill impacts since the typical landfill indicator parameters have been impacted by upgradient sources. The greatest number and highest concentrations of VOCs were detected in the monitoring wells immediately downgradient of the Landfill (MW-5, MW-6, and MW-10). Detected VOCs in these wells included 1,1-DCA, cis-1,2-DCE, trans-1,2-DCE, PCE, TCE, and VC. Overall decreasing trends have occurred in all three wells for 1,1-DCA, and in wells MW-5 and MW-6 for cis-1,2-DCE, trans-1,2-DCE, PCE, TCE, and VC. Cis-1,2-DCE concentrations have increased in MW-10. In well MW-9 located near the southern City Facility boundary, a similar suite of VOCs was detected; concentrations of 1,1-DCA have decreased and cis-1,2-DCE, PCE, and TCE have increased.

Along the eastern City Facility boundary, concentrations of 1,1-DCA, cis-1,2-DCE, and trichlorofluoromethane have shown an overall increase in well MW-4 but have decreased in well MW-3. Chloroform and bromodichloromethane in well MW-3 and well MW-8 near the southern City Facility boundary have increased over the past few years.

PCE in concentrations above the GWQS have consistently been detected in upgradient well MW-1, and its presence is likely related to transport by LFG. VOCs were not detected in upgradient well MW-11, except for benzene detected at the reporting limit.

In well MW-12, located further downgradient on City Property, chloroform, 1,1-DCA and cis-1,2-DCE were detected, with the Fourth Quarter 2022 concentration of 1,1-DCA above the GWQS. Further review of the trends will be performed following additional monitoring events.

4.4.2 Inorganic Parameters

Groundwater quality data collected from wells in the northern portion of the City Facility, in particular upgradient wells MW-1 and MW-11, former upgradient well MW-7, cross gradient well MW-2, and to some extent downgradient well MW-3, indicate that upgradient sources are contributing to area-wide background concentrations of inorganic compounds, including TDS, chloride, nitrate, and cations. Data spikes observed in these wells suggest that more than one source may have contributed pulses of contaminants over time.

Likely potential upgradient sources are those that involve application of water that could drive contaminants to the water table, such as agricultural irrigation at the crop circles, and septic systems in the adjacent Off-Road Vehicle (ORV) park. Biosolids applications in the northern portion of the City Facility have also been considered as a source but are not presently believed to have had substantial impacts since the biosolids are dry and applied in thin layers and have largely already been scraped off for other City Facility uses.

Ongoing groundwater monitoring related to the Hanford Reservation has documented occurrences of nitrate plumes in the Richland area with concentrations of greater than 10 mg/L nitrate as N (45 mg/L Nitrate as NO₃). The sources of nitrate have been attributed to agricultural applications of fertilizer to irrigated fields (CH2M 2015).

In upgradient well MW-1, concentrations of some parameters (including alkalinity, calcium, chloride, magnesium, nitrate, potassium, sodium, sulfate, total organic carbon (TOC), TDS, and conductivity) increased beginning in 2000, but stabilized over the past approximately 15 years.

In upgradient well MW-11, increasing trends in conductivity and TDS, and in concentrations of some inorganic parameters (including calcium, chloride, magnesium, nitrate, and sulfate) have been observed

since its installation in 2010, although concentrations have stabilized during the past approximately 5 years.

In cross-gradient well MW-2, located in the northeastern corner of the City Facility, conductivity and TDS, and the concentrations of some inorganic parameters (nitrate, calcium, sodium, chloride, magnesium, potassium, and sulfate) were higher than observed historically beginning in the Third Quarter of 2008, although concentrations began decreasing again in 2012.

Concentrations of inorganic parameters in wells located immediately downgradient of the Landfill (MW-5, MW-6, and MW-10) were generally higher than in wells located along the southern City Facility boundary (MW-8 and MW-9). However, concentrations of a number of inorganic parameters have shown increasing trends in wells MW-8 and MW-9 over the past few years, including calcium, chloride, magnesium, nitrate, and sulfate.

Concentrations of inorganic parameters in downgradient wells along the eastern City Facility boundary (MW-3 and MW-4) were comparatively low. In well MW-3, fluctuating trends in some parameters (including chloride, nitrate, potassium, sulfate, and TDS) have been observed; concentrations increased between 2011 and 2016, and then decreased again until 2019. It is not possible to determine if these trends represent natural changes in local groundwater or landfill impacts, since the upgradient wells have shown area-wide impacts by outside sources.

In well MW-12, located further downgradient on City Property, concentrations of inorganic parameters were generally between the range of wells MW-3 and MW-4. The slightly higher concentrations of some total metals (including chromium and cobalt) observed in the Third and Fourth Quarters of 2022 may be related to the higher measured TSS observed in the samples.

4.5 Sen's Slope Plots and Mann-Kendall Tests

Potential trends in the groundwater data were evaluated using the Mann-Kendall test for trend and Sen's nonparametric estimator of slope (EPA 2009) with the Sanitas™ software (Sanitas Technologies 2022). These tests are well suited to environmental data because there are no distributional assumptions, and missing data (non-detects) or irregularly spaced measurement periods are permitted. The Mann-Kendall test was used to identify whether or not a trend exists, and then the Sen's slope test was used to determine how steeply the concentration levels are changing.

The nonparametric Mann-Kendall test evaluates the significance of temporal trends at the 95 percent confidence level. A negative value for the Mann Kendall S statistic implies that a majority of the differences between earlier and later values are negative, suggestive of a decreasing trend. An S value near zero indicates a roughly equal number of positive and negative differences. This would be expected if the measurements were randomly fluctuating about a constant mean with no apparent trend.

The Sen's slope test is a nonparametric procedure used to estimate the true slope of the data. The advantage of the Sen's slope test over linear regression methods is that it is not greatly affected by gross data errors or outliers and can be computed when data are missing.

Sen's slope and Mann Kendall tests were analyzed for VOCs (Appendix D) using data for the past 10 years (First Quarter 2012 through Fourth Quarter 2022) and 5 years (First Quarter 2018 through Fourth Quarter 2022). A summary of statistically significant trends in parameter concentrations for VOCs are presented in Table 4-1. Only well/parameter cases with greater than 50 percent non-detected values are included in the trend evaluations.

**Table 4-1. Statistically Significant Trends in Volatile Organic Compounds Calculated Using the Sen's Slope and Mann-Kendall Test
(1Q2013-4Q2022 and 1Q2018-4Q2022)**

Parameter	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-8	MW-9	MW-10	MW-11
Past 10 Years 1Q2013-4Q2022										
1,1-DCA			↓	↑	↓	↓		↓	↓	
1,2-DCA					↓	↓			↓	
1,2-Dichloropropane					↓	↓				
Benzene					↓	↓			↓	
Chloroform			↑	↓					↓	
cis-1,2-DCE				↑	↓	↓				
PCE						↓		↑		
trans-1,2-DCE					↓	↓				
TCE	↓				↓	↓			↓	
Trichlorofluoromethane				↑						
Vinyl Chloride (VC)					↓	↓			↓	
Past 5 Years 1Q2018-4Q2022										
1,1-DCA				↑		↓		↓	↓	
Chloroform			↑							
cis-1,2-DCE				↑						
PCE								↑		
trans-1,2-DCE						↓				
TCE				↑						
Trichlorofluoromethane				↑						
Vinyl Chloride (VC)									↓	
Past 2 Years 1Q2021-4Q2022*										
No statistically significant trends										

↑ = Statistically significant increasing trend (positive Mann-Kendall and Sen's slope)

↓ = Statistically significant decreasing trend (negative Mann-Kendall and Sen's slope)

Red font indicates significant trend observed consistently for both past 5 years and past 10 years

*2-year trends were analyzed for well/parameter cases with statistically significant increasing trends over the past 5 years

4.5.1 Volatile Organic Compounds

As shown in Table 4-1, a number of VOCs in wells located adjacent to Phase 2 (MW-5, MW-6, and MW-10) showed statistically significant decreasing 10-year trends suggesting that the 2011 Phase I closure LFG extraction system is having an overall positive effect on groundwater concentrations near the Landfill. However, only some of these VOCs showed 5-year decreasing trends (1,1-DCA in MW-6, MW-9, and MW-10, VC in MW-10; and trans-1,2-DCE in MW-6), indicating that the VOC concentrations in wells adjacent to the Landfill may be stabilizing.

Wells along the Facility boundary (MW-3, MW-4, and MW-9) showed statistically significant increasing trends in some VOCs for the past 5 and 10 years (chloroform in well MW-3; 1,1-DCA, cis-1,2-DCE, TCE, and trichlorofluoromethane in well MW-4; and PCE in MW-9). However, 2-year trends were analyzed for the wells and parameters that had increasing trends over the past 5 years and none of the trends were significant. This indicates that VOC concentrations in wells located along the Facility boundary may be stabilizing.

4.6 Background Statistics

Background statistics (i.e., mean, variance, standard deviation, coefficient of variation, and standard error) for upgradient wells MW-1 and MW-11 are presented in Appendix E in accordance with WAC 173-351-420(1).

4.7 Natural Attenuation Parameters

Analysis and measurement of additional parameters (dissolved methane, ethane, ethene, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) are being performed to evaluate whether VOCs are degrading through either biological or chemical processes (Shaw Environmental, Inc. 2003). Natural attenuation of VOCs would be indicated by elevated concentrations of ethene or ethane and decreases in DO and ORP (EPA 1998).

Some of the 2022 data (Table A-1) indicate that natural attenuation is likely occurring. DO measurements were lower in downgradient wells MW-5, MW-6, and MW-10 adjacent to the Phase 2 closure (less than 1 mg/L) and some ORP measurements were also lower. The lower DO and ORP observed in these wells indicate more anaerobic conditions that would be favorable to reductive dechlorination of more highly chlorinated compounds (PCE and TCE) which have shown significant decreases in concentrations over the past 10 years (see Table 4-1).

Quantitative analysis of other evidence for reductive dechlorination is inconclusive. The high nitrate concentrations contributed by an upgradient source as demonstrated at well MW-11 would tend to inhibit reductive dechlorination reactions for more highly chlorinated compounds (PCE and TCE), and the high sulfate concentrations would inhibit reductive dechlorination of lower chlorinated compounds (DCE and VC). The low concentrations of iron and TOC throughout the Site are also unfavorable for reductive dechlorination. Methane is contributed directly by LFG and no ethane or ethene were detected in any of the wells.

Higher DO was measured in further downgradient well MW-9 (about 2 to 3 mg/L) and in the remaining wells (generally between about 4 and 8 mg/L), and ORP measurements generally followed this pattern with more positive values observed in wells with higher DO. The relatively higher DO and ORP in wells along the City Facility boundary compared to the wells along the edge of the Phase 2 closure indicates a

more aerobic environment which could support degradation of cis-1,2-DCE and VC, and the significantly lower concentrations in VC in wells at the City Facility boundary provide evidence that degradation of VC is occurring.

Trends in other parameters that might indicate that biodegradation is occurring (EPA 1998, Jurgens et al 2009), such as increases in chloride and alkalinity, or decreases in nitrate and sulfate, are somewhat ambiguous because concentrations of these parameters have been affected by contributions from upgradient sources. However, nitrate and sulfate concentrations are lower and alkalinity is higher in wells MW-5, MW-6, and MW-10 than in upgradient well MW-11, suggesting that biodegradation may be occurring.

Dissolved methane continued to be detected in downgradient wells adjacent to the Phase 2 closure: MW-5 (0.19 to 0.37 mg/L), MW-6 (2.2 to 4.3 mg/L), and MW-10 (1.4 to 2.1 mg/L). Methane was also detected in further downgradient well MW-9 (0.002 to 0.005 mg/L) and at lower concentrations (less than 0.001 mg/L) in the other upgradient, cross-gradient and downgradient wells. The occurrence of higher concentrations of dissolved methane in the wells with the highest concentrations of VOCs continues to support the hypothesis that LFG generated by the decomposition of solid waste within the Landfill is the source and transport mechanism for the VOCs impacting groundwater (Shaw Environmental, Inc. 2003).

4.8 Geochemical Evaluation

The geochemical evaluation (Appendix F) included preparing trilinear and Stiff diagrams to illustrate major ion geochemistry and calculating cation/anion balances.

4.8.1 Trilinear and Stiff Diagrams

Trilinear and Stiff diagrams are presented for 2022. The trilinear and Stiff diagrams indicate that in most of the wells the dominant anion was bicarbonate, and the dominant cation was calcium, followed by magnesium. However, the proportions of sulfate and chloride with respect to bicarbonate were higher in upgradient well MW-11 and downgradient well MW-8. Well MW-12 had slightly higher proportions of sodium and potassium with respect to magnesium and calcium than in the other downgradient wells.

4.8.2 Cation/Anion Balance Calculations

Cation/anion balance calculations for 2022 are presented in Appendix F. All groundwater sample charge balance differences were less than 10 percent. As stated in WAC 173-351-430-5(a), charge balance differences of greater than 5 to 10 percent (5 percent for cation/anion sums of greater than 5 milliequivalents per liter) could indicate laboratory error, poor well conditions, or other ions not accounted for in natural or impacted groundwater conditions. Charge balance differences of between 5 and 10 percent have periodically been observed in the monitoring wells. Actions taken to improve charge balance differences beginning in 2007 consisted of changing analytical laboratories and reviewing quality assurance records provided by the laboratory to monitor data quality.

This Page Intentionally Left Blank

5. GROUNDWATER FLOW DIRECTION AND RATE

5.1 Hydrogeologic Setting

Groundwater in the uppermost aquifer occurs under water table conditions in the sand, silt and gravel sediments of the middle Ringold Formation, and the aquifer thickness is approximately 80 to 110 ft (Parametrix 2017b). The water table beneath the City Facility occurs at depths of approximately 75 to 110 ft below ground surface (bgs) and elevations of approximately 385 to 388 ft NAVD88, and typically fluctuates less than a foot throughout the year.

Regionally, groundwater flow has been documented to be eastward toward the Columbia River (Shaw 2003). However, mounding effects of intermittent crop circle irrigation on the City Facility's eastern boundary and artificial recharge to the west have caused fluctuations in the groundwater flow direction both temporally and seasonally. Historical groundwater measurements have indicated the flow direction at the City Facility to be locally influenced by groundwater mounding from irrigated crop circles on the City Facility's eastern boundary, deflecting the flow in the eastern portion of the City Facility seasonally toward the southeast. Crop circles have been used to grow alfalfa hay, corn and potatoes since 1987. The source of the irrigation water is reported to be from the Columbia River.

Historical influences at the ORV park west of the City Facility may have also temporarily altered local flow directions by periodically flooding shallow unlined waterways for boat racing and allowing the water to seep out after each race. The ponds were constructed in 1999 and racing was discontinued in the mid 2000's. Additional sources of artificial recharge include the four septic systems at the ORV park, including a bathroom/shower facility designed for 4,000 uses per day.

Irrigation is conducted seasonally at the Tri City Kart Club, located on the ORV park property immediately west of the Landfill, and this facility also includes a bathroom/shower facility and septic system. Beginning in 2019, groundwater monitoring indicates groundwater mounding is occurring beneath the northern portion of the Landfill immediately downgradient of the Tri City Kart Club likely related to groundwater recharge from that facility. The mounding appears to steepen the groundwater gradient on the northwest portion of the Landfill and shift flow in that area slightly more toward the south-southeast.

5.2 Groundwater Flow

Groundwater elevations and potentiometric surface maps for 2022 are presented in Appendix G. The groundwater flow direction continued to be toward the southeast in the northern and southern portions of the City Facility but was easterly in the central portion of the City Facility. Although the overall historical flow direction has ranged from easterly to southeasterly, flow in the central portion of the City Facility has been more easterly over the past few years.

The calculated rate of flow ranged from 0.003 to 0.05 ft/day or 1 to 18 ft/year, based on the measured groundwater gradients in the vicinity of well MW-6 (ranging from 0.00052 ft/ft to 0.00065 ft/ft), hydraulic conductivity values of 2 to 15 ft/day (Shaw Environmental, Inc. 2003; Shannon & Wilson 1998), and estimated porosities between 20 and 35 percent (Walton 1985).

This Page Intentionally Left Blank

6. VADOSE ZONE MONITORING

The leachate ports were checked in the Third Quarter 2022, and a small amount of leachate was found in Port 4 that was sufficient to collect a sample to be tested for VOCs.

Leachate is collected from four lysimeters that monitor the vadose zone directly beneath the MSW located in the northeast corner of the Landfill. Drains from each lysimeter are connected to a common sampling vault where discrete samples of leachate are collected from four sampling ports. The approximate location of the lysimeters and sampling vault are identified in Figure 1-1. Samples from the four vadose monitoring ports are to be analyzed for leachate parameters listed in Appendix I and II of WAC 173-351-990.

The sample collected from Port 4 contained measured concentrations of 4-methyl-2-pentanone, carbon disulfide, cis-1,2-DCE, and VC. Reporting limits were elevated with respect to groundwater data.

This Page Intentionally Left Blank

7. LANDFILL GAS MONITORING

LFG measurements collected from thirteen LFG monitoring probes (Figure 1-1) are presented in Appendix H. Gas probes GP-1 through GP-4 and GP-7 through GP-11 are screened at two subsurface intervals, and GP-12 is screened at three separate intervals, including one deep probe just above groundwater. The data include measurements collected from three single-completion LFG probes (GP-13, GP-14, and GP-15) that were installed in June 2021 (Parametrix 2021b) to monitor the southeastern portion of the Expansion. The gas probes are completed in alluvium outside the Landfill.

7.1 Landfill Gas Data

In 2022, all methane concentrations were less than 5 percent by volume, except GP-12-1 (10.5 to 10.8 percent). The extent of LFG migration remains in close proximity to the perimeter of the Landfill and concentrations have not exceeded the 5 percent by volume regulatory action limit at the City Facility boundary.

7.2 Historical Landfill Gas Data Trends

Trends in probes where methane has historically been observed (GP-2, GP-9, and GP-12) are shown on the time-series plot in Figure 7-1. The data indicate that despite limited spikes, overall substantial decreases have been observed since the closure activities started in 2011 that included installation and operation of an active LFG control system. Methane concentrations in GP-2 and GP-12 have decreased from 35 to 45 percent by volume prior to the 2011 Phase 1 closure to below 5 percent, except for the concentrations at Probe GP-12-1 of just over 10 percent.

GP-12-1 is the shallowest probe at that location, with its screen extending to a depth of 2.5 feet below the bottom of waste (approximately 62 feet above the water table).

Of particular note are the reductions in methane concentrations in GP-12-3 because its screened interval extends to approximately 8 ft above the water table (56.5 ft below the top of waste). Methane concentrations in GP-12-3 have been significantly reduced since the Phase 1 closure, from typical concentrations of 15 to 25 percent, to less than 1 percent.

New gas probes GP-13, GP-14, and GP-15 that monitor the southeastern portion of the Expansion have not detected methane above background concentrations since installation in 2021.

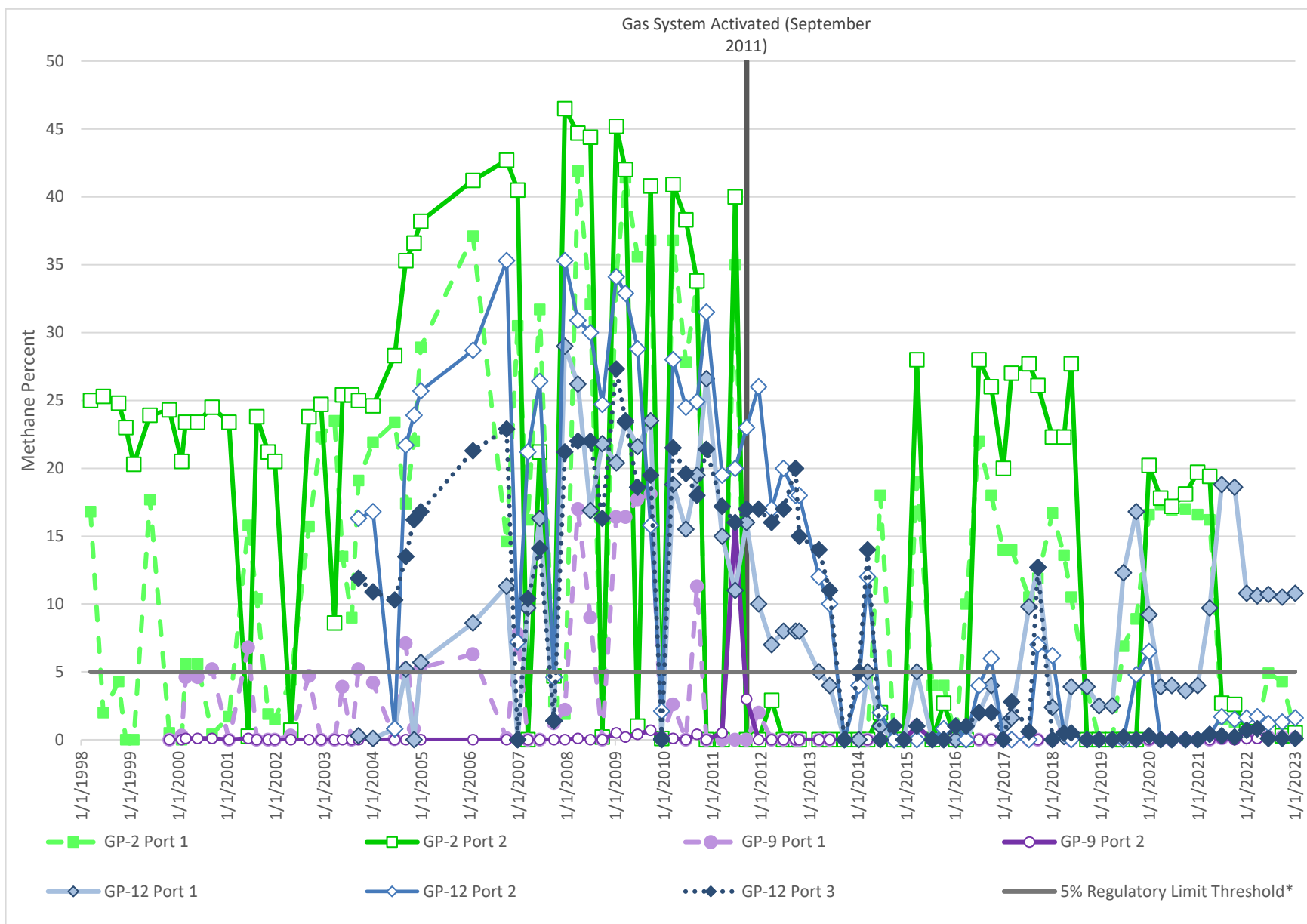


Figure 7-1
Methane in Landfill Gas Probes,
Horn Rapids Landfill

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

Since 2011, the Phase 1 LFG collection system and cover are effectively removing much of the gas within close proximity of the Landfill as demonstrated by the decreases in methane concentrations observed at multilevel gas probes GP-2 and GP-12, including GP-12-3, screened immediately above the water table. The decreasing trends in VOCs observed in wells adjacent to the Landfill indicate that removing or greatly reducing the LFG source has been effective in reducing impacts to groundwater beneath the Landfill. The source of VOCs to groundwater are expected to be further reduced upon full closure of the Landfill that is anticipated in 2023, which will include an expanded LFG system (Phase 2 closure). Methane has not been detected above background in new gas probes GP-13, GP-14, and GP-15 that monitor for southeastern portion of the Expansion.

Evaluation of natural attenuation parameters such as DO and ORP measurements indicate that conditions in groundwater near the Landfill source may be consistent with attenuation of PCE and TCE, and more aerobic conditions further downgradient may be consistent with degradation of cis-1,2-DCE and VC. However, quantitative analysis of other evidence is inconclusive. The high concentrations of nitrate and sulfate contributed by an upgradient source may inhibit reductive dechlorination. Trends in other parameters that might indicate that biodegradation is occurring, such as increases in chloride and alkalinity, or decreases in nitrate and sulfate, are somewhat ambiguous due to the influences from upgradient sources, and methane is also contributed directly by LFG.

Since area wide background concentrations of inorganic indicator parameters are present, VOCs are the only unambiguous compounds of concern reflecting landfill impacts. VOCs continued to be detected in groundwater at concentrations above groundwater quality criteria. The groundwater monitoring wells located in close proximity to the waste along the eastern edge of the Landfill (MW-5, MW-6, and MW-10) show the highest number and concentrations of VOCs. Further downgradient well MW-9, located along the southern City Facility boundary approximately 800 feet from the Landfill, also has been impacted by a similar suite of VOCs in lower concentrations. The other three further downgradient monitoring wells along the City Facility boundary, MW-3, MW-4, and MW-8, contain a slightly different distribution of VOCs and in lower concentrations. Low levels of VOCs have also been detected in well MW-12 further downgradient on City Property. Overall VOC concentrations appear consistent with the findings of the 2021 draft RI Report with exceedances of groundwater quality criteria generally limited to within 500 feet of the City Facility boundary.

Trend analyses indicate that the concentrations of VOCs have shown significant decreases in some groundwater wells during the past 10 years, likely as a result of the 2011 Phase 1 closure. These include 1,1-DCA in wells MW-3, MW-5, MW-6, MW-9, and MW-10; 1,2-DCA in wells MW-5, MW-6 and MW-10, 1,2-dichloropropane in wells MW-5 and MW-6; benzene in wells MW-5, MW-6, and MW-10; chloroform in wells MW-4 and MW-10; chlorinated ethenes in upgradient well MW-1 (TCE); well MW-5 (cis-1,2-DCE, trans-1,2-DCE, TCE and VC), well MW-6 (cis-1,2-DCE, PCE, trans-1,2-DCE, TCE, and VC), and well MW-10 (TCE and VC).

Increasing trends in some VOCs have been observed over the past 5 and 10 years in wells located along the Facility boundary. Wells and parameters showing increasing trends over the past 5 years (chloroform in well MW-3; 1,1-DCA, cis-1,2-DCE, TCE, and trichlorofluoromethane in well MW-4; and PCE in MW-9) were analyzed for 2-year trends and none were significant. This indicates that the VOC concentrations in wells located along the Facility boundary may be stabilizing. Activation of the Phase 2 LFG extraction system in

the coming years is anticipated to further decrease the concentrations of VOCs reaching the water table and subsequently decrease the concentrations within the dissolved phase plume.

The increasing VOC trends observed are attributed to historical and perhaps on-going LFG releases from the unlined portions of the landfill and are not considered to be related to the current active fill area in Phase 1E that is lined.

No Appendix III parameters other than VOCs have been detected in groundwater wells, and leachate generation has been shown to be minimal by insignificant quantities of liquids present in lysimeters.

Although the overall historical flow direction has ranged from easterly to southeasterly, flow in the central portion of the City Facility has been more easterly over the past few years.

8.2 Recommendations

Ongoing quarterly groundwater and LFG monitoring will continue to evaluate whether the Phase 1 closure and planned Phase 2 closure are actively mitigating the LFG source that has impacted groundwater. The Phase 1E Expansion that is the active fill area is a lined cell and no groundwater impacts are anticipated. On-going groundwater monitoring will assess whether decreasing trends in VOCs are continuing to occur in downgradient wells, reflecting attenuation of existing contamination related to historical releases. To this end, the statistical evaluation for groundwater data will continue to consist of evaluating groundwater time series plots, updating groundwater trend analyses, and updating plots of methane measurements in the LFG probes.

The draft RI Report has been submitted to and reviewed by Ecology, and Ecology comments were addressed. Ecology's comments on the draft RI Report (Ecology 2022) included the opinion that the extent of VOCs in groundwater is not fully delineated. This conclusion was based in part on the increasing trends in some VOCs observed over the past 5 years in wells MW-3 and MW-4 located along the eastern City Facility boundary, particularly in consideration of the more easterly flow direction observed over the past few years. The City has agreed to develop a work plan evaluating current flow directions and describing an approach for additional delineation.

Following the completion of the final RI Report, a FS report will be prepared in accordance with the MTCA Agreed Order that focuses on the Phase 2 closure and LFG control as the likely cleanup remedy. Phase 2 closure will likely be completed in 2023 with installation of the landfill cover and activation of the LFG extraction system. The Phase 2 closure is expected to reduce the source of VOCs to groundwater and address the increasing trends observed in wells near the City Facility boundary.

As discussed in a letter submitted to BFCHD (Parametrix 2022c) it is recommended that testing for the WAC 173-351 Appendix III assessment monitoring parameters be discontinued in 2023 since none of the additional parameters have been detected other than VOCs which are listed as detection monitoring constituents in WAC 173-351 Appendix I. Therefore, the Site has met the criteria "concentrations of all Appendix III constituents are at or below background values for two consecutive events" per WAC 173-351-440(5).

9. REFERENCES

- Benton-Franklin Health District (BFHD). 2017. Solid Waste Landfill Permit Modification Request, Horn Rapids Landfill. Letter to Pete Rogalsky, Public Works Director, City of Richland. January 25, 2017.
- CH2M 2015. Hanford Groundwater Monitoring Report for 2014. Prepared for Department of Energy. DOE/RL-2015-07. July 2015.
- Ecology (Washington State Department of Ecology) 2012. Guidance for Groundwater Monitoring at Landfills and Other Facilities Regulated Under Chapters 173-304, 173-306, 173-350, and 173-351 WAC. Publication No. 12-07-072.
- Ecology. 2017. Approval of Remedial Investigation Work Plan for Richland Horn Rapids Landfill. Letter from Patricia Shanley to Pete Rogalsky, City of Richland. April 28, 2017.
- Ecology. 2022. Ecology Comments on the Horn Rapids Landfill Remedial Investigation Report. Letter from Luke LeMond to Mark Chidester, City of Richland. August 2, 2022.
- EMCON. 1999. Closure and Post-Closure Plan, Horn Rapids Landfill, Richland, Washington. Prepared for City of Richland. March 26, 1999.
- EPA (U.S. Environmental Protection Agency). 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. EPA/600/R-98/128. September 1998.
- EPA 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance.
- Jurgens, Bryant C., McMahon, Peter B., Chapelle, Francis H., and Eberts, Sandra M., 2009. *An Excel Workbook for Identifying Redox Processes in Ground Water*. U.S. Geological Survey Open File Report 2009-1004.
- Parametrix. 2006. Horn Rapids Landfill Closure and Post-Closure Plan Addendum. Prepared for City of Richland Public Works by Parametrix, Seattle, WA. October 17, 2006.
- Parametrix. 2008. Revised Landfill Closure Plan, Horn Rapids Landfill. Prepared for City of Richland Public Works Department by Parametrix, Seattle, WA. December 2008.
- Parametrix. 2011. Horn Rapids Landfill Contract Documents and Specifications, Phase 1 Closure Project Contract SB 11-01PW. Prepared for City of Richland Public Works Department by Parametrix, Seattle, WA. March 2011.
- Parametrix. 2012a. Horn Rapids Landfill Phase 1 Closure Construction Quality Assurance Report. Prepared for City of Richland Public Works Department by Parametrix, Seattle, WA. March 2012.
- Parametrix. 2012b. Horn Rapids Landfill, Landfill Gas Collection System Operation and Maintenance Manual. Prepared for City of Richland Public Works Department by Parametrix, Seattle, WA. May 2012.
- Parametrix, Inc. 2016. Horn Rapids Landfill Environmental Monitoring Report, Calendar Year 2015. Prepared for City of Richland. March 2016.
- Parametrix, Inc. 2017a. Horn Rapids Landfill Quality Assurance Project Plan. Prepared for City of Richland. January 2017.

- Parametrix, Inc. 2017b. Horn Rapids Landfill Hydrogeologic Report. Prepared for City of Richland. January 2017.
- Parametrix, Inc. 2017c. Horn Rapids Landfill Operations Plan. Prepared for City of Richland. January 2017.
- Parametrix, Inc. 2017d. Horn Rapids Landfill Remedial Investigation Work Plan. Prepared for City of Richland. April 2017.
- Parametrix, Inc. 2018. Horn Rapids Landfill Remedial Investigation Phase I Push Probe Investigation. Prepared for City of Richland. February 2018.
- Parametrix, Inc. 2019. Horn Rapids Landfill Technical Memorandum Installation of Well MW-12. Prepared for City of Richland. February 2019.
- Parametrix, Inc. 2021a. Horn Rapids Landfill Draft Remedial Investigation Report. Prepared for City of Richland. January 2021.
- Parametrix, Inc. 2021b. Installation of Gas Probes GP-13 through GP-15, Horn Rapids Landfill. Technical Memorandum prepared for City of Richland. August 2021.
- Parametrix, Inc. 2022a. Horn Rapids Landfill Environmental Monitoring Report, First Quarter 2022. Prepared for City of Richland. May 2022.
- Parametrix, Inc. 2022b. Horn Rapids Landfill Environmental Monitoring Report Second Quarter 2022. Prepared for City of Richland. August 2022.
- Parametrix, Inc. 2022c. Horn Rapids Landfill - Recommendation to Discontinue Testing of WAC 173-351 Appendix III Parameters. Letter to Mr. James Coleman, Benton-Franklin County Health District. October 19.
- Parametrix, Inc. 2022d. Horn Rapids Landfill Environmental Monitoring Report, Third Quarter 2022. Prepared for City of Richland. December 2022.
- Sanitas Technologies (formerly NIC and Intelligent Decision Technologies/IDT). 2022. Sanitas™ Version 9.6.32. Shawnee, Kansas.
- Shannon & Wilson. 1998. Results of Hydrogeologic Service for the Richland Landfill, Richland, Washington.
- Shaw Environmental, Inc. 2003. Phase I Remedial Investigation Summary Report. Horn Rapids Landfill, Richland, Washington. Prepared for City of Richland Department of Public Works. June 16, 2003.
- Shaw Environmental, Inc. 2004. Phase 2 Remedial Investigation Summary Report. Horn Rapids Landfill, Richland, Washington. Prepared for City of Richland Department of Public Works. April 2, 2004.
- Shaw EMCON/OWT, Inc. 2005. Results of Pilot-Scale LFG Extraction Test (Draft), Horn Rapids Landfill, Richland, Washington. Prepared for Mr. Steve McNutt Horn Rapids Landfill, April 8, 2005.
- Walton, W.C. 1985. Practical Aspects of Groundwater Modeling.

Appendix A

Groundwater Quality Data Summary Tables



Table A-1. Groundwater Quality Monitoring Results, Horn Rapids Landfill, 2022

				MW-1	MW-1	MW-1	MW-1	MW-2	MW-2	MW-21	MW-2	MW-2	MW-3	MW-3	MW-3	MW-21	
		GWQS	MCL	3/16/2022	6/29/2022	9/20/2022	12/8/2022	3/15/2022	6/28/2022	(MW-2 Dup) 6/28/2022	9/19/2022	12/7/2022	3/16/2022	6/28/2022	9/19/2022	(MW-3 Dup) 9/19/2022	
Analyte	Units																
FIELD DATA	pH	units	6.5-8.5	7.10	7.14	7.21	7.30	7.67	7.73	NA	7.61	7.88	7.27	7.81	7.61	NA	
	Conductivity	µmhos/cm	700 **	628	837	788	751	385	510	NA	495.1	504.2	290	371.7	346.0	NA	
	Temperature	C°		20.57	21.1	20.2	18.0	20.10	21.9	NA	20.5	18.0	20.69	21.8	22.9	NA	
	Redox	mv		176.8	135.0	129.9	83.0	178.1	140.0	NA	161.7	109.0	187.4	122.0	151.6	NA	
	Dissolved Oxygen	mg/L		5.19	6.13	5.65	6.05	6.23	6.85	NA	6.07	6.29	8.36	8.88	7.50	NA	
WATER QUALITY PARAMETERS	Nitrate-Nitrogen	mg/L	10 *	10 *	9.4	8.0	8.4	7.2	9.0	10	10	12	12	4.8	4.5	4.3	4.3
	Calcium, Dissolved	mg/L			110	110	98	110	59	54	58	56	65	42	40	37	38
	Sodium, Dissolved	mg/L			21	24	22	22	13	12	13	13	13	13	13	12	13
	Bicarbonate Alkalinity	mg/L as CaCO3			270	300	300	290	110	120	120	110	120	88	95	95	98
	Chloride	mg/L	250 **	250 **	30	26	25	24	24	24	24	25	24	20	18	17	17
	Magnesium, Dissolved	mg/L			21	23	19	21	12	12	13	12	14	8.0	7.9	7.1	7.4
	Potassium, Dissolved	mg/L			8.0	8.4	7.9	7.7	6.3	5.6	6.0	5.8	5.7	6.3	5.9	5.7	5.8
	Sulfate	mg/L	250 **	250 **	60	56	53	49	56	55	56	57	55	45	40	37	37
	Total Alkalinity	mg/L as CaCO3			270	300	300	290	110	120	120	110	120	88	95	95	98
	Iron, Dissolved	mg/L	0.30 **	0.30 **	<0.10	<0.50	0.14	0.19	<0.10	<0.50	<0.50	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10
	Manganese, Dissolved	mg/L	0.05 **	0.05 **	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Ammonia-Nitrogen	mg/L as N			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Total Organic Carbon	mg/L			1.2	1.2	1.3	<1.5	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0	NA	<1.0	<1.0
	Total Dissolved Solids	mg/L	500 **	500 **	480	440	420	560	270	500	440	330	340	250	660	250 J	120 J
	Total Suspended Solids	mg/L			<2.0	<2.0	<2.0	<2.0	2.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
METALS	Antimony, Total	mg/L		6 *	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
	Arsenic, Total	mg/L	0.00005 ***	0.01 *	0.0037	0.0038	0.0042	0.0043	0.0047	0.0039	0.0039	0.0042	0.0044	0.0080	0.0086	0.0090	0.0091
	Barium, Total	mg/L	1 *	2 *	0.052	0.052	0.054	0.053	0.031	0.030	0.032	0.033	0.035	0.019	0.019	0.019	0.019
	Beryllium, Total	mg/L		0.004 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Cadmium, Total	mg/L	0.01 *	0.005 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Chromium, Total	mg/L	0.05 *	0.1 *	0.0024	0.0073	0.0051	0.0048	0.22	0.039	0.038	0.042	0.058	0.0033	0.0073	0.0037	0.0038
	Cobalt, Total	mg/L			0.013	0.020	0.016	0.014	0.00067	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00074	<0.00040	<0.00040
	Copper, Total	mg/L	1 **		<0.0020	0.0022	0.0032	<0.0020	0.015	0.0022	0.0021	0.0022	0.0026	<0.0020	<0.0020	<0.0020	<0.0020
	Lead, Total	mg/L	0.05 *		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00053	<0.00040	<0.00040	<0.00040
	Nickel, Total	mg/L		0.1 *	<0.0030	0.0043	<0.0030	<0.0030	0.035	0.0082	0.0083	0.0050	0.018	<0.0030	0.0048	<0.0030	<0.0030
	Selenium, Total	mg/L	0.01 *	0.05 *	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080
	Silver, Total	mg/L	0.05 *	0.1 **	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Thallium, Total	mg/L		0.002 *	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vanadium, Total	mg/L			0.0088	0.0088	0.0090	0.0090	0.015	0.011	0.011	0.011	0.012	0.015	0.015	0.015	0.015
	Zinc, Total	mg/L	5 **	5 **	<0.0070	0.032	0.044	0.013	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070
VOLATILE ORGANIC COMPOUNDS	1,1,1,2-Tetrachloroethane	µg/L			<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.30
	1,1,1-Trichloroethane	µg/L	200 *	200 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	1,1,2,2-Tetrachloroethane	µg/L			<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	1,1,2-Trichloroethane	µg/L		5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	1,1-Dichloroethane	µg/L	1 ***		<0.20	<0.20	<0.20	<0.50	0.22	0.22	0.22	<0.20	0.22 J	<0.20	<0.20	<0.20	<0.20
	1,1-Dichloroethene	µg/L		7 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	1,2,3-Trichloropropane	µg/L			<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	1,2-Dibromo-3-Chloropropane	µg/L		0.2 *	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0
	1,2-Dibromoethane	µg/L	0.001 ***	0.05 *	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10
	1,2-Dichlorobenzene	µg/L		600 *	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.30
	1,2-Dichloroethane	µg/L	0.5 ***	5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	1,2-Dichloropropane	µg/L	0.6 ***	5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	1,4-Dichlorobenzene	µg/L	4 ***	75 *	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.30
	2-Butanone	µg/L			<10	<10	<15	3.2 J	<10	<10	<10	<10	<5.0	<10	<10	<10	<10
	2-Hexanone	µg/L			<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<3.0	<3.0

Table A-1. Groundwater Quality Monitoring Results, Horn Rapids Landfill, 2022

				MW-3	MW-4	MW-4	MW-4	MW-4	MW-21		MW-5	MW-5	MW-5	MW-5	MW-21			MW-6
		GWQS	MCL	12/7/2022	3/15/2022	6/28/2022	9/19/2022	12/7/2022	(MW-4 Dup) 12/7/2022		3/16/2022	6/27/2022	9/20/2022	12/8/2022	3/16/2022	(MW-6 Dup) 3/16/2022	6/27/2022	9/20/2022
Analyte	Units																	
FIELD DATA	pH	units	6.5-8.5	8.04	7.46	7.54	7.55	7.73	NA		6.35	6.61	6.73	6.83	6.29	NA	6.52	6.66
	Conductivity	µmhos/cm	700 **	333.0	493	644	624	636	NA		996	1227	1174	1104	899	NA	1138	1082
	Temperature	C°		17.1	20.08	21.3	21.5	18.5	NA		23.35	25.6	26.3	19.4	24.32	NA	27.3	26.4
	Redox	mv		118.1	190.1	124.6	134.6	105.5	NA		168.2	-15.6	55.0	129.5	167.5	NA	-18.6	31.8
	Dissolved Oxygen	mg/L		7.52	4.22	4.72	4.13	7.62	NA		0.24	0.84	0.51	0.54	0.61	NA	0.94	0.58
WATER QUALITY PARAMETERS	Nitrate-Nitrogen	mg/L	10 *	10 *	3.8	5.4	6.3	7.5	7.3	7.3	1.4	1.8	1.7	1.6	2.4	2.4	2.3	1.2
	Calcium, Dissolved	mg/L			40	85	81	75	88	88	180	150	140	160	160	160	150	140
	Sodium, Dissolved	mg/L			11	16	15	15	14	14	27	23	23	22	22	23	22	22
	Bicarbonate Alkalinity	mg/L as CaCO3			95	230	250	240	240	240	500	490	470	460	480	490	490	500
	Chloride	mg/L	250 **	250 **	16	16	15	15	15	14	52	47	45	47	24	24	20	21
	Magnesium, Dissolved	mg/L			7.7	18	18	16	19	19	43	38	35	39	38	38	38	35
	Potassium, Dissolved	mg/L			5.4	7.4	7.2	6.8	6.9	7.1	13	11	11	11	12	11	12	12
	Sulfate	mg/L	250 **	250 **	34	36	34	33	32	33	87	75	70	71	59	59	50	52
	Total Alkalinity	mg/L as CaCO3			95	230	250	240	240	240	500	490	470	460	480	490	490	500
	Iron, Dissolved	mg/L	0.30 **	0.30 **	<0.10	<0.10	<0.50	0.11	0.12	0.12	0.10	<0.50	0.20	0.22	0.12	0.13	<0.50	0.44
	Manganese, Dissolved	mg/L	0.05 **	0.05 **	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.39	0.29	0.32	0.39	0.064	0.062	0.055	0.065
	Ammonia-Nitrogen	mg/L as N			<0.50	<0.50	0.58	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Total Organic Carbon	mg/L			<1.5	<1.0	<1.0	<1.0	<1.5	<1.5	2.4	2.0	2.2	2.5	1.2	1.2	1.3	1.5
	Total Dissolved Solids	mg/L	500 **	500 **	210	340	730	340	520 J	400 J	710	780	650	810	590	650	720	610
	Total Suspended Solids	mg/L			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.5	<2.0	<2.0	<2.0	<2.0
METALS	Antimony, Total	mg/L		6 *	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
	Arsenic, Total	mg/L	0.00005 ***	0.01 *	0.0090	0.0039	0.0040	0.0041	0.0046	0.0040	0.0028	0.0028	0.0031	0.0033	0.0016	0.0015	0.0019	0.0016
	Barium, Total	mg/L	1 *	2 *	0.019	0.048	0.047	0.049	0.058	0.051	0.10	0.097	0.10	0.11	0.098	0.099	0.099	0.10
	Beryllium, Total	mg/L		0.004 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Cadmium, Total	mg/L	0.01 *	0.005 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Chromium, Total	mg/L	0.05 *	0.1 *	0.0055	0.0019	0.0018	0.0042	0.0038	0.0035	<0.00080	<0.00080	0.00090	0.0011	0.0036	0.0037	0.0044	0.0034
	Cobalt, Total	mg/L			<0.00040	0.0032	0.0031	0.012	0.017	0.016	0.00056	0.00051	0.0010	0.00094	0.0034	0.0036	0.0030	0.0032
	Copper, Total	mg/L	1 **		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	<0.0020	0.0025	0.0041	<0.0020	<0.0020	0.0023	<0.0020
	Lead, Total	mg/L	0.05 *		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Nickel, Total	mg/L		0.1 *	<0.0030	<0.0030	<0.0030	0.0030	<0.0030	<0.0030	0.0036	0.0037	0.0037	0.0038	0.0047	0.0042	0.0045	0.0039
	Selenium, Total	mg/L	0.01 *	0.05 *	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080
	Silver, Total	mg/L	0.05 *	0.1 **	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Thallium, Total	mg/L		0.002 *	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vanadium, Total	mg/L			0.017	0.011	0.011	0.011	0.013	0.011	0.0077	0.0077	0.0077	0.0085	0.0066	0.0064	0.0068	0.0059
	Zinc, Total	mg/L	5 **	5 **	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	0.015	0.016	0.021	0.026	<0.0070	<0.0070	0.0081	<0.0070
VOLATILE ORGANIC COMPOUNDS	1,1,1,2-Tetrachloroethane	µg/L			<0.50	<0.30	<0.30	<0.30	<0.50	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<1.5	<1.5
	1,1,1-Trichloroethane	µg/L	200 *	200 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	1,1,2,2-Tetrachloroethane	µg/L			<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	1,1,2-Trichloroethane	µg/L		5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	1,1-Dichloroethane	µg/L	1 ***		<0.50	5.0	5.4	5.3	5.1	4.9	3.9	4.0	4.1	3.5	2.2	2.3	1.2	2.0
	1,1-Dichloroethene	µg/L		7 *	<0.50	<0.20	0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	1,2,3-Trichloropropane	µg/L			<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	1,2-Dibromo-3-Chloropropane	µg/L		0.2 *	<1.0	<2.0	<2.0	<2.0	<1.0	<1.0	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<10	<10
	1,2-Dibromoethane	µg/L	0.001 ***	0.05 *	<0.50	<0.10	<0.10	<0.10	<0.50	<0.50	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.50	<0.50
	1,2-Dichlorobenzene	µg/L		600 *	<0.50	<0.30	<0.30	<0.30	<0.50	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<1.5	<1.5
	1,2-Dichloroethane	µg/L	0.5 ***	5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	0.35	0.46	<0.20	0.44 J	0.28	0.26	<1.0	<1.0
	1,2-Dichloropropane	µg/L	0.6 ***	5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	0.27	0.28	0.24	0.21 J	0.27	0.25	<1.0	<1.0
	1,4-Dichlorobenzene	µg/L	4 ***	75 *	<0.50	<0.30	<0.30	<0.30	<0.50	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<1.5	<1.5
	2-Butanone	µg/L			<5.0	<10	<10	<10	<5.0	<5.0	<10	<10	<15	<5.0	<10	<10	<50	<15
	2-Hexanone	µg/L			<6.0	<3.0	<3.0	<3.0	<6.0	<6.0	<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<15	<15

Table A-1. Groundwater Quality Monitoring Results, Horn Rapids Landfill, 2022

				MW-6	MW-8	MW-8	MW-8	MW-8	MW-9	MW-9	MW-9	MW-9	MW-10	MW-10	MW-10	MW-10
		GWQS	MCL	12/8/2022	3/15/2022	6/28/2022	9/19/2022	12/7/2022	3/15/2022	6/28/2022	9/19/2022	12/7/2022	3/15/2022	6/27/2022	9/20/2022	12/8/2022
Analyte	Units															
FIELD DATA	pH	units	6.5-8.5	6.73	7.45	7.62	7.63	7.96	6.86	6.84	6.87	7.06	6.40	6.57	6.72	6.74
	Conductivity	µmhos/cm	700 **	1050	757	944	669	476.5	817	1112	1043	1023	1026	1325	1200	1206
	Temperature	C°		24.6	22.26	23.7	23.8	19.1	22.03	23.9	19.4	22.7	25.39	26.3	25.0	24.3
	Redox	mv		-30.5	168.1	121.4	130.4	103.5	170.0	95.8	124.7	104.3	179.6	NA	116.3	103.9
	Dissolved Oxygen	mg/L		0.33	7.72	8.60	7.06	5.52	2.87	3.20	2.88	2.05	0.05	0.43	0.29	0.33
WATER QUALITY PARAMETERS	Nitrate-Nitrogen	mg/L	10 * 10 *	0.73	22	20	14	8.5	7.0	7.8	8.6	7.7	3.9	4.8	5.3	4.8
	Calcium, Dissolved	mg/L		150	120	98	71	55	140	140	130	140	210	180	170	190
	Sodium, Dissolved	mg/L		21	28	27	22	16	24	26	25	22	23	21	22	20
	Bicarbonate Alkalinity	mg/L as CaCO3		500	110	130	130	130	340	360	360	360	550	550	530	520
	Chloride	mg/L	250 ** 250 **	22	140	110	68	28	65	56	58	52	33	31	29	28
	Magnesium, Dissolved	mg/L		38	23	21	14	11	31	33	28	31	43	40	36	40
	Potassium, Dissolved	mg/L		11	9.7	8.8	7.7	6.5	9.7	9.8	9.1	9.1	13	12	12	11
	Sulfate	mg/L	250 ** 250 **	49	84	76	59	39	82	77	78	71	91	85	77	73
	Total Alkalinity	mg/L as CaCO3		500	110	130	130	130	340	360	360	360	550	550	530	520
	Iron, Dissolved	mg/L	0.30 ** 0.30 **	0.51	<0.10	<0.50	0.11	0.10	<0.10	<0.50	0.23	0.20	0.19	<0.50	0.23	0.23
	Manganese, Dissolved	mg/L	0.05 ** 0.05 **	0.051	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.043	0.038	0.034	0.039
	Ammonia-Nitrogen	mg/L as N		<0.50	0.56	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Total Organic Carbon	mg/L		1.6	1.3	1.2	1.0	<1.5	1.8	1.0	<1.0	<1.5	2.9	1.6	1.8	2.1
	Total Dissolved Solids	mg/L	500 ** 500 **	680	720	700	360	320	600	720	640	680	730	910	810	900
	Total Suspended Solids	mg/L		<2.5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.5
METALS	Antimony, Total	mg/L	6 *	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
	Arsenic, Total	mg/L	0.00005 *** 0.01 *	0.0013	0.0079	0.0079	0.0093	0.0094	0.0016	0.0018	0.0021	0.0019	0.0014	0.0013	0.0015	0.0016
	Barium, Total	mg/L	1 * 2 *	0.099	0.078	0.081	0.056	0.036	0.079	0.086	0.089	0.082	0.11	0.11	0.11	0.10
	Beryllium, Total	mg/L	0.004 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Cadmium, Total	mg/L	0.01 * 0.005 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Chromium, Total	mg/L	0.05 * 0.1 *	0.00090	0.0038	0.0041	0.0086	0.0077	0.0033	0.0026	0.0028	0.0020	0.0017	0.0011	0.00098	0.0011
	Cobalt, Total	mg/L		0.00056	<0.00040	<0.00040	<0.00040	0.00074	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Copper, Total	mg/L	1 **	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0028	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Lead, Total	mg/L	0.05 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Nickel, Total	mg/L	0.1 *	<0.0030	<0.0030	<0.0030	0.0060	0.0062	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Selenium, Total	mg/L	0.01 * 0.05 *	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080
	Silver, Total	mg/L	0.05 * 0.1 **	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Thallium, Total	mg/L	0.002 *	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vanadium, Total	mg/L		0.0053	0.014	0.015	0.016	0.016	0.0070	0.0068	0.0073	0.0071	0.0066	0.0069	0.0067	0.0065
	Zinc, Total	mg/L	5 ** 5 **	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070
VOLATILE ORGANIC COMPOUNDS	1,1,1,2-Tetrachloroethane	µg/L		<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50
	1,1,1-Trichloroethane	µg/L	200 * 200 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	1,1,2,2-Tetrachloroethane	µg/L		<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	1,1,2-Trichloroethane	µg/L	5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	1,1-Dichloroethane	µg/L	1 ***	2.2	<0.20	<0.20	<0.20	0.48 J	2.0	2.0	1.8	1.8	5.0	5.4	5.3	4.6
	1,1-Dichloroethene	µg/L	7 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	1,2,3-Trichloropropane	µg/L		<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	1,2-Dibromo-3-Chloropropane	µg/L	0.2 *	<1.0	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<1.0
	1,2-Dibromoethane	µg/L	0.001 *** 0.05 *	<0.50	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.50
	1,2-Dichlorobenzene	µg/L	600 *	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50
	1,2-Dichloroethane	µg/L	0.5 *** 5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	0.38	0.43	0.36	0.42 J
	1,2-Dichloropropane	µg/L	0.6 *** 5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	1,4-Dichlorobenzene	µg/L	4 *** 75 *	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50
	2-Butanone	µg/L		<5.0	<10	<10	<10	<5.0	<10	<10	<10	<5.0	<10	<10	<15	<5.0
	2-Hexanone	µg/L		<6.0	<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<3.0	<6.0

Table A-1. Groundwater Quality Monitoring Results, Horn Rapids Landfill, 2022

				MW-11	MW-11	MW-11	MW-11	MW-12	MW-12	MW-12	MW-12	Trip	Trip	Trip	Trip	Leachate	Leachate
		GWQS	MCL	3/15/2022	6/27/2022	9/20/2022	12/8/2022	3/15/2022	6/29/2022	9/20/2022	12/8/2022	Blank	Blank	Blank	Blank	Pond	Port
Analyte		Units										3/15/2022	6/27/2022	9/19/2022	12/8/2022	6/28/2022	9/20/2022
FIELD DATA	pH	units	6.5-8.5	7.11	7.25	7.30	7.49	7.54	7.74	7.71	7.85	NA	NA	NA	NA	8.44	NA
	Conductivity	µmhos/cm	700 **	1426	1844	1616	1686	368	432.8	421.7	490.1	NA	NA	NA	NA	1977	NA
	Temperature	C°		20.86	22.1	23.3	17.4	21.35	25.2	22.7	17.5	NA	NA	NA	NA	26.1	NA
	Redox	mv		142.2	197.9	151.3	54.2	185.5	143.7	101.5	126.2	NA	NA	NA	NA	73.5	NA
	Dissolved Oxygen	mg/L		7.90	8.95	7.06	7.16	4.80	7.73	5.45	5.65	NA	NA	NA	NA	3.59	NA
WATER QUALITY PARAMETERS	Nitrate-Nitrogen	mg/L	10 * 10 *	39	36	41	38	4.7	5.0	5.0	5.4	NA	NA	NA	NA	<0.05	NA
	Calcium, Dissolved	mg/L		270	240	210	250	56	45	43	64	NA	NA	NA	NA	11	NA
	Sodium, Dissolved	mg/L		20	20	19	19	20	21	20	18	NA	NA	NA	NA	200	NA
	Bicarbonate Alkalinity	mg/L as CaCO3		150	160	170	160	140	130	150	180	NA	NA	NA	NA	280	NA
	Chloride	mg/L	250 ** 250 **	240	200	190	210	15	13	12	14	NA	NA	NA	NA	380	NA
	Magnesium, Dissolved	mg/L		51	50	43	50	11	9.5	8.9	12	NA	NA	NA	NA	73	NA
	Potassium, Dissolved	mg/L		13	12	11	11	7.6	7.5	7.5	7.3	NA	NA	NA	NA	83	NA
	Sulfate	mg/L	250 ** 250 **	360	290	280	300	39	37	34	34	NA	NA	NA	NA	17	NA
	Total Alkalinity	mg/L as CaCO3		150	160	170	160	140	130	150	180	NA	NA	NA	NA	370	NA
	Iron, Dissolved	mg/L	0.30 ** 0.30 **	0.15	<0.50	0.28	0.33	<0.10	<0.50	<0.10	<0.10	NA	NA	NA	NA	<0.50	NA
	Manganese, Dissolved	mg/L	0.05 ** 0.05 **	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	<0.020	NA	NA	NA	NA	0.15	NA
	Ammonia-Nitrogen	mg/L as N		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NA	NA	NA	NA	2.3	NA
	Total Organic Carbon	mg/L		4.5	4.6	3.2	4.2	<1.0	<1.0	<1.0	<1.5	NA	NA	NA	NA	45	NA
	Total Dissolved Solids	mg/L	500 ** 500 **	1100	1300	1400	1400	280	240	380	360	NA	NA	NA	NA	1100	NA
	Total Suspended Solids	mg/L		<2.0	<2.0	<2.0	<2.0	<2.0	2.0	18.0	31	NA	NA	NA	NA	86	NA
METALS	Antimony, Total	mg/L	6 *	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	NA	NA	NA	NA	0.0011	NA
	Arsenic, Total	mg/L	0.00005 *** 0.01 *	0.0042	0.0042	0.0048	0.0043	0.0066	0.0082	0.0083	0.0065	NA	NA	NA	NA	0.0094	NA
	Barium, Total	mg/L	1 * 2 *	0.098	0.092	0.090	0.096	0.051	0.044	0.053	0.060	NA	NA	NA	NA	0.057	NA
	Beryllium, Total	mg/L	0.004 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	NA	NA	NA	NA	<0.00040	NA
	Cadmium, Total	mg/L	0.01 * 0.005 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	NA	NA	NA	NA	<0.00040	NA
	Chromium, Total	mg/L	0.05 * 0.1 *	0.0038	0.0055	0.0098	0.014	0.012	0.012	0.024	0.040	NA	NA	NA	NA	0.0015	NA
	Cobalt, Total	mg/L		<0.00040	0.00043	0.0021	0.0036	0.0010	0.00045	0.0057	0.011	NA	NA	NA	NA	0.0042	NA
	Copper, Total	mg/L	1 **	<0.0020	<0.0020	<0.0020	<0.0020	0.0065	0.0034	0.0083	0.016	NA	NA	NA	NA	<0.0020	NA
	Lead, Total	mg/L	0.05 *	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	NA	NA	NA	NA	<0.00040	NA
	Nickel, Total	mg/L	0.1 *	0.0040	0.0036	0.0046	0.0080	0.0080	0.0055	0.015	0.024	NA	NA	NA	NA	0.020	NA
	Selenium, Total	mg/L	0.01 * 0.05 *	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	NA	NA	NA	NA	<0.0080	NA
	Silver, Total	mg/L	0.05 * 0.1 **	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.0011	0.0063	NA	NA	NA	NA	<0.00040	NA
	Thallium, Total	mg/L	0.002 *	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NA	NA	NA	NA	<0.0010	NA
	Vanadium, Total	mg/L		0.011	0.0094	0.010	0.010	0.012	0.015	0.016	0.014	NA	NA	NA	NA	0.0048	NA
	Zinc, Total	mg/L	5 ** 5 **	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	0.0098	NA	NA	NA	NA	<0.0070	NA
VOLATILE ORGANIC COMPOUNDS	1,1,1,2-Tetrachloroethane	µg/L		<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<3.0	<15 J
	1,1,1-Trichloroethane	µg/L	200 * 200 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	1,1,2,2-Tetrachloroethane	µg/L		<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	1,1,2-Trichloroethane	µg/L	5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	1,1-Dichloroethane	µg/L	1 ***	<0.20	<0.20	<0.20	<0.50	0.83	0.38	0.46	1.7	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	1,1-Dichloroethene	µg/L	7 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	1,2,3-Trichloropropane	µg/L		<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	1,2-Dibromo-3-Chloropropane	µg/L	0.2 *	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<1.0	<20	<100 J
	1,2-Dibromoethane	µg/L	0.001 *** 0.05 *	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.50	<1.0	<5.0 J
	1,2-Dichlorobenzene	µg/L	600 *	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<3.0	<15 J
	1,2-Dichloroethane	µg/L	0.5 *** 5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	1,2-Dichloropropane	µg/L	0.6 *** 5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	1,4-Dichlorobenzene	µg/L	4 *** 75 *	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30	<0.50	<3.0	<15 J
	2-Butanone	µg/L		<10	<10	<15	<5.0	<10	<10	<15	<5.0	<10	<10	<10	<5.0	<100	<500 J
	2-Hexanone	µg/L		<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<3.0	<6.0	<30	<150 J

Table A-1. Groundwater Quality Monitoring Results, Horn Rapids Landfill, 2022

	Analyte	Units	GWQS	MCL	MW-1	MW-1	MW-1	MW-1	MW-2	MW-2	MW-21	MW-2	MW-2	MW-3	MW-3	MW-3	MW-21
					3/16/2022	6/29/2022	9/20/2022	12/8/2022	3/15/2022	6/28/2022	(MW-2 Dup) 6/28/2022	9/19/2022	12/7/2022	3/16/2022	6/28/2022	9/19/2022	(MW-3 Dup) 9/19/2022
VOLATILE ORGANIC COMPOUNDS (Cont.)	4-Methyl-2-pentanone	µg/L			<10	<10	<10	<5.0	<10	<10	<10	<10	<5.0	<10	<10	<10	<10
	Acetone	µg/L			<10	<10	<10	<8.0	<10	<10	<10	<10	<8.0	<10	<10	<10	<10
	Acrylonitrile	µg/L	0.07 ***		<10	<10	<15	<5.0	<10	<10	<10	<10	<5.0	<10	<10	<10	<10
	Benzene	µg/L	1 ***	5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	Bromochloromethane	µg/L			<0.20	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<0.20
	Bromodichloromethane	µg/L	0.3 ***	80 * THM	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	0.25	0.20	0.21
	Bromoform	µg/L	5 ***	80 * THM	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Bromomethane	µg/L			<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50
	Carbon Disulfide	µg/L			<0.30	<0.30	<0.30	<1.0	<0.30	<0.30	<0.30	<0.30	<1.0	<0.30	<0.30	<0.30	<0.30
	Carbon Tetrachloride	µg/L	0.3 ***	5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	Chlorobenzene	µg/L		100 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	Chloroethane	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Chloroform	µg/L	7 ***	80 * THM	<0.20	<0.20	<0.20	0.19 J	<0.20	<0.20	<0.20	<0.20	<0.50	5.7	6.3	7.2	7.4
	Chloromethane	µg/L			<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
	cis-1,2-Dichloroethene	µg/L		70 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	cis-1,3-Dichloropropene	µg/L			<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	Dibromochloromethane	µg/L		80 * THM	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	Dibromomethane	µg/L			<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	Ethylbenzene	µg/L		700 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	Iodomethane	µg/L			<0.50	<0.50	<0.50	<25	<0.50	<0.50	<0.50	<0.50	<25	<0.50	<0.50	<0.50	<0.50
	Methylene Chloride	µg/L	5 ***	5 *	<5.0	<5.0	<5.0	0.97 J	<5.0	<5.0	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<5.0
	m,p-Xylene	µg/L			<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
	o-Xylene	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Styrene	µg/L		100 *	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0
	Tetrachloroethene	µg/L	0.8 ***	5 *	3.8	6.0	6.0	4.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Toluene	µg/L		1000 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	trans-1,2-Dichloroethene	µg/L		100 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	trans-1,3-Dichloropropene	µg/L			<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	trans-1,4-Dichloro-2-butene	µg/L			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Trichloroethene	µg/L	3 ***	5 *	<0.20	0.38	0.25	0.21 J	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
	Trichlorofluoromethane	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Vinyl Acetate	µg/L			<2.0	<2.0	<3.0	<5.0	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<2.0	<2.0
	Vinyl Chloride	µg/L	0.02 ***	2 *	<0.020	<0.02	<0.020	<0.50	<0.020	<0.02	<0.02	<0.020	<0.50	<0.020	<0.02	<0.020	<0.020
	Total Xylenes	µg/L		10000 * XYL	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
NATURAL ATTENUATION	Ethane	µg/L			<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
	Ethene	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Methane	µg/L			0.79	<0.58	<0.58	0.62	<0.58	<0.58	<0.58	0.58	0.61	<0.58	<0.58	<0.58	0.59

Table A-1. Groundwater Quality Monitoring Results, Horn Rapids Landfill, 2022

					MW-3	MW-4	MW-4	MW-4	MW-4	MW-21					MW-21			
			GWQS	MCL	12/7/2022	3/15/2022	6/28/2022	9/19/2022	12/7/2022	(MW-4 Dup) 12/7/2022	MW-5	MW-5	MW-5	MW-5	MW-6	(MW-6 Dup)	MW-6	MW-6
Analyte			Units								3/16/2022	6/27/2022	9/20/2022	12/8/2022	3/16/2022	3/16/2022	6/27/2022	9/20/2022
VOLATILE ORGANIC COMPOUNDS (Cont.)	4-Methyl-2-pentanone	µg/L			<5.0	<10	<10	<10	<5.0	<5.0	<10	<10	<10	<5.0	<10	<10	<50	<50
	Acetone	µg/L			<8.0	<10	<10	<10	<8.0	<8.0	<10	<10	<10	<8.0	<10	<10	<50	<50
	Acrylonitrile	µg/L	0.07 ***		<5.0	<10	<10	<10	<5.0	<5.0	<10	<10	<15	<5.0	<10	<10	<50	<15
	Benzene	µg/L	1 ***	5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	0.24	0.21	<0.20	<0.50	0.26	0.29	<1.0	<1.0
	Bromochloromethane	µg/L			<1.0	<0.20	<0.20	<0.20	<1.0	<1.0	<0.20	<0.20	<0.20	<1.0	<0.20	<0.20	<1.0	<1.0
	Bromodichloromethane	µg/L	0.3 ***	80 * THM	0.23 J	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	Bromoform	µg/L	5 ***	80 * THM	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.5	<2.5
	Bromomethane	µg/L			<2.0	<0.50	<0.50	<0.50	<2.0	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<2.5	<2.5
	Carbon Disulfide	µg/L			<1.0	<0.30	<0.30	<0.30	<1.0	<1.0	<0.30	<0.30	<0.30	<1.0	<0.30	<0.30	<1.5	<1.5
	Carbon Tetrachloride	µg/L	0.3 ***	5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	Chlorobenzene	µg/L		100 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	Chloroethane	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.5	<2.5
	Chloroform	µg/L	7 ***	80 * THM	6.6	0.30	0.35	0.22	0.33 J	0.32 J	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	Chloromethane	µg/L			<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<2.5	<2.5
	cis-1,2-Dichloroethene	µg/L		70 *	<0.50	4.0	5.0	4.2	5.7	5.6	27	26	23	21	42	38	19	37
	cis-1,3-Dichloropropene	µg/L			<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	Dibromochloromethane	µg/L		80 * THM	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	Dibromomethane	µg/L			<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	Ethylbenzene	µg/L		700 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	Iodomethane	µg/L			<25	<0.50	<0.50	<0.50	<25	<25	<0.50	<0.50	<0.50	<25	<0.50	<0.50	<2.5	<2.5
	Methylene Chloride	µg/L	5 ***	5 *	<1.0	<5.0	<5.0	<5.0	<1.0	<1.0	<5.0	<5.0	<5.0	<1.0	<5.0	<5.0	<25	<25
	m,p-Xylene	µg/L			<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<2.5	<2.5
	o-Xylene	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.5	<2.5
	Styrene	µg/L		100 *	<0.50	<1.0	<1.0	<1.0	<0.50	<0.50	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<5.0	<5.0
	Tetrachloroethene	µg/L	0.8 ***	5 *	<0.50	<0.50	<0.50	<0.50	0.40 J	0.50	14	13	13	13	22	24	8.0	18
	Toluene	µg/L		1000 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	trans-1,2-Dichloroethene	µg/L		100 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	0.36	<0.20	<0.50	0.91	1.2	<1.0	<1.0
	trans-1,3-Dichloropropene	µg/L			<0.50	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1.0	<1.0
	trans-1,4-Dichloro-2-butene	µg/L			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<10	<10
	Trichloroethene	µg/L	3 ***	5 *	<0.50	0.44	0.56	0.26	0.64	0.57	5.0	5.1	4.4	4.5	11	12	4.5	6.3
	Trichlorofluoromethane	µg/L			<0.50	1.1	1.6	1.2	0.85	0.85	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.5	<2.5
	Vinyl Acetate	µg/L			<5.0	<2.0	<2.0	<2.0	<5.0	<5.0	<2.0	<2.0	<3.0	<5.0	<2.0	<2.0	<10	<3.0
	Vinyl Chloride	µg/L	0.02 ***	2 *	<0.50	<0.020	0.038	<0.020	<0.50	<0.50	1.0	1.2	0.85	0.66	2.0	2.0	1.0	1.6
	Total Xylenes	µg/L		10000 * XYL	<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<2.5	<2.5
NATURAL ATTENUATION	Ethane	µg/L			<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
	Ethene	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Methane	µg/L			<0.58	0.84	<0.58	0.59	0.61	0.66	370	250	320	190	4300	4300	3700	2400

Table A-1. Groundwater Quality Monitoring Results, Horn Rapids Landfill, 2022

	Analyte	Units	GWQS	MCL	MW-6	MW-8	MW-8	MW-8	MW-8	MW-9	MW-9	MW-9	MW-9	MW-10	MW-10	MW-10	MW-10
					12/8/2022	3/15/2022	6/28/2022	9/19/2022	12/7/2022	3/15/2022	6/28/2022	9/19/2022	12/7/2022	3/15/2022	6/27/2022	9/20/2022	12/8/2022
VOLATILE ORGANIC COMPOUNDS (Cont.)	4-Methyl-2-pentanone	µg/L			<5.0	<10	<10	<10	<5.0	<10	<10	<10	<5.0	<10	<10	<10	<5.0
	Acetone	µg/L			<8.0	<10	<10	<10	<8.0	<10	<10	<10	<8.0	<10	<10	<10	5.6 J
	Acrylonitrile	µg/L	0.07 ***		<5.0	<10	<10	<10	<5.0	<10	<10	<10	<5.0	<10	<10	<15	<5.0
	Benzene	µg/L	1 ***	5 *	0.22 J	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	0.14 J
	Bromochloromethane	µg/L			<1.0	<0.20	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<1.0
	Bromodichloromethane	µg/L	0.3 ***	80 * THM	<0.50	0.39	0.51	0.69	0.89	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	Bromoform	µg/L	5 ***	80 * THM	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Bromomethane	µg/L			<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0
	Carbon Disulfide	µg/L			<1.0	<0.30	<0.30	<0.30	<1.0	<0.30	<0.30	<0.30	<1.0	<0.30	<0.30	<0.30	<1.0
	Carbon Tetrachloride	µg/L	0.3 ***	5 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	Chlorobenzene	µg/L		100 *	0.13 J	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	Chloroethane	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Chloroform	µg/L	7 ***	80 * THM	<0.50	5.7	6.8	12	14	0.35	0.76	1.2	2.6	0.50	0.54	0.46	0.37 J
	Chloromethane	µg/L			<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0
	cis-1,2-Dichloroethene	µg/L		70 *	43	<0.20	<0.20	<0.20	0.31 J	11	11	8.3	10	16	18	15	15
	cis-1,3-Dichloropropene	µg/L			<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	Dibromochloromethane	µg/L		80 * THM	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	Dibromomethane	µg/L			<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	Ethylbenzene	µg/L		700 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	Iodomethane	µg/L			<25	<0.50	<0.50	<0.50	<25	<0.50	<0.50	<0.50	<25	<0.50	<0.50	<0.50	<25
	Methylene Chloride	µg/L	5 ***	5 *	<1.0	<5.0	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<1.0
	m,p-Xylene	µg/L			<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0
	o-Xylene	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Styrene	µg/L		100 *	<0.50	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<0.50
	Tetrachloroethene	µg/L	0.8 ***	5 *	24	<0.50	<0.50	<0.50	<0.50	12	13	12	13	5.9	5.9	5.1	4.8
	Toluene	µg/L		1000 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	trans-1,2-Dichloroethene	µg/L		100 *	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	0.37	0.27	0.35 J	<0.20	0.23	<0.20	<0.50
	trans-1,3-Dichloropropene	µg/L			<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50
	trans-1,4-Dichloro-2-butene	µg/L			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Trichloroethene	µg/L	3 ***	5 *	11	<0.20	<0.20	<0.20	<0.50	4.7	4.6	3.6	4.2	3.1	3.2	2.7	2.6
	Trichlorofluoromethane	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Vinyl Acetate	µg/L			<5.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<3.0	<5.0
	Vinyl Chloride	µg/L	0.02 ***	2 *	0.79	<0.020	<0.02	<0.020	<0.50	<0.020	<0.02	<0.020	<0.50	<0.020	0.36	0.25	<0.50
	Total Xylenes	µg/L		10000 * XYL	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0
NATURAL ATTENUATION	Ethane	µg/L			<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
	Ethene	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Methane	µg/L			2200	0.94	<0.58	0.60	0.59	5.1	2.4	2.6	2.4	2100	1800	1400	1700

Table A-1. Groundwater Quality Monitoring Results, Horn Rapids Landfill, 2022

			GWQS	MCL	MW-11 3/15/2022	MW-11 6/27/2022	MW-11 9/20/2022	MW-11 12/8/2022	MW-12 3/15/2022	MW-12 6/29/2022	MW-12 9/20/2022	MW-12 12/8/2022	Trip Blank 3/15/2022	Trip Blank 6/27/2022	Trip Blank 9/19/2022	Trip Blank 12/8/2022	Leachate Pond 6/28/2022	Leachate Port 9/20/2022
Analyte			Units															
VOLATILE ORGANIC COMPOUNDS (Cont.)	4-Methyl-2-pentanone	µg/L			<10	<10	<10	<5.0	<10	<10	<10	<5.0	<10	<10	<10	<5.0	<100	2600 J
	Acetone	µg/L			<10	<10	<10	<8.0	<10	<10	<10	<8.0	<10	<10	<10	<8.0	<100	<500 J
	Acrylonitrile	µg/L	0.07 ***		<10	<10	<15	<5.0	<10	<10	<15	<5.0	<10	<10	<10	<5.0	<100	<500 J
	Benzene	µg/L	1 ***	5 *	<0.20	<0.20	0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Bromochloromethane	µg/L			<0.20	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<1.0	<2.0	<10 J
	Bromodichloromethane	µg/L	0.3 ***	80 * THM	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Bromoform	µg/L	5 ***	80 * THM	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<25 J
	Bromomethane	µg/L			<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<5.0	<25 J
	Carbon Disulfide	µg/L			<0.30	<0.30	<0.30	<1.0	<0.30	<0.30	<0.30	<1.0	<0.30	<0.30	<0.30	<1.0	<3.0	21 J
	Carbon Tetrachloride	µg/L	0.3 ***	5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Chlorobenzene	µg/L		100 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Chloroethane	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<25 J
	Chloroform	µg/L	7 ***	80 * THM	<0.20	<0.20	<0.20	<0.50	0.20	<0.20	<0.20	0.44 J	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Chloromethane	µg/L			<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<5.0	<25 J
	cis-1,2-Dichloroethene	µg/L		70 *	<0.20	<0.20	<0.20	<0.50	0.44	0.22	0.28	1.6	<0.20	<0.20	<0.20	<0.50	<2.0	11 J
	cis-1,3-Dichloropropene	µg/L			<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Dibromochloromethane	µg/L		80 * THM	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Dibromomethane	µg/L			<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Ethylbenzene	µg/L		700 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Iodomethane	µg/L			<0.50	<0.50	<0.50	<25	<0.50	<0.50	<0.50	<25	<0.50	<0.50	<0.50	<25	<5.0	<25 J
	Methylene Chloride	µg/L	5 ***	5 *	<5.0	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<1.0	<50	<250 J
	m,p-Xylene	µg/L			<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<5.0	<25 J
	o-Xylene	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<25 J
	Styrene	µg/L		100 *	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<0.50	<10	<50 J
	Tetrachloroethene	µg/L	0.8 ***	5 *	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<25 J
	Toluene	µg/L		1000 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	2.7	<10 J
	trans-1,2-Dichloroethene	µg/L		100 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	trans-1,3-Dichloropropene	µg/L			<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	trans-1,4-Dichloro-2-butene	µg/L			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<20	<100 J
	Trichloroethene	µg/L	3 ***	5 *	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.50	<2.0	<10 J
	Trichlorofluoromethane	µg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<25 J
	Vinyl Acetate	µg/L			<2.0	<2.0	<3.0	<5.0	<2.0	<2.0	<3.0	<5.0	<2.0	<2.0	<2.0	<5.0	<20	<100 J
	Vinyl Chloride	µg/L	0.02 ***	2 *	<0.020	<0.02	<0.020	<0.50	<0.020	<0.02	<0.020	<0.50	<0.020	<0.02	<0.020	<0.50	<0.20	6.6 J
	Total Xylenes	µg/L		10000 * XYL	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<5.0	<25 J
NATURAL ATTENUATION	Ethane	µg/L			<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	NA
	Ethene	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA
	Methane	µg/L			0.66	<0.58	0.61	0.65	<0.58	<0.58	0.75	0.75	<0.58	<0.58	<0.58	<0.58	1900	NA

Notes: GWQS = Water Quality Standards for Ground Waters of the State of Washington (WAC 173-200)
MCL = Maximum Contaminant Level, State Drinking Water Regulations (WAC 246-290)
* = Primary
** = Secondary
*** = Carcinogen
*THM = Primary MCL for the sum of all trihalomethanes
*XYL = Primary MCL for the sum of all xylenes
J = Estimated value
Bold = Does not meet GWQS or MCL
NA = Not analyzed

Table A-2. Groundwater Quality Results, Appendix III¹ Parameters,
Horn Rapids Landfill, Second Quarter 2022

	Analyte	Units	GWQS	MCL	MW-4 6/28/2022
SEMIVOLATILE ORGANIC COMPOUNDS	1,2,4,5-Tetrachlorobenzene	µg/L			<9.1
	1,2,4-Trichlorobenzene	µg/L			<3.6
	1,2-Dichlorobenzene	µg/L		60 *	<3.6
	1,3,5-Trinitrobenzene	µg/L			<45
	1,3-Dichlorobenzene	µg/L			<9.1
	1,3-Dinitrobenzene	µg/L			<9.1
	1,4-Dichlorobenzene	µg/L	4 ***	75 *	<3.6
	1-Naphthylamine	µg/L			<9.1
	2,2'-oxybis[1-chloropropane]	µg/L			<9.1
	2,3,4,6-Tetrachlorophenol	µg/L			<45
	2,4,5-Trichlorophenol	µg/L			<9.1
	2,4,6-Trichlorophenol	µg/L	4 ***		<9.1
	2,4-Dichlorophenol	µg/L			<9.1
	2,4-Dimethylphenol	µg/L			<9.1
	2,4-Dinitrophenol	µg/L			<27
	2,4-Dinitrotoluene	µg/L	0.1 ***		<9.1
	2,6-Dichlorophenol	µg/L			<9.1
	2,6-Dinitrotoluene	µg/L	0.1 ***		<9.1
	2-Acetylaminofluorene	µg/L			<91
	2-Chloronaphthalene	µg/L			<3.6
	2-Chlorophenol	µg/L			<9.1
	2-Methylnaphthalene	µg/L			<3.6
	2-Methylphenol	µg/L			<9.1
	2-Nitroaniline	µg/L			<9.1
	2-Nitrophenol	µg/L			<9.1
	2-Toluidine	µg/L			<9.1
	3 & 4 Methylphenol	µg/L			<9.1
	3,3'-Dichlorobenzidine	µg/L			<45
	3-Methylcholanthrene	µg/L			<18
	4,6-Dinitro-2-Methylphenol	µg/L			<45
	4-Aminobiphenyl	µg/L			<45
	4-Bromophenyl phenyl ether	µg/L			<9.1
	4-Chloro-3-Methylphenol	µg/L			<9.1
	4-Chloroaniline	µg/L			<9.1
	4-Chlorophenyl-Phenylether	µg/L			<9.1
	4-Nitroaniline	µg/L			<9.1
	4-Nitrophenol	µg/L			<9.1
	7,12-Dimethylbenz(a)anthracene	µg/L			<18
	a,a-Dimethylphenethylamine	µg/L			<45
	Acenaphthene	µg/L			<3.6
	Acenaphthylene	µg/L			<3.6
	Anthracene	µg/L			<3.6
	Benzidine, 3,3-Dimethyl-	µg/L	0.007 ***		<18
	Benzo[a]anthracene	µg/L			<3.6
	Benzo[a]pyrene	µg/L	0.008 ***	0.2 *	<3.6
	Benzo[b]fluoranthene	µg/L			<3.6
	Benzo[g,h,i]perylene	µg/L			<3.6
	Benzo[k]fluoranthene	µg/L			<3.6
	Benzyl Alcohol	µg/L			<9.1
	Bis(2-Chloroethoxy)Methane	µg/L			<9.1
	Bis(2-Chloroethyl)Ether	µg/L			<9.1
	Bis(2-Ethylhexyl) Phthalate	µg/L	6 ***		<9.1
	Butyl benzyl phthalate	µg/L			<3.6
	Chlorobenzilate	µg/L			<9.1
	Chrysene	µg/L			<3.6
	Di-allate (Avadex)	µg/L	1 ***		<18
	Dibenzo(a,h)anthracene	µg/L			<9.1
	Dibenzofuran	µg/L			<3.6
	Di-n-butyl phthalate	µg/L			<3.6
	Diethyl phthalate	µg/L			<3.6
	Dimethoate	µg/L			<18
	Dimethyl phthalate	µg/L			<3.6
	Di-N-Octyl Phthalate	µg/L			<9.1
	Diphenylamine	µg/L			<9.1
	Disulfoton (Di-Syston)	µg/L			<45
	Acetophenone	µg/L			<9.1
	Ethyl Methanesulfonate	µg/L			<9.1
	Famphur	µg/L			<91
	Fluoranthene	µg/L			<3.6
	Fluorene	µg/L			<3.6
	Hexachlorobenzene	µg/L	0.05 ***	1 *	<9.1
	Hexachlorobutadiene	µg/L			<9.1
	Hexachlorocyclopentadiene	µg/L		50 *	<45
	Hexachloroethane	µg/L			<9.1
	Hexachloropropene	µg/L			<91
	Indeno(1,2,3-cd)pyrene	µg/L			<9.1
	Isophorone	µg/L			<9.1
	Isosafrole	µg/L			<18
	Methapyrilene	µg/L			<45
	Methyl Methanesulfonate	µg/L			<9.1
	Methyl Parathion	µg/L			<45
	m-Nitroaniline	µg/L			<9.1
	Naphthalene	µg/L			<3.6
	Naphthoquinone, 1,4-	µg/L			<45
	Naphthylamine, 2-	µg/L			<9.1
	Nitrobenzene	µg/L			<9.1

Table A-2. Groundwater Quality Results, Appendix III¹ Parameters,
Horn Rapids Landfill, Second Quarter 2022

					MW-4 6/28/2022
	Analyte	Units	GWQS	MCL	
SEMIVOLATILE ORGANIC COMPOUNDS (Cont.)	N-Nitrosodiethylamine	µg/L	0.0005 ***		<9.1
	N-Nitrosodimethylamine	µg/L	0.002 ***		<9.1
	N-Nitrosodi-N-Butylamine	µg/L	0.02 ***		<9.1
	N-Nitrosodi-n-propylamine	µg/L	0.01 ***		<9.1
	n-Nitrosodiphenylamine(as diphenylamine)	µg/L	17 ***		<9.1
	N-Nitrosomethylethylamine	µg/L	0.004 ***		<9.1
	N-Nitrosopiperidine	µg/L			<9.1
	N-Nitrosopyrrolidine	µg/L	0.04 ***		<9.1
	O,O,O-Triethyl phosphorothioate	µg/L			<45
	Ethyl Parathion	µg/L			<45
	p-Dimethylamino azobenzene	µg/L			<18
	Pentachlorobenzene	µg/L			<9.1
	Pentachloronitrobenzene	µg/L			<45
	Pentachlorophenol	µg/L		1 *	<45
	Phenacetin	µg/L			<18
	Phenanthrene	µg/L			<3.6
	Phenol	µg/L			<9.1
	Phorate	µg/L			<45
	p-Phenylene diamine	µg/L			<91
	Pronamide (Kerb)	µg/L			<18
	Pyrene	µg/L			<9.1
	Safrole	µg/L			<18
	Thionazin	µg/L			<45
	Toluidine, 5-Nitro-O-	µg/L			<18
ORGANOCHLORINE PESTICIDES	4,4'-DDD	µg/L	0.3 ***		<0.049
	4,4'-DDE	µg/L	0.3 ***		<0.049
	4,4'-DDT	µg/L	0.3 ***		<0.049
	Aldrin	µg/L	0.005 ***		<0.049
	alpha-BHC	µg/L			<0.049
ORGANOCHLORINE PESTICIDES (Cont.)	beta-BHC	µg/L			<0.049
	delta-BHC	µg/L			<0.049
	Dieldrin	µg/L	0.005 ***		<0.049
	Endosulfan I	µg/L			<0.049
	Endosulfan II	µg/L			<0.049
	Endosulfan Sulfate	µg/L			<0.049
	Endrin	µg/L	0.2 *	2 *	<0.049
	Endrin Aldehyde	µg/L			<0.049
	Lindane	µg/L	0.06 ***	0.2 *	<0.049
	Heptachlor	µg/L	0.02 ***	0.4 *	<0.049
	Heptachlor Epoxide	µg/L	0.009 ***	0.2 *	<0.049
	Isodrin	µg/L			<0.098
	Kepone	µg/L			<0.98
	Methoxychlor	µg/L	100 *	40 *	<0.098
	Chlordane, technical	µg/L	0.06 ***	2 *	<0.49
	Toxaphene	µg/L	0.08 ***	3 *	<2.0
POLYCHLORINATED BIPHENYLS (PCBs)	PCB-aroclor 1016	µg/L	0.01 ***	0.5 *	<0.98
	PCB-aroclor 1221	µg/L	0.01 ***	0.5 *	<0.98
	PCB-aroclor 1232	µg/L	0.01 ***	0.5 *	<0.98
	PCB-aroclor 1242	µg/L	0.01 ***	0.5 *	<0.98
	PCB-aroclor 1248	µg/L	0.01 ***	0.5 *	<0.98
	PCB-aroclor 1254	µg/L	0.01 ***	0.5 *	<0.98
	PCB-aroclor 1260	µg/L	0.01 ***	0.5 *	<0.98
	PCB-aroclor 1262	µg/L	0.01 ***	0.5 *	<0.98
	PCB-aroclor 1268	µg/L	0.01 ***	0.5 *	<0.98
	PCB, Sum of Aroclors	µg/L	0.01 ***	0.5 *	<0.98
HERBICIDES	2,4,5-T	µg/L			<0.15 J
	2,4-D	µg/L	100 *	70 *	<0.58 J
	Dinoseb	µg/L		7 *	<0.58 J
	Silvex	µg/L	10 *	50 *	<0.049 J
	Mercury	µg/L	0.002 *	0.002 *	<0.20
	Cyanide	mg/L		0.2 *	<0.010
	Sulfide	mg/L			<4.0
	2,3,7,8-TCDD	pg/L		0.6	<3.9

Notes: ¹ = Chapter 173-351 WAC
GWQS = Water Quality Standards for Ground Waters of the State of Washington (WAC 173-200)
MCL = Maximum Contaminant Level, State Drinking Water Regulations (WAC 246-290)
* = Primary
** = Secondary
*** = Carcinogen
*THM = Primary MCL for the sum of all trihalomethanes
*XYL = Primary MCL for the sum of all xylenes
Bold = Does not meet GWQS or MCL
J = Estimated value

Appendix B

Laboratory Data Report and Data Review Memorandum





Report of Analysis

For: Parametrix

Attn: Lisa Gilbert

Authorized Signature:

13-Dec-22

Client Sample ID: MW-1

Site: Parametrix

Lab Sample ID: 230566-01

Collection Date: 12/8/2022 6:10 PM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	7.2	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-5

Site: Parametrix

Lab Sample ID: 230566-02

Collection Date: 12/8/2022 11:05 AM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	1.6	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-6

Site: Parametrix

Lab Sample ID: 230566-03

Collection Date: 12/8/2022 4:15 PM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	0.73	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-10

Site: Parametrix

Lab Sample ID: 230566-04

Collection Date: 12/8/2022 12:35 PM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	4.8	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-11

Site: Parametrix

Lab Sample ID: 230566-05

Collection Date: 12/8/2022 2:20 PM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	38	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-12

Site: Parametrix

Lab Sample ID: 230566-06

Collection Date: 12/8/2022 9:50 AM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	5.4	mg/L	tkroupa	EPA 300.0	0.05 mg/L

ND = Not Detected





Report of Analysis

For: Parametrix

Attn: Lisa Gilbert

Authorized Signature:

20-Dec-22

Client Sample ID: MW-2

Site: Parametrix

Lab Sample ID: 230564-01

Collection Date: 12/7/2022 5:05 PM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	12	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-3

Site: Parametrix

Lab Sample ID: 230564-02

Collection Date: 12/7/2022 3:05 PM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	3.8	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-4

Site: Parametrix

Lab Sample ID: 230564-03

Collection Date: 12/7/2022 1:25 PM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	7.3	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-8

Site: Parametrix

Lab Sample ID: 230564-04

Collection Date: 12/7/2022 11:20 AM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	8.5	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-9

Site: Parametrix

Lab Sample ID: 230564-05

Collection Date: 12/7/2022 9:50 AM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	7.7	mg/L	tkroupa	EPA 300.0	0.05 mg/L

Client Sample ID: MW-21

Site: Parametrix

Lab Sample ID: 230564-06

Collection Date: 12/7/2022 7:00 AM

Analyte	Result	Units	Analyst	Method	Reporting Limit
Nitrate (as N)	7.3	mg/L	tkroupa	EPA 300.0	0.05 mg/L

ND = Not Detected



ANALYTICAL REPORT

PREPARED FOR

Attn: Lisa Gilbert
Parametrix, Inc.
719 2nd Avenue
Suite 200

Seattle, Washington 98104

Generated 1/25/2023 12:19:48 PM Revision 3

JOB DESCRIPTION

Horn Rapids Landfill

JOB NUMBER

580-121071-1

Eurofins Seattle

Job Notes

This report is issued solely for the use of the person or company to whom it is addressed. Any use, copying or disclosure other than by the intended recipient is unauthorized. If you have received this report in error, please notify the sender and destroy this report immediately. This report shall not be reproduced except in full, without prior express written approval by the laboratory.

The data in the report relate to the field sample(s) as received by the laboratory and associated QC. All results have been reviewed and have been found to be compliant with laboratory and accreditation requirements, with the exception of the noted deviation(s). For questions, please contact the Project Manager.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northwest, LLC Project Manager.

Authorization



Authorized for release by
Katie Grant, Project Manager I
Katie.Grant@et.eurofinsus.com
(253)922-2310

Generated
1/25/2023 12:19:48 PM
Revision 3



Table of Contents

Cover Page	1
Table of Contents	3
Case Narrative	4
Definitions	5
Client Sample Results	6
QC Sample Results	44
Chronicle	71
Certification Summary	78
Sample Summary	80
Chain of Custody	81
Receipt Checklists	83

Case Narrative

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Job ID: 580-121071-1

Laboratory: Eurofins Seattle

Narrative

Job Narrative 580-121071-1

Revision 1/24/2023

Report name was changed to Attn: Lisa Gilbert. Two narratives about ms/msd were removed from GC/MS VOA. Cited MS/MSD were not reported. One narrative about MS/MSD were removed from GeneralChemistry. Cited MS/MSD were not reported. Formatter for TOC was changed not to report down to MDL.

Revision 1/12/2023

Revision only reports method 8260 to the MDL.

Revision: 1/5/2023

Revision reports down to the MDL.

Comments

No additional comments.

Receipt

The samples were received on 12/9/2022 4:23 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 4 coolers at receipt time were -1.7° C, -1.4° C, -1.2° C and -1.0° C.

GC/MS VOA

Method 8260B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries and precision for analytical batch 570-289424 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory sample control duplicate (LCS/LCSD) precision was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals

Method 200.7 Rev 4.4: The post digestion spike % recovery for Ca associated with batch 580-413533 was outside of control limits. The associated sample is: (580-121071-J-1-A PDS).

Method 200.7 Rev 4.4: The serial dilution performed for the following sample associated with batch 580-413533 was outside control limits for Na and K: (580-121027-A-1-A SD ^5)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

VOA Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-1

Lab Sample ID: 580-121071-1

Date Collected: 12/08/22 18:10

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/16/22 02:13	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/16/22 02:13	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/16/22 02:13	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/16/22 02:13	1
1,1-Dichloroethane	ND		0.50	0.21	ug/L			12/16/22 02:13	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/16/22 02:13	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/16/22 02:13	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/16/22 02:13	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/16/22 02:13	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/16/22 02:13	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/16/22 02:13	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/16/22 02:13	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/16/22 02:13	1
2-Butanone	3.2	J	5.0	2.9	ug/L			12/16/22 02:13	1
2-Hexanone	ND		6.0	2.0	ug/L			12/16/22 02:13	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/16/22 02:13	1
Acetone	ND		8.0	3.6	ug/L			12/16/22 02:13	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/16/22 02:13	1
Benzene	ND		0.50	0.14	ug/L			12/16/22 02:13	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/16/22 02:13	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/16/22 02:13	1
Bromoform	ND		0.50	0.28	ug/L			12/16/22 02:13	1
Bromomethane	ND		2.0	1.9	ug/L			12/16/22 02:13	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/16/22 02:13	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/16/22 02:13	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/16/22 02:13	1
Chloroethane	ND		0.50	0.38	ug/L			12/16/22 02:13	1
Chloroform	0.19	J	0.50	0.17	ug/L			12/16/22 02:13	1
Chloromethane	ND		1.0	0.65	ug/L			12/16/22 02:13	1
cis-1,2-Dichloroethene	ND		0.50	0.16	ug/L			12/16/22 02:13	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/16/22 02:13	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/16/22 02:13	1
Dibromomethane	ND		0.50	0.16	ug/L			12/16/22 02:13	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/16/22 02:13	1
Iodomethane	ND		25	8.7	ug/L			12/16/22 02:13	1
Methylene Chloride	0.97	J	1.0	0.40	ug/L			12/16/22 02:13	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/16/22 02:13	1
o-Xylene	ND		0.50	0.18	ug/L			12/16/22 02:13	1
Styrene	ND		0.50	0.27	ug/L			12/16/22 02:13	1
Tetrachloroethene	4.0		0.50	0.16	ug/L			12/16/22 02:13	1
Toluene	ND		0.50	0.14	ug/L			12/16/22 02:13	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/16/22 02:13	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/16/22 02:13	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/16/22 02:13	1
Trichloroethene	0.21	J	0.50	0.15	ug/L			12/16/22 02:13	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/16/22 02:13	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/16/22 02:13	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/16/22 02:13	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/16/22 02:13	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-1

Lab Sample ID: 580-121071-1

Date Collected: 12/08/22 18:10

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	97		64 - 132		12/16/22 02:13	1
4-Bromofluorobenzene (Surr)	108		76 - 120		12/16/22 02:13	1
Toluene-d8 (Surr)	102		80 - 120		12/16/22 02:13	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/20/22 11:47	1
Ethylene	ND		1.0		ug/L			12/20/22 11:47	1
Methane	0.62		0.58		ug/L			12/20/22 11:47	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	110		0.50		mg/L		12/16/22 11:42	12/19/22 20:18	1
Magnesium	21		0.50		mg/L		12/16/22 11:42	12/19/22 20:18	1
Manganese	ND		0.020		mg/L		12/16/22 11:42	12/19/22 20:18	1
Potassium	7.7		3.3		mg/L		12/16/22 11:42	12/19/22 20:18	1
Sodium	22		0.50		mg/L		12/16/22 11:42	12/19/22 20:18	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0043		0.0010		mg/L		12/19/22 17:42	12/20/22 20:44	1
Antimony	ND		0.00080		mg/L		12/19/22 17:42	12/20/22 20:44	1
Barium	0.053		0.0012		mg/L		12/19/22 17:42	12/20/22 20:44	1
Beryllium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:44	1
Cadmium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:44	1
Chromium	0.0048		0.00080		mg/L		12/19/22 17:42	12/20/22 20:44	1
Cobalt	0.014		0.00040		mg/L		12/19/22 17:42	12/20/22 20:44	1
Copper	ND		0.0020		mg/L		12/19/22 17:42	12/20/22 20:44	1
Lead	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:44	1
Nickel	ND		0.0030		mg/L		12/19/22 17:42	12/20/22 20:44	1
Selenium	ND		0.0080		mg/L		12/19/22 17:42	12/20/22 20:44	1
Silver	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:44	1
Thallium	ND		0.0010		mg/L		12/19/22 17:42	12/20/22 20:44	1
Vanadium	0.0090		0.0040		mg/L		12/19/22 17:42	12/20/22 20:44	1
Zinc	0.013		0.0070		mg/L		12/19/22 17:42	12/20/22 20:44	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.19		0.10		mg/L		12/16/22 11:42	12/20/22 15:56	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	24		1.5		mg/L			12/29/22 22:28	1
Sulfate (MCAWW 300.0)	49		1.5		mg/L			12/29/22 22:28	1
Total Organic Carbon (SM 5310B)	ND		1.5		mg/L			12/28/22 21:24	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	290		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	290		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	560		10	10	mg/L			12/14/22 18:43	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-1
Date Collected: 12/08/22 18:10
Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-1
Matrix: Water

General Chemistry (Continued)									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.0	2.0	mg/L			12/14/22 22:39	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-2

Lab Sample ID: 580-121071-2

Date Collected: 12/07/22 17:05

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/16/22 01:07	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/16/22 01:07	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/16/22 01:07	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/16/22 01:07	1
1,1-Dichloroethane	0.22	J	0.50	0.21	ug/L			12/16/22 01:07	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/16/22 01:07	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/16/22 01:07	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/16/22 01:07	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/16/22 01:07	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/16/22 01:07	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/16/22 01:07	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/16/22 01:07	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/16/22 01:07	1
2-Butanone	ND		5.0	2.9	ug/L			12/16/22 01:07	1
2-Hexanone	ND		6.0	2.0	ug/L			12/16/22 01:07	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/16/22 01:07	1
Acetone	ND		8.0	3.6	ug/L			12/16/22 01:07	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/16/22 01:07	1
Benzene	ND		0.50	0.14	ug/L			12/16/22 01:07	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/16/22 01:07	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/16/22 01:07	1
Bromoform	ND		0.50	0.28	ug/L			12/16/22 01:07	1
Bromomethane	ND		2.0	1.9	ug/L			12/16/22 01:07	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/16/22 01:07	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/16/22 01:07	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/16/22 01:07	1
Chloroethane	ND		0.50	0.38	ug/L			12/16/22 01:07	1
Chloroform	ND		0.50	0.17	ug/L			12/16/22 01:07	1
Chloromethane	ND		1.0	0.65	ug/L			12/16/22 01:07	1
cis-1,2-Dichloroethene	ND		0.50	0.16	ug/L			12/16/22 01:07	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/16/22 01:07	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/16/22 01:07	1
Dibromomethane	ND		0.50	0.16	ug/L			12/16/22 01:07	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/16/22 01:07	1
Iodomethane	ND		25	8.7	ug/L			12/16/22 01:07	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/16/22 01:07	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/16/22 01:07	1
o-Xylene	ND		0.50	0.18	ug/L			12/16/22 01:07	1
Styrene	ND		0.50	0.27	ug/L			12/16/22 01:07	1
Tetrachloroethene	ND		0.50	0.16	ug/L			12/16/22 01:07	1
Toluene	ND		0.50	0.14	ug/L			12/16/22 01:07	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/16/22 01:07	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/16/22 01:07	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/16/22 01:07	1
Trichloroethene	ND		0.50	0.15	ug/L			12/16/22 01:07	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/16/22 01:07	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/16/22 01:07	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/16/22 01:07	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/16/22 01:07	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-2

Lab Sample ID: 580-121071-2

Date Collected: 12/07/22 17:05

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	105		64 - 132		12/16/22 01:07	1
4-Bromofluorobenzene (Surr)	95		76 - 120		12/16/22 01:07	1
Toluene-d8 (Surr)	100		80 - 120		12/16/22 01:07	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/17/22 14:13	1
Ethylene	ND		1.0		ug/L			12/17/22 14:13	1
Methane	0.61		0.58		ug/L			12/17/22 14:13	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	65		0.50		mg/L		12/19/22 17:42	12/20/22 18:54	1
Magnesium	14		0.50		mg/L		12/19/22 17:42	12/20/22 18:54	1
Manganese	ND		0.020		mg/L		12/19/22 17:42	12/20/22 18:54	1
Potassium	5.7		3.3		mg/L		12/19/22 17:42	12/20/22 18:54	1
Sodium	13		0.50		mg/L		12/19/22 17:42	12/20/22 18:54	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0044		0.0010		mg/L		12/16/22 11:42	12/20/22 15:58	1
Antimony	ND		0.00080		mg/L		12/16/22 11:42	12/20/22 15:58	1
Barium	0.035		0.0012		mg/L		12/16/22 11:42	12/20/22 15:58	1
Beryllium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 15:58	1
Cadmium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 15:58	1
Chromium	0.058		0.00080		mg/L		12/16/22 11:42	12/20/22 15:58	1
Cobalt	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 15:58	1
Copper	0.0026		0.0020		mg/L		12/16/22 11:42	12/20/22 15:58	1
Lead	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 15:58	1
Nickel	0.018		0.0030		mg/L		12/16/22 11:42	12/20/22 15:58	1
Selenium	ND		0.0080		mg/L		12/16/22 11:42	12/20/22 15:58	1
Silver	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 15:58	1
Thallium	ND		0.0010		mg/L		12/16/22 11:42	12/20/22 15:58	1
Vanadium	0.012		0.0040		mg/L		12/16/22 11:42	12/20/22 15:58	1
Zinc	ND		0.0070		mg/L		12/16/22 11:42	12/20/22 15:58	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		0.10		mg/L		12/19/22 17:42	12/20/22 21:10	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	24		1.5		mg/L			12/29/22 22:40	1
Sulfate (MCAWW 300.0)	55		1.5		mg/L			12/29/22 22:40	1
Total Organic Carbon (SM 5310B)	ND		1.5		mg/L			12/28/22 22:33	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	120		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	120		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	340		10	10	mg/L			12/14/22 14:29	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-2
Date Collected: 12/07/22 17:05
Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-2
Matrix: Water

General Chemistry (Continued)									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.0	2.0	mg/L			12/13/22 08:05	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-3

Lab Sample ID: 580-121071-3

Date Collected: 12/07/22 15:05

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/15/22 22:40	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/15/22 22:40	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/15/22 22:40	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/15/22 22:40	1
1,1-Dichloroethane	ND		0.50	0.21	ug/L			12/15/22 22:40	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/15/22 22:40	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/15/22 22:40	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/15/22 22:40	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/15/22 22:40	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/15/22 22:40	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/15/22 22:40	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/15/22 22:40	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/15/22 22:40	1
2-Butanone	ND		5.0	2.9	ug/L			12/15/22 22:40	1
2-Hexanone	ND		6.0	2.0	ug/L			12/15/22 22:40	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/15/22 22:40	1
Acetone	ND		8.0	3.6	ug/L			12/15/22 22:40	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/15/22 22:40	1
Benzene	ND		0.50	0.14	ug/L			12/15/22 22:40	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/15/22 22:40	1
Bromodichloromethane	0.23	J	0.50	0.15	ug/L			12/15/22 22:40	1
Bromoform	ND		0.50	0.28	ug/L			12/15/22 22:40	1
Bromomethane	ND		2.0	1.9	ug/L			12/15/22 22:40	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/15/22 22:40	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/15/22 22:40	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/15/22 22:40	1
Chloroethane	ND		0.50	0.38	ug/L			12/15/22 22:40	1
Chloroform	6.6		0.50	0.17	ug/L			12/15/22 22:40	1
Chloromethane	ND		1.0	0.65	ug/L			12/15/22 22:40	1
cis-1,2-Dichloroethene	ND		0.50	0.16	ug/L			12/15/22 22:40	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/15/22 22:40	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/15/22 22:40	1
Dibromomethane	ND		0.50	0.16	ug/L			12/15/22 22:40	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/15/22 22:40	1
Iodomethane	ND		25	8.7	ug/L			12/15/22 22:40	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/15/22 22:40	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/15/22 22:40	1
o-Xylene	ND		0.50	0.18	ug/L			12/15/22 22:40	1
Styrene	ND		0.50	0.27	ug/L			12/15/22 22:40	1
Tetrachloroethene	ND		0.50	0.16	ug/L			12/15/22 22:40	1
Toluene	ND		0.50	0.14	ug/L			12/15/22 22:40	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/15/22 22:40	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/15/22 22:40	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/15/22 22:40	1
Trichloroethene	ND		0.50	0.15	ug/L			12/15/22 22:40	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/15/22 22:40	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/15/22 22:40	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/15/22 22:40	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/15/22 22:40	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-3

Lab Sample ID: 580-121071-3

Date Collected: 12/07/22 15:05

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	103		64 - 132		12/15/22 22:40	1
4-Bromofluorobenzene (Surr)	112		76 - 120		12/15/22 22:40	1
Toluene-d8 (Surr)	100		80 - 120		12/15/22 22:40	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/17/22 14:25	1
Ethylene	ND		1.0		ug/L			12/17/22 14:25	1
Methane	ND		0.58		ug/L			12/17/22 14:25	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	40		0.50		mg/L		12/19/22 17:42	12/20/22 19:00	1
Magnesium	7.7		0.50		mg/L		12/19/22 17:42	12/20/22 19:00	1
Manganese	ND		0.020		mg/L		12/19/22 17:42	12/20/22 19:00	1
Potassium	5.4		3.3		mg/L		12/19/22 17:42	12/20/22 19:00	1
Sodium	11		0.50		mg/L		12/19/22 17:42	12/20/22 19:00	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0090		0.0010		mg/L		12/16/22 11:42	12/20/22 16:01	1
Antimony	ND		0.00080		mg/L		12/16/22 11:42	12/20/22 16:01	1
Barium	0.019		0.0012		mg/L		12/16/22 11:42	12/20/22 16:01	1
Beryllium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:01	1
Cadmium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:01	1
Chromium	0.0055		0.00080		mg/L		12/16/22 11:42	12/20/22 16:01	1
Cobalt	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:01	1
Copper	ND		0.0020		mg/L		12/16/22 11:42	12/20/22 16:01	1
Lead	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:01	1
Nickel	ND		0.0030		mg/L		12/16/22 11:42	12/20/22 16:01	1
Selenium	ND		0.0080		mg/L		12/16/22 11:42	12/20/22 16:01	1
Silver	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:01	1
Thallium	ND		0.0010		mg/L		12/16/22 11:42	12/20/22 16:01	1
Vanadium	0.017		0.0040		mg/L		12/16/22 11:42	12/20/22 16:01	1
Zinc	ND		0.0070		mg/L		12/16/22 11:42	12/20/22 16:01	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		0.10		mg/L		12/19/22 17:42	12/20/22 21:12	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	16		1.5		mg/L			12/29/22 22:52	1
Sulfate (MCAWW 300.0)	34		1.5		mg/L			12/29/22 22:52	1
Total Organic Carbon (SM 5310B)	ND		1.5		mg/L			12/28/22 22:50	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	95		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	95		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	210		10	10	mg/L			12/14/22 14:29	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-3

Lab Sample ID: 580-121071-3

Date Collected: 12/07/22 15:05

Matrix: Water

Date Received: 12/09/22 16:23

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.0	2.0	mg/L			12/13/22 08:05	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-4

Lab Sample ID: 580-121071-4

Date Collected: 12/07/22 13:25

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/15/22 23:02	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/15/22 23:02	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/15/22 23:02	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/15/22 23:02	1
1,1-Dichloroethane	5.1		0.50	0.21	ug/L			12/15/22 23:02	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/15/22 23:02	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/15/22 23:02	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/15/22 23:02	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/15/22 23:02	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/15/22 23:02	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/15/22 23:02	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/15/22 23:02	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/15/22 23:02	1
2-Butanone	ND		5.0	2.9	ug/L			12/15/22 23:02	1
2-Hexanone	ND		6.0	2.0	ug/L			12/15/22 23:02	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/15/22 23:02	1
Acetone	ND		8.0	3.6	ug/L			12/15/22 23:02	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/15/22 23:02	1
Benzene	ND		0.50	0.14	ug/L			12/15/22 23:02	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/15/22 23:02	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/15/22 23:02	1
Bromoform	ND		0.50	0.28	ug/L			12/15/22 23:02	1
Bromomethane	ND		2.0	1.9	ug/L			12/15/22 23:02	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/15/22 23:02	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/15/22 23:02	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/15/22 23:02	1
Chloroethane	ND		0.50	0.38	ug/L			12/15/22 23:02	1
Chloroform	0.33	J	0.50	0.17	ug/L			12/15/22 23:02	1
Chloromethane	ND		1.0	0.65	ug/L			12/15/22 23:02	1
cis-1,2-Dichloroethene	5.7		0.50	0.16	ug/L			12/15/22 23:02	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/15/22 23:02	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/15/22 23:02	1
Dibromomethane	ND		0.50	0.16	ug/L			12/15/22 23:02	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/15/22 23:02	1
Iodomethane	ND		25	8.7	ug/L			12/15/22 23:02	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/15/22 23:02	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/15/22 23:02	1
o-Xylene	ND		0.50	0.18	ug/L			12/15/22 23:02	1
Styrene	ND		0.50	0.27	ug/L			12/15/22 23:02	1
Tetrachloroethene	0.40	J	0.50	0.16	ug/L			12/15/22 23:02	1
Toluene	ND		0.50	0.14	ug/L			12/15/22 23:02	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/15/22 23:02	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/15/22 23:02	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/15/22 23:02	1
Trichloroethene	0.64		0.50	0.15	ug/L			12/15/22 23:02	1
Trichlorofluoromethane	0.85		0.50	0.26	ug/L			12/15/22 23:02	1
Vinyl acetate	ND	F2	5.0	3.2	ug/L			12/15/22 23:02	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/15/22 23:02	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/15/22 23:02	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-4

Lab Sample ID: 580-121071-4

Date Collected: 12/07/22 13:25

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	97		64 - 132		12/15/22 23:02	1
4-Bromofluorobenzene (Surr)	112		76 - 120		12/15/22 23:02	1
Toluene-d8 (Surr)	103		80 - 120		12/15/22 23:02	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/17/22 14:38	1
Ethylene	ND		1.0		ug/L			12/17/22 14:38	1
Methane	0.61		0.58		ug/L			12/17/22 14:38	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	88		0.50		mg/L		12/19/22 17:42	12/20/22 19:04	1
Magnesium	19		0.50		mg/L		12/19/22 17:42	12/20/22 19:04	1
Manganese	ND		0.020		mg/L		12/19/22 17:42	12/20/22 19:04	1
Potassium	6.9		3.3		mg/L		12/19/22 17:42	12/20/22 19:04	1
Sodium	14		0.50		mg/L		12/19/22 17:42	12/20/22 19:04	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0046		0.0010		mg/L		12/16/22 11:42	12/20/22 16:03	1
Antimony	ND		0.00080		mg/L		12/16/22 11:42	12/20/22 16:03	1
Barium	0.058		0.0012		mg/L		12/16/22 11:42	12/20/22 16:03	1
Beryllium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:03	1
Cadmium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:03	1
Chromium	0.0038		0.00080		mg/L		12/16/22 11:42	12/20/22 16:03	1
Cobalt	0.017		0.00040		mg/L		12/16/22 11:42	12/20/22 16:03	1
Copper	ND		0.0020		mg/L		12/16/22 11:42	12/20/22 16:03	1
Lead	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:03	1
Nickel	ND		0.0030		mg/L		12/16/22 11:42	12/20/22 16:03	1
Selenium	ND		0.0080		mg/L		12/16/22 11:42	12/20/22 16:03	1
Silver	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:03	1
Thallium	ND		0.0010		mg/L		12/16/22 11:42	12/20/22 16:03	1
Vanadium	0.013		0.0040		mg/L		12/16/22 11:42	12/20/22 16:03	1
Zinc	ND		0.0070		mg/L		12/16/22 11:42	12/20/22 16:03	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.12		0.10		mg/L		12/19/22 17:42	12/20/22 21:14	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	15		1.5		mg/L			12/29/22 23:03	1
Sulfate (MCAWW 300.0)	32		1.5		mg/L			12/29/22 23:03	1
Total Organic Carbon (SM 5310B)	ND		1.5		mg/L			12/29/22 04:41	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	240		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	240		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	520		10	10	mg/L			12/14/22 14:29	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-4

Lab Sample ID: 580-121071-4

Date Collected: 12/07/22 13:25

Matrix: Water

Date Received: 12/09/22 16:23

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.0	2.0	mg/L			12/13/22 08:05	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-5

Lab Sample ID: 580-121071-5

Date Collected: 12/08/22 11:05

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/15/22 23:23	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/15/22 23:23	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/15/22 23:23	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/15/22 23:23	1
1,1-Dichloroethane	3.5		0.50	0.21	ug/L			12/15/22 23:23	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/15/22 23:23	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/15/22 23:23	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/15/22 23:23	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/15/22 23:23	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/15/22 23:23	1
1,2-Dichloroethane	0.44	J	0.50	0.14	ug/L			12/15/22 23:23	1
1,2-Dichloropropane	0.21	J	0.50	0.14	ug/L			12/15/22 23:23	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/15/22 23:23	1
2-Butanone	ND		5.0	2.9	ug/L			12/15/22 23:23	1
2-Hexanone	ND		6.0	2.0	ug/L			12/15/22 23:23	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/15/22 23:23	1
Acetone	ND		8.0	3.6	ug/L			12/15/22 23:23	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/15/22 23:23	1
Benzene	ND		0.50	0.14	ug/L			12/15/22 23:23	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/15/22 23:23	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/15/22 23:23	1
Bromoform	ND		0.50	0.28	ug/L			12/15/22 23:23	1
Bromomethane	ND		2.0	1.9	ug/L			12/15/22 23:23	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/15/22 23:23	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/15/22 23:23	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/15/22 23:23	1
Chloroethane	ND		0.50	0.38	ug/L			12/15/22 23:23	1
Chloroform	ND		0.50	0.17	ug/L			12/15/22 23:23	1
Chloromethane	ND		1.0	0.65	ug/L			12/15/22 23:23	1
cis-1,2-Dichloroethene	21		0.50	0.16	ug/L			12/15/22 23:23	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/15/22 23:23	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/15/22 23:23	1
Dibromomethane	ND		0.50	0.16	ug/L			12/15/22 23:23	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/15/22 23:23	1
Iodomethane	ND		25	8.7	ug/L			12/15/22 23:23	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/15/22 23:23	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/15/22 23:23	1
o-Xylene	ND		0.50	0.18	ug/L			12/15/22 23:23	1
Styrene	ND		0.50	0.27	ug/L			12/15/22 23:23	1
Tetrachloroethene	13		0.50	0.16	ug/L			12/15/22 23:23	1
Toluene	ND		0.50	0.14	ug/L			12/15/22 23:23	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/15/22 23:23	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/15/22 23:23	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/15/22 23:23	1
Trichloroethene	4.5		0.50	0.15	ug/L			12/15/22 23:23	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/15/22 23:23	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/15/22 23:23	1
Vinyl chloride	0.66		0.50	0.23	ug/L			12/15/22 23:23	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/15/22 23:23	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-5

Lab Sample ID: 580-121071-5

Date Collected: 12/08/22 11:05

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	104		64 - 132		12/15/22 23:23	1
4-Bromofluorobenzene (Surr)	108		76 - 120		12/15/22 23:23	1
Toluene-d8 (Surr)	98		80 - 120		12/15/22 23:23	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/20/22 12:00	1
Ethylene	ND		1.0		ug/L			12/20/22 12:00	1
Methane	190		0.58		ug/L			12/20/22 12:00	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	160		0.50		mg/L		12/19/22 17:42	12/20/22 19:08	1
Magnesium	39		0.50		mg/L		12/19/22 17:42	12/20/22 19:08	1
Manganese	0.39		0.020		mg/L		12/19/22 17:42	12/20/22 19:08	1
Potassium	11		3.3		mg/L		12/19/22 17:42	12/20/22 19:08	1
Sodium	22		0.50		mg/L		12/19/22 17:42	12/20/22 19:08	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0033		0.0010		mg/L		12/16/22 11:42	12/20/22 16:05	1
Antimony	ND		0.00080		mg/L		12/16/22 11:42	12/20/22 16:05	1
Barium	0.11		0.0012		mg/L		12/16/22 11:42	12/20/22 16:05	1
Beryllium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:05	1
Cadmium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:05	1
Chromium	0.0011		0.00080		mg/L		12/16/22 11:42	12/20/22 16:05	1
Cobalt	0.00094		0.00040		mg/L		12/16/22 11:42	12/20/22 16:05	1
Copper	0.0041		0.0020		mg/L		12/16/22 11:42	12/20/22 16:05	1
Lead	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:05	1
Nickel	0.0038		0.0030		mg/L		12/16/22 11:42	12/20/22 16:05	1
Selenium	ND		0.0080		mg/L		12/16/22 11:42	12/20/22 16:05	1
Silver	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 16:05	1
Thallium	ND		0.0010		mg/L		12/16/22 11:42	12/20/22 16:05	1
Vanadium	0.0085		0.0040		mg/L		12/16/22 11:42	12/20/22 16:05	1
Zinc	0.026		0.0070		mg/L		12/16/22 11:42	12/20/22 16:05	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.22		0.10		mg/L		12/19/22 17:42	12/20/22 21:17	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	47		1.5		mg/L			12/29/22 23:15	1
Sulfate (MCAWW 300.0)	71		1.5		mg/L			12/29/22 23:15	1
Total Organic Carbon (SM 5310B)	2.5		1.5	0.38	mg/L			12/28/22 23:42	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	460		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	460		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	810		10	10	mg/L			12/14/22 18:43	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-5

Lab Sample ID: 580-121071-5

Date Collected: 12/08/22 11:05

Matrix: Water

Date Received: 12/09/22 16:23

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.5	2.5	mg/L			12/14/22 14:26	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-6

Lab Sample ID: 580-121071-6

Date Collected: 12/08/22 16:15

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/15/22 23:44	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/15/22 23:44	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/15/22 23:44	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/15/22 23:44	1
1,1-Dichloroethane	2.2		0.50	0.21	ug/L			12/15/22 23:44	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/15/22 23:44	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/15/22 23:44	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/15/22 23:44	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/15/22 23:44	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/15/22 23:44	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/15/22 23:44	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/15/22 23:44	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/15/22 23:44	1
2-Butanone	ND		5.0	2.9	ug/L			12/15/22 23:44	1
2-Hexanone	ND		6.0	2.0	ug/L			12/15/22 23:44	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/15/22 23:44	1
Acetone	ND		8.0	3.6	ug/L			12/15/22 23:44	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/15/22 23:44	1
Benzene	0.22	J	0.50	0.14	ug/L			12/15/22 23:44	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/15/22 23:44	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/15/22 23:44	1
Bromoform	ND		0.50	0.28	ug/L			12/15/22 23:44	1
Bromomethane	ND		2.0	1.9	ug/L			12/15/22 23:44	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/15/22 23:44	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/15/22 23:44	1
Chlorobenzene	0.13	J	0.50	0.12	ug/L			12/15/22 23:44	1
Chloroethane	ND		0.50	0.38	ug/L			12/15/22 23:44	1
Chloroform	ND		0.50	0.17	ug/L			12/15/22 23:44	1
Chloromethane	ND		1.0	0.65	ug/L			12/15/22 23:44	1
cis-1,2-Dichloroethene	43		0.50	0.16	ug/L			12/15/22 23:44	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/15/22 23:44	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/15/22 23:44	1
Dibromomethane	ND		0.50	0.16	ug/L			12/15/22 23:44	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/15/22 23:44	1
Iodomethane	ND		25	8.7	ug/L			12/15/22 23:44	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/15/22 23:44	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/15/22 23:44	1
o-Xylene	ND		0.50	0.18	ug/L			12/15/22 23:44	1
Styrene	ND		0.50	0.27	ug/L			12/15/22 23:44	1
Tetrachloroethene	24		0.50	0.16	ug/L			12/15/22 23:44	1
Toluene	ND		0.50	0.14	ug/L			12/15/22 23:44	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/15/22 23:44	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/15/22 23:44	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/15/22 23:44	1
Trichloroethene	11		0.50	0.15	ug/L			12/15/22 23:44	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/15/22 23:44	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/15/22 23:44	1
Vinyl chloride	0.79		0.50	0.23	ug/L			12/15/22 23:44	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/15/22 23:44	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-6

Lab Sample ID: 580-121071-6

Date Collected: 12/08/22 16:15

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	104		64 - 132		12/15/22 23:44	1
4-Bromofluorobenzene (Surr)	106		76 - 120		12/15/22 23:44	1
Toluene-d8 (Surr)	98		80 - 120		12/15/22 23:44	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/20/22 12:13	1
Ethylene	ND		1.0		ug/L			12/20/22 12:13	1
Methane (TCD)	2200		390		ug/L			12/20/22 12:13	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	150		0.50		mg/L		12/16/22 11:42	12/19/22 20:24	1
Magnesium	38		0.50		mg/L		12/16/22 11:42	12/19/22 20:24	1
Manganese	0.051		0.020		mg/L		12/16/22 11:42	12/19/22 20:24	1
Potassium	11		3.3		mg/L		12/16/22 11:42	12/19/22 20:24	1
Sodium	21		0.50		mg/L		12/16/22 11:42	12/19/22 20:24	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0013		0.0010		mg/L		12/19/22 17:42	12/20/22 21:19	1
Antimony	ND		0.00080		mg/L		12/19/22 17:42	12/20/22 21:19	1
Barium	0.099		0.0012		mg/L		12/19/22 17:42	12/20/22 21:19	1
Beryllium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:19	1
Cadmium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:19	1
Chromium	0.00090		0.00080		mg/L		12/19/22 17:42	12/20/22 21:19	1
Cobalt	0.00056		0.00040		mg/L		12/19/22 17:42	12/20/22 21:19	1
Copper	ND		0.0020		mg/L		12/19/22 17:42	12/20/22 21:19	1
Lead	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:19	1
Nickel	ND		0.0030		mg/L		12/19/22 17:42	12/20/22 21:19	1
Selenium	ND		0.0080		mg/L		12/19/22 17:42	12/20/22 21:19	1
Silver	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:19	1
Thallium	ND		0.0010		mg/L		12/19/22 17:42	12/20/22 21:19	1
Vanadium	0.0053		0.0040		mg/L		12/19/22 17:42	12/20/22 21:19	1
Zinc	ND		0.0070		mg/L		12/19/22 17:42	12/20/22 21:19	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.51		0.10		mg/L		12/16/22 11:42	12/20/22 15:16	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	22		1.5		mg/L			12/29/22 23:27	1
Sulfate (MCAWW 300.0)	49		1.5		mg/L			12/29/22 23:27	1
Total Organic Carbon (SM 5310B)	1.6		1.5	0.38	mg/L			12/29/22 00:00	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	500		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	500		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	680		10	10	mg/L			12/14/22 18:43	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-6
Date Collected: 12/08/22 16:15
Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-6
Matrix: Water

General Chemistry (Continued)									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.5	2.5	mg/L			12/14/22 14:26	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-8

Lab Sample ID: 580-121071-7

Date Collected: 12/07/22 11:20

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/16/22 00:05	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/16/22 00:05	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/16/22 00:05	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/16/22 00:05	1
1,1-Dichloroethane	0.48	J	0.50	0.21	ug/L			12/16/22 00:05	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/16/22 00:05	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/16/22 00:05	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/16/22 00:05	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/16/22 00:05	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/16/22 00:05	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/16/22 00:05	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/16/22 00:05	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/16/22 00:05	1
2-Butanone	ND		5.0	2.9	ug/L			12/16/22 00:05	1
2-Hexanone	ND		6.0	2.0	ug/L			12/16/22 00:05	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/16/22 00:05	1
Acetone	ND		8.0	3.6	ug/L			12/16/22 00:05	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/16/22 00:05	1
Benzene	ND		0.50	0.14	ug/L			12/16/22 00:05	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/16/22 00:05	1
Bromodichloromethane	0.89		0.50	0.15	ug/L			12/16/22 00:05	1
Bromoform	ND		0.50	0.28	ug/L			12/16/22 00:05	1
Bromomethane	ND		2.0	1.9	ug/L			12/16/22 00:05	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/16/22 00:05	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/16/22 00:05	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/16/22 00:05	1
Chloroethane	ND		0.50	0.38	ug/L			12/16/22 00:05	1
Chloroform	14		0.50	0.17	ug/L			12/16/22 00:05	1
Chloromethane	ND		1.0	0.65	ug/L			12/16/22 00:05	1
cis-1,2-Dichloroethene	0.31	J	0.50	0.16	ug/L			12/16/22 00:05	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/16/22 00:05	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/16/22 00:05	1
Dibromomethane	ND		0.50	0.16	ug/L			12/16/22 00:05	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/16/22 00:05	1
Iodomethane	ND		25	8.7	ug/L			12/16/22 00:05	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/16/22 00:05	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/16/22 00:05	1
o-Xylene	ND		0.50	0.18	ug/L			12/16/22 00:05	1
Styrene	ND		0.50	0.27	ug/L			12/16/22 00:05	1
Tetrachloroethene	ND		0.50	0.16	ug/L			12/16/22 00:05	1
Toluene	ND		0.50	0.14	ug/L			12/16/22 00:05	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/16/22 00:05	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/16/22 00:05	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/16/22 00:05	1
Trichloroethene	ND		0.50	0.15	ug/L			12/16/22 00:05	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/16/22 00:05	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/16/22 00:05	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/16/22 00:05	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/16/22 00:05	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-8

Lab Sample ID: 580-121071-7

Date Collected: 12/07/22 11:20

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	102		64 - 132		12/16/22 00:05	1
4-Bromofluorobenzene (Surr)	112		76 - 120		12/16/22 00:05	1
Toluene-d8 (Surr)	103		80 - 120		12/16/22 00:05	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/17/22 14:51	1
Ethylene	ND		1.0		ug/L			12/17/22 14:51	1
Methane	0.59		0.58		ug/L			12/17/22 14:51	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	55		0.50		mg/L		12/19/22 18:57	12/20/22 21:45	1
Magnesium	11		0.50		mg/L		12/19/22 18:57	12/20/22 21:45	1
Manganese	ND		0.020		mg/L		12/19/22 18:57	12/20/22 21:45	1
Potassium	6.5		3.3		mg/L		12/19/22 18:57	12/20/22 21:45	1
Sodium	16		0.50		mg/L		12/19/22 18:57	12/20/22 21:45	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0094		0.0010		mg/L		12/19/22 17:42	12/20/22 21:21	1
Antimony	ND		0.00080		mg/L		12/19/22 17:42	12/20/22 21:21	1
Barium	0.036		0.0012		mg/L		12/19/22 17:42	12/20/22 21:21	1
Beryllium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:21	1
Cadmium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:21	1
Chromium	0.0077		0.00080		mg/L		12/19/22 17:42	12/20/22 21:21	1
Cobalt	0.00074		0.00040		mg/L		12/19/22 17:42	12/20/22 21:21	1
Copper	ND		0.0020		mg/L		12/19/22 17:42	12/20/22 21:21	1
Lead	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:21	1
Nickel	0.0062		0.0030		mg/L		12/19/22 17:42	12/20/22 21:21	1
Selenium	ND		0.0080		mg/L		12/19/22 17:42	12/20/22 21:21	1
Silver	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:21	1
Thallium	ND		0.0010		mg/L		12/19/22 17:42	12/20/22 21:21	1
Vanadium	0.016		0.0040		mg/L		12/19/22 17:42	12/20/22 21:21	1
Zinc	ND		0.0070		mg/L		12/19/22 17:42	12/20/22 21:21	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.10		0.10		mg/L		12/19/22 18:57	12/20/22 20:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	28		1.5		mg/L			12/29/22 23:39	1
Sulfate (MCAWW 300.0)	39		1.5		mg/L			12/29/22 23:39	1
Total Organic Carbon (SM 5310B)	ND		1.5		mg/L			12/29/22 00:17	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	130		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	130		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	320		10	10	mg/L			12/14/22 14:29	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-8

Lab Sample ID: 580-121071-7

Date Collected: 12/07/22 11:20

Matrix: Water

Date Received: 12/09/22 16:23

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.0	2.0	mg/L			12/13/22 08:05	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-9

Lab Sample ID: 580-121071-8

Date Collected: 12/07/22 09:50

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/16/22 00:27	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/16/22 00:27	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/16/22 00:27	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/16/22 00:27	1
1,1-Dichloroethane	1.8		0.50	0.21	ug/L			12/16/22 00:27	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/16/22 00:27	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/16/22 00:27	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/16/22 00:27	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/16/22 00:27	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/16/22 00:27	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/16/22 00:27	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/16/22 00:27	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/16/22 00:27	1
2-Butanone	ND		5.0	2.9	ug/L			12/16/22 00:27	1
2-Hexanone	ND		6.0	2.0	ug/L			12/16/22 00:27	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/16/22 00:27	1
Acetone	ND		8.0	3.6	ug/L			12/16/22 00:27	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/16/22 00:27	1
Benzene	ND		0.50	0.14	ug/L			12/16/22 00:27	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/16/22 00:27	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/16/22 00:27	1
Bromoform	ND		0.50	0.28	ug/L			12/16/22 00:27	1
Bromomethane	ND		2.0	1.9	ug/L			12/16/22 00:27	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/16/22 00:27	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/16/22 00:27	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/16/22 00:27	1
Chloroethane	ND		0.50	0.38	ug/L			12/16/22 00:27	1
Chloroform	2.6		0.50	0.17	ug/L			12/16/22 00:27	1
Chloromethane	ND		1.0	0.65	ug/L			12/16/22 00:27	1
cis-1,2-Dichloroethene	10		0.50	0.16	ug/L			12/16/22 00:27	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/16/22 00:27	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/16/22 00:27	1
Dibromomethane	ND		0.50	0.16	ug/L			12/16/22 00:27	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/16/22 00:27	1
Iodomethane	ND		25	8.7	ug/L			12/16/22 00:27	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/16/22 00:27	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/16/22 00:27	1
o-Xylene	ND		0.50	0.18	ug/L			12/16/22 00:27	1
Styrene	ND		0.50	0.27	ug/L			12/16/22 00:27	1
Tetrachloroethene	13		0.50	0.16	ug/L			12/16/22 00:27	1
Toluene	ND		0.50	0.14	ug/L			12/16/22 00:27	1
trans-1,2-Dichloroethene	0.35 J		0.50	0.22	ug/L			12/16/22 00:27	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/16/22 00:27	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/16/22 00:27	1
Trichloroethene	4.2		0.50	0.15	ug/L			12/16/22 00:27	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/16/22 00:27	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/16/22 00:27	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/16/22 00:27	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/16/22 00:27	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-9

Lab Sample ID: 580-121071-8

Date Collected: 12/07/22 09:50

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	101		64 - 132		12/16/22 00:27	1
4-Bromofluorobenzene (Surr)	108		76 - 120		12/16/22 00:27	1
Toluene-d8 (Surr)	98		80 - 120		12/16/22 00:27	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/17/22 15:04	1
Ethylene	ND		1.0		ug/L			12/17/22 15:04	1
Methane	2.4		0.58		ug/L			12/17/22 15:04	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	140		0.50		mg/L		12/19/22 18:57	12/20/22 21:49	1
Magnesium	31		0.50		mg/L		12/19/22 18:57	12/20/22 21:49	1
Manganese	ND		0.020		mg/L		12/19/22 18:57	12/20/22 21:49	1
Potassium	9.1		3.3		mg/L		12/19/22 18:57	12/20/22 21:49	1
Sodium	22		0.50		mg/L		12/19/22 18:57	12/20/22 21:49	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0019		0.0010		mg/L		12/19/22 17:42	12/20/22 21:24	1
Antimony	ND		0.00080		mg/L		12/19/22 17:42	12/20/22 21:24	1
Barium	0.082		0.0012		mg/L		12/19/22 17:42	12/20/22 21:24	1
Beryllium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:24	1
Cadmium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:24	1
Chromium	0.0020		0.00080		mg/L		12/19/22 17:42	12/20/22 21:24	1
Cobalt	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:24	1
Copper	ND		0.0020		mg/L		12/19/22 17:42	12/20/22 21:24	1
Lead	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:24	1
Nickel	ND		0.0030		mg/L		12/19/22 17:42	12/20/22 21:24	1
Selenium	ND		0.0080		mg/L		12/19/22 17:42	12/20/22 21:24	1
Silver	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:24	1
Thallium	ND		0.0010		mg/L		12/19/22 17:42	12/20/22 21:24	1
Vanadium	0.0071		0.0040		mg/L		12/19/22 17:42	12/20/22 21:24	1
Zinc	ND		0.0070		mg/L		12/19/22 17:42	12/20/22 21:24	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.20		0.10		mg/L		12/19/22 18:57	12/20/22 20:21	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	52		1.5		mg/L			12/20/22 20:15	1
Sulfate (MCAWW 300.0)	71		1.5		mg/L			12/20/22 20:15	1
Total Organic Carbon (SM 5310B)	ND		1.5		mg/L			12/29/22 00:34	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	360		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	360		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	680		10	10	mg/L			12/14/22 14:29	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-9
Date Collected: 12/07/22 09:50
Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-8
Matrix: Water

General Chemistry (Continued)									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.0	2.0	mg/L			12/13/22 13:09	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-10

Lab Sample ID: 580-121071-9

Date Collected: 12/08/22 12:35

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/16/22 00:48	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/16/22 00:48	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/16/22 00:48	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/16/22 00:48	1
1,1-Dichloroethane	4.6		0.50	0.21	ug/L			12/16/22 00:48	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/16/22 00:48	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/16/22 00:48	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/16/22 00:48	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/16/22 00:48	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/16/22 00:48	1
1,2-Dichloroethane	0.42	J	0.50	0.14	ug/L			12/16/22 00:48	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/16/22 00:48	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/16/22 00:48	1
2-Butanone	ND		5.0	2.9	ug/L			12/16/22 00:48	1
2-Hexanone	ND		6.0	2.0	ug/L			12/16/22 00:48	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/16/22 00:48	1
Acetone	5.6	J	8.0	3.6	ug/L			12/16/22 00:48	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/16/22 00:48	1
Benzene	0.14	J	0.50	0.14	ug/L			12/16/22 00:48	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/16/22 00:48	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/16/22 00:48	1
Bromoform	ND		0.50	0.28	ug/L			12/16/22 00:48	1
Bromomethane	ND		2.0	1.9	ug/L			12/16/22 00:48	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/16/22 00:48	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/16/22 00:48	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/16/22 00:48	1
Chloroethane	ND		0.50	0.38	ug/L			12/16/22 00:48	1
Chloroform	0.37	J	0.50	0.17	ug/L			12/16/22 00:48	1
Chloromethane	ND		1.0	0.65	ug/L			12/16/22 00:48	1
cis-1,2-Dichloroethene	15		0.50	0.16	ug/L			12/16/22 00:48	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/16/22 00:48	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/16/22 00:48	1
Dibromomethane	ND		0.50	0.16	ug/L			12/16/22 00:48	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/16/22 00:48	1
Iodomethane	ND		25	8.7	ug/L			12/16/22 00:48	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/16/22 00:48	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/16/22 00:48	1
o-Xylene	ND		0.50	0.18	ug/L			12/16/22 00:48	1
Styrene	ND		0.50	0.27	ug/L			12/16/22 00:48	1
Tetrachloroethene	4.8		0.50	0.16	ug/L			12/16/22 00:48	1
Toluene	ND		0.50	0.14	ug/L			12/16/22 00:48	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/16/22 00:48	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/16/22 00:48	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/16/22 00:48	1
Trichloroethene	2.6		0.50	0.15	ug/L			12/16/22 00:48	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/16/22 00:48	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/16/22 00:48	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/16/22 00:48	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/16/22 00:48	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-10

Lab Sample ID: 580-121071-9

Date Collected: 12/08/22 12:35

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	103		64 - 132		12/16/22 00:48	1
4-Bromofluorobenzene (Surr)	113		76 - 120		12/16/22 00:48	1
Toluene-d8 (Surr)	101		80 - 120		12/16/22 00:48	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/20/22 12:26	1
Ethylene	ND		1.0		ug/L			12/20/22 12:26	1
Methane (TCD)	1700		390		ug/L			12/20/22 12:26	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	190		0.50		mg/L		12/19/22 17:42	12/20/22 19:29	1
Magnesium	40		0.50		mg/L		12/19/22 17:42	12/20/22 19:29	1
Manganese	0.039		0.020		mg/L		12/19/22 17:42	12/20/22 19:29	1
Potassium	11		3.3		mg/L		12/19/22 17:42	12/20/22 19:29	1
Sodium	20		0.50		mg/L		12/19/22 17:42	12/20/22 19:29	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0016		0.0010		mg/L		12/19/22 18:57	12/20/22 20:09	1
Antimony	ND		0.00080		mg/L		12/19/22 18:57	12/20/22 20:09	1
Barium	0.10		0.0012		mg/L		12/19/22 18:57	12/20/22 20:09	1
Beryllium	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:09	1
Cadmium	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:09	1
Chromium	0.0011		0.00080		mg/L		12/19/22 18:57	12/20/22 20:09	1
Cobalt	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:09	1
Copper	ND		0.0020		mg/L		12/19/22 18:57	12/20/22 20:09	1
Lead	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:09	1
Nickel	ND		0.0030		mg/L		12/19/22 18:57	12/20/22 20:09	1
Selenium	ND		0.0080		mg/L		12/19/22 18:57	12/20/22 20:09	1
Silver	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:09	1
Thallium	ND		0.0010		mg/L		12/19/22 18:57	12/20/22 20:09	1
Vanadium	0.0065		0.0040		mg/L		12/19/22 18:57	12/20/22 20:09	1
Zinc	ND		0.0070		mg/L		12/19/22 18:57	12/20/22 20:09	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.23		0.10		mg/L		12/19/22 17:42	12/20/22 21:26	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	28		1.5		mg/L			12/20/22 20:26	1
Sulfate (MCAWW 300.0)	73		1.5		mg/L			12/20/22 20:26	1
Total Organic Carbon (SM 5310B)	2.1		1.5	0.38	mg/L			12/29/22 00:51	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	520		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	520		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	900		10	10	mg/L			12/14/22 18:43	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-10

Lab Sample ID: 580-121071-9

Date Collected: 12/08/22 12:35

Matrix: Water

Date Received: 12/09/22 16:23

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.5	2.5	mg/L			12/14/22 14:26	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-11

Lab Sample ID: 580-121071-10

Date Collected: 12/08/22 14:20

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/16/22 01:09	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/16/22 01:09	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/16/22 01:09	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/16/22 01:09	1
1,1-Dichloroethane	ND		0.50	0.21	ug/L			12/16/22 01:09	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/16/22 01:09	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/16/22 01:09	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/16/22 01:09	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/16/22 01:09	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/16/22 01:09	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/16/22 01:09	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/16/22 01:09	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/16/22 01:09	1
2-Butanone	ND		5.0	2.9	ug/L			12/16/22 01:09	1
2-Hexanone	ND		6.0	2.0	ug/L			12/16/22 01:09	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/16/22 01:09	1
Acetone	ND		8.0	3.6	ug/L			12/16/22 01:09	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/16/22 01:09	1
Benzene	ND		0.50	0.14	ug/L			12/16/22 01:09	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/16/22 01:09	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/16/22 01:09	1
Bromoform	ND		0.50	0.28	ug/L			12/16/22 01:09	1
Bromomethane	ND		2.0	1.9	ug/L			12/16/22 01:09	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/16/22 01:09	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/16/22 01:09	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/16/22 01:09	1
Chloroethane	ND		0.50	0.38	ug/L			12/16/22 01:09	1
Chloroform	ND		0.50	0.17	ug/L			12/16/22 01:09	1
Chloromethane	ND		1.0	0.65	ug/L			12/16/22 01:09	1
cis-1,2-Dichloroethene	ND		0.50	0.16	ug/L			12/16/22 01:09	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/16/22 01:09	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/16/22 01:09	1
Dibromomethane	ND		0.50	0.16	ug/L			12/16/22 01:09	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/16/22 01:09	1
Iodomethane	ND		25	8.7	ug/L			12/16/22 01:09	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/16/22 01:09	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/16/22 01:09	1
o-Xylene	ND		0.50	0.18	ug/L			12/16/22 01:09	1
Styrene	ND		0.50	0.27	ug/L			12/16/22 01:09	1
Tetrachloroethene	ND		0.50	0.16	ug/L			12/16/22 01:09	1
Toluene	ND		0.50	0.14	ug/L			12/16/22 01:09	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/16/22 01:09	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/16/22 01:09	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/16/22 01:09	1
Trichloroethene	ND		0.50	0.15	ug/L			12/16/22 01:09	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/16/22 01:09	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/16/22 01:09	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/16/22 01:09	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/16/22 01:09	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-11

Lab Sample ID: 580-121071-10

Date Collected: 12/08/22 14:20

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	98		64 - 132		12/16/22 01:09	1
4-Bromofluorobenzene (Surr)	111		76 - 120		12/16/22 01:09	1
Toluene-d8 (Surr)	105		80 - 120		12/16/22 01:09	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/20/22 12:39	1
Ethylene	ND		1.0		ug/L			12/20/22 12:39	1
Methane	0.65		0.58		ug/L			12/20/22 12:39	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	250		0.50		mg/L		12/19/22 17:42	12/20/22 19:33	1
Magnesium	50		0.50		mg/L		12/19/22 17:42	12/20/22 19:33	1
Manganese	ND		0.020		mg/L		12/19/22 17:42	12/20/22 19:33	1
Potassium	11		3.3		mg/L		12/19/22 17:42	12/20/22 19:33	1
Sodium	19		0.50		mg/L		12/19/22 17:42	12/20/22 19:33	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0043		0.0010		mg/L		12/19/22 18:57	12/20/22 20:12	1
Antimony	ND		0.00080		mg/L		12/19/22 18:57	12/20/22 20:12	1
Barium	0.096		0.0012		mg/L		12/19/22 18:57	12/20/22 20:12	1
Beryllium	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:12	1
Cadmium	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:12	1
Chromium	0.014		0.00080		mg/L		12/19/22 18:57	12/20/22 20:12	1
Cobalt	0.0036		0.00040		mg/L		12/19/22 18:57	12/20/22 20:12	1
Copper	ND		0.0020		mg/L		12/19/22 18:57	12/20/22 20:12	1
Lead	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:12	1
Nickel	0.0080		0.0030		mg/L		12/19/22 18:57	12/20/22 20:12	1
Selenium	ND		0.0080		mg/L		12/19/22 18:57	12/20/22 20:12	1
Silver	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 20:12	1
Thallium	ND		0.0010		mg/L		12/19/22 18:57	12/20/22 20:12	1
Vanadium	0.010		0.0040		mg/L		12/19/22 18:57	12/20/22 20:12	1
Zinc	ND		0.0070		mg/L		12/19/22 18:57	12/20/22 20:12	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.33		0.10		mg/L		12/19/22 17:42	12/20/22 21:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	210		7.5		mg/L			12/20/22 20:50	5
Sulfate (MCAWW 300.0)	300		7.5		mg/L			12/20/22 20:50	5
Total Organic Carbon (SM 5310B)	4.2		1.5	0.38	mg/L			12/29/22 01:09	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	160		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	160		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	1400		10	10	mg/L			12/14/22 18:43	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-11

Date Collected: 12/08/22 14:20

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-10

Matrix: Water

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.0	2.0	mg/L			12/14/22 18:11	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-12

Lab Sample ID: 580-121071-11

Date Collected: 12/08/22 09:50

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/16/22 01:30	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/16/22 01:30	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/16/22 01:30	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/16/22 01:30	1
1,1-Dichloroethane	1.7		0.50	0.21	ug/L			12/16/22 01:30	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/16/22 01:30	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/16/22 01:30	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/16/22 01:30	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/16/22 01:30	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/16/22 01:30	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/16/22 01:30	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/16/22 01:30	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/16/22 01:30	1
2-Butanone	ND		5.0	2.9	ug/L			12/16/22 01:30	1
2-Hexanone	ND		6.0	2.0	ug/L			12/16/22 01:30	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/16/22 01:30	1
Acetone	ND		8.0	3.6	ug/L			12/16/22 01:30	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/16/22 01:30	1
Benzene	ND		0.50	0.14	ug/L			12/16/22 01:30	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/16/22 01:30	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/16/22 01:30	1
Bromoform	ND		0.50	0.28	ug/L			12/16/22 01:30	1
Bromomethane	ND		2.0	1.9	ug/L			12/16/22 01:30	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/16/22 01:30	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/16/22 01:30	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/16/22 01:30	1
Chloroethane	ND		0.50	0.38	ug/L			12/16/22 01:30	1
Chloroform	0.44	J	0.50	0.17	ug/L			12/16/22 01:30	1
Chloromethane	ND		1.0	0.65	ug/L			12/16/22 01:30	1
cis-1,2-Dichloroethene	1.6		0.50	0.16	ug/L			12/16/22 01:30	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/16/22 01:30	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/16/22 01:30	1
Dibromomethane	ND		0.50	0.16	ug/L			12/16/22 01:30	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/16/22 01:30	1
Iodomethane	ND		25	8.7	ug/L			12/16/22 01:30	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/16/22 01:30	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/16/22 01:30	1
o-Xylene	ND		0.50	0.18	ug/L			12/16/22 01:30	1
Styrene	ND		0.50	0.27	ug/L			12/16/22 01:30	1
Tetrachloroethene	ND		0.50	0.16	ug/L			12/16/22 01:30	1
Toluene	ND		0.50	0.14	ug/L			12/16/22 01:30	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/16/22 01:30	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/16/22 01:30	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/16/22 01:30	1
Trichloroethene	ND		0.50	0.15	ug/L			12/16/22 01:30	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/16/22 01:30	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/16/22 01:30	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/16/22 01:30	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/16/22 01:30	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-12

Date Collected: 12/08/22 09:50

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-11

Matrix: Water

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	101		64 - 132		12/16/22 01:30	1
4-Bromofluorobenzene (Surr)	112		76 - 120		12/16/22 01:30	1
Toluene-d8 (Surr)	105		80 - 120		12/16/22 01:30	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/21/22 15:47	1
Ethylene	ND		1.0		ug/L			12/21/22 15:47	1
Methane	0.75		0.58		ug/L			12/21/22 15:47	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	64		0.50		mg/L		12/19/22 18:57	12/20/22 21:52	1
Magnesium	12		0.50		mg/L		12/19/22 18:57	12/20/22 21:52	1
Manganese	ND		0.020		mg/L		12/19/22 18:57	12/20/22 21:52	1
Potassium	7.3		3.3		mg/L		12/19/22 18:57	12/20/22 21:52	1
Sodium	18		0.50		mg/L		12/19/22 18:57	12/20/22 21:52	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0065		0.0010		mg/L		12/19/22 17:42	12/20/22 21:31	1
Antimony	ND		0.00080		mg/L		12/19/22 17:42	12/20/22 21:31	1
Barium	0.060		0.0012		mg/L		12/19/22 17:42	12/20/22 21:31	1
Beryllium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:31	1
Cadmium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:31	1
Chromium	0.040		0.00080		mg/L		12/19/22 17:42	12/20/22 21:31	1
Cobalt	0.011		0.00040		mg/L		12/19/22 17:42	12/20/22 21:31	1
Copper	0.016		0.0020		mg/L		12/19/22 17:42	12/20/22 21:31	1
Lead	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 21:31	1
Nickel	0.024		0.0030		mg/L		12/19/22 17:42	12/20/22 21:31	1
Selenium	ND		0.0080		mg/L		12/19/22 17:42	12/20/22 21:31	1
Silver	0.0063		0.00040		mg/L		12/19/22 17:42	12/20/22 21:31	1
Thallium	ND		0.0010		mg/L		12/19/22 17:42	12/20/22 21:31	1
Vanadium	0.014		0.0040		mg/L		12/19/22 17:42	12/20/22 21:31	1
Zinc	0.0098		0.0070		mg/L		12/19/22 17:42	12/20/22 21:31	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		0.10		mg/L		12/19/22 18:57	12/20/22 20:23	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	14		1.5		mg/L			12/20/22 21:01	1
Sulfate (MCAWW 300.0)	34		1.5		mg/L			12/20/22 21:01	1
Total Organic Carbon (SM 5310B)	ND		1.5		mg/L			12/29/22 01:26	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	180		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	180		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	360		10	10	mg/L			12/14/22 18:43	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-12

Date Collected: 12/08/22 09:50

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-11

Matrix: Water

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	31		2.0	2.0	mg/L			12/14/22 18:11	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-21

Lab Sample ID: 580-121071-12

Date Collected: 12/07/22 07:00

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/16/22 01:52	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/16/22 01:52	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/16/22 01:52	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/16/22 01:52	1
1,1-Dichloroethane	4.9		0.50	0.21	ug/L			12/16/22 01:52	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/16/22 01:52	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/16/22 01:52	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/16/22 01:52	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/16/22 01:52	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/16/22 01:52	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/16/22 01:52	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/16/22 01:52	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/16/22 01:52	1
2-Butanone	ND		5.0	2.9	ug/L			12/16/22 01:52	1
2-Hexanone	ND		6.0	2.0	ug/L			12/16/22 01:52	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/16/22 01:52	1
Acetone	ND		8.0	3.6	ug/L			12/16/22 01:52	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/16/22 01:52	1
Benzene	ND		0.50	0.14	ug/L			12/16/22 01:52	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/16/22 01:52	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/16/22 01:52	1
Bromoform	ND		0.50	0.28	ug/L			12/16/22 01:52	1
Bromomethane	ND		2.0	1.9	ug/L			12/16/22 01:52	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/16/22 01:52	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/16/22 01:52	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/16/22 01:52	1
Chloroethane	ND		0.50	0.38	ug/L			12/16/22 01:52	1
Chloroform	0.32	J	0.50	0.17	ug/L			12/16/22 01:52	1
Chloromethane	ND		1.0	0.65	ug/L			12/16/22 01:52	1
cis-1,2-Dichloroethene	5.6		0.50	0.16	ug/L			12/16/22 01:52	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/16/22 01:52	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/16/22 01:52	1
Dibromomethane	ND		0.50	0.16	ug/L			12/16/22 01:52	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/16/22 01:52	1
Iodomethane	ND		25	8.7	ug/L			12/16/22 01:52	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/16/22 01:52	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/16/22 01:52	1
o-Xylene	ND		0.50	0.18	ug/L			12/16/22 01:52	1
Styrene	ND		0.50	0.27	ug/L			12/16/22 01:52	1
Tetrachloroethene	0.50		0.50	0.16	ug/L			12/16/22 01:52	1
Toluene	ND		0.50	0.14	ug/L			12/16/22 01:52	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/16/22 01:52	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/16/22 01:52	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/16/22 01:52	1
Trichloroethene	0.57		0.50	0.15	ug/L			12/16/22 01:52	1
Trichlorofluoromethane	0.85		0.50	0.26	ug/L			12/16/22 01:52	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/16/22 01:52	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/16/22 01:52	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/16/22 01:52	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-21

Lab Sample ID: 580-121071-12

Date Collected: 12/07/22 07:00

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	104		64 - 132		12/16/22 01:52	1
4-Bromofluorobenzene (Surr)	115		76 - 120		12/16/22 01:52	1
Toluene-d8 (Surr)	102		80 - 120		12/16/22 01:52	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/17/22 15:17	1
Ethylene	ND		1.0		ug/L			12/17/22 15:17	1
Methane	0.66		0.58		ug/L			12/17/22 15:17	1

Method: 40CFR136A 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	88		0.50		mg/L		12/19/22 18:57	12/20/22 21:56	1
Magnesium	19		0.50		mg/L		12/19/22 18:57	12/20/22 21:56	1
Manganese	ND		0.020		mg/L		12/19/22 18:57	12/20/22 21:56	1
Potassium	7.1		3.3		mg/L		12/19/22 18:57	12/20/22 21:56	1
Sodium	14		0.50		mg/L		12/19/22 18:57	12/20/22 21:56	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0040		0.0010		mg/L		12/19/22 17:42	12/20/22 20:42	1
Antimony	ND		0.00080		mg/L		12/19/22 17:42	12/20/22 20:42	1
Barium	0.051		0.0012		mg/L		12/19/22 17:42	12/20/22 20:42	1
Beryllium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:42	1
Cadmium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:42	1
Chromium	0.0035		0.00080		mg/L		12/19/22 17:42	12/20/22 20:42	1
Cobalt	0.016		0.00040		mg/L		12/19/22 17:42	12/20/22 20:42	1
Copper	ND		0.0020		mg/L		12/19/22 17:42	12/20/22 20:42	1
Lead	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:42	1
Nickel	ND		0.0030		mg/L		12/19/22 17:42	12/20/22 20:42	1
Selenium	ND		0.0080		mg/L		12/19/22 17:42	12/20/22 20:42	1
Silver	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:42	1
Thallium	ND		0.0010		mg/L		12/19/22 17:42	12/20/22 20:42	1
Vanadium	0.011		0.0040		mg/L		12/19/22 17:42	12/20/22 20:42	1
Zinc	ND		0.0070		mg/L		12/19/22 17:42	12/20/22 20:42	1

Method: EPA 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.12		0.10		mg/L		12/19/22 18:57	12/20/22 20:26	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (MCAWW 300.0)	14		1.5		mg/L			12/20/22 21:13	1
Sulfate (MCAWW 300.0)	33		1.5		mg/L			12/20/22 21:13	1
Total Organic Carbon (SM 5310B)	ND		1.5		mg/L			12/29/22 01:43	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (MCAWW 350.1)	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1
Alkalinity (SM 2320B)	240		7.0	7.0	mg/L			12/20/22 18:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B)	240		7.0	7.0	mg/L			12/20/22 18:39	1
Total Dissolved Solids (SM 2540C)	400		10	10	mg/L			12/14/22 18:43	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-21

Lab Sample ID: 580-121071-12

Date Collected: 12/07/22 07:00

Matrix: Water

Date Received: 12/09/22 16:23

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (SM 2540D)	ND		2.0	2.0	mg/L			12/13/22 13:09	1

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-121071-13

Date Collected: 12/07/22 00:01

Matrix: Water

Date Received: 12/09/22 16:23

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/15/22 21:37	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/15/22 21:37	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/15/22 21:37	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/15/22 21:37	1
1,1-Dichloroethane	ND		0.50	0.21	ug/L			12/15/22 21:37	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/15/22 21:37	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/15/22 21:37	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/15/22 21:37	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/15/22 21:37	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/15/22 21:37	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/15/22 21:37	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/15/22 21:37	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/15/22 21:37	1
2-Butanone	ND		5.0	2.9	ug/L			12/15/22 21:37	1
2-Hexanone	ND		6.0	2.0	ug/L			12/15/22 21:37	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/15/22 21:37	1
Acetone	ND		8.0	3.6	ug/L			12/15/22 21:37	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/15/22 21:37	1
Benzene	ND		0.50	0.14	ug/L			12/15/22 21:37	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/15/22 21:37	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/15/22 21:37	1
Bromoform	ND		0.50	0.28	ug/L			12/15/22 21:37	1
Bromomethane	ND		2.0	1.9	ug/L			12/15/22 21:37	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/15/22 21:37	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/15/22 21:37	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/15/22 21:37	1
Chloroethane	ND		0.50	0.38	ug/L			12/15/22 21:37	1
Chloroform	ND		0.50	0.17	ug/L			12/15/22 21:37	1
Chloromethane	ND		1.0	0.65	ug/L			12/15/22 21:37	1
cis-1,2-Dichloroethene	ND		0.50	0.16	ug/L			12/15/22 21:37	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/15/22 21:37	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/15/22 21:37	1
Dibromomethane	ND		0.50	0.16	ug/L			12/15/22 21:37	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/15/22 21:37	1
Iodomethane	ND		25	8.7	ug/L			12/15/22 21:37	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/15/22 21:37	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/15/22 21:37	1
o-Xylene	ND		0.50	0.18	ug/L			12/15/22 21:37	1
Styrene	ND		0.50	0.27	ug/L			12/15/22 21:37	1
Tetrachloroethene	ND		0.50	0.16	ug/L			12/15/22 21:37	1
Toluene	ND		0.50	0.14	ug/L			12/15/22 21:37	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/15/22 21:37	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/15/22 21:37	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/15/22 21:37	1
Trichloroethene	ND		0.50	0.15	ug/L			12/15/22 21:37	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/15/22 21:37	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/15/22 21:37	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/15/22 21:37	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/15/22 21:37	1

Eurofins Seattle

Client Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-121071-13

Date Collected: 12/07/22 00:01

Matrix: Water

Date Received: 12/09/22 16:23

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	100		64 - 132		12/15/22 21:37	1
4-Bromofluorobenzene (Surr)	108		76 - 120		12/15/22 21:37	1
Toluene-d8 (Surr)	101		80 - 120		12/15/22 21:37	1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/17/22 10:32	1
Ethylene	ND		1.0		ug/L			12/17/22 10:32	1
Methane	ND		0.58		ug/L			12/17/22 10:32	1

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 570-289424/6

Matrix: Water

Analysis Batch: 289424

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/15/22 21:16	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/15/22 21:16	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/15/22 21:16	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/15/22 21:16	1
1,1-Dichloroethane	ND		0.50	0.21	ug/L			12/15/22 21:16	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/15/22 21:16	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/15/22 21:16	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/15/22 21:16	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/15/22 21:16	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/15/22 21:16	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/15/22 21:16	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/15/22 21:16	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/15/22 21:16	1
2-Butanone	ND		5.0	2.9	ug/L			12/15/22 21:16	1
2-Hexanone	ND		6.0	2.0	ug/L			12/15/22 21:16	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/15/22 21:16	1
Acetone	ND		8.0	3.6	ug/L			12/15/22 21:16	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/15/22 21:16	1
Benzene	ND		0.50	0.14	ug/L			12/15/22 21:16	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/15/22 21:16	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/15/22 21:16	1
Bromoform	ND		0.50	0.28	ug/L			12/15/22 21:16	1
Bromomethane	ND		2.0	1.9	ug/L			12/15/22 21:16	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/15/22 21:16	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/15/22 21:16	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/15/22 21:16	1
Chloroethane	ND		0.50	0.38	ug/L			12/15/22 21:16	1
Chloroform	ND		0.50	0.17	ug/L			12/15/22 21:16	1
Chloromethane	ND		1.0	0.65	ug/L			12/15/22 21:16	1
cis-1,2-Dichloroethene	ND		0.50	0.16	ug/L			12/15/22 21:16	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/15/22 21:16	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/15/22 21:16	1
Dibromomethane	ND		0.50	0.16	ug/L			12/15/22 21:16	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/15/22 21:16	1
Iodomethane	ND		25	8.7	ug/L			12/15/22 21:16	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/15/22 21:16	1
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/15/22 21:16	1
o-Xylene	ND		0.50	0.18	ug/L			12/15/22 21:16	1
Styrene	ND		0.50	0.27	ug/L			12/15/22 21:16	1
Tetrachloroethene	ND		0.50	0.16	ug/L			12/15/22 21:16	1
Toluene	ND		0.50	0.14	ug/L			12/15/22 21:16	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/15/22 21:16	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/15/22 21:16	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/15/22 21:16	1
Trichloroethene	ND		0.50	0.15	ug/L			12/15/22 21:16	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/15/22 21:16	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/15/22 21:16	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/15/22 21:16	1

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 570-289424/6

Matrix: Water

Analysis Batch: 289424

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Xylenes, Total	ND		1.0	0.39	ug/L			12/15/22 21:16	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	99		64 - 132					12/15/22 21:16	1
4-Bromofluorobenzene (Surr)	108		76 - 120					12/15/22 21:16	1
Toluene-d8 (Surr)	101		80 - 120					12/15/22 21:16	1

Lab Sample ID: LCS 570-289424/3

Matrix: Water

Analysis Batch: 289424

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,1,1,2-Tetrachloroethane	10.0	9.93		ug/L		99	80 - 125
1,1,1-Trichloroethane	10.0	10.1		ug/L		101	75 - 121
1,1,2,2-Tetrachloroethane	10.0	9.41		ug/L		94	80 - 120
1,1,2-Trichloroethane	10.0	9.78		ug/L		98	80 - 121
1,1-Dichloroethane	10.0	8.81		ug/L		88	80 - 120
1,1-Dichloroethene	10.0	9.41		ug/L		94	80 - 126
1,2,3-Trichloropropane	10.0	10.3		ug/L		103	75 - 127
1,2-Dibromo-3-Chloropropane	10.0	10.3		ug/L		103	63 - 123
1,2-Dibromoethane	10.0	9.24		ug/L		92	80 - 125
1,2-Dichlorobenzene	10.0	10.1		ug/L		101	80 - 120
1,2-Dichloroethane	10.0	9.74		ug/L		97	76 - 130
1,2-Dichloropropane	10.0	8.95		ug/L		89	74 - 124
1,4-Dichlorobenzene	10.0	9.86		ug/L		99	80 - 120
2-Butanone	10.0	7.21		ug/L		72	48 - 145
2-Hexanone	10.0	8.35		ug/L		83	50 - 149
4-Methyl-2-pentanone	10.0	8.25		ug/L		82	63 - 120
Acetone	10.0	8.00		ug/L		80	45 - 139
Acrylonitrile	10.0	7.95		ug/L		79	57 - 142
Benzene	10.0	9.36		ug/L		94	80 - 120
Bromochloromethane	10.0	9.19		ug/L		92	80 - 120
Bromodichloromethane	10.0	9.69		ug/L		97	73 - 131
Bromoform	10.0	10.5		ug/L		105	76 - 124
Bromomethane	10.0	6.66		ug/L		67	26 - 180
Carbon disulfide	10.0	7.94		ug/L		79	75 - 123
Carbon tetrachloride	10.0	10.5		ug/L		105	61 - 139
Chlorobenzene	10.0	10.3		ug/L		103	80 - 120
Chloroethane	10.0	8.01		ug/L		80	54 - 150
Chloroform	10.0	8.88		ug/L		89	80 - 120
Chloromethane	10.0	6.02		ug/L		60	28 - 151
cis-1,2-Dichloroethene	10.0	9.04		ug/L		90	80 - 120
cis-1,3-Dichloropropene	10.0	9.92		ug/L		99	76 - 123
Dibromochloromethane	10.0	9.57		ug/L		96	74 - 136
Dibromomethane	10.0	9.85		ug/L		98	80 - 122
Ethylbenzene	10.0	10.4		ug/L		104	80 - 126
Iodomethane	50.0	44.1		ug/L		88	54 - 144
Methylene Chloride	10.0	8.54		ug/L		85	80 - 120

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 570-289424/3

Matrix: Water

Analysis Batch: 289424

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
m-Xylene & p-Xylene	20.0	21.3		ug/L		106	80 - 123
o-Xylene	10.0	10.5		ug/L		105	80 - 124
Styrene	10.0	9.99		ug/L		100	80 - 121
Tetrachloroethene	10.0	10.3		ug/L		103	80 - 125
Toluene	10.0	9.74		ug/L		97	80 - 120
trans-1,2-Dichloroethene	10.0	8.82		ug/L		88	79 - 120
trans-1,3-Dichloropropene	10.0	9.04		ug/L		90	80 - 126
trans-1,4-Dichloro-2-butene	10.0	8.48		ug/L		85	54 - 146
Trichloroethene	10.0	9.55		ug/L		96	77 - 124
Trichlorofluoromethane	10.0	9.23		ug/L		92	41 - 163
Vinyl acetate	10.0	7.79		ug/L		78	61 - 126
Vinyl chloride	10.0	6.87		ug/L		69	50 - 160
Xylenes, Total	30.0	31.8		ug/L		106	80 - 122

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	103		64 - 132
4-Bromofluorobenzene (Surr)	105		76 - 120
Toluene-d8 (Surr)	101		80 - 120

Lab Sample ID: LCSD 570-289424/4

Matrix: Water

Analysis Batch: 289424

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,1,1,2-Tetrachloroethane	10.0	9.18		ug/L		92	80 - 125	8	20
1,1,1-Trichloroethane	10.0	10.5		ug/L		105	75 - 121	4	20
1,1,2,2-Tetrachloroethane	10.0	8.05		ug/L		80	80 - 120	16	20
1,1,2-Trichloroethane	10.0	8.89		ug/L		89	80 - 121	10	20
1,1-Dichloroethane	10.0	9.28		ug/L		93	80 - 120	5	20
1,1-Dichloroethene	10.0	10.0		ug/L		100	80 - 126	6	21
1,2,3-Trichloropropane	10.0	8.71		ug/L		87	75 - 127	16	20
1,2-Dibromo-3-Chloropropane	10.0	8.98		ug/L		90	63 - 123	14	20
1,2-Dibromoethane	10.0	8.69		ug/L		87	80 - 125	6	20
1,2-Dichlorobenzene	10.0	9.14		ug/L		91	80 - 120	10	20
1,2-Dichloroethane	10.0	9.94		ug/L		99	76 - 130	2	20
1,2-Dichloropropane	10.0	9.17		ug/L		92	74 - 124	2	20
1,4-Dichlorobenzene	10.0	8.67		ug/L		87	80 - 120	13	20
2-Butanone	10.0	8.75		ug/L		87	48 - 145	19	30
2-Hexanone	10.0	10.2		ug/L		102	50 - 149	20	29
4-Methyl-2-pentanone	10.0	6.87		ug/L		69	63 - 120	18	20
Acetone	10.0	9.06		ug/L		91	45 - 139	12	30
Acrylonitrile	10.0	8.34		ug/L		83	57 - 142	5	20
Benzene	10.0	9.70		ug/L		97	80 - 120	4	20
Bromochloromethane	10.0	9.29		ug/L		93	80 - 120	1	20
Bromodichloromethane	10.0	9.86		ug/L		99	73 - 131	2	20
Bromoform	10.0	8.88		ug/L		89	76 - 124	17	20
Bromomethane	10.0	6.87		ug/L		69	26 - 180	3	20
Carbon disulfide	10.0	8.71		ug/L		87	75 - 123	9	20

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 570-289424/4

Matrix: Water

Analysis Batch: 289424

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Carbon tetrachloride	10.0	11.2		ug/L		112	61 - 139	6	20
Chlorobenzene	10.0	9.74		ug/L		97	80 - 120	6	20
Chloroethane	10.0	8.40		ug/L		84	54 - 150	5	25
Chloroform	10.0	9.28		ug/L		93	80 - 120	4	20
Chloromethane	10.0	6.43		ug/L		64	28 - 151	7	20
cis-1,2-Dichloroethene	10.0	9.48		ug/L		95	80 - 120	5	20
cis-1,3-Dichloropropene	10.0	9.65		ug/L		97	76 - 123	3	20
Dibromochloromethane	10.0	8.94		ug/L		89	74 - 136	7	20
Dibromomethane	10.0	10.1		ug/L		101	80 - 122	2	20
Ethylbenzene	10.0	10.1		ug/L		101	80 - 126	4	20
Iodomethane	50.0	46.7		ug/L		93	54 - 144	6	20
Methylene Chloride	10.0	8.93		ug/L		89	80 - 120	4	20
m-Xylene & p-Xylene	20.0	20.9		ug/L		104	80 - 123	2	20
o-Xylene	10.0	10.0		ug/L		100	80 - 124	4	20
Styrene	10.0	9.87		ug/L		99	80 - 121	1	20
Tetrachloroethene	10.0	9.98		ug/L		100	80 - 125	3	20
Toluene	10.0	10.1		ug/L		101	80 - 120	4	20
trans-1,2-Dichloroethene	10.0	9.22		ug/L		92	79 - 120	4	20
trans-1,3-Dichloropropene	10.0	8.73		ug/L		87	80 - 126	3	20
trans-1,4-Dichloro-2-butene	10.0	7.51		ug/L		75	54 - 146	12	20
Trichloroethene	10.0	9.75		ug/L		97	77 - 124	2	20
Trichlorofluoromethane	10.0	10.1		ug/L		101	41 - 163	9	21
Vinyl acetate	10.0	8.22		ug/L		82	61 - 126	5	24
Vinyl chloride	10.0	7.50		ug/L		75	50 - 160	9	20
Xylenes, Total	30.0	30.9		ug/L		103	80 - 122	3	20

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	110		64 - 132
4-Bromofluorobenzene (Surr)	110		76 - 120
Toluene-d8 (Surr)	101		80 - 120

Lab Sample ID: 580-121071-4 MS

Matrix: Water

Analysis Batch: 289424

Client Sample ID: MW-4

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
1,1,1,2-Tetrachloroethane	ND		10.0	10.4		ug/L		104	61 - 142
1,1,1-Trichloroethane	ND		10.0	11.8		ug/L		118	68 - 138
1,1,2,2-Tetrachloroethane	ND		10.0	10.2		ug/L		102	71 - 133
1,1,2-Trichloroethane	ND		10.0	10.1		ug/L		101	70 - 132
1,1-Dichloroethane	5.1		10.0	15.6		ug/L		105	70 - 132
1,1-Dichloroethene	ND		10.0	11.8		ug/L		118	57 - 148
1,2,3-Trichloropropane	ND		10.0	9.31		ug/L		93	61 - 130
1,2-Dibromo-3-Chloropropane	ND		10.0	10.0		ug/L		100	48 - 132
1,2-Dibromoethane	ND		10.0	9.32		ug/L		93	74 - 128
1,2-Dichlorobenzene	ND		10.0	10.9		ug/L		109	74 - 126
1,2-Dichloroethane	ND		10.0	11.0		ug/L		110	65 - 140
1,2-Dichloropropane	ND		10.0	10.2		ug/L		102	75 - 127

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-121071-4 MS

Matrix: Water

Analysis Batch: 289424

Client Sample ID: MW-4

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
1,4-Dichlorobenzene	ND		10.0	10.6		ug/L		106	73 - 125
2-Butanone	ND		10.0	10.0		ug/L		100	44 - 140
2-Hexanone	ND		10.0	11.0		ug/L		110	52 - 136
4-Methyl-2-pentanone	ND		10.0	8.35		ug/L		84	44 - 139
Acetone	ND		10.0	9.64		ug/L		96	20 - 174
Acrylonitrile	ND		10.0	8.26		ug/L		83	50 - 140
Benzene	ND		10.0	11.1		ug/L		111	75 - 125
Bromochloromethane	ND		10.0	10.0		ug/L		100	75 - 125
Bromodichloromethane	ND		10.0	11.3		ug/L		113	70 - 137
Bromoform	ND		10.0	10.6		ug/L		106	51 - 142
Bromomethane	ND		10.0	6.12		ug/L		61	46 - 164
Carbon disulfide	ND		10.0	10.2		ug/L		102	70 - 132
Carbon tetrachloride	ND		10.0	12.0		ug/L		120	50 - 159
Chlorobenzene	ND		10.0	11.2		ug/L		112	75 - 128
Chloroethane	ND		10.0	10.9		ug/L		109	62 - 161
Chloroform	0.33	J	10.0	10.7		ug/L		104	73 - 130
Chloromethane	ND		10.0	8.03		ug/L		80	45 - 157
cis-1,2-Dichloroethene	5.7		10.0	16.4		ug/L		107	62 - 138
cis-1,3-Dichloropropene	ND		10.0	9.57		ug/L		96	67 - 125
Dibromochloromethane	ND		10.0	10.4		ug/L		104	63 - 145
Dibromomethane	ND		10.0	10.3		ug/L		103	75 - 127
Ethylbenzene	ND		10.0	11.7		ug/L		117	73 - 135
Iodomethane	ND		50.0	49.0		ug/L		98	42 - 141
Methylene Chloride	ND		10.0	9.46		ug/L		95	65 - 127
m-Xylene & p-Xylene	ND		20.0	23.7		ug/L		119	73 - 138
o-Xylene	ND		10.0	11.5		ug/L		115	69 - 138
Styrene	ND		10.0	11.0		ug/L		110	45 - 144
Tetrachloroethene	0.40	J	10.0	11.5		ug/L		111	64 - 150
Toluene	ND		10.0	11.5		ug/L		115	75 - 127
trans-1,2-Dichloroethene	ND		10.0	10.5		ug/L		105	61 - 138
trans-1,3-Dichloropropene	ND		10.0	8.82		ug/L		88	61 - 131
trans-1,4-Dichloro-2-butene	ND		10.0	6.95		ug/L		69	37 - 146
Trichloroethene	0.64		10.0	11.8		ug/L		111	34 - 159
Trichlorofluoromethane	0.85		10.0	12.6		ug/L		118	69 - 142
Vinyl acetate	ND	F2	10.0	4.43	J	ug/L		44	35 - 132
Vinyl chloride	ND		10.0	8.96		ug/L		90	51 - 168
Xylenes, Total	ND		30.0	35.2		ug/L		117	72 - 138

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	107		64 - 132
4-Bromofluorobenzene (Surr)	104		76 - 120
Toluene-d8 (Surr)	102		80 - 120

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-121071-4 MSD

Matrix: Water

Analysis Batch: 289424

Client Sample ID: MW-4

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,1,1,2-Tetrachloroethane	ND		10.0	10.2		ug/L		102	61 - 142	1	20
1,1,1-Trichloroethane	ND		10.0	11.9		ug/L		119	68 - 138	0	20
1,1,2,2-Tetrachloroethane	ND		10.0	10.6		ug/L		106	71 - 133	4	20
1,1,2-Trichloroethane	ND		10.0	10.1		ug/L		101	70 - 132	0	20
1,1-Dichloroethane	5.1		10.0	15.7		ug/L		106	70 - 132	1	20
1,1-Dichloroethene	ND		10.0	11.9		ug/L		119	57 - 148	1	20
1,2,3-Trichloropropane	ND		10.0	9.76		ug/L		98	61 - 130	5	20
1,2-Dibromo-3-Chloropropane	ND		10.0	10.4		ug/L		104	48 - 132	4	20
1,2-Dibromoethane	ND		10.0	9.52		ug/L		95	74 - 128	2	20
1,2-Dichlorobenzene	ND		10.0	11.4		ug/L		114	74 - 126	5	20
1,2-Dichloroethane	ND		10.0	11.4		ug/L		114	65 - 140	4	20
1,2-Dichloropropane	ND		10.0	10.4		ug/L		104	75 - 127	2	20
1,4-Dichlorobenzene	ND		10.0	10.9		ug/L		109	73 - 125	2	20
2-Butanone	ND		10.0	8.46		ug/L		85	44 - 140	17	34
2-Hexanone	ND		10.0	7.96		ug/L		80	52 - 136	32	37
4-Methyl-2-pentanone	ND		10.0	8.62		ug/L		86	44 - 139	3	21
Acetone	ND		10.0	10.8		ug/L		108	20 - 174	11	35
Acrylonitrile	ND		10.0	8.09		ug/L		81	50 - 140	2	40
Benzene	ND		10.0	11.0		ug/L		110	75 - 125	1	20
Bromochloromethane	ND		10.0	10.3		ug/L		103	75 - 125	3	20
Bromodichloromethane	ND		10.0	11.2		ug/L		112	70 - 137	1	20
Bromoform	ND		10.0	11.1		ug/L		111	51 - 142	5	20
Bromomethane	ND		10.0	5.21		ug/L		52	46 - 164	16	25
Carbon disulfide	ND		10.0	10.3		ug/L		103	70 - 132	1	20
Carbon tetrachloride	ND		10.0	12.1		ug/L		121	50 - 159	1	20
Chlorobenzene	ND		10.0	11.3		ug/L		113	75 - 128	1	20
Chloroethane	ND		10.0	10.2		ug/L		102	62 - 161	6	20
Chloroform	0.33	J	10.0	10.8		ug/L		105	73 - 130	1	20
Chloromethane	ND		10.0	8.40		ug/L		84	45 - 157	4	21
cis-1,2-Dichloroethene	5.7		10.0	16.3		ug/L		106	62 - 138	1	20
cis-1,3-Dichloropropene	ND		10.0	9.77		ug/L		98	67 - 125	2	20
Dibromochloromethane	ND		10.0	10.5		ug/L		105	63 - 145	0	20
Dibromomethane	ND		10.0	10.7		ug/L		107	75 - 127	4	20
Ethylbenzene	ND		10.0	11.7		ug/L		117	73 - 135	0	20
Iodomethane	ND		50.0	51.7		ug/L		103	42 - 141	5	28
Methylene Chloride	ND		10.0	9.62		ug/L		96	65 - 127	2	20
m-Xylene & p-Xylene	ND		20.0	23.8		ug/L		119	73 - 138	0	21
o-Xylene	ND		10.0	11.4		ug/L		114	69 - 138	1	20
Styrene	ND		10.0	10.8		ug/L		108	45 - 144	2	32
Tetrachloroethene	0.40	J	10.0	12.1		ug/L		117	64 - 150	6	23
Toluene	ND		10.0	11.5		ug/L		115	75 - 127	0	20
trans-1,2-Dichloroethene	ND		10.0	10.5		ug/L		105	61 - 138	0	21
trans-1,3-Dichloropropene	ND		10.0	8.41		ug/L		84	61 - 131	5	20
trans-1,4-Dichloro-2-butene	ND		10.0	8.28		ug/L		83	37 - 146	17	22
Trichloroethene	0.64		10.0	11.8		ug/L		112	34 - 159	0	23
Trichlorofluoromethane	0.85		10.0	12.3		ug/L		114	69 - 142	3	20
Vinyl acetate	ND	F2	10.0	9.01	F2	ug/L		90	35 - 132	68	29
Vinyl chloride	ND		10.0	8.75		ug/L		88	51 - 168	2	20

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-121071-4 MSD

Matrix: Water

Analysis Batch: 289424

Client Sample ID: MW-4

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Xylenes, Total	ND		30.0	35.2		ug/L		117	72 - 138	0	20
Surrogate	MSD %Recovery	MSD Qualifier	Limits								
1,2-Dichloroethane-d4 (Surr)	107		64 - 132								
4-Bromofluorobenzene (Surr)	107		76 - 120								
Toluene-d8 (Surr)	104		80 - 120								

Lab Sample ID: MB 570-289425/6

Matrix: Water

Analysis Batch: 289425

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.20	ug/L			12/15/22 23:44	1
1,1,1-Trichloroethane	ND		0.50	0.20	ug/L			12/15/22 23:44	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.14	ug/L			12/15/22 23:44	1
1,1,2-Trichloroethane	ND		0.50	0.18	ug/L			12/15/22 23:44	1
1,1-Dichloroethane	ND		0.50	0.21	ug/L			12/15/22 23:44	1
1,1-Dichloroethene	ND		0.50	0.21	ug/L			12/15/22 23:44	1
1,2,3-Trichloropropane	ND		0.50	0.31	ug/L			12/15/22 23:44	1
1,2-Dibromo-3-Chloropropane	ND		1.0	0.84	ug/L			12/15/22 23:44	1
1,2-Dibromoethane	ND		0.50	0.27	ug/L			12/15/22 23:44	1
1,2-Dichlorobenzene	ND		0.50	0.14	ug/L			12/15/22 23:44	1
1,2-Dichloroethane	ND		0.50	0.14	ug/L			12/15/22 23:44	1
1,2-Dichloropropane	ND		0.50	0.14	ug/L			12/15/22 23:44	1
1,4-Dichlorobenzene	ND		0.50	0.11	ug/L			12/15/22 23:44	1
2-Butanone	ND		5.0	2.9	ug/L			12/15/22 23:44	1
2-Hexanone	ND		6.0	2.0	ug/L			12/15/22 23:44	1
4-Methyl-2-pentanone	ND		5.0	1.6	ug/L			12/15/22 23:44	1
Acetone	ND		8.0	3.6	ug/L			12/15/22 23:44	1
Acrylonitrile	ND		5.0	2.0	ug/L			12/15/22 23:44	1
Benzene	ND		0.50	0.14	ug/L			12/15/22 23:44	1
Bromochloromethane	ND		1.0	0.27	ug/L			12/15/22 23:44	1
Bromodichloromethane	ND		0.50	0.15	ug/L			12/15/22 23:44	1
Bromoform	ND		0.50	0.28	ug/L			12/15/22 23:44	1
Bromomethane	ND		2.0	1.9	ug/L			12/15/22 23:44	1
Carbon disulfide	ND		1.0	0.32	ug/L			12/15/22 23:44	1
Carbon tetrachloride	ND		0.50	0.27	ug/L			12/15/22 23:44	1
Chlorobenzene	ND		0.50	0.12	ug/L			12/15/22 23:44	1
Chloroethane	ND		0.50	0.38	ug/L			12/15/22 23:44	1
Chloroform	ND		0.50	0.17	ug/L			12/15/22 23:44	1
Chloromethane	ND		1.0	0.65	ug/L			12/15/22 23:44	1
cis-1,2-Dichloroethene	ND		0.50	0.16	ug/L			12/15/22 23:44	1
cis-1,3-Dichloropropene	ND		0.50	0.15	ug/L			12/15/22 23:44	1
Dibromochloromethane	ND		0.50	0.21	ug/L			12/15/22 23:44	1
Dibromomethane	ND		0.50	0.16	ug/L			12/15/22 23:44	1
Ethylbenzene	ND		0.50	0.16	ug/L			12/15/22 23:44	1
Iodomethane	ND		25	8.7	ug/L			12/15/22 23:44	1
Methylene Chloride	ND		1.0	0.40	ug/L			12/15/22 23:44	1

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 570-289425/6

Matrix: Water

Analysis Batch: 289425

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m-Xylene & p-Xylene	ND		1.0	0.39	ug/L			12/15/22 23:44	1
o-Xylene	ND		0.50	0.18	ug/L			12/15/22 23:44	1
Styrene	ND		0.50	0.27	ug/L			12/15/22 23:44	1
Tetrachloroethene	ND		0.50	0.16	ug/L			12/15/22 23:44	1
Toluene	ND		0.50	0.14	ug/L			12/15/22 23:44	1
trans-1,2-Dichloroethene	ND		0.50	0.22	ug/L			12/15/22 23:44	1
trans-1,3-Dichloropropene	ND		0.50	0.21	ug/L			12/15/22 23:44	1
trans-1,4-Dichloro-2-butene	ND		2.0	1.5	ug/L			12/15/22 23:44	1
Trichloroethene	ND		0.50	0.15	ug/L			12/15/22 23:44	1
Trichlorofluoromethane	ND		0.50	0.26	ug/L			12/15/22 23:44	1
Vinyl acetate	ND		5.0	3.2	ug/L			12/15/22 23:44	1
Vinyl chloride	ND		0.50	0.23	ug/L			12/15/22 23:44	1
Xylenes, Total	ND		1.0	0.39	ug/L			12/15/22 23:44	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	107		64 - 132		12/15/22 23:44	1
4-Bromofluorobenzene (Surr)	93		76 - 120		12/15/22 23:44	1
Toluene-d8 (Surr)	99		80 - 120		12/15/22 23:44	1

Lab Sample ID: LCS 570-289425/3

Matrix: Water

Analysis Batch: 289425

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,1,1,2-Tetrachloroethane	10.0	9.84		ug/L		98	80 - 125
1,1,1-Trichloroethane	10.0	10.3		ug/L		103	75 - 121
1,1,2,2-Tetrachloroethane	10.0	10.2		ug/L		102	80 - 120
1,1,2-Trichloroethane	10.0	10.3		ug/L		103	80 - 121
1,1-Dichloroethane	10.0	10.9		ug/L		109	80 - 120
1,1-Dichloroethene	10.0	9.50		ug/L		95	80 - 126
1,2,3-Trichloropropane	10.0	10.1		ug/L		101	75 - 127
1,2-Dibromo-3-Chloropropane	10.0	10.6		ug/L		106	63 - 123
1,2-Dibromoethane	10.0	10.0		ug/L		100	80 - 125
1,2-Dichlorobenzene	10.0	10.3		ug/L		103	80 - 120
1,2-Dichloroethane	10.0	10.6		ug/L		106	76 - 130
1,2-Dichloropropane	10.0	10.3		ug/L		103	74 - 124
1,4-Dichlorobenzene	10.0	10.4		ug/L		104	80 - 120
2-Butanone	10.0	10.5		ug/L		105	48 - 145
2-Hexanone	10.0	9.33		ug/L		93	50 - 149
4-Methyl-2-pentanone	10.0	9.82		ug/L		98	63 - 120
Acetone	10.0	7.76	J	ug/L		78	45 - 139
Acrylonitrile	100	109		ug/L		109	57 - 142
Benzene	10.0	10.2		ug/L		102	80 - 120
Bromochloromethane	10.0	11.2		ug/L		112	80 - 120
Bromodichloromethane	10.0	10.3		ug/L		103	73 - 131
Bromoform	10.0	10.4		ug/L		104	76 - 124
Bromomethane	10.0	9.10		ug/L		91	26 - 180
Carbon disulfide	10.0	10.7		ug/L		107	75 - 123

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 570-289425/3

Matrix: Water

Analysis Batch: 289425

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Carbon tetrachloride	10.0	10.5		ug/L		105	61 - 139
Chlorobenzene	10.0	9.97		ug/L		100	80 - 120
Chloroethane	10.0	9.37		ug/L		94	54 - 150
Chloroform	10.0	9.90		ug/L		99	80 - 120
Chloromethane	10.0	12.5		ug/L		125	28 - 151
cis-1,2-Dichloroethene	10.0	10.4		ug/L		104	80 - 120
cis-1,3-Dichloropropene	10.0	11.1		ug/L		111	76 - 123
Dibromochloromethane	10.0	10.4		ug/L		104	74 - 136
Dibromomethane	10.0	10.6		ug/L		106	80 - 122
Ethylbenzene	10.0	10.2		ug/L		102	80 - 126
Iodomethane	10.0	11.0	J	ug/L		110	54 - 144
Methylene Chloride	10.0	9.61		ug/L		96	80 - 120
m-Xylene & p-Xylene	10.0	10.2		ug/L		102	80 - 123
o-Xylene	10.0	10.2		ug/L		102	80 - 124
Styrene	10.0	10.4		ug/L		104	80 - 121
Tetrachloroethene	10.0	10.3		ug/L		103	80 - 125
Toluene	10.0	10.4		ug/L		104	80 - 120
trans-1,2-Dichloroethene	10.0	10.3		ug/L		103	79 - 120
trans-1,3-Dichloropropene	10.0	10.3		ug/L		103	80 - 126
trans-1,4-Dichloro-2-butene	10.0	9.98		ug/L		100	54 - 146
Trichloroethene	10.0	10.4		ug/L		104	77 - 124
Trichlorofluoromethane	10.0	10.1		ug/L		101	41 - 163
Vinyl acetate	10.0	11.3		ug/L		113	61 - 126
Vinyl chloride	10.0	9.95		ug/L		100	50 - 160
Xylenes, Total	20.0	20.4		ug/L		102	80 - 122

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	101		64 - 132
4-Bromofluorobenzene (Surr)	98		76 - 120
Toluene-d8 (Surr)	102		80 - 120

Lab Sample ID: LCSD 570-289425/4

Matrix: Water

Analysis Batch: 289425

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,1,1,2-Tetrachloroethane	10.0	9.48		ug/L		95	80 - 125	4	20
1,1,1-Trichloroethane	10.0	9.96		ug/L		100	75 - 121	4	20
1,1,2,2-Tetrachloroethane	10.0	9.85		ug/L		99	80 - 120	4	20
1,1,2-Trichloroethane	10.0	10.3		ug/L		103	80 - 121	1	20
1,1-Dichloroethane	10.0	10.3		ug/L		103	80 - 120	5	20
1,1-Dichloroethene	10.0	8.94		ug/L		89	80 - 126	6	21
1,2,3-Trichloropropane	10.0	9.93		ug/L		99	75 - 127	2	20
1,2-Dibromo-3-Chloropropane	10.0	10.3		ug/L		103	63 - 123	3	20
1,2-Dibromoethane	10.0	9.92		ug/L		99	80 - 125	1	20
1,2-Dichlorobenzene	10.0	9.92		ug/L		99	80 - 120	4	20
1,2-Dichloroethane	10.0	10.2		ug/L		102	76 - 130	4	20
1,2-Dichloropropane	10.0	10.1		ug/L		101	74 - 124	3	20

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 570-289425/4

Matrix: Water

Analysis Batch: 289425

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,4-Dichlorobenzene	10.0	9.69		ug/L		97	80 - 120	7	20
2-Butanone	10.0	10.3		ug/L		103	48 - 145	1	30
2-Hexanone	10.0	9.60		ug/L		96	50 - 149	3	29
4-Methyl-2-pentanone	10.0	9.80		ug/L		98	63 - 120	0	20
Acetone	10.0	9.39		ug/L		94	45 - 139	19	30
Acrylonitrile	100	109		ug/L		109	57 - 142	0	20
Benzene	10.0	9.65		ug/L		97	80 - 120	6	20
Bromochloromethane	10.0	10.4		ug/L		104	80 - 120	8	20
Bromodichloromethane	10.0	10.0		ug/L		100	73 - 131	3	20
Bromoform	10.0	9.97		ug/L		100	76 - 124	4	20
Bromomethane	10.0	9.03		ug/L		90	26 - 180	1	20
Carbon disulfide	10.0	9.90		ug/L		99	75 - 123	8	20
Carbon tetrachloride	10.0	9.92		ug/L		99	61 - 139	6	20
Chlorobenzene	10.0	9.68		ug/L		97	80 - 120	3	20
Chloroethane	10.0	9.33		ug/L		93	54 - 150	0	25
Chloroform	10.0	9.54		ug/L		95	80 - 120	4	20
Chloromethane	10.0	11.8		ug/L		118	28 - 151	6	20
cis-1,2-Dichloroethene	10.0	9.67		ug/L		97	80 - 120	7	20
cis-1,3-Dichloropropene	10.0	10.6		ug/L		106	76 - 123	5	20
Dibromochloromethane	10.0	10.3		ug/L		103	74 - 136	1	20
Dibromomethane	10.0	10.4		ug/L		104	80 - 122	3	20
Ethylbenzene	10.0	9.71		ug/L		97	80 - 126	5	20
Iodomethane	10.0	10.4	J	ug/L		104	54 - 144	6	20
Methylene Chloride	10.0	9.38		ug/L		94	80 - 120	2	20
m-Xylene & p-Xylene	10.0	9.73		ug/L		97	80 - 123	5	20
o-Xylene	10.0	9.72		ug/L		97	80 - 124	5	20
Styrene	10.0	10.1		ug/L		101	80 - 121	4	20
Tetrachloroethene	10.0	9.68		ug/L		97	80 - 125	6	20
Toluene	10.0	9.70		ug/L		97	80 - 120	7	20
trans-1,2-Dichloroethene	10.0	9.96		ug/L		100	79 - 120	4	20
trans-1,3-Dichloropropene	10.0	10.2		ug/L		102	80 - 126	1	20
trans-1,4-Dichloro-2-butene	10.0	9.46		ug/L		95	54 - 146	5	20
Trichloroethene	10.0	9.63		ug/L		96	77 - 124	8	20
Trichlorofluoromethane	10.0	9.41		ug/L		94	41 - 163	8	21
Vinyl acetate	10.0	11.5		ug/L		115	61 - 126	2	24
Vinyl chloride	10.0	9.53		ug/L		95	50 - 160	4	20
Xylenes, Total	20.0	19.5		ug/L		97	80 - 122	5	20

Surrogate	LCSD %Recovery	LCSD Qualifier	LCSD Limits
1,2-Dichloroethane-d4 (Surr)	103		64 - 132
4-Bromofluorobenzene (Surr)	98		76 - 120
Toluene-d8 (Surr)	99		80 - 120

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 680-755591/68

Matrix: Water

Analysis Batch: 755591

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/17/22 10:09	1
Ethylene	ND		1.0		ug/L			12/17/22 10:09	1
Methane	ND		0.58		ug/L			12/17/22 10:09	1

Lab Sample ID: LCS 680-755591/64

Matrix: Water

Analysis Batch: 755591

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Methane (TCD)	1920	1710		ug/L		89	75 - 125

Lab Sample ID: LCS 680-755591/66

Matrix: Water

Analysis Batch: 755591

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ethane	361	349		ug/L		97	75 - 125
Ethylene	337	312		ug/L		93	75 - 125
Methane	192	187		ug/L		97	75 - 125

Lab Sample ID: LCSD 680-755591/65

Matrix: Water

Analysis Batch: 755591

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Methane (TCD)	1920	1890		ug/L		98	75 - 125	10	30

Lab Sample ID: LCSD 680-755591/67

Matrix: Water

Analysis Batch: 755591

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Ethane	361	347		ug/L		96	75 - 125	0	30
Ethylene	337	307		ug/L		91	75 - 125	1	30
Methane	192	185		ug/L		96	75 - 125	1	30

Lab Sample ID: MB 680-755982/66

Matrix: Water

Analysis Batch: 755982

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/20/22 11:24	1
Ethylene	ND		1.0		ug/L			12/20/22 11:24	1
Methane	ND		0.58		ug/L			12/20/22 11:24	1

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: RSK-175 - Dissolved Gases (GC) (Continued)

Lab Sample ID: LCS 680-755982/62

Matrix: Water

Analysis Batch: 755982

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Methane (TCD)	1920	1820		ug/L		94	75 - 125

Lab Sample ID: LCS 680-755982/64

Matrix: Water

Analysis Batch: 755982

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ethane	361	355		ug/L		99	75 - 125
Ethylene	337	319		ug/L		95	75 - 125
Methane	192	191		ug/L		99	75 - 125

Lab Sample ID: LCSD 680-755982/63

Matrix: Water

Analysis Batch: 755982

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Methane (TCD)	1920	1820		ug/L		95	75 - 125	0	30

Lab Sample ID: LCSD 680-755982/65

Matrix: Water

Analysis Batch: 755982

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Ethane	361	352		ug/L		98	75 - 125	1	30
Ethylene	337	313		ug/L		93	75 - 125	2	30
Methane	192	190		ug/L		99	75 - 125	1	30

Lab Sample ID: MB 680-756152/95

Matrix: Water

Analysis Batch: 756152

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	ND		1.1		ug/L			12/21/22 11:31	1
Ethylene	ND		1.0		ug/L			12/21/22 11:31	1
Methane	ND		0.58		ug/L			12/21/22 11:31	1

Lab Sample ID: LCS 680-756152/91

Matrix: Water

Analysis Batch: 756152

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Methane (TCD)	1920	1870		ug/L		97	75 - 125

Lab Sample ID: LCS 680-756152/93

Matrix: Water

Analysis Batch: 756152

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ethane	361	321		ug/L		89	75 - 125
Ethylene	337	282		ug/L		84	75 - 125

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: RSK-175 - Dissolved Gases (GC) (Continued)

Lab Sample ID: LCS 680-756152/93

Matrix: Water

Analysis Batch: 756152

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Methane	192	171		ug/L		89	75 - 125

Lab Sample ID: LCSD 680-756152/92

Matrix: Water

Analysis Batch: 756152

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Methane (TCD)	1920	1900		ug/L		99	75 - 125	2	30

Lab Sample ID: LCSD 680-756152/94

Matrix: Water

Analysis Batch: 756152

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Ethane	361	409		ug/L		113	75 - 125	24	30
Ethylene	337	360		ug/L		107	75 - 125	24	30
Methane	192	219		ug/L		114	75 - 125	25	30

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 580-413156/25-A

Matrix: Water

Analysis Batch: 413393

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 413156

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		0.50		mg/L		12/16/22 11:42	12/19/22 21:24	1
Magnesium	ND		0.50		mg/L		12/16/22 11:42	12/19/22 21:24	1
Manganese	ND		0.020		mg/L		12/16/22 11:42	12/19/22 21:24	1
Potassium	ND		3.3		mg/L		12/16/22 11:42	12/19/22 21:24	1
Sodium	ND		0.50		mg/L		12/16/22 11:42	12/19/22 21:24	1

Lab Sample ID: LCS 580-413156/26-A

Matrix: Water

Analysis Batch: 413393

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 413156

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	20.0	20.3		mg/L		102	85 - 115
Magnesium	20.0	20.2		mg/L		101	85 - 115
Manganese	1.00	1.03		mg/L		103	85 - 115
Potassium	20.0	19.6		mg/L		98	85 - 115
Sodium	20.0	19.8		mg/L		99	85 - 115

Lab Sample ID: LCSD 580-413156/27-A

Matrix: Water

Analysis Batch: 413393

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 413156

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Calcium	20.0	19.8		mg/L		99	85 - 115	3	20
Magnesium	20.0	19.8		mg/L		99	85 - 115	2	20
Manganese	1.00	0.992		mg/L		99	85 - 115	4	20

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: LCSD 580-413156/27-A
Matrix: Water
Analysis Batch: 413393

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 413156

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Potassium	20.0	19.0		mg/L		95	85 - 115	3	20
Sodium	20.0	19.2		mg/L		96	85 - 115	3	20

Lab Sample ID: MB 580-413337/23-A
Matrix: Water
Analysis Batch: 413533

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 413337

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		0.50		mg/L		12/19/22 17:42	12/20/22 18:15	1
Magnesium	ND		0.50		mg/L		12/19/22 17:42	12/20/22 18:15	1
Manganese	ND		0.020		mg/L		12/19/22 17:42	12/20/22 18:15	1
Potassium	ND		3.3		mg/L		12/19/22 17:42	12/20/22 18:15	1
Sodium	ND		0.50		mg/L		12/19/22 17:42	12/20/22 18:15	1

Lab Sample ID: LCS 580-413337/24-A
Matrix: Water
Analysis Batch: 413533

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 413337

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	20.0	19.7		mg/L		98	85 - 115
Magnesium	20.0	19.5		mg/L		97	85 - 115
Manganese	1.00	0.982		mg/L		98	85 - 115
Potassium	20.0	19.3		mg/L		96	85 - 115
Sodium	20.0	18.6		mg/L		93	85 - 115

Lab Sample ID: LCSD 580-413337/25-A
Matrix: Water
Analysis Batch: 413533

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 413337

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Calcium	20.0	19.4		mg/L		97	85 - 115	2	20
Magnesium	20.0	19.2		mg/L		96	85 - 115	1	20
Manganese	1.00	0.976		mg/L		98	85 - 115	1	20
Potassium	20.0	19.1		mg/L		95	85 - 115	1	20
Sodium	20.0	18.3		mg/L		91	85 - 115	2	20

Lab Sample ID: MB 580-413340/22-A
Matrix: Water
Analysis Batch: 413533

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 413340

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		0.50		mg/L		12/19/22 18:57	12/20/22 20:01	1
Magnesium	ND		0.50		mg/L		12/19/22 18:57	12/20/22 20:01	1
Manganese	ND		0.020		mg/L		12/19/22 18:57	12/20/22 20:01	1
Potassium	ND		3.3		mg/L		12/19/22 18:57	12/20/22 20:01	1
Sodium	ND		0.50		mg/L		12/19/22 18:57	12/20/22 20:01	1

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: LCS 580-413340/23-A
Matrix: Water
Analysis Batch: 413533

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 413340

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	20.0	19.9		mg/L		99	85 - 115
Magnesium	20.0	19.7		mg/L		98	85 - 115
Manganese	1.00	1.00		mg/L		100	85 - 115
Potassium	20.0	19.5		mg/L		97	85 - 115
Sodium	20.0	18.9		mg/L		94	85 - 115

Lab Sample ID: LCSD 580-413340/24-A
Matrix: Water
Analysis Batch: 413533

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 413340

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Calcium	20.0	19.3		mg/L		96	85 - 115	3	20
Magnesium	20.0	19.1		mg/L		96	85 - 115	3	20
Manganese	1.00	0.967		mg/L		97	85 - 115	4	20
Potassium	20.0	19.0		mg/L		95	85 - 115	2	20
Sodium	20.0	18.3		mg/L		91	85 - 115	3	20

Lab Sample ID: 580-121071-6 MS
Matrix: Water
Analysis Batch: 413393

Client Sample ID: MW-6
Prep Type: Dissolved
Prep Batch: 413156

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	150		20.0	179	4	mg/L		126	70 - 130
Magnesium	38		20.0	58.1		mg/L		101	70 - 130
Manganese	0.051		1.00	1.04		mg/L		99	70 - 130
Potassium	11		20.0	30.9		mg/L		98	70 - 130
Sodium	21		20.0	40.8		mg/L		98	70 - 130

Lab Sample ID: 580-121071-6 MSD
Matrix: Water
Analysis Batch: 413393

Client Sample ID: MW-6
Prep Type: Dissolved
Prep Batch: 413156

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Calcium	150		20.0	182	4	mg/L		144	70 - 130	2	20
Magnesium	38		20.0	58.5		mg/L		103	70 - 130	1	20
Manganese	0.051		1.00	1.06		mg/L		101	70 - 130	2	20
Potassium	11		20.0	31.6		mg/L		102	70 - 130	2	20
Sodium	21		20.0	41.9		mg/L		104	70 - 130	3	20

Lab Sample ID: 580-121071-J-1-C MS
Matrix: Water
Analysis Batch: 413533

Client Sample ID: 580-121071-J-1-C MS
Prep Type: Dissolved
Prep Batch: 413337

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	110		20.0	127	4	mg/L		97	70 - 130
Magnesium	21		20.0	40.3		mg/L		96	70 - 130
Manganese	ND		1.00	0.981		mg/L		98	70 - 130
Potassium	7.7		20.0	27.3		mg/L		98	70 - 130
Sodium	21		20.0	40.8		mg/L		99	70 - 130

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: 580-121071-J-1-D MSD
Matrix: Water
Analysis Batch: 413533

Client Sample ID: 580-121071-J-1-D MSD
Prep Type: Dissolved
Prep Batch: 413337

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Calcium	110		20.0	127	4	mg/L		98	70 - 130	0	20
Magnesium	21		20.0	40.3		mg/L		97	70 - 130	0	20
Manganese	ND		1.00	0.993		mg/L		99	70 - 130	1	20
Potassium	7.7		20.0	27.3		mg/L		98	70 - 130	0	20
Sodium	21		20.0	41.5		mg/L		102	70 - 130	2	20

Lab Sample ID: 580-121071-J-1-B DU
Matrix: Water
Analysis Batch: 413533

Client Sample ID: 580-121071-J-1-B DU
Prep Type: Dissolved
Prep Batch: 413337

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Calcium	110		107		mg/L		0.6	20
Magnesium	21		20.8		mg/L		0.8	20
Manganese	ND		ND		mg/L		NC	20
Potassium	7.7		7.52		mg/L		3	20
Sodium	21		20.9		mg/L		0.5	20

Method: 200.8 - Metals (ICP/MS)

Lab Sample ID: MB 580-413156/25-A
Matrix: Water
Analysis Batch: 413517

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 413156

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		12/16/22 11:42	12/20/22 13:20	1
Iron	ND		0.10		mg/L		12/16/22 11:42	12/20/22 13:20	1
Antimony	ND		0.00080		mg/L		12/16/22 11:42	12/20/22 13:20	1
Barium	ND		0.0012		mg/L		12/16/22 11:42	12/20/22 13:20	1
Beryllium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 13:20	1
Cadmium	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 13:20	1
Chromium	ND		0.00080		mg/L		12/16/22 11:42	12/20/22 13:20	1
Cobalt	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 13:20	1
Copper	ND		0.0020		mg/L		12/16/22 11:42	12/20/22 13:20	1
Lead	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 13:20	1
Nickel	ND		0.0030		mg/L		12/16/22 11:42	12/20/22 13:20	1
Selenium	ND		0.0080		mg/L		12/16/22 11:42	12/20/22 13:20	1
Silver	ND		0.00040		mg/L		12/16/22 11:42	12/20/22 13:20	1
Thallium	ND		0.0010		mg/L		12/16/22 11:42	12/20/22 13:20	1
Vanadium	ND		0.0040		mg/L		12/16/22 11:42	12/20/22 13:20	1
Zinc	ND		0.0070		mg/L		12/16/22 11:42	12/20/22 13:20	1

Lab Sample ID: LCS 580-413156/26-A
Matrix: Water
Analysis Batch: 413517

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 413156

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	1.00	0.982		mg/L		98	85 - 115
Iron	20.0	19.9		mg/L		100	85 - 115
Antimony	1.00	0.975		mg/L		97	85 - 115

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 580-413156/26-A

Matrix: Water

Analysis Batch: 413517

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 413156

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	1.00	0.967		mg/L		97	85 - 115
Beryllium	1.00	0.994		mg/L		99	85 - 115
Cadmium	1.00	0.979		mg/L		98	85 - 115
Chromium	1.00	0.999		mg/L		100	85 - 115
Cobalt	1.00	0.978		mg/L		98	85 - 115
Copper	1.00	0.987		mg/L		99	85 - 115
Lead	1.00	0.997		mg/L		100	85 - 115
Nickel	1.00	0.992		mg/L		99	85 - 115
Selenium	1.00	0.997		mg/L		100	85 - 115
Silver	1.00	0.989		mg/L		99	85 - 115
Thallium	1.00	0.963		mg/L		96	85 - 115
Vanadium	1.00	1.00		mg/L		100	85 - 115
Zinc	1.00	0.969		mg/L		97	85 - 115

Lab Sample ID: LCSD 580-413156/27-A

Matrix: Water

Analysis Batch: 413517

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 413156

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	1.00	0.994		mg/L		99	85 - 115	1	20
Iron	20.0	20.8		mg/L		104	85 - 115	5	20
Antimony	1.00	0.990		mg/L		99	85 - 115	2	20
Barium	1.00	0.984		mg/L		98	85 - 115	2	20
Beryllium	1.00	0.931		mg/L		93	85 - 115	6	20
Cadmium	1.00	0.997		mg/L		100	85 - 115	2	20
Chromium	1.00	1.04		mg/L		104	85 - 115	4	20
Cobalt	1.00	0.997		mg/L		100	85 - 115	2	20
Copper	1.00	1.00		mg/L		100	85 - 115	2	20
Lead	1.00	1.01		mg/L		101	85 - 115	2	20
Nickel	1.00	1.00		mg/L		100	85 - 115	1	20
Selenium	1.00	1.01		mg/L		101	85 - 115	1	20
Silver	1.00	1.01		mg/L		101	85 - 115	2	20
Thallium	1.00	0.978		mg/L		98	85 - 115	2	20
Vanadium	1.00	1.04		mg/L		104	85 - 115	4	20
Zinc	1.00	1.00		mg/L		100	85 - 115	3	20

Lab Sample ID: MB 580-413337/23-A

Matrix: Water

Analysis Batch: 413517

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 413337

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		12/19/22 17:42	12/20/22 20:40	1
Iron	ND		0.10		mg/L		12/19/22 17:42	12/20/22 20:40	1
Antimony	ND		0.00080		mg/L		12/19/22 17:42	12/20/22 20:40	1
Barium	ND		0.0012		mg/L		12/19/22 17:42	12/20/22 20:40	1
Beryllium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:40	1
Cadmium	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:40	1
Chromium	ND		0.00080		mg/L		12/19/22 17:42	12/20/22 20:40	1
Cobalt	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:40	1

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 580-413337/23-A
Matrix: Water
Analysis Batch: 413517

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 413337

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	ND		0.0020		mg/L		12/19/22 17:42	12/20/22 20:40	1
Lead	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:40	1
Nickel	ND		0.0030		mg/L		12/19/22 17:42	12/20/22 20:40	1
Selenium	ND		0.0080		mg/L		12/19/22 17:42	12/20/22 20:40	1
Silver	ND		0.00040		mg/L		12/19/22 17:42	12/20/22 20:40	1
Thallium	ND		0.0010		mg/L		12/19/22 17:42	12/20/22 20:40	1
Vanadium	ND		0.0040		mg/L		12/19/22 17:42	12/20/22 20:40	1
Zinc	ND		0.0070		mg/L		12/19/22 17:42	12/20/22 20:40	1

Lab Sample ID: LCS 580-413337/24-A
Matrix: Water
Analysis Batch: 413517

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 413337

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	1.00	0.968		mg/L		97	85 - 115
Iron	20.0	20.2		mg/L		101	85 - 115
Antimony	1.00	0.987		mg/L		99	85 - 115
Barium	1.00	0.990		mg/L		99	85 - 115
Beryllium	1.00	0.920		mg/L		92	85 - 115
Cadmium	1.00	0.994		mg/L		99	85 - 115
Chromium	1.00	0.995		mg/L		99	85 - 115
Cobalt	1.00	1.00		mg/L		100	85 - 115
Copper	1.00	1.02		mg/L		102	85 - 115
Lead	1.00	1.04		mg/L		104	85 - 115
Nickel	1.00	1.01		mg/L		101	85 - 115
Selenium	1.00	0.955		mg/L		96	85 - 115
Silver	1.00	1.02		mg/L		102	85 - 115
Thallium	1.00	0.994		mg/L		99	85 - 115
Vanadium	1.00	0.990		mg/L		99	85 - 115
Zinc	1.00	1.05		mg/L		105	85 - 115

Lab Sample ID: LCSD 580-413337/25-A
Matrix: Water
Analysis Batch: 413517

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 413337

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	1.00	0.994		mg/L		99	85 - 115	3	20
Iron	20.0	19.7		mg/L		98	85 - 115	2	20
Antimony	1.00	0.988		mg/L		99	85 - 115	0	20
Barium	1.00	0.985		mg/L		99	85 - 115	0	20
Beryllium	1.00	0.959		mg/L		96	85 - 115	4	20
Cadmium	1.00	0.989		mg/L		99	85 - 115	1	20
Chromium	1.00	0.981		mg/L		98	85 - 115	1	20
Cobalt	1.00	1.01		mg/L		101	85 - 115	1	20
Copper	1.00	1.03		mg/L		103	85 - 115	1	20
Lead	1.00	1.02		mg/L		102	85 - 115	2	20
Nickel	1.00	1.01		mg/L		101	85 - 115	1	20
Selenium	1.00	0.965		mg/L		97	85 - 115	1	20
Silver	1.00	1.01		mg/L		101	85 - 115	1	20

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 580-413337/25-A
Matrix: Water
Analysis Batch: 413517

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 413337

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Thallium	1.00	0.986		mg/L		99	85 - 115	1	20
Vanadium	1.00	0.980		mg/L		98	85 - 115	1	20
Zinc	1.00	0.997		mg/L		100	85 - 115	5	20

Lab Sample ID: 580-121071-1 MS
Matrix: Water
Analysis Batch: 413517

Client Sample ID: MW-1
Prep Type: Total/NA
Prep Batch: 413337

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	0.0043		1.00	1.04		mg/L		103	70 - 130		
Iron	0.16		20.0	20.1		mg/L		100	70 - 130		
Antimony	ND		1.00	0.980		mg/L		98	70 - 130		
Barium	0.053		1.00	1.07		mg/L		102	70 - 130		
Beryllium	ND		1.00	0.982		mg/L		98	70 - 130		
Cadmium	ND		1.00	1.00		mg/L		100	70 - 130		
Chromium	0.0048		1.00	1.01		mg/L		101	70 - 130		
Cobalt	0.014		1.00	1.08		mg/L		106	70 - 130		
Copper	ND		1.00	1.09		mg/L		109	70 - 130		
Lead	ND		1.00	1.05		mg/L		105	70 - 130		
Nickel	ND		1.00	1.04		mg/L		104	70 - 130		
Selenium	ND		1.00	1.00		mg/L		100	70 - 130		
Silver	ND		1.00	1.05		mg/L		105	70 - 130		
Thallium	ND		1.00	1.02		mg/L		102	70 - 130		
Vanadium	0.0090		1.00	1.01		mg/L		100	70 - 130		
Zinc	0.013		1.00	1.04		mg/L		102	70 - 130		

Lab Sample ID: 580-121071-1 MSD
Matrix: Water
Analysis Batch: 413517

Client Sample ID: MW-1
Prep Type: Total/NA
Prep Batch: 413337

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	0.0043		1.00	1.02		mg/L		101	70 - 130	2	20
Iron	0.16		20.0	19.9		mg/L		99	70 - 130	1	20
Antimony	ND		1.00	0.957		mg/L		96	70 - 130	2	20
Barium	0.053		1.00	1.04		mg/L		99	70 - 130	3	20
Beryllium	ND		1.00	1.00		mg/L		100	70 - 130	2	20
Cadmium	ND		1.00	0.982		mg/L		98	70 - 130	2	20
Chromium	0.0048		1.00	0.984		mg/L		98	70 - 130	3	20
Cobalt	0.014		1.00	1.05		mg/L		103	70 - 130	3	20
Copper	ND		1.00	1.07		mg/L		106	70 - 130	2	20
Lead	ND		1.00	1.02		mg/L		102	70 - 130	3	20
Nickel	ND		1.00	1.02		mg/L		102	70 - 130	2	20
Selenium	ND		1.00	0.970		mg/L		97	70 - 130	3	20
Silver	ND		1.00	1.01		mg/L		101	70 - 130	3	20
Thallium	ND		1.00	0.999		mg/L		100	70 - 130	2	20
Vanadium	0.0090		1.00	0.985		mg/L		98	70 - 130	3	20
Zinc	0.013		1.00	1.02		mg/L		101	70 - 130	2	20

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: 580-121071-1 DU

Matrix: Water

Analysis Batch: 413517

Client Sample ID: MW-1

Prep Type: Total/NA

Prep Batch: 413337

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Arsenic	0.0043		0.00415		mg/L		5	20
Iron	0.16		0.159		mg/L		2	20
Antimony	ND		ND		mg/L		NC	20
Barium	0.053		0.0517		mg/L		2	20
Beryllium	ND		ND		mg/L		NC	20
Cadmium	ND		ND		mg/L		NC	20
Chromium	0.0048		0.00470		mg/L		2	20
Cobalt	0.014		0.0137		mg/L		2	20
Copper	ND		ND		mg/L		NC	20
Lead	ND		ND		mg/L		NC	20
Nickel	ND		ND		mg/L		NC	20
Selenium	ND		ND		mg/L		NC	20
Silver	ND		ND		mg/L		NC	20
Thallium	ND		ND		mg/L		NC	20
Vanadium	0.0090		0.00885		mg/L		1	20
Zinc	0.013		0.0111		mg/L		13	20

Lab Sample ID: MB 580-413340/22-A

Matrix: Water

Analysis Batch: 413535

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 413340

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		12/19/22 18:57	12/20/22 19:39	1
Iron	ND		0.10		mg/L		12/19/22 18:57	12/20/22 19:39	1
Antimony	ND		0.00080		mg/L		12/19/22 18:57	12/20/22 19:39	1
Barium	ND		0.0012		mg/L		12/19/22 18:57	12/20/22 19:39	1
Beryllium	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 19:39	1
Cadmium	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 19:39	1
Chromium	ND		0.00080		mg/L		12/19/22 18:57	12/20/22 19:39	1
Cobalt	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 19:39	1
Copper	ND		0.0020		mg/L		12/19/22 18:57	12/20/22 19:39	1
Lead	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 19:39	1
Nickel	ND		0.0030		mg/L		12/19/22 18:57	12/20/22 19:39	1
Selenium	ND		0.0080		mg/L		12/19/22 18:57	12/20/22 19:39	1
Silver	ND		0.00040		mg/L		12/19/22 18:57	12/20/22 19:39	1
Thallium	ND		0.0010		mg/L		12/19/22 18:57	12/20/22 19:39	1
Vanadium	ND		0.0040		mg/L		12/19/22 18:57	12/20/22 19:39	1
Zinc	ND		0.0070		mg/L		12/19/22 18:57	12/20/22 19:39	1

Lab Sample ID: LCS 580-413340/23-A

Matrix: Water

Analysis Batch: 413535

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 413340

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	1.00	0.961		mg/L		96	85 - 115
Iron	20.0	19.5		mg/L		97	85 - 115
Antimony	1.00	0.996		mg/L		100	85 - 115
Barium	1.00	0.995		mg/L		100	85 - 115
Beryllium	1.00	1.06		mg/L		106	85 - 115

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 580-413340/23-A

Matrix: Water

Analysis Batch: 413535

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 413340

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Cadmium	1.00	0.986		mg/L		99	85 - 115
Chromium	1.00	0.971		mg/L		97	85 - 115
Cobalt	1.00	0.991		mg/L		99	85 - 115
Copper	1.00	1.00		mg/L		100	85 - 115
Lead	1.00	0.959		mg/L		96	85 - 115
Nickel	1.00	0.990		mg/L		99	85 - 115
Selenium	1.00	0.944		mg/L		94	85 - 115
Silver	1.00	0.914		mg/L		91	85 - 115
Thallium	1.00	0.912		mg/L		91	85 - 115
Vanadium	1.00	0.979		mg/L		98	85 - 115
Zinc	1.00	0.975		mg/L		98	85 - 115

Lab Sample ID: LCSD 580-413340/24-A

Matrix: Water

Analysis Batch: 413535

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 413340

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	1.00	0.917		mg/L		92	85 - 115	5	20
Iron	20.0	18.9		mg/L		94	85 - 115	3	20
Antimony	1.00	0.954		mg/L		95	85 - 115	4	20
Barium	1.00	0.951		mg/L		95	85 - 115	5	20
Beryllium	1.00	0.918		mg/L		92	85 - 115	14	20
Cadmium	1.00	0.954		mg/L		95	85 - 115	3	20
Chromium	1.00	0.939		mg/L		94	85 - 115	3	20
Cobalt	1.00	0.952		mg/L		95	85 - 115	4	20
Copper	1.00	0.959		mg/L		96	85 - 115	5	20
Lead	1.00	0.956		mg/L		96	85 - 115	0	20
Nickel	1.00	0.946		mg/L		95	85 - 115	5	20
Selenium	1.00	0.920		mg/L		92	85 - 115	3	20
Silver	1.00	0.946		mg/L		95	85 - 115	3	20
Thallium	1.00	0.921		mg/L		92	85 - 115	1	20
Vanadium	1.00	0.940		mg/L		94	85 - 115	4	20
Zinc	1.00	0.935		mg/L		93	85 - 115	4	20

Lab Sample ID: 580-121071-6 MS

Matrix: Water

Analysis Batch: 413517

Client Sample ID: MW-6

Prep Type: Dissolved

Prep Batch: 413156

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	ND		1.00	1.04		mg/L		104	70 - 130
Iron	0.51		20.0	20.8		mg/L		101	70 - 130
Antimony	ND		1.00	0.989		mg/L		99	70 - 130
Barium	0.11		1.00	1.13		mg/L		102	70 - 130
Beryllium	ND		1.00	0.951		mg/L		95	70 - 130
Cadmium	ND		1.00	1.03		mg/L		103	70 - 130
Chromium	ND		1.00	1.02		mg/L		102	70 - 130
Cobalt	0.00045		1.00	1.03		mg/L		103	70 - 130
Copper	ND		1.00	1.04		mg/L		104	70 - 130
Lead	ND		1.00	1.04		mg/L		104	70 - 130

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: 580-121071-6 MS

Matrix: Water

Analysis Batch: 413517

Client Sample ID: MW-6

Prep Type: Dissolved

Prep Batch: 413156

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Nickel	ND		1.00	1.01		mg/L		101	70 - 130
Selenium	ND		1.00	1.06		mg/L		106	70 - 130
Silver	ND		1.00	1.03		mg/L		103	70 - 130
Thallium	ND		1.00	1.02		mg/L		102	70 - 130
Vanadium	0.0059		1.00	1.02		mg/L		101	70 - 130
Zinc	0.012		1.00	1.04		mg/L		102	70 - 130

Lab Sample ID: 580-121071-6 MSD

Matrix: Water

Analysis Batch: 413517

Client Sample ID: MW-6

Prep Type: Dissolved

Prep Batch: 413156

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	ND		1.00	1.04		mg/L		104	70 - 130	0	20
Iron	0.51		20.0	21.5		mg/L		105	70 - 130	4	20
Antimony	ND		1.00	0.999		mg/L		100	70 - 130	1	20
Barium	0.11		1.00	1.13		mg/L		102	70 - 130	0	20
Beryllium	ND		1.00	1.01		mg/L		101	70 - 130	6	20
Cadmium	ND		1.00	1.03		mg/L		103	70 - 130	0	20
Chromium	ND		1.00	1.04		mg/L		104	70 - 130	2	20
Cobalt	0.00045		1.00	1.03		mg/L		103	70 - 130	0	20
Copper	ND		1.00	1.05		mg/L		105	70 - 130	1	20
Lead	ND		1.00	1.03		mg/L		103	70 - 130	0	20
Nickel	ND		1.00	1.02		mg/L		102	70 - 130	1	20
Selenium	ND		1.00	1.05		mg/L		105	70 - 130	1	20
Silver	ND		1.00	1.04		mg/L		104	70 - 130	1	20
Thallium	ND		1.00	1.01		mg/L		101	70 - 130	1	20
Vanadium	0.0059		1.00	1.04		mg/L		104	70 - 130	2	20
Zinc	0.012		1.00	1.03		mg/L		102	70 - 130	0	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 580-414168/27

Matrix: Water

Analysis Batch: 414168

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.5		mg/L			12/20/22 13:13	1
Sulfate	ND		1.5		mg/L			12/20/22 13:13	1

Lab Sample ID: LCS 580-414168/28

Matrix: Water

Analysis Batch: 414168

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	50.2		mg/L		100	90 - 110
Sulfate	50.0	49.3		mg/L		99	90 - 110

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCSD 580-414168/29

Matrix: Water

Analysis Batch: 414168

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	50.0	50.3		mg/L		101	90 - 110	0	15
Sulfate	50.0	49.3		mg/L		99	90 - 110	0	15

Lab Sample ID: MB 580-414264/3

Matrix: Water

Analysis Batch: 414264

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.5		mg/L			12/21/22 17:39	1
Sulfate	ND		1.5		mg/L			12/21/22 17:39	1

Lab Sample ID: LCS 580-414264/4

Matrix: Water

Analysis Batch: 414264

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	50.0		mg/L		100	90 - 110
Sulfate	50.0	49.1		mg/L		98	90 - 110

Lab Sample ID: LCSD 580-414264/5

Matrix: Water

Analysis Batch: 414264

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	50.0	50.0		mg/L		100	90 - 110	0	15
Sulfate	50.0	49.1		mg/L		98	90 - 110	0	15

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 580-413483/1-A

Matrix: Water

Analysis Batch: 413497

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 413483

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.50	0.50	mg/L		12/20/22 21:15	12/21/22 00:19	1

Lab Sample ID: LCS 580-413483/2-A

Matrix: Water

Analysis Batch: 413497

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 413483

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	2.00	1.98		mg/L		99	90 - 110

Lab Sample ID: 580-121071-7 MS

Matrix: Water

Analysis Batch: 413497

Client Sample ID: MW-8

Prep Type: Total/NA

Prep Batch: 413483

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	ND		2.00	2.16		mg/L		108	90 - 110

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: 580-121071-7 MSD
Matrix: Water
Analysis Batch: 413497

Client Sample ID: MW-8
Prep Type: Total/NA
Prep Batch: 413483

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Ammonia	ND		2.00	2.02		mg/L		101	90 - 110	7	20

Lab Sample ID: 580-121071-7 DU
Matrix: Water
Analysis Batch: 413497

Client Sample ID: MW-8
Prep Type: Total/NA
Prep Batch: 413483

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Ammonia	ND		ND		mg/L		NC	20

Method: SM 2320B - Alkalinity

Lab Sample ID: LCS 580-413475/2
Matrix: Water
Analysis Batch: 413475

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Alkalinity	100	92.3		mg/L		92	85 - 115

Lab Sample ID: 580-121071-1 DU
Matrix: Water
Analysis Batch: 413475

Client Sample ID: MW-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity	290		305		mg/L		5	17
Bicarbonate Alkalinity as CaCO3	290		305		mg/L		5	20

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 580-412924/1
Matrix: Water
Analysis Batch: 412924

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			12/14/22 14:29	1

Lab Sample ID: LCS 580-412924/2
Matrix: Water
Analysis Batch: 412924

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	1030		mg/L		103	80 - 120

Lab Sample ID: MB 580-412961/1
Matrix: Water
Analysis Batch: 412961

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			12/14/22 18:43	1

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 580-412961/2

Matrix: Water

Analysis Batch: 412961

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	1080		mg/L		108	80 - 120

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 580-412702/1

Matrix: Water

Analysis Batch: 412702

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	ND		2.0	2.0	mg/L			12/13/22 08:05	1

Lab Sample ID: LCS 580-412702/2

Matrix: Water

Analysis Batch: 412702

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	500	428		mg/L		86	80 - 120

Lab Sample ID: MB 580-412765/1

Matrix: Water

Analysis Batch: 412765

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	ND		2.0	2.0	mg/L			12/13/22 13:09	1

Lab Sample ID: LCS 580-412765/2

Matrix: Water

Analysis Batch: 412765

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	500	424		mg/L		85	80 - 120

Lab Sample ID: MB 580-412916/1

Matrix: Water

Analysis Batch: 412916

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	ND		2.0	2.0	mg/L			12/14/22 14:26	1

Lab Sample ID: LCS 580-412916/2

Matrix: Water

Analysis Batch: 412916

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	500	416		mg/L		83	80 - 120

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)

Lab Sample ID: MB 580-412950/1
Matrix: Water
Analysis Batch: 412950

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	ND		2.0	2.0	mg/L			12/14/22 18:11	1

Lab Sample ID: LCS 580-412950/2
Matrix: Water
Analysis Batch: 412950

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	500	472		mg/L		94	80 - 120

Lab Sample ID: MB 580-412967/1
Matrix: Water
Analysis Batch: 412967

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	ND		2.0	2.0	mg/L			12/14/22 22:39	1

Lab Sample ID: LCS 580-412967/2
Matrix: Water
Analysis Batch: 412967

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	500	528		mg/L		106	80 - 120

Method: SM 5310B - Organic Carbon, Total (TOC)

Lab Sample ID: MB 580-414142/3
Matrix: Water
Analysis Batch: 414142

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.5	0.38	mg/L			12/28/22 20:32	1

Lab Sample ID: LCS 580-414142/4
Matrix: Water
Analysis Batch: 414142

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	10.0	8.77		mg/L		88	85 - 115

Lab Sample ID: LCSD 580-414142/5
Matrix: Water
Analysis Batch: 414142

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Total Organic Carbon	10.0	8.86		mg/L		89	85 - 115	1	20

Eurofins Seattle

QC Sample Results

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Method: SM 5310B - Organic Carbon, Total (TOC) (Continued)

Lab Sample ID: 580-121071-1 MS

Matrix: Water

Analysis Batch: 414142

Client Sample ID: MW-1

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Total Organic Carbon	ND		10.0	11.2		mg/L		101	85 - 115		

Lab Sample ID: 580-121071-1 MSD

Matrix: Water

Analysis Batch: 414142

Client Sample ID: MW-1

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Total Organic Carbon	ND		10.0	10.7		mg/L		96	85 - 115	4	20

Lab Sample ID: 580-121071-1 DU

Matrix: Water

Analysis Batch: 414142

Client Sample ID: MW-1

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Organic Carbon	ND			1.08	J	mg/L				3	20

Lab Chronicle

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-1

Date Collected: 12/08/22 18:10

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/16/22 02:13
Total/NA	Analysis	RSK-175		1	755982	OK	EET SAV	12/20/22 11:47
Dissolved	Prep	200.8			413156	CA	EET SEA	12/16/22 11:42
Dissolved	Analysis	200.7 Rev 4.4		1	413393	JLS	EET SEA	12/19/22 20:18
Dissolved	Prep	200.8			413156	CA	EET SEA	12/16/22 11:42
Dissolved	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 15:56
Total/NA	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 20:44
Total/NA	Analysis	300.0		1	414264	JHR	EET SEA	12/29/22 22:28
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412961	FCG	EET SEA	12/14/22 18:43
Total/NA	Analysis	SM 2540D		1	412967	FCG	EET SEA	12/14/22 22:39
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/28/22 21:24

Client Sample ID: MW-2

Date Collected: 12/07/22 17:05

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289425	OH1	EET CAL 4	12/16/22 01:07
Total/NA	Analysis	RSK-175		1	755591	JCK	EET SAV	12/17/22 14:13
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 18:54
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:10
Total/NA	Prep	200.8			413156	CA	EET SEA	12/16/22 11:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 15:58
Total/NA	Analysis	300.0		1	414264	JHR	EET SEA	12/29/22 22:40
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412924	FCG	EET SEA	12/14/22 14:29
Total/NA	Analysis	SM 2540D		1	412702	AUA	EET SEA	12/13/22 08:05
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/28/22 22:33

Client Sample ID: MW-3

Date Collected: 12/07/22 15:05

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/15/22 22:40

Eurofins Seattle

Lab Chronicle

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-3

Date Collected: 12/07/22 15:05

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	RSK-175		1	755591	JCK	EET SAV	12/17/22 14:25
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 19:00
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:12
Total/NA	Prep	200.8			413156	CA	EET SEA	12/16/22 11:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 16:01
Total/NA	Analysis	300.0		1	414264	JHR	EET SEA	12/29/22 22:52
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412924	FCG	EET SEA	12/14/22 14:29
Total/NA	Analysis	SM 2540D		1	412702	AUA	EET SEA	12/13/22 08:05
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/28/22 22:50

Client Sample ID: MW-4

Date Collected: 12/07/22 13:25

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/15/22 23:02
Total/NA	Analysis	RSK-175		1	755591	JCK	EET SAV	12/17/22 14:38
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 19:04
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:14
Total/NA	Prep	200.8			413156	CA	EET SEA	12/16/22 11:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 16:03
Total/NA	Analysis	300.0		1	414264	JHR	EET SEA	12/29/22 23:03
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412924	FCG	EET SEA	12/14/22 14:29
Total/NA	Analysis	SM 2540D		1	412702	AUA	EET SEA	12/13/22 08:05
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/29/22 04:41

Client Sample ID: MW-5

Date Collected: 12/08/22 11:05

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/15/22 23:23
Total/NA	Analysis	RSK-175		1	755982	OK	EET SAV	12/20/22 12:00

Eurofins Seattle

Lab Chronicle

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-5

Date Collected: 12/08/22 11:05

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 19:08
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:17
Total/NA	Prep	200.8			413156	CA	EET SEA	12/16/22 11:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 16:05
Total/NA	Analysis	300.0		1	414264	JHR	EET SEA	12/29/22 23:15
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412961	FCG	EET SEA	12/14/22 18:43
Total/NA	Analysis	SM 2540D		1	412916	JL	EET SEA	12/14/22 14:26
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/28/22 23:42

Client Sample ID: MW-6

Date Collected: 12/08/22 16:15

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/15/22 23:44
Total/NA	Analysis	RSK-175		1	755982	OK	EET SAV	12/20/22 12:13
Dissolved	Prep	200.8			413156	CA	EET SEA	12/16/22 11:42
Dissolved	Analysis	200.7 Rev 4.4		1	413393	JLS	EET SEA	12/19/22 20:24
Dissolved	Prep	200.8			413156	CA	EET SEA	12/16/22 11:42
Dissolved	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 15:16
Total/NA	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:19
Total/NA	Analysis	300.0		1	414264	JHR	EET SEA	12/29/22 23:27
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412961	FCG	EET SEA	12/14/22 18:43
Total/NA	Analysis	SM 2540D		1	412916	JL	EET SEA	12/14/22 14:26
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/29/22 00:00

Client Sample ID: MW-8

Date Collected: 12/07/22 11:20

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/16/22 00:05
Total/NA	Analysis	RSK-175		1	755591	JCK	EET SAV	12/17/22 14:51

Eurofins Seattle

Lab Chronicle

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-8

Date Collected: 12/07/22 11:20

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Dissolved	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 21:45
Dissolved	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Dissolved	Analysis	200.8		1	413535	FCW	EET SEA	12/20/22 20:19
Total/NA	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:21
Total/NA	Analysis	300.0		1	414264	JHR	EET SEA	12/29/22 23:39
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412924	FCG	EET SEA	12/14/22 14:29
Total/NA	Analysis	SM 2540D		1	412702	AUA	EET SEA	12/13/22 08:05
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/29/22 00:17

Client Sample ID: MW-9

Date Collected: 12/07/22 09:50

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/16/22 00:27
Total/NA	Analysis	RSK-175		1	755591	JCK	EET SAV	12/17/22 15:04
Dissolved	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 21:49
Dissolved	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Dissolved	Analysis	200.8		1	413535	FCW	EET SEA	12/20/22 20:21
Total/NA	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:24
Total/NA	Analysis	300.0		1	414168	JHR	EET SEA	12/20/22 20:15
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412924	FCG	EET SEA	12/14/22 14:29
Total/NA	Analysis	SM 2540D		1	412765	AUA	EET SEA	12/13/22 13:09
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/29/22 00:34

Client Sample ID: MW-10

Date Collected: 12/08/22 12:35

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-9

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/16/22 00:48
Total/NA	Analysis	RSK-175		1	755982	OK	EET SAV	12/20/22 12:26

Eurofins Seattle

Lab Chronicle

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-10

Date Collected: 12/08/22 12:35

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-9

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 19:29
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:26
Total/NA	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Total/NA	Analysis	200.8		1	413535	FCW	EET SEA	12/20/22 20:09
Total/NA	Analysis	300.0		1	414168	JHR	EET SEA	12/20/22 20:26
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412961	FCG	EET SEA	12/14/22 18:43
Total/NA	Analysis	SM 2540D		1	412916	JL	EET SEA	12/14/22 14:26
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/29/22 00:51

Client Sample ID: MW-11

Date Collected: 12/08/22 14:20

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-10

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/16/22 01:09
Total/NA	Analysis	RSK-175		1	755982	OK	EET SAV	12/20/22 12:39
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 19:33
Dissolved	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Dissolved	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:28
Total/NA	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Total/NA	Analysis	200.8		1	413535	FCW	EET SEA	12/20/22 20:12
Total/NA	Analysis	300.0		5	414168	JHR	EET SEA	12/20/22 20:50
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412961	FCG	EET SEA	12/14/22 18:43
Total/NA	Analysis	SM 2540D		1	412950	JL	EET SEA	12/14/22 18:11
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/29/22 01:09

Client Sample ID: MW-12

Date Collected: 12/08/22 09:50

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-11

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/16/22 01:30
Total/NA	Analysis	RSK-175		1	756152	JCK	EET SAV	12/21/22 15:47

Eurofins Seattle

Lab Chronicle

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Client Sample ID: MW-12

Date Collected: 12/08/22 09:50

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-11

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Dissolved	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 21:52
Dissolved	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Dissolved	Analysis	200.8		1	413535	FCW	EET SEA	12/20/22 20:23
Total/NA	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 21:31
Total/NA	Analysis	300.0		1	414168	JHR	EET SEA	12/20/22 21:01
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412961	FCG	EET SEA	12/14/22 18:43
Total/NA	Analysis	SM 2540D		1	412950	JL	EET SEA	12/14/22 18:11
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/29/22 01:26

Client Sample ID: MW-21

Date Collected: 12/07/22 07:00

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-12

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/16/22 01:52
Total/NA	Analysis	RSK-175		1	755591	JCK	EET SAV	12/17/22 15:17
Dissolved	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Dissolved	Analysis	200.7 Rev 4.4		1	413533	JLS	EET SEA	12/20/22 21:56
Dissolved	Prep	200.8			413340	TMH	EET SEA	12/19/22 18:57
Dissolved	Analysis	200.8		1	413535	FCW	EET SEA	12/20/22 20:26
Total/NA	Prep	200.8			413337	JL	EET SEA	12/19/22 17:42
Total/NA	Analysis	200.8		1	413517	FCW	EET SEA	12/20/22 20:42
Total/NA	Analysis	300.0		1	414168	JHR	EET SEA	12/20/22 21:13
Total/NA	Prep	Distill/Ammonia			413483	MLT	EET SEA	12/20/22 21:15
Total/NA	Analysis	350.1		1	413497	MLT	EET SEA	12/21/22 00:19
Total/NA	Analysis	SM 2320B		1	413475	MLT	EET SEA	12/20/22 18:39
Total/NA	Analysis	SM 2540C		1	412961	FCG	EET SEA	12/14/22 18:43
Total/NA	Analysis	SM 2540D		1	412765	AUA	EET SEA	12/13/22 13:09
Total/NA	Analysis	SM 5310B		1	414142	FCG	EET SEA	12/29/22 01:43

Client Sample ID: Trip Blank

Date Collected: 12/07/22 00:01

Date Received: 12/09/22 16:23

Lab Sample ID: 580-121071-13

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	289424	OH1	EET CAL 4	12/15/22 21:37
Total/NA	Analysis	RSK-175		1	755591	JCK	EET SAV	12/17/22 10:32

Eurofins Seattle

Lab Chronicle

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Laboratory References:

EET CAL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494
EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858
EET SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

1
2
3
4
5
6
7
8
9
10
11

Accreditation/Certification Summary

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Laboratory: Eurofins Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4167	07-08-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
SM 2320B		Water	Bicarbonate Alkalinity as CaCO3
Washington	State	C788	07-13-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
200.7 Rev 4.4	200.8	Water	Calcium
200.7 Rev 4.4	200.8	Water	Magnesium
200.7 Rev 4.4	200.8	Water	Manganese
200.7 Rev 4.4	200.8	Water	Potassium
200.7 Rev 4.4	200.8	Water	Sodium
200.8	200.8	Water	Antimony
200.8	200.8	Water	Arsenic
200.8	200.8	Water	Barium
200.8	200.8	Water	Beryllium
200.8	200.8	Water	Cadmium
200.8	200.8	Water	Chromium
200.8	200.8	Water	Copper
200.8	200.8	Water	Lead
200.8	200.8	Water	Nickel
200.8	200.8	Water	Selenium
200.8	200.8	Water	Silver
200.8	200.8	Water	Thallium
200.8	200.8	Water	Vanadium
200.8	200.8	Water	Zinc
300.0		Water	Chloride
300.0		Water	Sulfate
SM 2320B		Water	Alkalinity
SM 2320B		Water	Bicarbonate Alkalinity as CaCO3
SM 2540C		Water	Total Dissolved Solids
SM 5310B		Water	Total Organic Carbon

Laboratory: Eurofins Calscience

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arizona	State	AZ0830	11-16-23
California	Los Angeles County Sanitation Districts	10109	07-31-23
California	State	3082	07-31-23
Nevada	State	CA00111	08-01-23
Oregon	NELAP	4175	02-02-23
USDA	US Federal Programs	P330-22-00059	05-24-23
Washington	State	C916-18	10-12-22 *

Laboratory: Eurofins Savannah

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Seattle

Accreditation/Certification Summary

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Laboratory: Eurofins Savannah (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
	AFCEE	SAVLAB	
Alabama	State	41450	06-30-23
ANAB	Dept. of Defense ELAP	L2463	09-22-24
Arkansas DEQ	State	19-015-0	02-01-23
California	State	2939	06-30-22 *
Connecticut	State	PH-0161	03-31-23
Florida	NELAP	E87052	01-09-23
Georgia	State	E87052	06-30-23
Georgia (DW)	State	803	06-30-23
Guam	State	19-007R	04-17-23
Hawaii	State	<cert No.>	06-30-23
Illinois	NELAP	200022	11-30-23
Indiana	State	C-GA-02	06-30-23
Iowa	State	353	07-01-23
Kentucky (UST)	State	NA	06-30-23
Louisiana	NELAP	30690	06-30-23
Louisiana (All)	NELAP	30690	06-30-23
Louisiana (DW)	State	LA009	12-31-22
Maine	State	GA00006	12-27-22
Maryland	State	250	12-31-23
Massachusetts	State	M-GA006	01-14-23
Michigan	State	9925	06-30-23
Mississippi	State	<cert No.>	06-30-23
Nebraska	State	NE-OS-7-04	06-30-23
New Jersey	NELAP	GA769	06-30-23
New Mexico	State	GA00006	06-30-23
New York	NELAP	10842	04-01-23
North Carolina (DW)	State	13701	07-31-23
North Carolina (WW/SW)	State	269	12-31-22
Pennsylvania	NELAP	68-00474	06-30-23
Puerto Rico	State	GA00006	12-30-22
South Carolina	State	98001	01-17-23
Tennessee	State	TN02961	06-30-23
Texas	NELAP	T1047004185-19-14	11-30-23
Texas	TCEQ Water Supply	T104704185	06-30-23
USDA	US Federal Programs	P330-18-00313	09-03-24
Virginia	NELAP	460161	06-14-23
Wisconsin	State	999819810	08-31-23
Wyoming	State	8TMS-L	06-30-23

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Seattle

Sample Summary

Client: Parametrix, Inc.
Project/Site: Horn Rapids Landfill

Job ID: 580-121071-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-121071-1	MW-1	Water	12/08/22 18:10	12/09/22 16:23
580-121071-2	MW-2	Water	12/07/22 17:05	12/09/22 16:23
580-121071-3	MW-3	Water	12/07/22 15:05	12/09/22 16:23
580-121071-4	MW-4	Water	12/07/22 13:25	12/09/22 16:23
580-121071-5	MW-5	Water	12/08/22 11:05	12/09/22 16:23
580-121071-6	MW-6	Water	12/08/22 16:15	12/09/22 16:23
580-121071-7	MW-8	Water	12/07/22 11:20	12/09/22 16:23
580-121071-8	MW-9	Water	12/07/22 09:50	12/09/22 16:23
580-121071-9	MW-10	Water	12/08/22 12:35	12/09/22 16:23
580-121071-10	MW-11	Water	12/08/22 14:20	12/09/22 16:23
580-121071-11	MW-12	Water	12/08/22 09:50	12/09/22 16:23
580-121071-12	MW-21	Water	12/07/22 07:00	12/09/22 16:23
580-121071-13	Trip Blank	Water	12/07/22 00:01	12/09/22 16:23

TestAmerica Seattle

5755 8th Street East

Tacoma, WA 98424

phone 253.922.2310 fax 253.922.5047

Chain of Custody Record
TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

 Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other: **WAC 173- TestAmerica Laboratories, Inc.**

Client Contact		Project Manager: Lisa Gilbert		COC No:											
Parametrix, Inc.		Tel/Fax: (206) 394-3667		_____ of _____ COCs											
719 Second Avenue, Suite 200		Analysis Turnaround Time		Sampler:											
Seattle, WA 98104		☐ CALENDAR DAYS ☒ WORKING DAYS		For Lab Use Only:											
(206) 394-3700		TAT if different from Below _____		Walk-in Client: _____											
Project Name: Horn Rapids Landfill		☒ 2 weeks		Lab Sampling: _____											
Site: Richland, WA		☐ 1 week		Job / SDG No.: _____											
P O # _____		☐ 2 days													
		☐ 1 day													
Sample Identification	Sample Date	Sample Time	Sample Type (C/Comp-G/Grab)	Matrix	# of Cont.	Perform MS / MSD (Y / N)	VOCs (8260C) / APPENDIX I	Alk, Bicarb, Cl, Sulfate	TDS, TSS	TOC	Ammonia	Dis. Metals (WAC173-351App1)	Total Metals (WAC173-351App1)	Methane, Ethane, Ethene	Sample Specific Notes:
MW-1	12-8-22	1810	G	water	12		X	X	X	X	X	X	X	X	Dissolved metals are field filtered
MW-2	12-7-22	1705		water	12		X	X	X	X	X	X	X	X	
MW-3	12-7-22	1505		water	12		X	X	X	X	X	X	X	X	
MW-4	12-7-22	1325		water	18	Y	X	X	X	X	X	X	X	X	MS/MSD VOCs only
MW-5	12-8-22	1105		water	12		X	X	X	X	X	X	X	X	
MW-6	12-8-22	1615		water	12		X	X	X	X	X	X	X	X	
MW-8	12-7-22	1120		water	12		X	X	X	X	X	X	X	X	
MW-9	12-7-22	0950		water	12		X	X	X	X	X	X	X	X	
MW-10	12-8-22	1235		water	12		X	X	X	X	X	X	X	X	
MW-11	12-8-22	1420		water	12		X	X	X	X	X	X	X	X	
MW-12	12-8-22	0950		water	12		X	X	X	X	X	X	X	X	
MW-21	12-7-22	0700	✓	water	12		X	X	X	X	X	X	X	X	
Trip Blank	NA	NA	NA	water	4		X							X	
Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other															
Possible Hazard Identification:															
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.															
☒ Non-Hazardous ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Return to Client ☒ Dis. Sample for _____ Months															
Special Instructions/QC Requirements & Comments: Dissolved metals are field filtered															
Custody Seals Intact: ☐ Yes ☐ No		Custody Seal No.:		Cooler Temp. (°C): Obs'd: _____ Cor'd: _____											
Relinquished by: <i>ARAC THAM</i>		Parametrix, Inc		Date/Time: 12-9-22 1623											
Relinquished by:		Company:		Date/Time:											
Relinquished by:		Company:		Date/Time:											
				Received by: <i>[Signature]</i>											
				Date/Time: 12/9/22 1623											
				Received in Laboratory											



Therm. ID: 1810 Cor: -1.0 ° Unc: -1.2 °
Cooler Dsc: DB
Packing: DB FedEx: _____
Cust. Seal: Yes No ☒ UPS: _____
Blue Ice: Wet Dry, None Lab Cour: _____
Other: Client
Report

Therm. ID: 1810 Cor: -1.4 ° Unc: -1.6 °
Cooler Dsc: DB
Packing: DB FedEx: _____
Cust. Seal: Yes No ☒ UPS: _____
Blue Ice: Wet Dry, None Lab Cour: _____
Other: Client
Report

Therm. ID: 1810 Cor: -1.7 ° Unc: -1.9 °
Cooler Dsc: DB
Packing: DB FedEx: _____
Cust. Seal: Yes No ☒ UPS: _____
Blue Ice: Wet Dry, None Lab Cour: _____
Other: Client
Report

Therm. ID: 1810 Cor: -1.2 ° Unc: -1.4 °
Cooler Dsc: DB
Packing: DB FedEx: _____
Cust. Seal: Yes No ☒ UPS: _____
Blue Ice: Wet Dry, None Lab Cour: _____
Other: Client
Report

Login Sample Receipt Checklist

Client: Parametrix, Inc.

Job Number: 580-121071-1

Login Number: 121071

List Number: 1

Creator: Presley, Kim A

List Source: Eurofins Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Parametrix, Inc.

Job Number: 580-121071-1

Login Number: 121071

List Number: 3

Creator: Khana, Piyush

List Source: Eurofins Calscience

List Creation: 12/13/22 01:22 PM

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	2072492
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.9
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Parametrix, Inc.

Job Number: 580-121071-1

Login Number: 121071

List Number: 2

Creator: Givens, Keshia

List Source: Eurofins Savannah

List Creation: 12/13/22 02:47 PM

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

This Page Intentionally Left Blank

Project: Horn Rapids Landfill Fourth Quarter 2022: 555-3820-004

Date Completed: 1/3/2023

Sample Numbers: MW-1 through MW-6, MW-8 through MW-12, MW-21, and TB
Test America 580-121071

ENW 230564, 230566 Nitrate

MS/MSD and duplicate samples collected at MW-4

Sample Date: December 7 and 8, 2022

QA/QC Completed By: Lisa Gilbert

Holding Times: All within limits

Chain vs Data: Method 8260B was used instead of 8260D. As a result, RLs were higher. Lab provided J-flagged data above the MDL.

Blanks: (List any compounds detected)

MB

None

Trip

None

Lab Comments: **Sample Receipt**

The samples were received on 12/9/2022 4:23 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 4 coolers at receipt time were -1.7° C, -1.4° C, -1.2° C and -1.0° C.

VOCs (8260B)

Method 8260B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries and precision for analytical batch 570-289424 were outside control limits (RPD 68% for vinyl acetate, qualified F2). Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory sample control duplicate (LCS/LCSD) precision was within acceptance limits.

RSK-175

No analytical or quality issues were noted.

Metals (200.8)

Method 200.7 Rev 4.4: The post digestion spike % recovery for Ca associated with batch 580-413533 was outside of control limits. The associated sample is: (580-121071-J-1-A PDS).

Lab explanation of significance: The post digestion spike is something we do each batch just in case even though it is often not needed. In this case looking at the data the concentration of Ca in the sample that the PDS was done on is high enough that the recovery does not really tell us much similar to how the MS/MSD is 4 flagged.

Method 200.7 Rev 4.4: The serial dilution performed for the following sample associated with batch 580-413533 was outside control limits for Na and K: (580-121027-A-1-A SD ^5)

Project: Horn Rapids Landfill Fourth Quarter 2022: 555-3820-004
Date Completed: 1/3/2023
Sample Numbers: MW-1 through MW-6, MW-8 through MW-12, MW-21, and TB
Test America 580-121071
ENW 230564, 230566 Nitrate
MS/MSD and duplicate samples collected at MW-4
Sample Date: December 7 and 8, 2022
QA/QC Completed By: Lisa Gilbert

Lab explanation of significance: If the serial dilution is off then physical or chemical interference is suspected. In this case Na concentration in the parent sample looks to have been high enough to cause the qc failure. Since this result on this undiluted sample was likely wrong the % difference on the serial dilution was also off. Na interferes with K explaining the K being off.

The results of these samples do not have any bearing on the overall quality of the test just these specific samples.

General Chemistry

No analytical or quality issues were noted.

Parametrix Qualifiers

Quality TDS in MW-4 and MW-21 "J" due to high variability between sample and field duplicate

Data Validation

Horn Rapids 555-3820-004

QA/QC completed by: Lisa Gilbert

1/3/2023

Sample number: MW-1 through MW-6, MW-8 through MW-12, MW-21, and TB
 Test America 580-121071
 ENW 230564, 230566 Nitrate
 Sample Date: December 7 and 8, 2022

Parameter	sample	duplicate	avg	diff	rpd	=/<25%	RL	w/in RL?
	MW-4	MW-21						
Metals total (ug/L)								
Arsenic	0.0046	0.0040	0.0043	0.0006	14	y	0.0010	
Antimony	<0.0008	<0.0008	#DIV/0!	#VALUE!	#VALUE!		0.00080	y
Barium	0.058	0.051	0.0545	0.007	13	y	0.0012	
Beryllium	<0.0004	<0.0004	#DIV/0!	#VALUE!	#VALUE!		0.00040	y
Cadmium	<0.0004	<0.0004	#DIV/0!	#VALUE!	#VALUE!		0.00040	y
Chromium	0.0038	0.0035	0.00365	0.0003	8	y	0.00080	
Cobalt	0.017	0.016	0.0165	0.001	6	y	0.00040	
Copper	<0.002	<0.002	#DIV/0!	#VALUE!	#VALUE!		0.0020	y
Lead	<0.0004	<0.0004	#DIV/0!	#VALUE!	#VALUE!		0.00040	y
Nickel	<0.003	<0.003	#DIV/0!	#VALUE!	#VALUE!		0.0030	y
Selenium	<0.008	<0.008	#DIV/0!	#VALUE!	#VALUE!		0.0080	y
Silver	<0.0004	<0.0004	#DIV/0!	#VALUE!	#VALUE!		0.00040	y
Thallium	<0.001	<0.001	#DIV/0!	#VALUE!	#VALUE!		0.0010	y
Vanadium	0.013	0.011	0.012	0.002	17	y	0.0040	
Zinc	<0.007	<0.007	#DIV/0!	#VALUE!	#VALUE!		0.0070	y
Metals dissolved (ug/L)								
Calcium	88	88	88	0	0	y	0.50	
Magnesium	19	19	19	0	0	y	0.50	
Manganese	<0.02	<0.02	#DIV/0!	#VALUE!	#VALUE!		0.020	y
Potassium	6.9	7.1	7	-0.2	3	y	3.3	
Sodium	14	14	14	0	0	y	0.50	
Iron	0.12	0.12	0.12	0	0	y	0.10	
RSK (ug/L)								
ethane	<1.1	<1.1	#DIV/0!	#VALUE!	#VALUE!		1.1	y
ethene	<1.0	<1.0	#DIV/0!	#VALUE!	#VALUE!		1.00	y
methane	0.61	0.66	0.635	-0.05	8	y	0.58	

QA/QC completed by: Lisa Gilbert

1/3/2023

Sample number: MW-1 through MW-6, MW-8 through MW-12, MW-21, and TB
 Test America 580-121071
 ENW 230564, 230566 Nitrate
 Sample Date: December 7 and 8, 2022

Parameter	sample	duplicate	avg	diff	rpd	=/<25%	RL	w/in RL?
	MW-4	MW-21						
Conventional (mg/L)								
chloride	15	14	14.5	1	7	y	1.5	
nitrate	7.3	7.3	7.3	0	0	y	0.05	
sulfate	32	33	32.5	-1	3	y	1.5	
TOC	<1.5	<1.5	#DIV/0!	#VALUE!	#VALUE!		1.5	y
Ammonia	<0.5	<0.5	#DIV/0!	#VALUE!	#VALUE!		0.50	y
Alkalinity	240	240	240	0	0	y	7.0	
Bicarbonate	240	240	240	0	0	y	7.0	
TDS	520	400	460	120	26	n	10	n
TSS	<2	<2	#DIV/0!	#VALUE!	#VALUE!		2.0	y
VOCs (ug/L)								
1,1-dichloroethane	5.1	4.9	5	0.2	4	y	0.50	
1,2-dichloroethane	<0.5	<0.5	#DIV/0!	#VALUE!	#VALUE!		0.50	y
1,2-dichloropropane	<0.5	<0.5	#DIV/0!	#VALUE!	#VALUE!		0.50	y
acetone	<8	<8	#DIV/0!	#VALUE!	#VALUE!		8.00	y
benzene	<0.5	<0.5	#DIV/0!	#VALUE!	#VALUE!		0.50	y
bromodichloromethane	<0.5	<0.5	#DIV/0!	#VALUE!	#VALUE!		0.50	y
chloroform	0.33	0.32	0.325	0.01	3	y	0.50	
cis-1,2-dichloroethene	5.7	5.6	5.65	0.1	2	y	0.50	y
tetrachloroethene	0.40	0.50	0.45	-0.1	22	y	0.50	
trans-1,2-dichloroethene	<0.5	<0.5	#DIV/0!	#VALUE!	#VALUE!		0.50	y
trichloroethene	0.64	0.57	0.605	0.07	12	y	0.50	
trichlorotrifluoromethane	0.85	0.85	0.85	0	0	y	0.50	
vinyl chloride	<0.5	<0.5	#DIV/0!	#VALUE!	#VALUE!		0.50	y

Horn Rapids Data Validation Checklist
Holding Times

Analyte	Holding Time	prep/analysis	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-8	MW-9	MW-10	MW-11	MW-12	MW-21	TB
date sampled			12/8/2022	12/7/2022	12/7/2022	12/7/2022	12/8/2022	12/8/2022	12/7/2022	12/7/2022	12/8/2022	12/8/2022	12/8/2022	12/7/2022	12/7/2022
time sampled			1810	1705	1505	1325	1105	1615	1120	950	1235	1420	950	700	
VOCs	14 days (pres)	16-Dec	√	√					√	√	√	√	√	√	
		15-Dec			√	√	√	√							
MEE	14 days (pres)	20-Dec	√				√	√			√	√			
		17-Dec		√	√	√			√	√				√	
		21-Dec											√		
Metals 200.7 D	6 months	16-Dec	√					√							
		19-Dec		√	√	√	√		√	√	√	√	√	√	
Metals 200.8 T	6 months	19-Dec	√					√	√	√	√	√	√	√	
		16-Dec		√	√	√	√								
Iron 200.8 D	6 months	16-Dec	√					√							
		19-Dec		√	√	√	√		√	√	√	√	√	√	
Chloride	28 days	29-Dec	√	√	√	√	√	√	√						
		20-Dec								√	√	√	√	√	
Sulfate	28 days	29-Dec	√	√	√	√	√	√	√						
		20-Dec								√	√	√	√	√	
TOC	28 days	28-Dec	√	√	√		√								
		29-Dec				√		√	√	√	√	√	√	√	
Ammonia	28 days	21-Dec	√	√	√	√	√	√	√	√	√	√	√	√	
Alkalinity	14 days	20-Dec	√	√	√	√	√	√	√	√	√	√	√	√	
Bicarbonate	14 days	20-Dec	√	√	√	√	√	√	√	√	√	√	√	√	
TDS	7 days	14-Dec	√	√	√	√	√	√	√	√	√	√	√	√	
TSS	7 days	14-Dec	√				√	√			√	√	√		

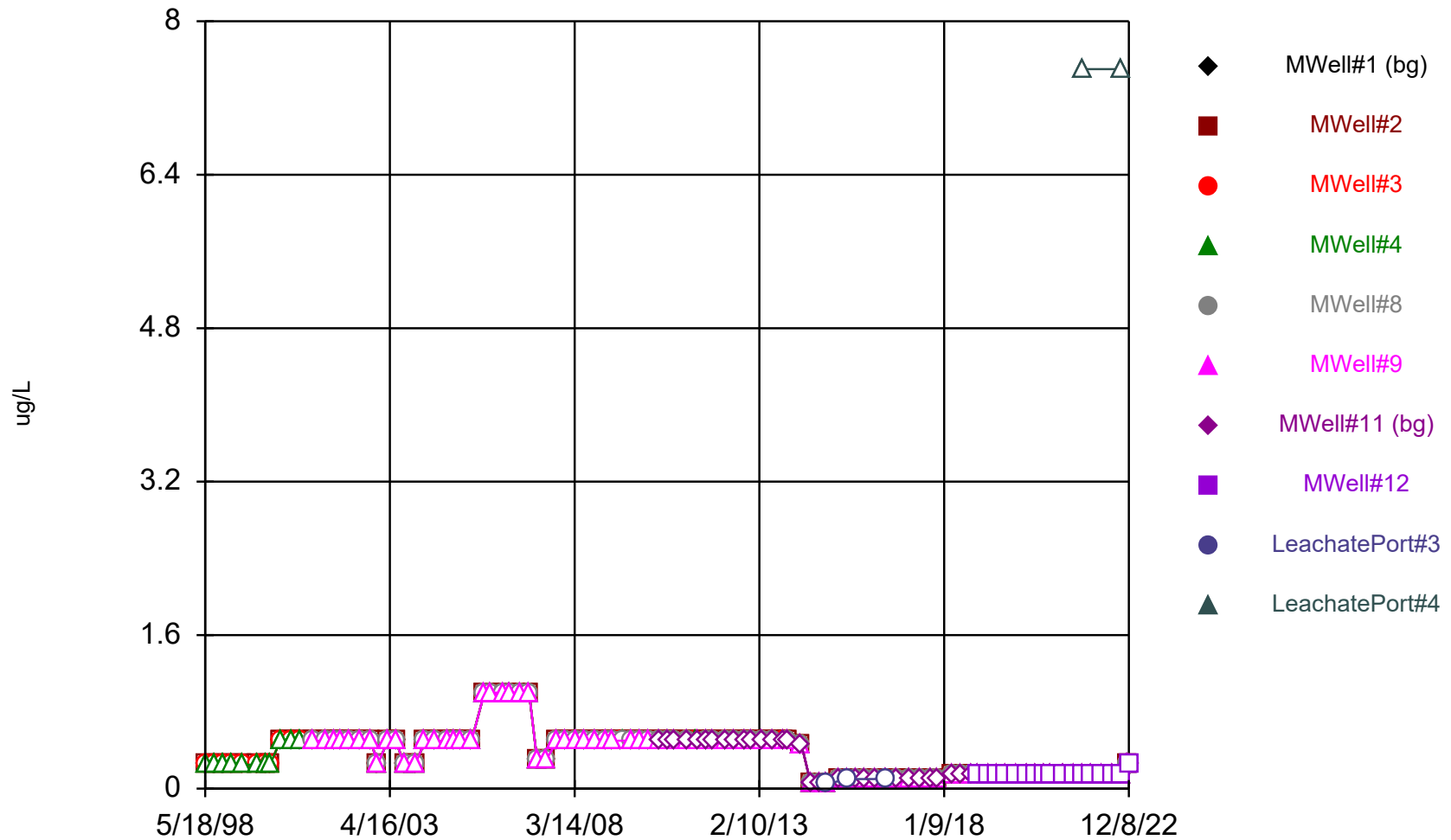
This Page Intentionally Left Blank

Appendix C

Time-Series Plots



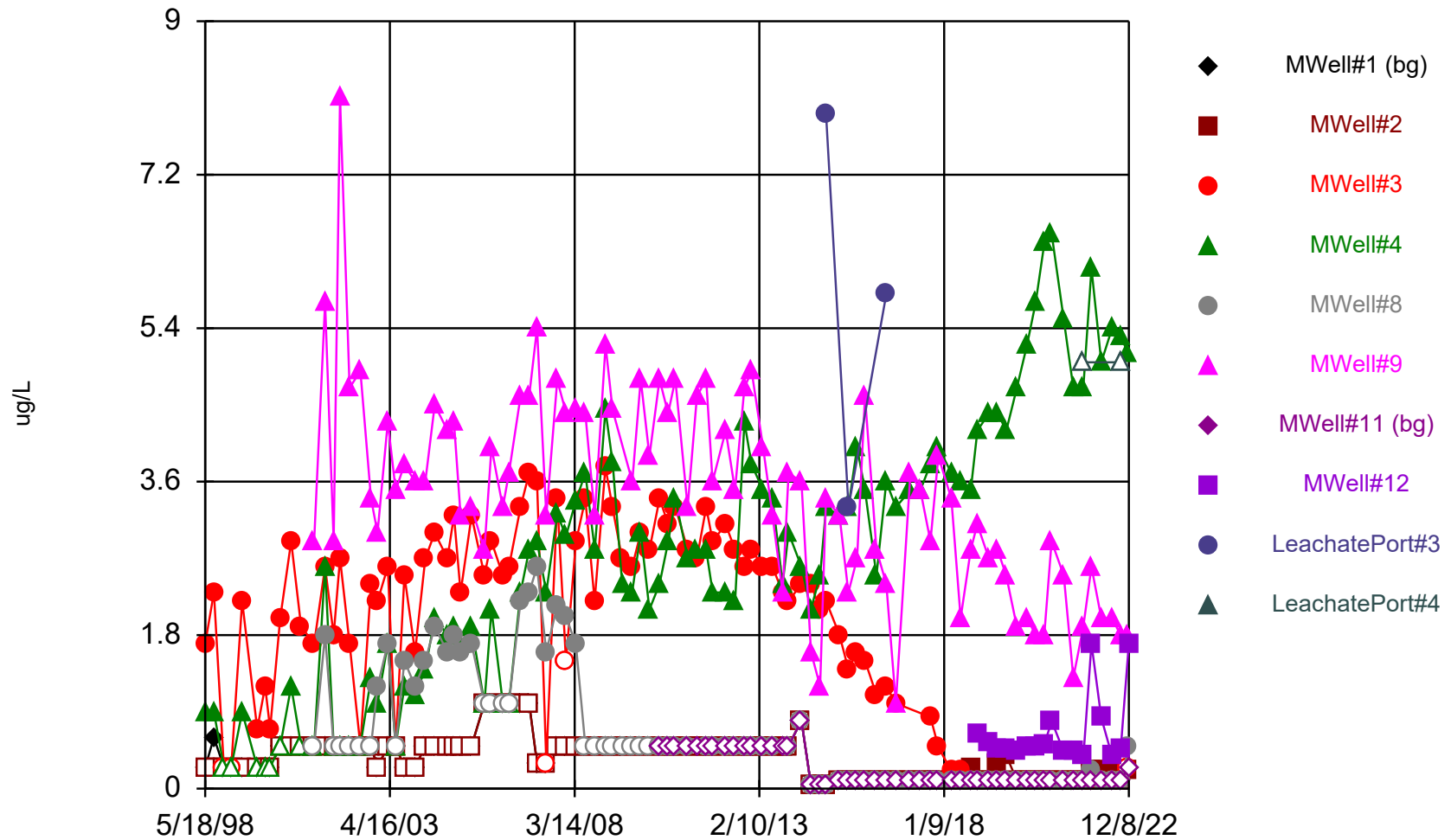
Time Series



Constituent: 1,1,1,2-Tetrachloroethane Analysis Run 2/3/2023 4:02 PM View: HRLF_TSP Set1

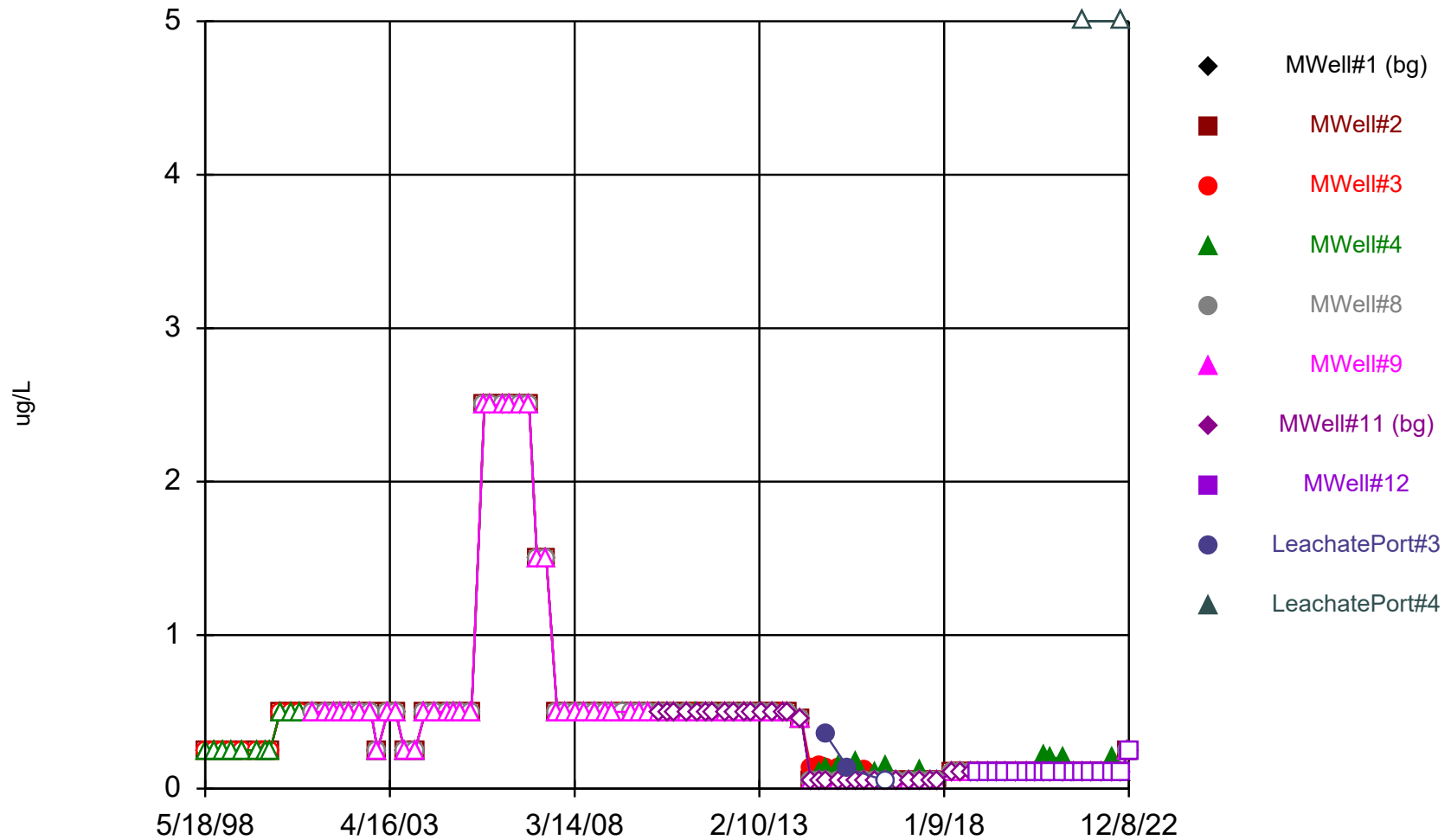
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



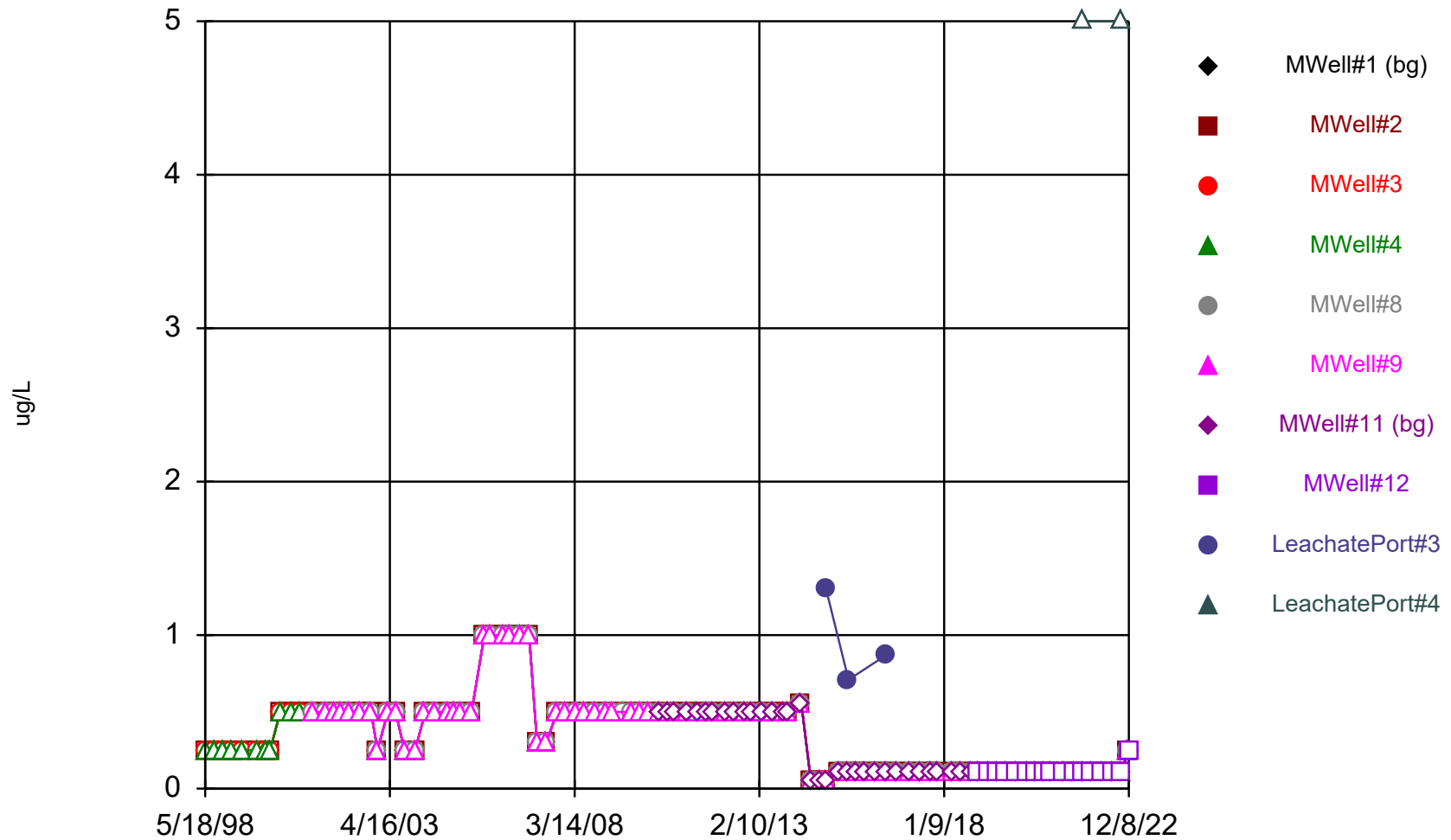
Constituent: 1,1-Dichloroethane Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



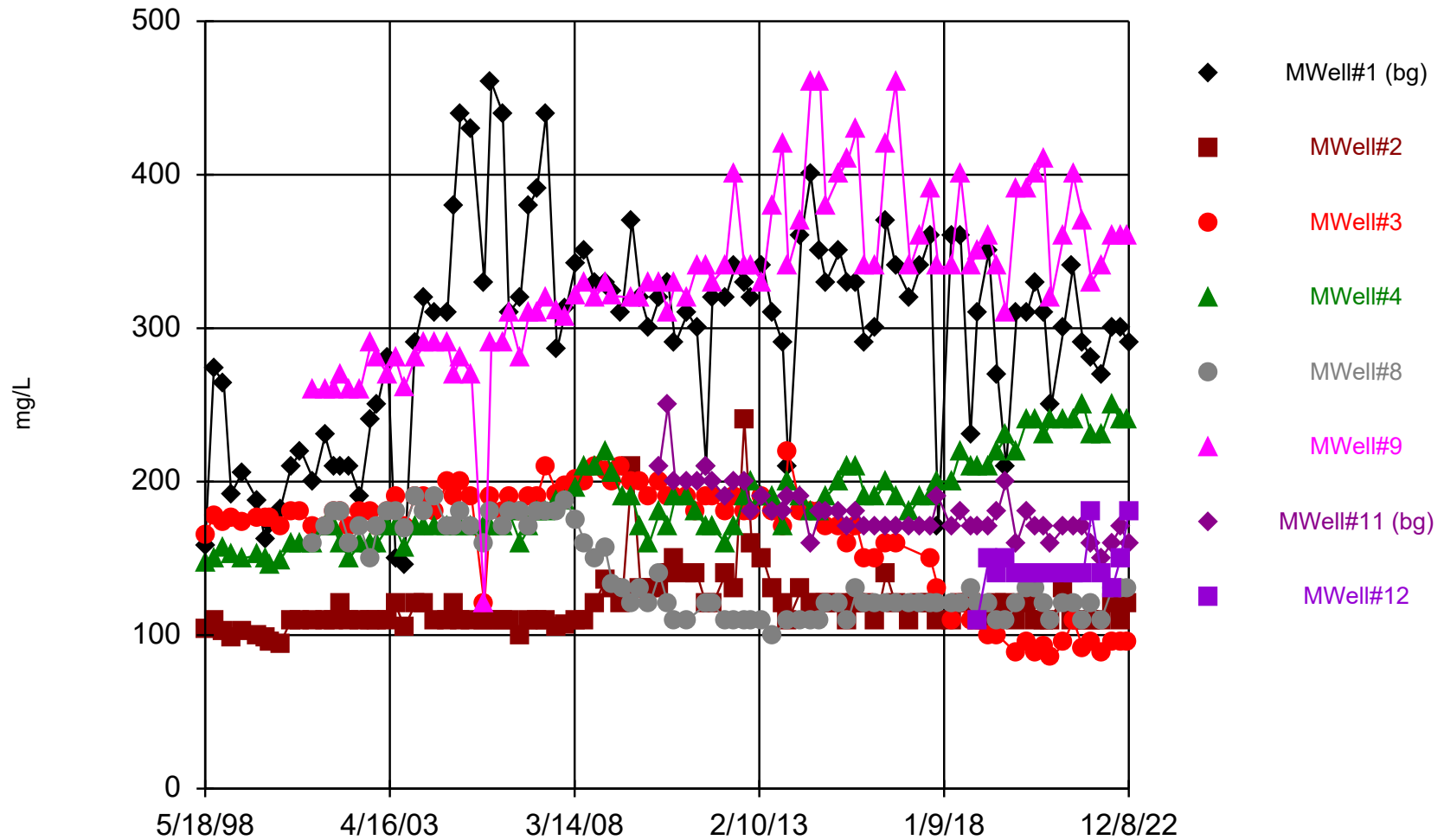
Constituent: 1,1-Dichloroethene Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: 1,2-Dichloroethane Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

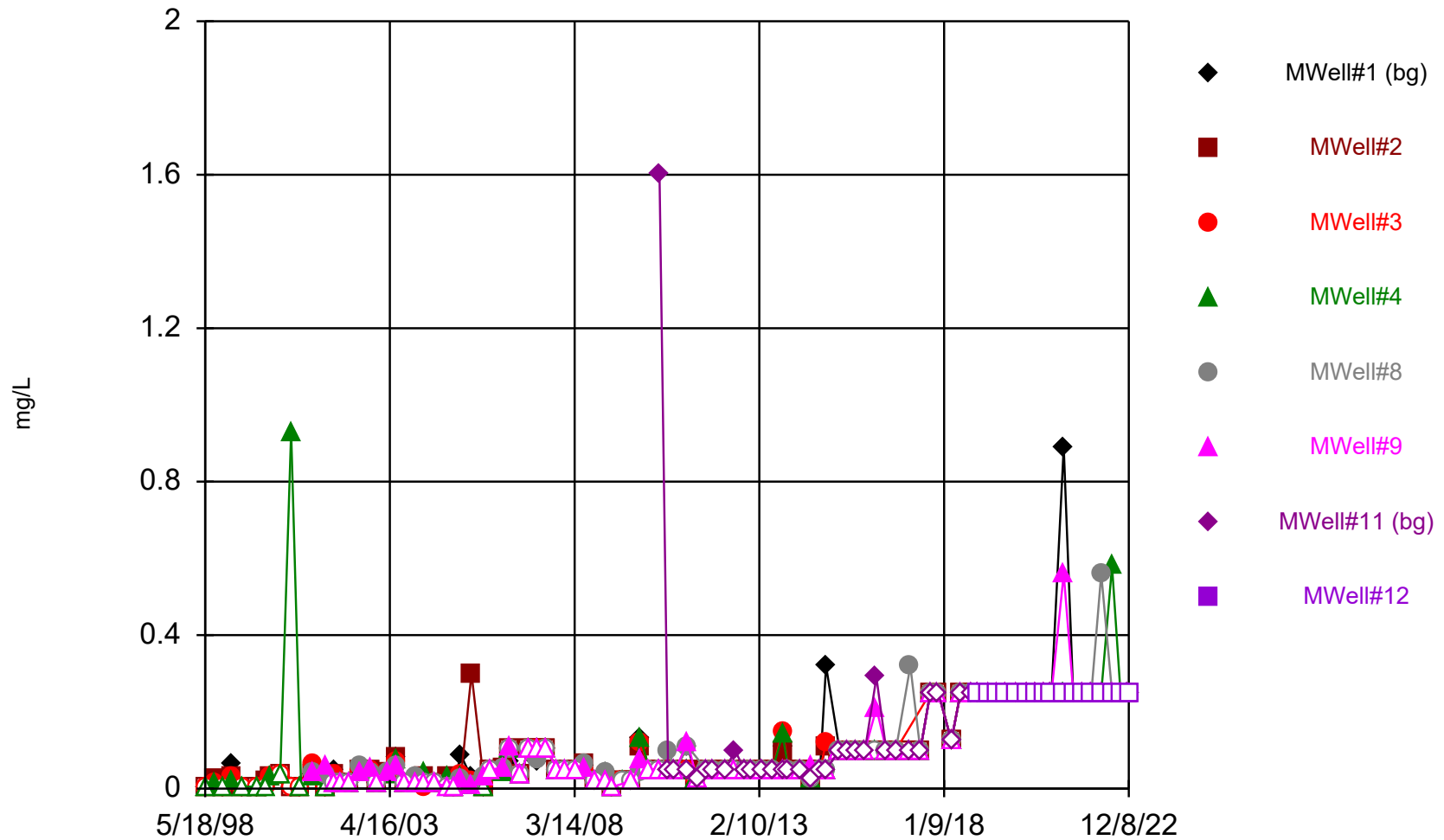
Time Series



Constituent: Alkalinity Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

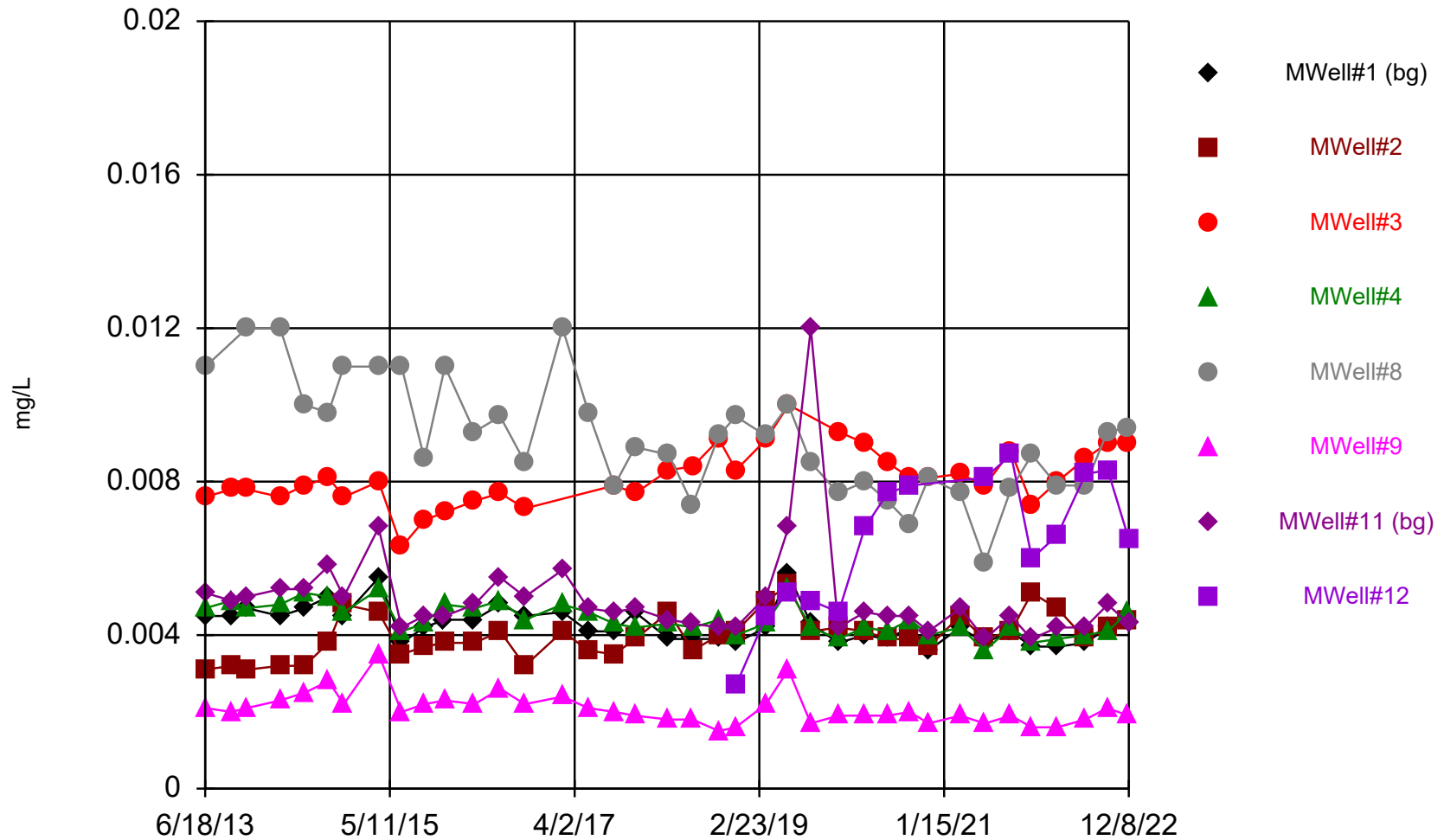
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Ammonia Nitrogen Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

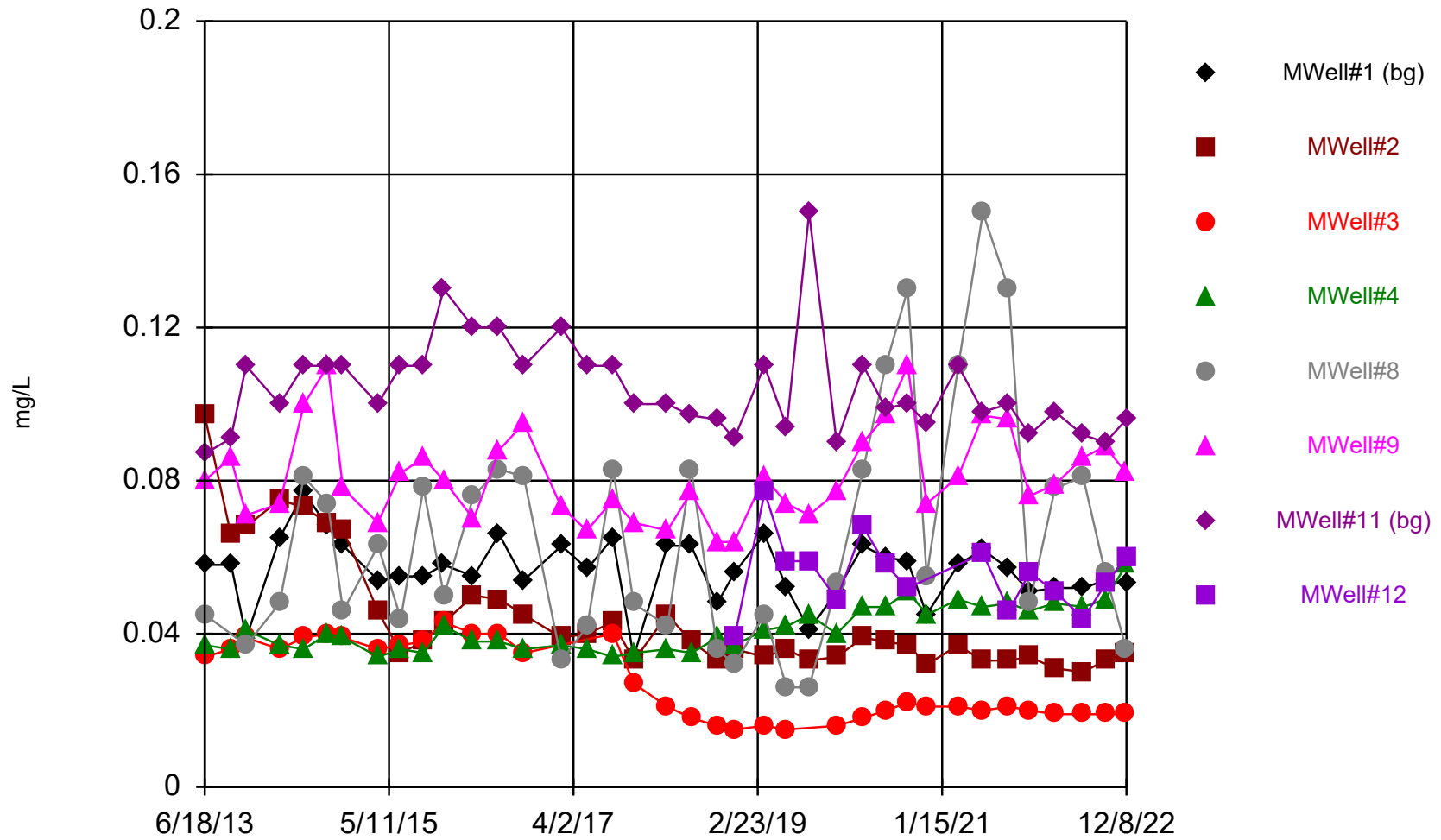
Time Series



Constituent: Arsenic, Total Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

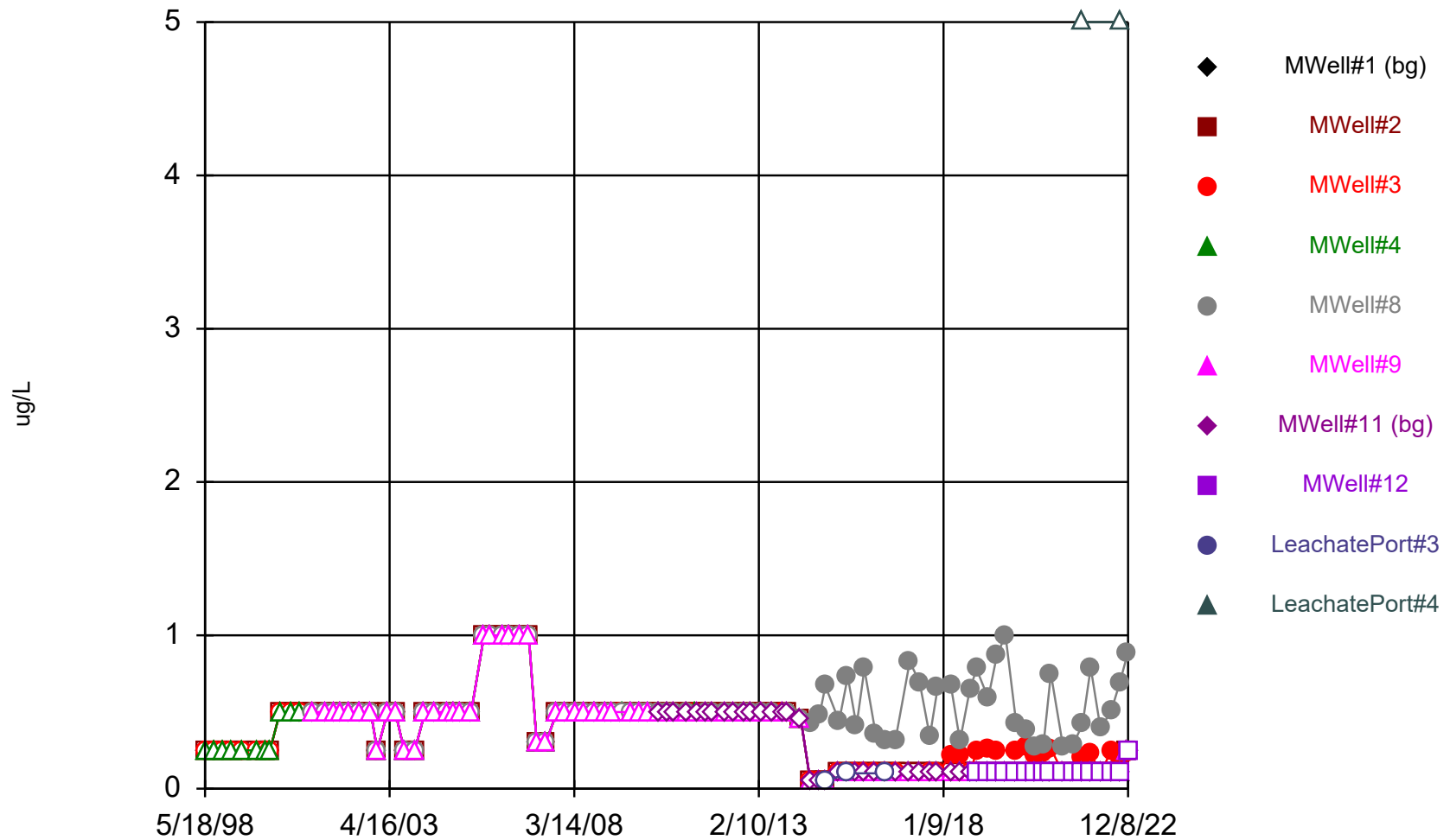
Time Series



Constituent: Barium, Total Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

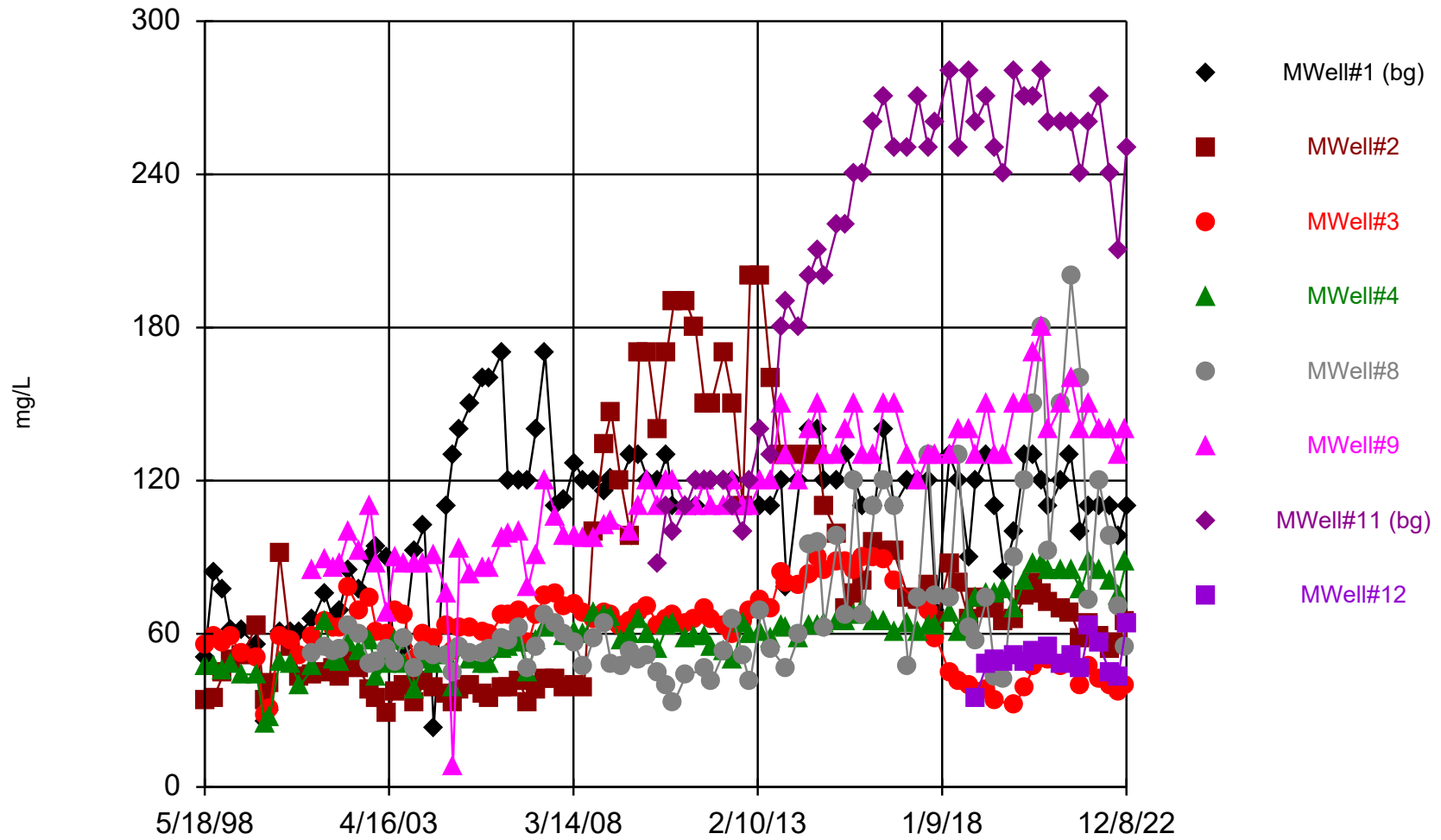
Time Series



Constituent: Bromodichloromethane Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

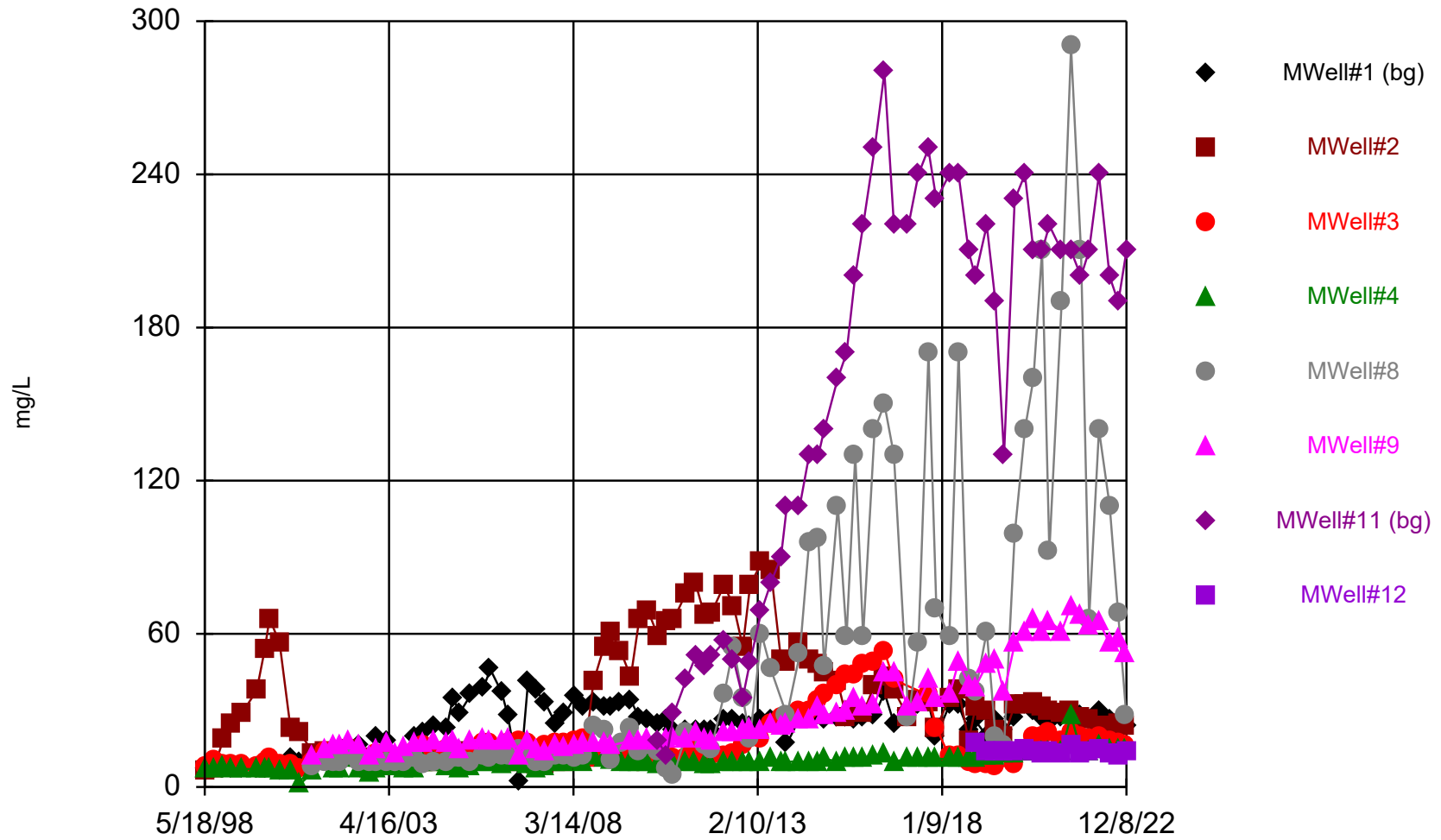
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Calcium, Dissolved Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

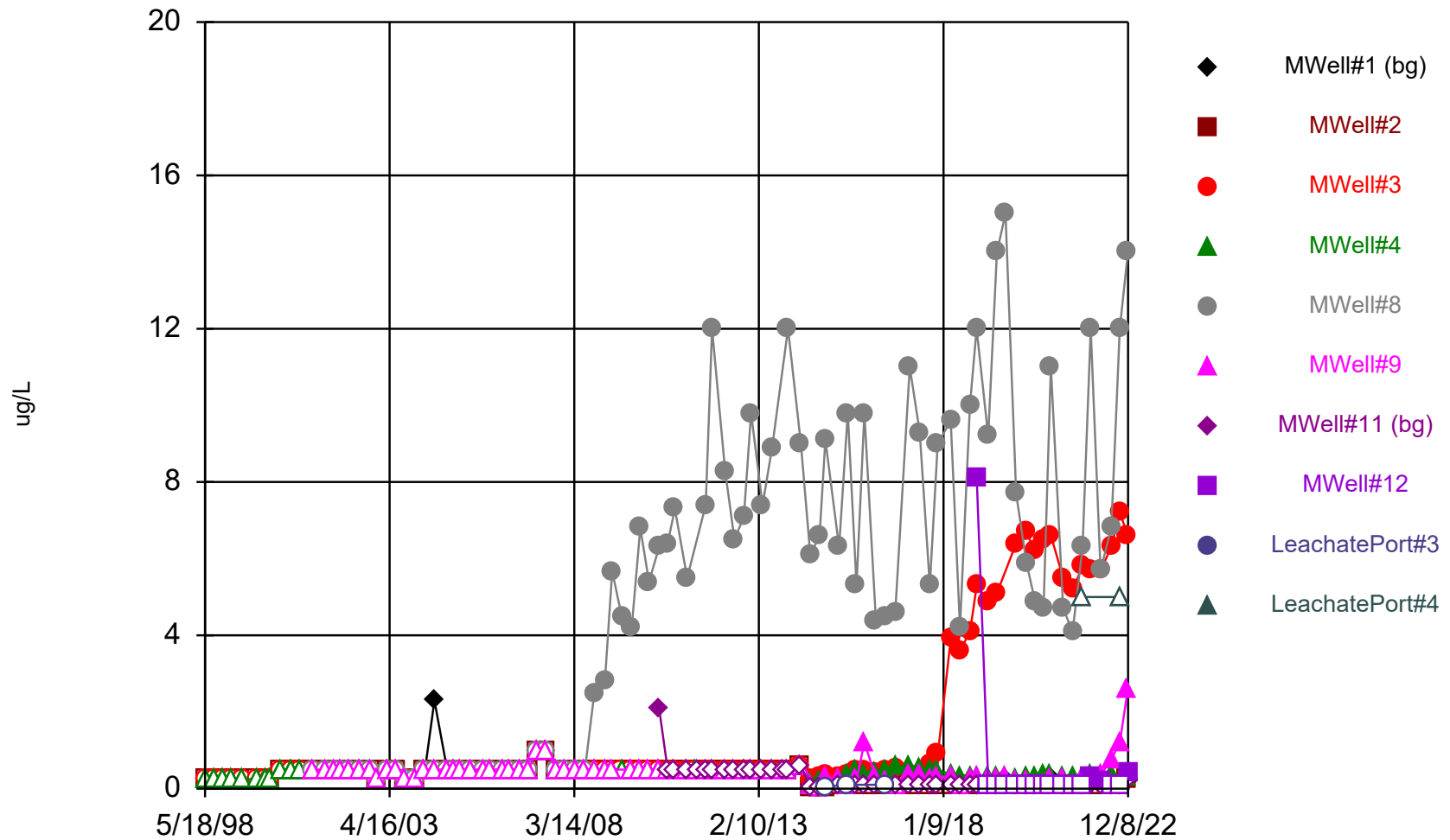
Time Series



Constituent: Chloride Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

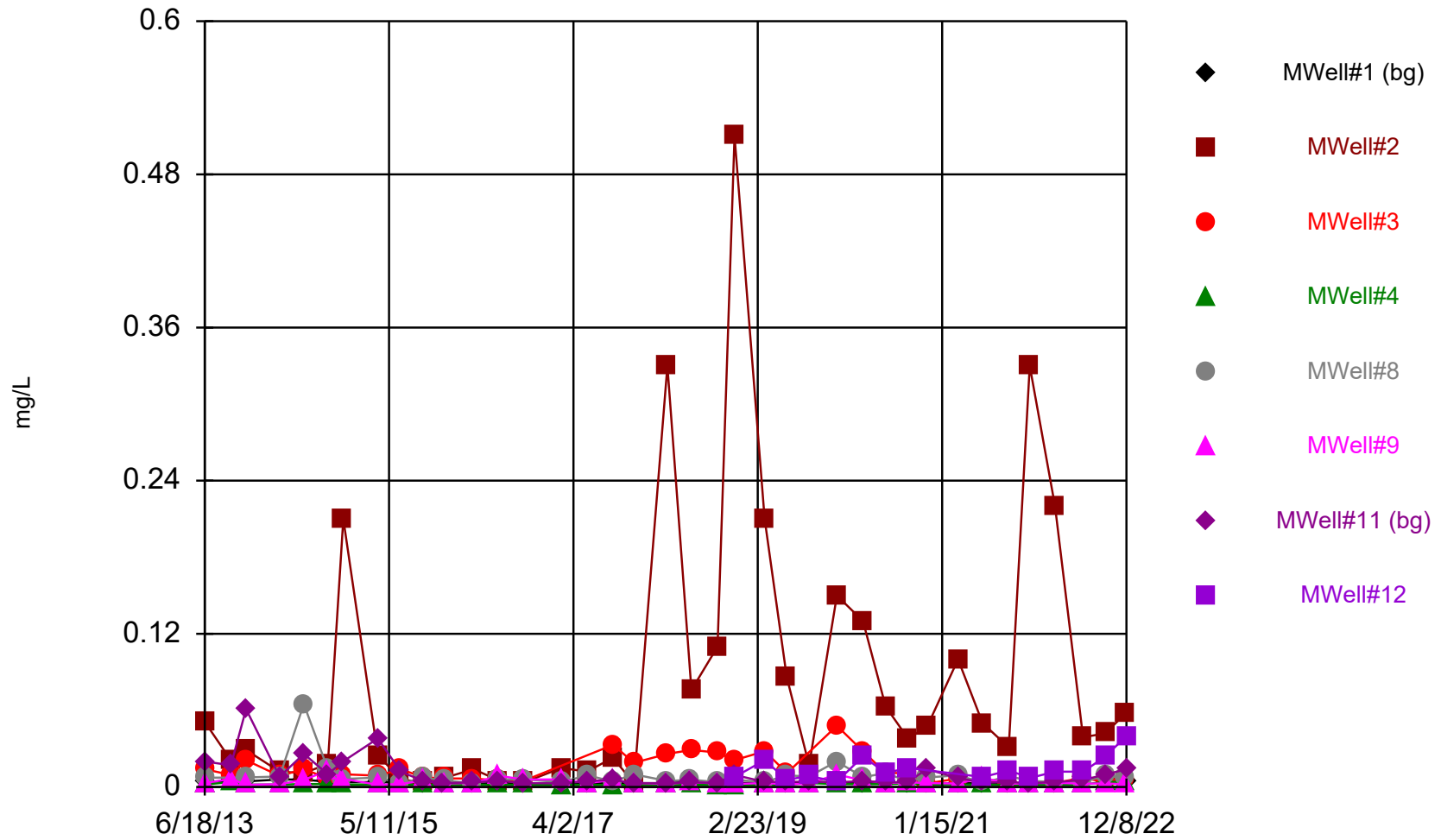
Time Series



Constituent: Chloroform Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

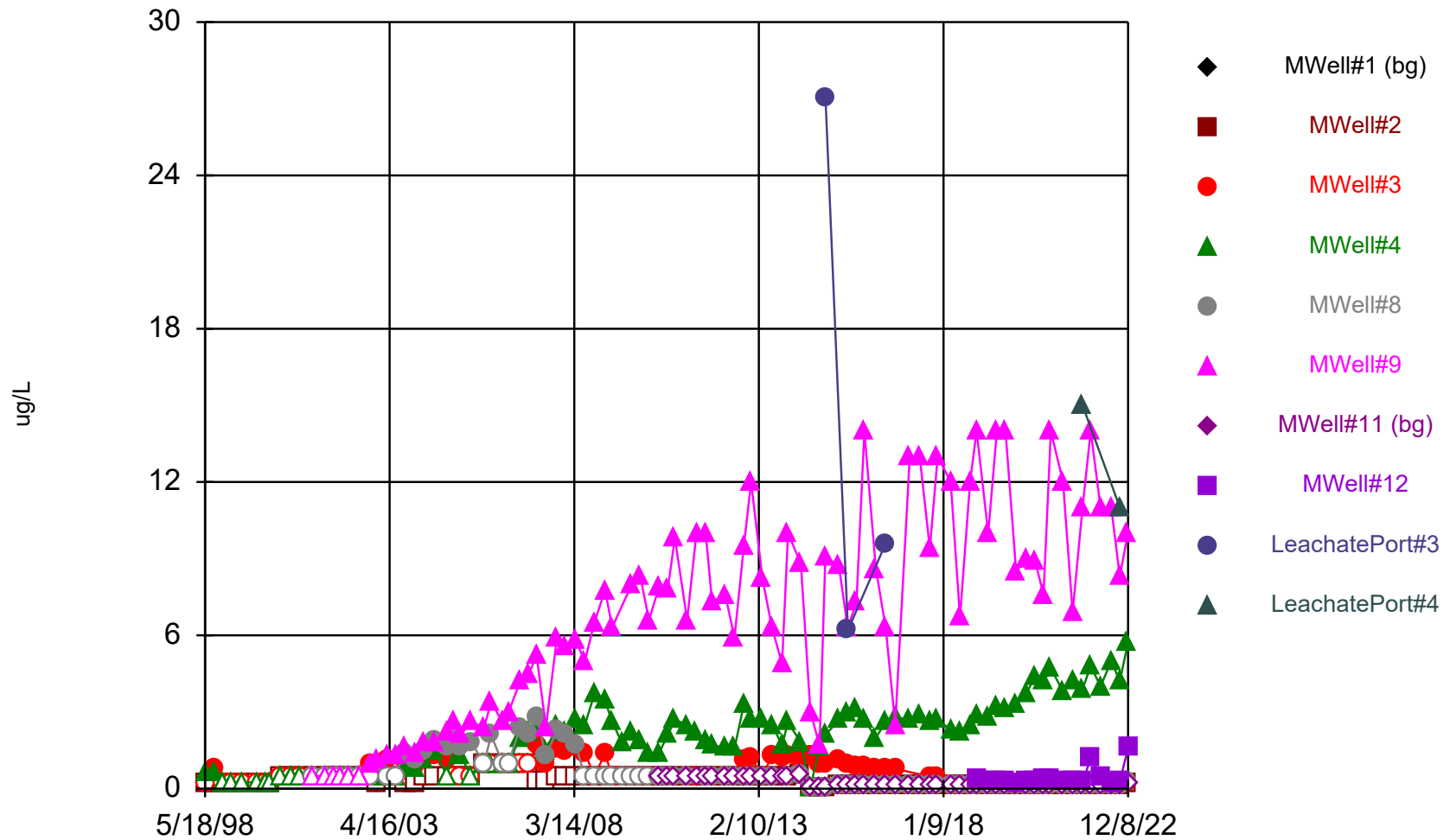
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



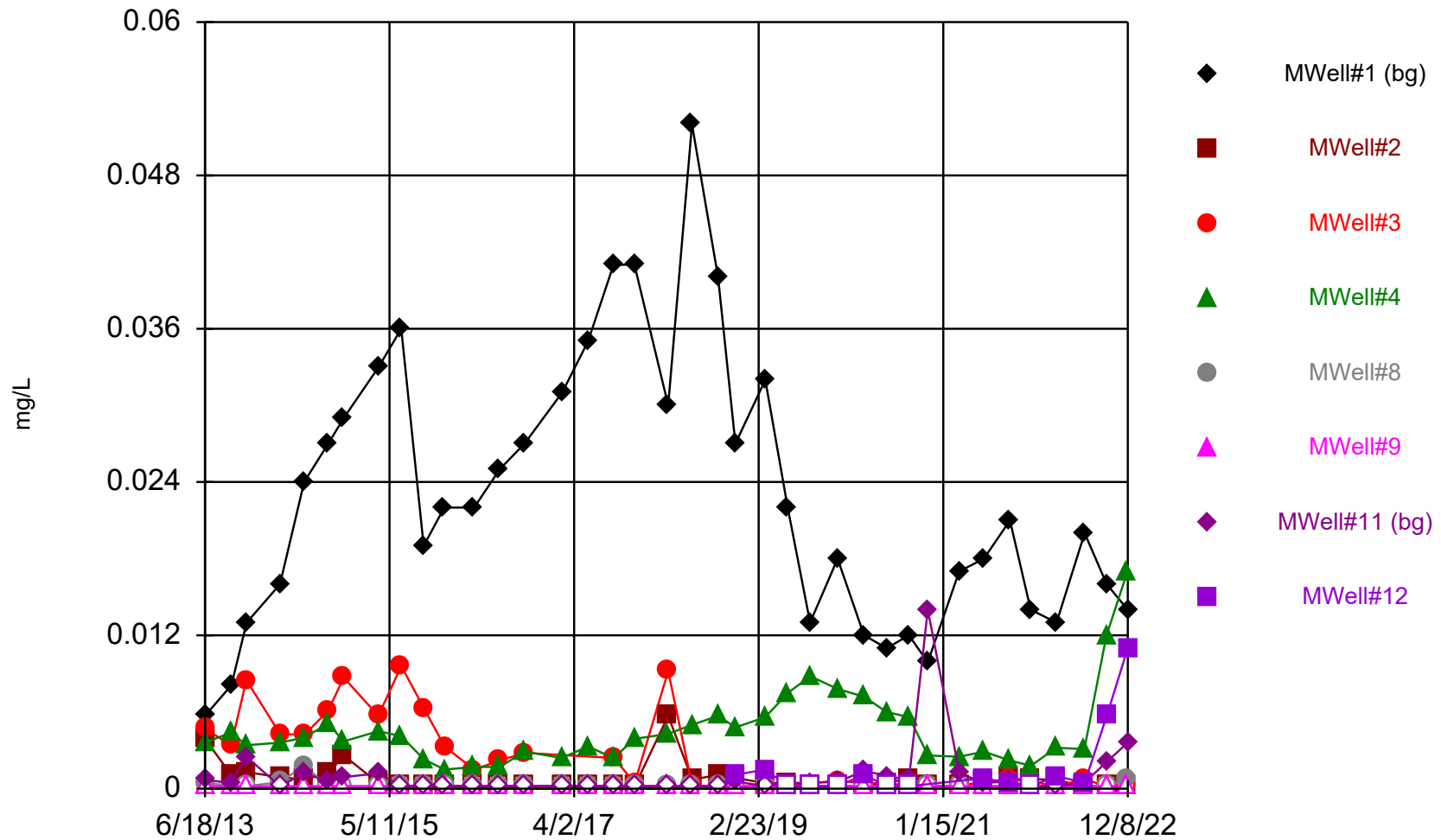
Constituent: Chromium, Total Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: cis-1,2-Dichloroethene Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

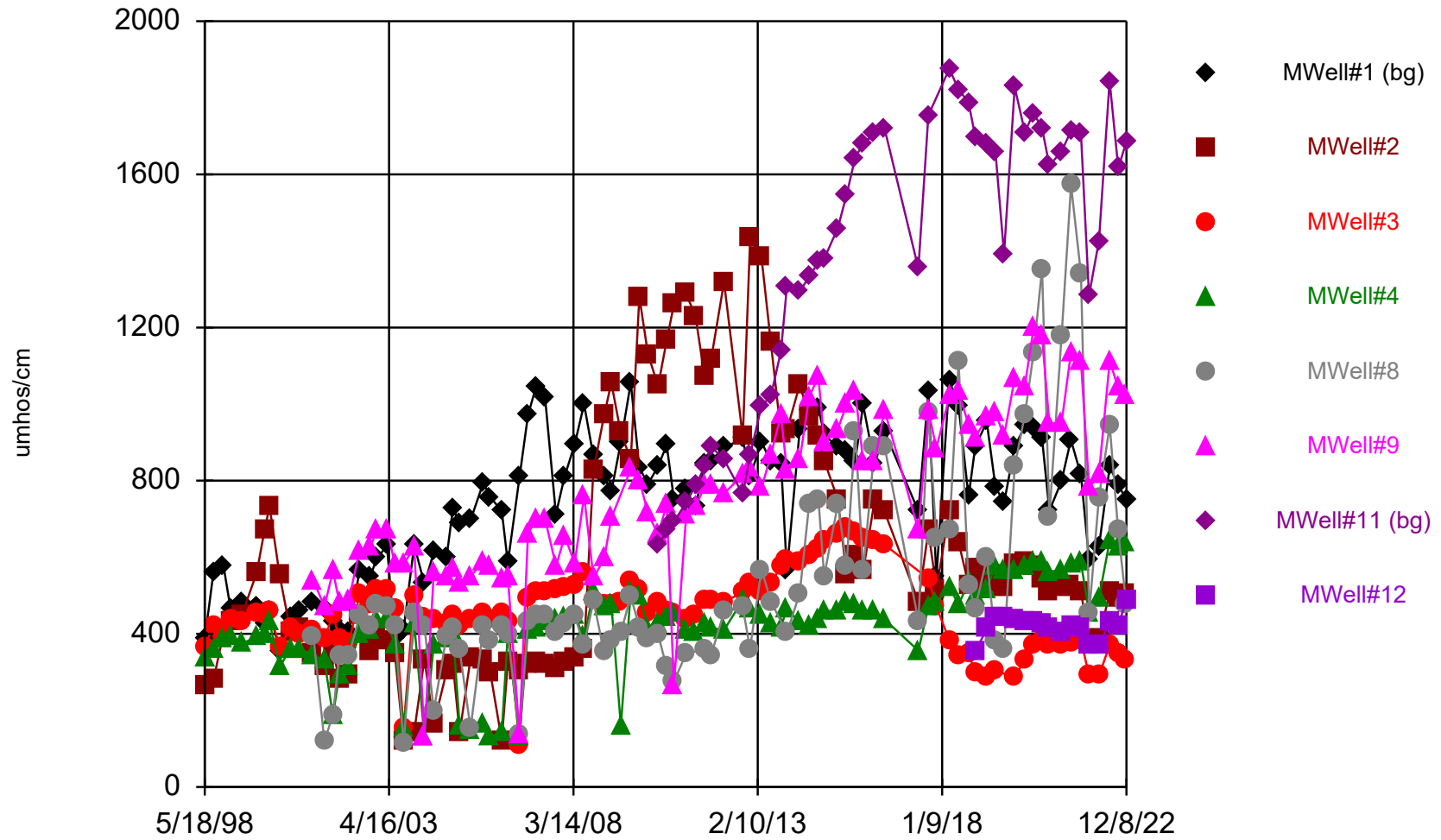
Time Series



Constituent: Cobalt, Total Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

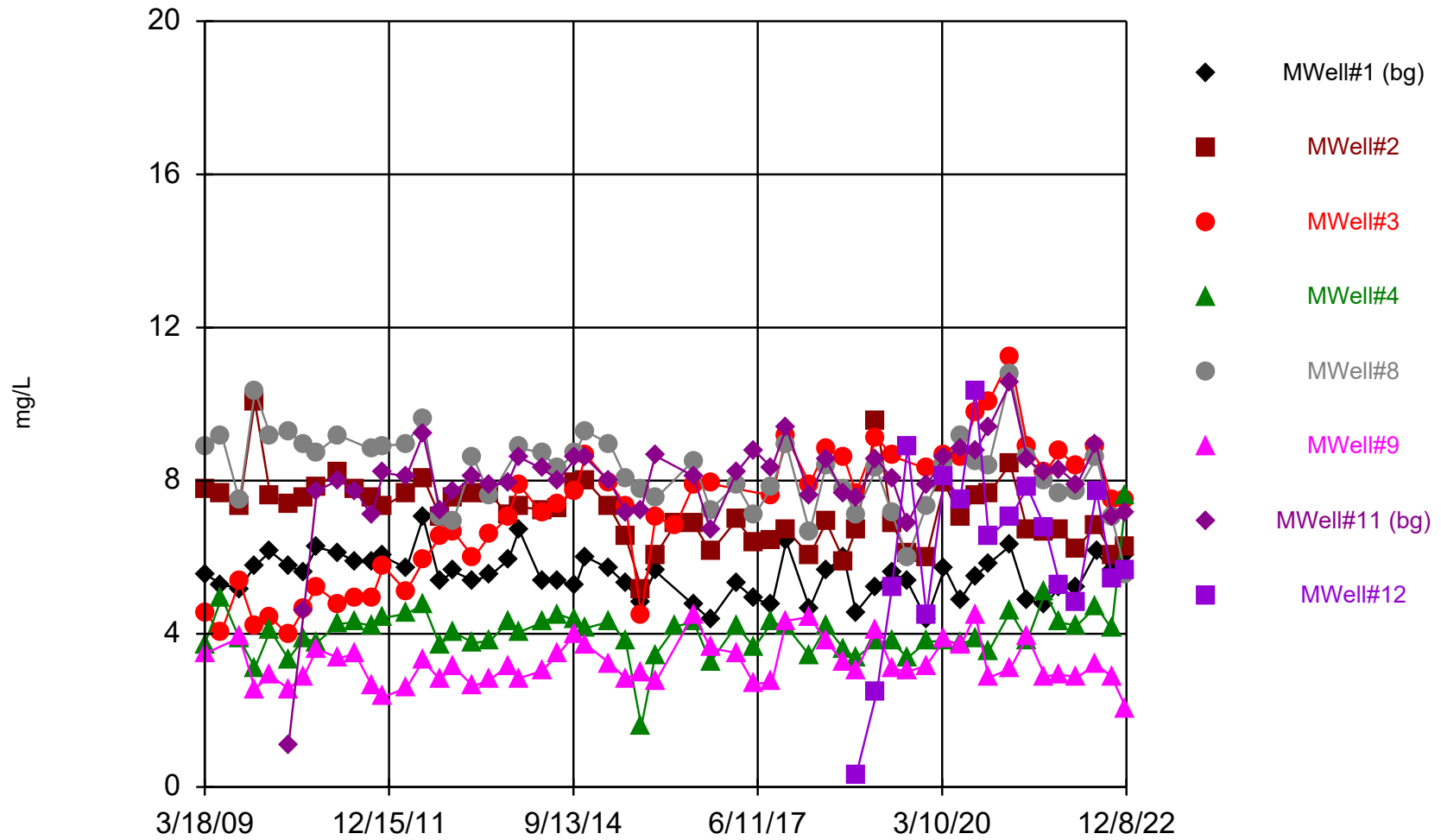
Time Series



Constituent: Conductivity Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

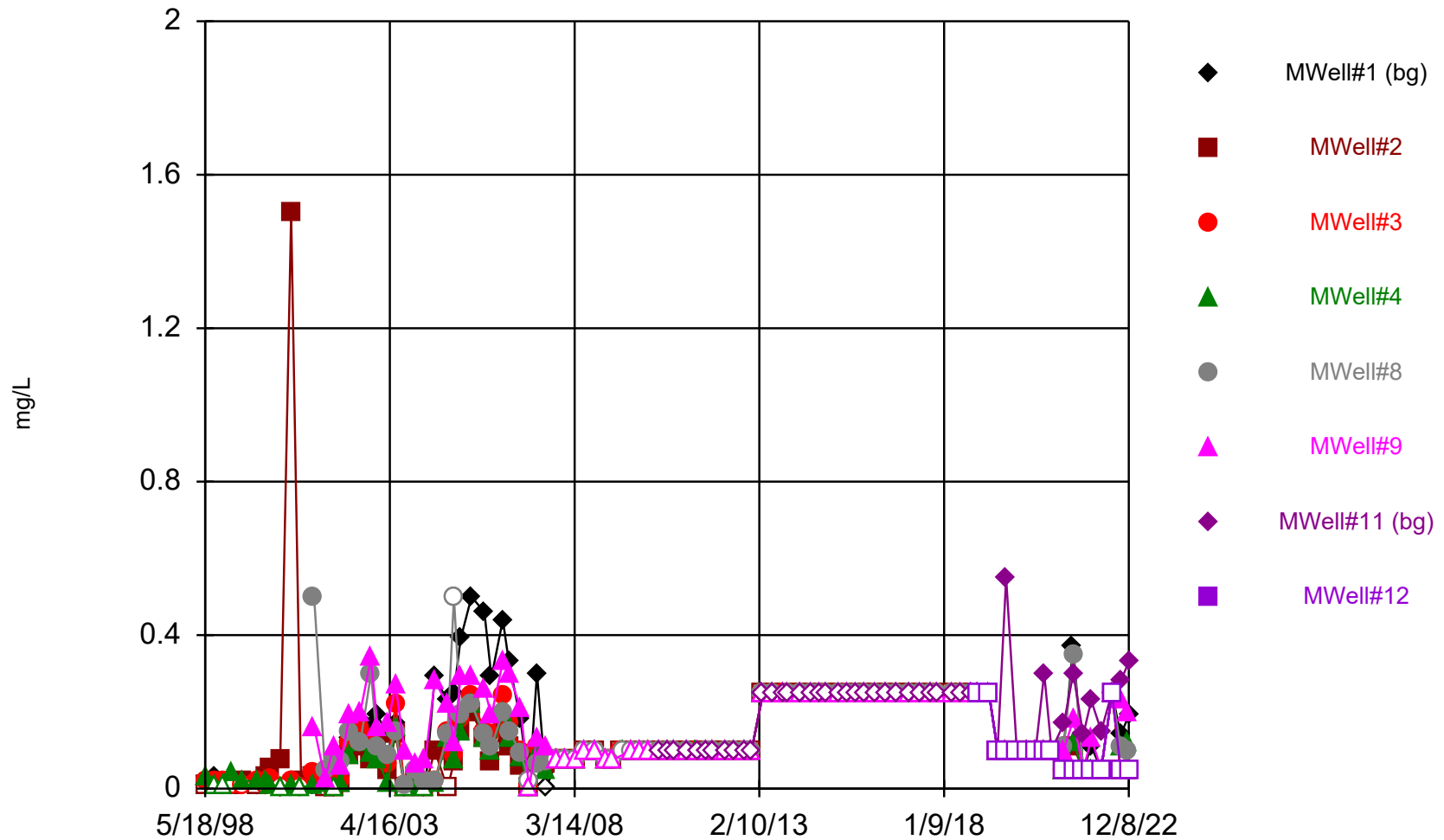
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Dissolved Oxygen Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

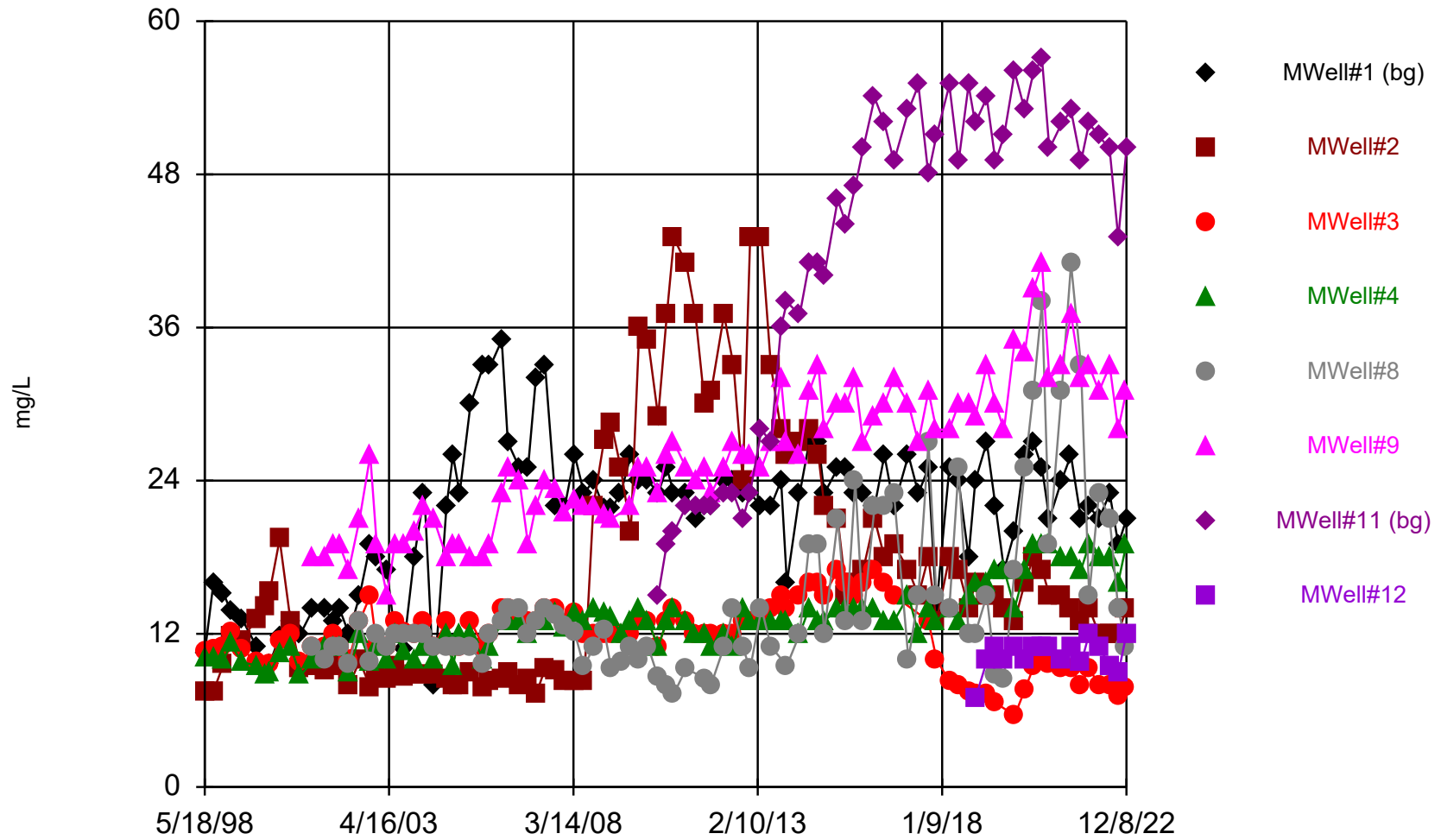
Time Series



Constituent: Iron, Dissolved Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

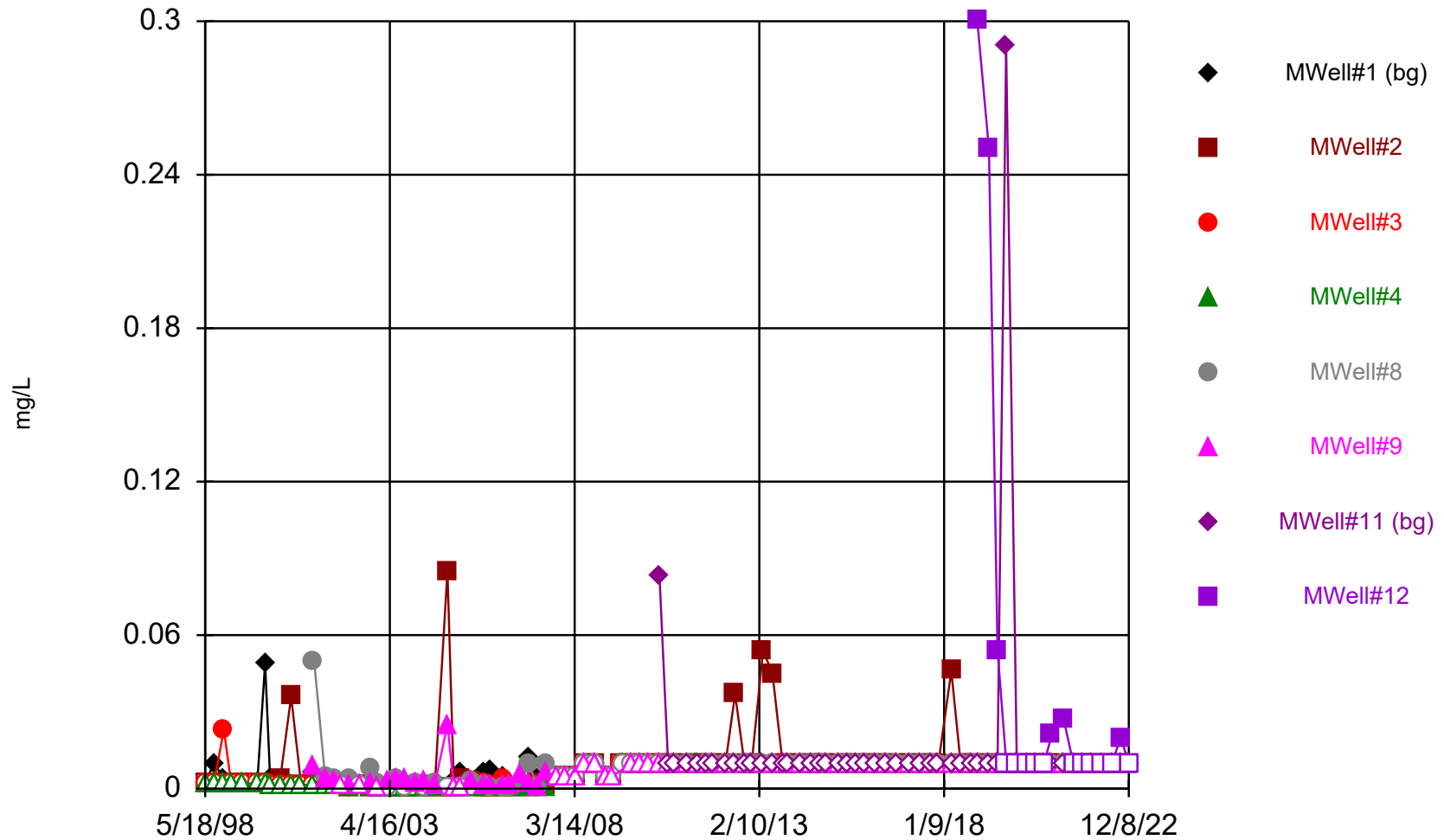
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



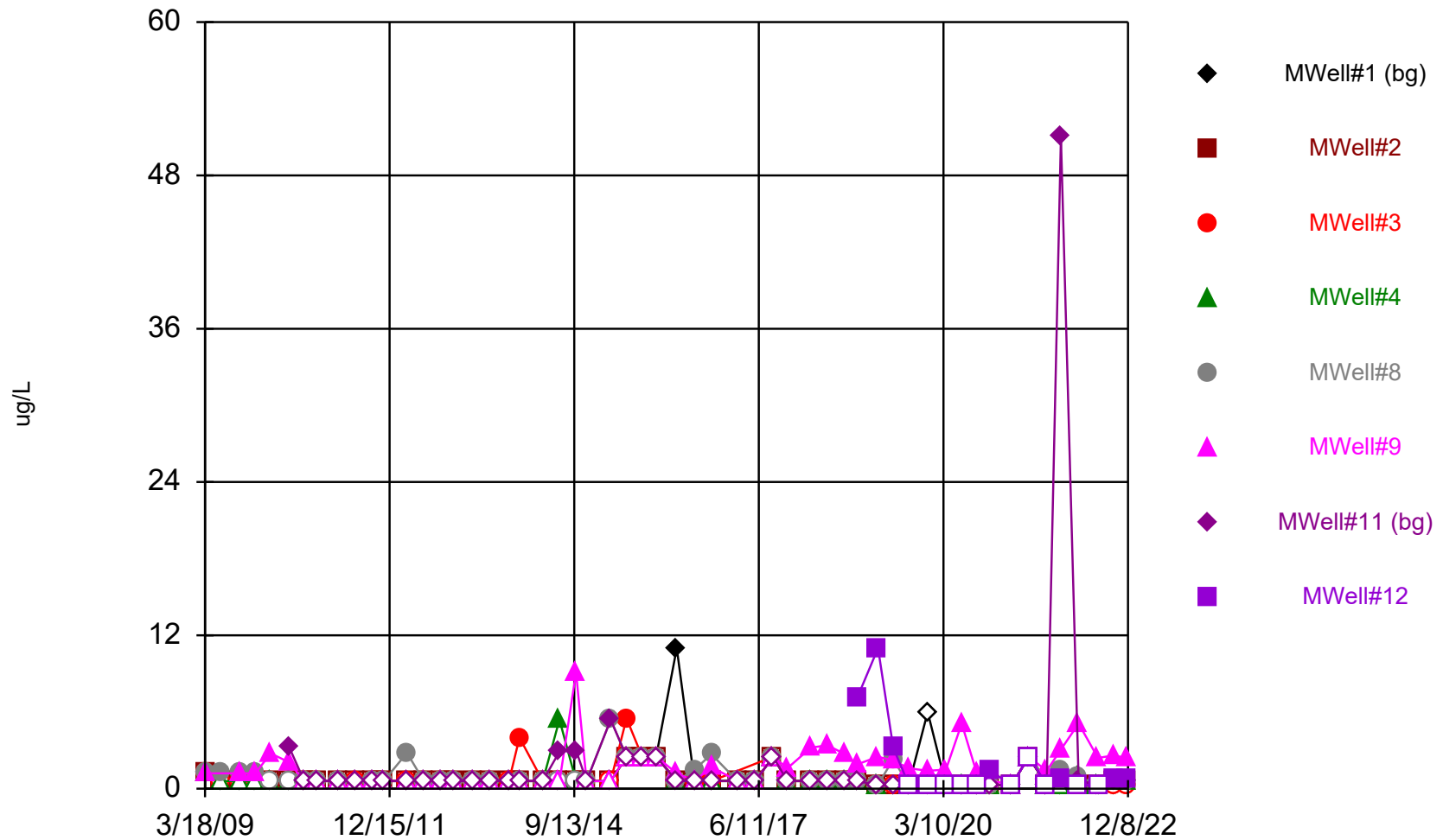
Constituent: Magnesium, Dissolved Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Manganese, Dissolved Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

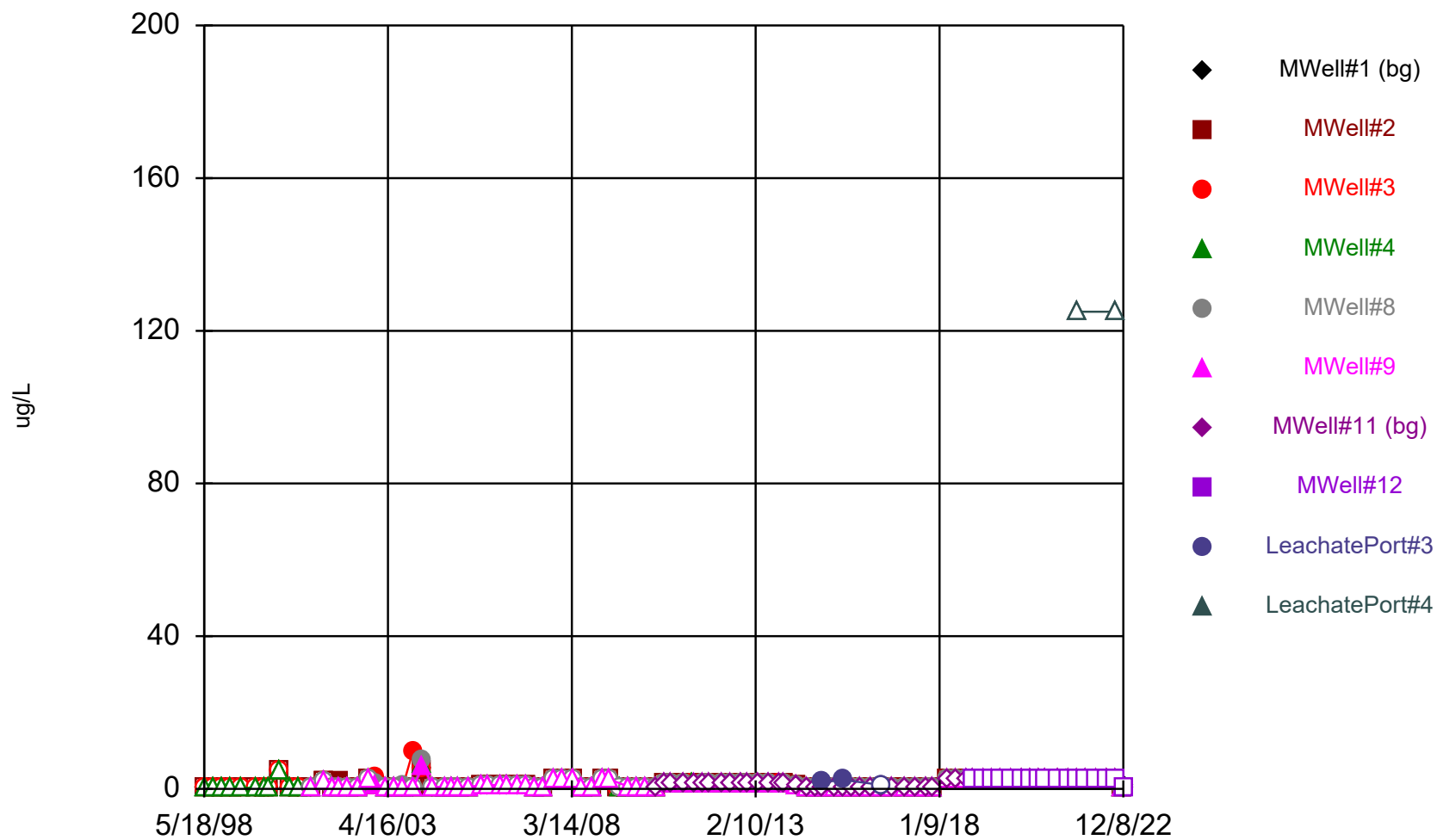
Time Series



Constituent: Methane Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

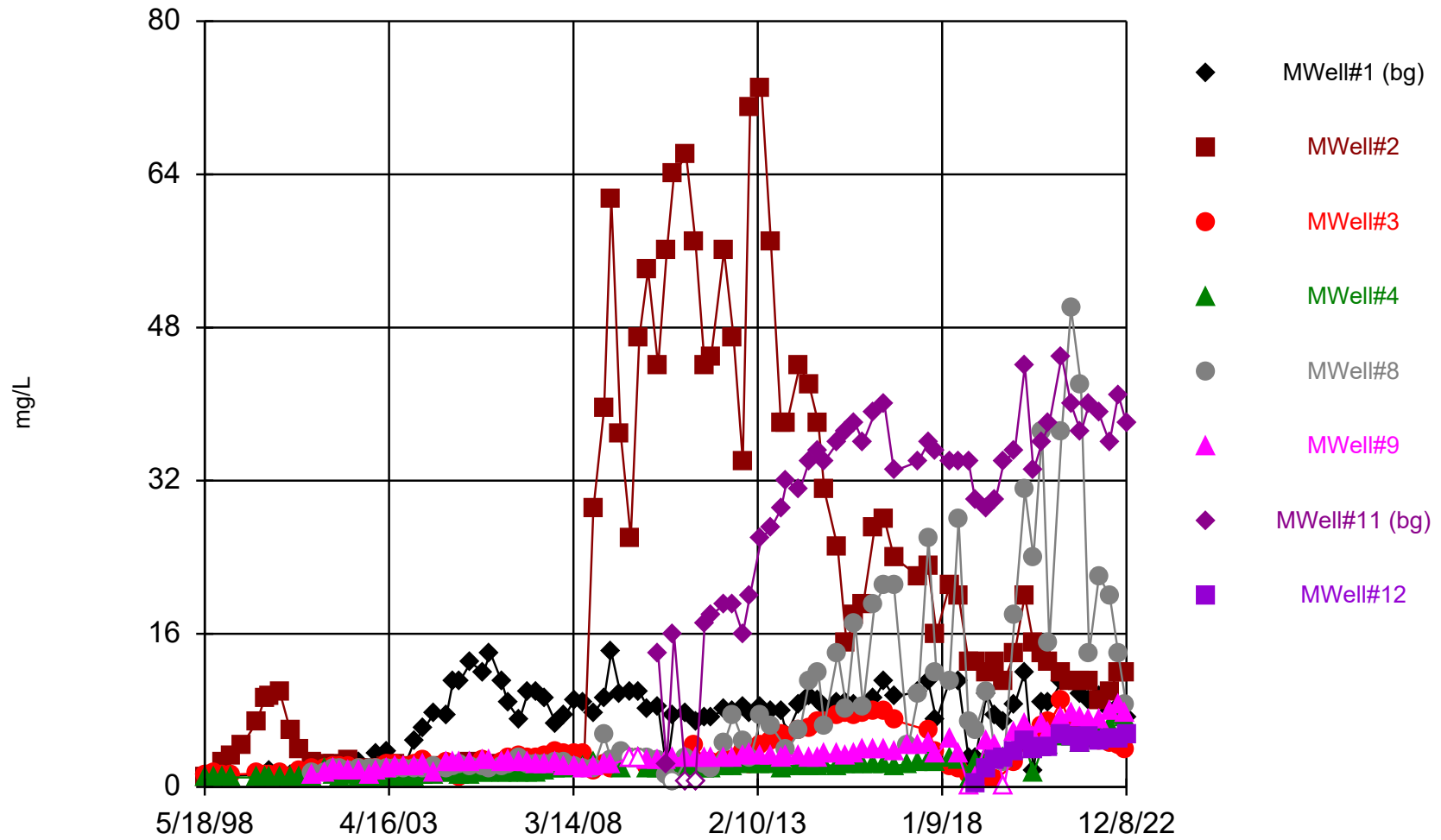
Time Series



Constituent: Methylene Chloride Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

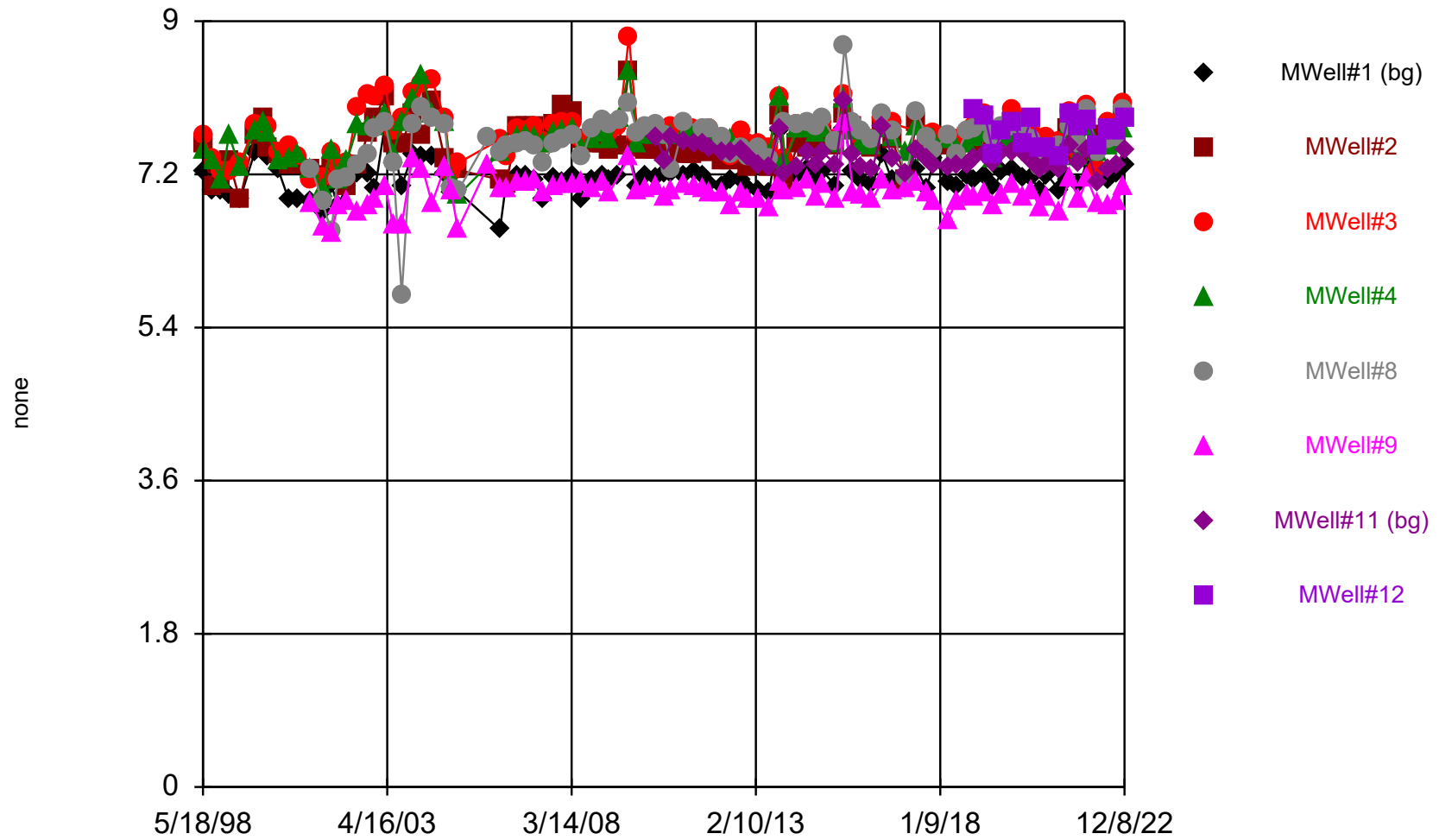
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Nitrate Nitrogen Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

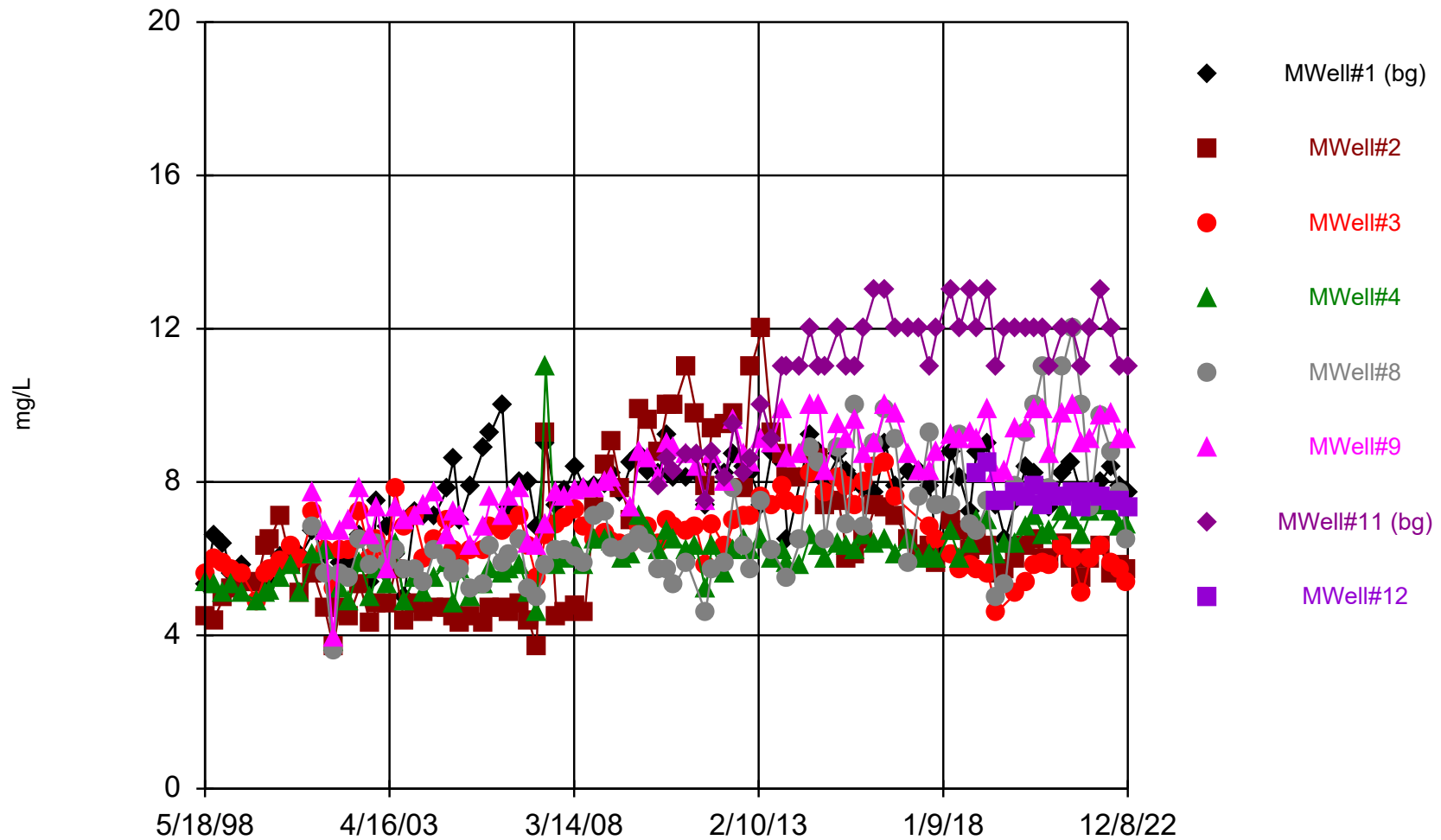
Time Series



Constituent: pH Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

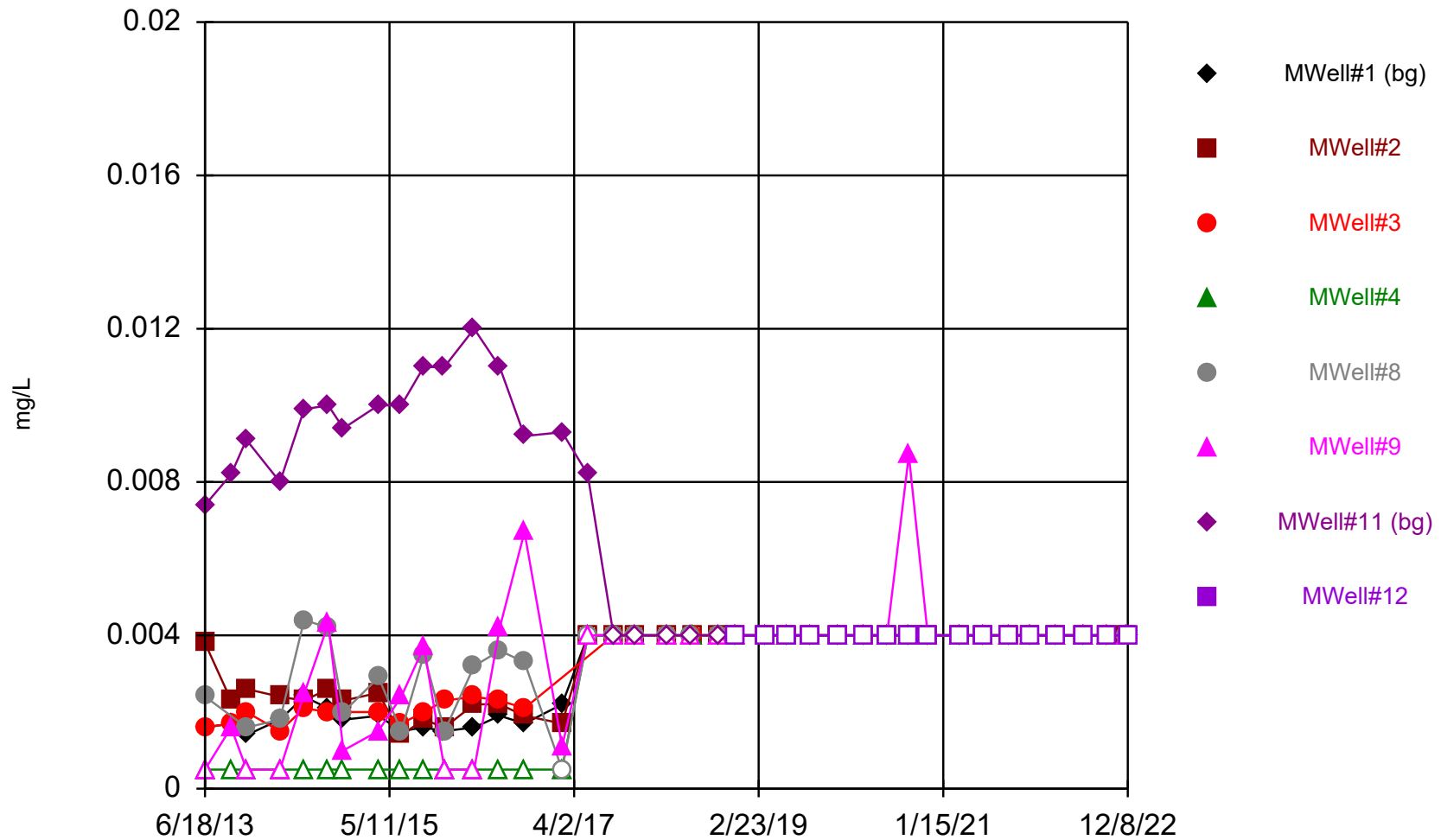
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Potassium, Dissolved Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

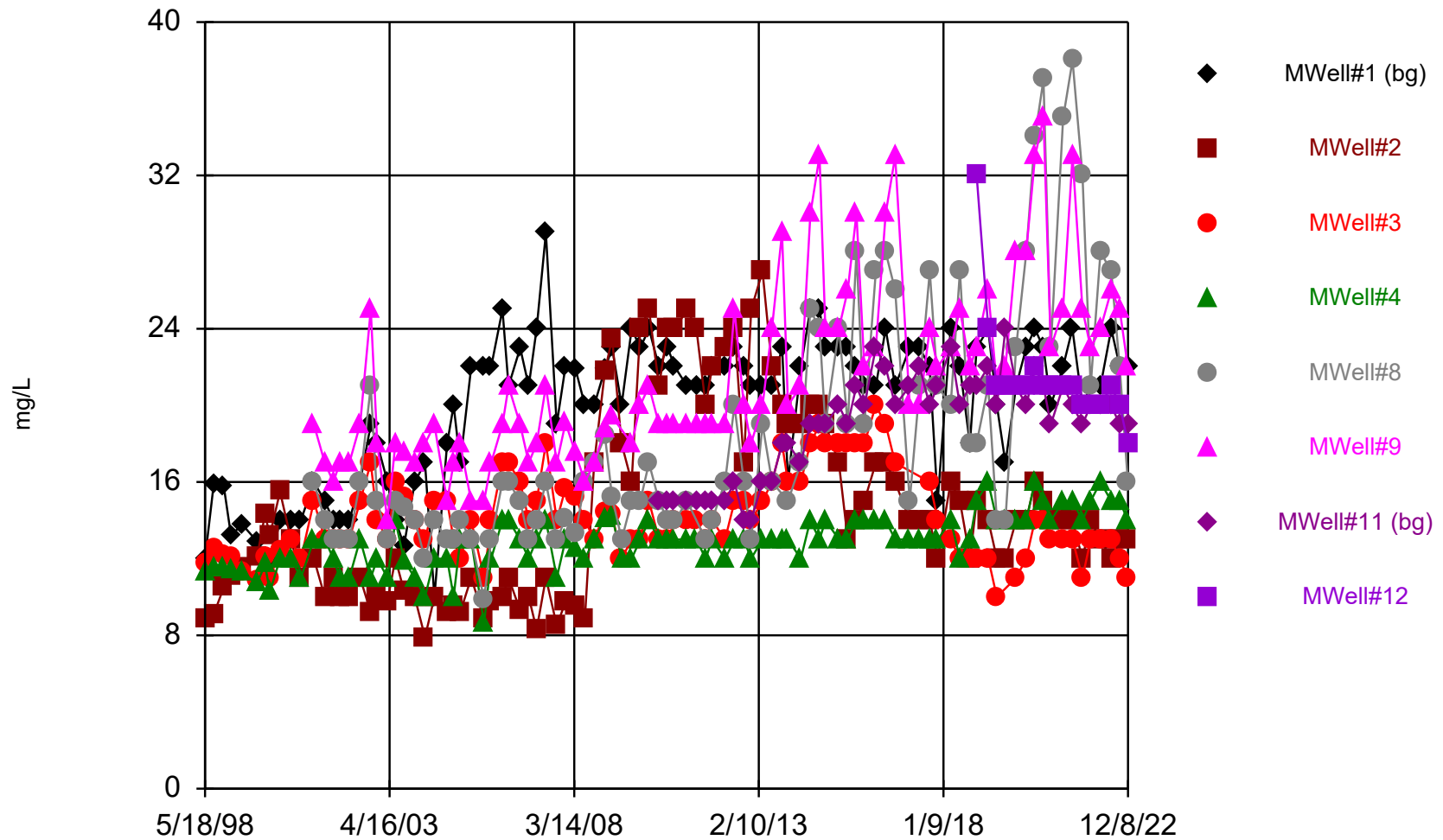
Time Series



Constituent: Selenium, Total Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

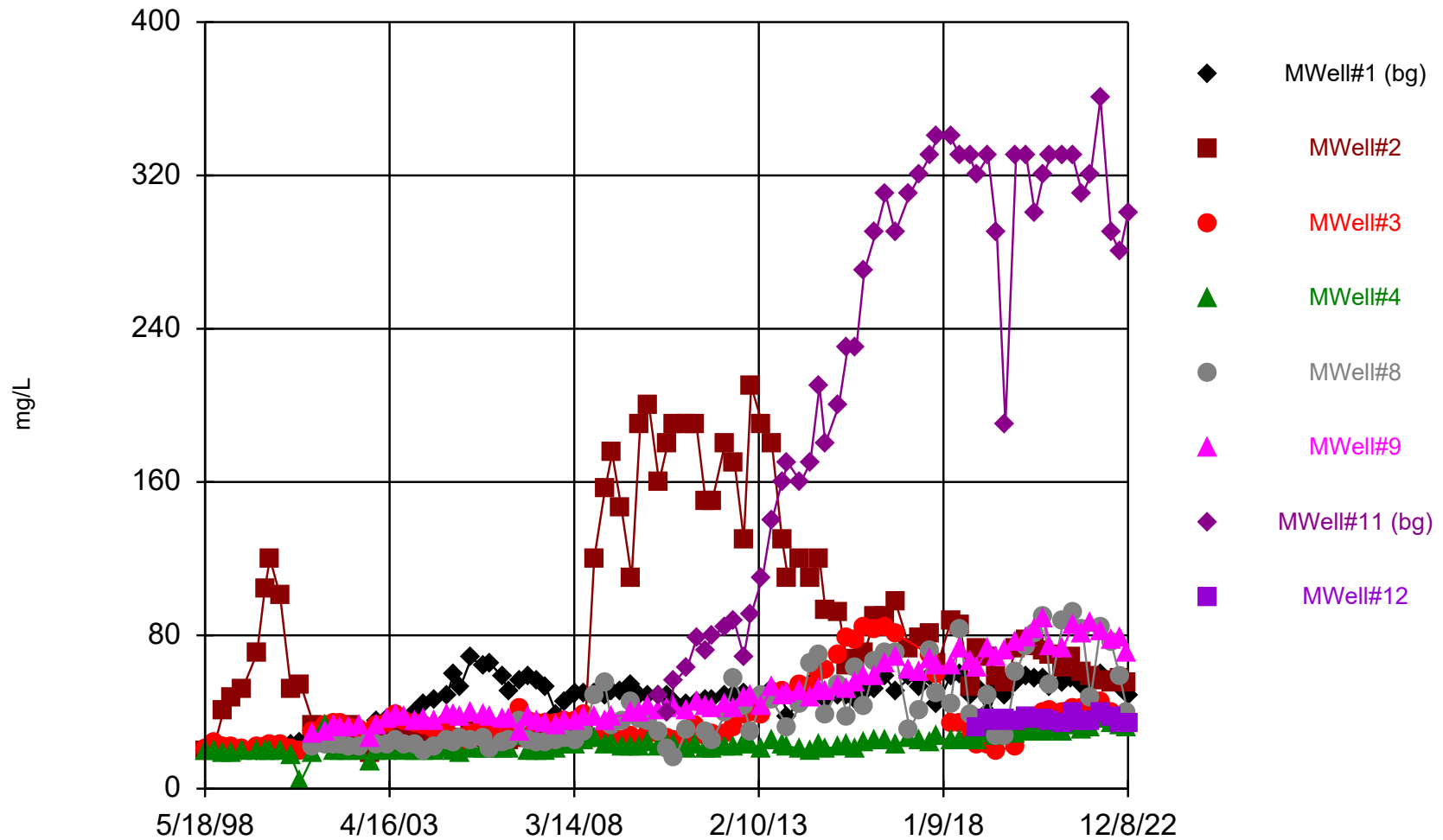
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Sodium, Dissolved Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

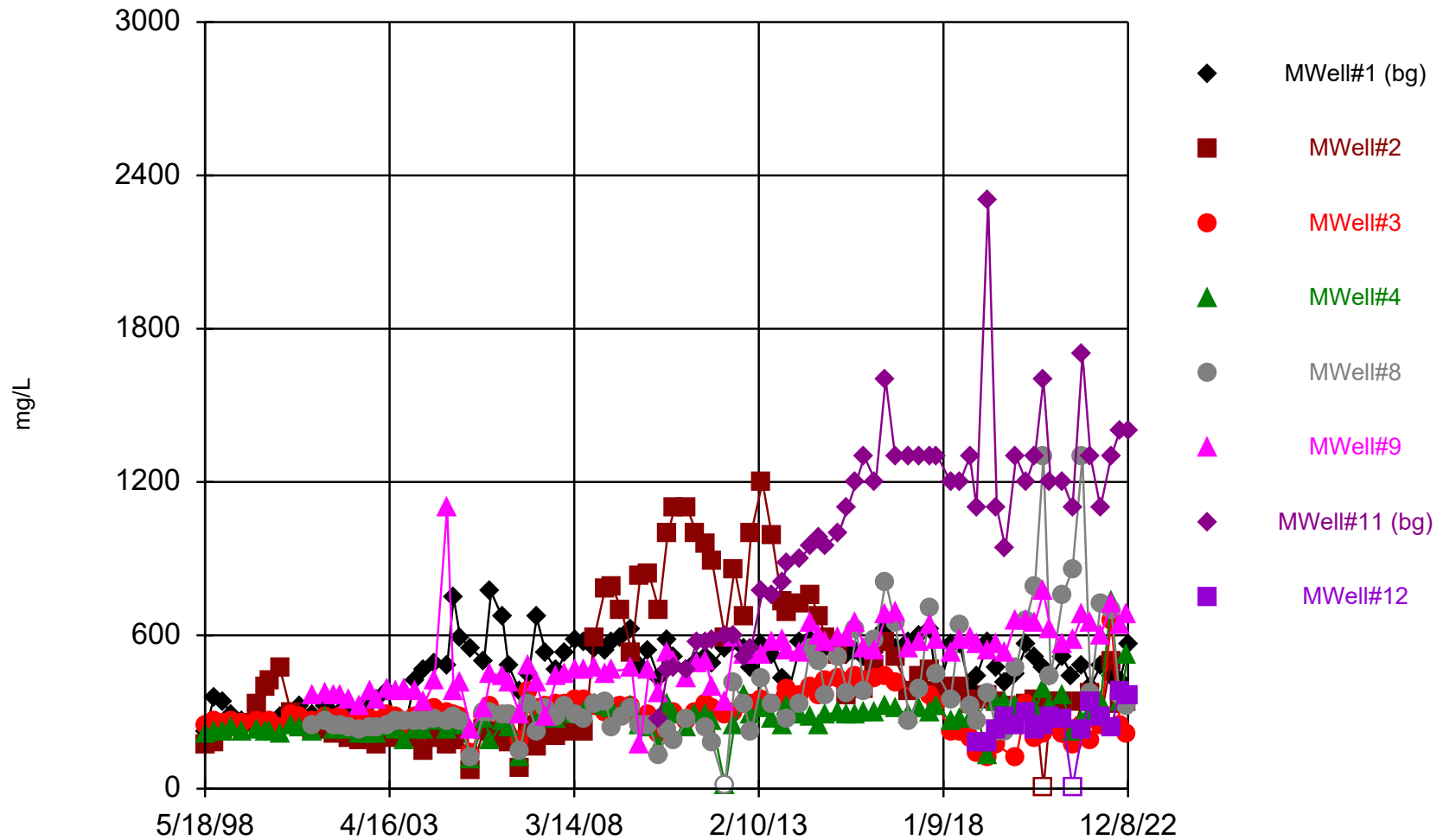
Time Series



Constituent: Sulfate Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

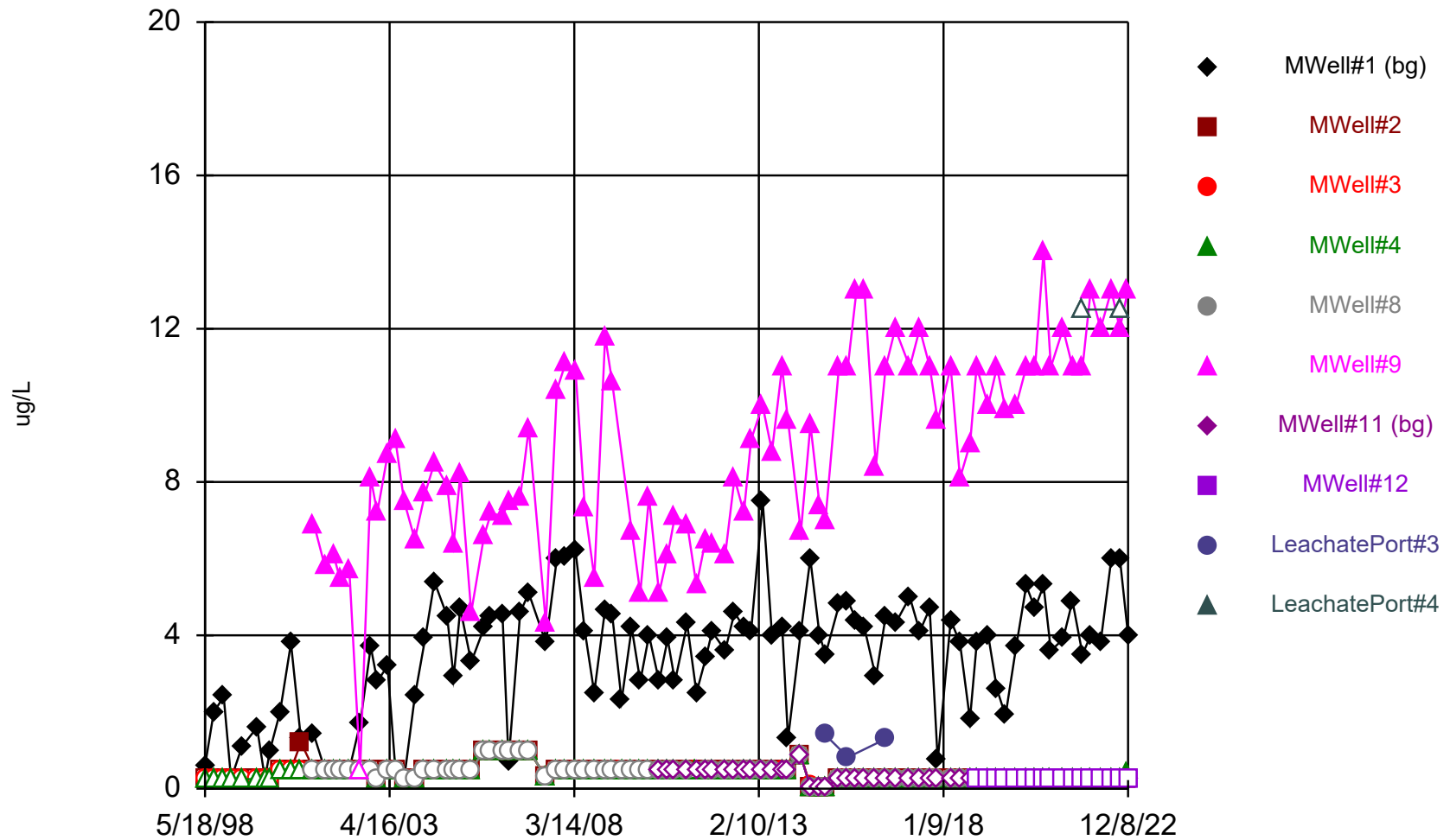
Time Series



Constituent: TDS Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

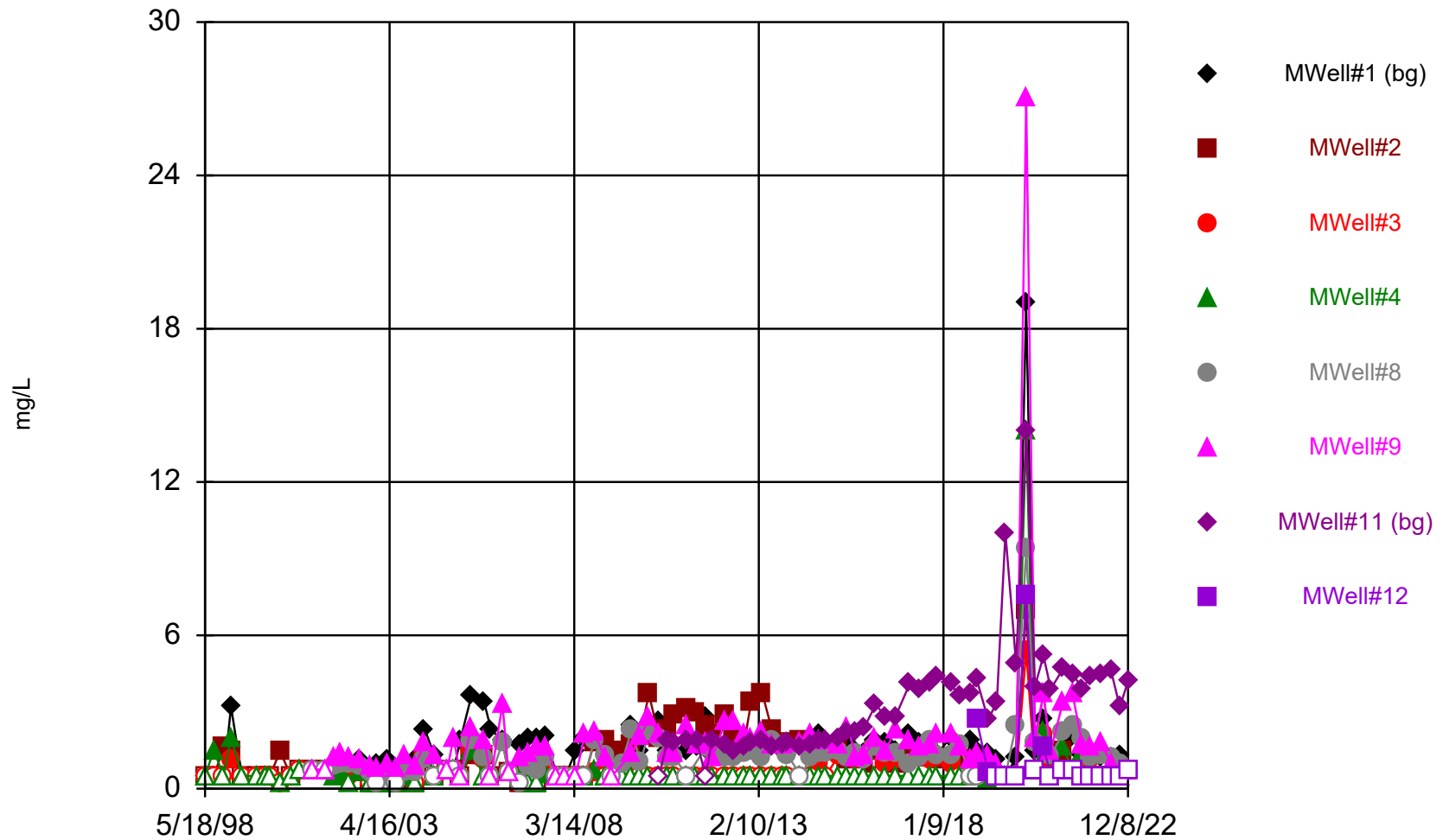
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Tetrachloroethene Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

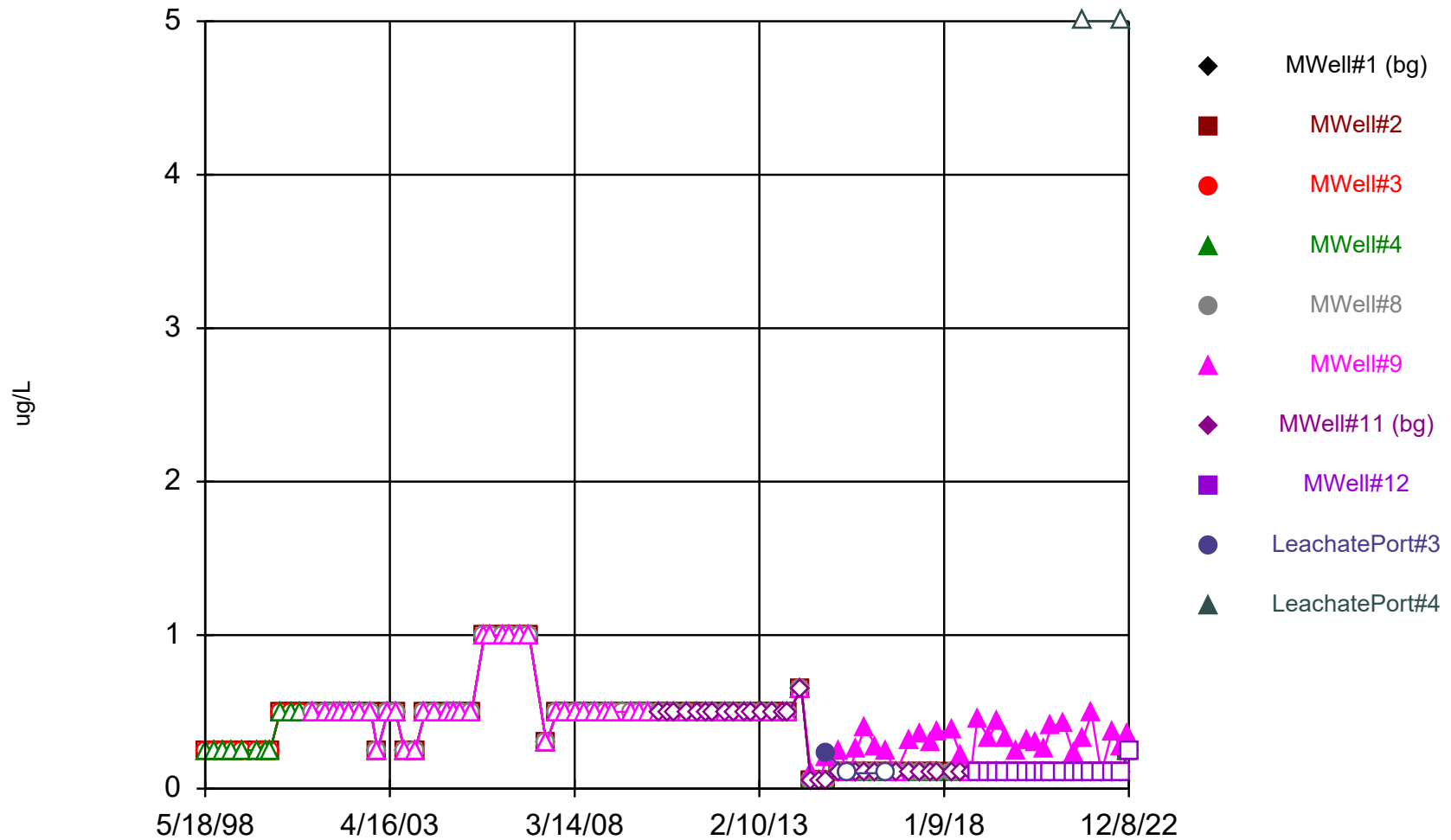
Time Series



Constituent: TOC Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

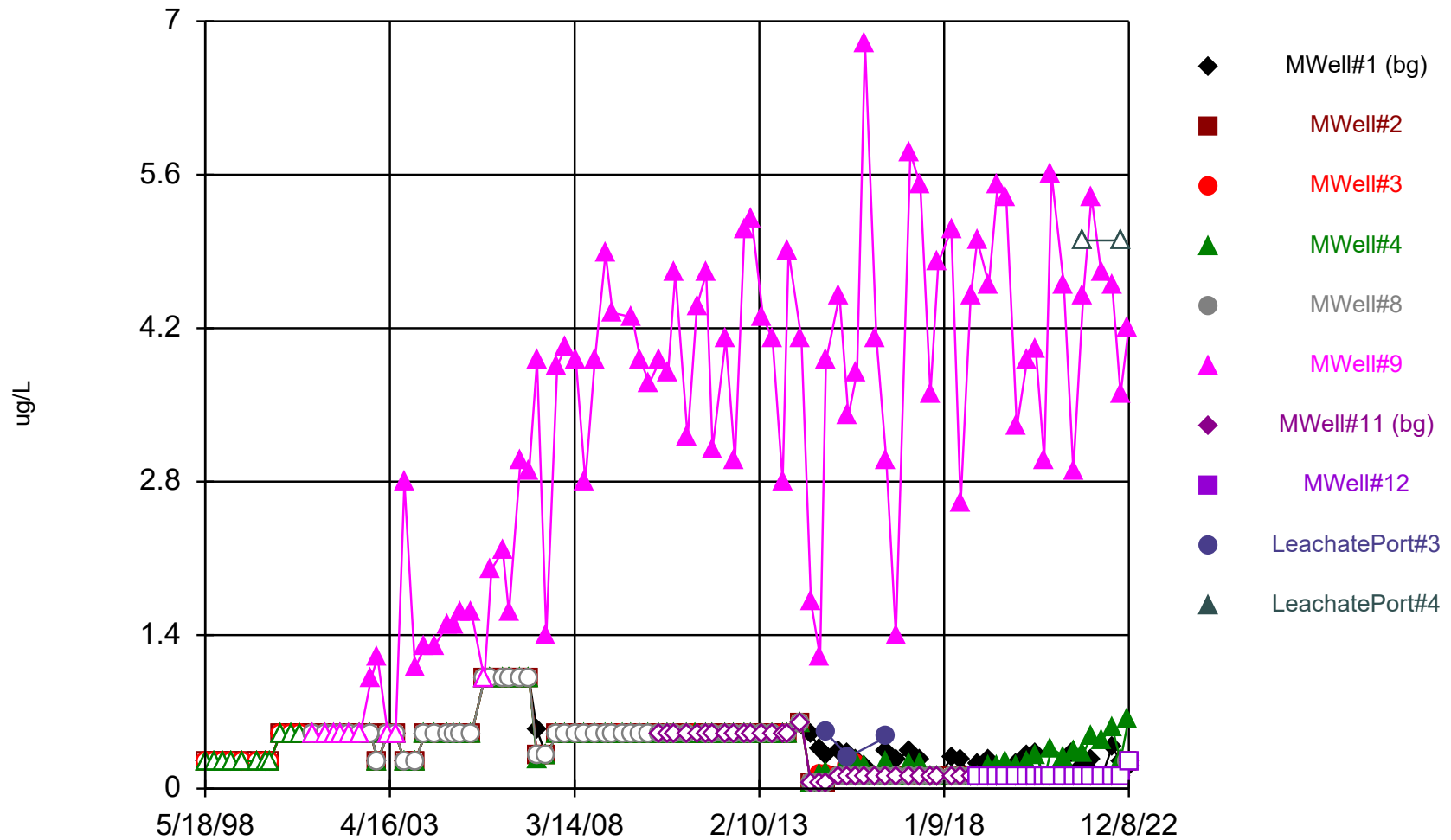
Time Series



Constituent: trans-1,2-Dichloroethene Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

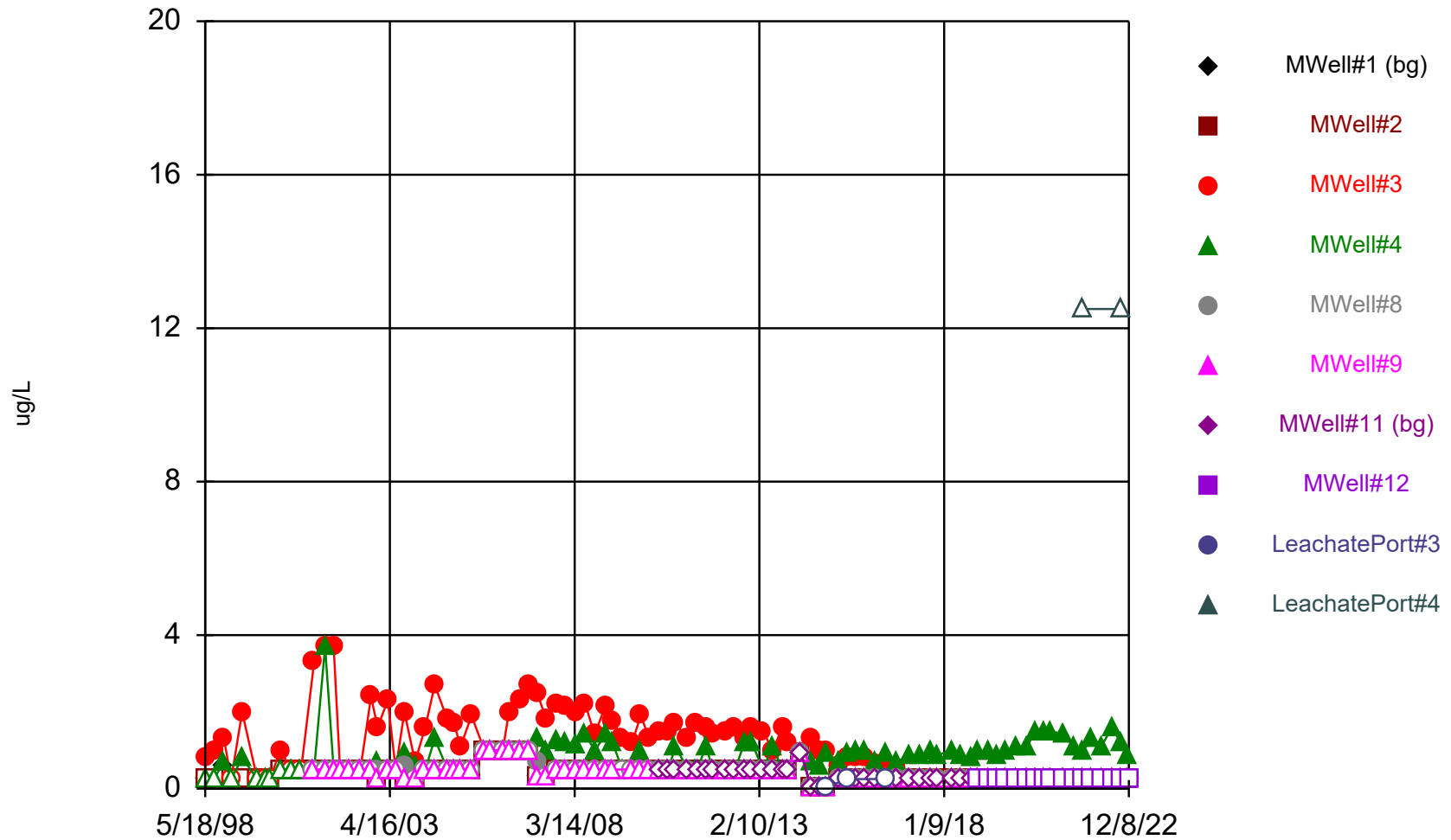
Time Series



Constituent: Trichloroethene Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1

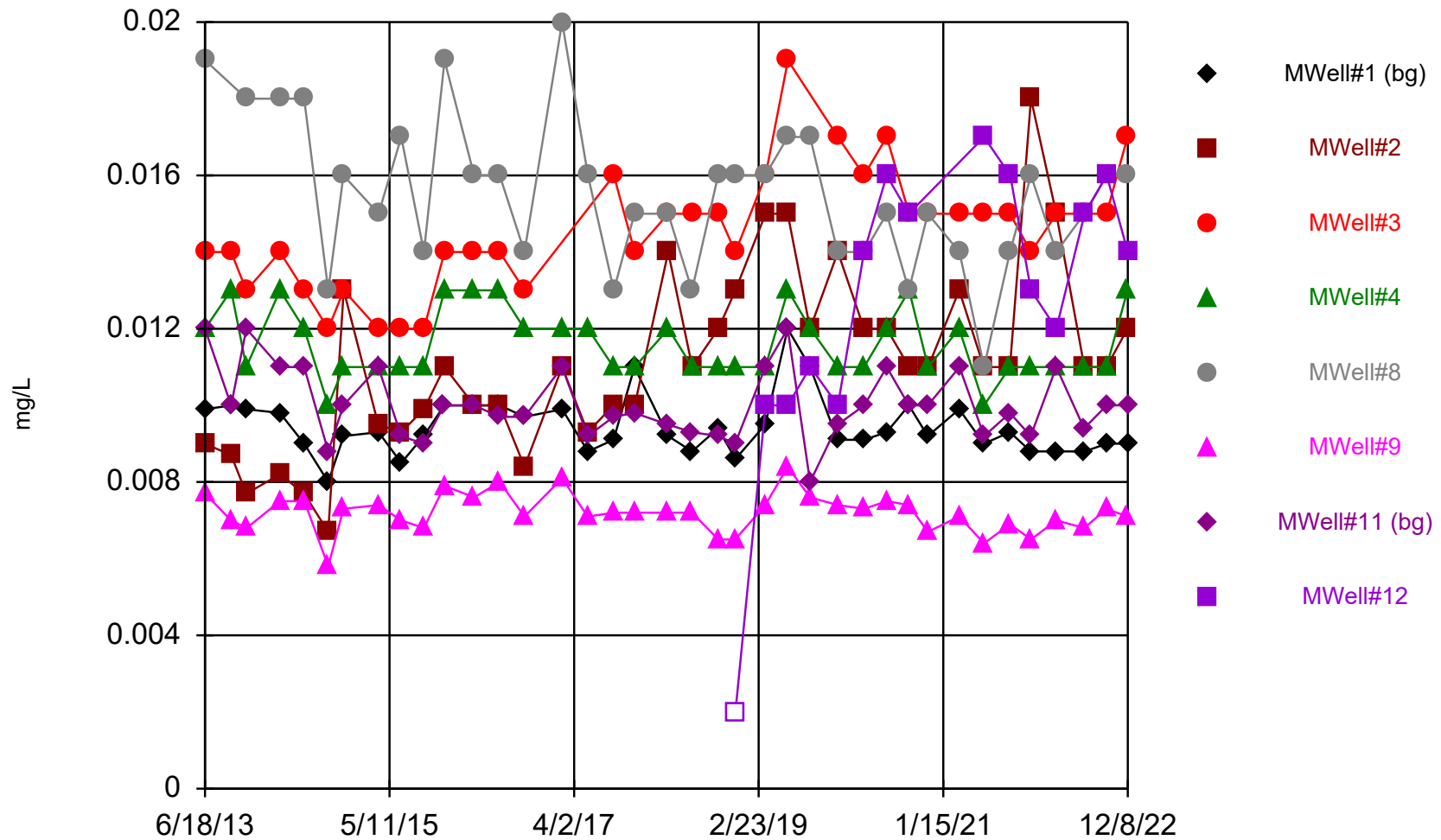
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Trichlorofluoromethane Analysis Run 2/3/2023 4:03 PM View: HRLF_TSP Set1
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

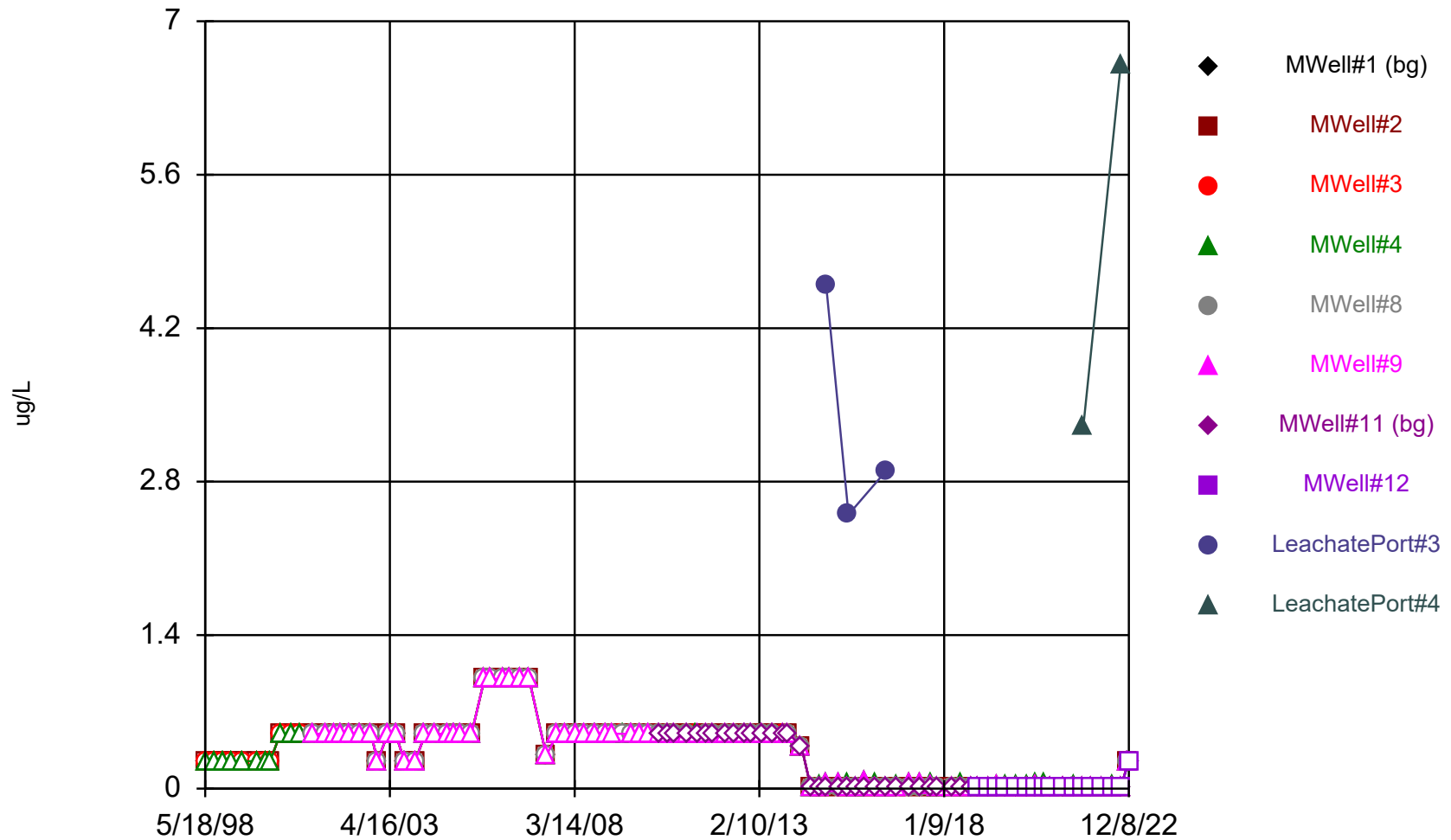
Time Series



Constituent: Vanadium, Total Analysis Run 2/3/2023 4:04 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

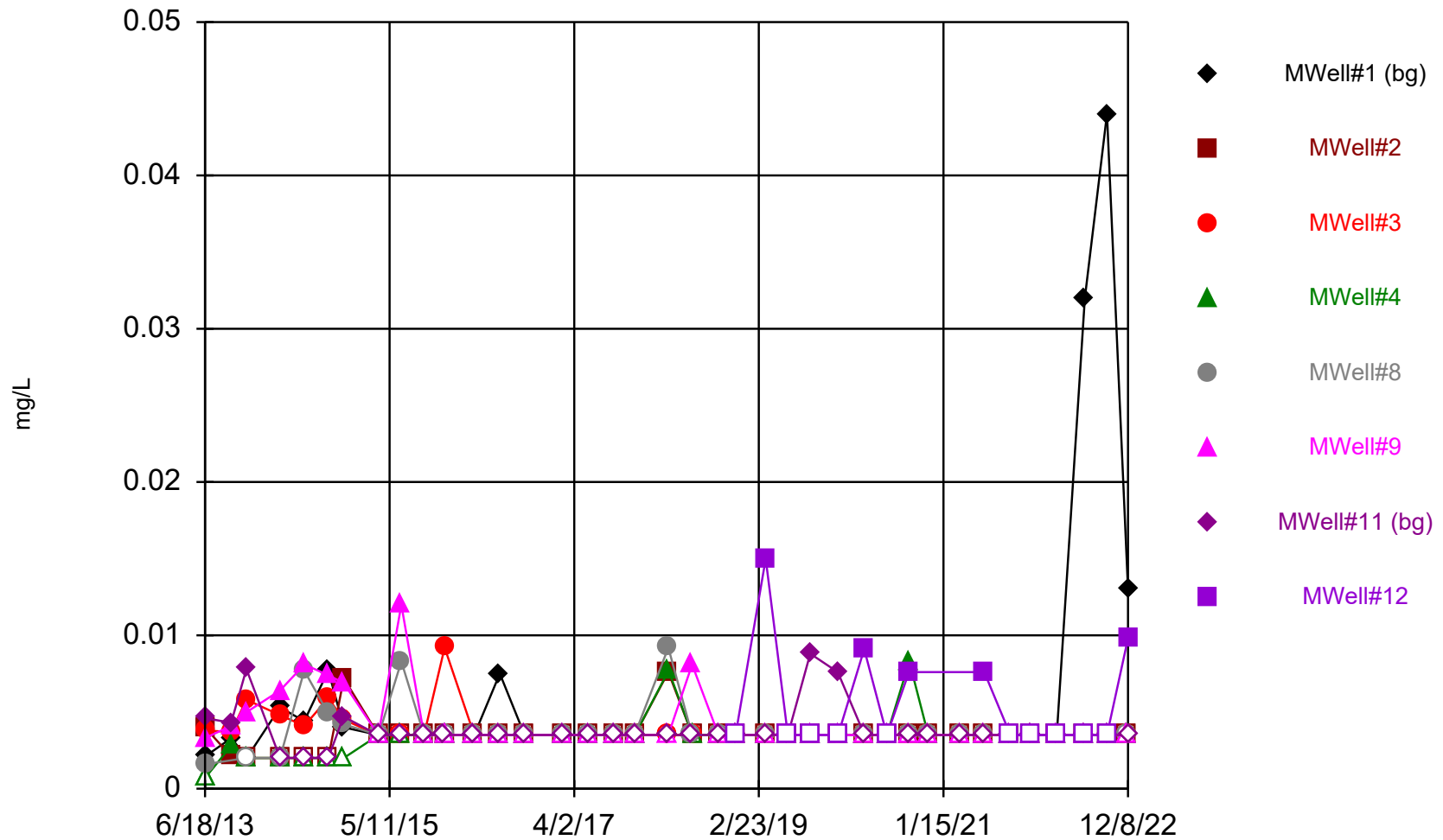
Time Series



Constituent: Vinyl Chloride Analysis Run 2/3/2023 4:04 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series

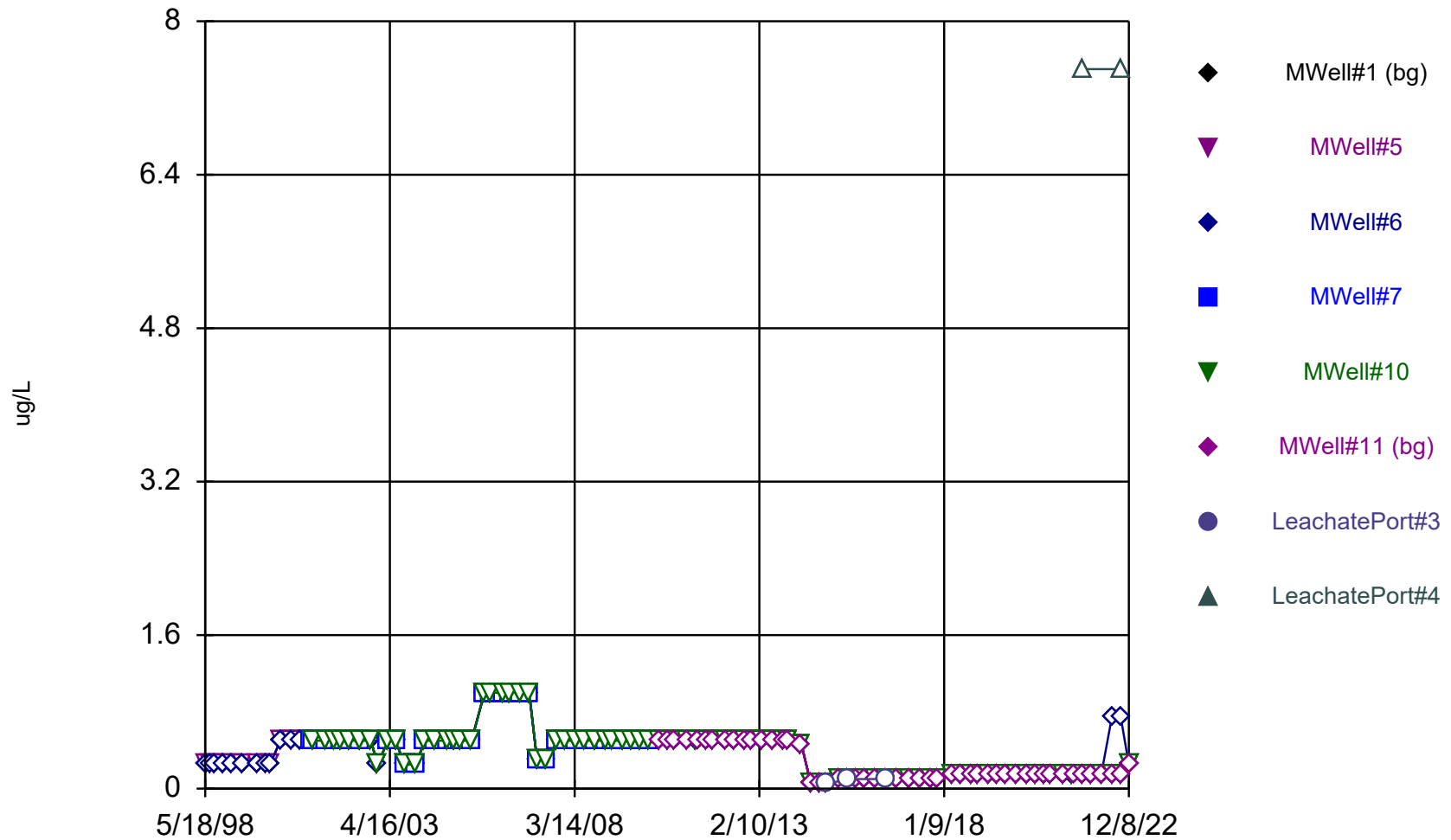


Constituent: Zinc, Total Analysis Run 2/3/2023 4:04 PM View: HRLF_TSP Set1

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

This Page Intentionally Left Blank

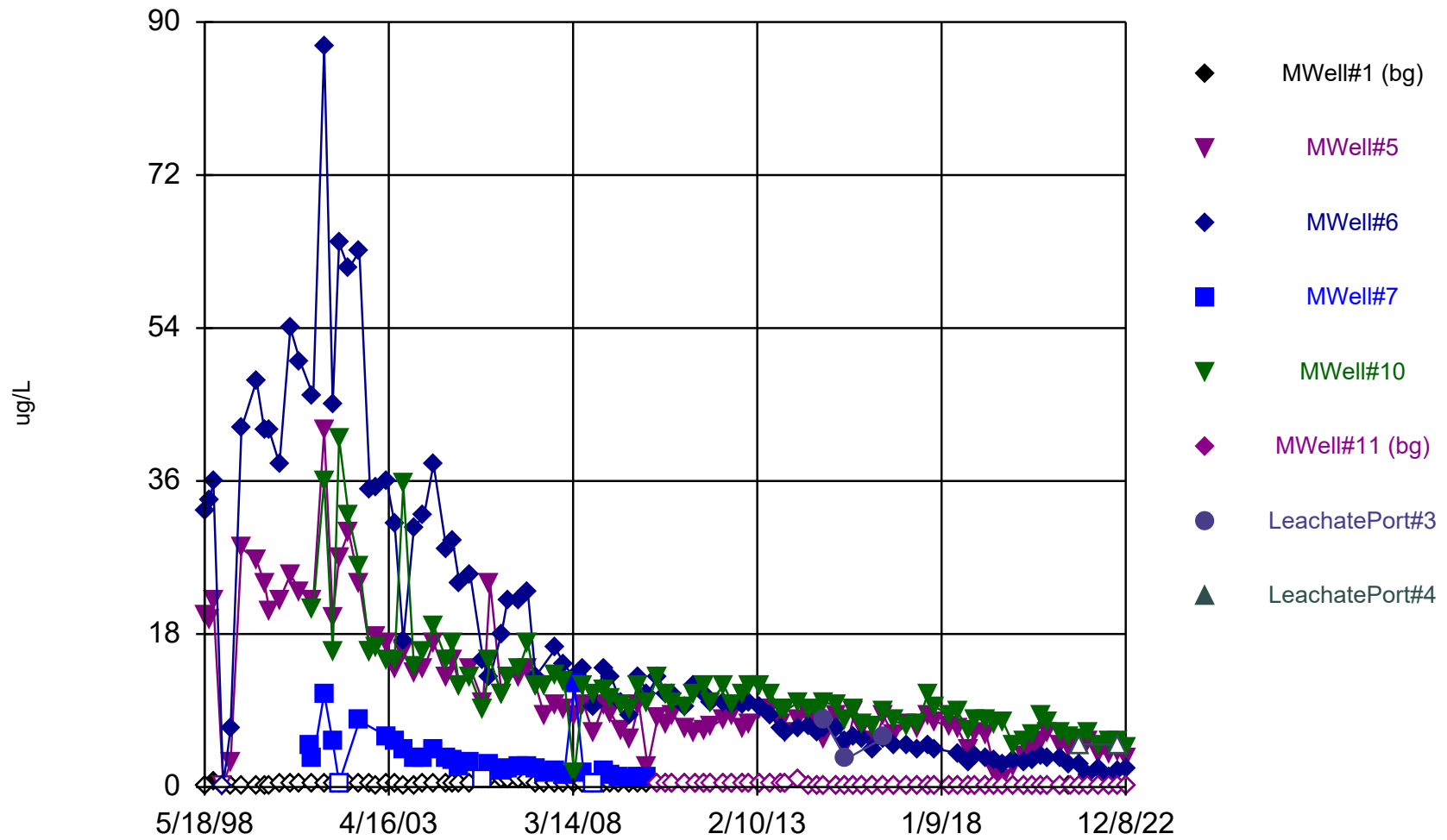
Time Series



Constituent: 1,1,1,2-Tetrachloroethane Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

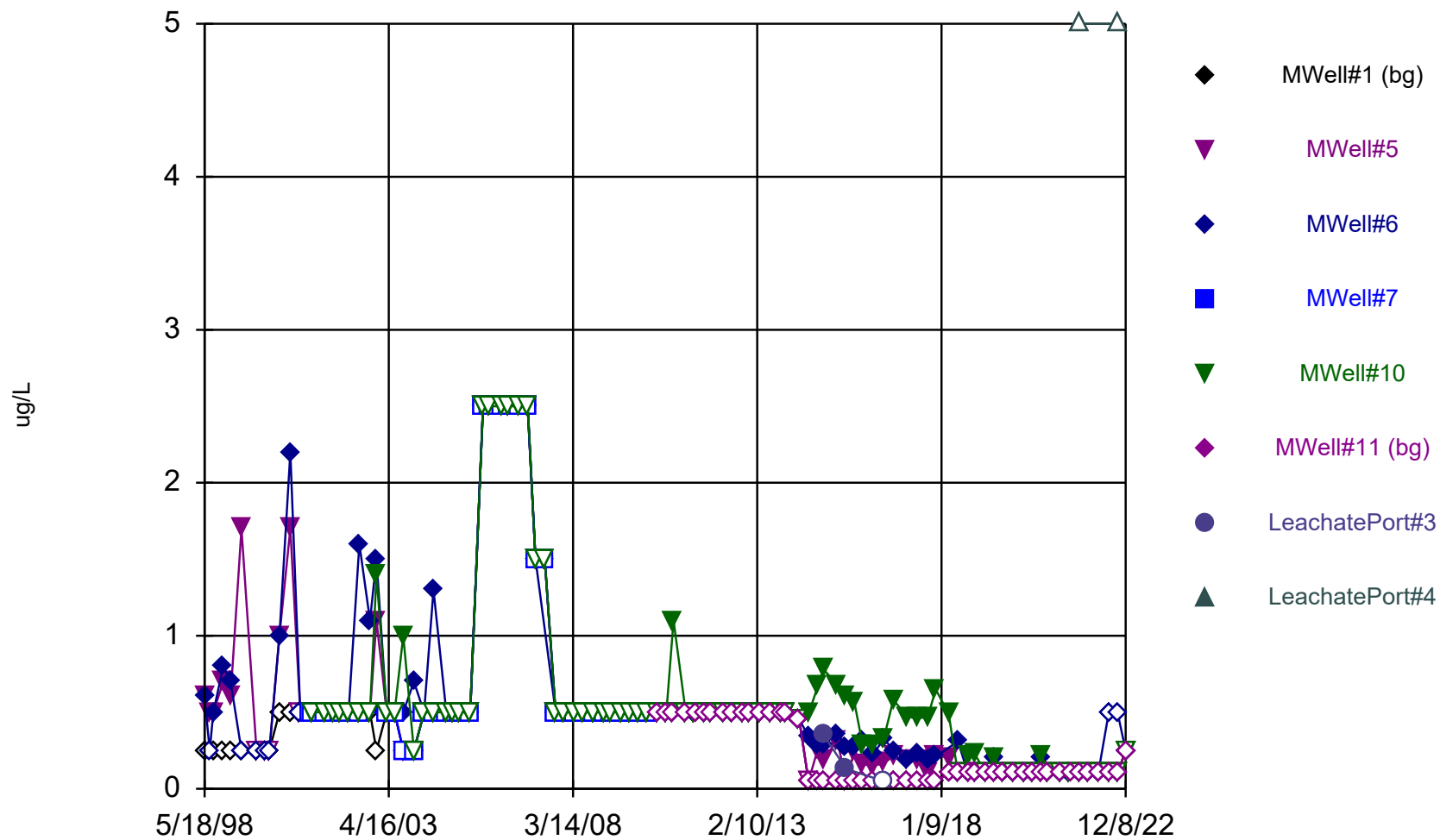
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: 1,1-Dichloroethane Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

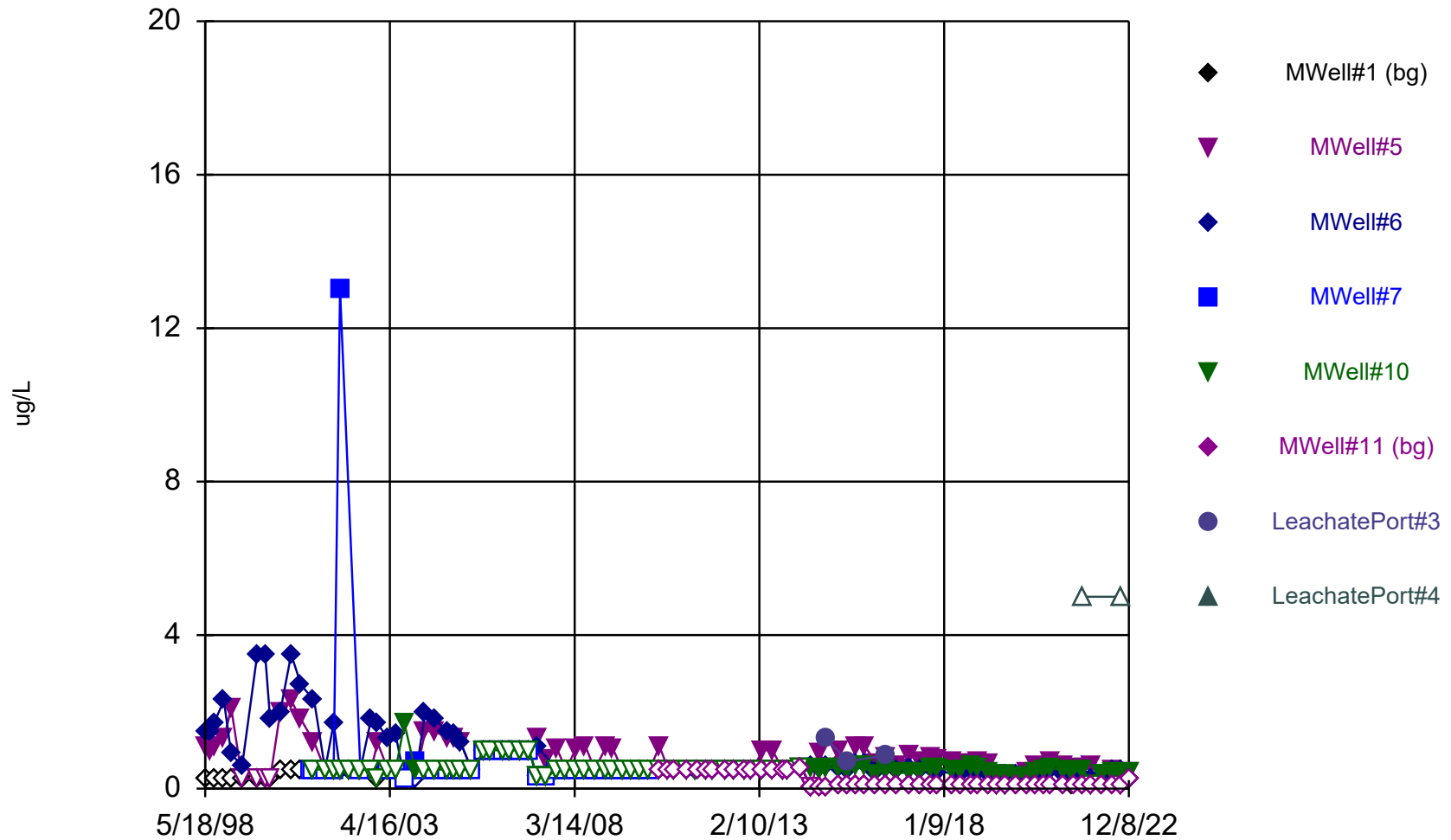
Time Series



Constituent: 1,1-Dichloroethene Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

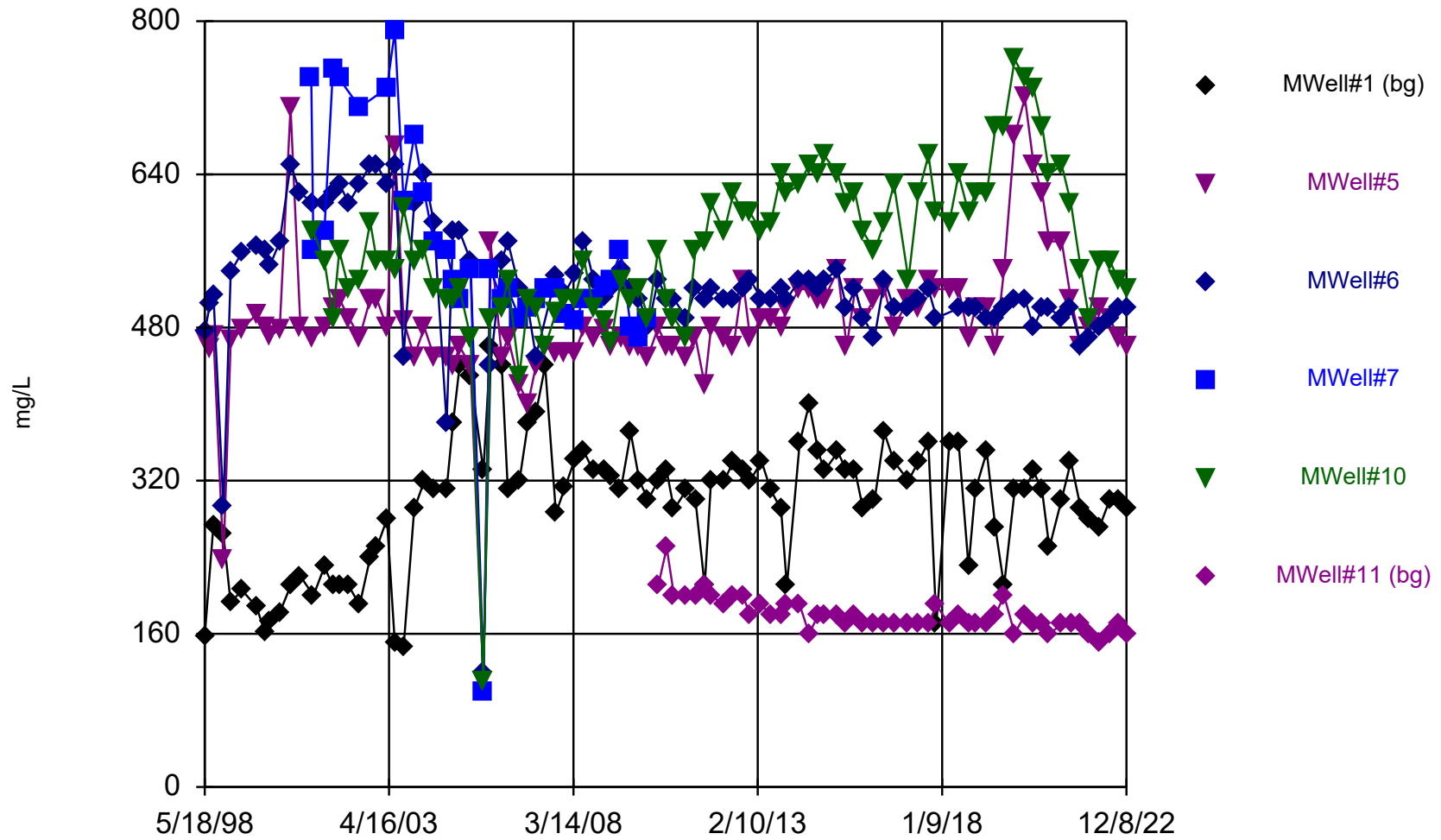
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: 1,2-Dichloroethane Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

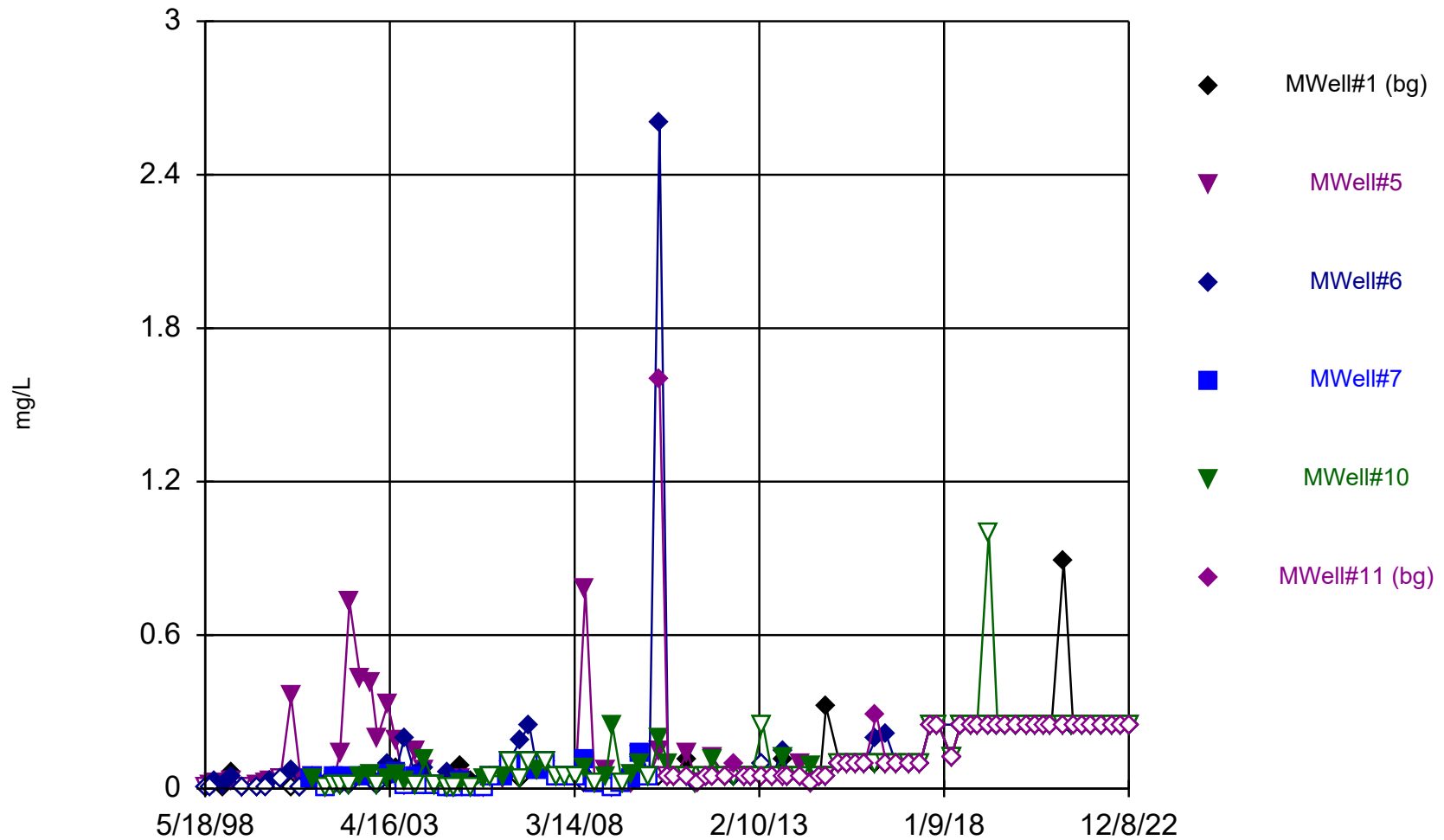
Time Series



Constituent: Alkalinity Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

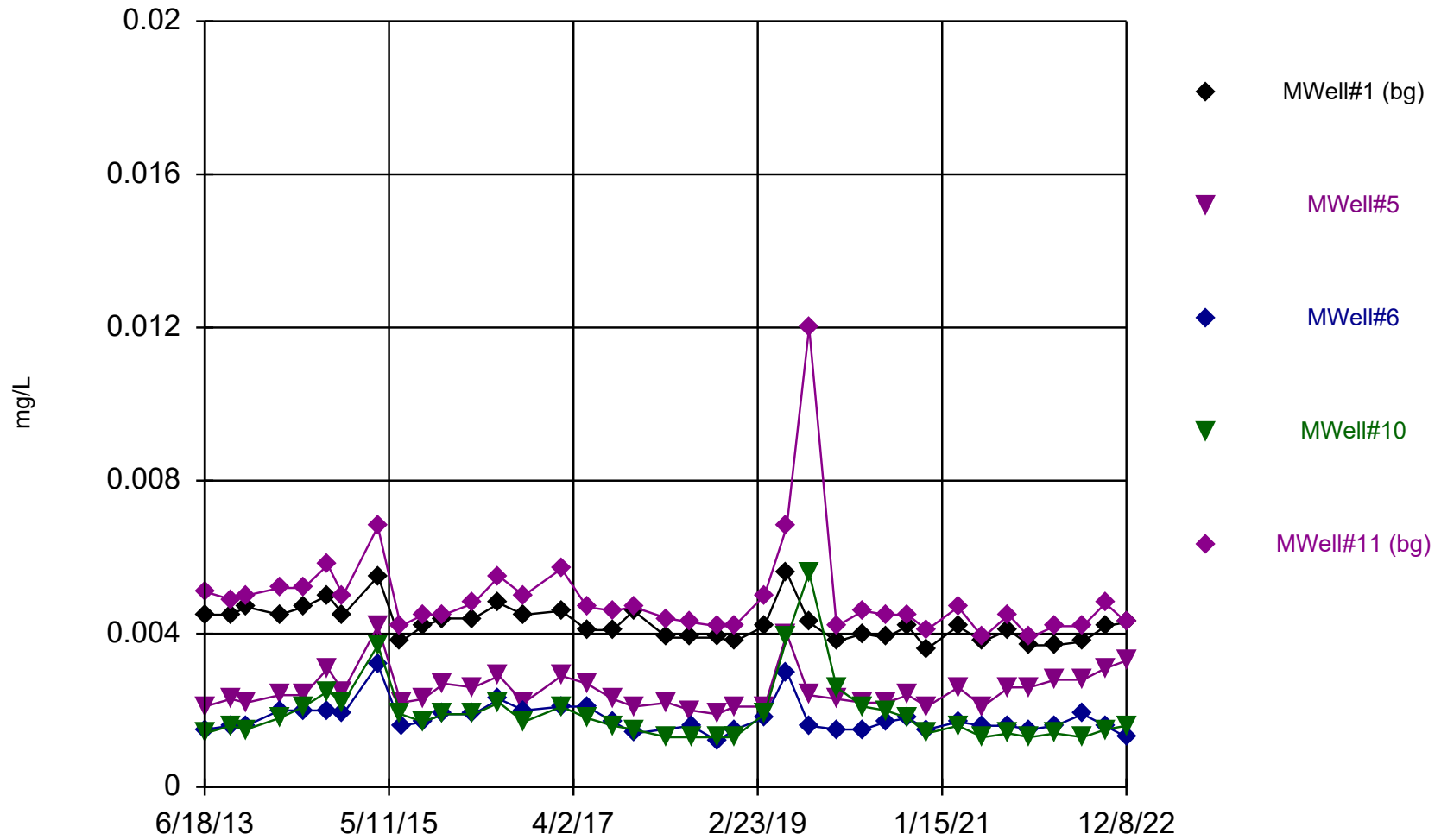
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Ammonia Nitrogen Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

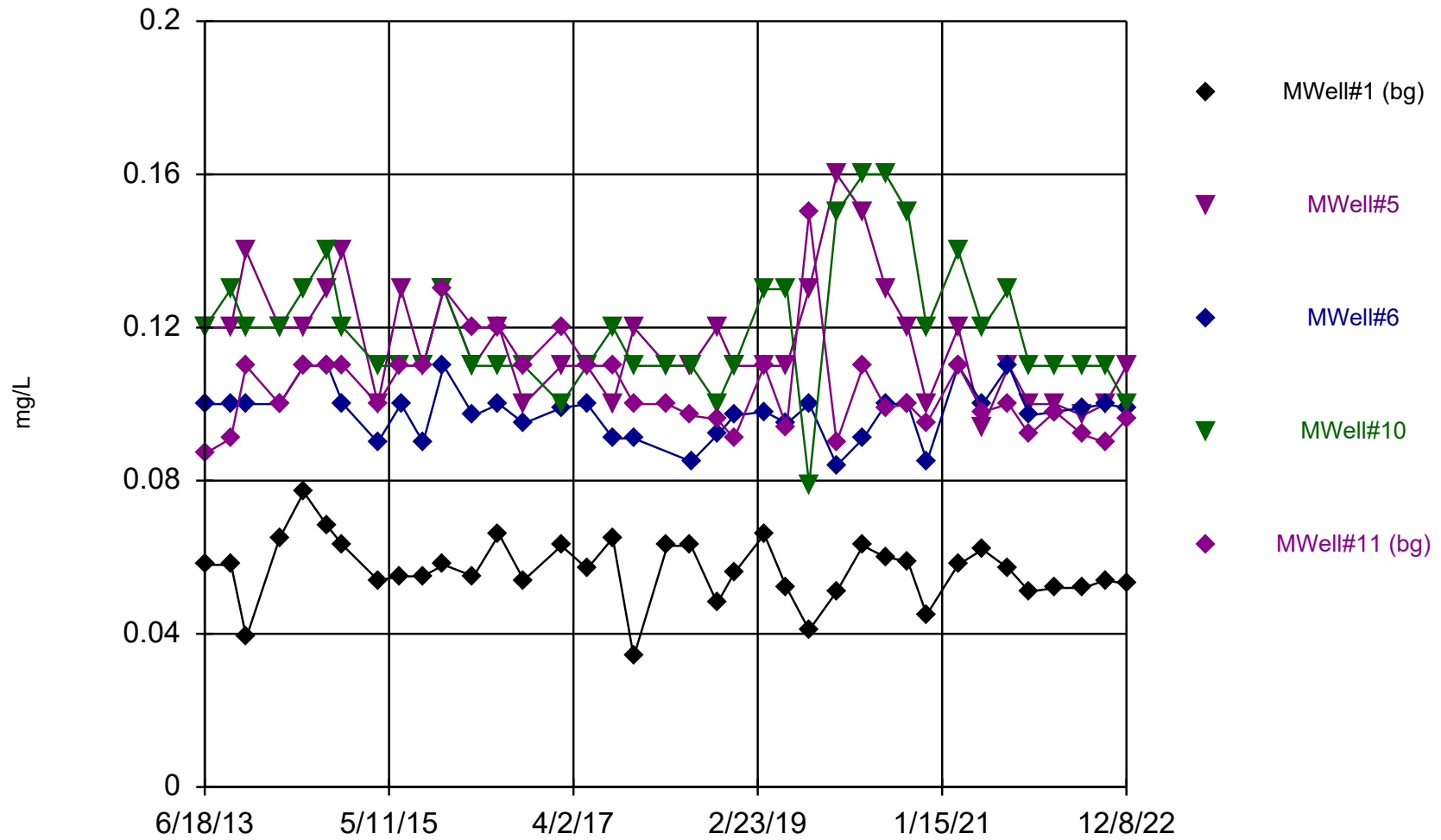
Time Series



Constituent: Arsenic, Total Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

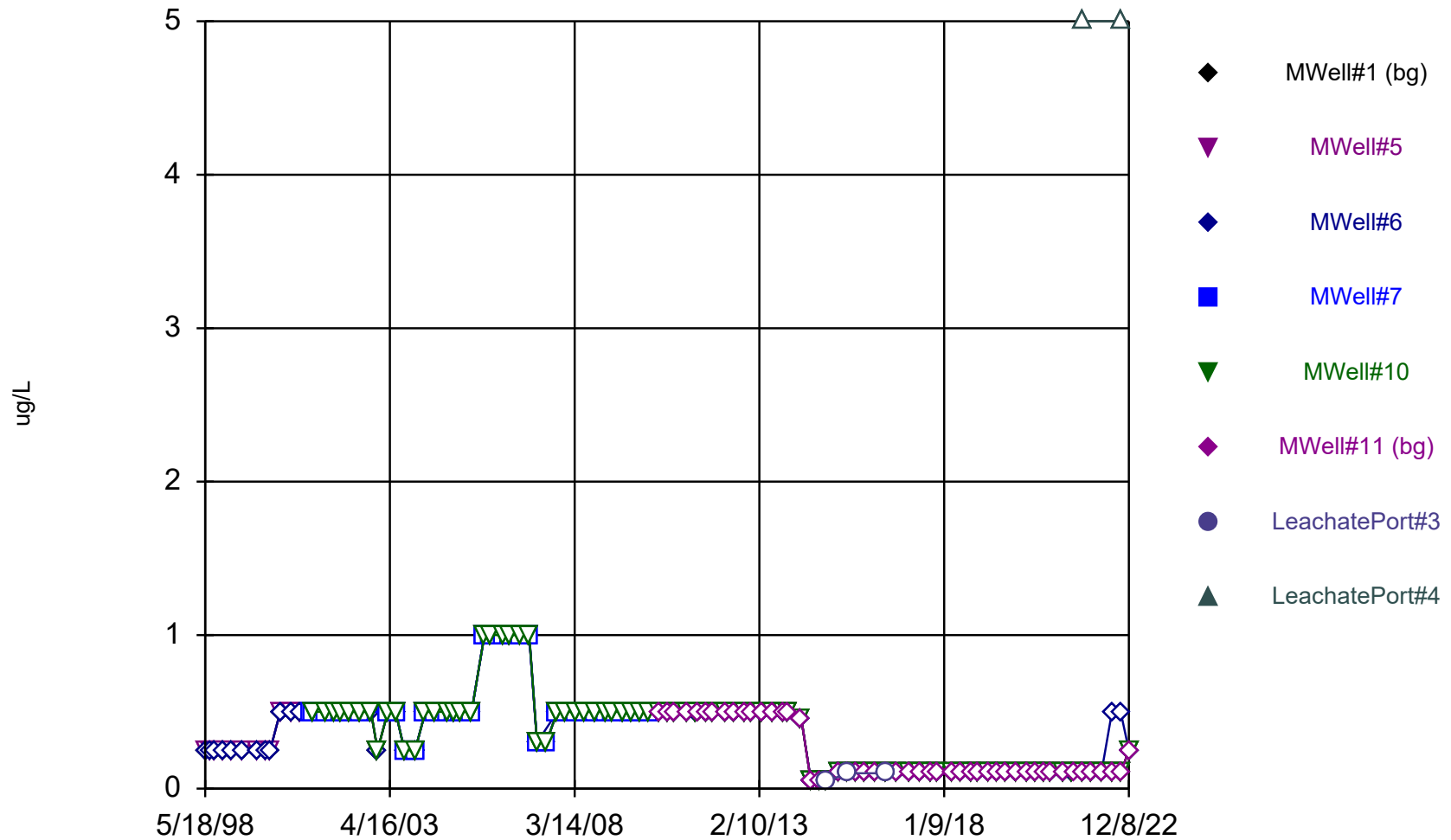
Time Series



Constituent: Barium, Total Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

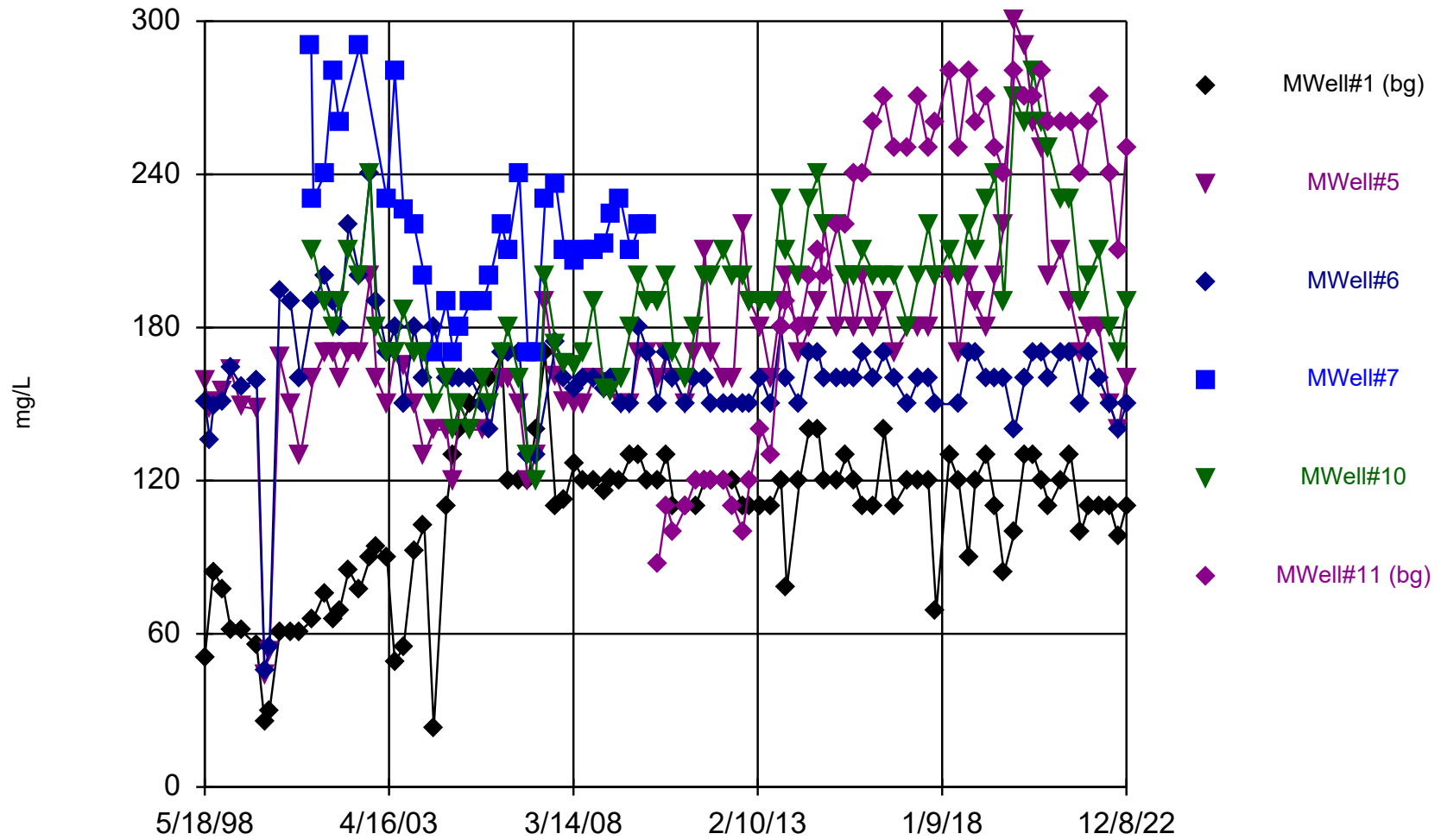
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



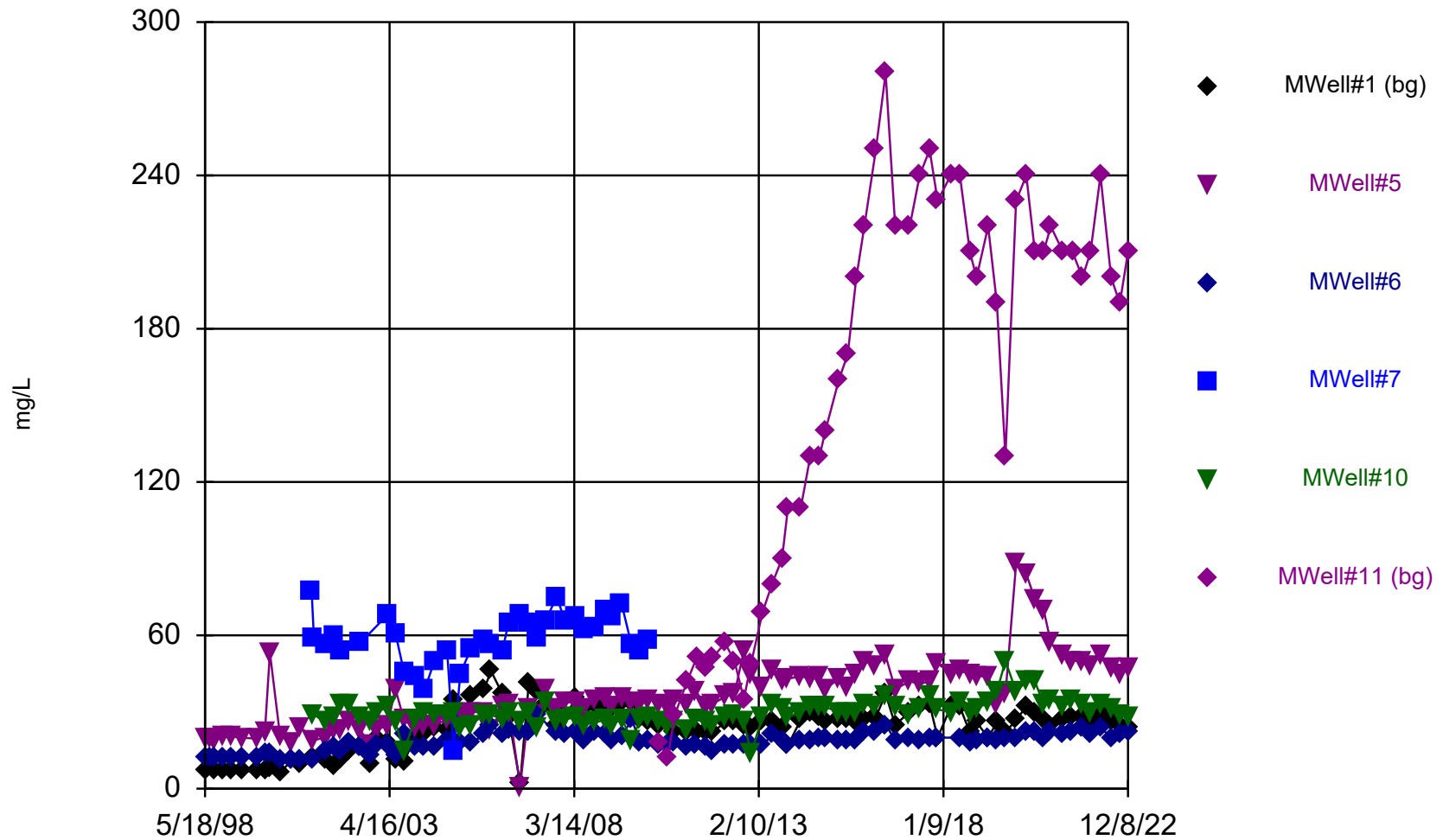
Constituent: Bromodichloromethane Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Calcium, Dissolved Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

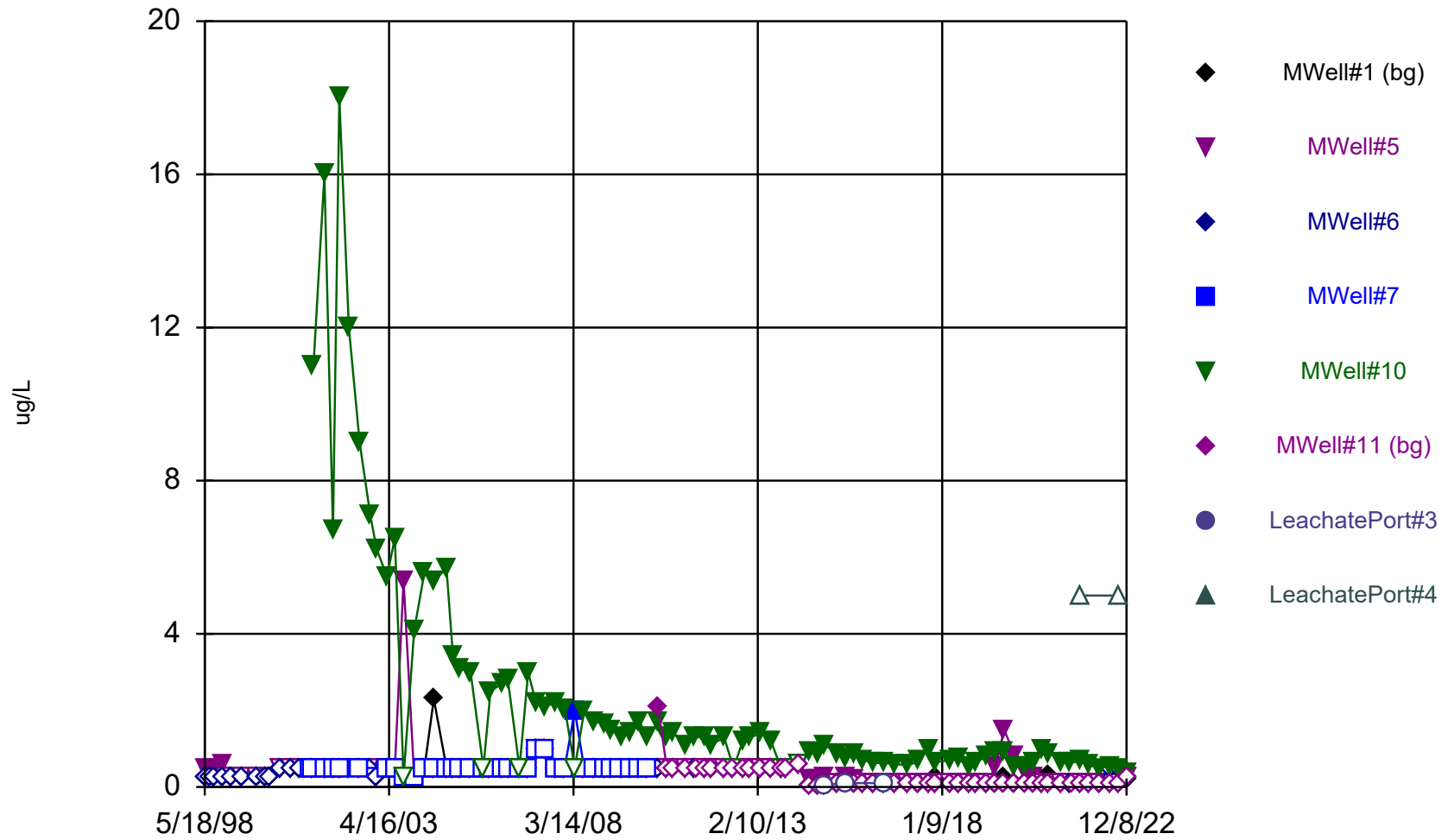
Time Series



Constituent: Chloride Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

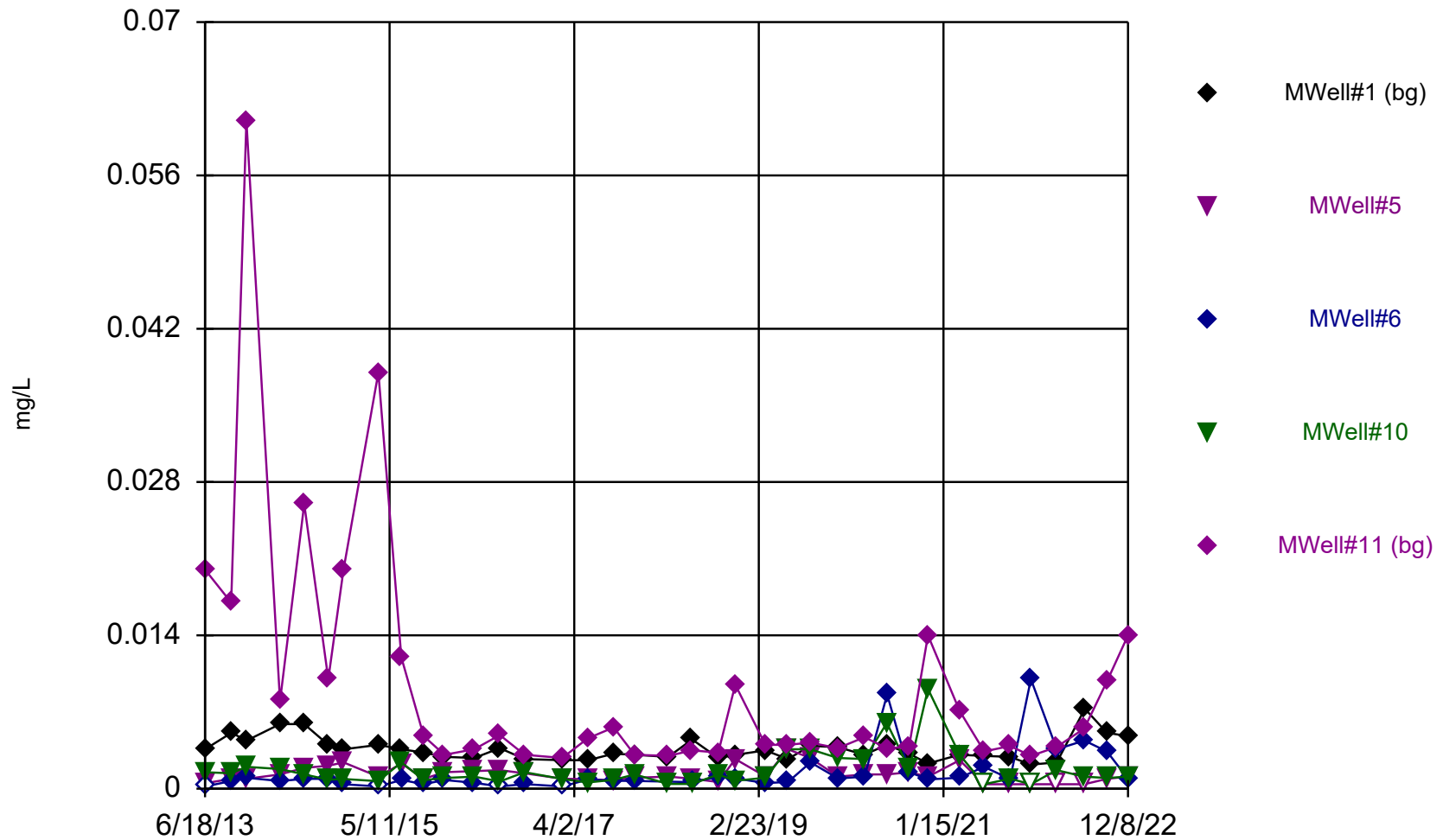
Time Series



Constituent: Chloroform Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

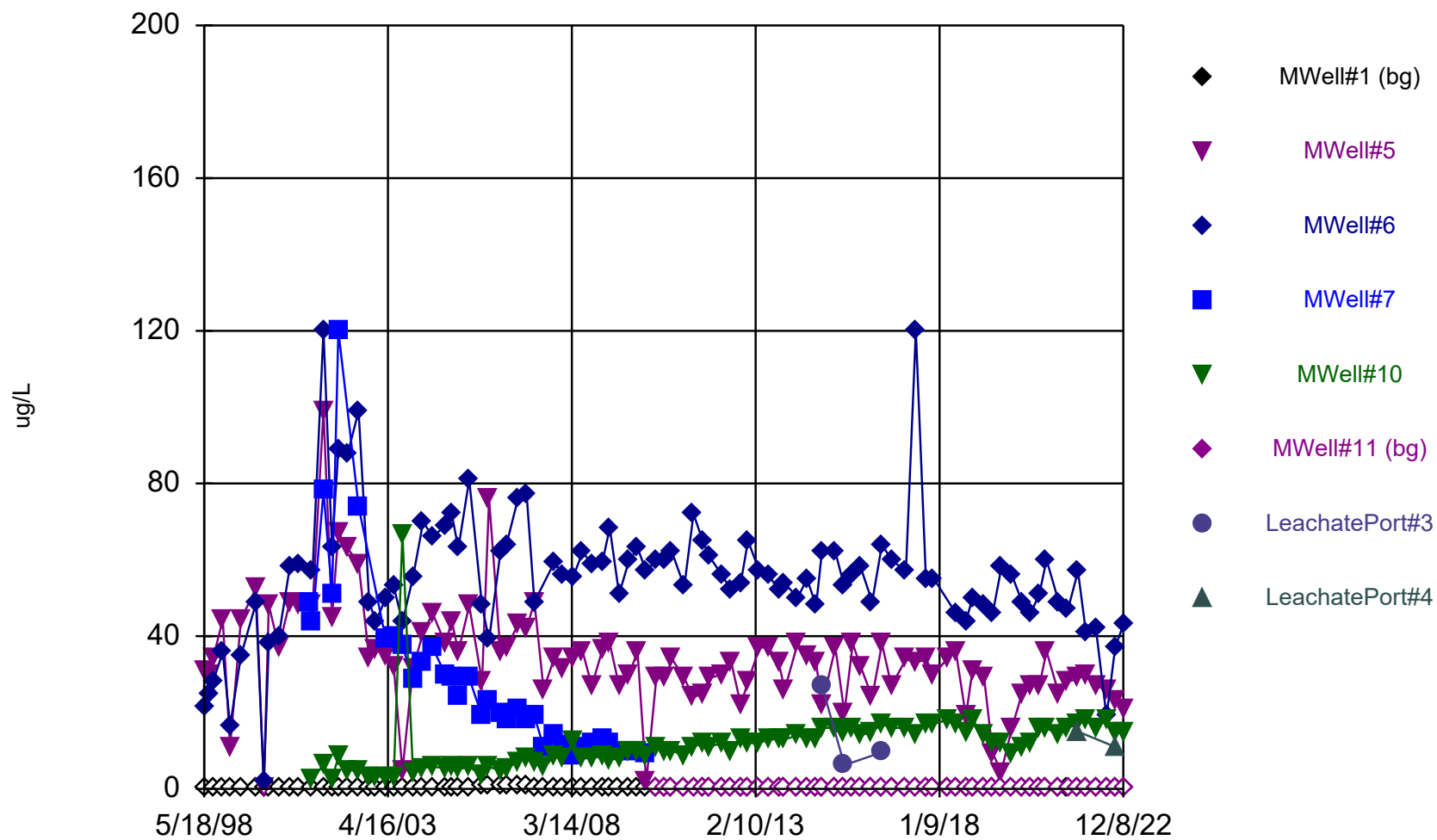
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Chromium, Total Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

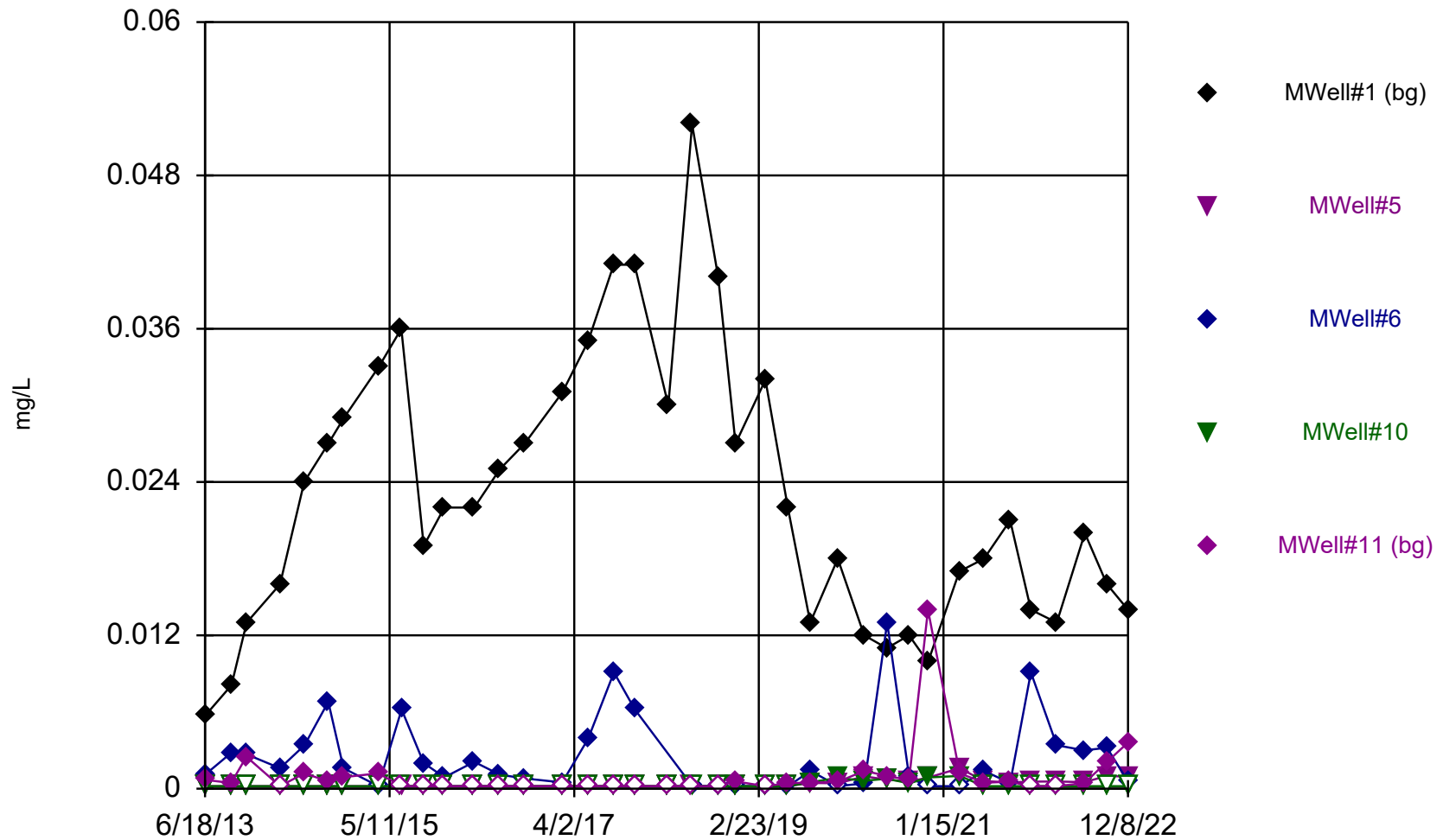
Time Series



Constituent: cis-1,2-Dichloroethene Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

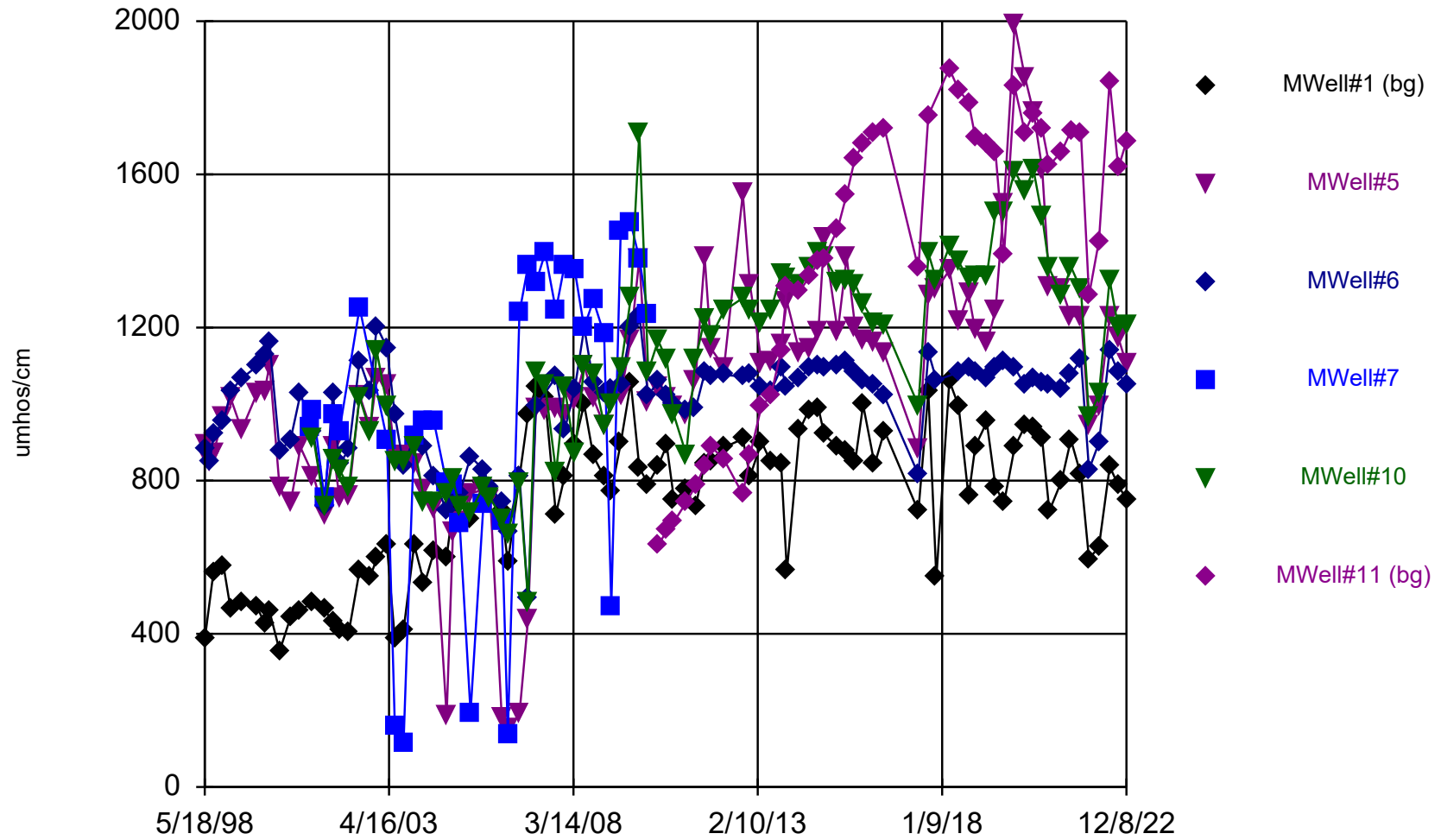
Time Series



Constituent: Cobalt, Total Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

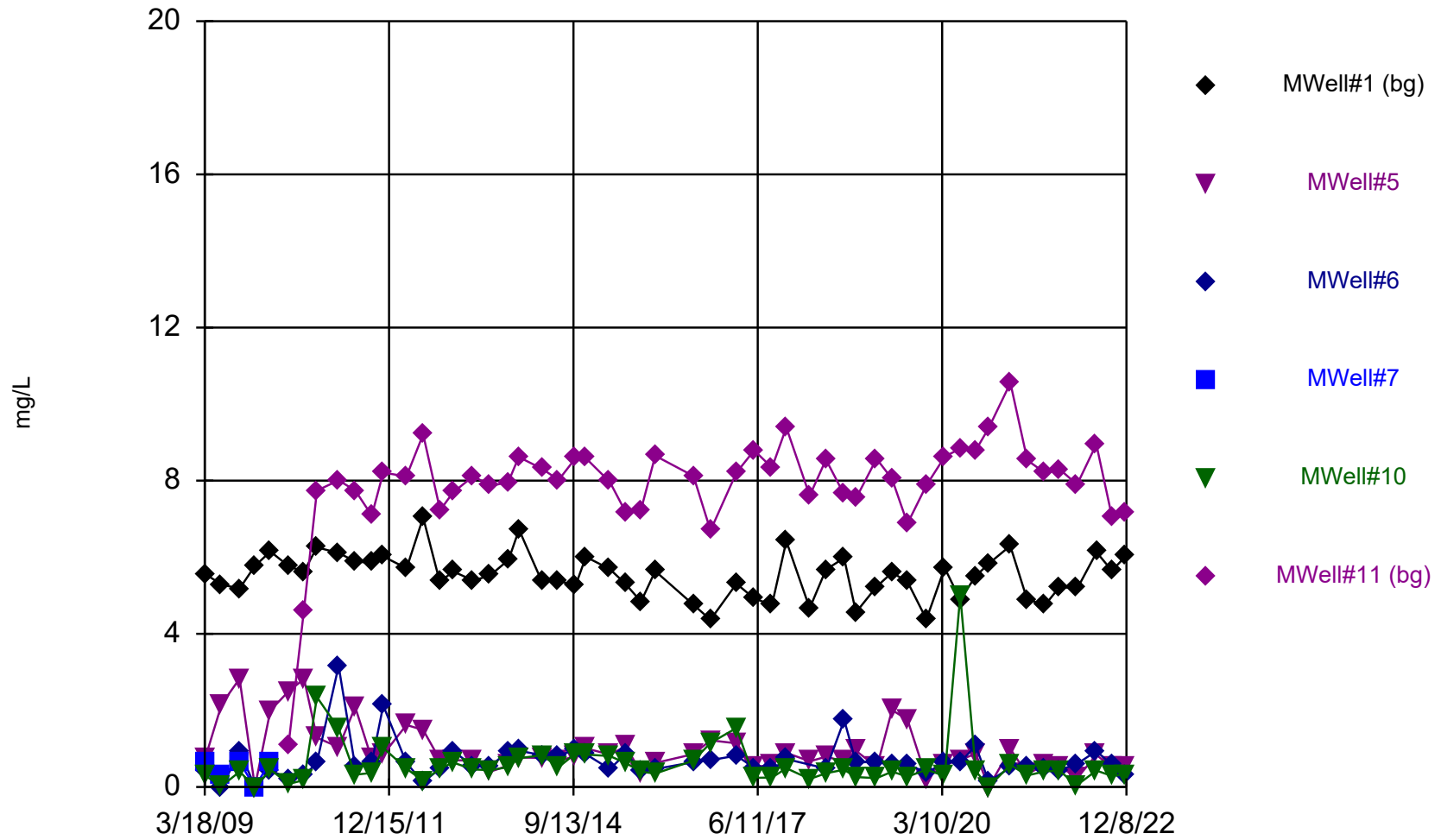
Time Series



Constituent: Conductivity Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

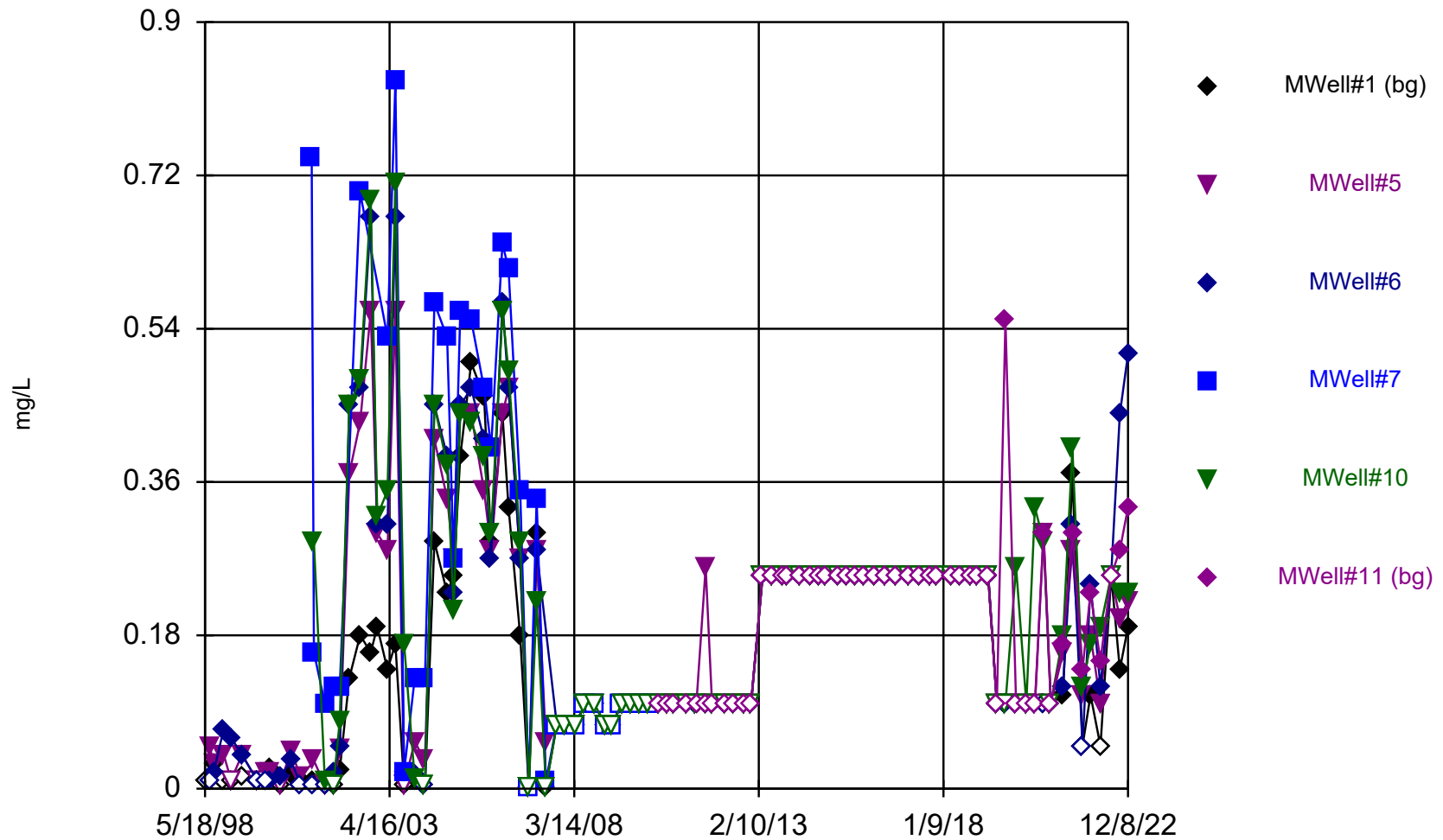
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Dissolved Oxygen Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

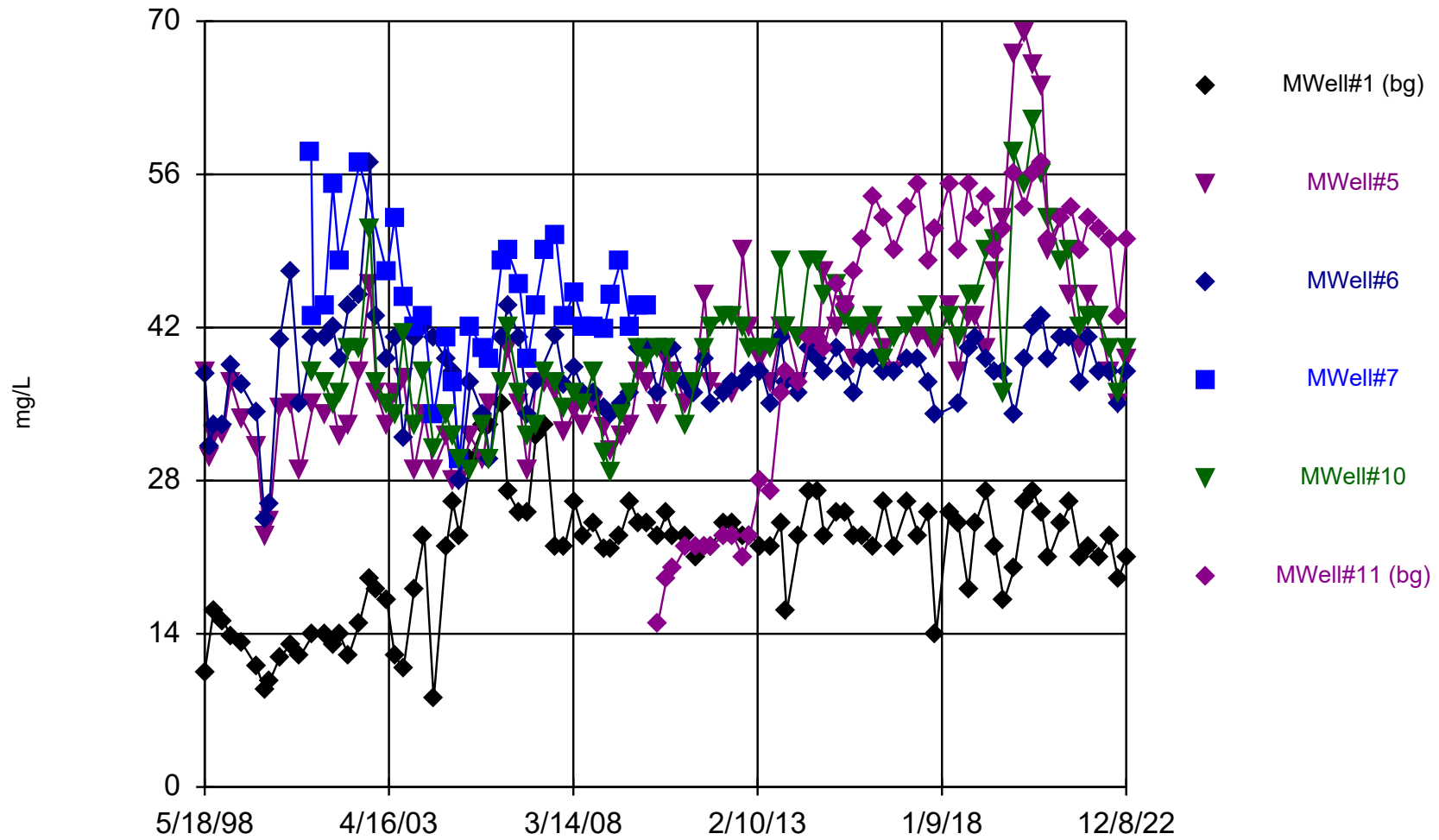
Time Series



Constituent: Iron, Dissolved Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

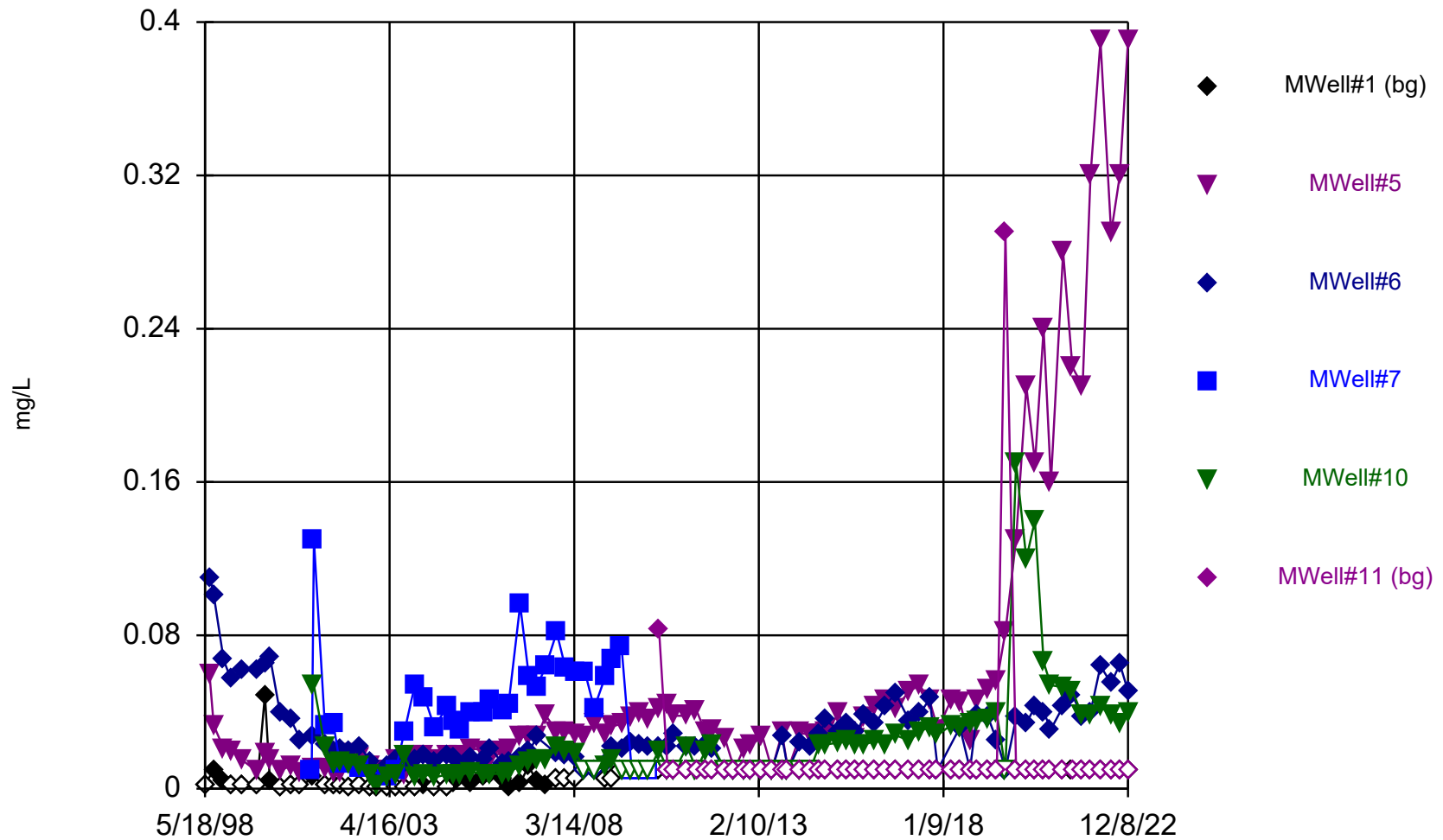
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



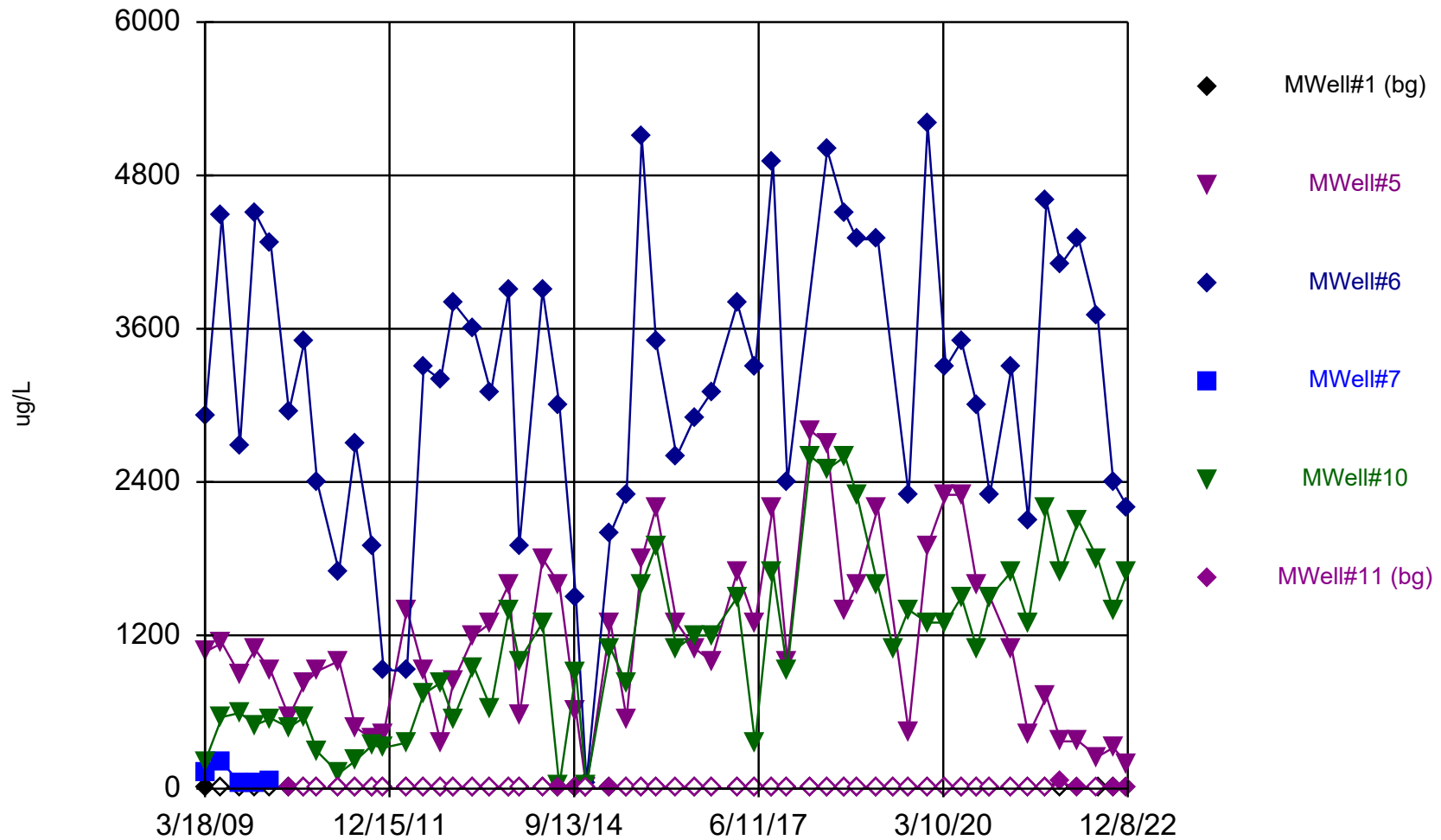
Constituent: Magnesium, Dissolved Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Manganese, Dissolved Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

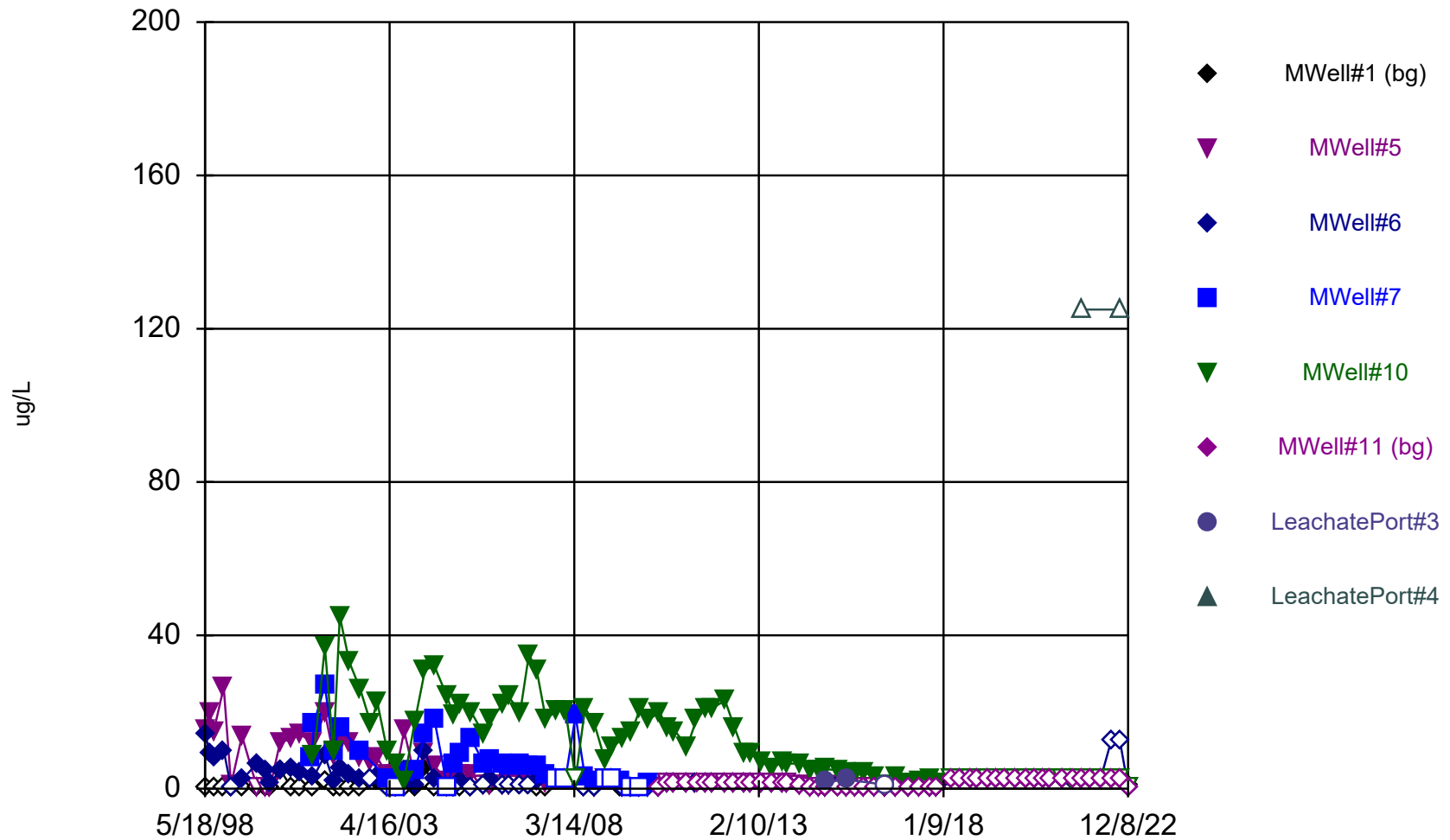
Time Series



Constituent: Methane Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

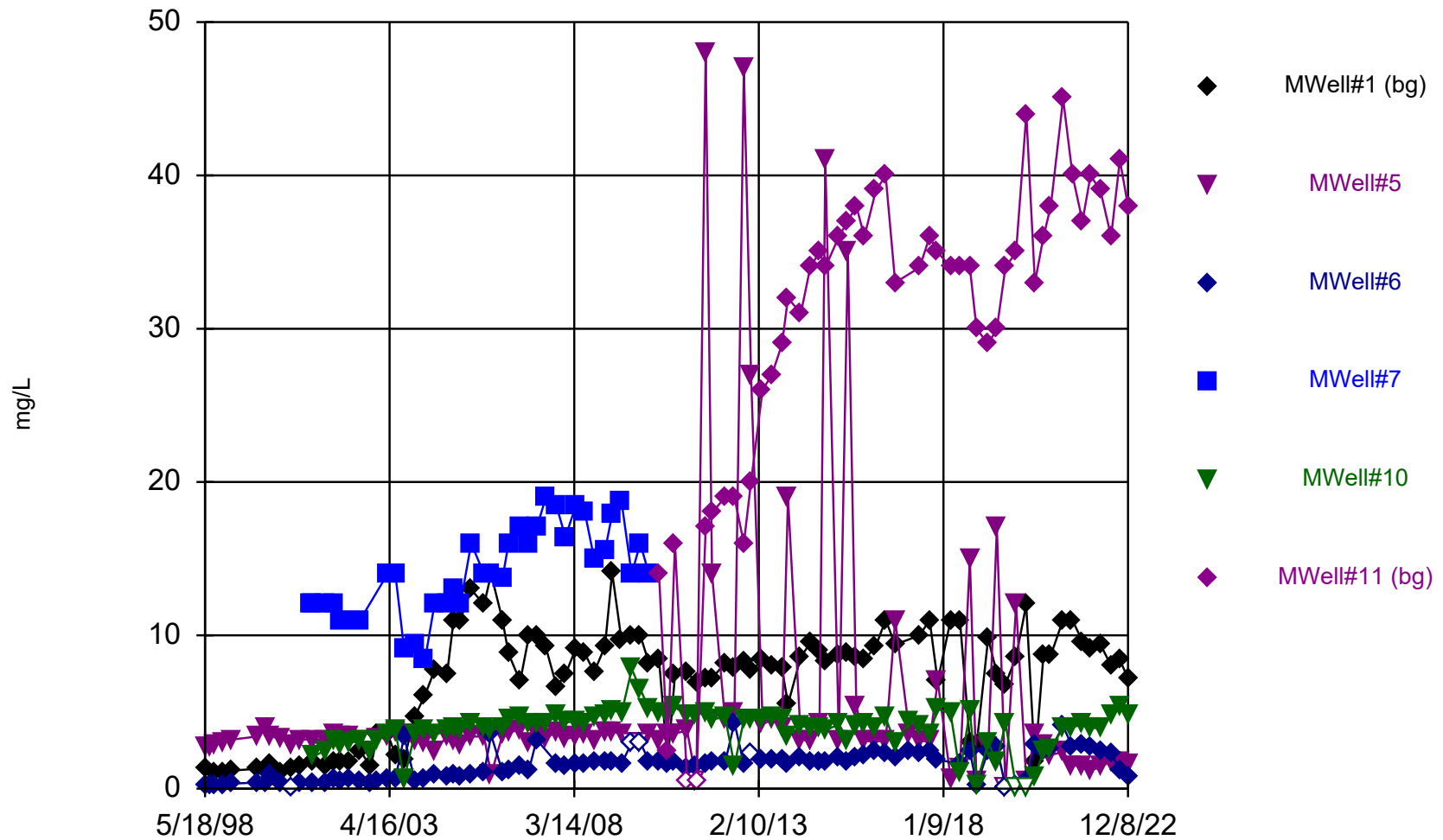
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Methylene Chloride Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

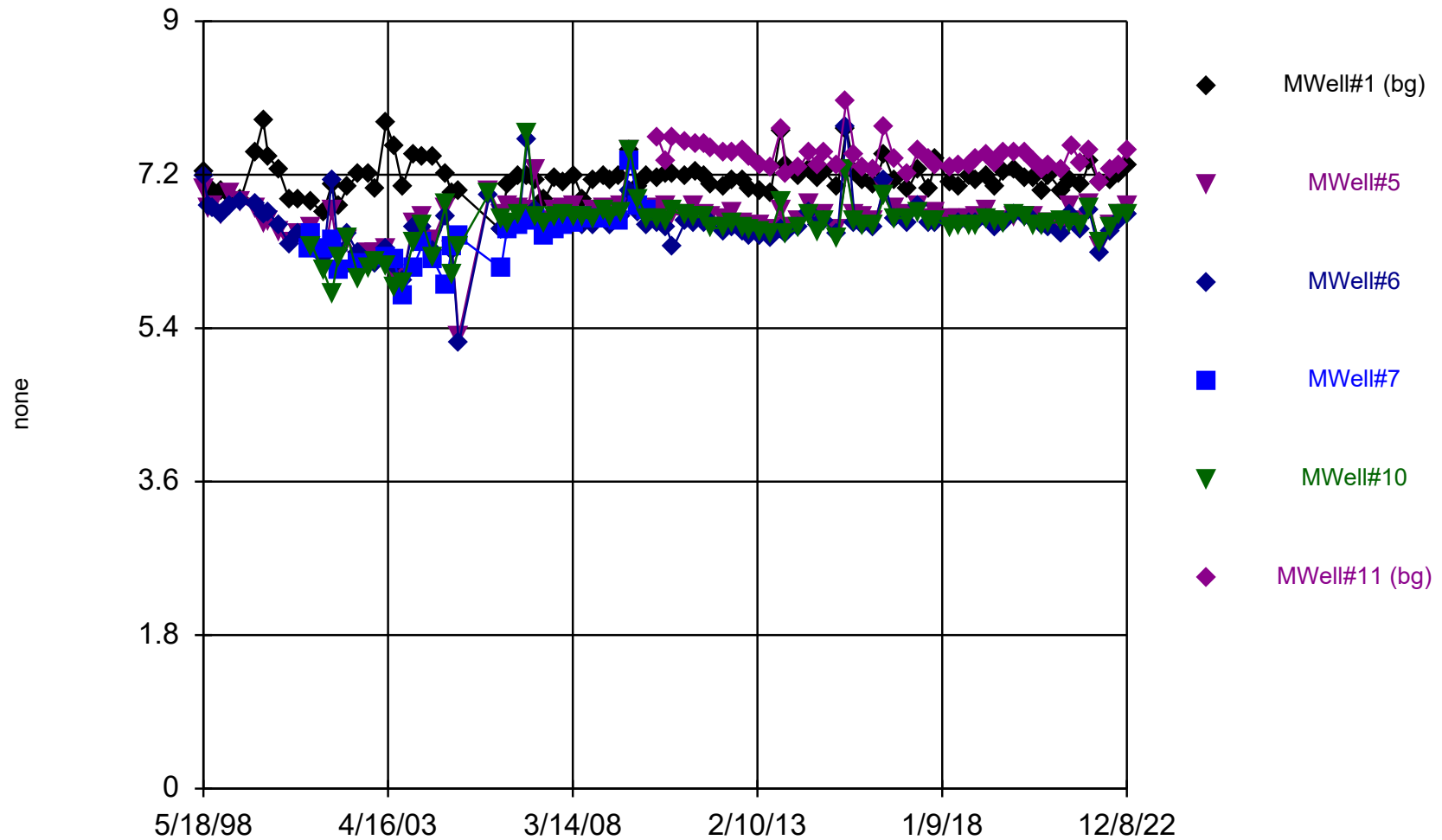
Time Series



Constituent: Nitrate Nitrogen Analysis Run 2/3/2023 4:11 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

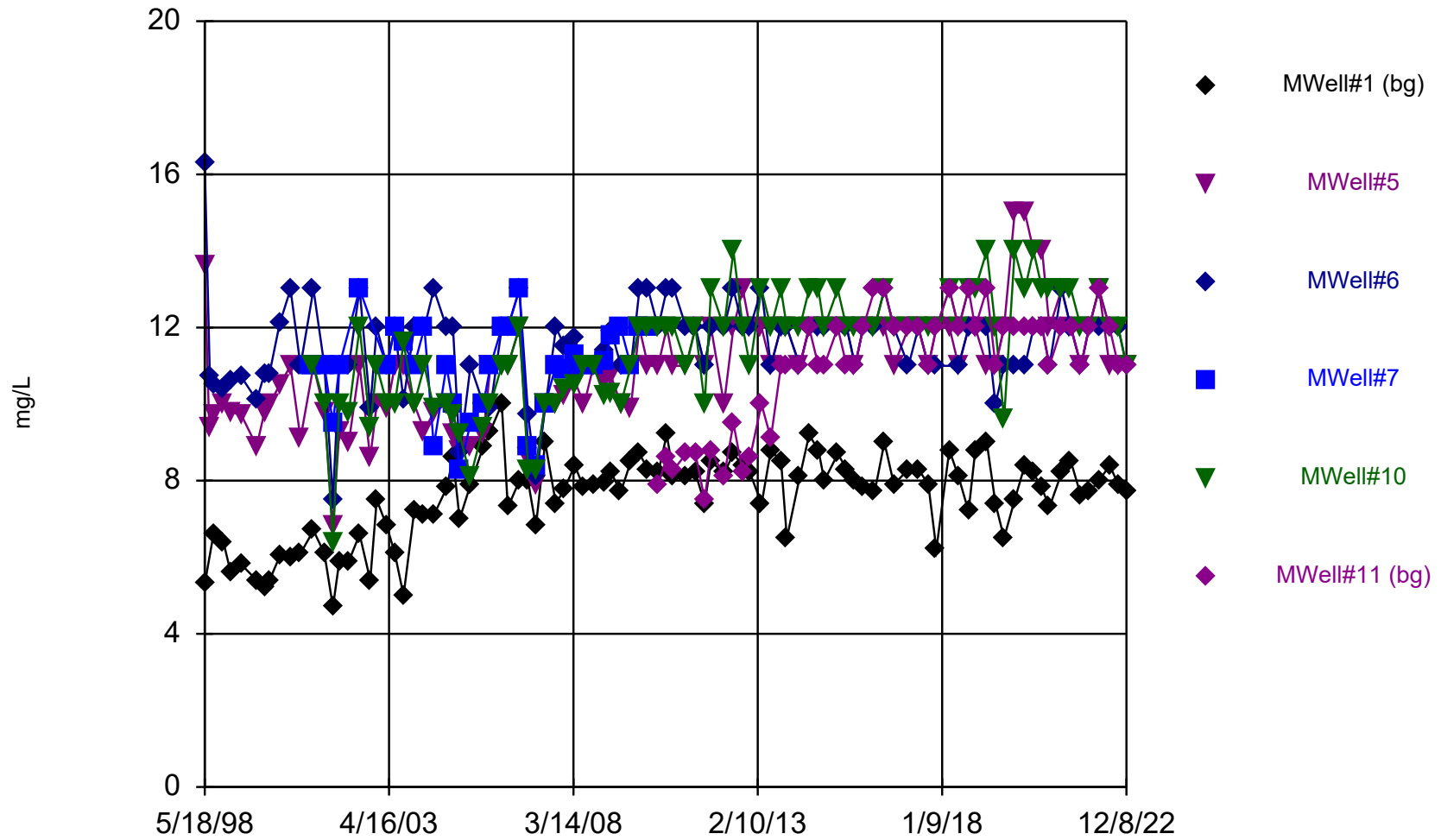
Time Series



Constituent: pH Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

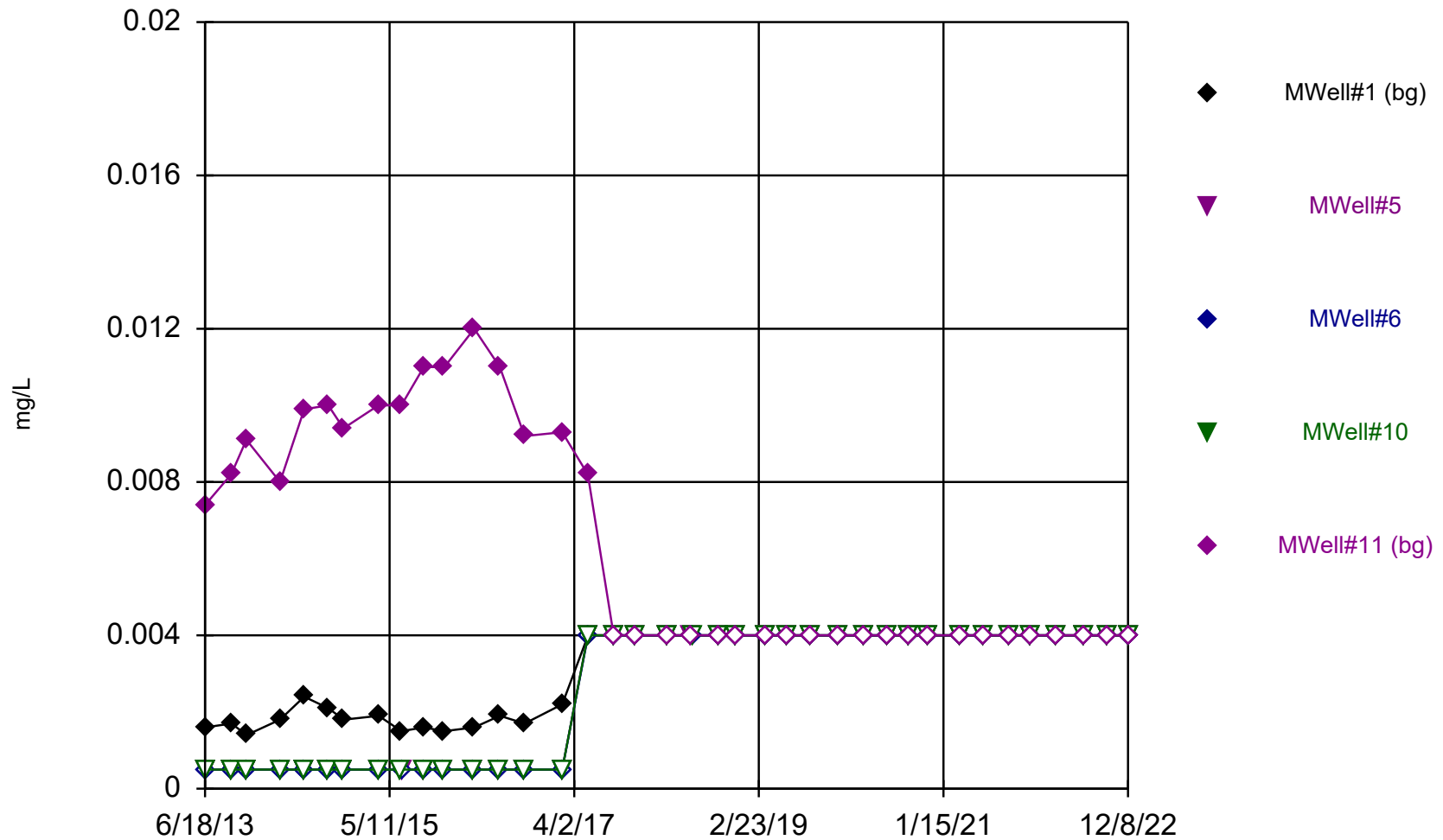
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Potassium, Dissolved Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

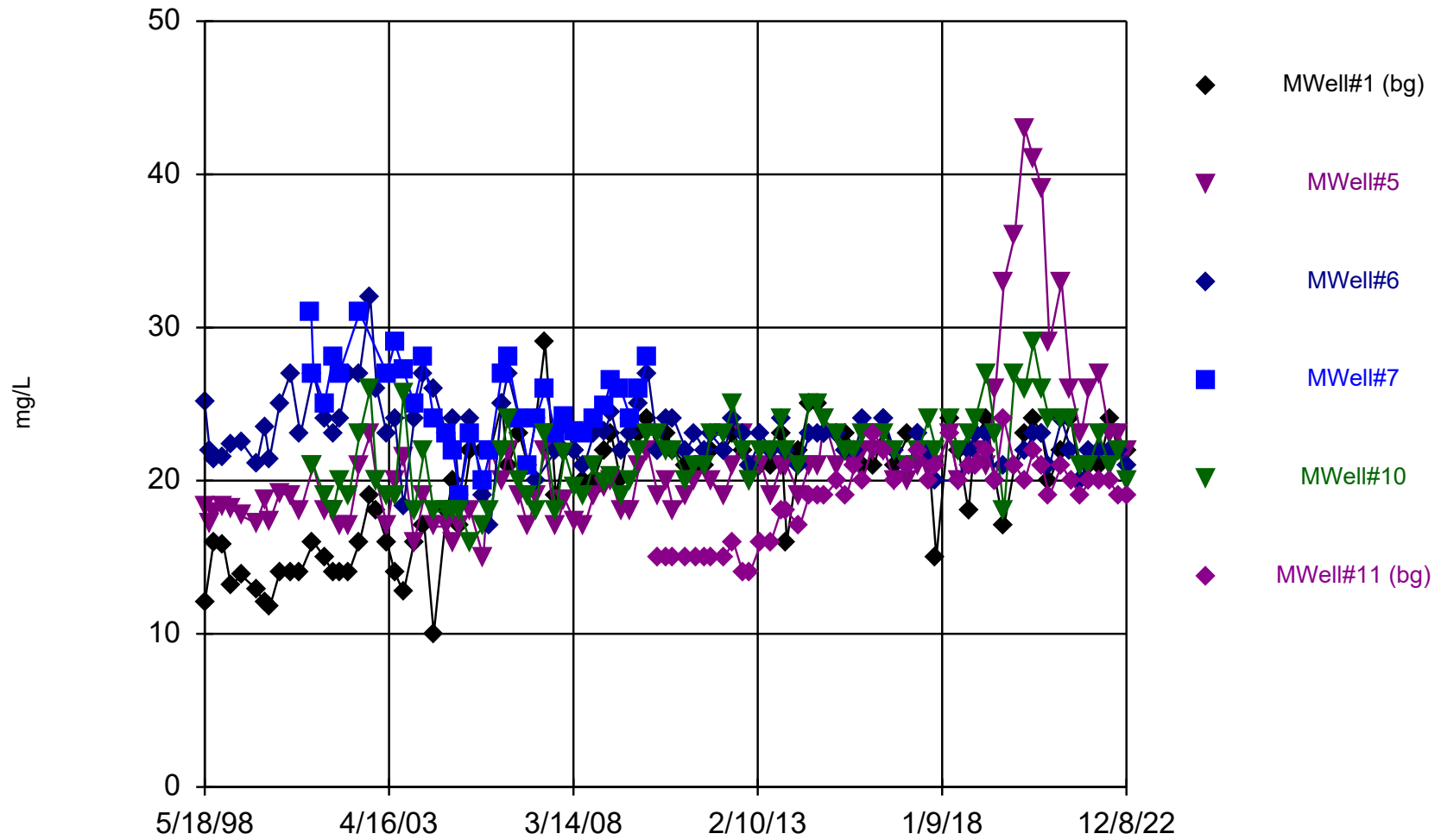
Time Series



Constituent: Selenium, Total Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

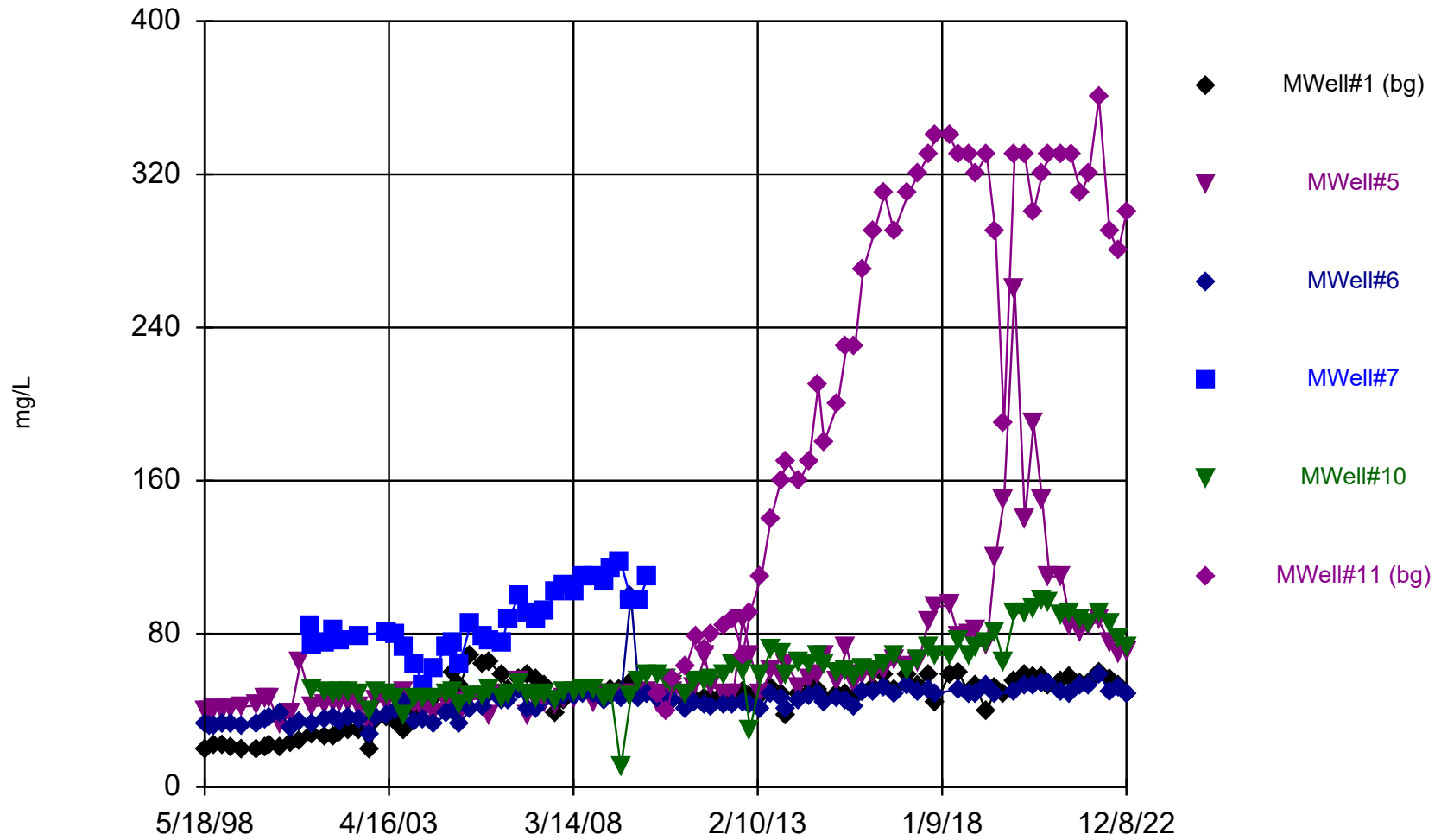
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Sodium, Dissolved Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

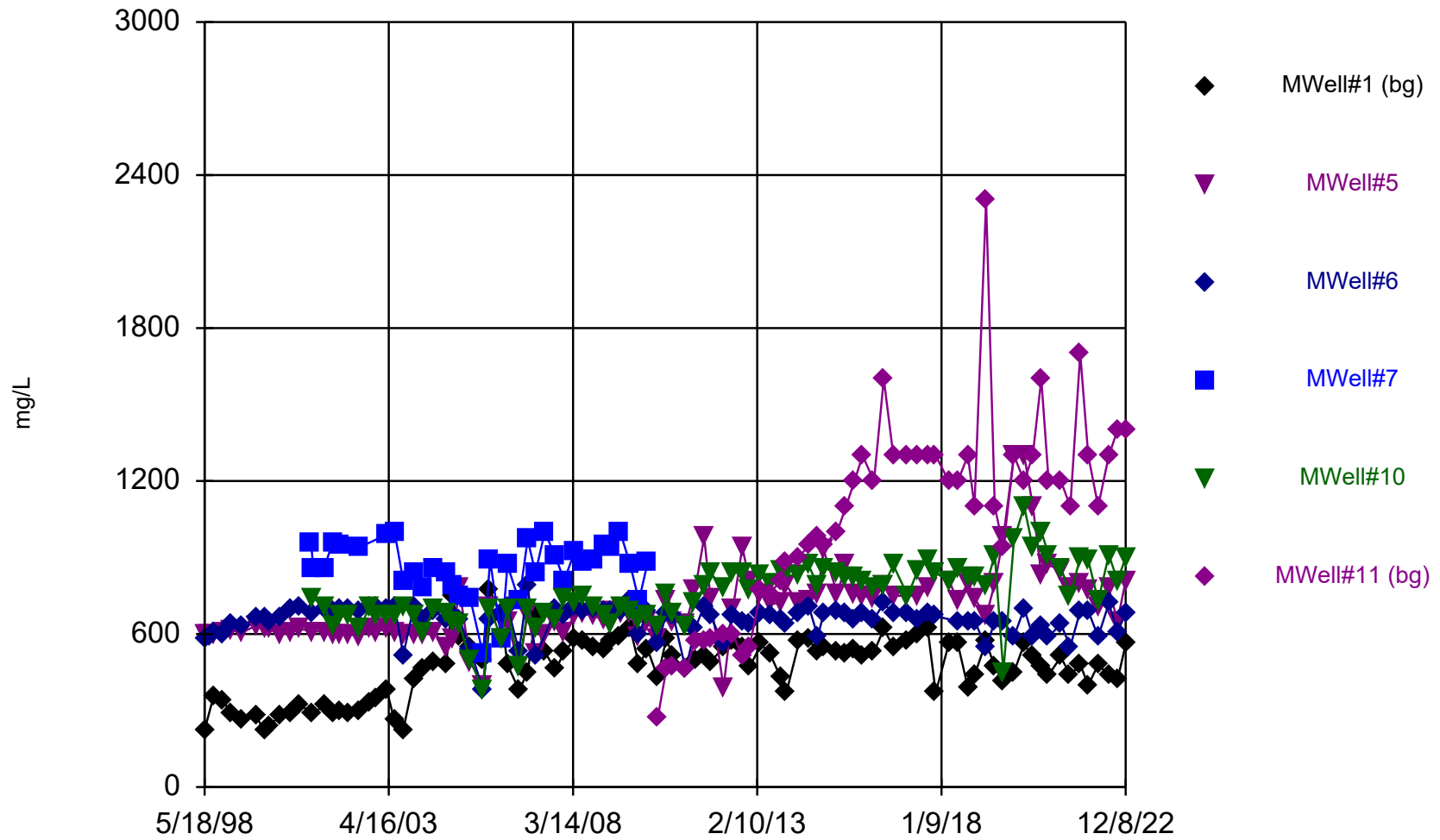
Time Series



Constituent: Sulfate Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

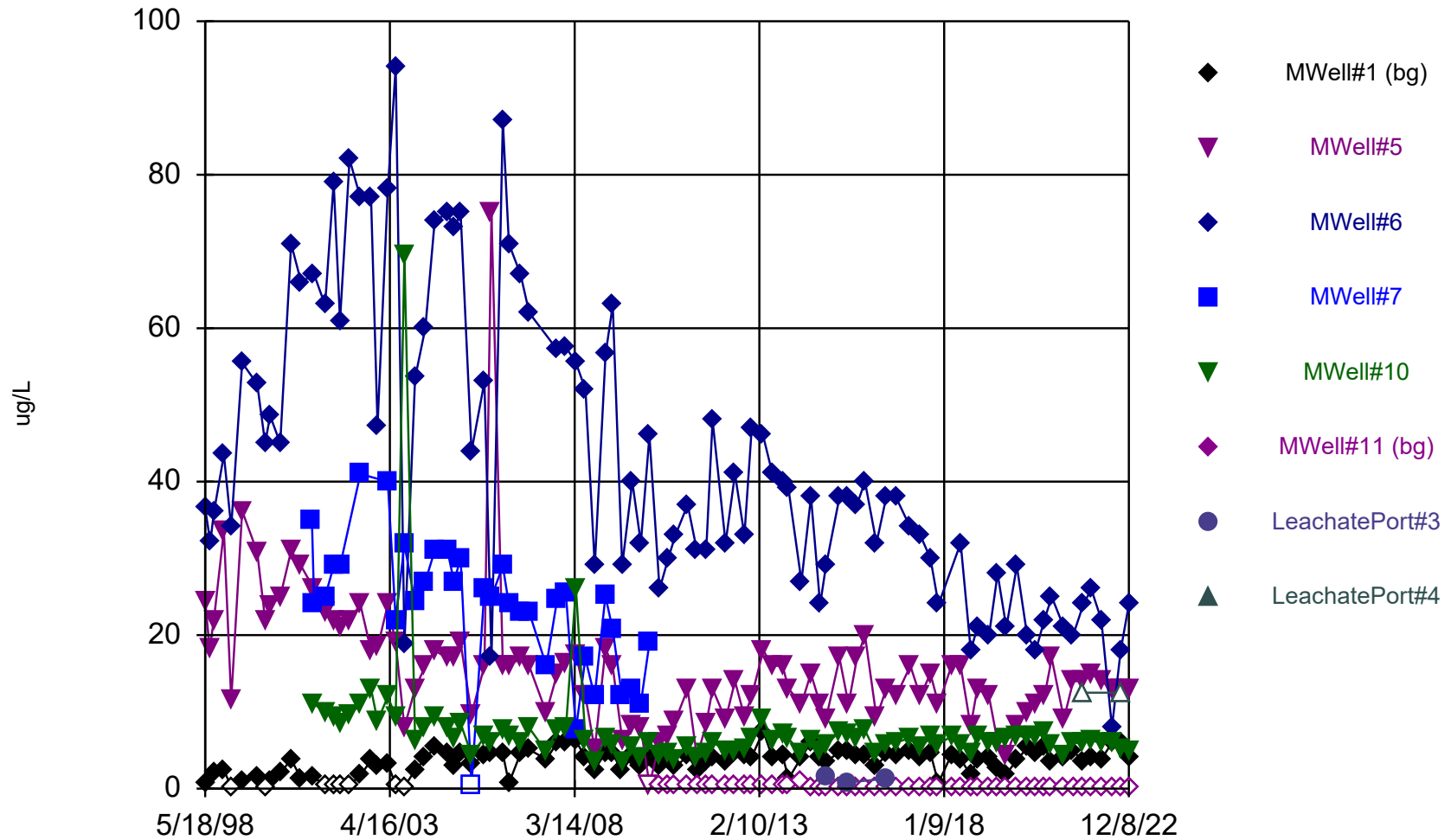
Time Series



Constituent: TDS Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

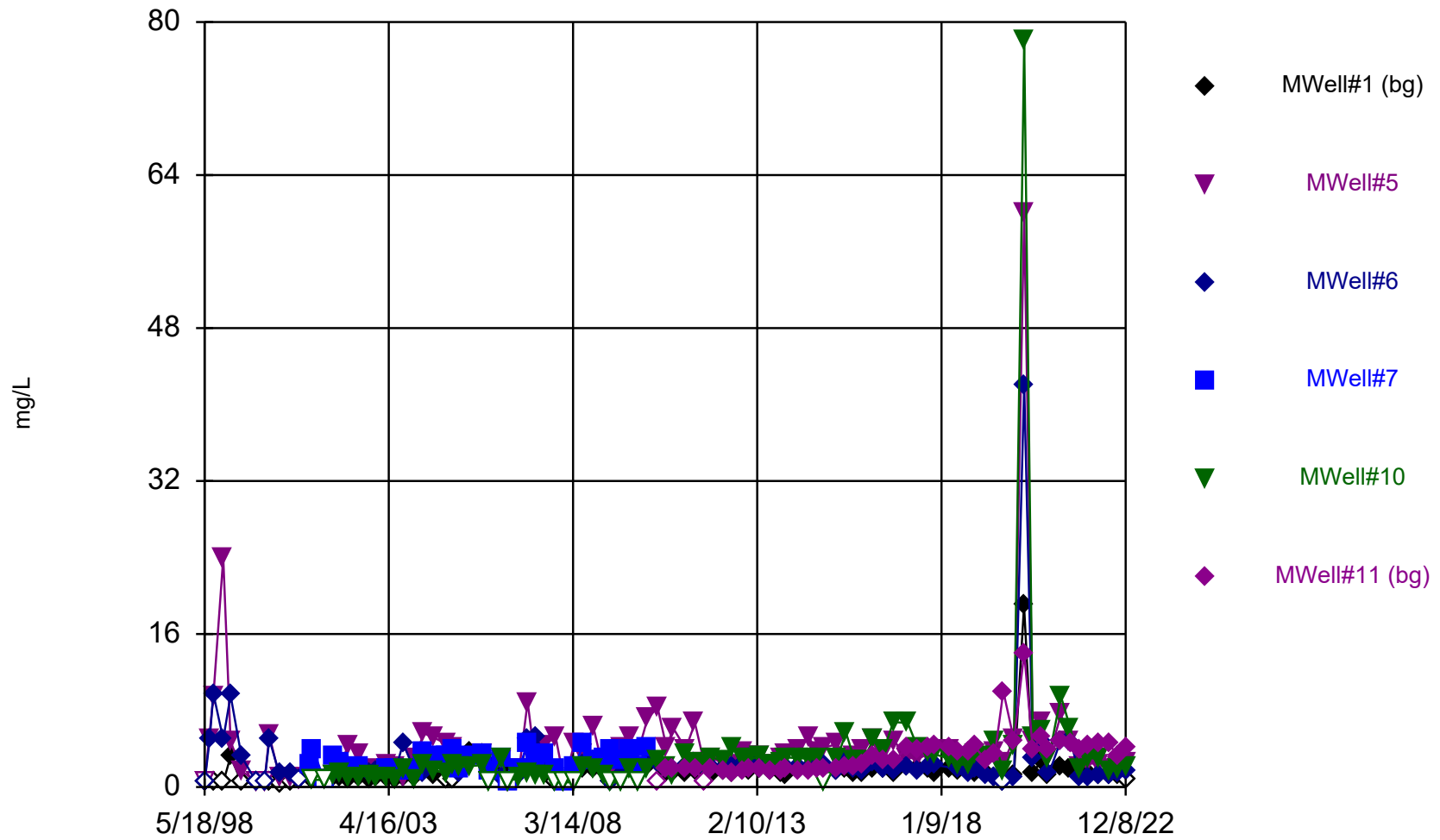
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Tetrachloroethene Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

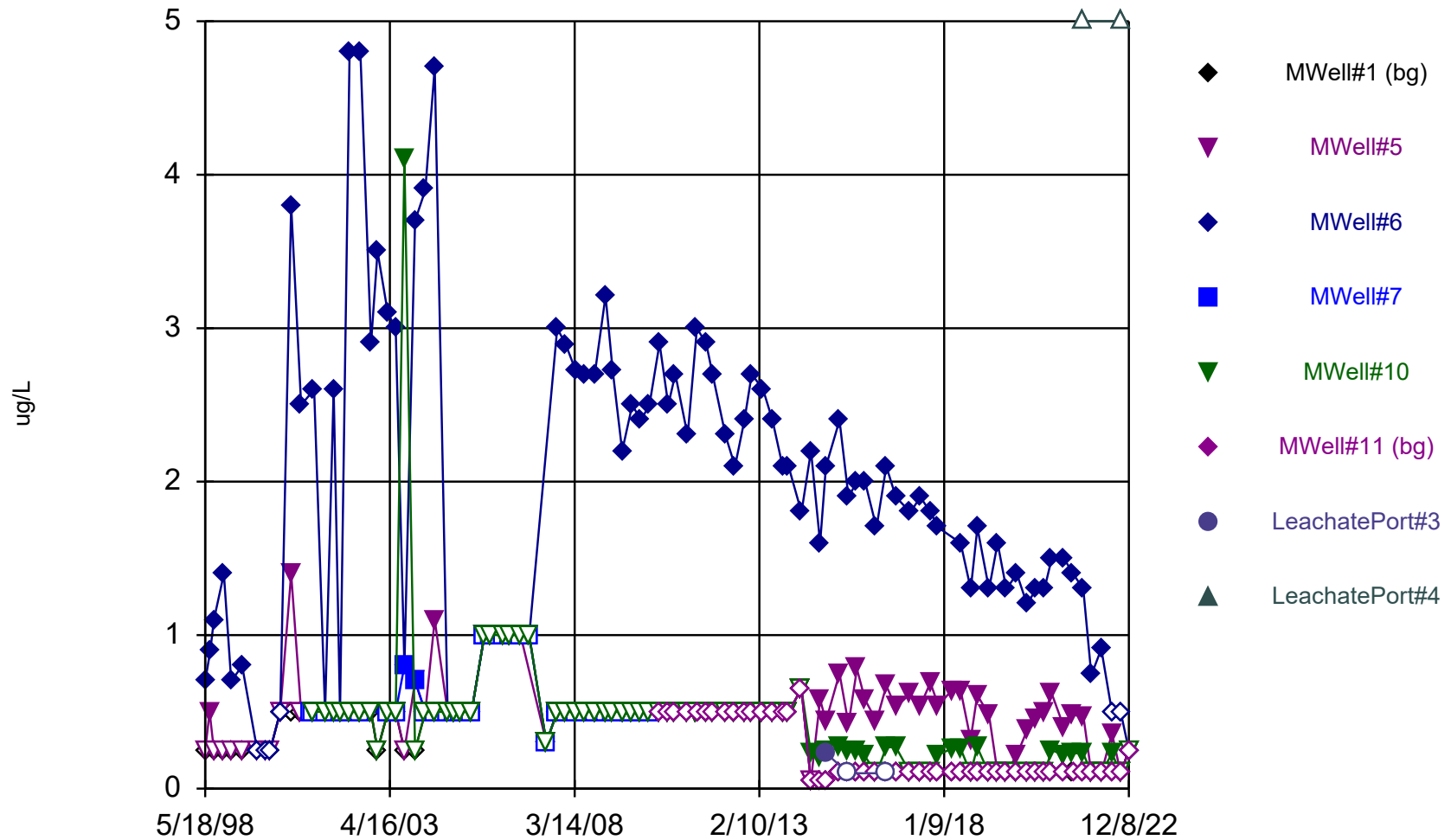
Time Series



Constituent: TOC Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

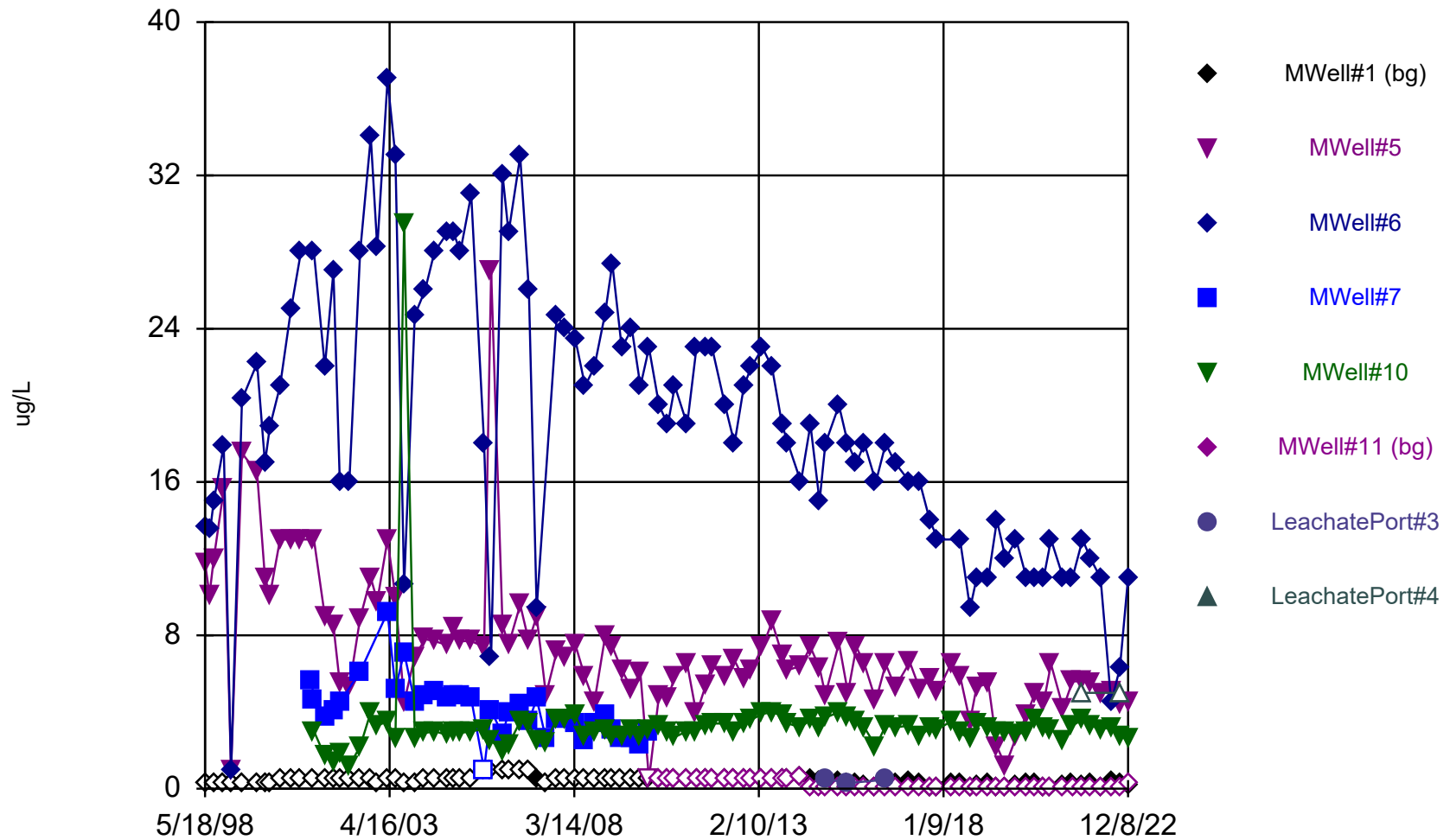
Time Series



Constituent: trans-1,2-Dichloroethene Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

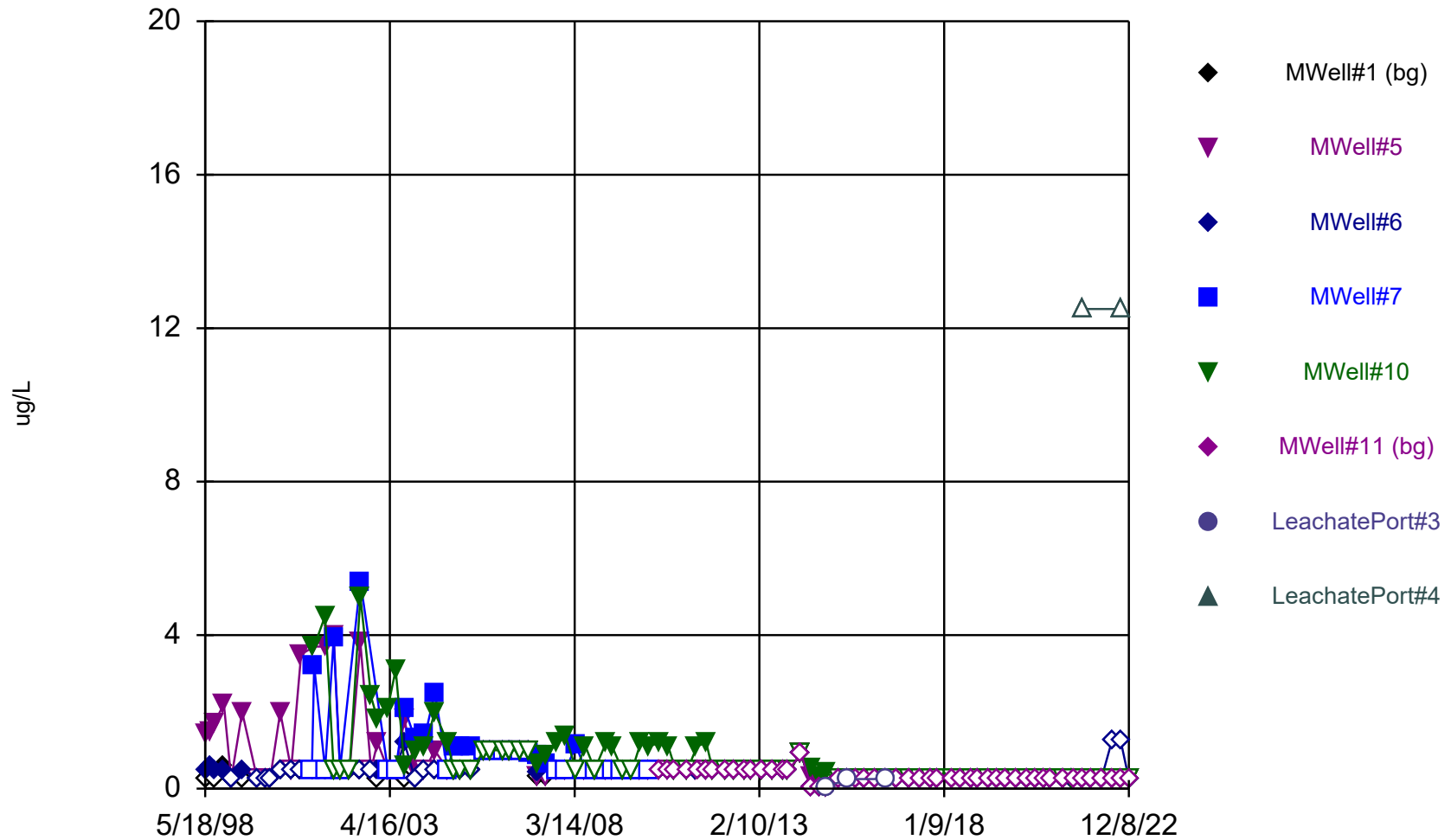
Time Series



Constituent: Trichloroethene Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

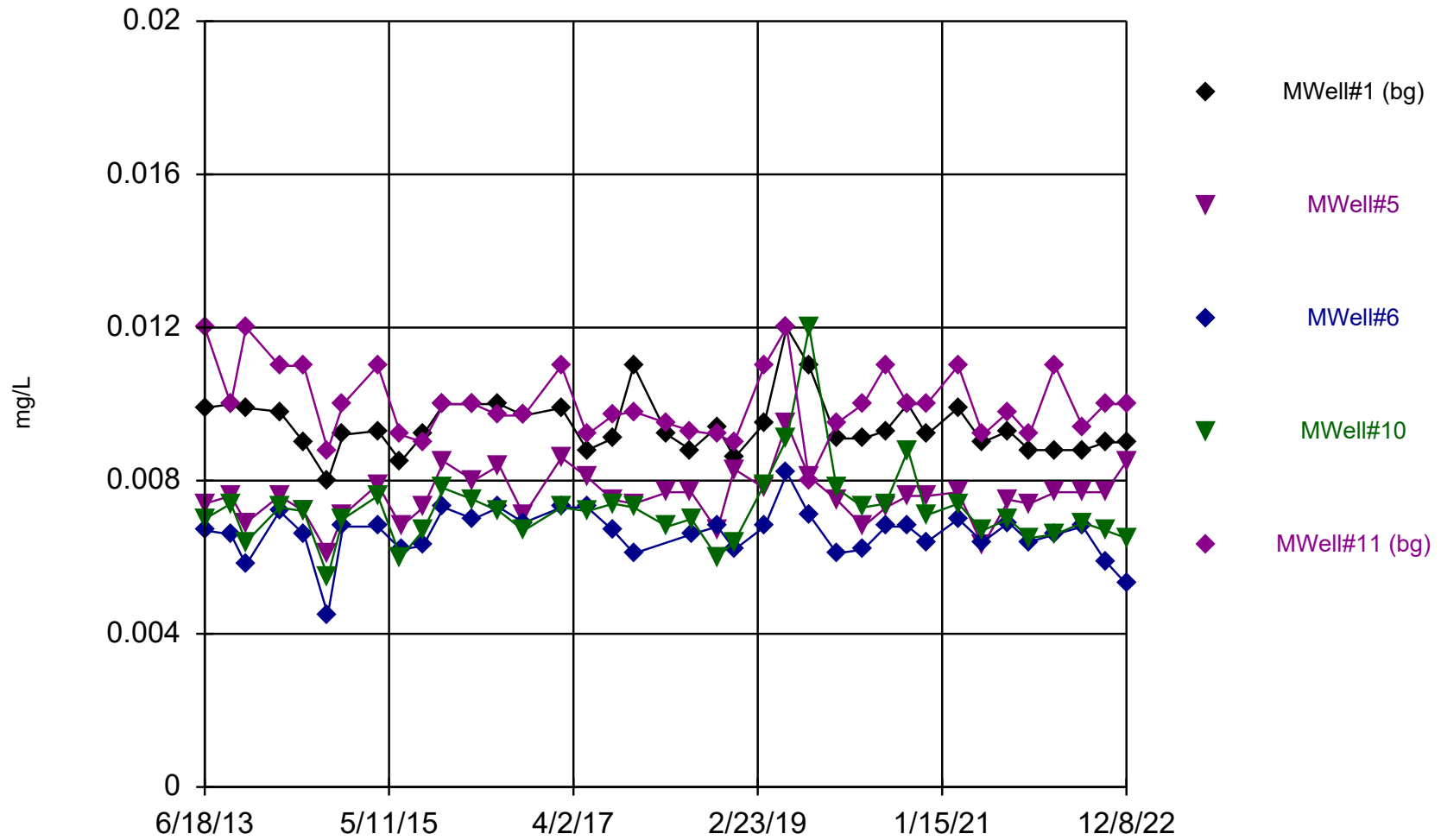
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



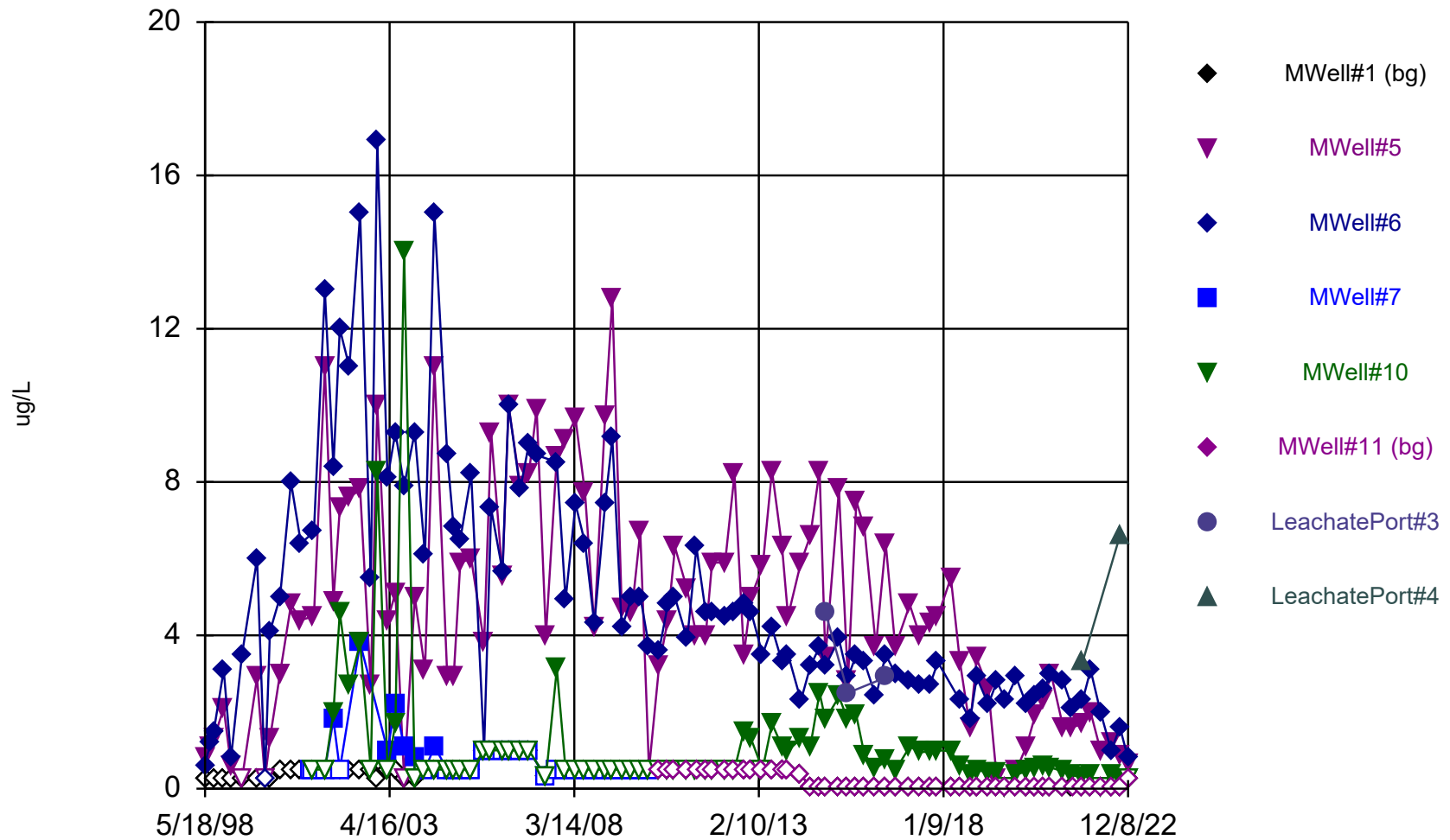
Constituent: Trichlorofluoromethane Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Vanadium, Total Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

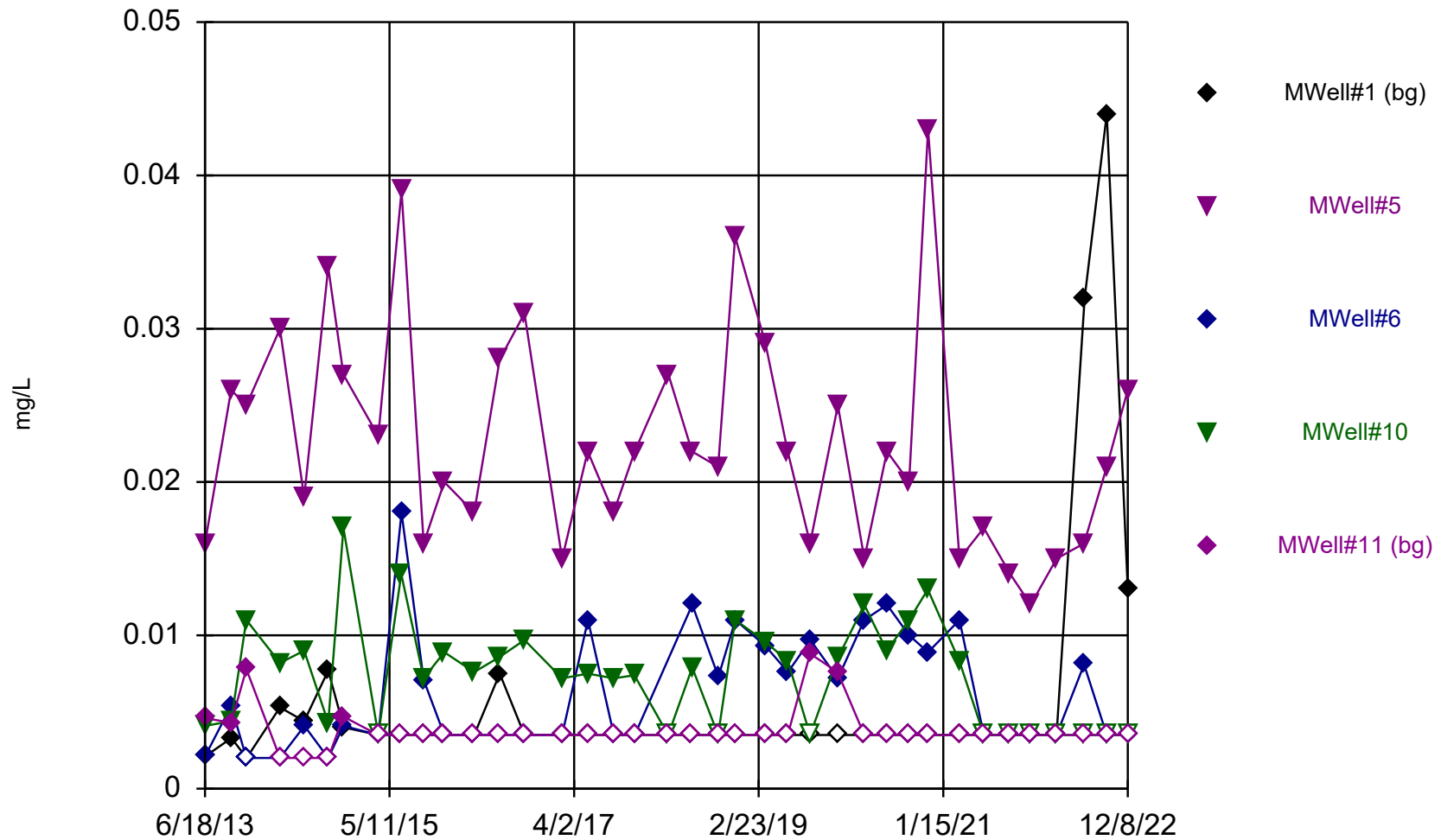
Time Series



Constituent: Vinyl Chloride Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Time Series



Constituent: Zinc, Total Analysis Run 2/3/2023 4:12 PM View: HRLF_TSP Set2

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

This Page Intentionally Left Blank

Appendix D

Sen's Slope/Mann Kendall Tests



Appendix D-1

10-Year Trends

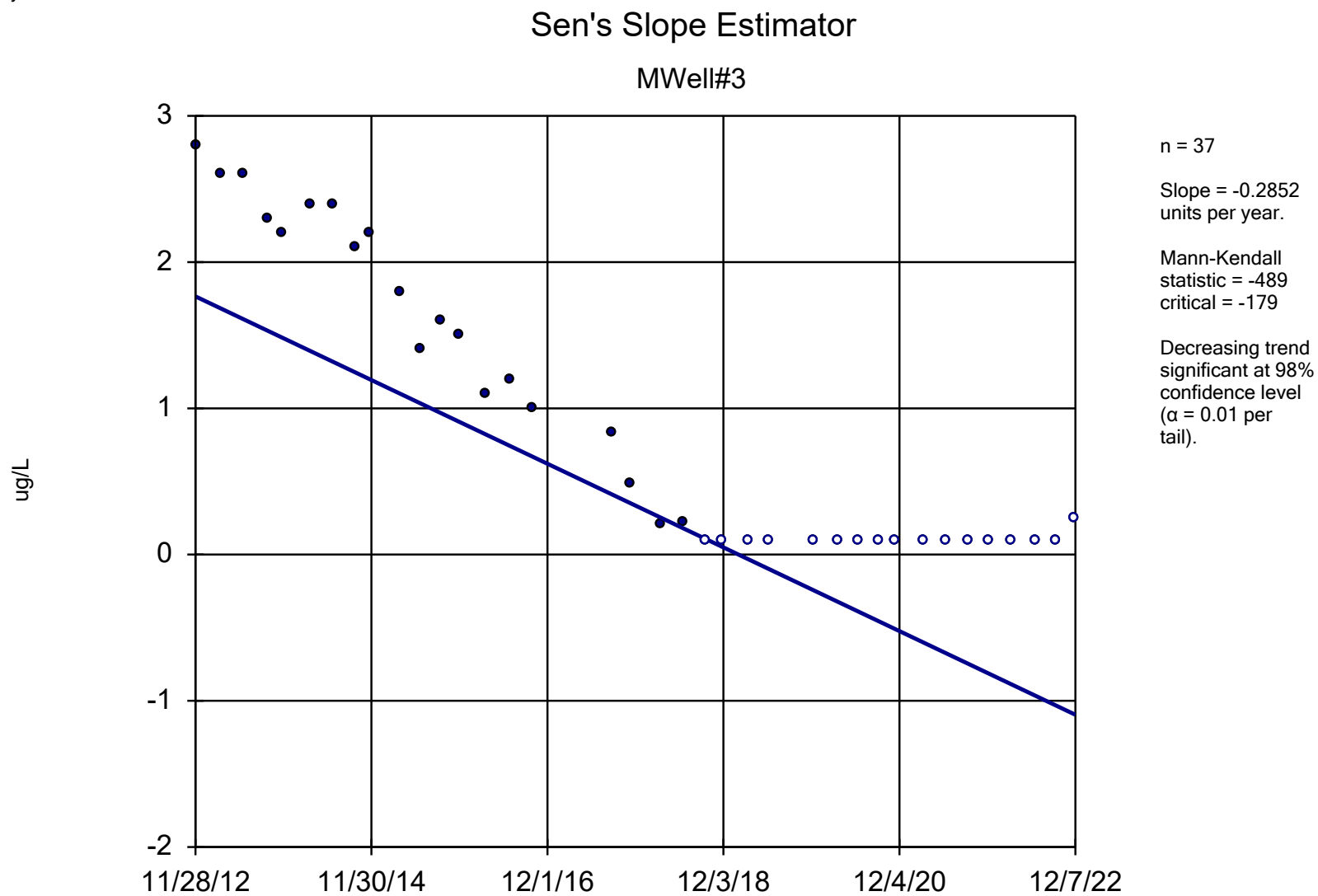


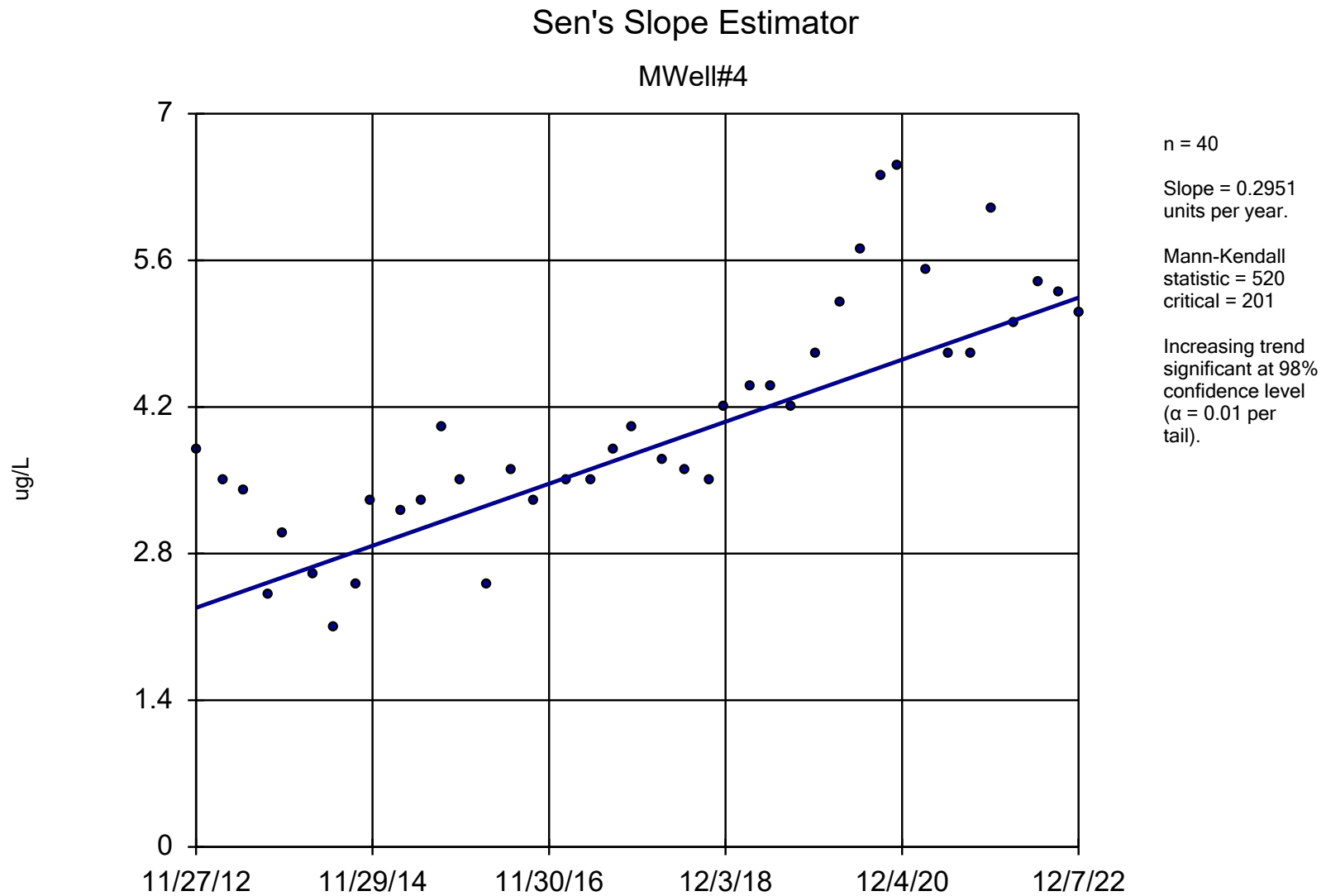
Horn Rapids Landfill Trends for Volatile Organic Compounds, First Quarter 2013 through Fourth Quarter 2022

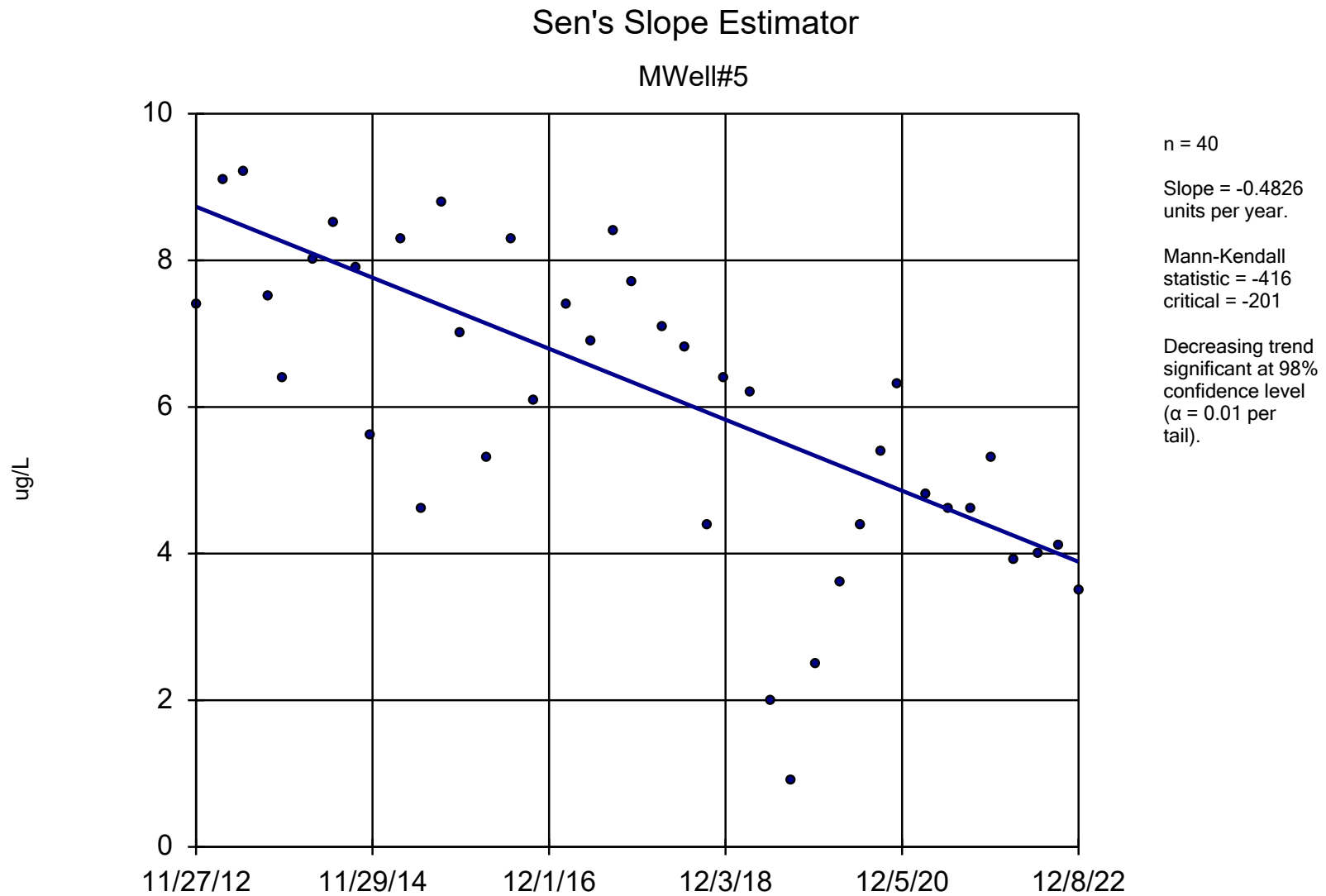
Constituent Name	Well	Slope	Calculated Statistic	Critical Value	Trend	N	% Non-detects	Normality	Transformation	Alpha	Method
1,1-Dichloroethane (ug/L)	MWell#3	-0.2852	-489	-179	Yes	37	45.95	n/a	n/a	0.02	NP
1,1-Dichloroethane (ug/L)	MWell#4	0.2951	520	201	Yes	40	0	n/a	n/a	0.02	NP
1,1-Dichloroethane (ug/L)	MWell#5	-0.4826	-416	-201	Yes	40	0	n/a	n/a	0.02	NP
1,1-Dichloroethane (ug/L)	MWell#6	-0.6363	-614	-194	Yes	39	0	n/a	n/a	0.02	NP
1,1-Dichloroethane (ug/L)	MWell#9	-0.1802	-301	-201	Yes	40	0	n/a	n/a	0.02	NP
1,1-Dichloroethane (ug/L)	MWell#10	-0.5437	-514	-201	Yes	40	0	n/a	n/a	0.02	NP
1,2-Dichloroethane (ug/L)	MWell#5	-0.04351	-240	-201	Yes	40	20	n/a	n/a	0.02	NP
1,2-Dichloroethane (ug/L)	MWell#6	-0.02341	-394	-194	Yes	39	23.08	n/a	n/a	0.02	NP
1,2-Dichloroethane (ug/L)	MWell#10	-0.01233	-260	-201	Yes	40	17.5	n/a	n/a	0.02	NP
1,2-Dichloropropane (ug/L)	MWell#5	-0.02511	-345	-201	Yes	40	17.5	n/a	n/a	0.02	NP
1,2-Dichloropropane (ug/L)	MWell#6	-0.02433	-358	-194	Yes	39	20.51	n/a	n/a	0.02	NP
Benzene (ug/L)	MWell#5	-0.02001	-299	-201	Yes	40	30	n/a	n/a	0.02	NP
Benzene (ug/L)	MWell#6	-0.01701	-306	-194	Yes	39	20.51	n/a	n/a	0.02	NP
Benzene (ug/L)	MWell#10	-0.05194	-538	-201	Yes	40	27.5	n/a	n/a	0.02	NP
Chloroform (ug/L)	MWell#3	0.7351	453	179	Yes	37	16.22	n/a	n/a	0.02	NP
Chloroform (ug/L)	MWell#4	-0.01957	-234	-201	Yes	40	15	n/a	n/a	0.02	NP
Chloroform (ug/L)	MWell#10	-0.03595	-250	-201	Yes	40	7.5	n/a	n/a	0.02	NP
cis-1,2-Dichloroethene (ug/L)	MWell#4	0.272	491	201	Yes	40	2.5	n/a	n/a	0.02	NP
cis-1,2-Dichloroethene (ug/L)	MWell#5	-1.045	-242	-201	Yes	40	0	n/a	n/a	0.02	NP
cis-1,2-Dichloroethene (ug/L)	MWell#6	-1.45	-289	-194	Yes	39	0	n/a	n/a	0.02	NP
Tetrachloroethene (ug/L)	MWell#6	-2.37	-448	-194	Yes	39	0	n/a	n/a	0.02	NP
Tetrachloroethene (ug/L)	MWell#9	0.2834	295	201	Yes	40	0	n/a	n/a	0.02	NP
trans-1,2-Dichloroethene (ug/L)	MWell#5	-0.02528	-232	-201	Yes	40	32.5	n/a	n/a	0.02	NP
trans-1,2-Dichloroethene (ug/L)	MWell#6	-0.1579	-563	-194	Yes	39	7.692	n/a	n/a	0.02	NP
Trichloroethene (ug/L)	MWell#1 (bg)	-0.02688	-343	-201	Yes	40	37.5	n/a	n/a	0.02	NP
Trichloroethene (ug/L)	MWell#5	-0.2487	-318	-201	Yes	40	0	n/a	n/a	0.02	NP
Trichloroethene (ug/L)	MWell#6	-1.183	-522	-194	Yes	39	0	n/a	n/a	0.02	NP
Trichloroethene (ug/L)	MWell#10	-0.07299	-298	-201	Yes	40	0	n/a	n/a	0.02	NP

Horn Rapids Landfill Trends for Volatile Organic Compounds, First Quarter 2013 through Fourth Quarter 2022

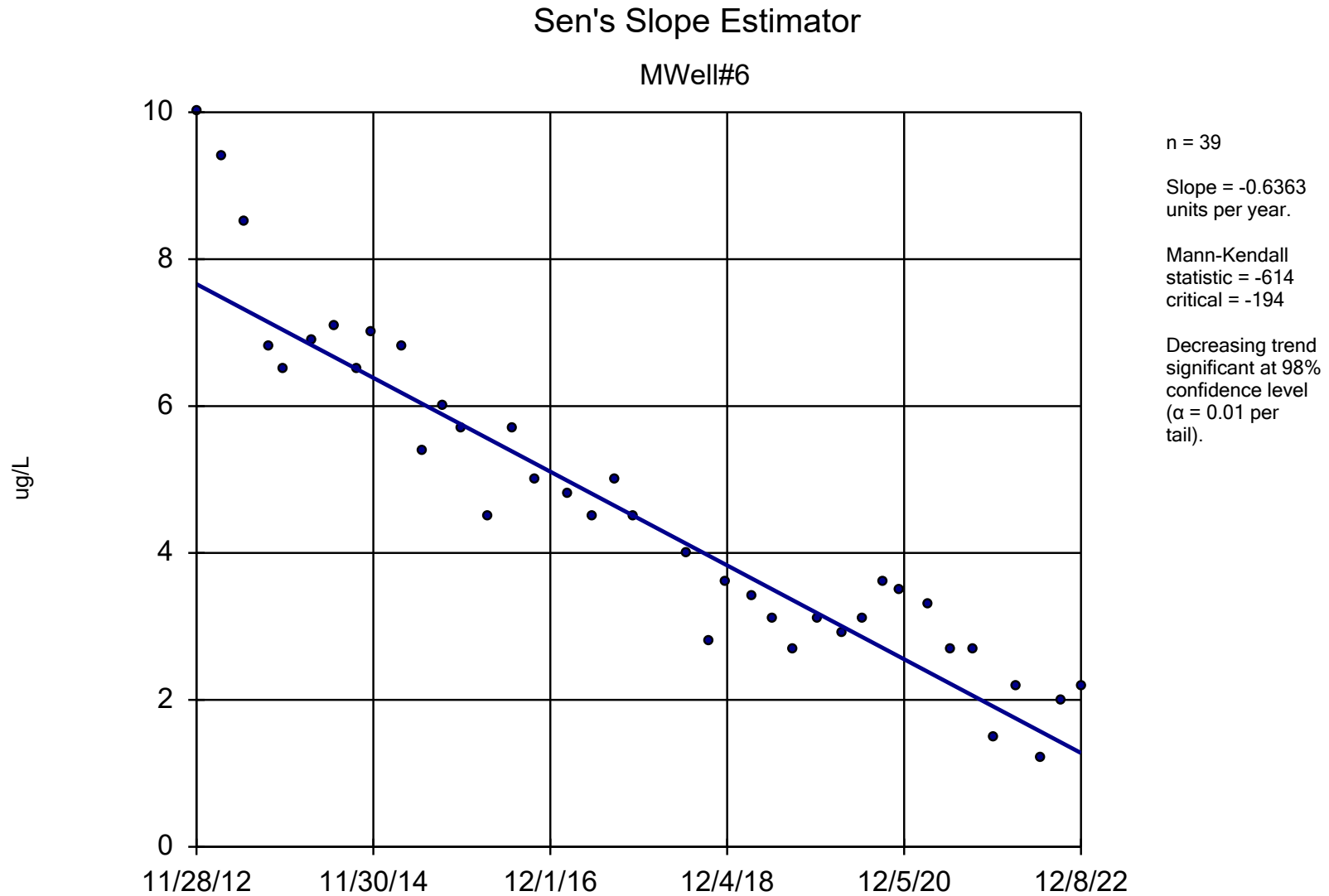
Constituent Name	Well	Slope	Calculated Statistic	Critical Value	Trend	N	% Non-detects	Normality	Transformation	Alpha	Method
Trichlorofluoromethane (ug/L)	MWell#4	0.05946	350	201	Yes	40	10	n/a	n/a	0.02	NP
Vinyl Chloride (ug/L)	MWell#5	-0.6263	-469	-201	Yes	40	2.5	n/a	n/a	0.02	NP
Vinyl Chloride (ug/L)	MWell#6	-0.1869	-417	-194	Yes	39	0	n/a	n/a	0.02	NP
Vinyl Chloride (ug/L)	MWell#10	-0.1248	-482	-201	Yes	40	10	n/a	n/a	0.02	NP



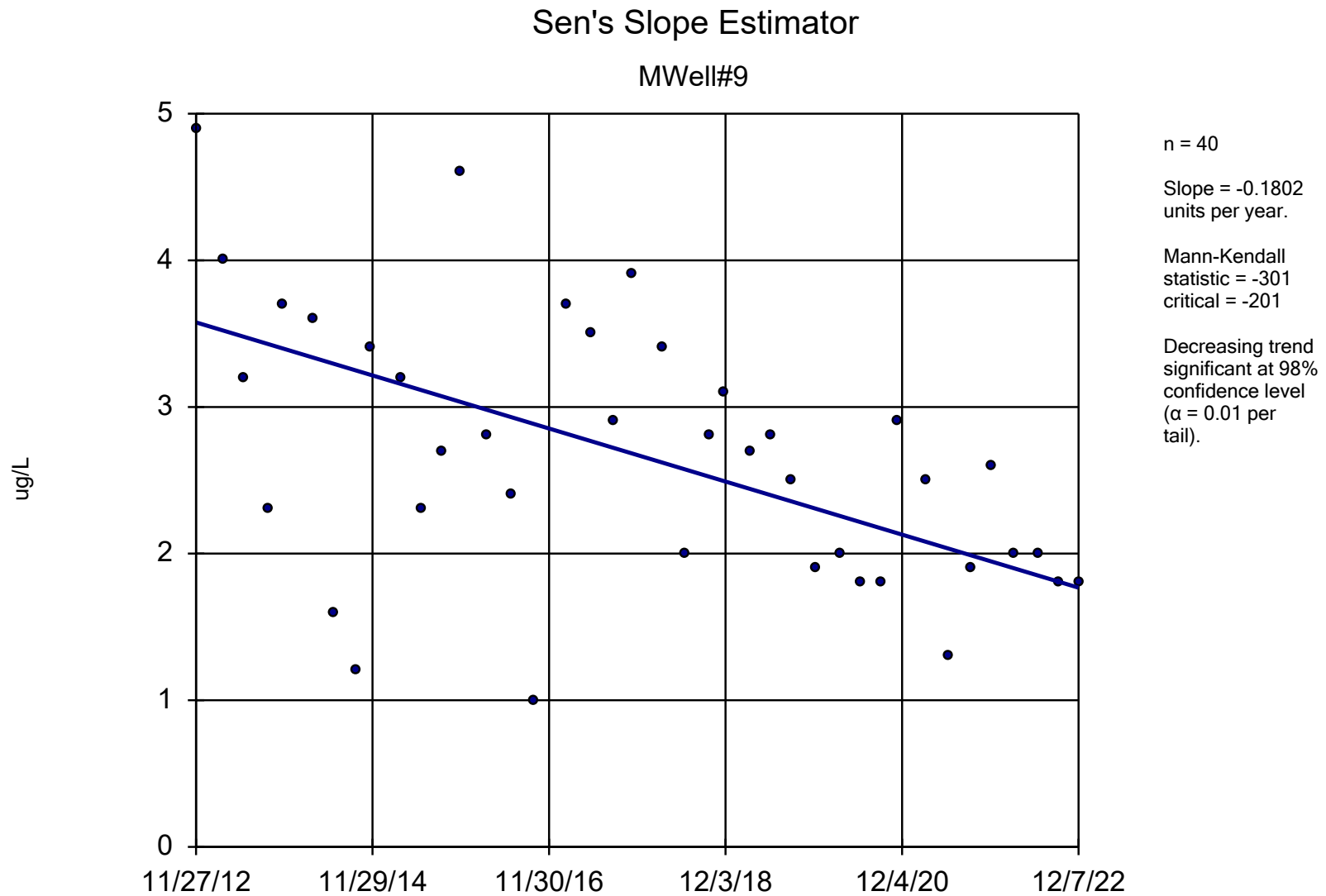




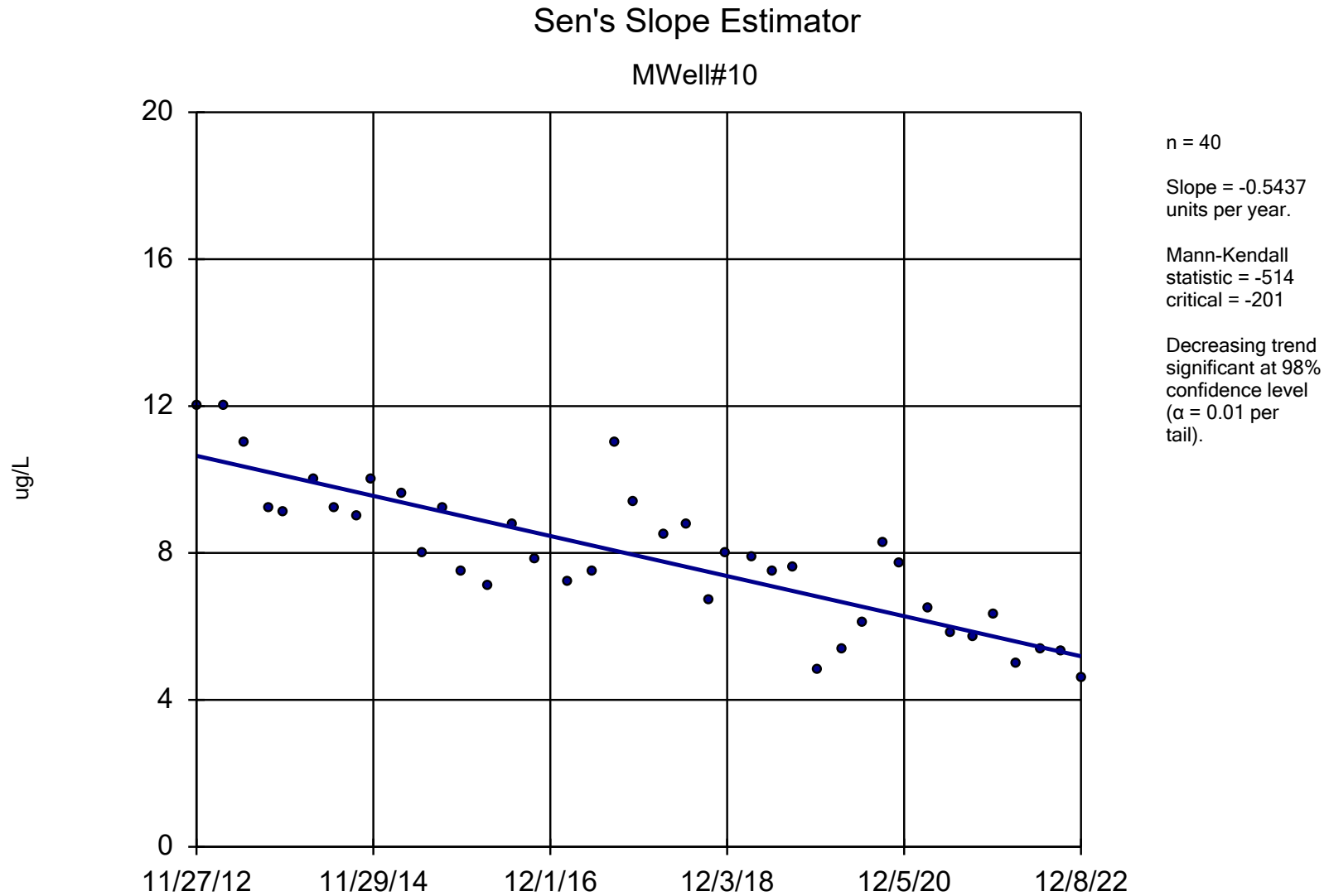
Constituent: 1,1-Dichloroethane Analysis Run 2/8/2023 11:57 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: 1,1-Dichloroethane Analysis Run 2/8/2023 11:57 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



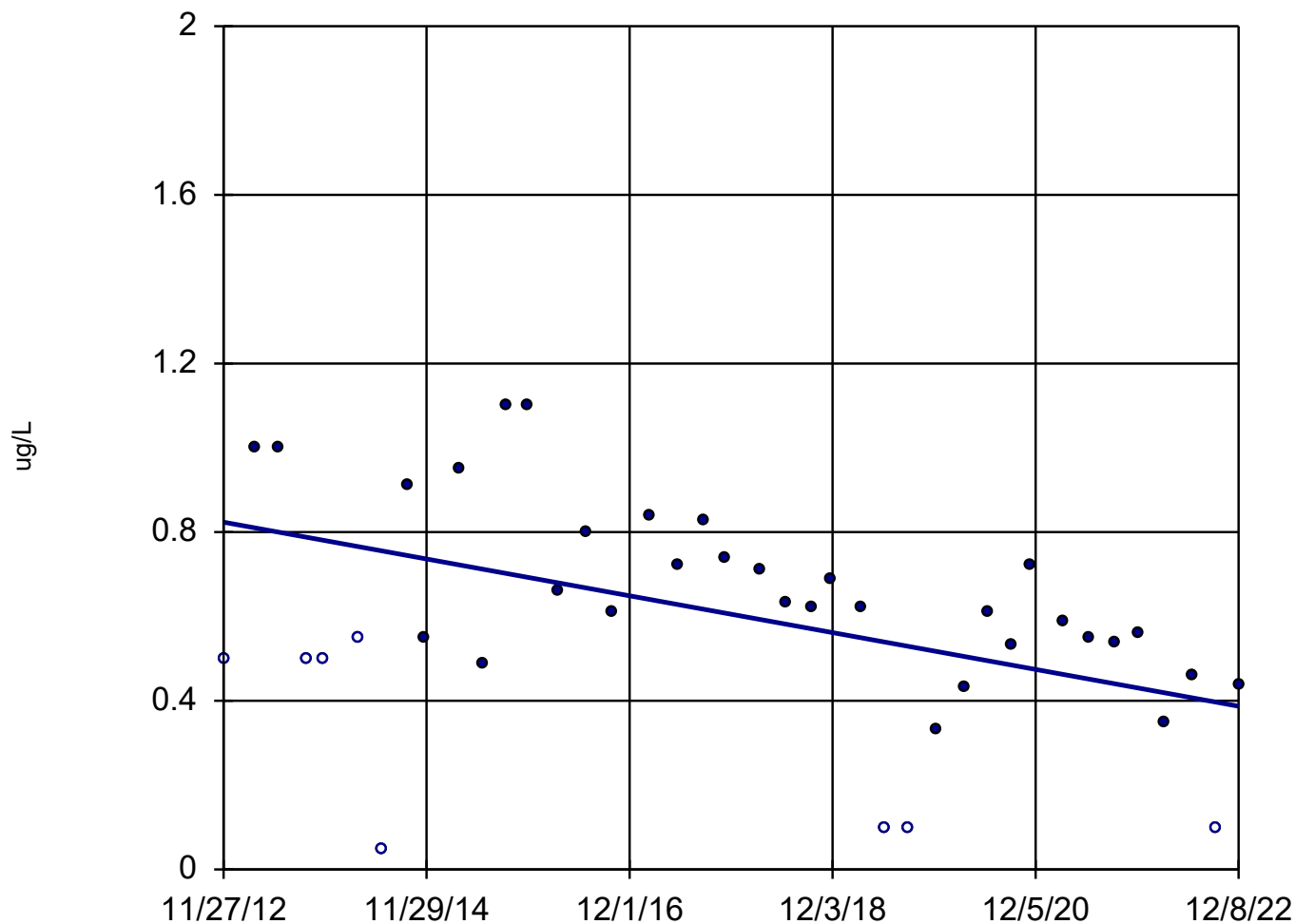
Constituent: 1,1-Dichloroethane Analysis Run 2/8/2023 11:57 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: 1,1-Dichloroethane Analysis Run 2/8/2023 11:57 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Sen's Slope Estimator

MWWell#5



$n = 40$

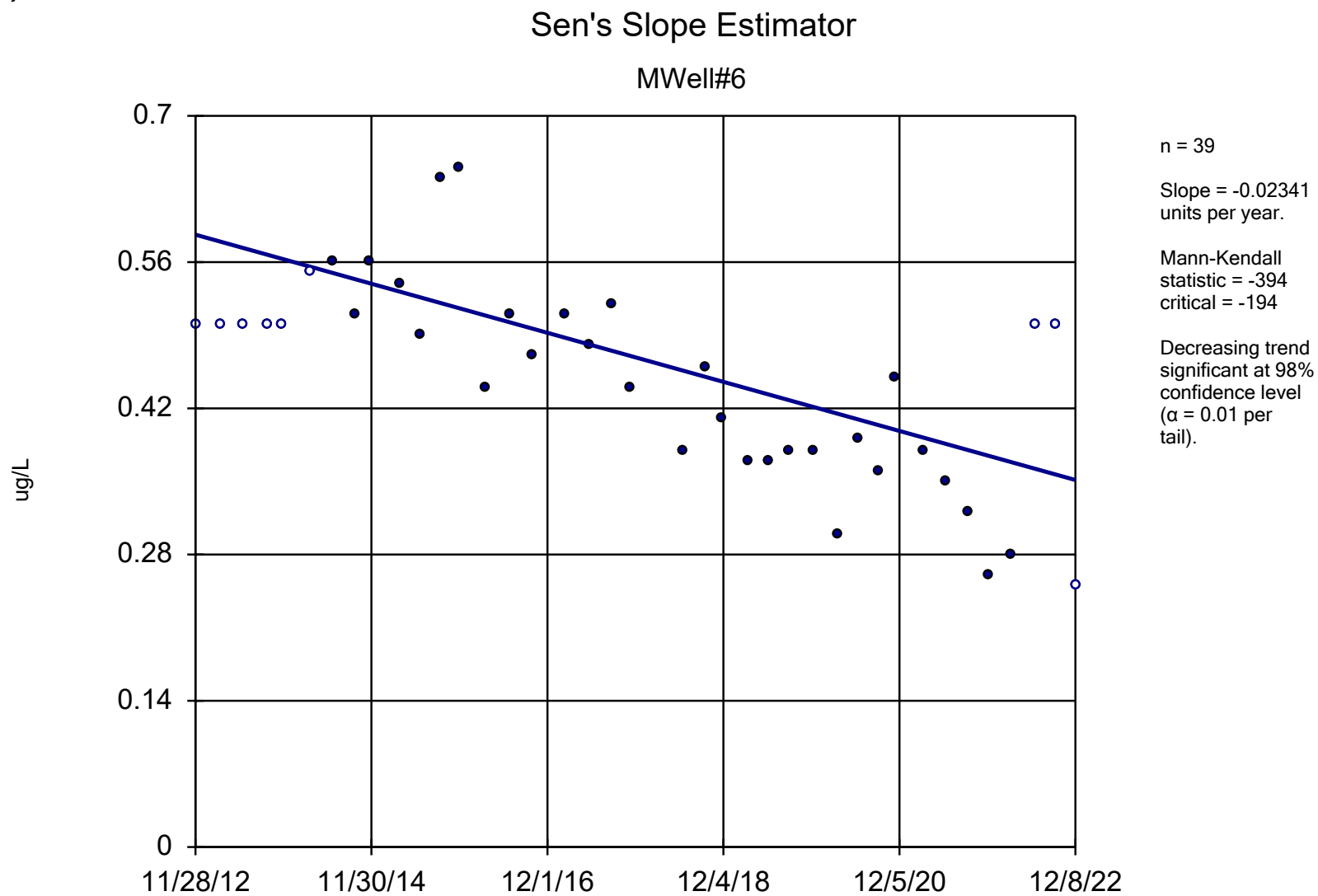
Slope = -0.04351
units per year.

Mann-Kendall
statistic = -240
critical = -201

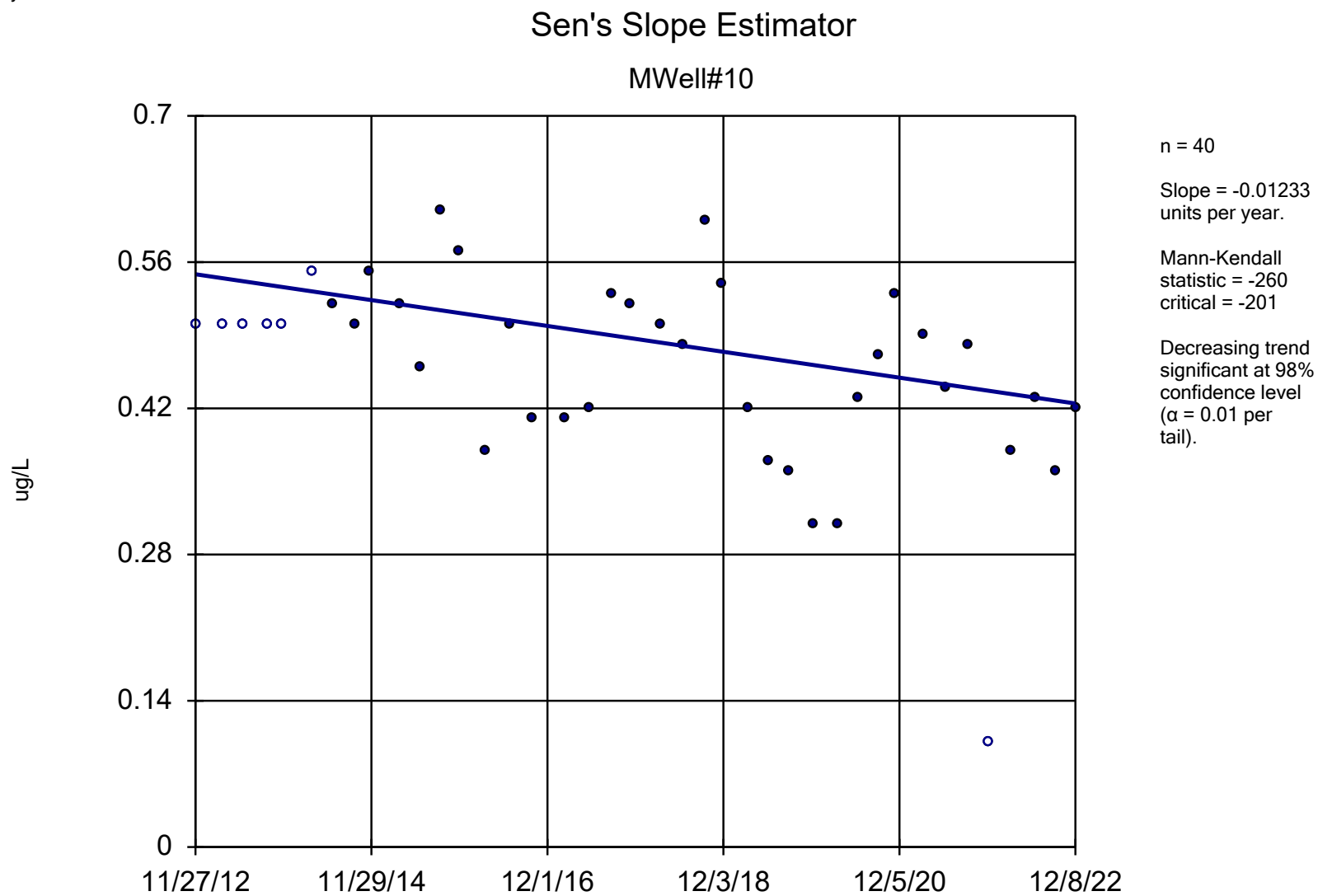
Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

Constituent: 1,2-Dichloroethane Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year

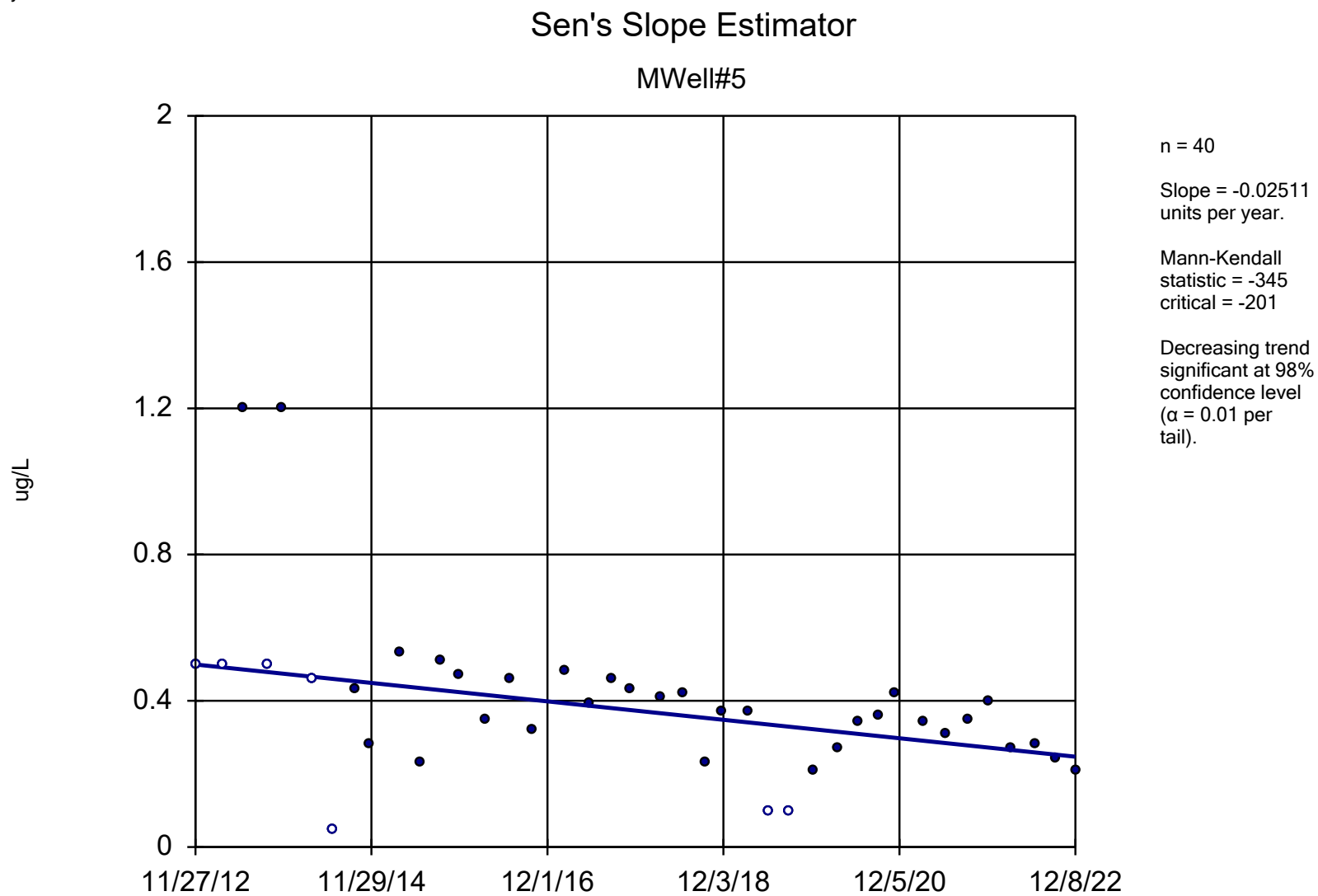
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



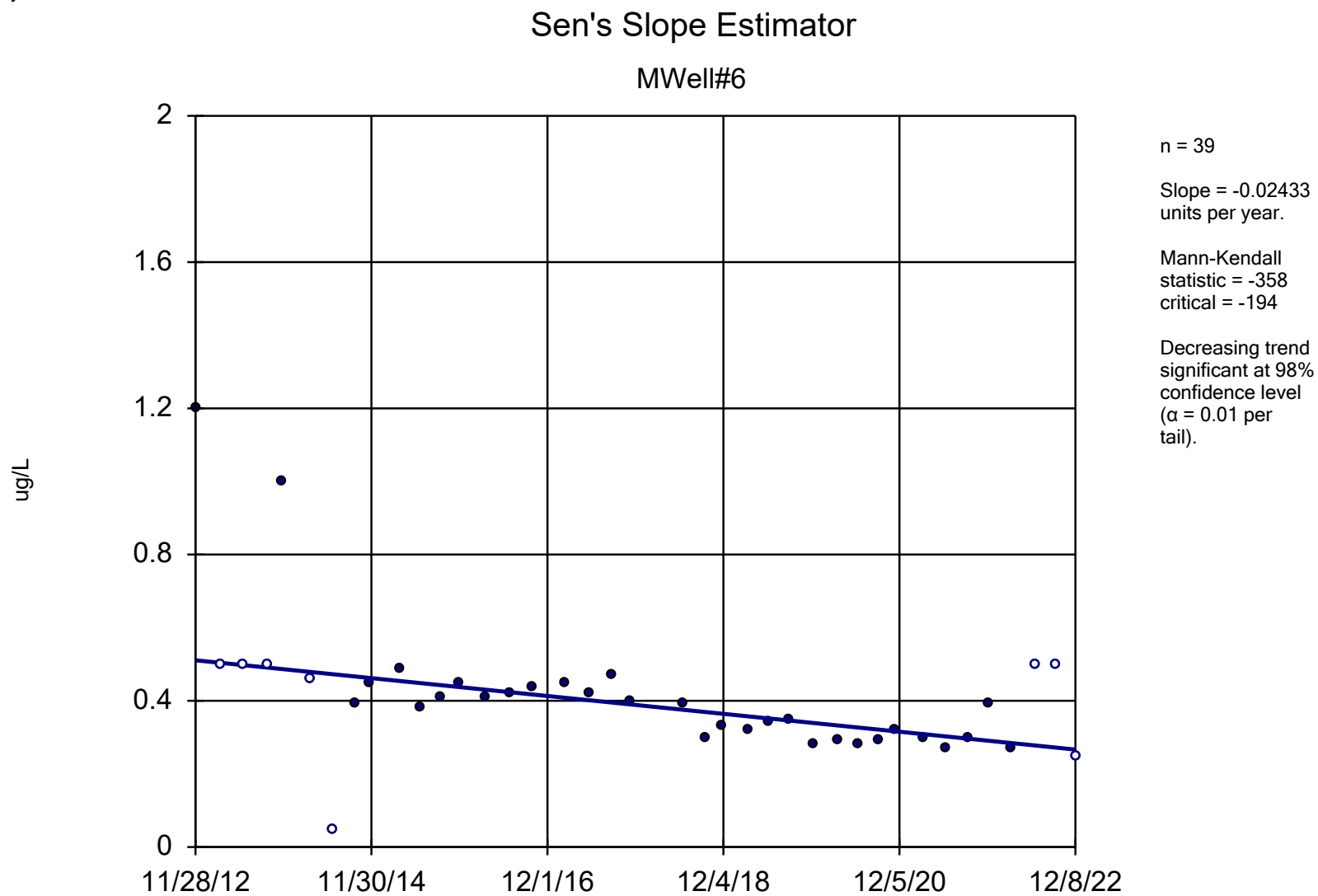
Constituent: 1,2-Dichloroethane Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



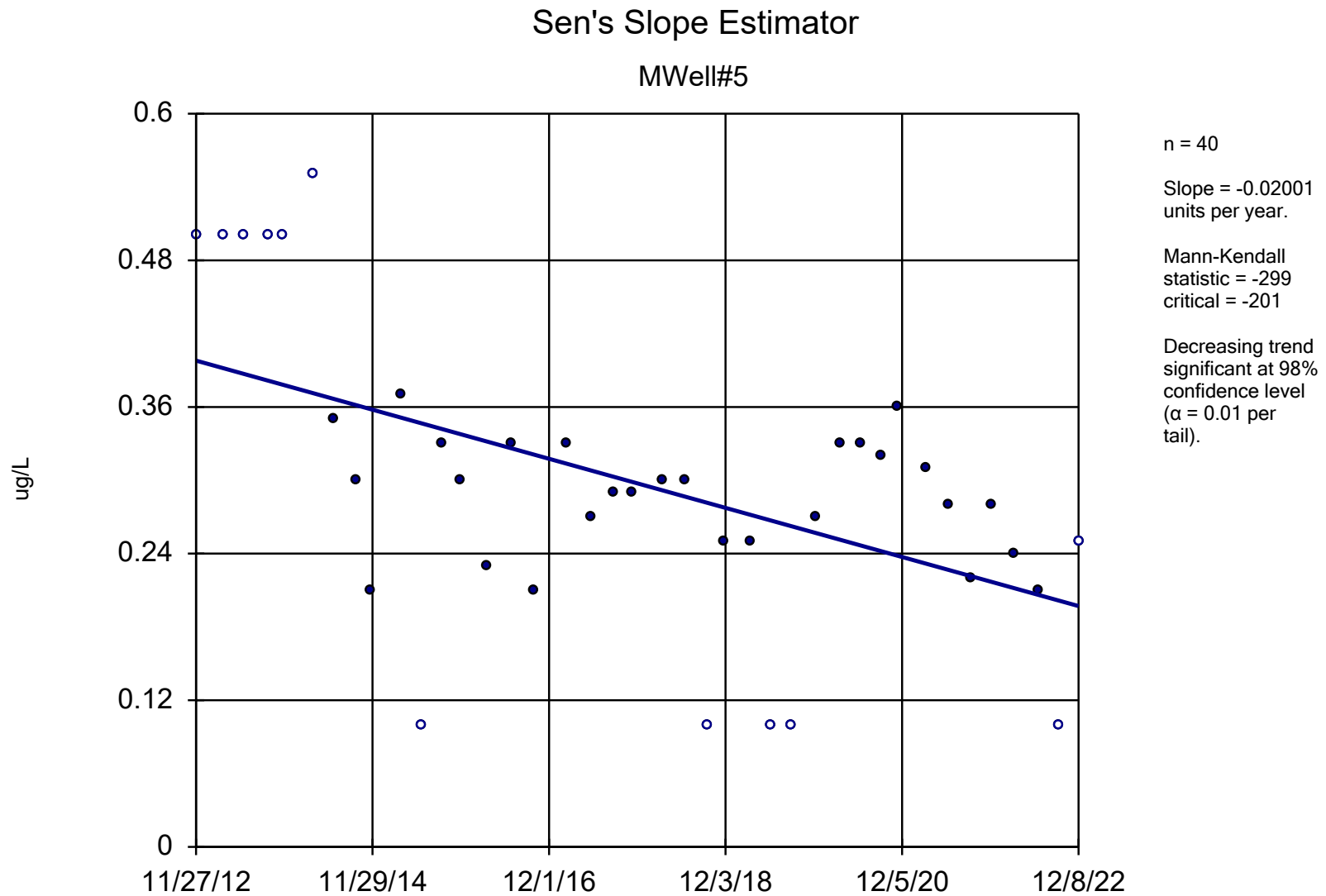
Constituent: 1,2-Dichloroethane Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: 1,2-Dichloropropane Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



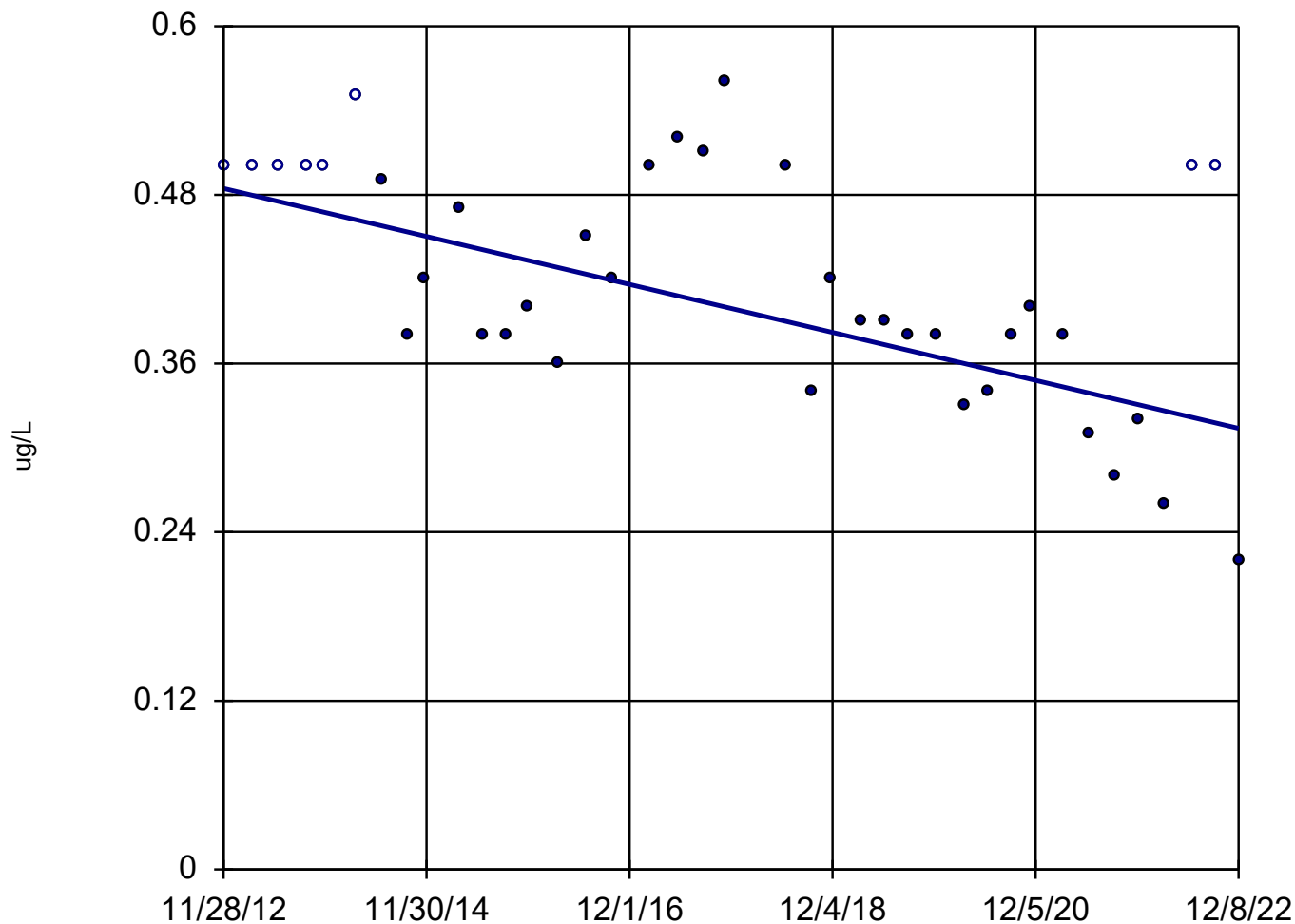
Constituent: 1,2-Dichloropropane Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: Benzene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Sen's Slope Estimator

MWWell#6



n = 39

Slope = -0.01701
units per year.

Mann-Kendall
statistic = -306
critical = -194

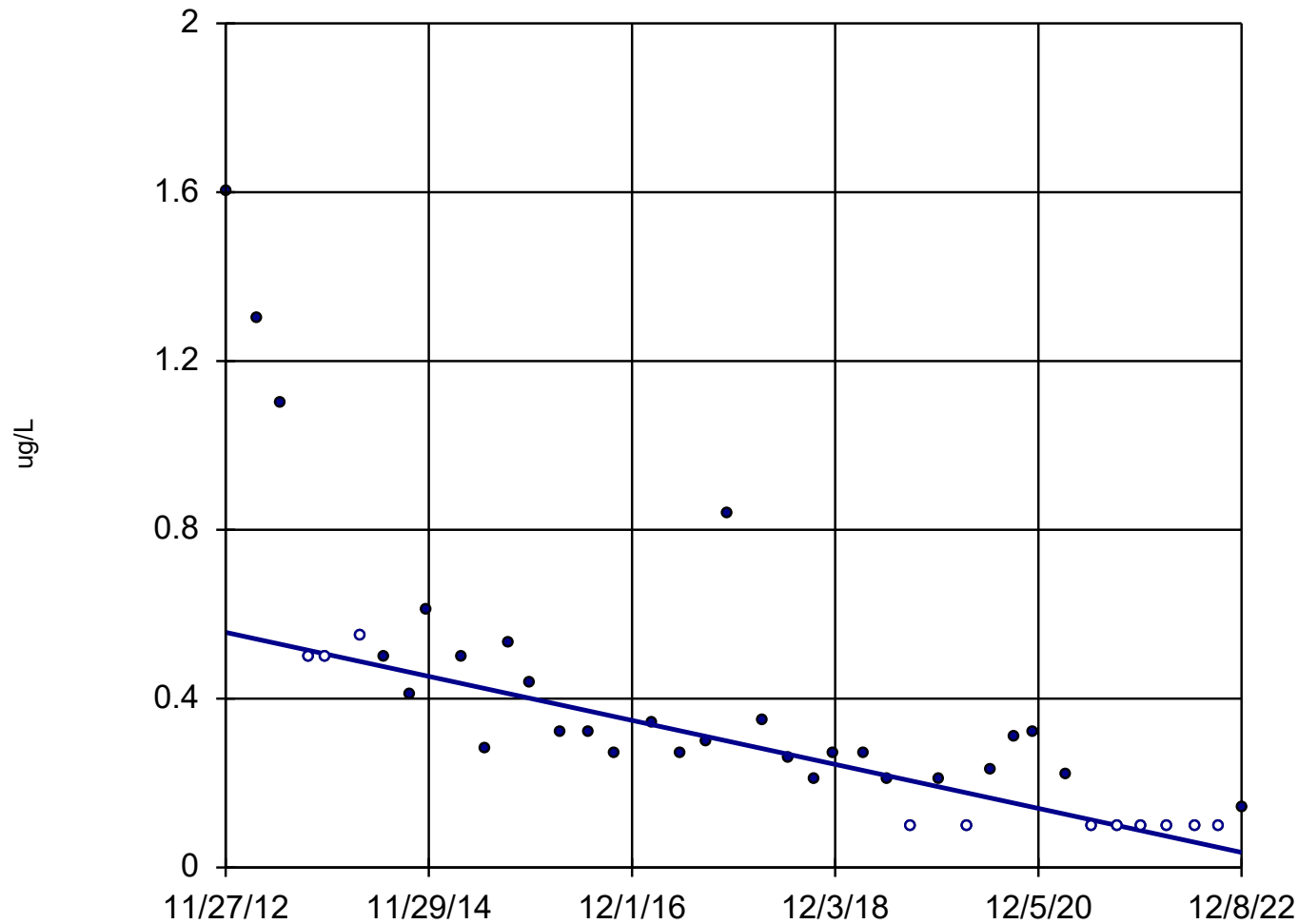
Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

Constituent: Benzene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Sen's Slope Estimator

MWell#10



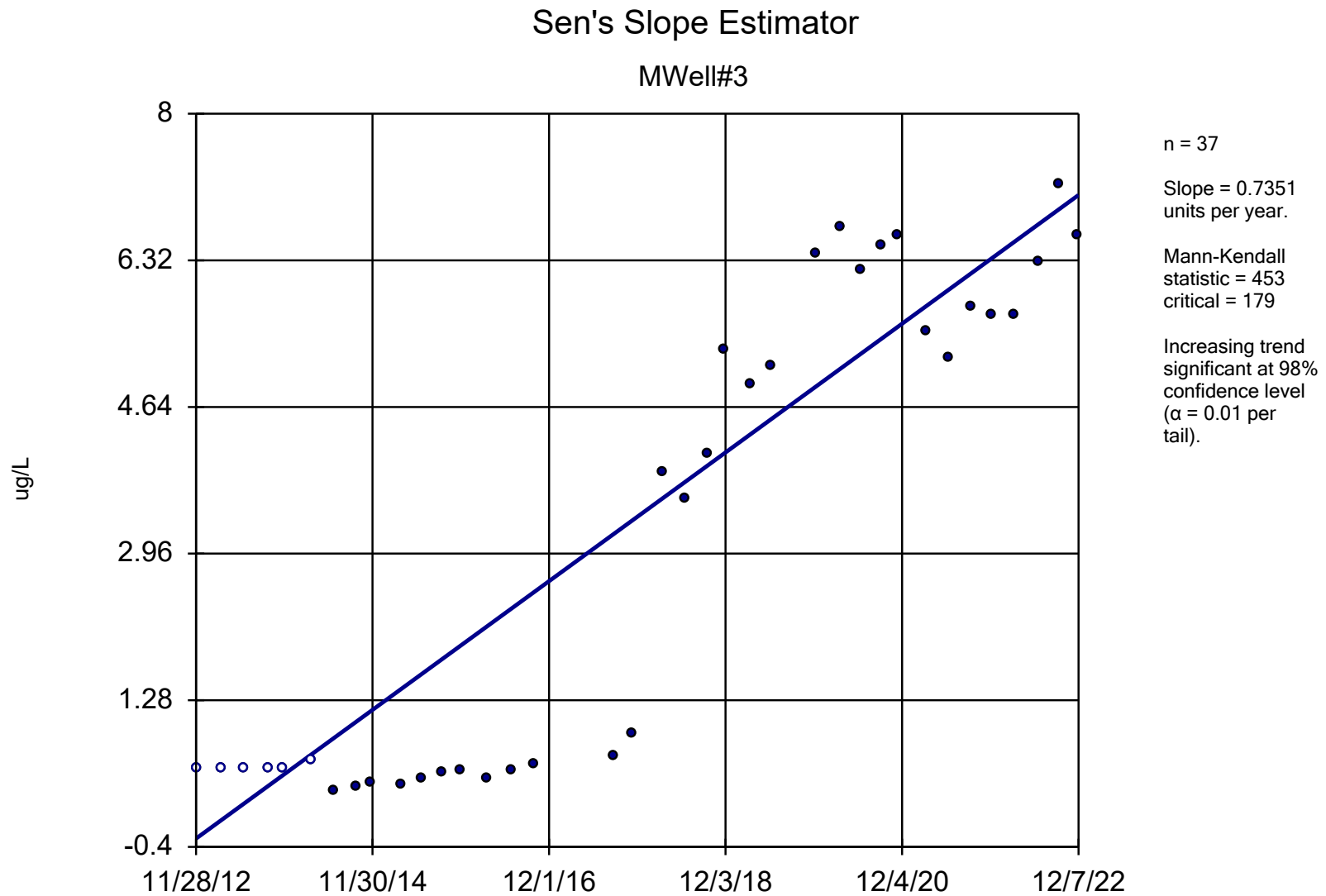
n = 40

Slope = -0.05194
units per year.

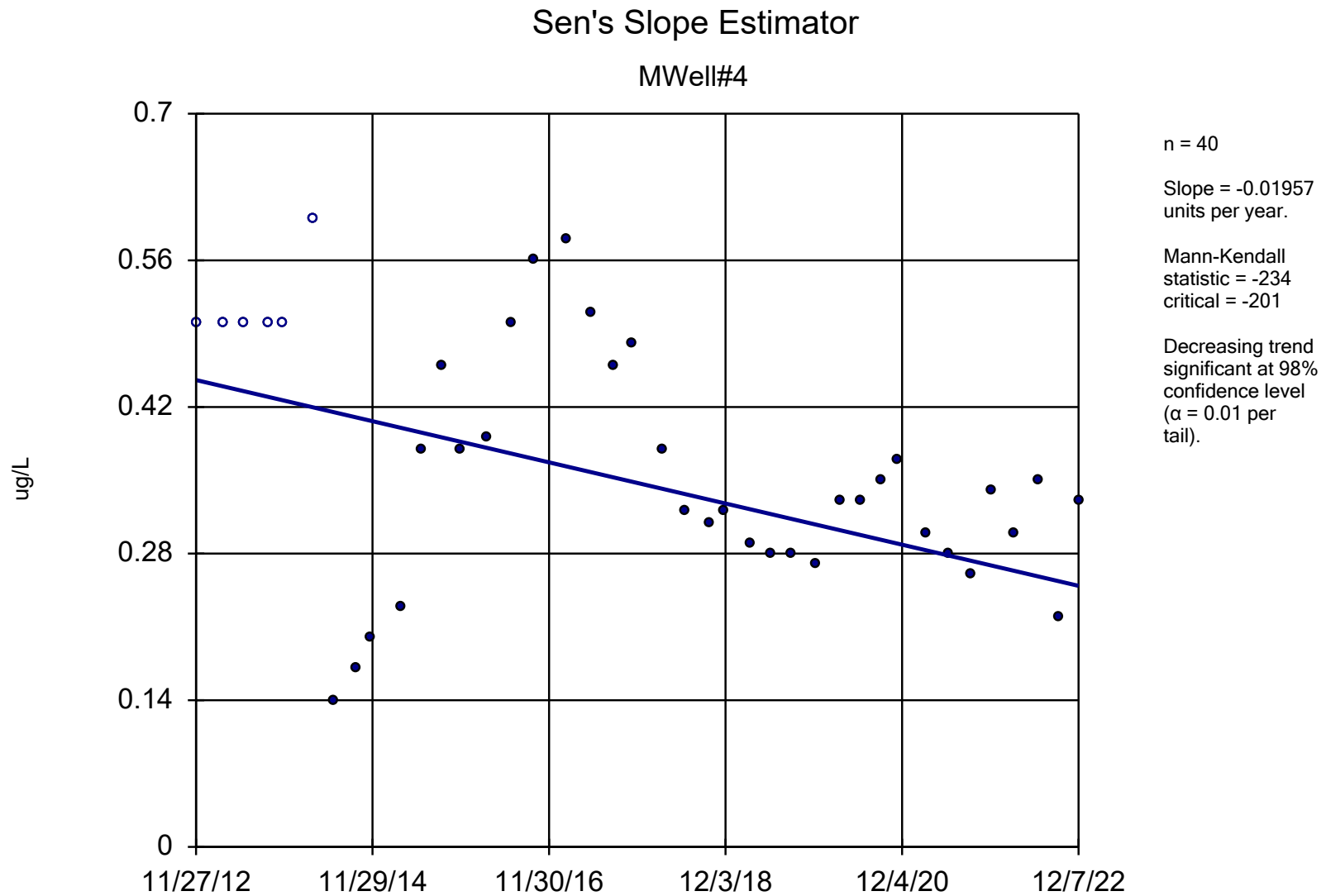
Mann-Kendall
statistic = -538
critical = -201

Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

Constituent: Benzene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



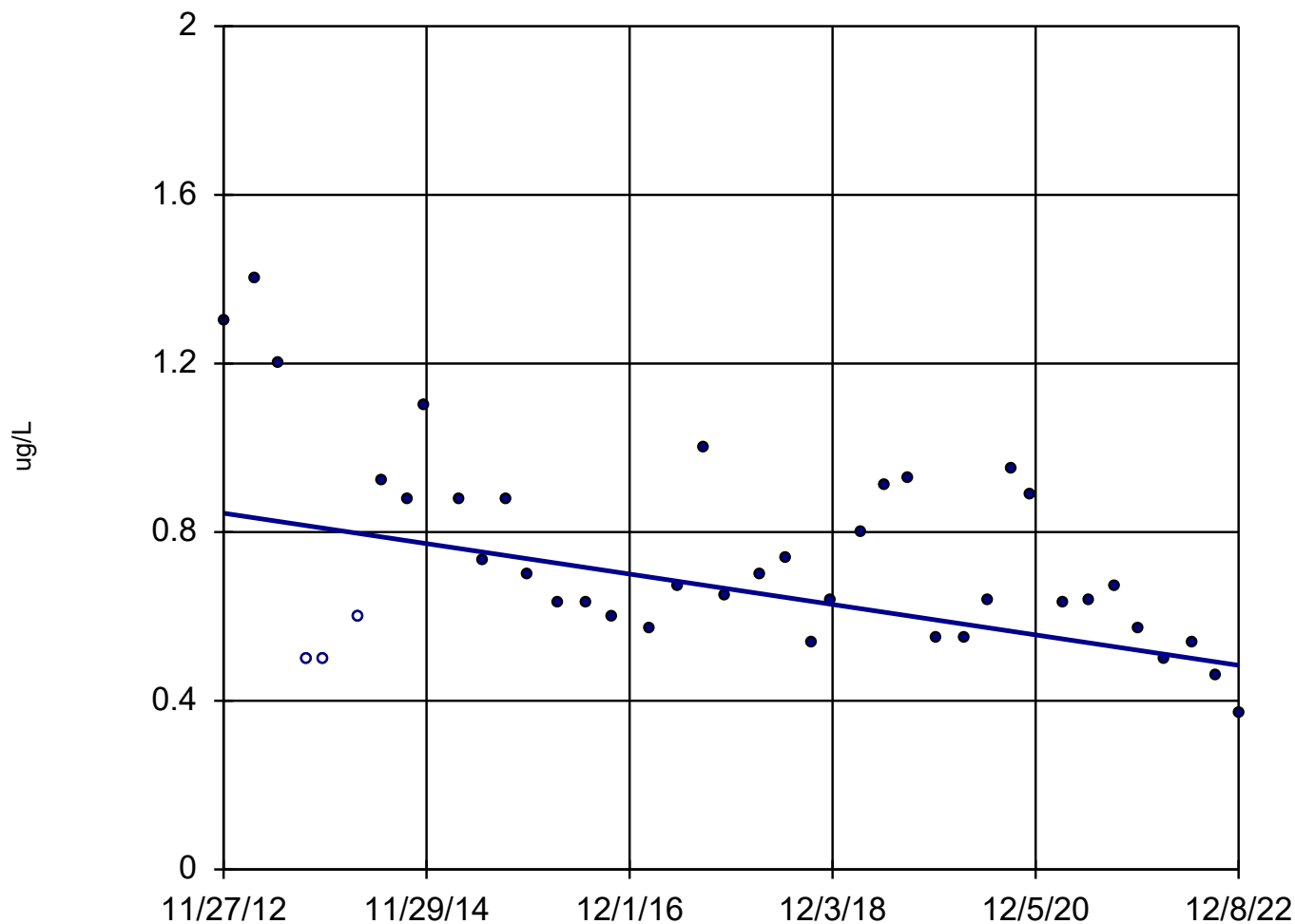
Constituent: Chloroform Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: Chloroform Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Sen's Slope Estimator

MWell#10



n = 40

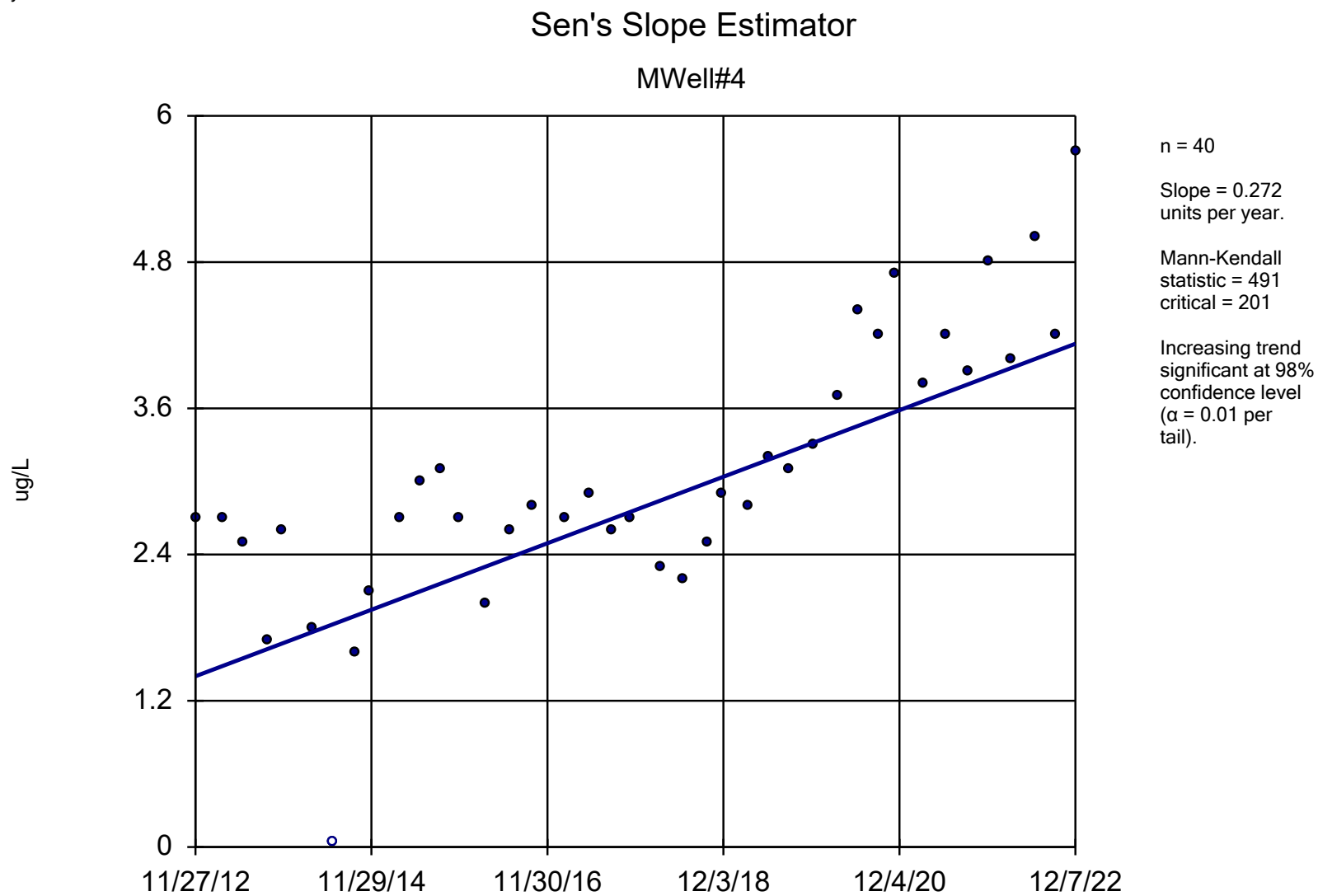
Slope = -0.03595
units per year.

Mann-Kendall
statistic = -250
critical = -201

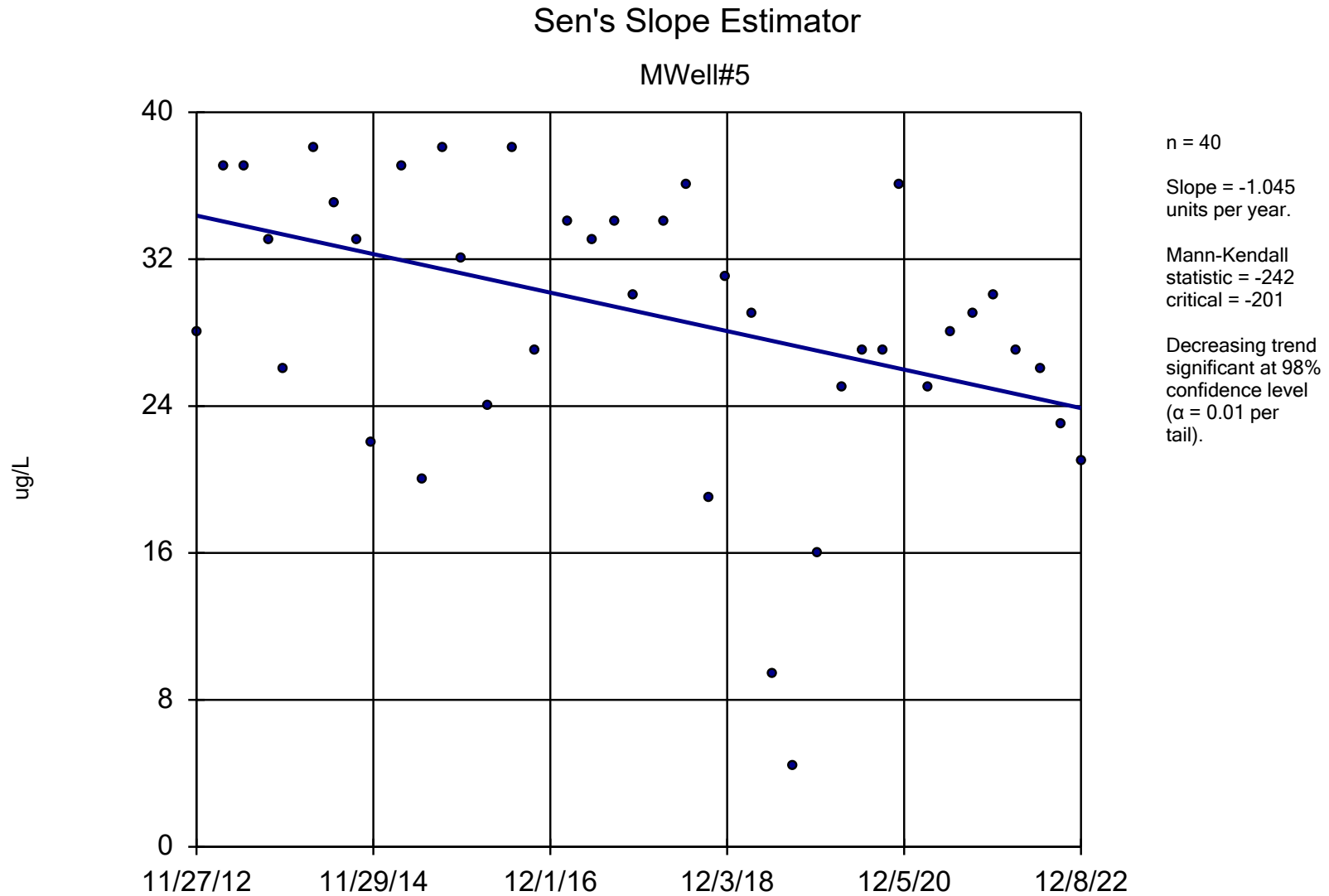
Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

Constituent: Chloroform Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year

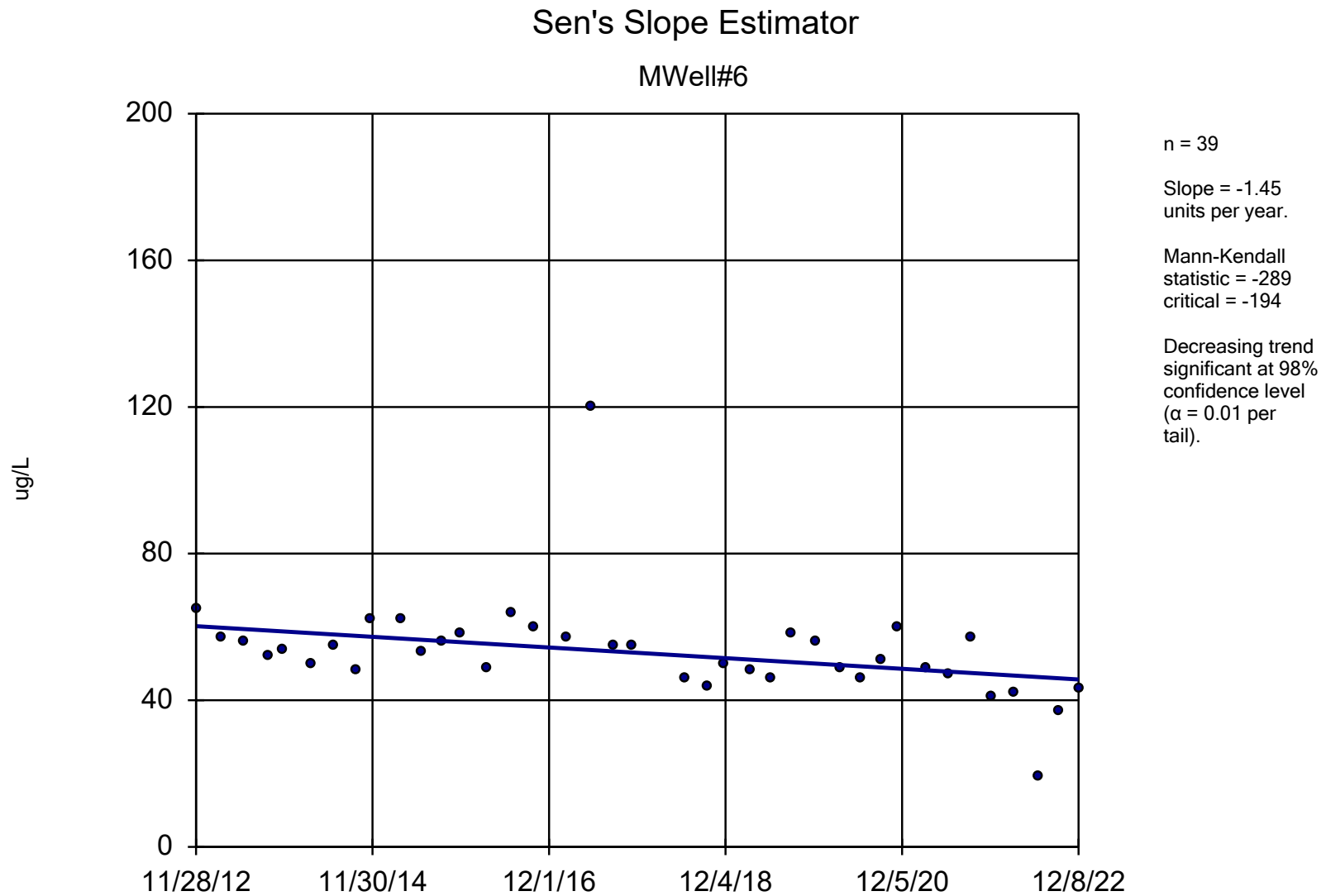
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



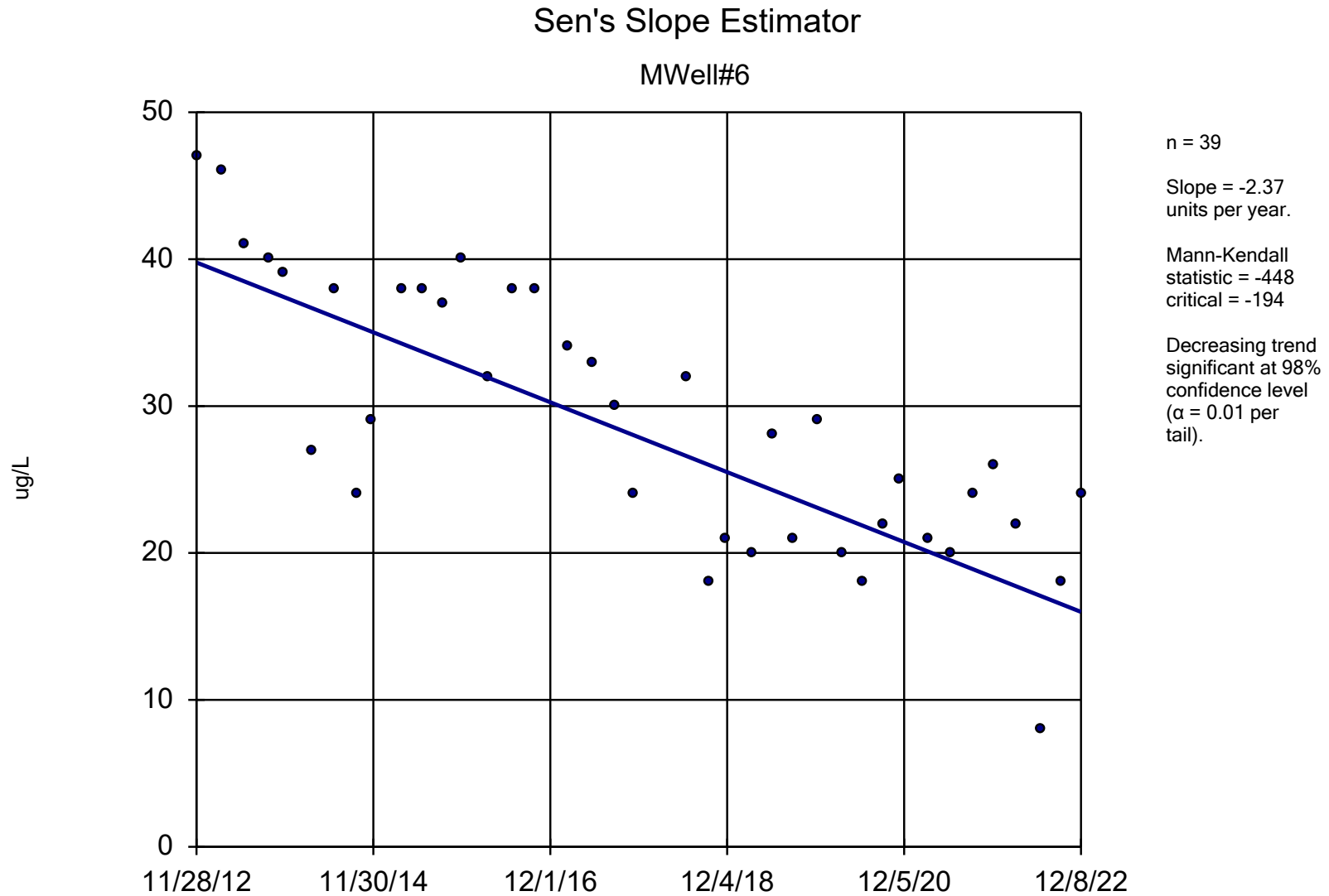
Constituent: cis-1,2-Dichloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



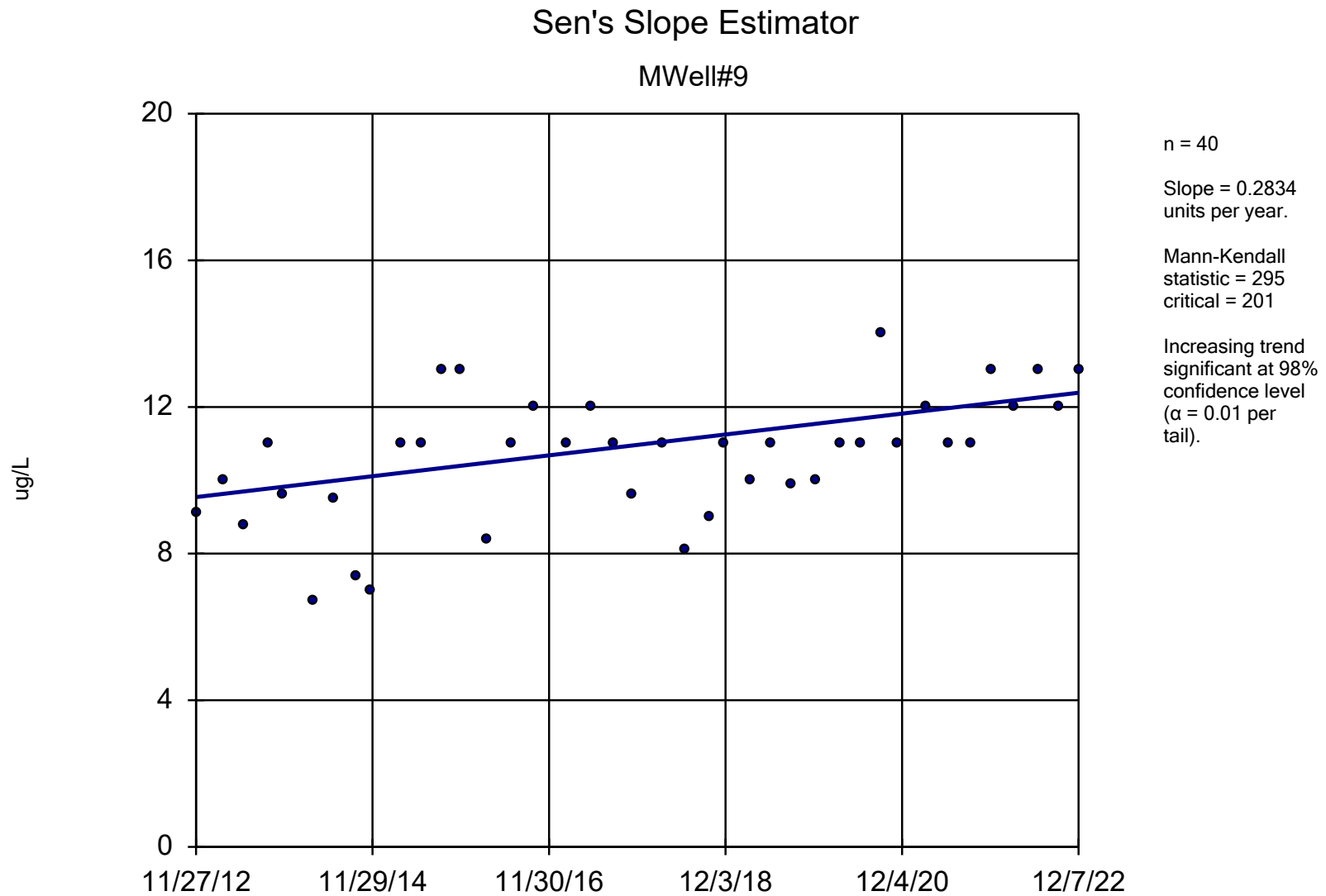
Constituent: cis-1,2-Dichloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



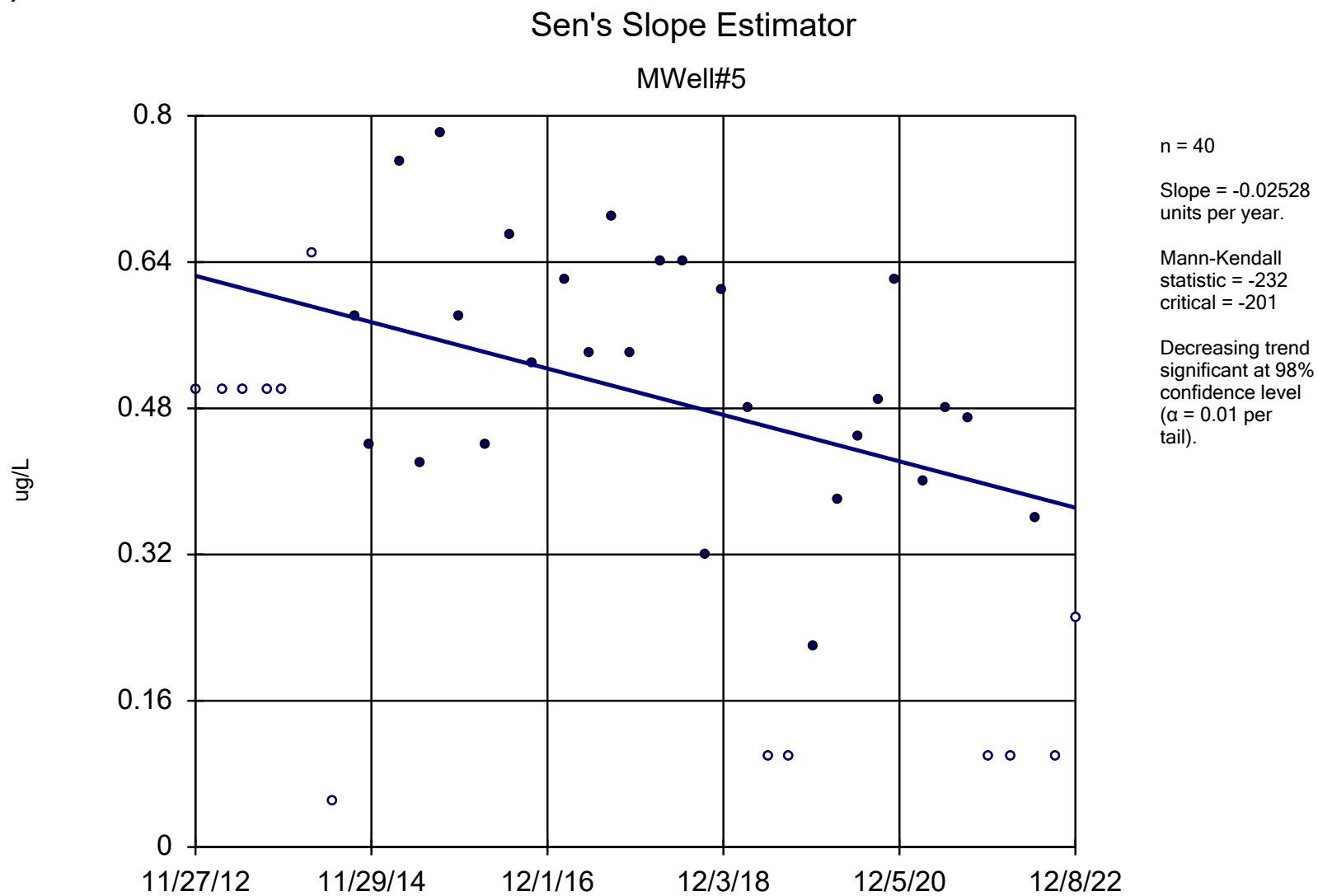
Constituent: cis-1,2-Dichloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



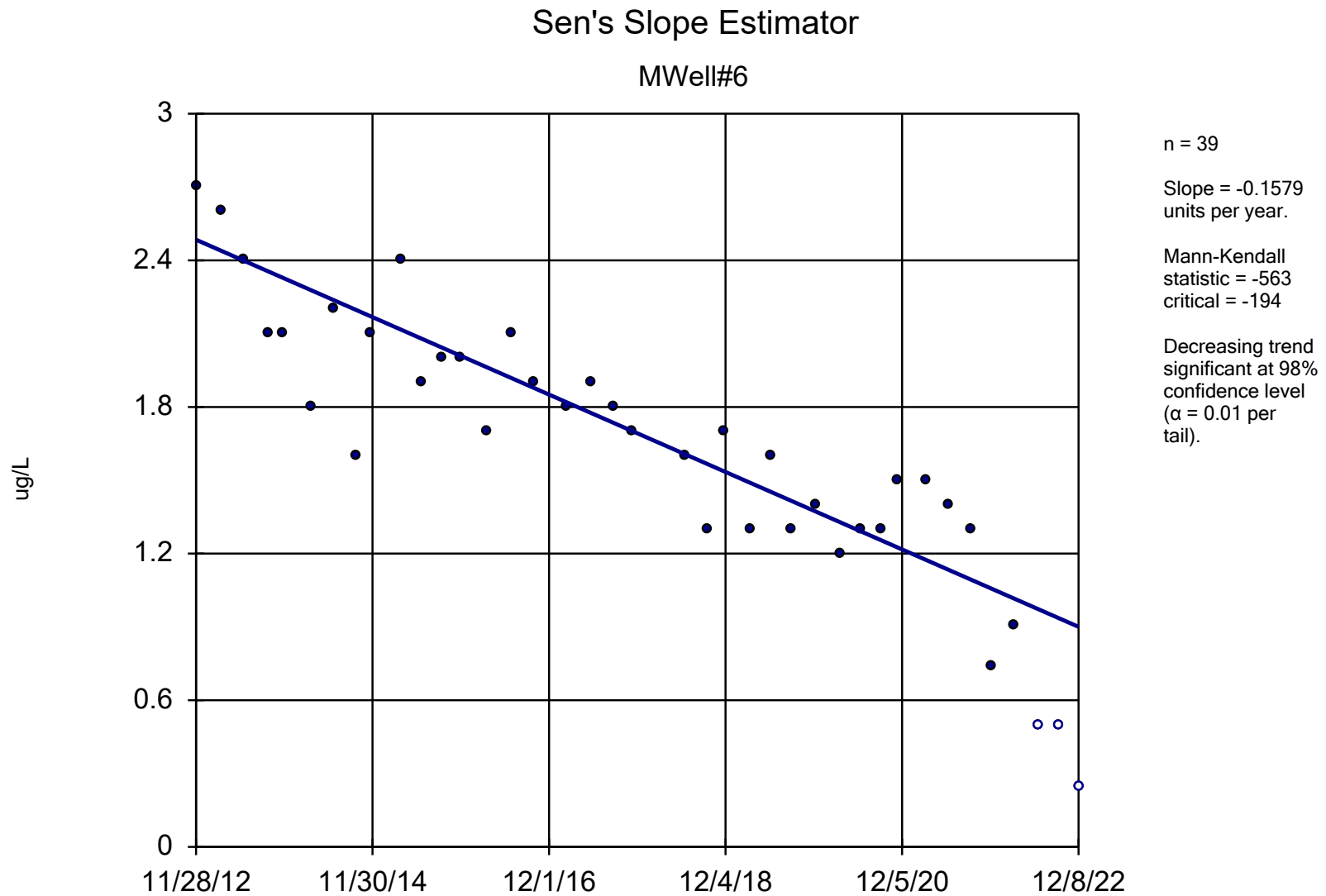
Constituent: Tetrachloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

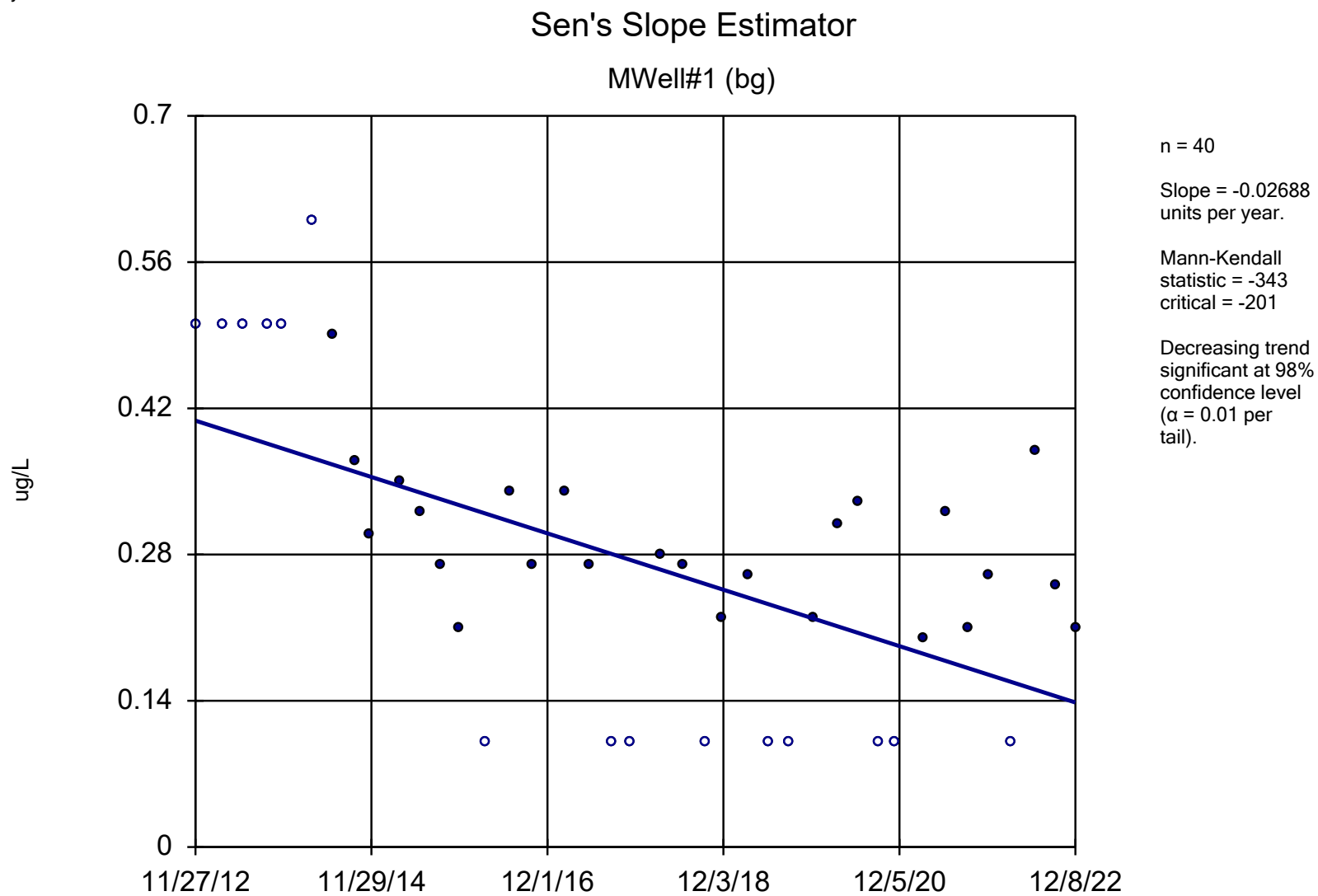


Constituent: Tetrachloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

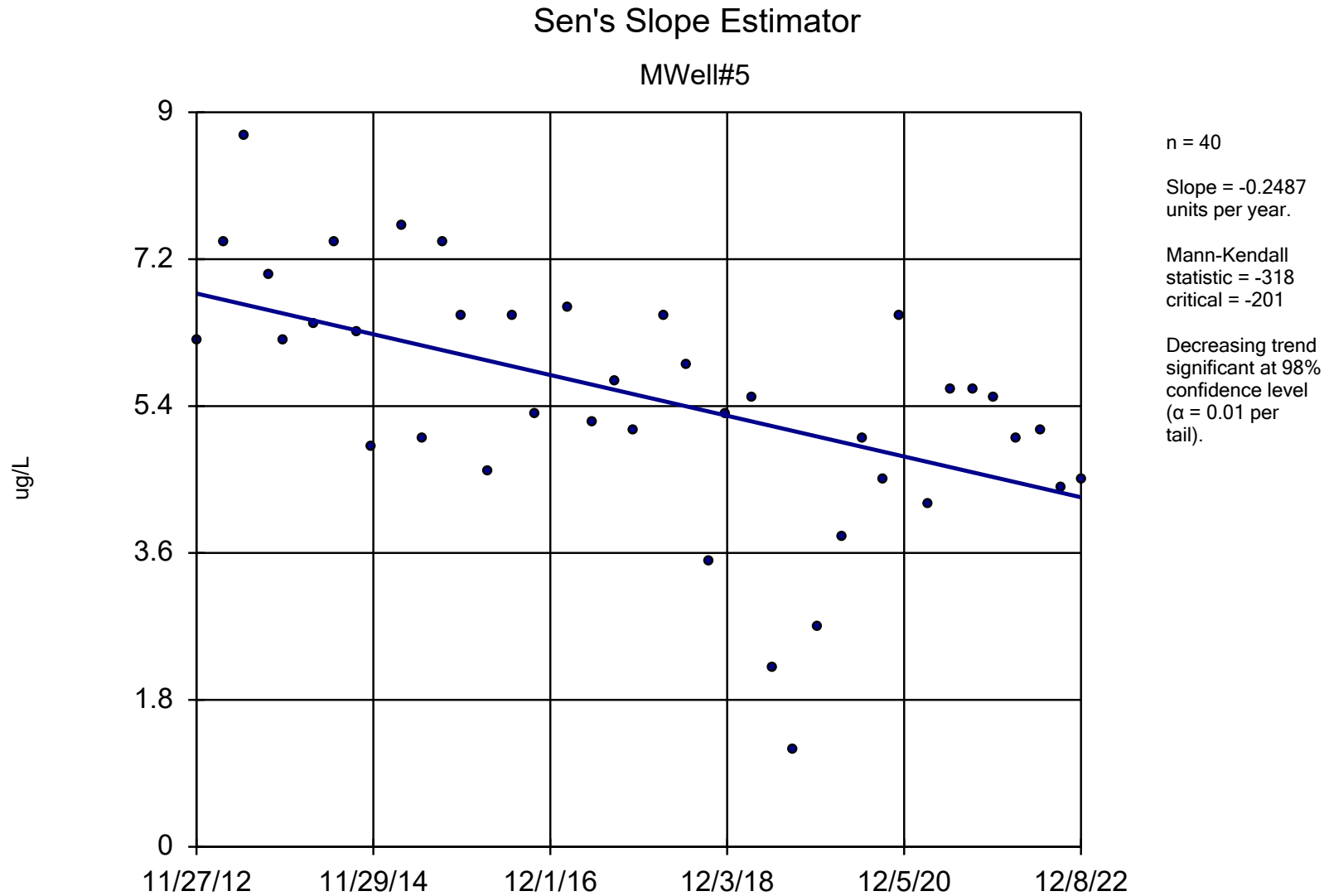


Constituent: trans-1,2-Dichloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

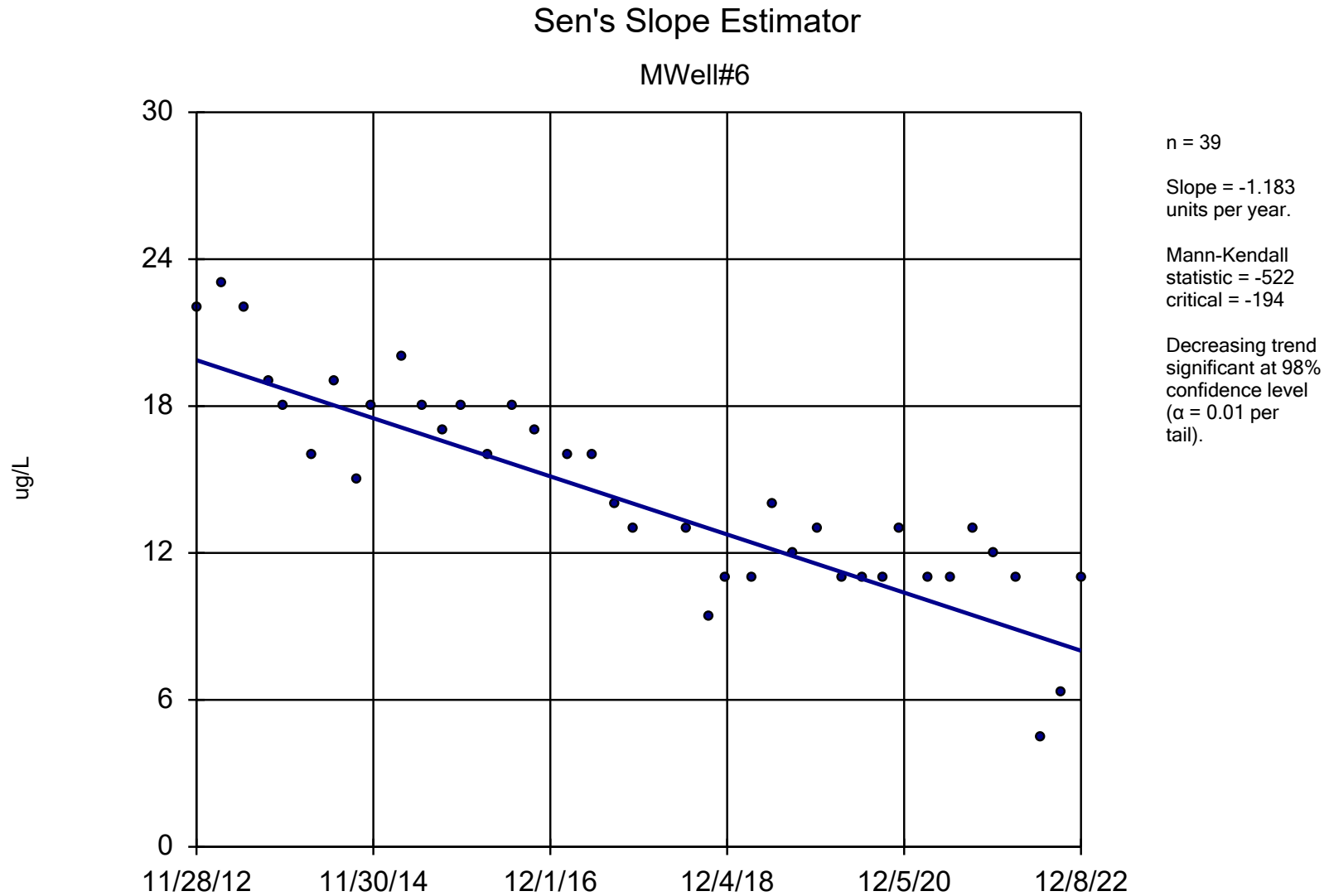




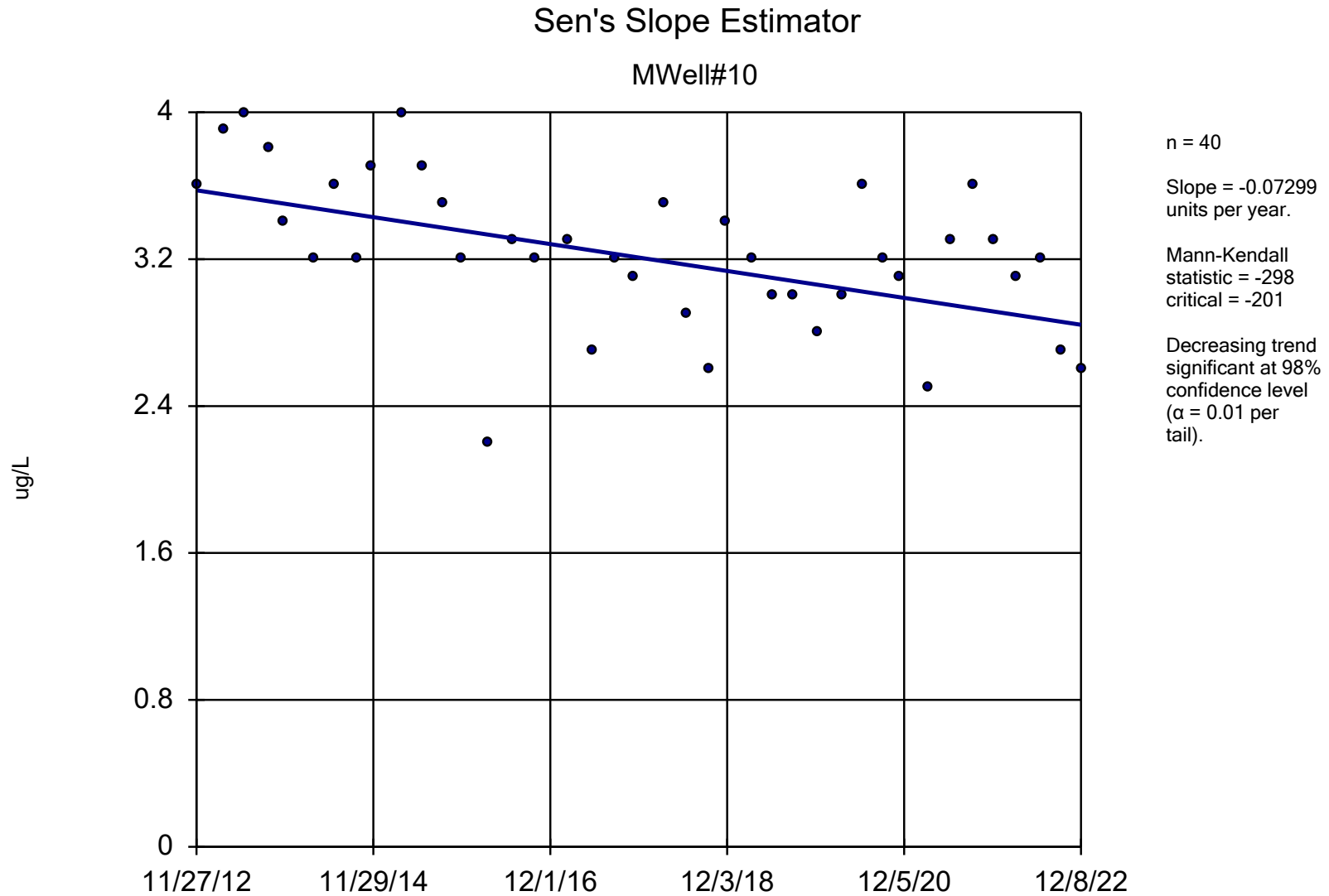
Constituent: Trichloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



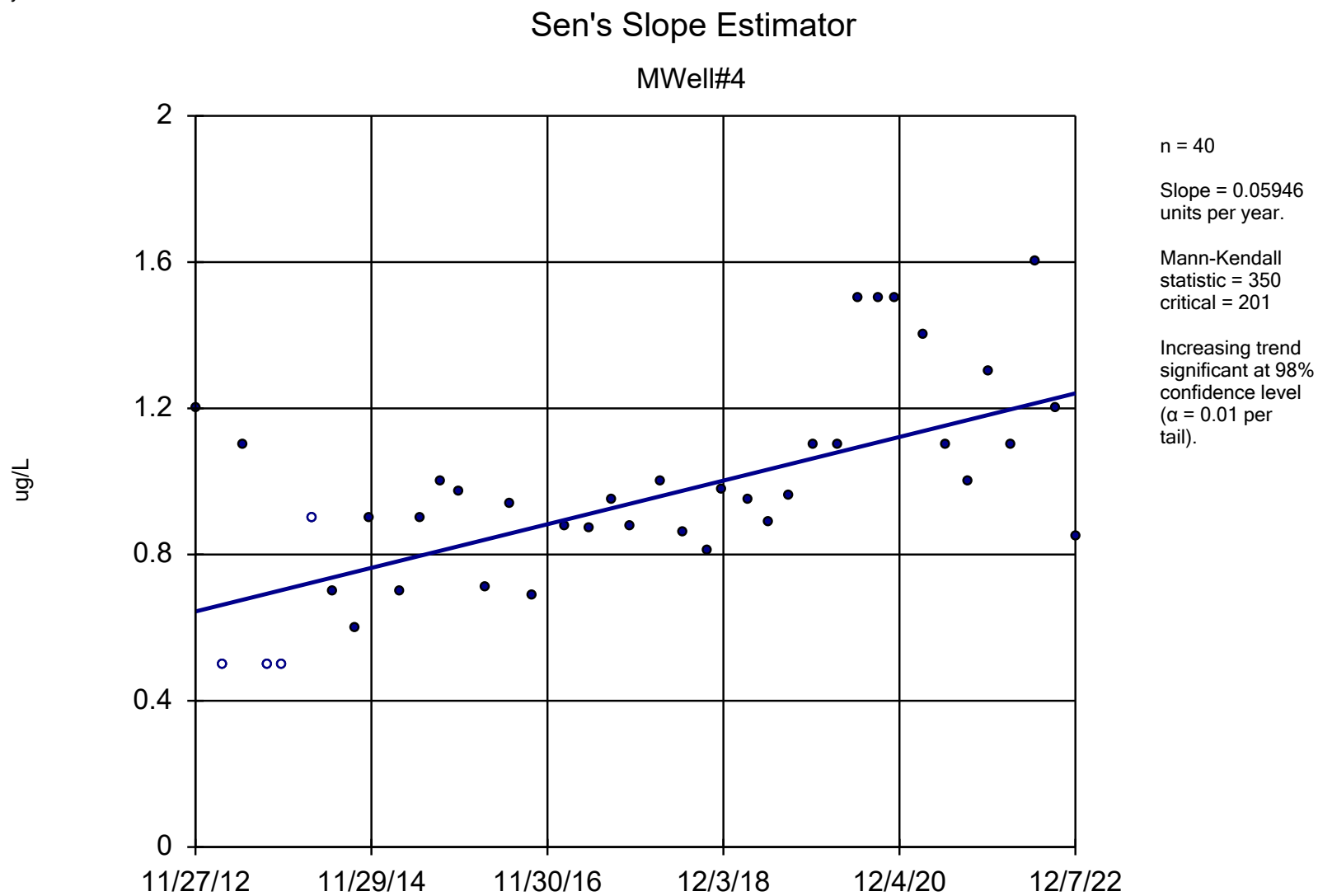
Constituent: Trichloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



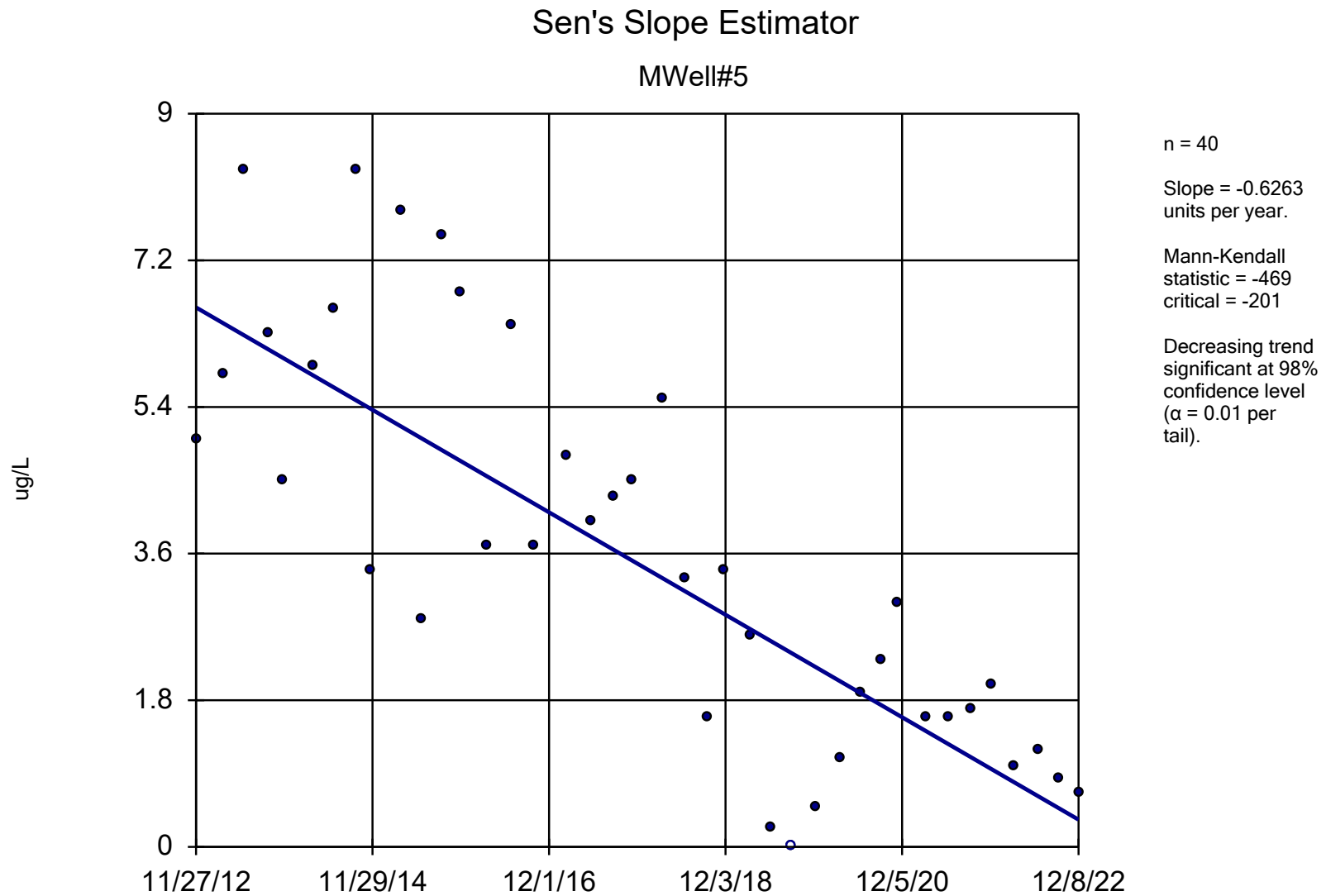
Constituent: Trichloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



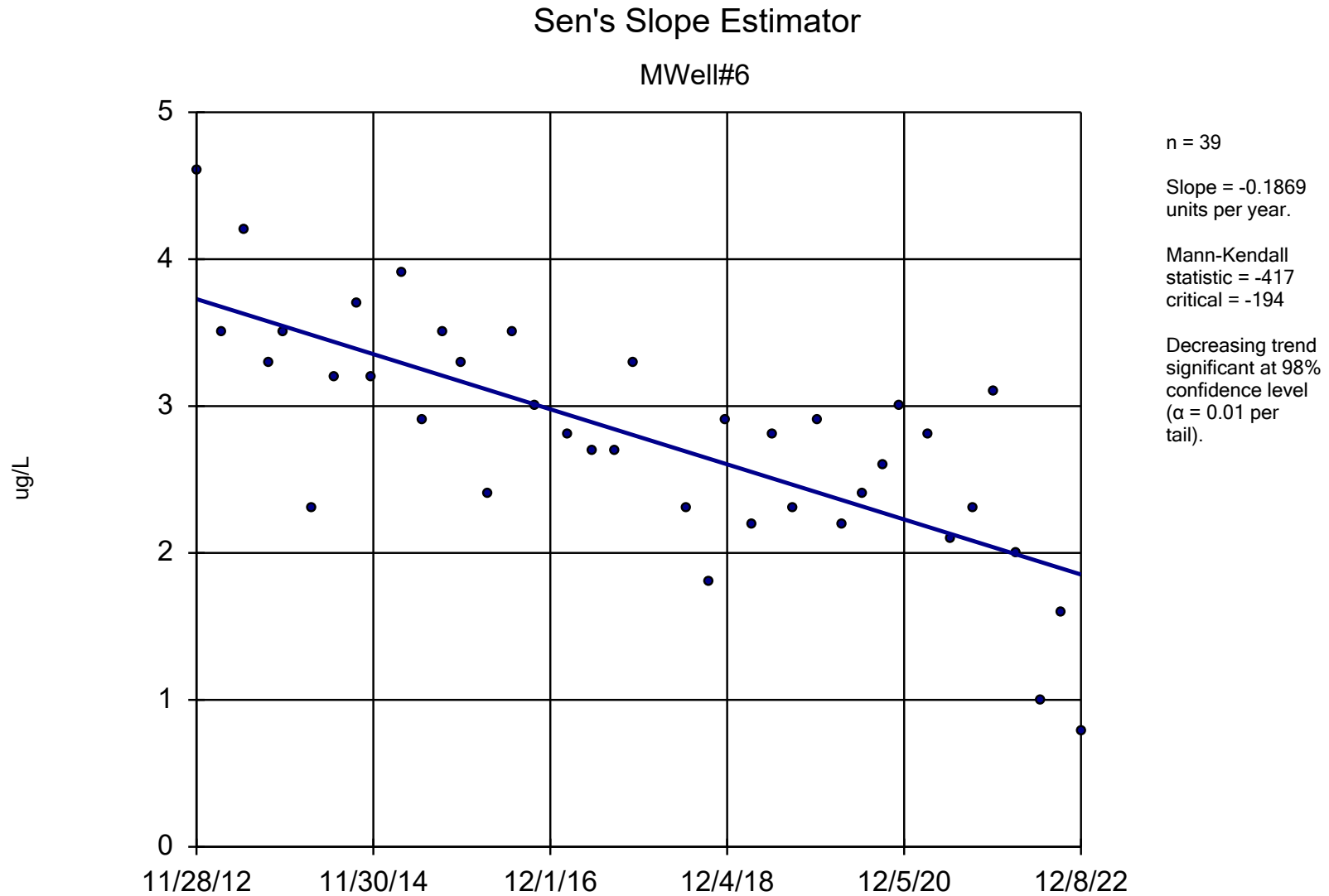
Constituent: Trichloroethene Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: Trichlorofluoromethane Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



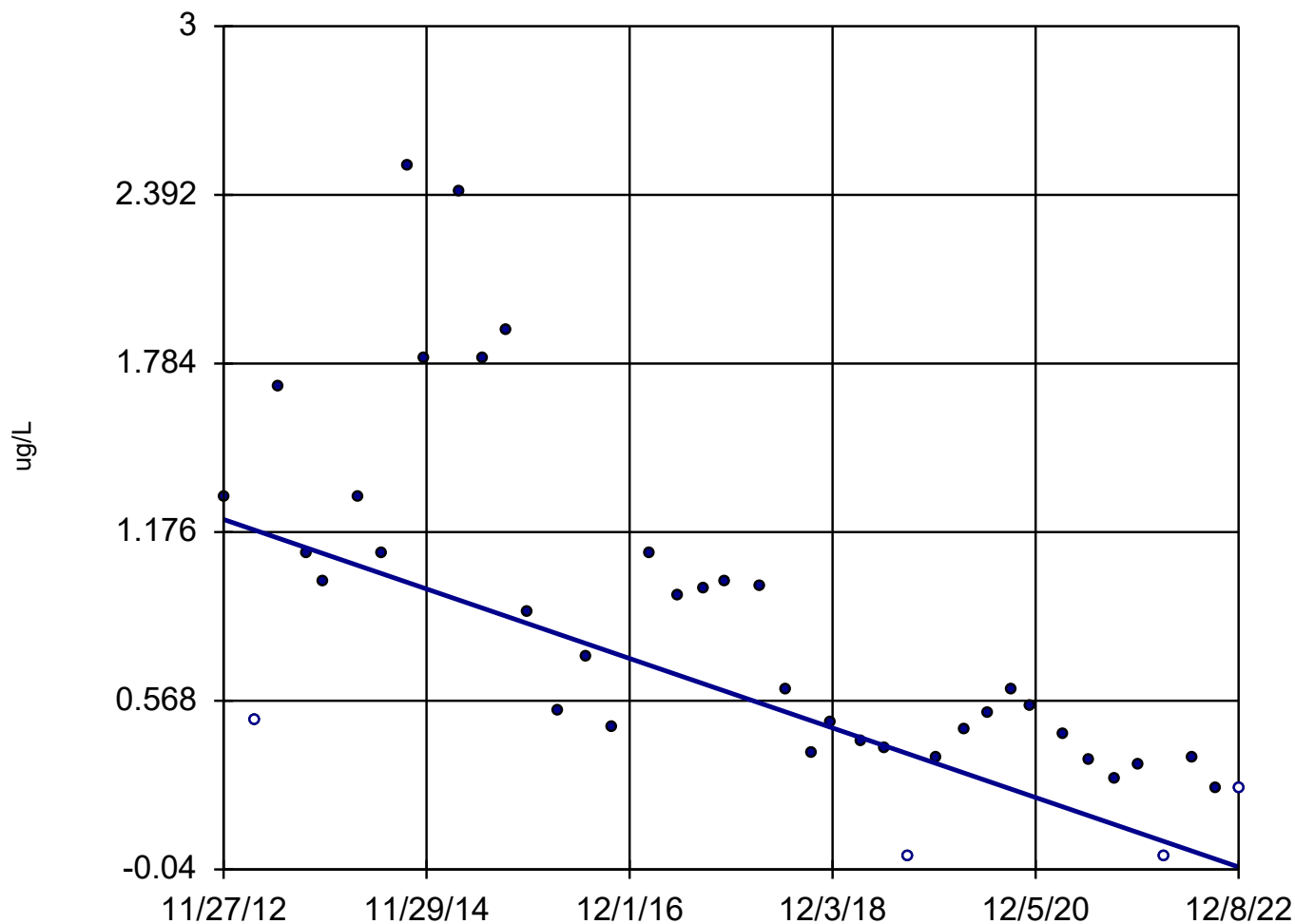
Constituent: Vinyl Chloride Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: Vinyl Chloride Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Sen's Slope Estimator

MWell#10



Constituent: Vinyl Chloride Analysis Run 2/8/2023 11:58 AM View: HRLF_SensSlope 10-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Appendix D-2

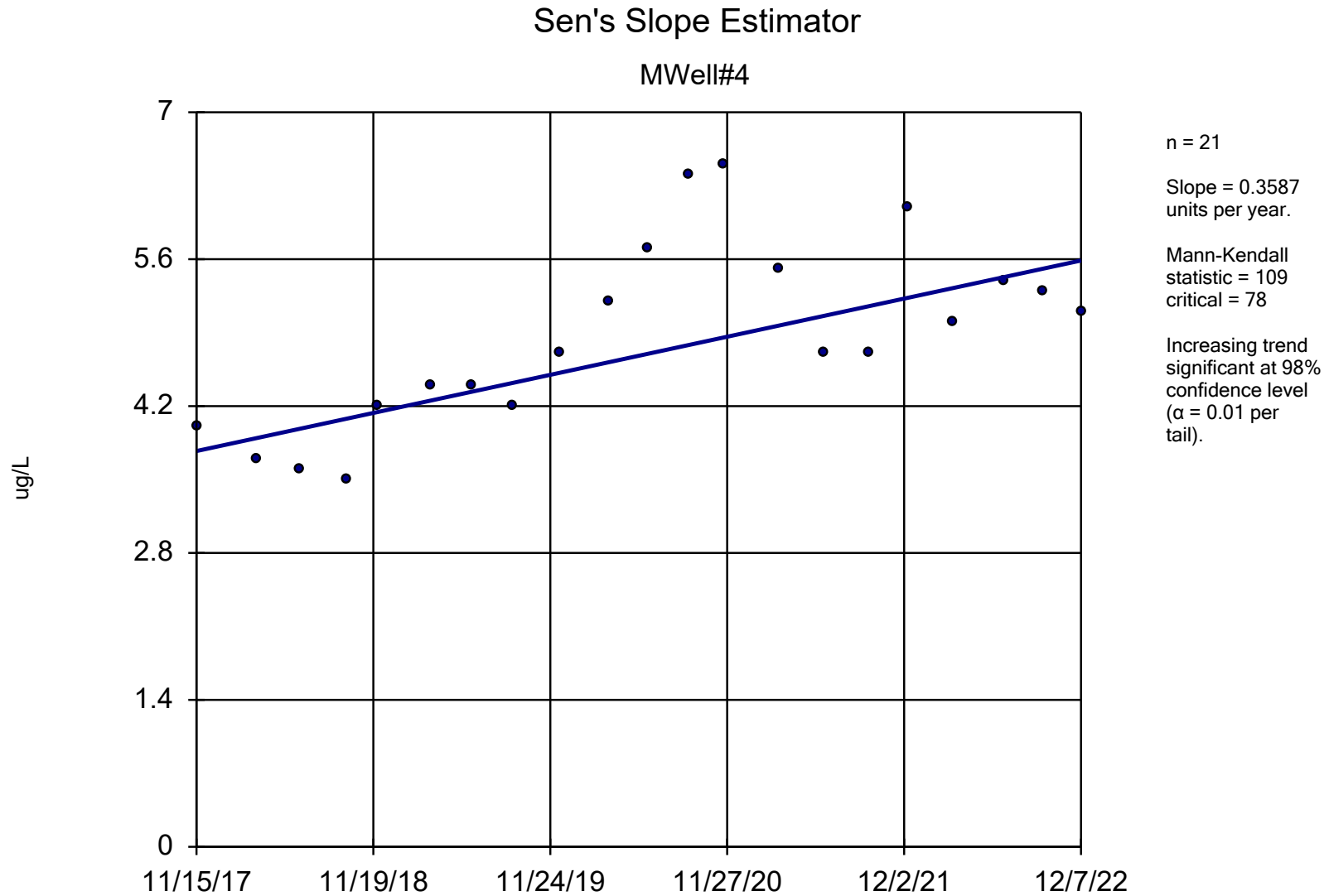
5-Year Trends



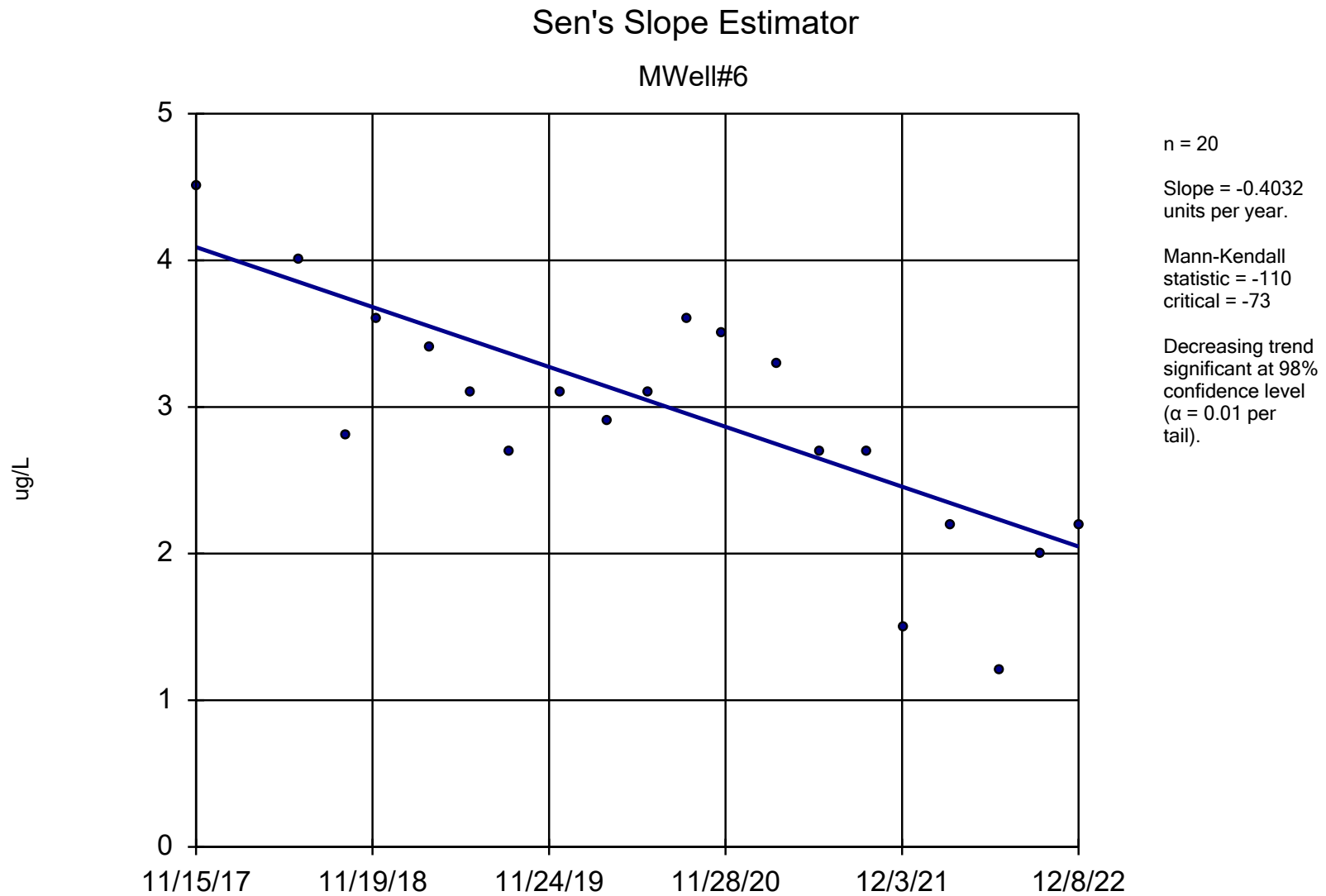
Horn Rapids Landfill Trends for Volatile Organic Compounds, First Quarter 2018 through Fourth Quarter 2022

Constituent Name	Well	Slope	Calculated Statistic	Critical Value	Trend	N	% Non-detects	Normality	Transformation	Alpha	Method
1,1-Dichloroethane (ug/L)	MWell#4	0.3587	109	78	Yes	21	0	n/a	n/a	0.02	NP
1,1-Dichloroethane (ug/L)	MWell#6	-0.4032	-110	-73	Yes	20	0	n/a	n/a	0.02	NP
1,1-Dichloroethane (ug/L)	MWell#9	-0.2882	-103	-78	Yes	21	0	n/a	n/a	0.02	NP
1,1-Dichloroethane (ug/L)	MWell#10	-0.7916	-129	-78	Yes	21	0	n/a	n/a	0.02	NP
Chloroform (ug/L)	MWell#3	0.5778	104	73	Yes	20	0	n/a	n/a	0.02	NP
cis-1,2-Dichloroethene (ug/L)	MWell#4	0.5847	157	78	Yes	21	0	n/a	n/a	0.02	NP
Tetrachloroethene (ug/L)	MWell#9	0.6685	121	78	Yes	21	0	n/a	n/a	0.02	NP
trans-1,2-Dichloroethene (ug/L)	MWell#6	-0.2198	-108	-73	Yes	20	15	n/a	n/a	0.02	NP
Trichloroethene (ug/L)	MWell#4	0.08879	151	78	Yes	21	28.57	n/a	n/a	0.02	NP
Vinyl Chloride (ug/L)	MWell#10	-0.08064	-106	-78	Yes	21	14.29	n/a	n/a	0.02	NP

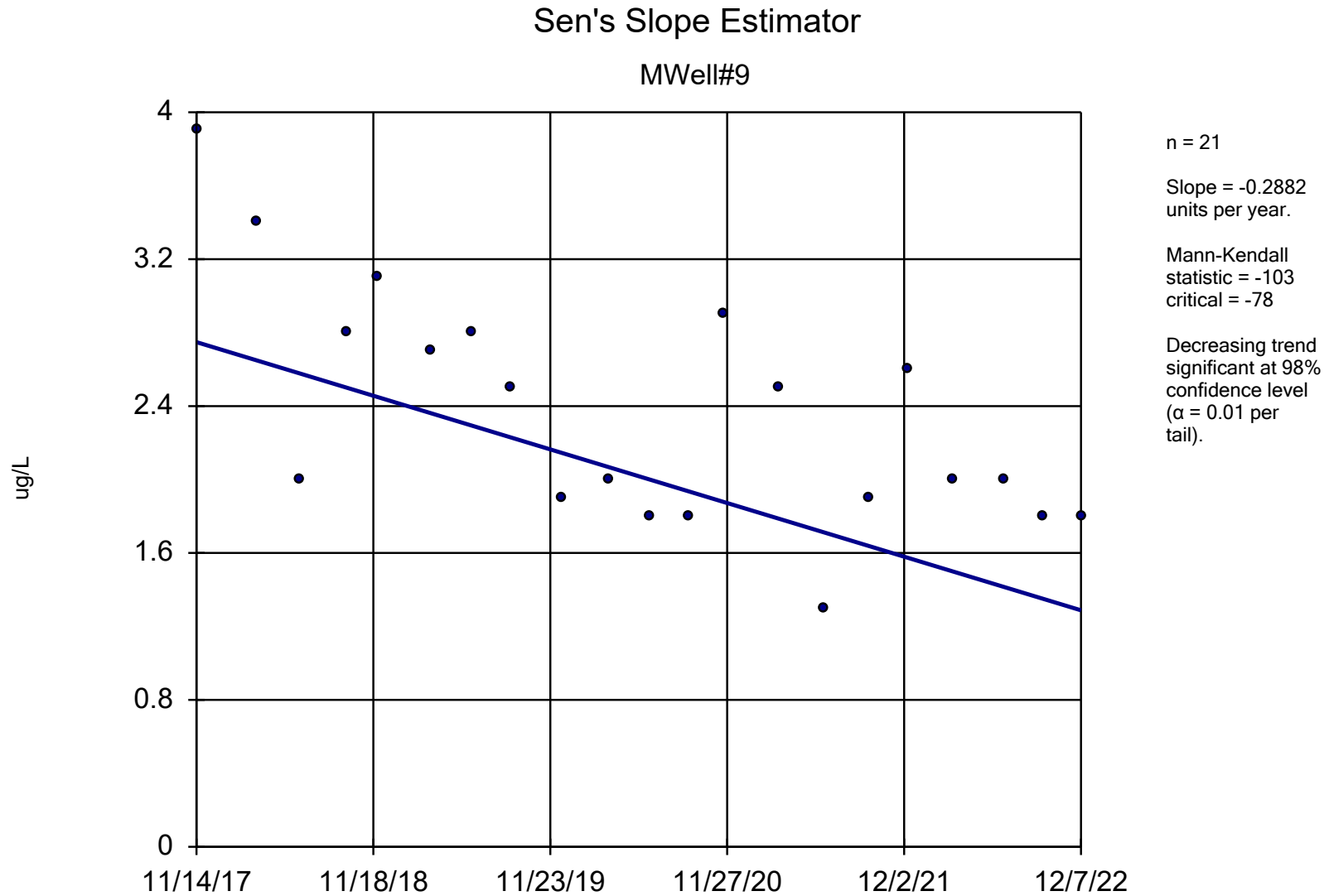
This Page Intentionally Left Blank



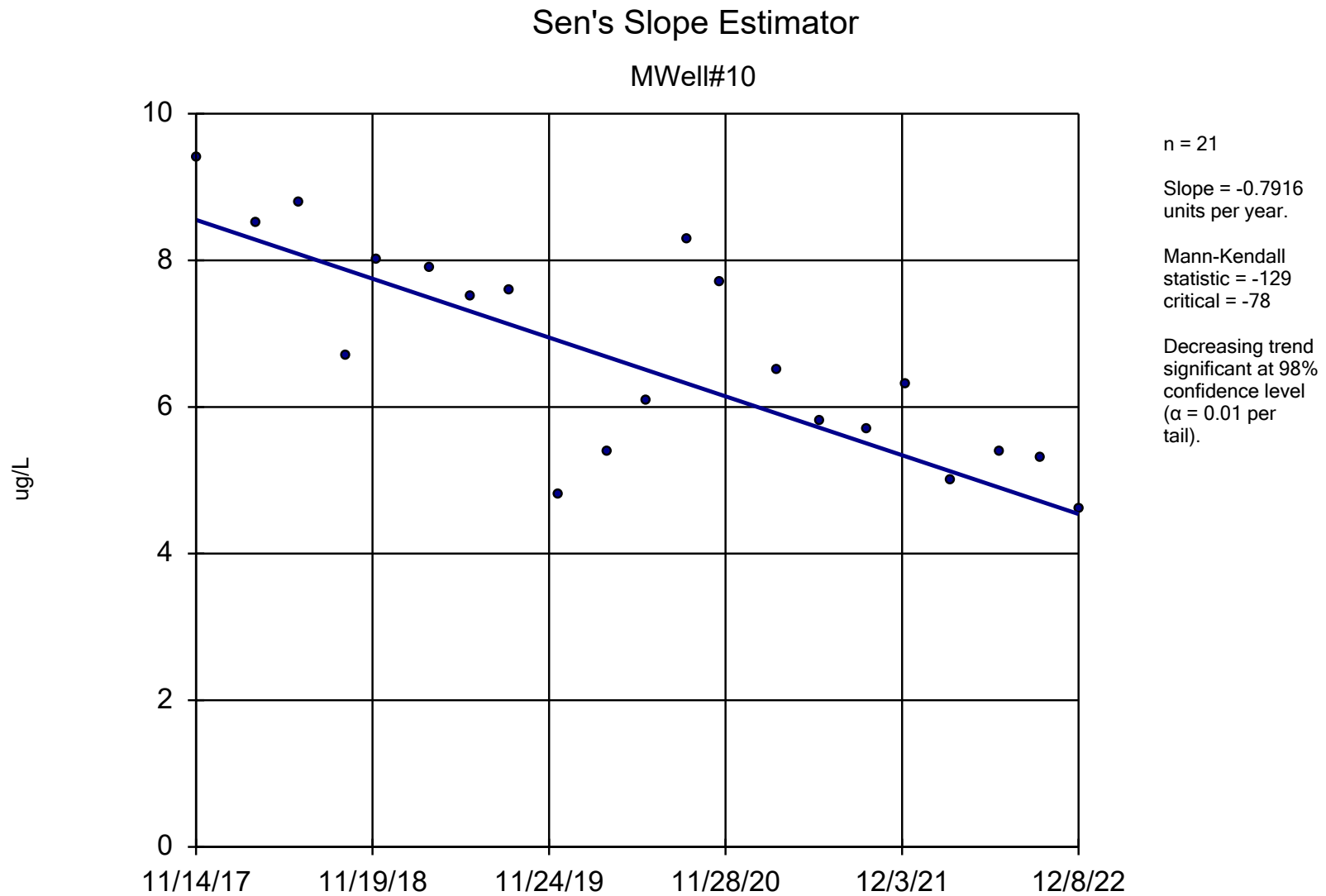
Constituent: 1,1-Dichloroethane Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



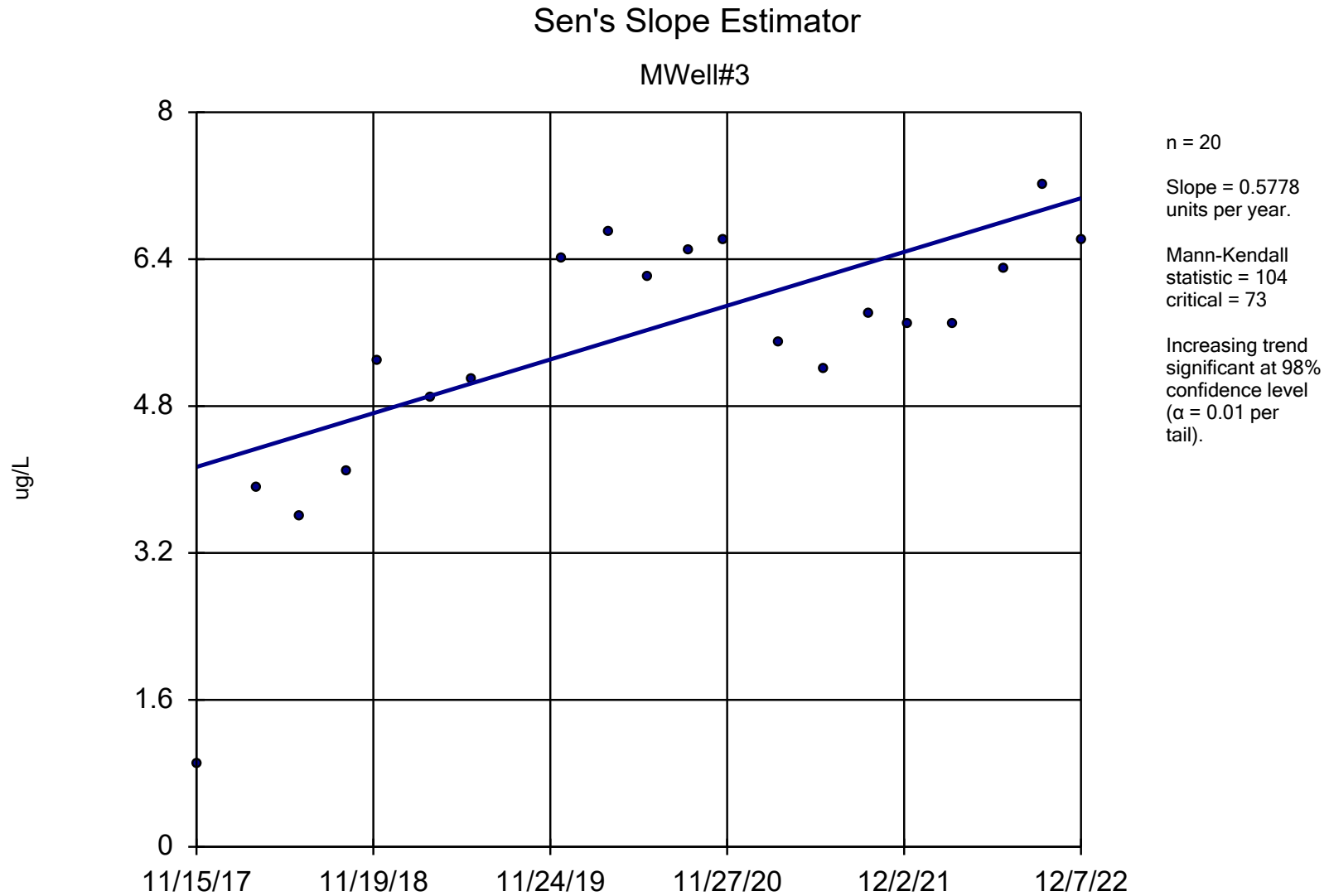
Constituent: 1,1-Dichloroethane Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



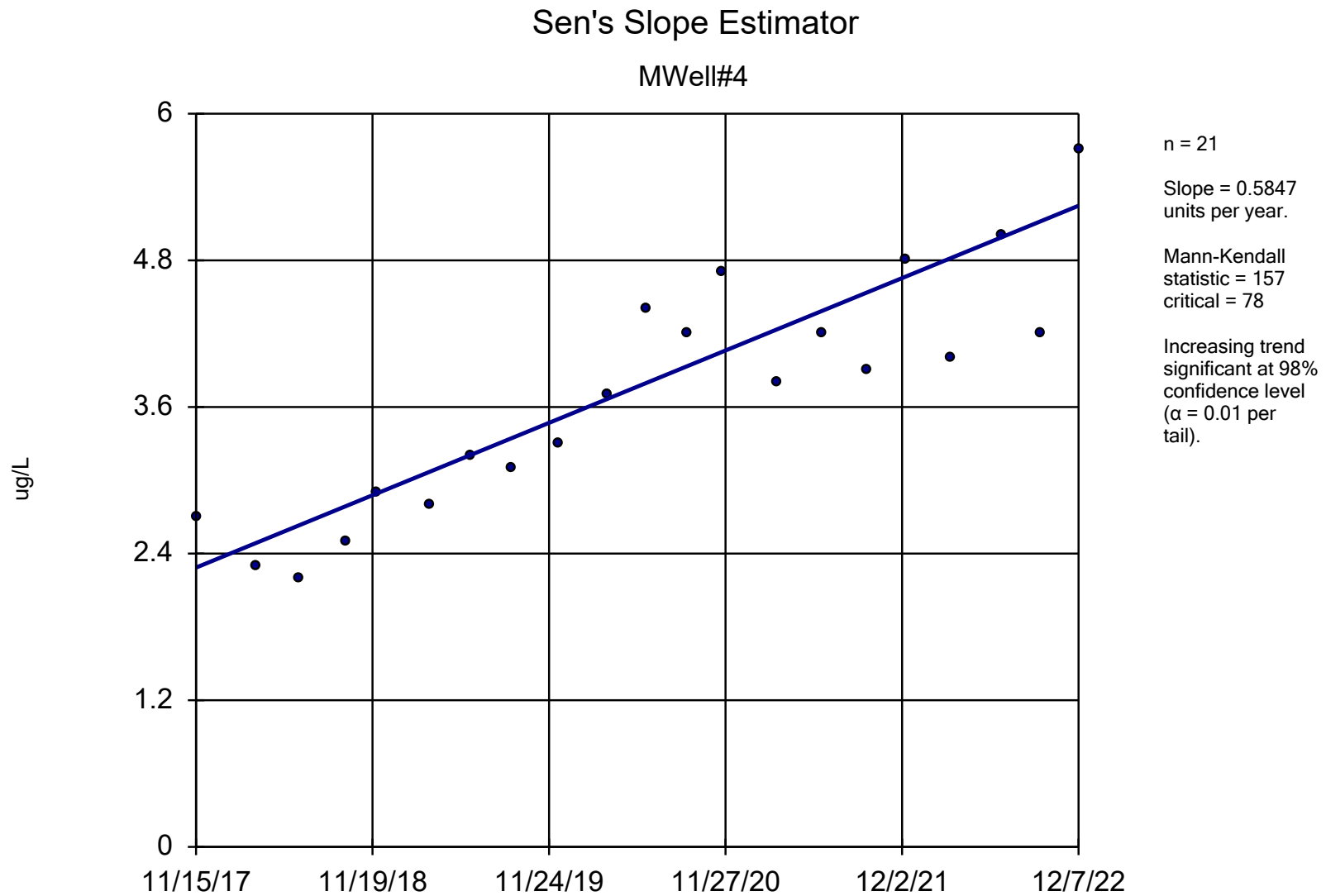
Constituent: 1,1-Dichloroethane Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



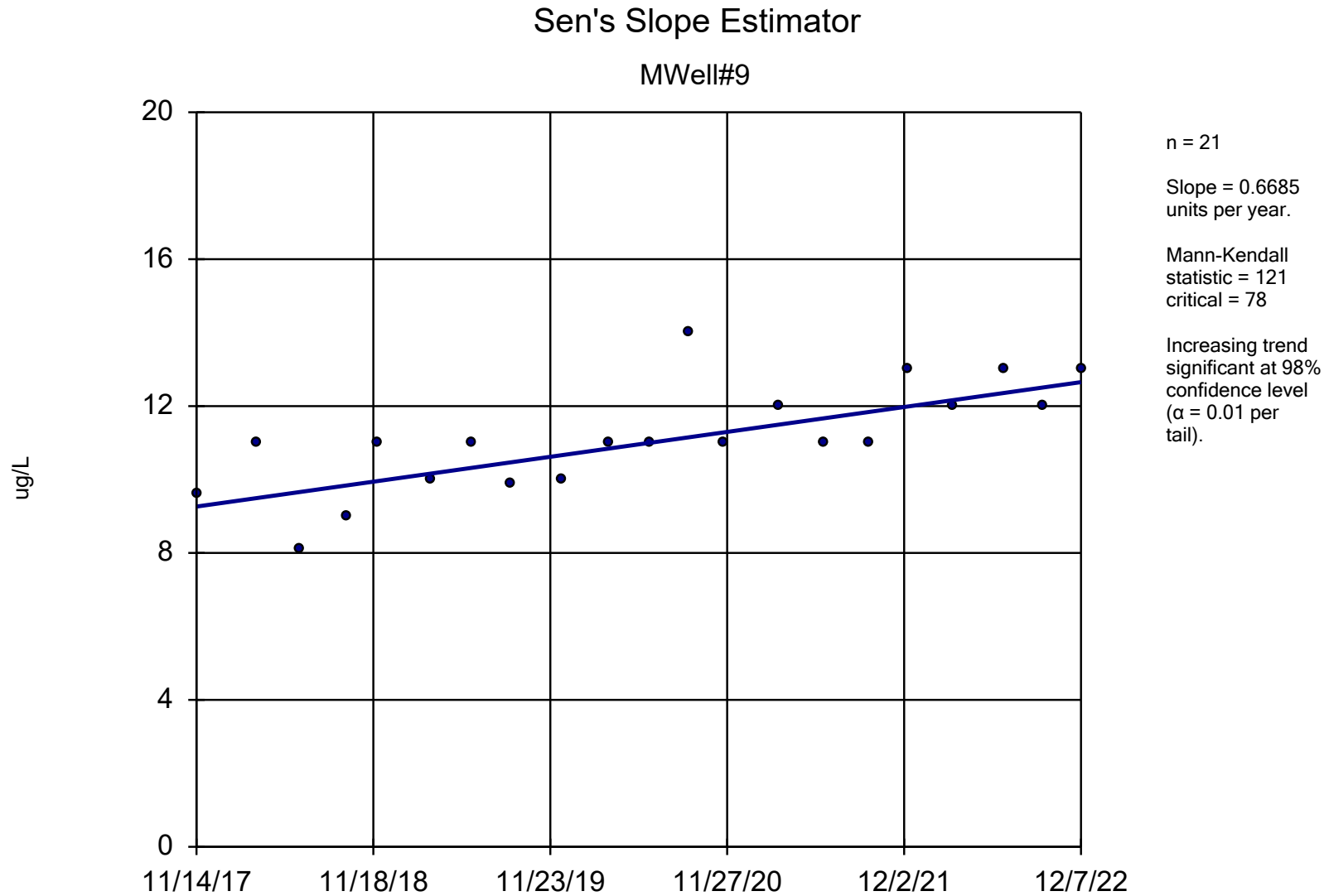
Constituent: 1,1-Dichloroethane Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



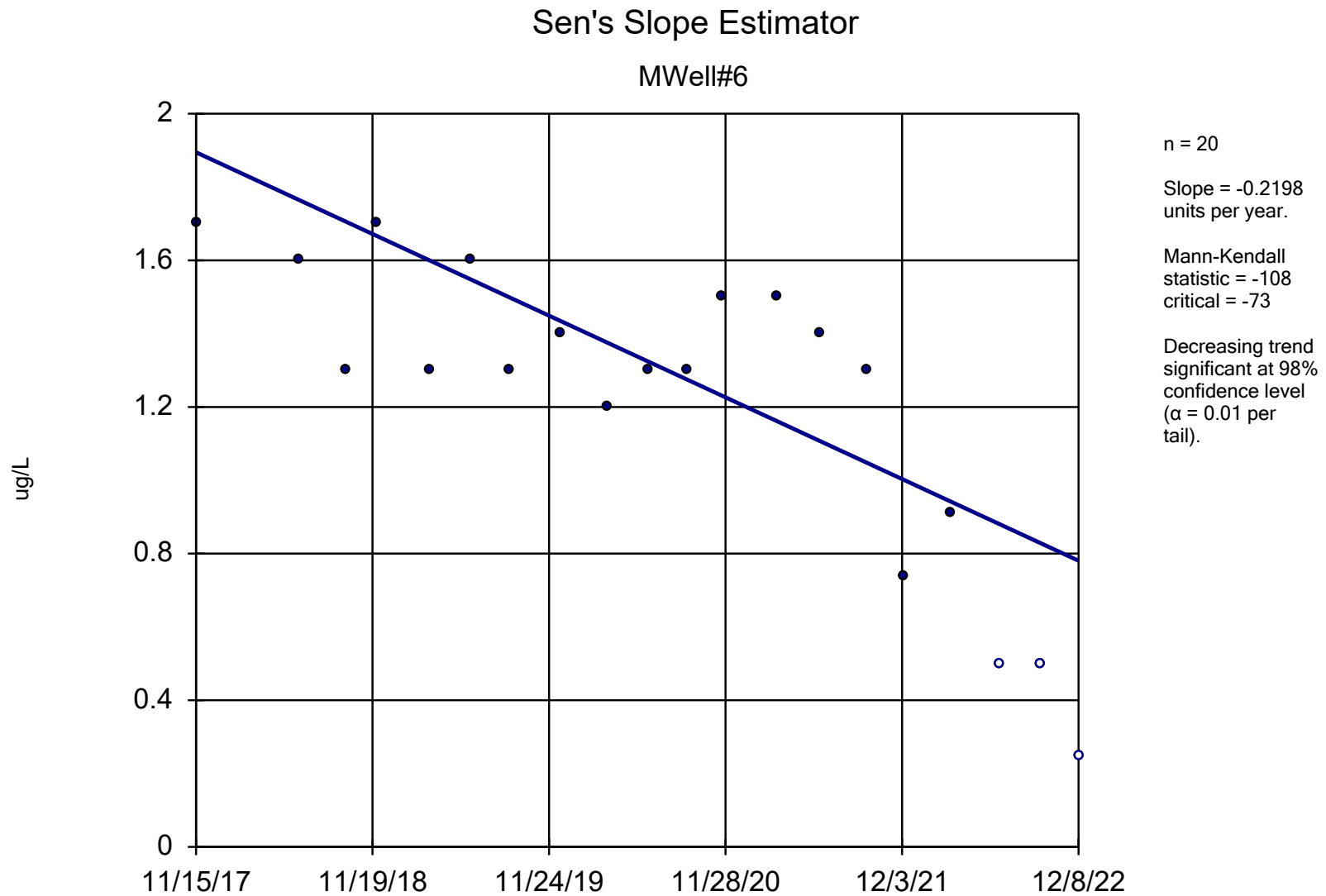
Constituent: Chloroform Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: cis-1,2-Dichloroethene Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

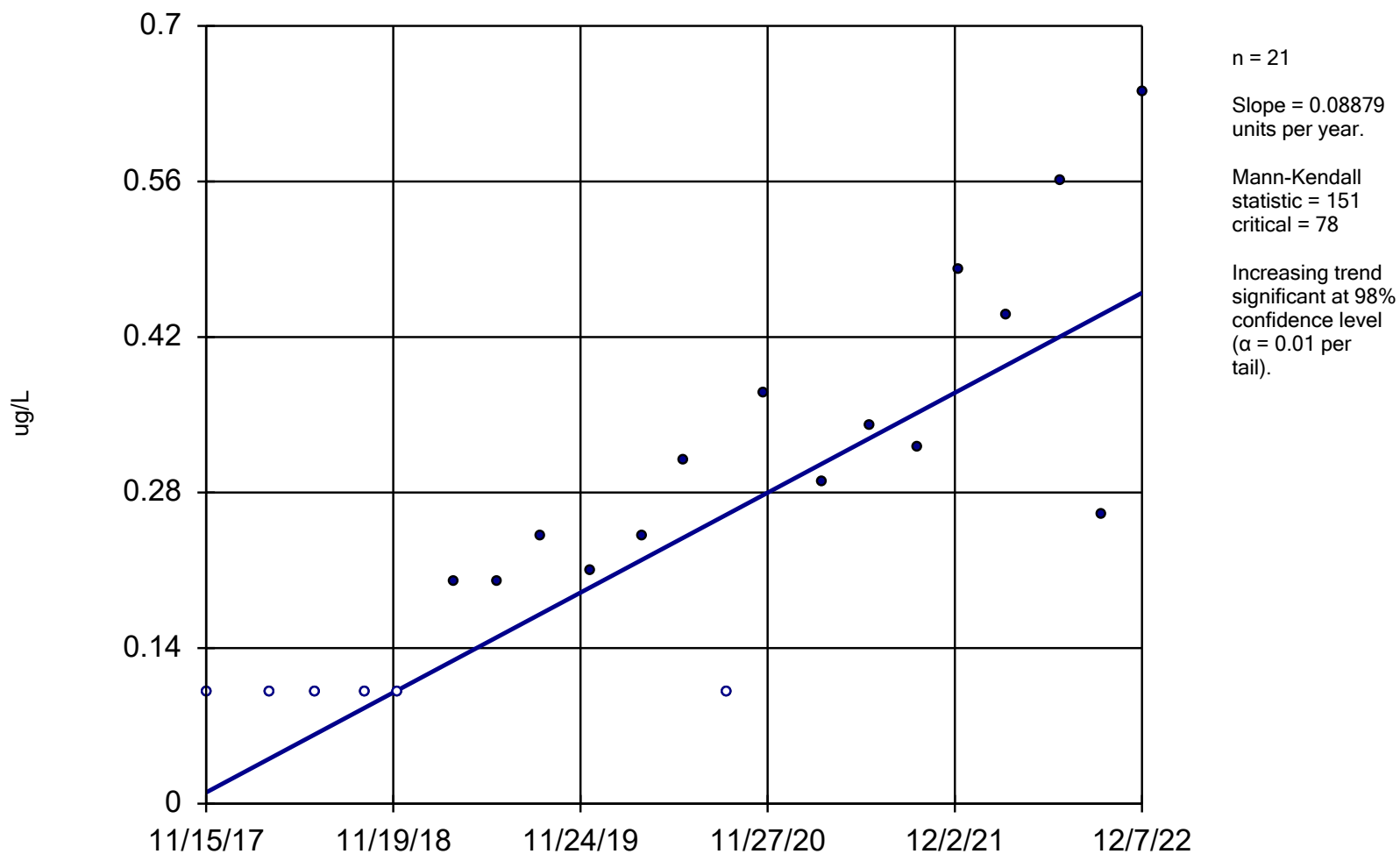


Constituent: Tetrachloroethene Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Sen's Slope Estimator

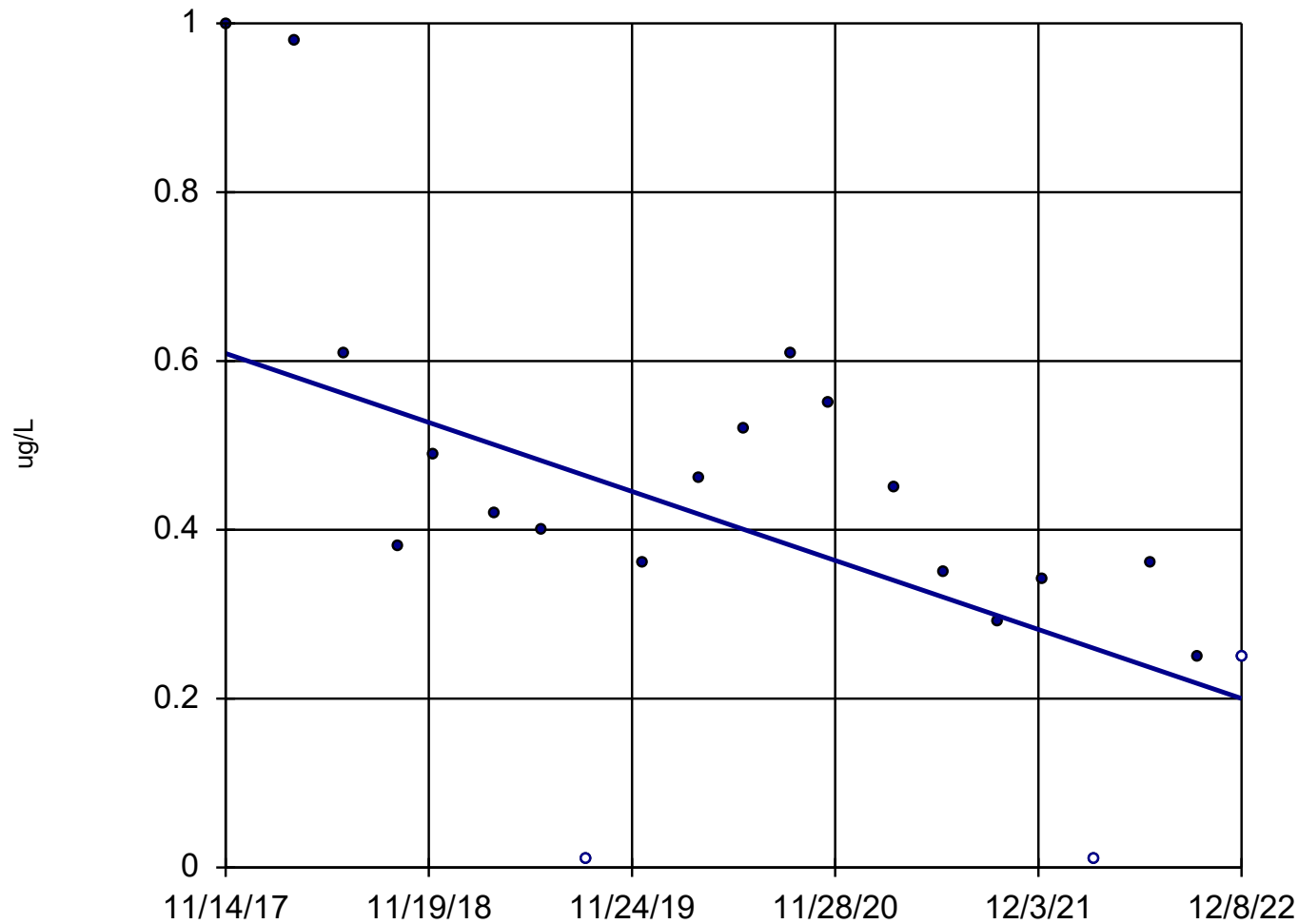
MWell#4



Constituent: Trichloroethene Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Sen's Slope Estimator

MWell#10



n = 21

Slope = -0.08064
units per year.

Mann-Kendall
statistic = -106
critical = -78

Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

Constituent: Vinyl Chloride Analysis Run 2/8/2023 11:38 AM View: HRLF_SensSlope 5-year
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Appendix D-2

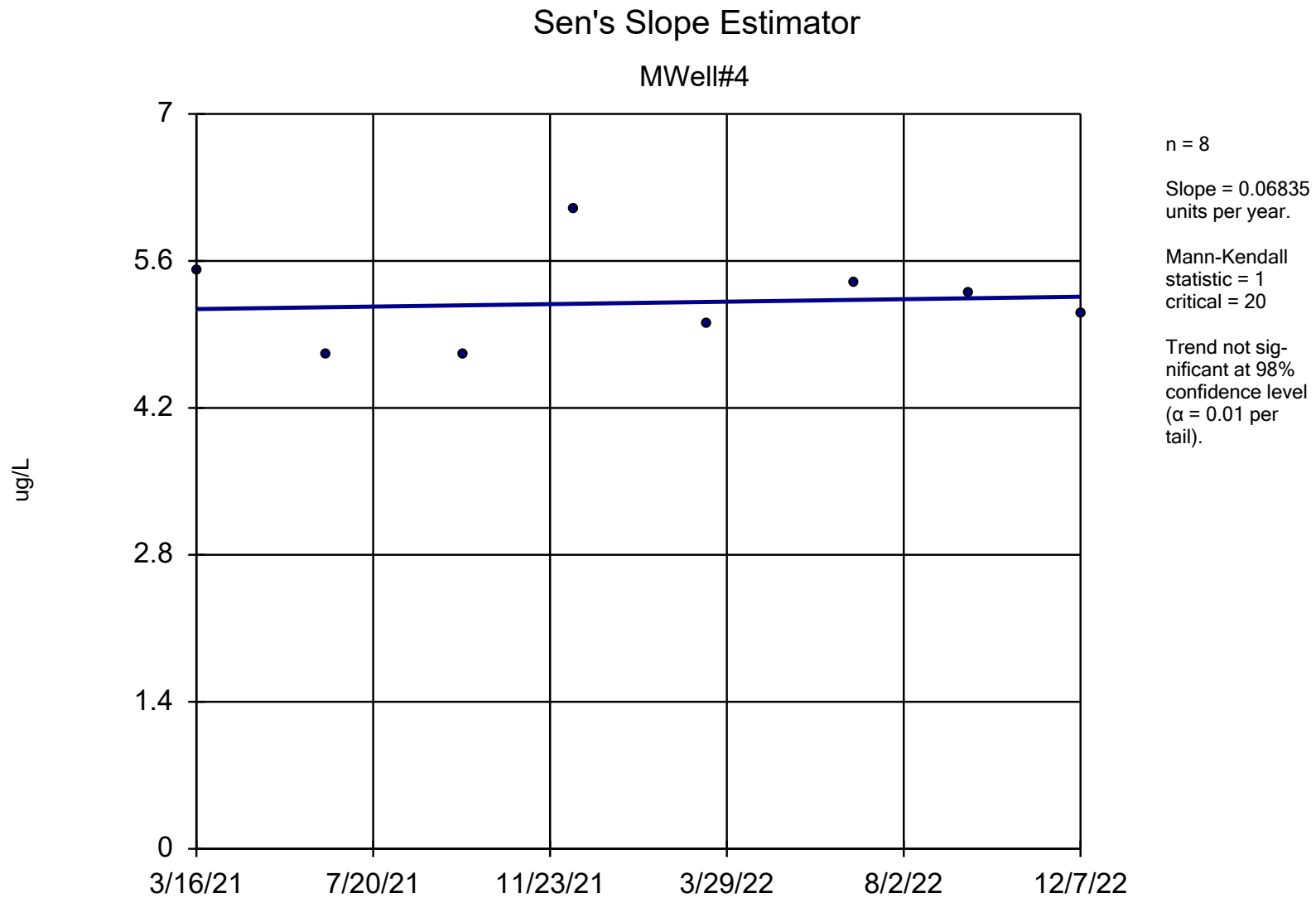
2-Year Trends



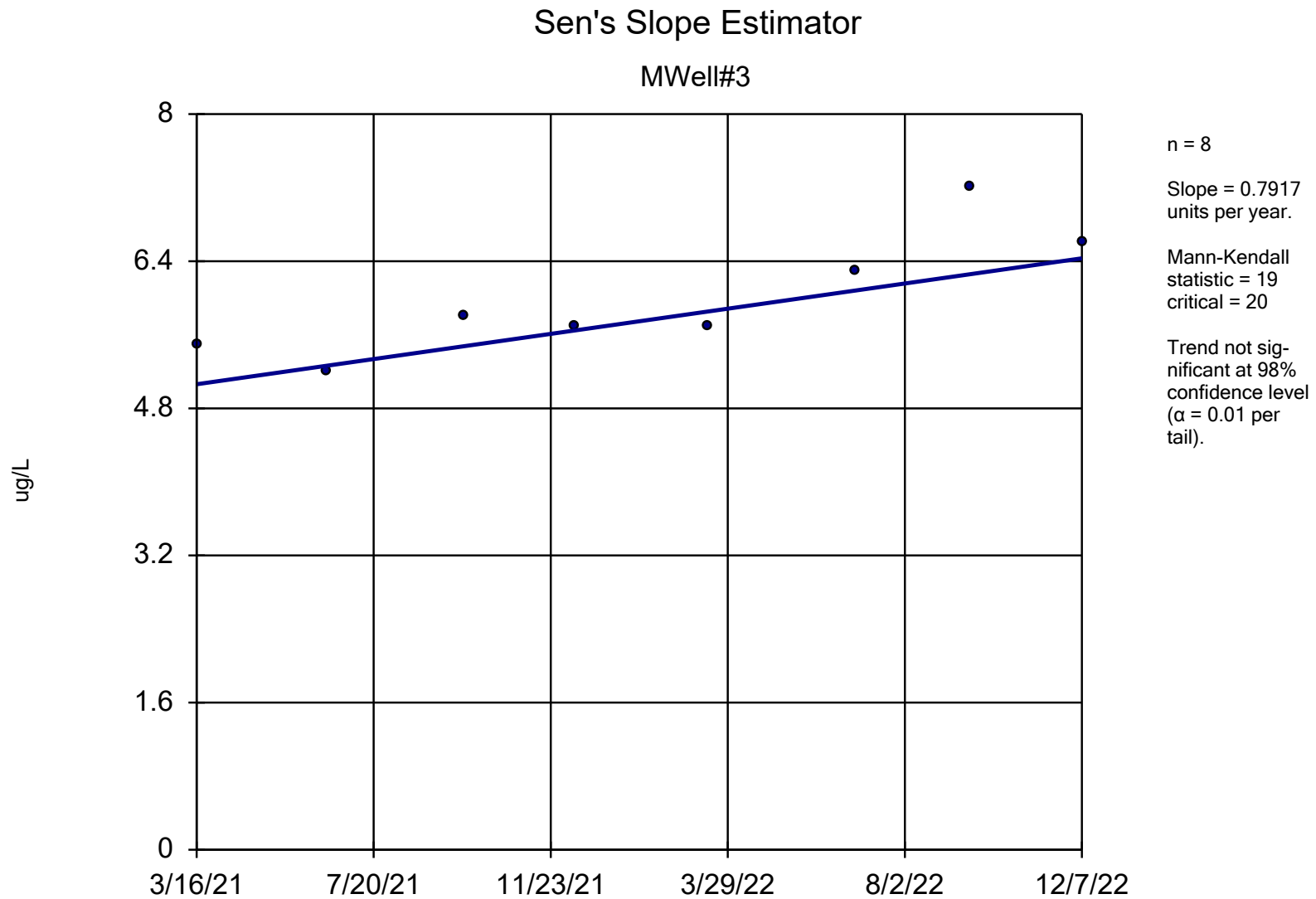
Horn Rapids Landfill Trends for Volatile Organic Compounds, First Quarter 2021 through Fourth Quarter 2022

Constituent Name	Well	Slope	Calculated Statistic	Critical Value	Trend	N	% Non-detects	Normality	Transformation	Alpha	Method
1,1-Dichloroethane (ug/L)	MWell#4	0.06835	1	20	No	8	0	n/a	n/a	0.02	NP
Chloroform (ug/L)	MWell#3	0.7917	19	20	No	8	0	n/a	n/a	0.02	NP
cis-1,2-Dichloroethene (ug/L)	MWell#4	0.842	17	20	No	8	0	n/a	n/a	0.02	NP
Tetrachloroethene (ug/L)	MWell#9	0.7867	11	20	No	8	0	n/a	n/a	0.02	NP
Trichloroethene (ug/L)	MWell#4	0.1882	12	20	No	8	0	n/a	n/a	0.02	NP
Trichlorofluoromethane (ug/L)	MWell#4	-0.1306	-5	-20	No	8	0	n/a	n/a	0.02	NP

This Page Intentionally Left Blank

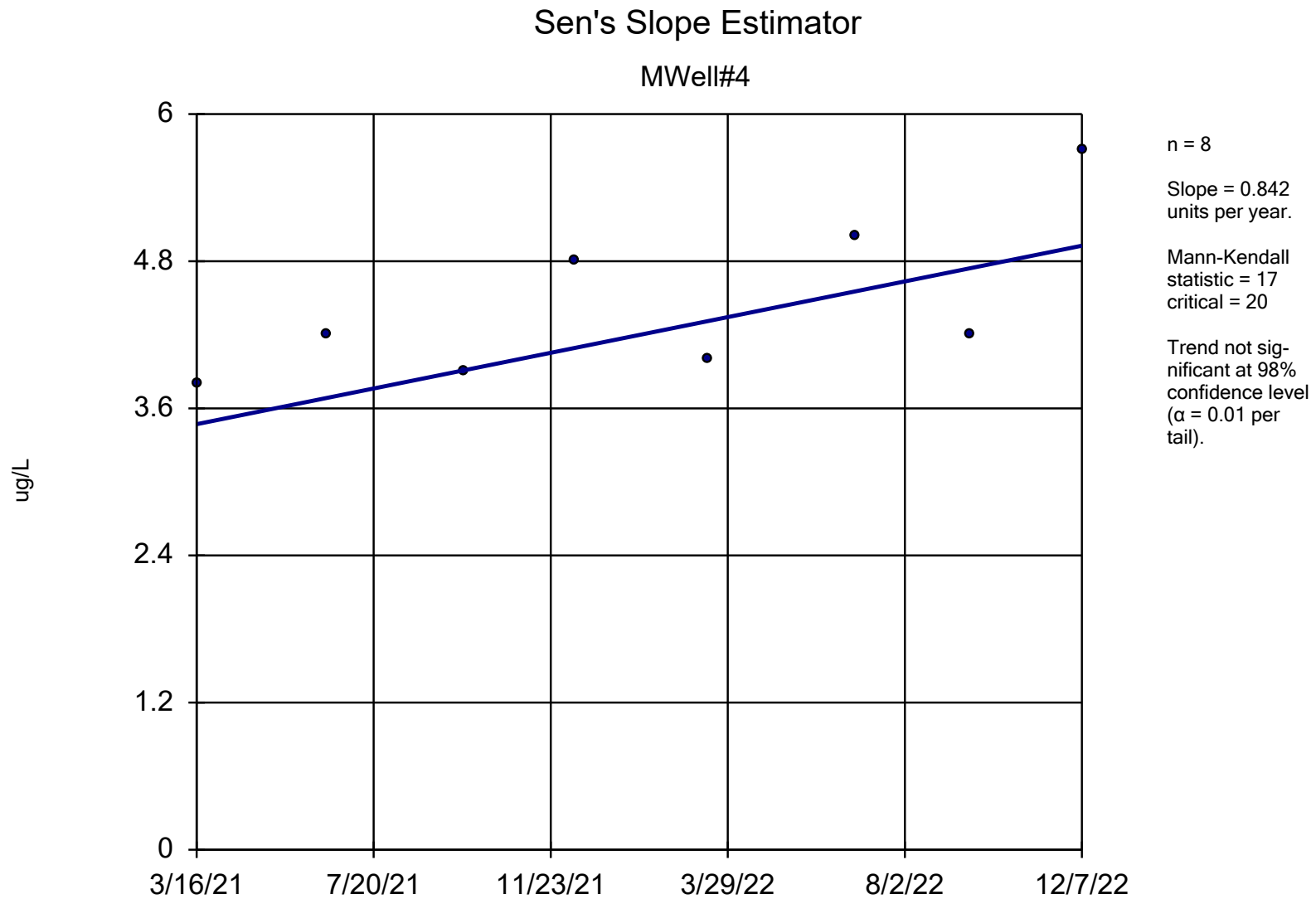


Constituent: 1,1-Dichloroethane Analysis Run 2/13/2023 12:51 PM View: 2-year trend
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

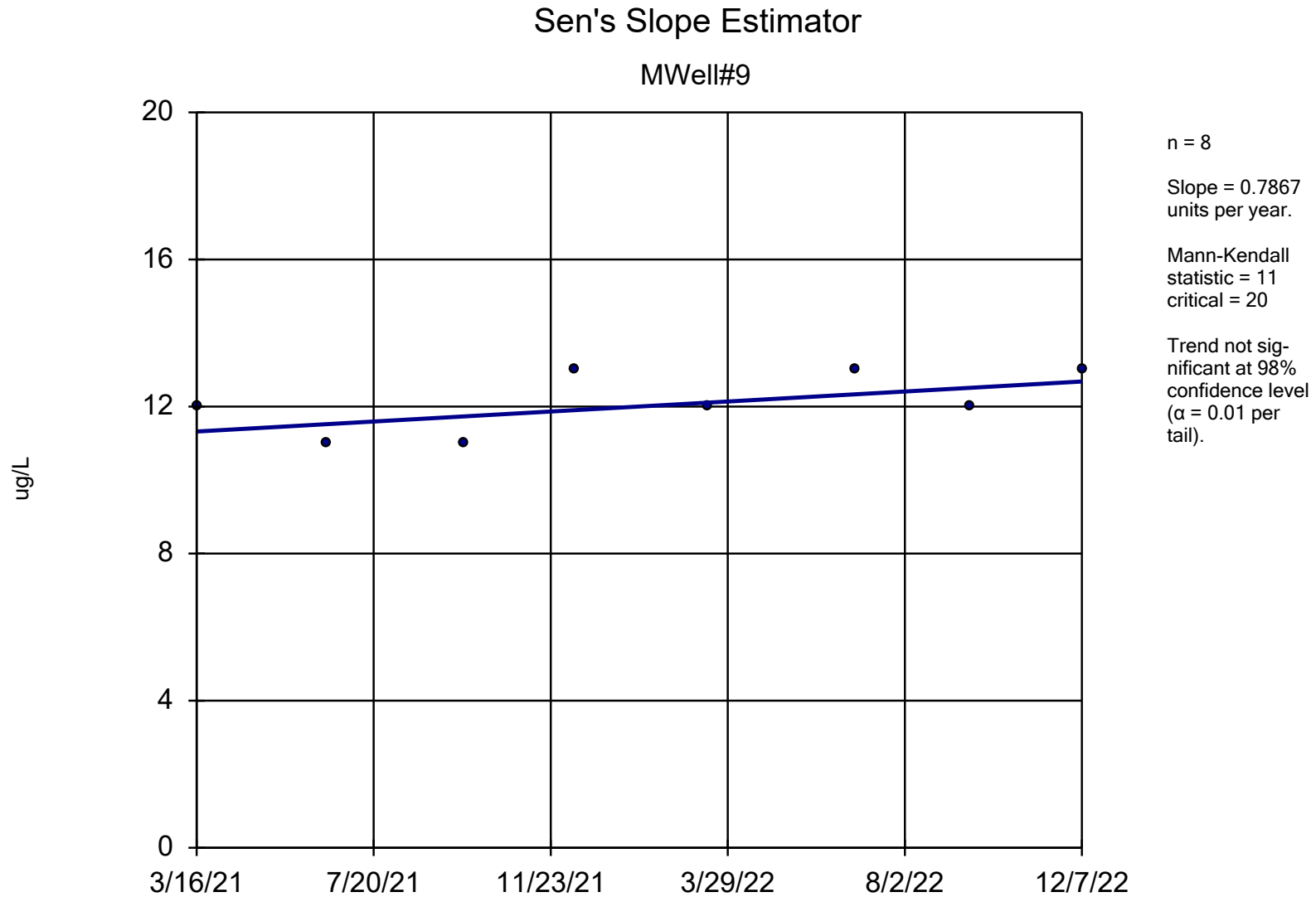


Constituent: Chloroform Analysis Run 2/13/2023 12:51 PM View: 2-year trend

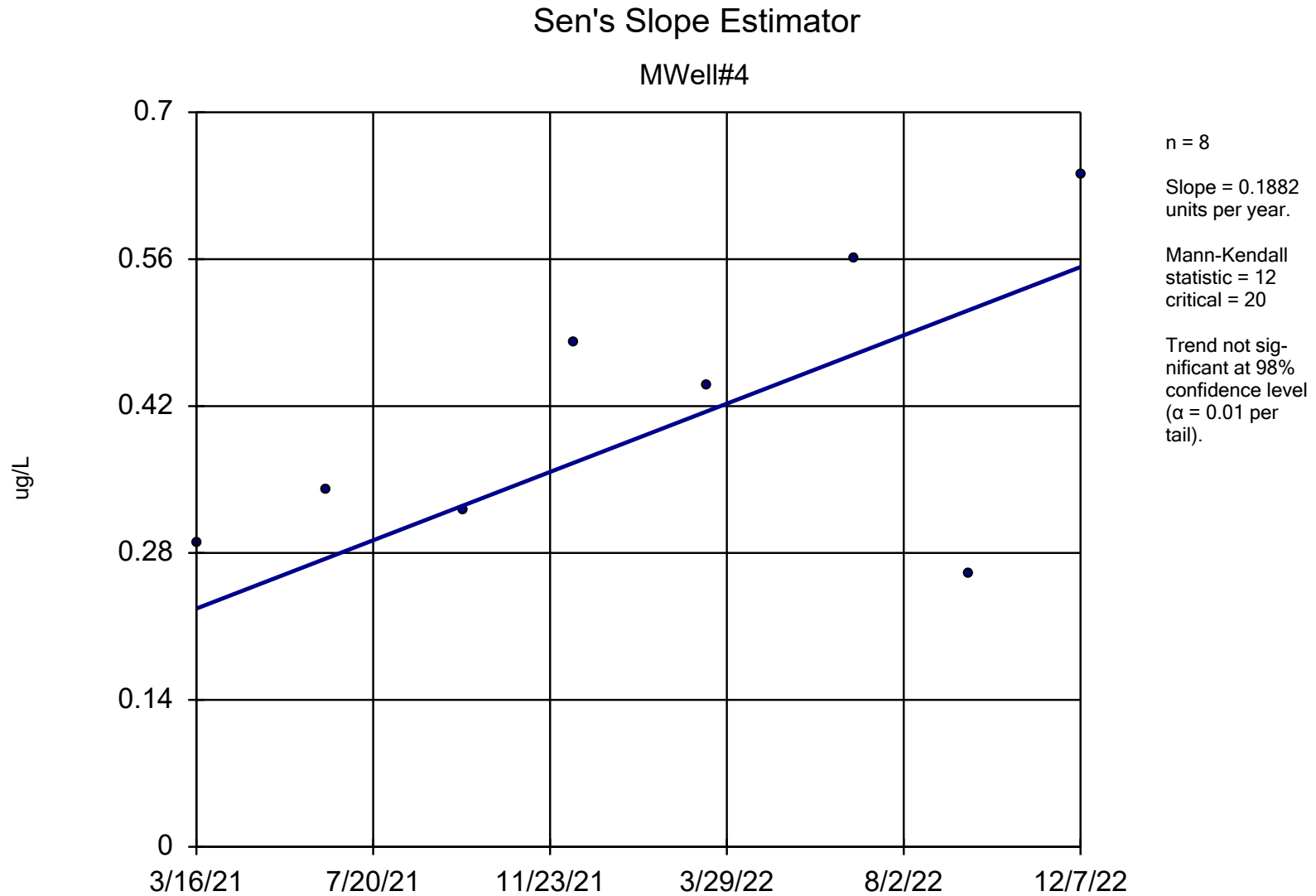
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: cis-1,2-Dichloroethene Analysis Run 2/13/2023 12:51 PM View: 2-year trend
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

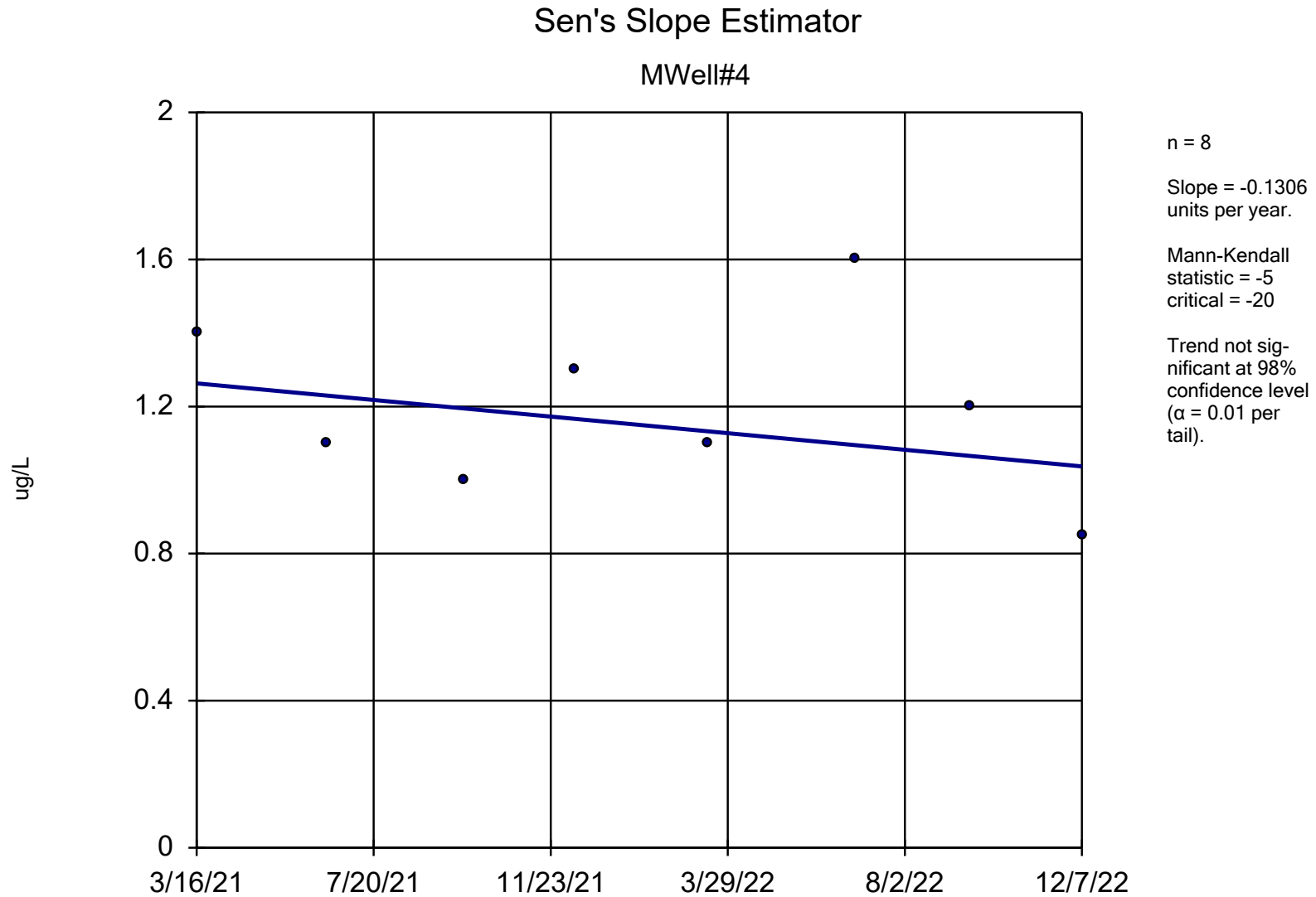


Constituent: Tetrachloroethene Analysis Run 2/13/2023 12:51 PM View: 2-year trend
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: Trichloroethene Analysis Run 2/13/2023 12:51 PM View: 2-year trend

Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata



Constituent: Trichlorofluoromethane Analysis Run 2/13/2023 12:51 PM View: 2-year trend
Horn Rapids Landfill Client: City of Richland Data: HRLF_alldata

Appendix E

Background Statistical Summary



HORN RAPIDS LANDFILL - FOURTH QUARTER 2022
Summary of Descriptive Statistics

Constituent Name	Well	N	Mean ¹	Variance	Standard Deviation	Standard Error	Coefficient of Variation	Median	% Non-Detects
1,1,1,2-Tetrachloroethane (ug/L)	MWell#1 (bg) ²	123	0.4749	0.25826724	0.5082	0.04582	1.070120025	0.5	100
1,1,1,2-Tetrachloroethane (ug/L)	MWell#11 (bg)	50	0.2462	0.03139984	0.1772	0.02506	0.719740049	0.15	100
1,1,1-Trichloroethane (ug/L)	MWell#1 (bg)	123	0.4643	0.26409321	0.5139	0.04634	1.106827482	0.5	100
1,1,1-Trichloroethane (ug/L)	MWell#11 (bg)	50	0.2253	0.03500641	0.1871	0.02646	0.830448291	0.1	100
1,1,2,2-Tetrachloroethane (ug/L)	MWell#1 (bg)	123	0.4668	0.26368225	0.5135	0.0463	1.100042845	0.5	100
1,1,2,2-Tetrachloroethane (ug/L)	MWell#11 (bg)	50	0.2264	0.03538161	0.1881	0.0266	0.830830389	0.1	100
1,1,2-Trichloroethane (ug/L)	MWell#1 (bg)	123	0.4698	0.266256	0.516	0.04653	1.098339719	0.5	100
1,1,2-Trichloroethane (ug/L)	MWell#11 (bg)	50	0.2237	0.03467044	0.1862	0.02633	0.832364774	0.1	100
1,1-Dichloroethane (ug/L)	MWell#1 (bg)	123	0.4866	0.26388769	0.5137	0.04632	1.055692561	0.5	95.93
1,1-Dichloroethane (ug/L)	MWell#11 (bg)	50	0.234	0.04124961	0.2031	0.02873	0.867948718	0.1	100
1,1-Dichloroethene (ug/L)	MWell#1 (bg)	123	0.5736	0.59706529	0.7727	0.06967	1.347105997	0.5	100
1,1-Dichloroethene (ug/L)	MWell#11 (bg)	50	0.2161	0.03896676	0.1974	0.02792	0.913465988	0.1	100
1,2,3-Trichloropropane (ug/L)	MWell#1 (bg)	123	0.5043	0.42981136	0.6556	0.05911	1.300019829	0.5	100
1,2,3-Trichloropropane (ug/L)	MWell#11 (bg)	50	0.2286	0.03415104	0.1848	0.02614	0.80839895	0.1	100
1,2-Dibromo-3-chloropropane (ug/L)	MWell#1 (bg)	121	1.453	1.597696	1.264	0.1149	0.869924295	1	100
1,2-Dibromo-3-chloropropane (ug/L)	MWell#11 (bg)	50	0.9297	0.04695889	0.2167	0.03065	0.233085942	1	100
1,2-Dibromoethane (ug/L)	MWell#1 (bg)	122	0.489	0.44568976	0.6676	0.06044	1.365235174	0.5	100
1,2-Dibromoethane (ug/L)	MWell#11 (bg)	50	0.1911	0.04272489	0.2067	0.02923	1.081632653	0.05	100
1,2-Dichlorobenzene (ug/L)	MWell#1 (bg)	122	0.5698	0.59028489	0.7683	0.06955	1.348367848	0.5	99.18
1,2-Dichlorobenzene (ug/L)	MWell#11 (bg)	50	0.27	0.03621409	0.1903	0.02692	0.704814815	0.15	100
1,2-Dichloroethane (ug/L)	MWell#1 (bg)	122	0.484	0.27499536	0.5244	0.04747	1.083471074	0.5	100
1,2-Dichloroethane (ug/L)	MWell#11 (bg)	50	0.229	0.03674889	0.1917	0.02711	0.837117904	0.1	100
1,2-Dichloropropane (ug/L)	MWell#1 (bg)	119	0.5081	0.294849	0.543	0.04978	1.068687266	0.5	100
1,2-Dichloropropane (ug/L)	MWell#11 (bg)	50	0.2272	0.035721	0.189	0.02673	0.831866197	0.1	100
1,4-Dichlorobenzene (ug/L)	MWell#1 (bg)	122	0.5698	0.58997761	0.7681	0.06954	1.348016848	0.5	99.18
1,4-Dichlorobenzene (ug/L)	MWell#11 (bg)	50	0.271	0.03767481	0.1941	0.02745	0.716236162	0.15	100
2-Butanone (ug/L)	MWell#1 (bg)	117	4.989	23.863225	4.885	0.4517	0.979154139	5	97.44
2-Butanone (ug/L)	MWell#11 (bg)	50	5.25	2.758921	1.661	0.2348	0.316380952	5	100
2-Hexanone (ug/L)	MWell#1 (bg)	117	2.568	6.507601	2.551	0.2358	0.993380062	2.5	99.15
2-Hexanone (ug/L)	MWell#11 (bg)	50	1.665	0.44289025	0.6655	0.09412	0.3996997	1.5	100
4-Methyl-2-pentanone (ug/L)	MWell#1 (bg)	116	2.661	2.458624	1.568	0.1456	0.589252161	2.5	100
4-Methyl-2-pentanone (ug/L)	MWell#11 (bg)	50	2.905	1.550025	1.245	0.1761	0.428571429	2.5	100

¹ All statistics based on Non-Detects = 1/2 MDL ² (bg) indicates a background well.

HORN RAPIDS LANDFILL - FOURTH QUARTER 2022
Summary of Descriptive Statistics

Constituent Name	Well	N	Mean ¹	Variance	Standard Deviation	Standard Error	Coefficient of Variation	Median	% Non- Detects
Acetone (ug/L)	MWell#1 (bg)	119	11.48	5090.8225	71.35	6.541	6.215156794	3	94.96
Acetone (ug/L)	MWell#11 (bg)	50	3.422	3.066001	1.751	0.2477	0.511689071	4.5	100
Acrylonitrile (ug/L)	MWell#1 (bg)	117	2.86	5.494336	2.344	0.2167	0.81958042	2.5	100
Acrylonitrile (ug/L)	MWell#11 (bg)	50	3.452	2.108304	1.452	0.2054	0.420625724	2.5	100
Alkalinity (mg/L)	MWell#1 (bg)	113	286.4	5256.25	72.5	6.82	0.253142458	300	0
Alkalinity (mg/L)	MWell#11 (bg)	50	179.8	308.0025	17.55	2.482	0.097608454	175	0
Ammonia Nitrogen (mg/L)	MWell#1 (bg)	122	0.09145	0.01240996	0.1114	0.01009	1.218151996	0.05	78.69
Ammonia Nitrogen (mg/L)	MWell#11 (bg)	50	0.1793	0.05089536	0.2256	0.0319	1.258226436	0.1	94
Antimony, Dissolved (mg/L)	MWell#1 (bg)	84	0.008953	0.000357966	0.01892	0.002064	2.113258126	0.0005	95.24
Antimony, Dissolved (mg/L)	MWell#11 (bg)	21	0.0002	0	0	0	0	0.0002	100
Antimony, Total (mg/L)	MWell#1 (bg)	38	0.0002632	8.87552E-09	0.00009421	0.00001528	0.357940729	0.0002	100
Antimony, Total (mg/L)	MWell#11 (bg)	38	0.0002632	8.87552E-09	0.00009421	0.00001528	0.357940729	0.0002	100
Arsenic, Dissolved (mg/L)	MWell#1 (bg)	85	0.00717	3.72344E-05	0.006102	0.0006619	0.851046025	0.005	15.29
Arsenic, Dissolved (mg/L)	MWell#11 (bg)	21	0.004729	7.58118E-07	0.0008707	0.00019	0.184119264	0.0049	0
Arsenic, Total (mg/L)	MWell#1 (bg)	38	0.004271	2.13999E-07	0.0004626	0.00007504	0.108311871	0.0042	0
Arsenic, Total (mg/L)	MWell#11 (bg)	38	0.004961	1.8171E-06	0.001348	0.0002187	0.271719411	0.00465	0
Barium, Dissolved (mg/L)	MWell#1 (bg)	85	0.04488	0.00032364	0.01799	0.001951	0.400846702	0.05	9.412
Barium, Dissolved (mg/L)	MWell#11 (bg)	21	0.08352	0.000259854	0.01612	0.003518	0.193007663	0.08	0
Barium, Total (mg/L)	MWell#1 (bg)	38	0.05658	6.92723E-05	0.008323	0.00135	0.147101449	0.057	0
Barium, Total (mg/L)	MWell#11 (bg)	38	0.1044	0.000158005	0.01257	0.002039	0.120402299	0.1	0
Benzene (ug/L)	MWell#1 (bg)	123	0.4821	0.27311076	0.5226	0.04713	1.084007467	0.5	100
Benzene (ug/L)	MWell#11 (bg)	50	0.231	0.03640464	0.1908	0.02699	0.825974026	0.1	98
Beryllium, Dissolved (mg/L)	MWell#1 (bg)	85	0.0006315	3.92878E-07	0.0006268	0.00006799	0.992557403	0.0005	100
Beryllium, Dissolved (mg/L)	MWell#11 (bg)	21	0.0002	0	0	0	0	0.0002	100
Beryllium, Total (mg/L)	MWell#1 (bg)	38	0.0002	0	0	0	0	0.0002	100
Beryllium, Total (mg/L)	MWell#11 (bg)	38	0.0002	0	0	0	0	0.0002	100
Bicarbonate (mg/L)	MWell#1 (bg)	113	295.8	4412.9449	66.43	6.249	0.224577417	310	0
Bicarbonate (mg/L)	MWell#11 (bg)	50	179.8	308.0025	17.55	2.482	0.097608454	175	0
Bromochloromethane (ug/L)	MWell#1 (bg)	122	0.4717	0.26512201	0.5149	0.04662	1.091583634	0.5	99.18
Bromochloromethane (ug/L)	MWell#11 (bg)	50	0.234	0.03822025	0.1955	0.02764	0.835470085	0.1	100
Bromodichloromethane (ug/L)	MWell#1 (bg)	123	0.4671	0.26368225	0.5135	0.0463	1.099336331	0.5	100
Bromodichloromethane (ug/L)	MWell#11 (bg)	50	0.227	0.03564544	0.1888	0.0267	0.831718062	0.1	100

¹ All statistics based on Non-Detects = 1/2 MDL ² (bg) indicates a background well.

HORN RAPIDS LANDFILL - FOURTH QUARTER 2022
Summary of Descriptive Statistics

Constituent Name	Well	N	Mean ¹	Variance	Standard Deviation	Standard Error	Coefficient of Variation	Median	% Non- Detects
Bromoform (ug/L)	MWell#1 (bg)	123	0.5065	0.24147396	0.4914	0.04431	0.970187562	0.5	100
Bromoform (ug/L)	MWell#11 (bg)	50	0.324	0.02217121	0.1489	0.02106	0.459567901	0.25	100
Bromomethane (ug/L)	MWell#1 (bg)	121	1.071	1.530169	1.237	0.1125	1.154995331	0.5	99.17
Bromomethane (ug/L)	MWell#11 (bg)	50	0.991	1.0201	1.01	0.1429	1.019172553	0.5	100
Cadmium, Dissolved (mg/L)	MWell#1 (bg)	85	0.001073	1.49084E-06	0.001221	0.0001324	1.137931034	0.0005	98.82
Cadmium, Dissolved (mg/L)	MWell#11 (bg)	21	0.0002	0	0	0	0	0.0002	100
Cadmium, Total (mg/L)	MWell#1 (bg)	38	0.0002211	3.86884E-09	0.0000622	0.00001009	0.281320669	0.0002	100
Cadmium, Total (mg/L)	MWell#11 (bg)	38	0.0002211	3.86884E-09	0.0000622	0.00001009	0.281320669	0.0002	100
Calcium, Dissolved (mg/L)	MWell#1 (bg)	112	101.3	1001.0896	31.64	2.99	0.312339585	110	0
Calcium, Dissolved (mg/L)	MWell#11 (bg)	50	211.1	4009.4224	63.32	8.955	0.299952629	240	0
Calcium, Total (mg/L)	MWell#1 (bg)	8	118.3	430.1476	20.74	7.333	0.175316991	120	0
Calcium, Total (mg/L)	MWell#11 (bg)	8	182.5	1164.1744	34.12	12.06	0.186958904	200	0
Carbon Disulfide (ug/L)	MWell#1 (bg)	117	2.041	43.612816	6.604	0.6105	3.23566879	0.5	98.29
Carbon Disulfide (ug/L)	MWell#11 (bg)	50	0.254	0.03426201	0.1851	0.02618	0.728740157	0.15	100
Carbon Tetrachloride (ug/L)	MWell#1 (bg)	122	0.491	0.27994681	0.5291	0.0479	1.077596741	0.5	100
Carbon Tetrachloride (ug/L)	MWell#11 (bg)	50	0.231	0.03825936	0.1956	0.02766	0.846753247	0.1	100
Carbonate (mg/L)	MWell#1 (bg)	8	3.438	1.674436	1.294	0.4575	0.376381617	2.5	100
Chloride (mg/L)	MWell#1 (bg)	124	20.3	112.5721	10.61	0.9524	0.522660099	23.5	0
Chloride (mg/L)	MWell#11 (bg)	50	159	6207.8641	78.79	11.14	0.495534591	200	0
Chlorobenzene (ug/L)	MWell#1 (bg)	123	0.4675	0.26368225	0.5135	0.0463	1.098395722	0.5	100
Chlorobenzene (ug/L)	MWell#11 (bg)	50	0.228	0.03613801	0.1901	0.02688	0.83377193	0.1	100
Chloroethane (ug/L)	MWell#1 (bg)	123	0.9461	1.4641	1.21	0.1091	1.278934574	0.5	100
Chloroethane (ug/L)	MWell#11 (bg)	50	0.9255	1.087849	1.043	0.1475	1.126958401	0.25	100
Chloroform (ug/L)	MWell#1 (bg)	123	0.4956	0.33016516	0.5746	0.05181	1.159402744	0.5	93.5
Chloroform (ug/L)	MWell#11 (bg)	50	0.262	0.106276	0.326	0.0461	1.244274809	0.1	98
Chloromethane (ug/L)	MWell#1 (bg)	121	1.042	1.605289	1.267	0.1152	1.215930902	0.5	99.17
Chloromethane (ug/L)	MWell#11 (bg)	50	0.906	1.121481	1.059	0.1498	1.168874172	0.25	100
Chromium, Dissolved (mg/L)	MWell#1 (bg)	85	0.004736	4.72794E-05	0.006876	0.0007458	1.451858108	0.0029	30.59
Chromium, Dissolved (mg/L)	MWell#11 (bg)	21	0.004514	2.2801E-06	0.00151	0.0003295	0.334514843	0.0042	0
Chromium, Total (mg/L)	MWell#1 (bg)	38	0.003621	1.22988E-06	0.001109	0.0001799	0.306268986	0.00325	0
Chromium, Total (mg/L)	MWell#11 (bg)	38	0.009461	0.000130874	0.01144	0.001856	1.209174506	0.00465	0
cis-1,2-Dichloroethene (ug/L)	MWell#1 (bg)	123	0.5126	0.51251281	0.7159	0.06455	1.39660554	0.5	99.19

¹ All statistics based on Non-Detects = 1/2 MDL ² (bg) indicates a background well.

HORN RAPIDS LANDFILL - FOURTH QUARTER 2022
Summary of Descriptive Statistics

Constituent Name	Well	N	Mean ¹	Variance	Standard Deviation	Standard Error	Coefficient of Variation	Median	% Non- Detects
cis-1,2-Dichloroethene (ug/L)	MWell#11 (bg)	50	0.229	0.03674889	0.1917	0.02711	0.837117904	0.1	100
cis-1,3-Dichloropropene (ug/L)	MWell#1 (bg)	121	0.4625	0.22581504	0.4752	0.0432	1.027459459	0.5	100
cis-1,3-Dichloropropene (ug/L)	MWell#11 (bg)	50	0.2572	0.03031081	0.1741	0.02463	0.676905132	0.25	100
Cobalt, Dissolved (mg/L)	MWell#1 (bg)	85	0.006439	5.32754E-05	0.007299	0.0007917	1.133561112	0.005	55.29
Cobalt, Dissolved (mg/L)	MWell#11 (bg)	21	0.0002833	2.11121E-08	0.0001453	0.00003172	0.512883869	0.0002	71.43
Cobalt, Total (mg/L)	MWell#1 (bg)	38	0.02281	0.000114276	0.01069	0.001734	0.468654099	0.0215	0
Cobalt, Total (mg/L)	MWell#11 (bg)	38	0.001009	5.21209E-06	0.002283	0.0003704	2.262636274	0.00044	44.74
Conductivity (umhos/cm)	MWell#1 (bg)	109	705	43388.89	208.3	19.95	0.295460993	750	0
Conductivity (umhos/cm)	MWell#11 (bg)	46	1390	151866.09	389.7	57.45	0.280359712	1503	0
Copper, Dissolved (mg/L)	MWell#1 (bg)	85	0.003993	4.10368E-05	0.006406	0.0006948	1.604307538	0.0014	68.24
Copper, Dissolved (mg/L)	MWell#11 (bg)	21	0.003633	1.18405E-05	0.003441	0.000751	0.947151115	0.0024	14.29
Copper, Total (mg/L)	MWell#1 (bg)	38	0.001305	9.04211E-07	0.0009509	0.0001543	0.728659004	0.001	73.68
Copper, Total (mg/L)	MWell#11 (bg)	38	0.002324	4.2066E-06	0.002051	0.0003327	0.88253012	0.001	55.26
Dibromochloromethane (ug/L)	MWell#1 (bg)	122	0.4693	0.26646244	0.5162	0.04674	1.099936075	0.5	100
Dibromochloromethane (ug/L)	MWell#11 (bg)	50	0.233	0.04016016	0.2004	0.02834	0.860085837	0.1	100
Dibromomethane (ug/L)	MWell#1 (bg)	119	0.4871	0.28100601	0.5301	0.04859	1.088277561	0.5	100
Dibromomethane (ug/L)	MWell#11 (bg)	50	0.2272	0.035721	0.189	0.02673	0.831866197	0.1	100
Dissolved Oxygen (mg/L)	MWell#1 (bg)	54	5.526	0.320356	0.566	0.07702	0.1024249	5.585	0
Dissolved Oxygen (mg/L)	MWell#11 (bg)	49	7.926	1.763584	1.328	0.1898	0.167549836	8.11	0
Ethane (ug/L)	MWell#1 (bg)	55	3.749	4.787344	2.188	0.295	0.583622299	5	100
Ethane (ug/L)	MWell#11 (bg)	50	3.415	4.137156	2.034	0.2876	0.595607613	5	100
Ethene (ug/L)	MWell#1 (bg)	55	3.718	4.618201	2.149	0.2898	0.577998924	5	100
Ethene (ug/L)	MWell#11 (bg)	50	3.4	4.223025	2.055	0.2907	0.604411765	5	100
Ethylbenzene (ug/L)	MWell#1 (bg)	122	0.4684	0.26563716	0.5154	0.04666	1.100341588	0.5	100
Ethylbenzene (ug/L)	MWell#11 (bg)	50	0.2269	0.03556996	0.1886	0.02668	0.831203173	0.1	100
Iodomethane (ug/L)	MWell#1 (bg)	115	1.553	2.673225	1.635	0.1525	1.05280103	1	100
Iodomethane (ug/L)	MWell#11 (bg)	50	1.177	3.736489	1.933	0.2734	1.64231096	0.25	100
Iron, Dissolved (mg/L)	MWell#1 (bg)	124	0.1448	0.02099601	0.1449	0.01301	1.000690608	0.1	70.16
Iron, Dissolved (mg/L)	MWell#11 (bg)	50	0.206	0.008049678	0.08972	0.01269	0.435533981	0.25	82
Iron, Total (mg/L)	MWell#1 (bg)	8	0.25	0	0	0	0	0.25	100
Iron, Total (mg/L)	MWell#11 (bg)	8	0.3813	0.13778944	0.3712	0.1313	0.973511671	0.25	87.5
Lead, Dissolved (mg/L)	MWell#1 (bg)	84	0.003381	5.8967E-05	0.007679	0.0008378	2.271221532	0.0005	90.48

¹ All statistics based on Non-Detects = 1/2 MDL ² (bg) indicates a background well.

HORN RAPIDS LANDFILL - FOURTH QUARTER 2022
Summary of Descriptive Statistics

Constituent Name	Well	N	Mean ¹	Variance	Standard Deviation	Standard Error	Coefficient of Variation	Median	% Non-Detects
Lead, Dissolved (mg/L)	MWell#11 (bg)	21	0.0002	0	0	0	0	0.0002	100
Lead, Total (mg/L)	MWell#1 (bg)	38	0.0003087	1.88788E-08	0.0001374	0.00002229	0.445092323	0.0002	92.11
Lead, Total (mg/L)	MWell#11 (bg)	38	0.0003034	2.36852E-08	0.0001539	0.00002496	0.507251154	0.0002	94.74
Magnesium, Dissolved (mg/L)	MWell#1 (bg)	112	20.3	36.905625	6.075	0.574	0.299261084	22	0
Magnesium, Dissolved (mg/L)	MWell#11 (bg)	50	42.12	169.7809	13.03	1.843	0.309354226	49	0
Magnesium, Total (mg/L)	MWell#1 (bg)	8	24	16	4	1.414	0.166666667	24	0
Magnesium, Total (mg/L)	MWell#11 (bg)	8	37.5	47.997184	6.928	2.449	0.184746667	40.5	0
Manganese, Dissolved (mg/L)	MWell#1 (bg)	124	0.01075	0.000326525	0.01807	0.001623	1.680930233	0.01	79.84
Manganese, Dissolved (mg/L)	MWell#11 (bg)	50	0.01706	0.001658118	0.04072	0.005758	2.386869871	0.01	96
Manganese, Total (mg/L)	MWell#1 (bg)	8	0.01	0	0	0	0	0.01	100
Manganese, Total (mg/L)	MWell#11 (bg)	8	0.01262	5.51306E-05	0.007425	0.002625	0.588351823	0.01	87.5
Methane (ug/L)	MWell#1 (bg)	55	1.007	2.735716	1.654	0.2231	1.642502483	0.6	92.73
Methane (ug/L)	MWell#11 (bg)	50	1.976	51.136801	7.151	1.011	3.618927126	0.6	84
Methylene Chloride (ug/L)	MWell#1 (bg)	123	1.328	1.263376	1.124	0.1013	0.846385542	1	97.56
Methylene Chloride (ug/L)	MWell#11 (bg)	50	1.476	0.88435216	0.9404	0.133	0.637127371	1.5	100
Nickel, Dissolved (mg/L)	MWell#1 (bg)	85	0.006874	0.000119246	0.01092	0.001184	1.588594705	0.0018	69.41
Nickel, Dissolved (mg/L)	MWell#11 (bg)	21	0.005238	6.38068E-06	0.002526	0.0005513	0.482245132	0.0052	14.29
Nickel, Total (mg/L)	MWell#1 (bg)	38	0.001621	2.84409E-07	0.0005333	0.00008651	0.328994448	0.0015	94.74
Nickel, Total (mg/L)	MWell#11 (bg)	38	0.004784	4.01449E-05	0.006336	0.001028	1.324414716	0.0015	55.26
Nitrate Nitrogen (mg/L)	MWell#1 (bg)	122	5.89	15.171025	3.895	0.3526	0.661290323	7.2	0
Nitrate Nitrogen (mg/L)	MWell#11 (bg)	49	30.23	114.9184	10.72	1.532	0.354614621	34	4.082
pH (none)	MWell#1 (bg)	113	7.233	0.06543364	0.2558	0.02406	0.035365685	7.17	0
pH (none)	MWell#11 (bg)	50	7.416	0.02709316	0.1646	0.02327	0.022195254	7.39	0
Potassium, Dissolved (mg/L)	MWell#1 (bg)	112	7.379	1.530169	1.237	0.1169	0.167637891	7.745	0
Potassium, Dissolved (mg/L)	MWell#11 (bg)	50	10.98	2.474329	1.573	0.2224	0.143260474	11	0
Potassium, Total (mg/L)	MWell#1 (bg)	8	8.713	1.800964	1.342	0.4745	0.154022725	8.55	0
Potassium, Total (mg/L)	MWell#11 (bg)	8	10.56	1.7424	1.32	0.4667	0.125	11	0
Redox (mv)	MWell#1 (bg)	55	121.4	6220.4769	78.87	10.64	0.649670511	118	0
Redox (mv)	MWell#11 (bg)	50	133.7	8860.4569	94.13	13.31	0.704038893	131.6	0
Selenium, Dissolved (mg/L)	MWell#1 (bg)	85	0.007247	0.000205062	0.01432	0.001554	1.975990065	0.002	31.76
Selenium, Dissolved (mg/L)	MWell#11 (bg)	21	0.005469	1.2996E-05	0.003605	0.0007867	0.659169867	0.0048	4.762
Selenium, Total (mg/L)	MWell#1 (bg)	38	0.003124	1.23877E-06	0.001113	0.0001806	0.356274008	0.004	60.53

¹ All statistics based on Non-Detects = 1/2 MDL ² (bg) indicates a background well.

HORN RAPIDS LANDFILL - FOURTH QUARTER 2022
Summary of Descriptive Statistics

Constituent Name	Well	N	Mean ¹	Variance	Standard Deviation	Standard Error	Coefficient of Variation	Median	% Non- Detects
Selenium, Total (mg/L)	MWell#11 (bg)	38	0.006361	8.52056E-06	0.002919	0.0004735	0.458890112	0.004	57.89
Silver, Dissolved (mg/L)	MWell#1 (bg)	85	0.003239	4.45556E-05	0.006675	0.000724	2.060821241	0.0005	97.65
Silver, Dissolved (mg/L)	MWell#11 (bg)	21	0.0002	0	0	0	0	0.0002	100
Silver, Total (mg/L)	MWell#1 (bg)	38	0.0002	0	0	0	0	0.0002	100
Silver, Total (mg/L)	MWell#11 (bg)	38	0.0002	0	0	0	0	0.0002	100
Sodium, Dissolved (mg/L)	MWell#1 (bg)	112	19.19	17.614809	4.197	0.3966	0.21870766	21	0
Sodium, Dissolved (mg/L)	MWell#11 (bg)	50	18.94	7.0756	2.66	0.3762	0.140443506	20	0
Sodium, Total (mg/L)	MWell#1 (bg)	8	22.38	9.696996	3.114	1.101	0.139142091	23	0
Sodium, Total (mg/L)	MWell#11 (bg)	8	18.5	1.999396	1.414	0.5	0.076432432	19	0
Styrene (ug/L)	MWell#1 (bg)	122	0.5272	0.236196	0.486	0.044	0.92185129	0.5	100
Styrene (ug/L)	MWell#11 (bg)	50	0.3704	0.02111209	0.1453	0.02055	0.392278618	0.5	100
Sulfate (mg/L)	MWell#1 (bg)	124	40.56	216.6784	14.72	1.322	0.362919132	46	0
Sulfate (mg/L)	MWell#11 (bg)	50	229	11046.01	105.1	14.86	0.458951965	285	0
TDS (mg/L)	MWell#1 (bg)	113	447.3	15825.64	125.8	11.84	0.281243014	470	0
TDS (mg/L)	MWell#11 (bg)	50	1056	148379.04	385.2	54.48	0.364772727	1100	0
Temperature (C)	MWell#1 (bg)	124	20.22	5.6169	2.37	0.2129	0.117210682	20.34	0
Temperature (C)	MWell#11 (bg)	50	20.7	4.787344	2.188	0.3095	0.105700483	20.9	0
Tetrachloroethene (ug/L)	MWell#1 (bg)	122	2.988	3.0276	1.74	0.1575	0.582329317	3.35	18.85
Tetrachloroethene (ug/L)	MWell#11 (bg)	50	0.325	0.02319529	0.1523	0.02154	0.468615385	0.25	100
Thallium, Dissolved (mg/L)	MWell#1 (bg)	85	0.003379	5.45087E-05	0.007383	0.0008008	2.184965966	0.0005	98.82
Thallium, Dissolved (mg/L)	MWell#11 (bg)	21	0.000481	1.61926E-09	0.00004024	0.000008781	0.083659044	0.0005	100
Thallium, Total (mg/L)	MWell#1 (bg)	38	0.0005	0	0	0	0	0.0005	100
Thallium, Total (mg/L)	MWell#11 (bg)	38	0.0005	0	0	0	0	0.0005	100
TOC (mg/L)	MWell#1 (bg)	123	1.468	3.290596	1.814	0.1636	1.235694823	1.3	29.27
TOC (mg/L)	MWell#11 (bg)	50	3.262	4.9284	2.22	0.314	0.680564071	2.8	4
Toluene (ug/L)	MWell#1 (bg)	123	0.4731	0.27279729	0.5223	0.04709	1.103994927	0.5	99.19
Toluene (ug/L)	MWell#11 (bg)	50	0.2269	0.03556996	0.1886	0.02668	0.831203173	0.1	100
Total Suspended Solids (mg/L)	MWell#1 (bg)	33	1.092	0.08988004	0.2998	0.05218	0.274542125	1	100
Total Suspended Solids (mg/L)	MWell#11 (bg)	33	2.574	22.714756	4.766	0.8296	1.851592852	1	75.76
trans-1,2-Dichloroethene (ug/L)	MWell#1 (bg)	122	0.4701	0.26594649	0.5157	0.04668	1.097000638	0.5	100
trans-1,2-Dichloroethene (ug/L)	MWell#11 (bg)	50	0.231	0.03825936	0.1956	0.02766	0.846753247	0.1	100
trans-1,3-Dichloropropene (ug/L)	MWell#1 (bg)	121	0.4486	0.23357889	0.4833	0.04394	1.077351761	0.5	100

¹ All statistics based on Non-Detects = 1/2 MDL ² (bg) indicates a background well.

HORN RAPIDS LANDFILL - FOURTH QUARTER 2022
Summary of Descriptive Statistics

Constituent Name	Well	N	Mean ¹	Variance	Standard Deviation	Standard Error	Coefficient of Variation	Median	% Non- Detects
trans-1,3-Dichloropropene (ug/L)	MWell#11 (bg)	50	0.2235	0.03467044	0.1862	0.02633	0.83310962	0.1	100
trans-1,4-Dichloro-2-butene (ug/L)	MWell#1 (bg)	112	1.449	1.117249	1.057	0.09987	0.729468599	1	100
trans-1,4-Dichloro-2-butene (ug/L)	MWell#11 (bg)	50	1.558	0.88661056	0.9416	0.1332	0.60436457	1	100
Trichloroethene (ug/L)	MWell#1 (bg)	123	0.5067	0.24186724	0.4918	0.04435	0.97059404	0.5	78.86
Trichloroethene (ug/L)	MWell#11 (bg)	50	0.23	0.03744225	0.1935	0.02737	0.841304348	0.1	100
Trichlorofluoromethane (ug/L)	MWell#1 (bg)	123	0.6187	0.89189136	0.9444	0.08516	1.526426378	0.5	96.75
Trichlorofluoromethane (ug/L)	MWell#11 (bg)	50	0.326	0.02430481	0.1559	0.02205	0.478220859	0.25	100
Vanadium, Dissolved (mg/L)	MWell#1 (bg)	85	0.01154	4.56976E-05	0.00676	0.0007332	0.585788562	0.0107	16.47
Vanadium, Dissolved (mg/L)	MWell#11 (bg)	21	0.0098	2.41181E-06	0.001553	0.000339	0.158469388	0.0098	0
Vanadium, Total (mg/L)	MWell#1 (bg)	38	0.00945	5.71687E-07	0.0007561	0.0001227	0.080010582	0.00925	0
Vanadium, Total (mg/L)	MWell#11 (bg)	38	0.01003	8.73103E-07	0.0009344	0.0001516	0.093160518	0.01	0
Vinyl Acetate (ug/L)	MWell#1 (bg)	117	2.182	8.025889	2.833	0.2619	1.298350137	1	100
Vinyl Acetate (ug/L)	MWell#11 (bg)	50	1.265	0.79192201	0.8899	0.1258	0.703478261	1	100
Vinyl Chloride (ug/L)	MWell#1 (bg)	122	0.5645	1.089936	1.044	0.09454	1.849424269	0.5	100
Vinyl Chloride (ug/L)	MWell#11 (bg)	50	0.1693	0.05166529	0.2273	0.03214	1.342587123	0.01	100
Xylenes (ug/L)	MWell#1 (bg)	84	0.6948	0.20593444	0.4538	0.04952	0.653137594	0.5	100
Xylenes (ug/L)	MWell#11 (bg)	50	0.5112	0.18844281	0.4341	0.06139	0.849178404	0.25	100
Zinc, Dissolved (mg/L)	MWell#1 (bg)	96	0.007066	7.98878E-05	0.008938	0.0009123	1.264930654	0.00405	53.13
Zinc, Dissolved (mg/L)	MWell#11 (bg)	21	0.006033	4.29811E-05	0.006556	0.001431	1.086689872	0.0035	28.57
Zinc, Total (mg/L)	MWell#1 (bg)	42	0.006662	7.3017E-05	0.008545	0.001319	1.282647853	0.0035	73.81
Zinc, Total (mg/L)	MWell#11 (bg)	38	0.003824	1.8769E-06	0.00137	0.0002222	0.358263598	0.0035	84.21

¹ All statistics based on Non-Detects = 1/2 MDL ² (bg) indicates a background well.

This Page Intentionally Left Blank

Appendix F

Geochemical Evaluation



**Summary of Cation/Anion Charge Balance Differences,
 2022 Groundwater Data, Horn Rapids Landfill**

Monitoring Well	First Quarter RPD ¹	Second Quarter RPD ¹	Third Quarter RPD ¹	Fourth Quarter RPD ¹
Well #1	4.32	3.73	-2.10	4.78
Well #2	5.34	-0.31	2.42	7.28
Well #3	2.12	0.88	-1.88	2.01
Well #4	5.78	1.08	-1.19	5.79
Well #5	2.72	-3.26	-4.23	1.73
Well #6	3.50	1.91	-2.39	0.74
Well #8	6.23	2.68	-1.01	2.00
Well #9	1.77	2.70	-2.31	2.21
Well #10	5.03	-0.80	-1.50	4.29
Well #11	2.67	5.55	-0.38	5.12
Well #12	7.38	4.07	-2.29	3.65
Leachate Pond	NA	2.11	NA	NA

Note:

¹ Reported in relative percent difference (RPD). For each sample the analytical results were converted into milliequivalents per liter (meq/L) and the cation meq/L summed (C) and the anion meq/L summed (A).

$$RPD = \frac{2(C-A)}{C+A} \times 100$$

Difference is greater than 10% [see WAC 173-351-430(5)(a)].

NA= Not available

This Page Intentionally Left Blank

Cation/Anion Balance Calculations (Dissolved Metals), Horn Rapids Landfill, First Quarter 2022

Conversion Factor ¹ (mg/L to meq/L)	Well #1			Well #2			Well #3			Well #4			Well #5			Well #6		
	Percent			Percent			Percent			Percent			Percent			Percent		
	Value (mg/L)	Value (meq/L)	of Total (meq/L)	Value (mg/L)	Value (meq/L)	of Total (meq/L)	Value (mg/L)	Value (meq/L)	of Total (meq/L)	Value (mg/L)	Value (meq/L)	of Total (meq/L)	Value (mg/L)	Value (meq/L)	of Total (meq/L)	Value (mg/L)	Value (meq/L)	of Total (meq/L)
CATIONS																		
Na 0.0435	21	0.91	10.96	13	0.57	12.13	13	0.57	16.24	16	0.70	10.53	27	1.17	8.36	22	0.96	7.73
Ca 0.0499	110	5.49	65.84	59	2.94	63.17	42	2.10	60.17	85	4.24	64.17	180	8.98	63.95	160	7.98	64.48
Mg 0.08229	21	1.73	20.73	12	0.99	21.19	8	0.66	18.90	18	1.48	22.41	43	3.54	25.19	38	3.13	25.26
Fe(+2) 0.03581	0.05	0.00	0.02	0.05	0.00	0.04	0.05	0.00	0.05	0.05	0.00	0.03	0.1	0.00	0.03	0.12	0.00	0.03
K 0.02558	8	0.20	2.45	6.3	0.16	3.46	6.3	0.16	4.63	7.4	0.19	2.86	13	0.33	2.37	12	0.31	2.48
Mn 0.0364	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.39	0.01	0.10	0.064	0.00	0.02
	TOTAL	8.34	100.00	TOTAL	4.66	100.00	TOTAL	3.48	100.00	TOTAL	6.61	100.00	TOTAL	14.05	100.00	TOTAL	12.38	100.00
ANIONS																		
HCO ₃ ² 0.02	270	5.40	70.61	110	2.20	52.53	88	1.76	52.72	230	4.60	78.13	500	10.00	75.18	480	9.60	83.16
SO ₄ 0.02082	60	1.25	16.34	56	1.17	27.84	45	0.94	28.06	36	0.75	12.73	87	1.81	13.62	59	1.23	10.64
Cl 0.02821	30	0.85	11.07	24	0.68	16.17	20	0.56	16.90	16	0.45	7.67	52	1.47	11.03	24	0.68	5.86
CO ₃ ² 0.02	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
NO ₃ 0.01613	9.4	0.15	1.98	9	0.15	3.47	4.8	0.08	2.32	5.4	0.09	1.48	1.4	0.02	0.17	2.4	0.04	0.34
	TOTAL	7.65	100.00	TOTAL	4.19	100.00	TOTAL	3.34	100.00	TOTAL	5.89	100.00	TOTAL	13.30	100.00	TOTAL	11.54	100.00
(meq/L cations-anions)/(meq/L cations+anions)*100			4.32			5.34			2.12			5.78			2.72			3.50

Cation/Anion Balance Calculations (Dissolved Metals), Horn Rapids Landfill, First Quarter 2022

Conversion Factor ¹ (mg/L to meq/L)	Well #8			Well #9			Well #10			Well #11			MW-12		
	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)
CATIONS															
Na 0.0435	28	1.22	13.03	24	1.04	9.64	23	1.00	6.51	20	0.87	4.61	20	0.87	18.25
Ca 0.0499	120	5.99	64.05	140	6.99	64.50	210	10.48	68.23	270	13.47	71.37	56	2.79	58.63
Mg 0.08229	23	1.89	20.24	31	2.55	23.55	43	3.54	23.04	51	4.20	22.23	11	0.91	18.99
Fe(+2) 0.03581	0.05	0.00	0.02	0.05	0.00	0.02	0.19	0.01	0.04	0.15	0.01	0.03	0.05	0.00	0.04
K 0.02558	9.7	0.25	2.65	9.7	0.25	2.29	13	0.33	2.17	13	0.33	1.76	7.6	0.19	4.08
Mn 0.0364	0.01	0.00	0.00	0.01	0.00	0.00	0.043	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01
	TOTAL	9.35	100.00	TOTAL	10.83	100.00	TOTAL	15.36	100.00	TOTAL	18.88	100.00	TOTAL	4.77	100.00
ANIONS															
HCO ₃ ² 0.02	110	2.20	26.66	340	6.80	65.05	550	11.00	79.20	150	3.00	16.76	140	2.80	68.11
SO ₄ 0.02082	84	1.75	21.19	82	1.71	16.33	91	1.89	13.64	360	7.50	41.89	39	0.81	19.75
Cl 0.02821	140	3.95	47.85	65	1.83	17.54	33	0.93	6.70	240	6.77	37.83	15	0.42	10.29
CO ₃ ² 0.02	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
NO ₃ 0.01613	22	0.35	4.30	7	0.11	1.08	3.9	0.06	0.45	39	0.63	3.52	4.7	0.08	1.84
	TOTAL	8.25	100.00	TOTAL	10.45	100.00	TOTAL	13.89	100.00	TOTAL	17.89	100.00	TOTAL	4.11	100.00
(meq/L cations-anions)/(meq/L cations+anions)*100			6.23			1.77			5.03			2.67			7.38

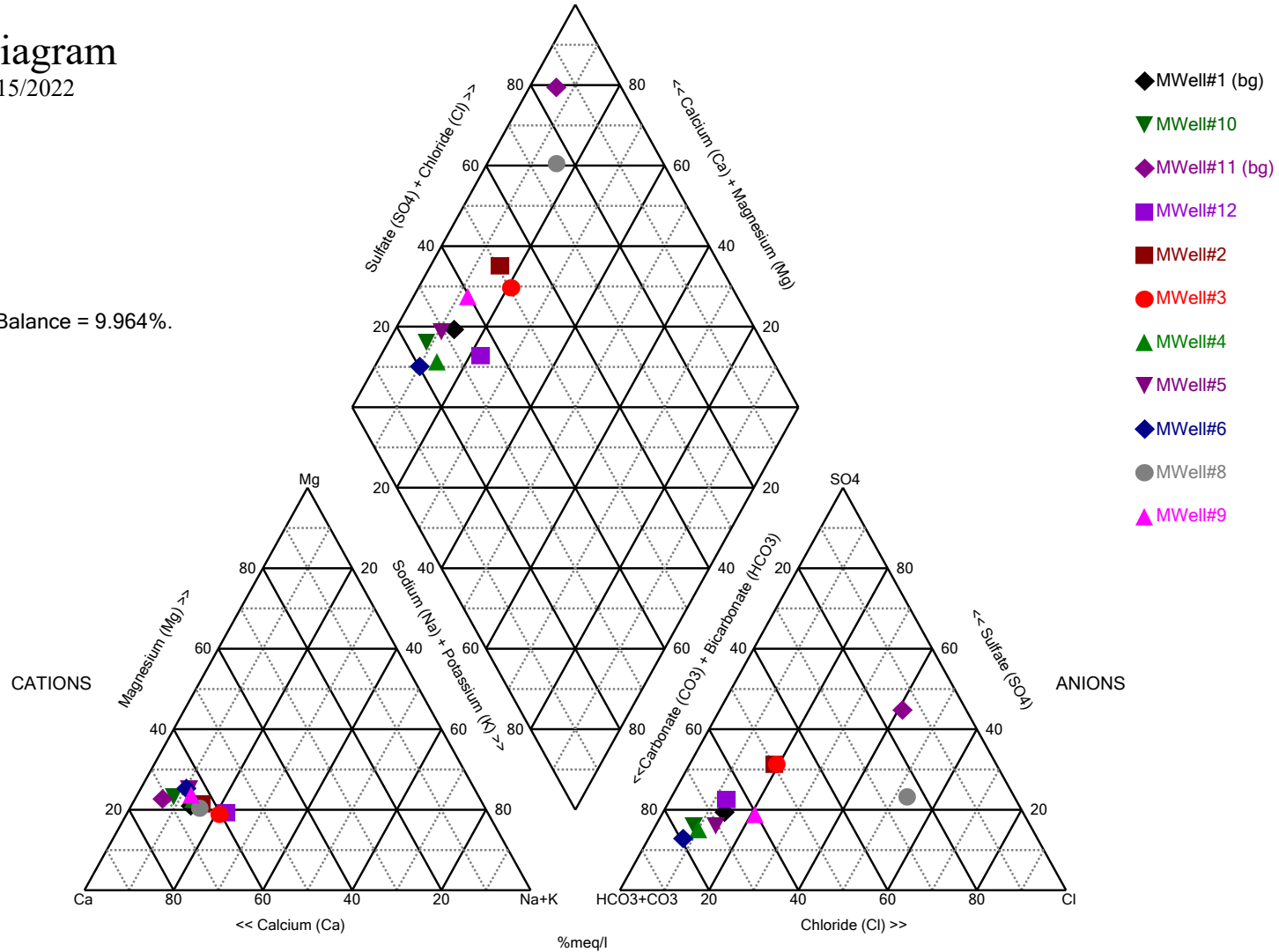
¹Reference: Hem 1985.

²HCO₃ and CO₃ reported as CaCO₃, conversion factor adjusted accordingly.

Piper Diagram

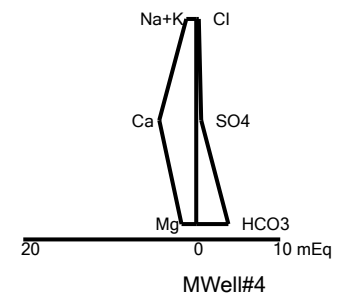
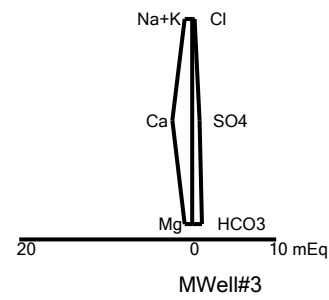
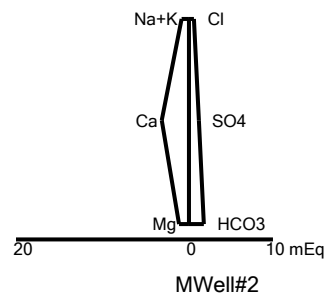
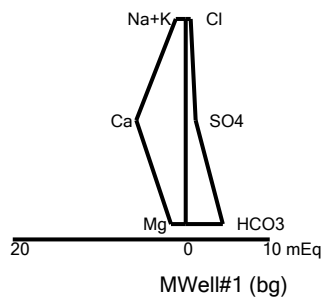
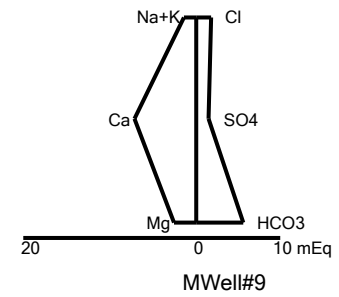
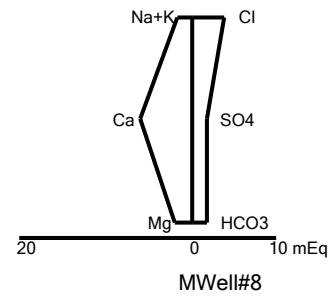
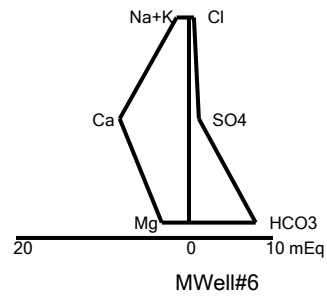
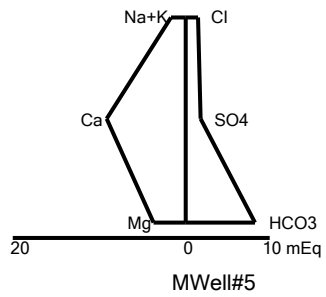
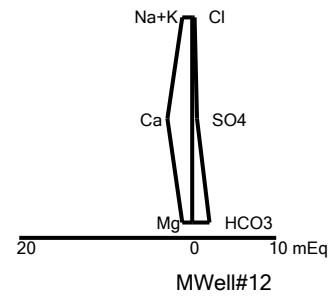
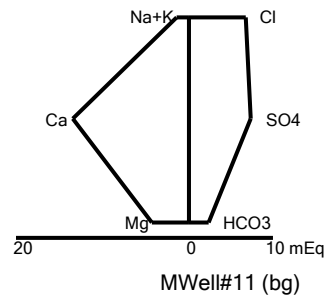
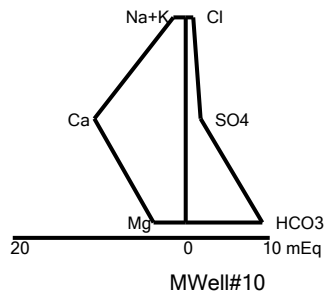
3/16/2022, 3/15/2022

Cation-Anion Balance = 9.964%.



Analysis Run 5/3/2022 2:03 PM

Horn Rapids Landfill Client: City of Richland Data: 1Q_22_PIPER



Stiff Diagram - 3/16/2022, 3/15/2022 Analysis Run 5/3/2022 2:06 PM
Horn Rapids Landfill Client: City of Richland Data: 1Q_22_PIPER

Cation/Anion Balance Calculations, Horn Rapids Landfill, Second Quarter 2022

Conversion Factor ¹ (mg/L to meq/L)	MW-1			MW-2			MW-3			MW-4			MW-5			MW-6													
	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)											
CATIONS																													
Na	0.0435	24	1.04	12.07	12	0.52	11.98	13	0.57	16.77	15	0.65	10.24	23	1.00	8.40	22	0.96	8.05										
Ca	0.0499	110	5.49	63.46	54	2.69	61.85	40	2.00	59.20	81	4.04	63.46	150	7.49	62.83	150	7.49	62.97										
Mg	0.08229	23	1.89	21.88	12	0.99	22.67	7.9	0.65	19.28	18	1.48	23.26	38	3.13	26.25	38	3.13	26.31										
Fe(+2)	0.03581	0.25	0.01	0.10	0.25	0.01	0.21	0.25	0.01	0.27	0.25	0.01	0.14	0.25	0.01	0.08	0.25	0.01	0.08										
K	0.02558	8.4	0.21	2.48	5.6	0.14	3.29	5.9	0.15	4.48	7.2	0.18	2.89	11	0.28	2.36	12	0.31	2.58										
Mn	0.0364	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.29	0.01	0.09	0.055	0.00	0.02										
		TOTAL	8.65	100.00	TOTAL	4.36	100.00	TOTAL	3.37	100.00	TOTAL	6.37	100.00	TOTAL	11.91	100.00	TOTAL	11.89	100.00										
ANIONS																													
HCO ₃ ²	0.02	300	6.00	74.73	120	2.40	54.75	95	1.90	57.35	250	5.00	80.22	490	9.80	77.07	490	9.80	85.65										
SO ₄	0.02082	56	1.17	14.52	55	1.15	26.12	40	0.83	25.14	34	0.71	11.36	75	1.56	12.28	50	1.04	9.10										
Cl	0.02821	26	0.73	9.14	24	0.68	15.45	18	0.51	15.33	15	0.42	6.79	47	1.33	10.43	20	0.56	4.93										
CO ₃ ²	0.02	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00										
NO ₃	0.01613	8	0.13	1.61	10	0.16	3.68	4.5	0.07	2.19	6.3	0.10	1.63	1.8	0.03	0.23	2.3	0.04	0.32										
		TOTAL	8.03	100.00	TOTAL	4.38	100.00	TOTAL	3.31	100.00	TOTAL	6.23	100.00	TOTAL	12.72	100.00	TOTAL	11.44	100.00										
(meq/L cations- anions)/(meq/L cations+anions)*100																													
				3.73					-0.31					0.88					1.08					-3.26					1.91

Cation/Anion Balance Calculations, Horn Rapids Landfill, Second Quarter 2022

Conversion Factor ¹ (mg/L to meq/L)	MW-8			MW-9			MW-10			MW-11			MW-12		
	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)
CATIONS															
Na 0.0435	27	1.17	14.63	26	1.13	10.20	21	0.91	6.76	20	0.87	5.04	21	0.91	22.05
Ca 0.0499	98	4.89	60.92	140	6.99	62.98	180	8.98	66.51	240	11.98	69.32	45	2.25	54.21
Mg 0.08229	21	1.73	21.53	33	2.72	24.48	40	3.29	24.37	50	4.11	23.82	9.5	0.78	18.87
Fe(+2) 0.03581	0.25	0.01	0.11	0.25	0.01	0.08	0.25	0.01	0.07	0.25	0.01	0.05	0.25	0.01	0.22
K 0.02558	8.8	0.23	2.80	9.8	0.25	2.26	12	0.31	2.27	12	0.31	1.78	7.5	0.19	4.63
Mn 0.0364	0.01	0.00	0.00	0.01	0.00	0.00	0.038	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01
	TOTAL	8.03	100.00	TOTAL	11.09	100.00	TOTAL	13.50	100.00	TOTAL	17.28	100.00	TOTAL	4.14	100.00
ANIONS															
HCO ₃ ² 0.02	130	2.60	34.17	360	7.20	68.51	550	11.00	80.17	160	3.20	20.70	130	2.60	68.10
SO ₄ 0.02082	76	1.58	20.80	77	1.60	15.26	85	1.77	12.90	290	6.04	39.05	37	0.77	20.18
Cl 0.02821	110	3.10	40.79	56	1.58	15.03	31	0.87	6.37	200	5.64	36.49	13	0.37	9.61
CO ₃ ² 0.02	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
NO ₃ 0.01613	20	0.32	4.24	7.8	0.13	1.20	4.8	0.08	0.56	36	0.58	3.76	5	0.08	2.11
	TOTAL	7.61	100.00	TOTAL	10.51	100.00	TOTAL	13.72	100.00	TOTAL	15.46	100.00	TOTAL	3.82	100.00
(meq/L cations- anions)/(meq/L cations+anions)*100			2.68			2.70			-0.80			5.55			4.07

Cation/Anion Balance Calculations, Horn Rapids Landfill, Second Quarter 2022

Conversion		Leachate Pond		
	Factor ¹ (mg/L to meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)
CATIONS				
Na	0.0435	200	8.70	50.02
Ca	0.0499	11	0.55	3.16
Mg	0.08229	73	6.01	34.54
Fe(+2)	0.03581	0.25	0.01	0.05
K	0.02558	83	2.12	12.21
Mn	0.0364	0.15	0.01	0.03
		TOTAL	17.39	100.00
ANIONS				
HCO ₃ ²	0.02	280	5.60	33.58
SO ₄	0.02082	17	0.35	2.12
Cl	0.02821	380	10.72	64.29
CO ₃ ²	0.02	0	0.00	0.00
NO ₃	0.01613	0.025	0.00	0.00
		TOTAL	16.67	100.00
(meq/L cations- anions)/(meq/L cations+anions)*100		2.11		

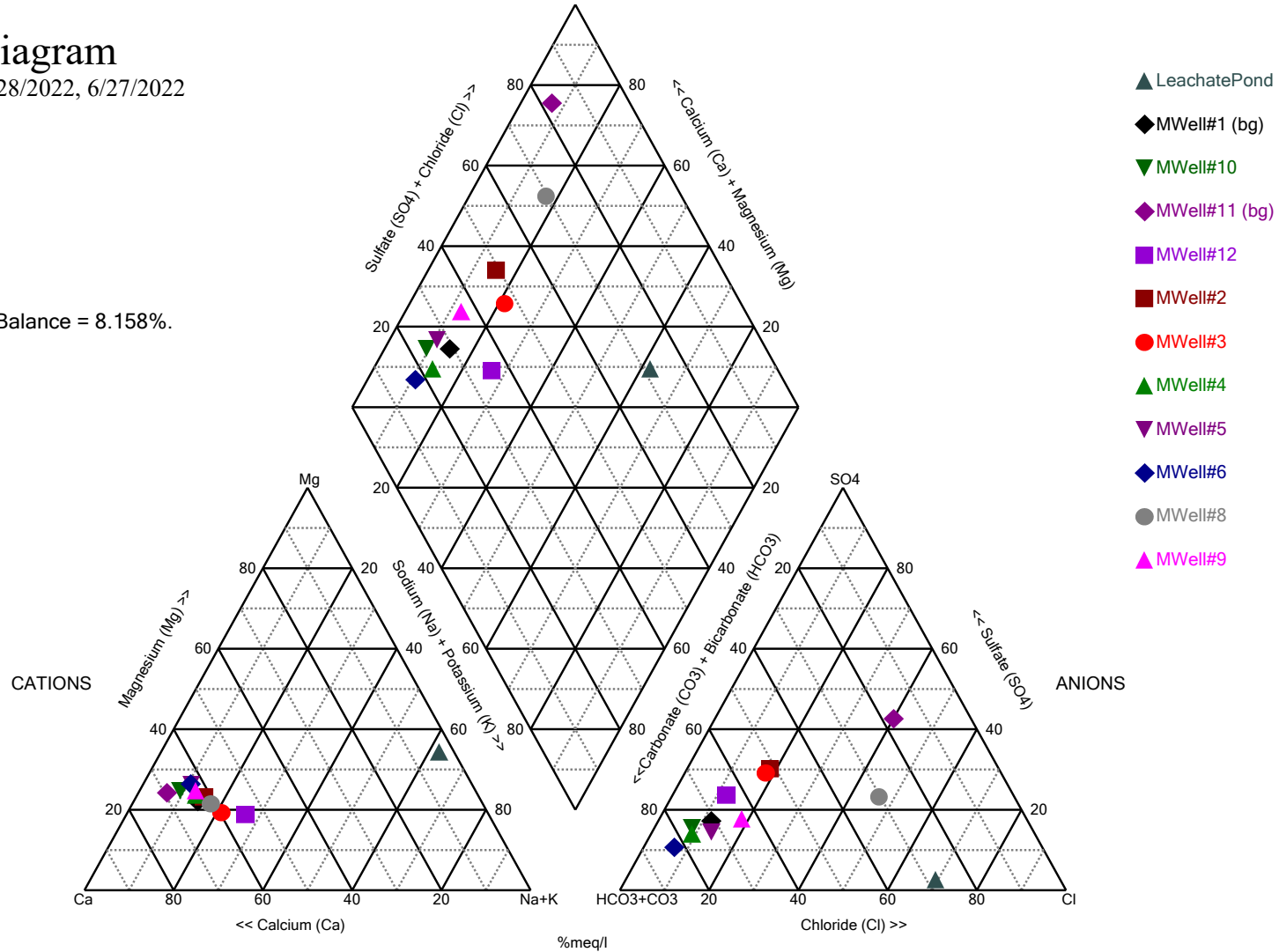
¹Reference: Hem 1985.

²HCO₃ and CO₃ reported as CaCO₃, conversion factor adjusted accordingly.

Piper Diagram

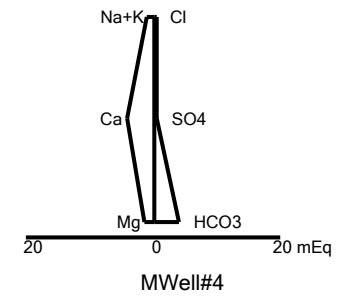
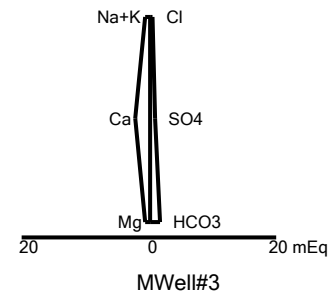
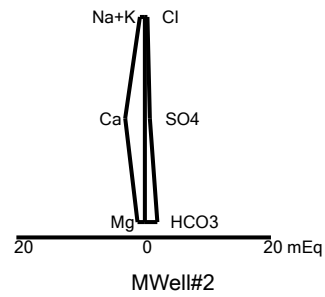
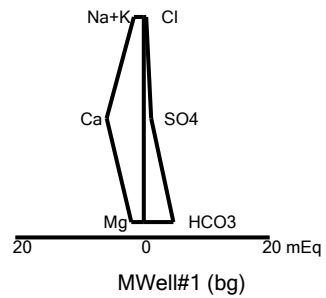
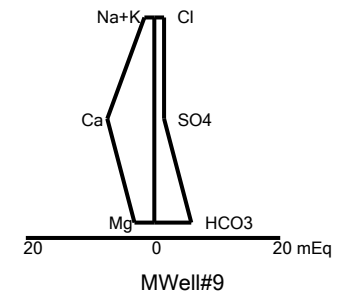
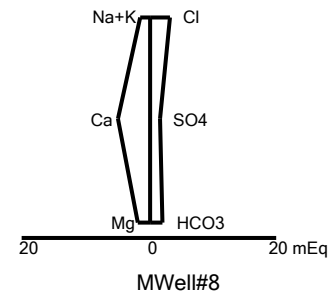
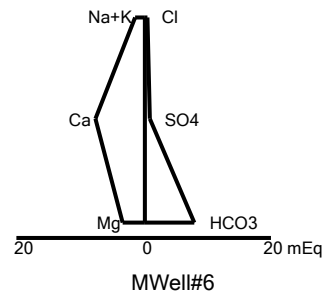
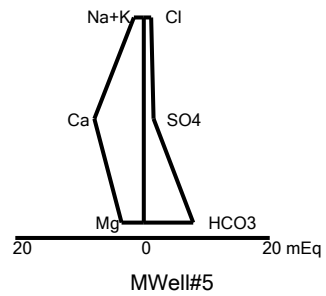
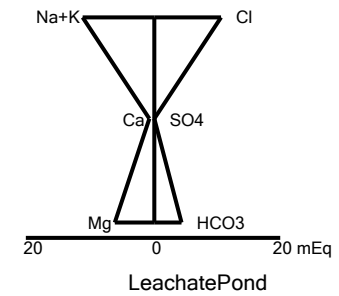
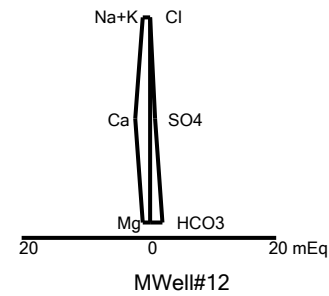
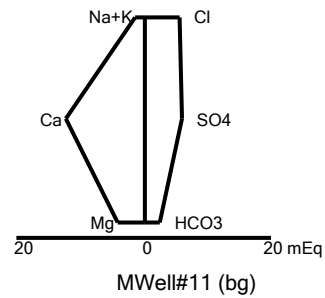
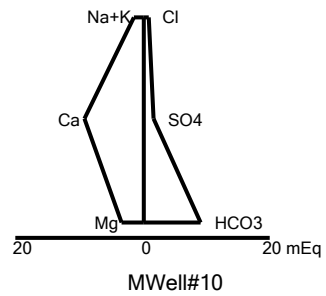
6/29/2022, 6/28/2022, 6/27/2022

Cation-Anion Balance = 8.158%.



Analysis Run 8/22/2022 5:35 PM

Horn Rapids Landfill Client: City of Richland Data: 2Q_22_PIPER



Stiff Diagram - 6/29/2022, 6/28/2022, 6/27/2022 Analysis Run 8/22/2022 5:36 PM

Horn Rapids Landfill Client: City of Richland Data: 2Q_22_PIPER

This Page Intentionally Left Blank

Cation/Anion Balance Calculations (Dissolved Metals), Horn Rapids Landfill, Third Quarter 2022

Conversion Factor ¹ (mg/L to meq/L)	MW-1			MW-2			MW-3			MW-4			MW-5			MW-6		
	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)
CATIONS																		
Na 0.0435	22	0.96	12.56	13	0.57	12.57	12	0.52	16.84	15	0.65	11.08	23	1.00	8.96	22	0.96	8.58
Ca 0.0499	98	4.89	64.19	56	2.79	62.13	37	1.85	59.55	75	3.74	63.54	140	6.99	62.56	140	6.99	62.66
Mg 0.08229	19	1.56	20.52	12	0.99	21.95	7.1	0.58	18.84	16	1.32	22.35	35	2.88	25.79	35	2.88	25.84
Fe(+2) 0.03581	0.14	0.01	0.07	0.05	0.00	0.04	0.05	0.00	0.06	0.11	0.00	0.07	0.2	0.01	0.06	0.44	0.02	0.14
K 0.02558	7.9	0.20	2.65	5.8	0.15	3.30	5.7	0.15	4.70	6.8	0.17	2.95	11	0.28	2.52	12	0.31	2.75
Mn 0.0364	0.010	0.00	0.00	0.010	0.00	0.01	0.010	0.00	0.01	0.010	0.00	0.01	0.32	0.012	0.10	0.065	0.00	0.02
	TOTAL	7.62	100.00	TOTAL	4.50	100.00	TOTAL	3.10	100.00	TOTAL	5.89	100.00	TOTAL	11.17	100.00	TOTAL	11.15	100.00
ANIONS																		
HCO ₃ ² 0.02	300	6.00	75.53	110	2.20	51.34	95	1.90	59.02	240	4.80	79.59	470	9.40	77.34	500	10.00	85.51
SO ₄ 0.02082	53	1.10	13.89	57	1.19	27.69	37	0.77	23.93	33	0.69	11.39	70	1.46	11.99	52	1.08	9.26
Cl 0.02821	25	0.71	8.88	25	0.71	16.46	17	0.48	14.90	15	0.42	7.02	45	1.27	10.44	21	0.59	5.07
CO ₃ ² 0.02	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
NO ₃ 0.01613	8.4	0.14	1.71	12	0.19	4.52	4.3	0.07	2.15	7.5	0.12	2.01	1.7	0.03	0.23	1.2	0.02	0.17
	TOTAL	7.94	100.00	TOTAL	4.29	100.00	TOTAL	3.22	100.00	TOTAL	6.03	100.00	TOTAL	12.15	100.00	TOTAL	11.69	100.00
(meq/L cations-anions)/(meq/L cations+anions)*100			-2.10			2.42			-1.88			-1.19			-4.23			-2.39

Cation/Anion Balance Calculations (Dissolved Metals), Horn Rapids Landfill, Third Quarter 2022

Conversion Factor ¹ (mg/L to meq/L)	MW-8			MW-9			MW-10			MW-11			MW-12						
	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)				
CATIONS																			
Na	0.0435	22	0.96	16.35	25	1.09	10.75	22	0.96	7.52	19	0.83	5.46	20	0.87	22.07			
Ca	0.0499	71	3.54	60.53	130	6.49	64.10	170	8.48	66.70	210	10.48	69.23	43	2.15	54.43			
Mg	0.08229	14	1.15	19.68	28	2.30	22.77	36	2.96	23.29	43	3.54	23.38	8.9	0.73	18.58			
Fe(+2)	0.03581	0.11	0.00	0.07	0.23	0.01	0.08	0.23	0.01	0.06	0.28	0.01	0.07	0.05	0.00	0.05			
K	0.02558	7.7	0.20	3.37	9.1	0.23	2.30	12	0.31	2.41	11	0.28	1.86	7.5	0.19	4.87			
Mn	0.0364	0.010	0.00	0.01	0.010	0.00	0.00	0.034	0.00	0.01	0.010	0.00	0.00	0.020	0.00	0.02			
TOTAL		5.85	100.00	TOTAL	10.12	100.00	TOTAL	12.72	100.00	TOTAL	15.14	100.00	TOTAL	3.94	100.00				
ANIONS																			
HCO ₃ ²	0.02	130	2.60	43.53	360	7.20	67.93	530	10.60	80.87	170	3.40	22.29	150	3.00	72.69			
SO ₄	0.02082	59	1.23	20.57	78	1.62	15.32	77	1.60	12.23	280	5.83	38.22	34	0.71	17.15			
Cl	0.02821	68	1.92	32.12	58	1.64	15.44	29	0.82	6.24	190	5.36	35.14	12	0.34	8.20			
CO ₃ ²	0.02	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00			
NO ₃	0.01613	14	0.23	3.78	8.6	0.14	1.31	5.3	0.09	0.65	41	0.66	4.34	5	0.08	1.95			
TOTAL		5.97	100.00	TOTAL	10.60	100.00	TOTAL	13.11	100.00	TOTAL	15.25	100.00	TOTAL	4.13	100.00				
(meq/L cations-anions)/(meq/L cations+anions)*100																			
				-1.01				-2.31				-1.50				-0.38			-2.29

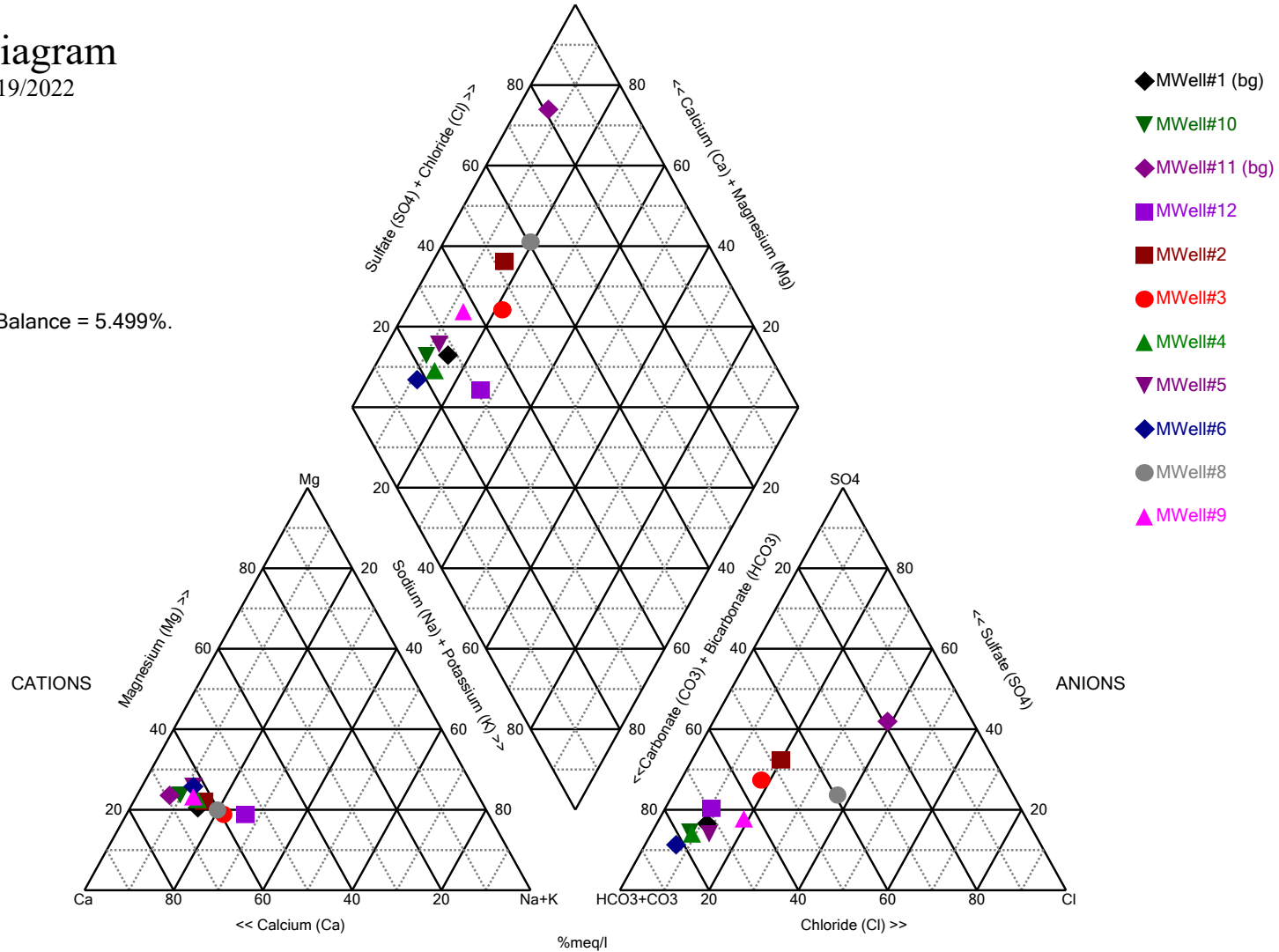
¹Reference: Hem 1985.

²HCO₃ and CO₃ reported as CaCO₃, conversion factor adjusted accordingly.

Piper Diagram

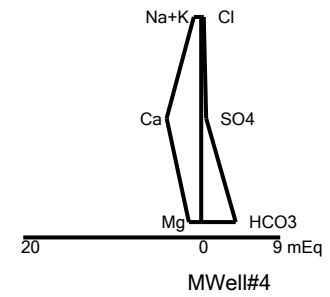
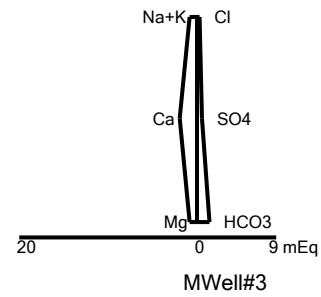
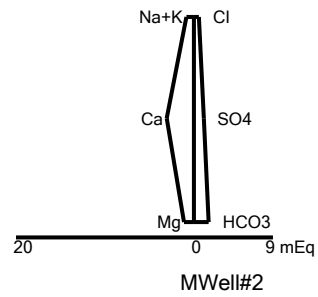
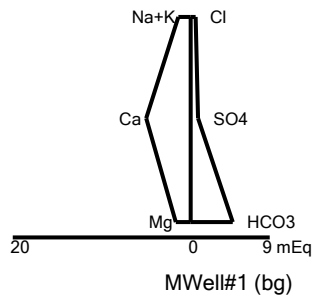
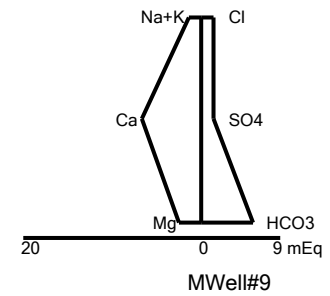
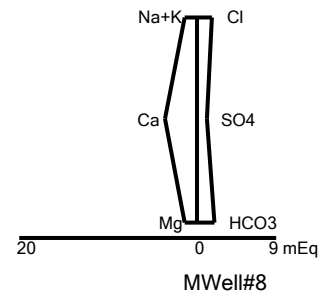
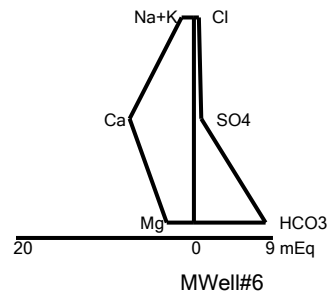
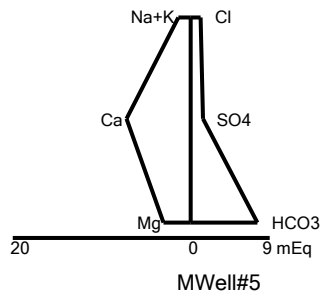
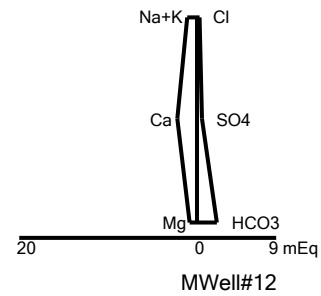
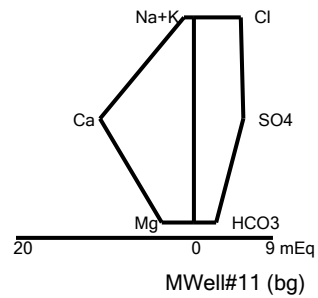
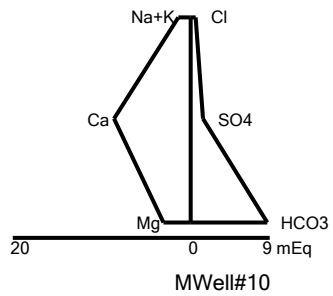
9/20/2022, 9/19/2022

Cation-Anion Balance = 5.499%.



Analysis Run 10/24/2022 9:26 PM

Horn Rapids Landfill Client: City of Richland Data: 3Q_22_PIPER



Stiff Diagram - 9/20/2022, 9/19/2022 Analysis Run 10/24/2022 9:33 PM

Horn Rapids Landfill Client: City of Richland Data: 3Q_22_PIPER

Cation/Anion Balance Calculations (Dissolved Metals), Horn Rapids Landfill, Fourth Quarter 2022

Conversion Factor ¹ (mg/L to meq/L)	MW-1			MW-2			MW-3			MW-4			MW-5			MW-6		
	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)
CATIONS																		
Na 0.0435	22	0.96	11.42	13	0.57	11.07	11	0.48	14.73	14	0.61	9.03	22	0.96	7.68	21	0.91	7.72
Ca 0.0499	110	5.49	65.52	65	3.24	63.49	40	2.00	61.45	88	4.39	65.10	160	7.98	64.11	150	7.49	63.29
Mg 0.08229	21	1.73	20.63	14	1.15	22.55	7.7	0.63	19.51	19	1.56	23.18	39	3.21	25.77	38	3.13	26.44
Fe(+2) 0.03581	0.19	0.01	0.08	0.05	0.00	0.04	0.05	0.00	0.06	0.12	0.00	0.06	0.22	0.01	0.06	0.51	0.02	0.15
K 0.02558	7.7	0.20	2.35	5.7	0.15	2.85	5.4	0.14	4.25	6.9	0.18	2.62	11	0.28	2.26	11	0.28	2.38
Mn 0.0364	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.39	0.01	0.11	0.051	0.00	0.02
	TOTAL	8.38	100.00	TOTAL	5.11	100.00	TOTAL	3.25	100.00	TOTAL	6.74	100.00	TOTAL	12.45	100.00	TOTAL	11.83	100.00
ANIONS																		
HCO ₃ ² 0.02	290	5.80	76.18	120	2.40	54.35	95	1.90	60.89	240	4.80	79.90	460	9.20	76.48	500	10.00	85.82
SO ₄ 0.02082	49	1.02	13.40	55	1.15	25.93	34	0.71	22.68	32	0.67	11.09	71	1.48	12.29	49	1.02	8.75
Cl 0.02821	24	0.68	8.89	24	0.68	15.33	16	0.45	14.46	15	0.42	7.04	47	1.33	11.02	22	0.62	5.33
CO ₃ ² 0.02	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
NO ₃ 0.01613	7.2	0.12	1.53	12	0.19	4.38	3.8	0.06	1.96	7.3	0.12	1.96	1.6	0.03	0.21	0.73	0.01	0.10
	TOTAL	7.61	100.00	TOTAL	4.42	100.00	TOTAL	3.12	100.00	TOTAL	6.01	100.00	TOTAL	12.03	100.00	TOTAL	11.65	100.00
(meq/L cations- anions)/(meq/L cations+anions)*100			4.78			7.28			2.01			5.79			1.73			0.74

Cation/Anion Balance Calculations (Dissolved Metals), Horn Rapids Landfill, Fourth Quarter 2022

Conversion Factor ¹ (mg/L to meq/L)	MW-8			MW-9			MW-10			MW-11			MW-12		
	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)	Value (mg/L)	Value (meq/L)	Percent of Total (meq/L)
CATIONS															
Na 0.0435	16	0.70	15.41	22	0.96	8.92	20	0.87	6.24	19	0.83	4.67	18	0.78	15.20
Ca 0.0499	55	2.74	60.77	140	6.99	65.08	190	9.48	68.04	250	12.48	70.44	64	3.19	61.98
Mg 0.08229	11	0.91	20.04	31	2.55	23.76	40	3.29	23.62	50	4.11	23.23	12	0.99	19.16
Fe(+2) 0.03581	0.1	0.00	0.08	0.2	0.01	0.07	0.23	0.01	0.06	0.33	0.01	0.07	0.05	0.00	0.03
K 0.02558	6.5	0.17	3.68	9.1	0.23	2.17	11	0.28	2.02	11	0.28	1.59	7.3	0.19	3.62
Mn 0.0364	0.01	0.00	0.01	0.01	0.00	0.00	0.039	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01
	TOTAL	4.52	100.00	TOTAL	10.73	100.00	TOTAL	13.93	100.00	TOTAL	17.71	100.00	TOTAL	5.15	100.00
ANIONS															
HCO ₃ ² 0.02	130	2.60	59.92	360	7.20	70.11	520	10.40	81.33	160	3.20	20.02	180	3.60	75.16
SO ₄ 0.02082	39	0.81	18.71	71	1.48	14.39	73	1.52	11.89	300	6.25	39.08	34	0.71	14.78
Cl 0.02821	28	0.79	18.20	52	1.47	14.28	28	0.79	6.18	210	5.92	37.06	14	0.39	8.25
CO ₃ ² 0.02	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
NO ₃ 0.01613	8.5	0.14	3.16	7.7	0.12	1.21	4.8	0.08	0.61	38	0.61	3.83	5.4	0.09	1.82
	TOTAL	4.34	100.00	TOTAL	10.27	100.00	TOTAL	12.79	100.00	TOTAL	15.98	100.00	TOTAL	4.79	100.00
(meq/L cations-anions)/(meq/L cations+anions)*100			2.00			2.21			4.29			5.12			3.65

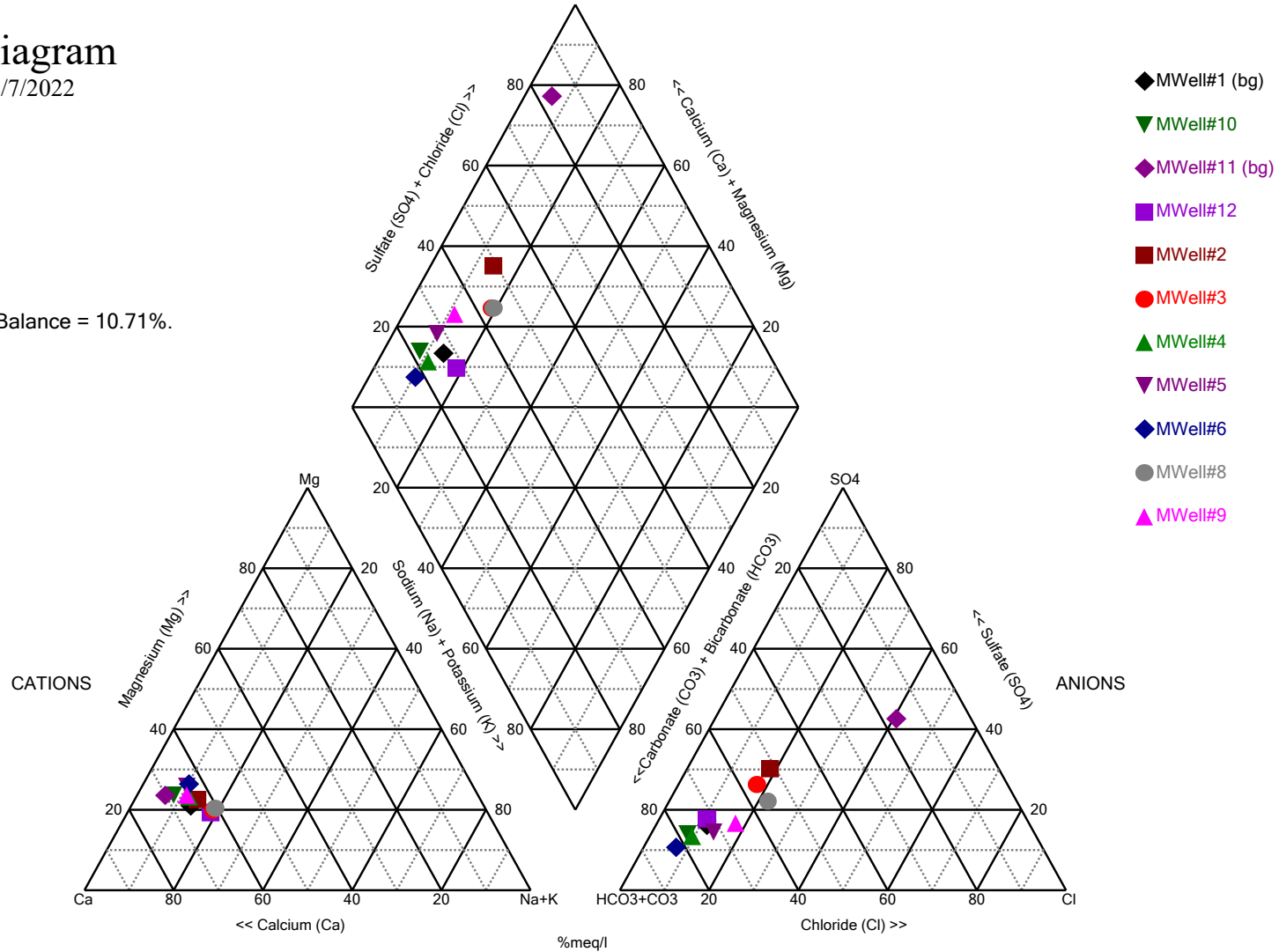
¹Reference: Hem 1985.

²HCO₃ and CO₃ reported as CaCO₃, conversion factor adjusted accordingly.

Piper Diagram

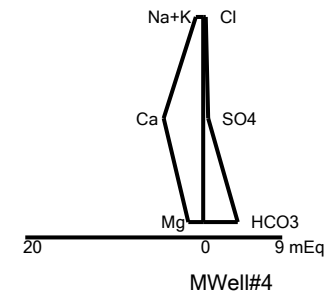
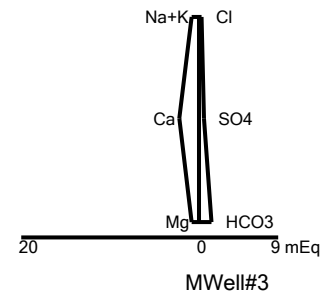
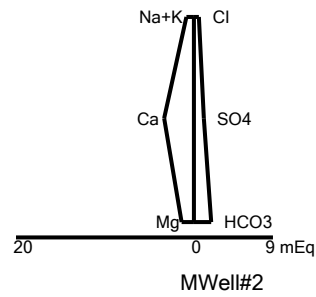
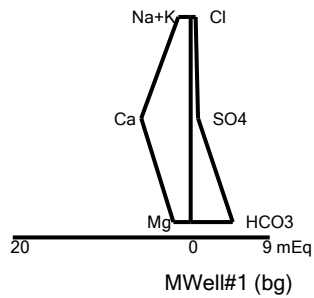
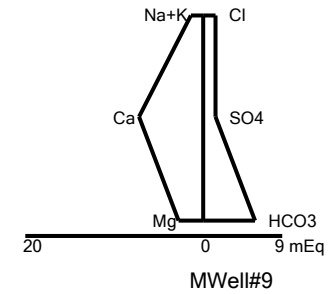
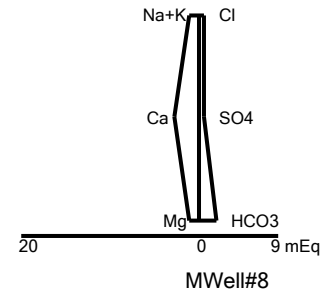
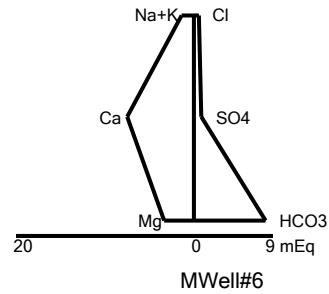
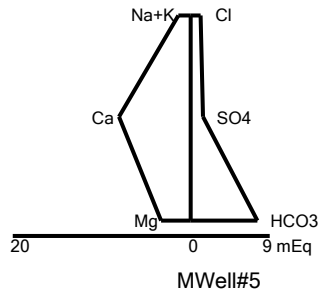
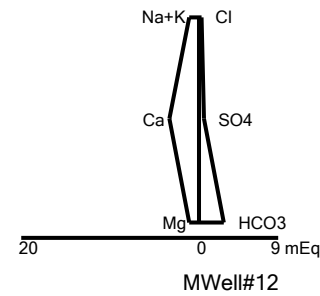
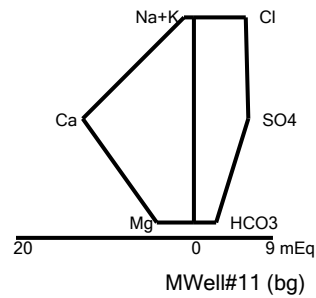
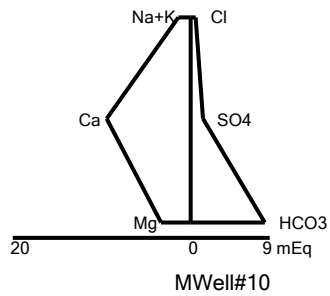
12/8/2022, 12/7/2022

Cation-Anion Balance = 10.71%.



Analysis Run 2/9/2023 11:57 PM

Horn Rapids Landfill Client: City of Richland Data: 4Q_22_PIPER



Stiff Diagram - 12/8/2022, 12/7/2022 Analysis Run 2/9/2023 11:58 PM

Horn Rapids Landfill Client: City of Richland Data: 4Q_22_PIPER

Appendix G

Groundwater Data and Potentiometric Surface Map



Table G-1. Groundwater Elevation Data, First Quarter 2022, Horn Rapids Landfill

Well	Northing ¹	Easting	Reference Elevation (NAVD88) ²	Depth to water (ft)	Groundwater Elevation (NAVD88)
MW-1	371,572.00	2,291,691.97	489.68	102.54	387.14
MW-2	372,460.09	2,294,368.28	469.73	84.12	385.61
MW-3	371,529.10	2,294,408.23	481.28	95.66	385.62
MW-4	370,722.92	2,294,379.43	462.52	76.90	385.62
MW-5	371,784.64	2,293,120.19	469.94	83.73	386.21
MW-6	370,965.00	2,293,109.43	484.54	98.41	386.13
MW-8	370,228.88	2,293,869.87	476.47	90.67	385.80
MW-9	370,175.53	2,293,150.76	490.75	104.58	386.17
MW-10 ³	372,265.23	2,293,111.61	464.08	77.04	387.04
MW-11	373,725.48	2,291,860.98	481.16	94.36	386.80
MW-12	368,946.27	1,934,322.73	477.63	91.93	385.70

Groundwater levels measured on March 15 and 16, 2022

Notes:

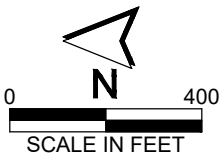
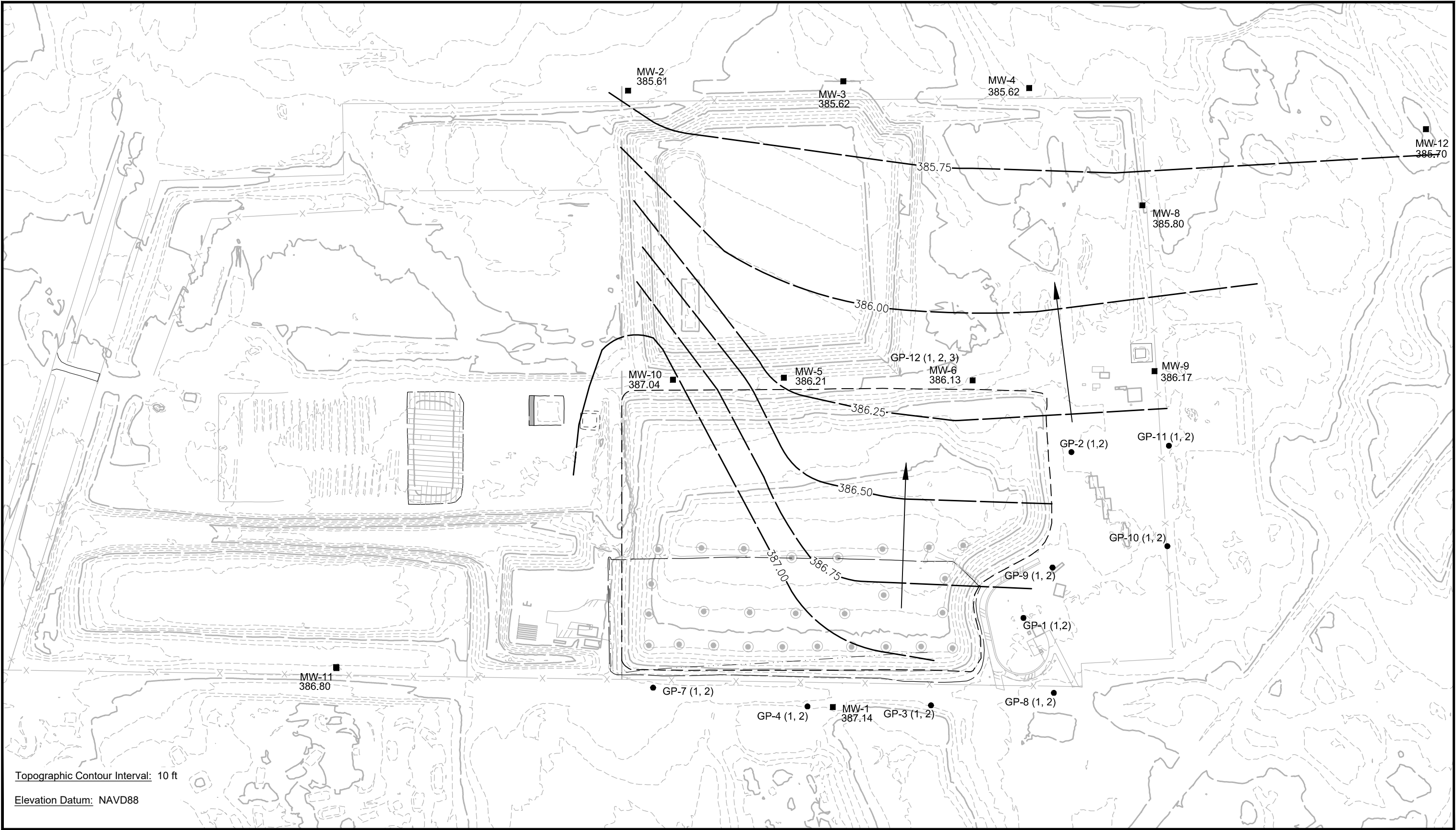
¹Northing and Easting will be updated with new survey data

²Updated to NAVD88 in accordance with Ecology guidance

³Resurveyed in December 2019 to reflect monument adjustment during construction at expansion area

This Page Intentionally Left Blank

FILE: BL3820004P04T02-F-G1-1stQ2022 LAYOUT: G1 PATH: U:\P50\Projects\Clients\3820-City of Richland\555-3820-004 HornRapid201\EM\995\esri\CADD\555-3820-004\Phase_04\Task_02\Figures\ PLOTTED BY: purpobut DATE: Monday, May 16, 2022 10:43:14 AM



LEGEND:

- Approximate extent of refuse
- Approximate site boundary
- Groundwater elevation contour
- Approximate groundwater flow direction

Monitoring Stations

- Monitoring well, with groundwater elevation in ft NAVD88 measured March 15 and 16, 2022
- Gas Probe (1, 2, 3) with variable-depth screens

Figure G1
Potentiometric Surface Map
First Quarter 2022
Horn Rapids Landfill

This Page Intentionally Left Blank

Table G-2. Groundwater Elevation Data, Second Quarter 2022, Horn Rapids Landfill

Well	Northing ¹	Easting	Reference Elevation (NAVD88) ²	Depth to water (ft)	Groundwater Elevation (NAVD88)
MW-1	371,572.00	2,291,691.97	489.68	102.56	387.12
MW-2	372,460.09	2,294,368.28	469.73	84.19	385.54
MW-3	371,529.10	2,294,408.23	481.28	95.66	385.62
MW-4	370,722.92	2,294,379.43	462.52	77.00	385.52
MW-5	371,784.64	2,293,120.19	469.94	83.77	386.17
MW-6	370,965.00	2,293,109.43	484.54	98.30	386.24
MW-8	370,228.88	2,293,869.87	476.47	90.67	385.80
MW-9	370,175.53	2,293,150.76	490.75	104.75	386.00
MW-10 ³	372,265.23	2,293,111.61	464.08	77.10	386.98
MW-11	373,725.48	2,291,860.98	481.16	94.27	386.89
MW-12	368,946.27	1,934,322.73	477.63	92.14	385.49

Groundwater levels measured on June 27 through 29, 2022

Notes:

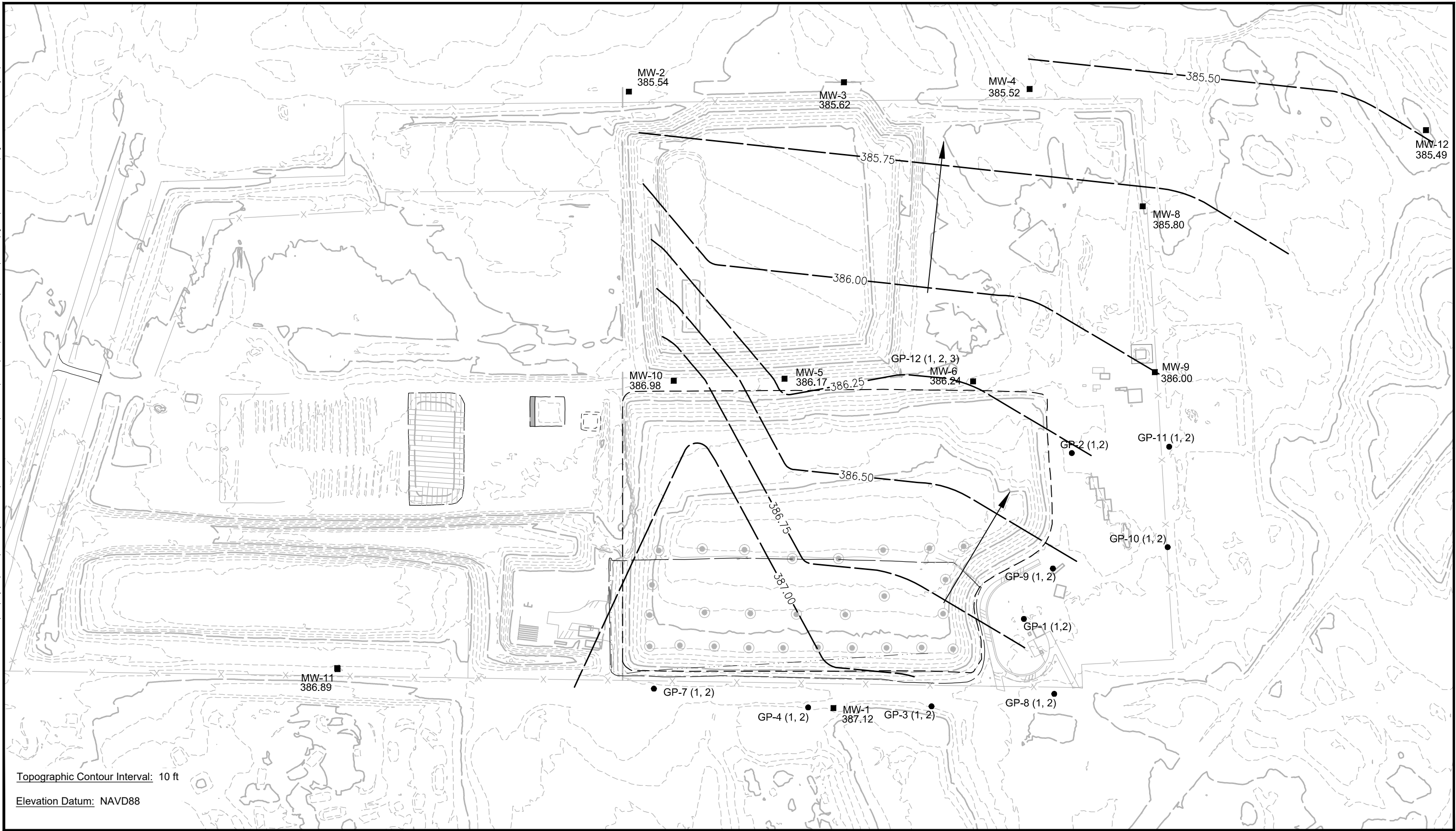
¹Northing and Easting will be updated with new survey data

²Updated to NAVD88 in accordance with Ecology guidance

³Resurveyed in December 2019 to reflect monument adjustment during construction at expansion area

This Page Intentionally Left Blank

FILE: BL3820004P04T02-F-G1-2ndQ2022 LAYOUT: G1 PATH: U:\PSC\Projects\Clients\3820-City of Richmond\555-3820-004 HornRapid201\EM\995\cadd\555-3820-004\Phase 04\Task 02\Figures\ PLOTTED BY: purgubut DATE: Thursday, September 1, 2022 9:44:35 AM



Parametrix DATE: Sep 01, 2022 FILE: BL3820004P04T02-F-G1-2ndQ2022



- LEGEND:**
- Approximate extent of refuse
 - Approximate site boundary
 - Groundwater elevation contour
 - Approximate groundwater flow direction

- Monitoring Stations**
- Monitoring well, with groundwater elevation in ft NAVD88 measured June 27 through 29, 2022
 - Gas Probe (1, 2, 3) with variable-depth screens

Figure G2
Potentiometric Surface Map
Second Quarter 2022
Horn Rapids Landfill

This Page Intentionally Left Blank

Table G-3. Groundwater Elevation Data, Third Quarter 2022, Horn Rapids Landfill

Well	Northing ¹	Easting	Reference Elevation (NAVD88) ²	Depth to water (ft)	Groundwater Elevation (NAVD88)
MW-1	371,572.00	2,291,691.97	489.68	102.70	386.98
MW-2	372,460.09	2,294,368.28	469.73	84.10	385.63
MW-3	371,529.10	2,294,408.23	481.28	95.55	385.73
MW-4	370,722.92	2,294,379.43	462.52	76.62	385.90
MW-5	371,784.64	2,293,120.19	469.94	83.85	386.09
MW-6	370,965.00	2,293,109.43	484.54	98.45	386.09
MW-8	370,228.88	2,293,869.87	476.47	90.73	385.74
MW-9	370,175.53	2,293,150.76	490.75	104.78	385.97
MW-10 ³	372,265.23	2,293,111.61	464.08	77.15	386.93
MW-11	373,725.48	2,291,860.98	481.16	94.10	387.06
MW-12	368,946.27	1,934,322.73	477.63	92.01	385.62

Groundwater levels measured on September 19 and 20, 2022

Notes:

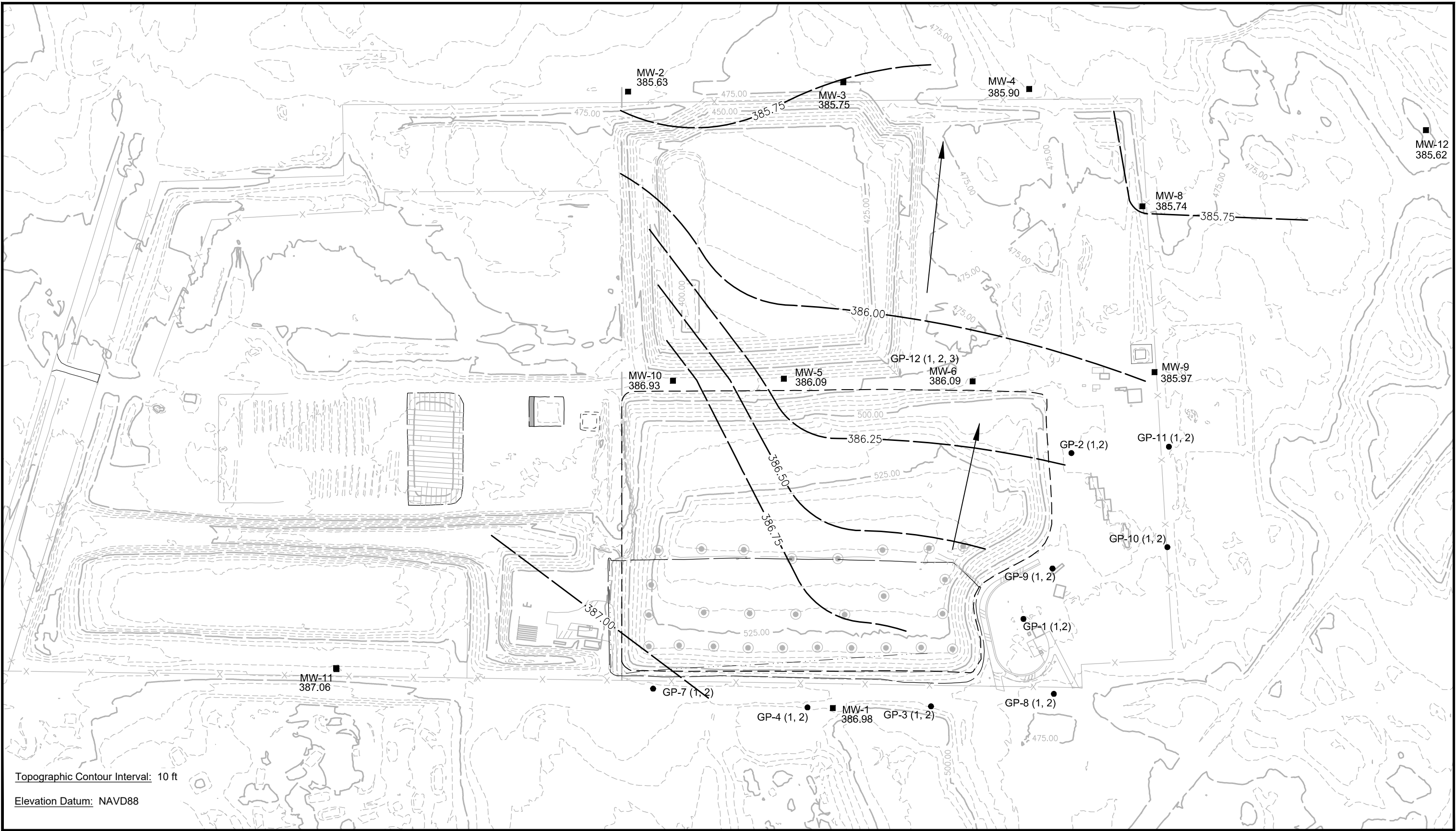
¹Northing and Easting will be updated with new survey data

²Updated to NAVD88 in accordance with Ecology guidance

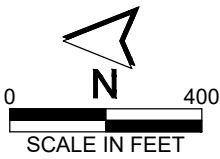
³Resurveyed in December 2019 to reflect monument adjustment during construction at expansion area

This Page Intentionally Left Blank

FILE: BL3820004P04T02-F-G1-3rdQ2022 LAYOUT: G1 PATH: U:\FSO\Projects\Clients\3820-City of Richmond\555-3820-004 HornRapid201\EM\995\cs\CADD\555-3820-004\Phase 04\Task 02\Figures\ PLOTTED BY: purgaut DATE: Wednesday, October 19, 2022 12:19:32 PM



Parametrix DATE: Oct 19, 2022 FILE: BL3820004P04T02-F-G1-3rdQ2022



- LEGEND:**
- Approximate extent of refuse
 - Approximate site boundary
 - Groundwater elevation contour
 - Approximate groundwater flow direction

- Monitoring Stations**
- Monitoring well, with groundwater elevation in ft NAVD88 measured September 19 and 20, 2022
 - Gas Probe (1, 2, 3) with variable-depth screens

Figure G3
Potentiometric Surface Map
Third Quarter 2022
Horn Rapids Landfill

This Page Intentionally Left Blank

Table G-4. Groundwater Elevation Data, Fourth Quarter 2022, Horn Rapids Landfill

Well	Northing ¹	Easting	Reference Elevation (NAVD88) ²	Depth to water (ft)	Groundwater Elevation (NAVD88)
MW-1	371,572.00	2,291,691.97	489.68	102.33	387.35
MW-2	372,460.09	2,294,368.28	469.73	83.92	385.81
MW-3	371,529.10	2,294,408.23	481.28	95.40	385.88
MW-4	370,722.92	2,294,379.43	462.52	76.70	385.82
MW-5	371,784.64	2,293,120.19	469.94	83.63	386.31
MW-6	370,965.00	2,293,109.43	484.54	98.15	386.39
MW-8	370,228.88	2,293,869.87	476.47	90.42	386.05
MW-9	370,175.53	2,293,150.76	490.75	104.52	386.23
MW-10 ³	372,265.23	2,293,111.61	464.08	76.94	387.14
MW-11	373,725.48	2,291,860.98	481.16	94.12	387.04
MW-12	368,946.27	1,934,322.73	477.63	91.66	385.97

Groundwater levels measured on December 7 and 8, 2022

Notes:

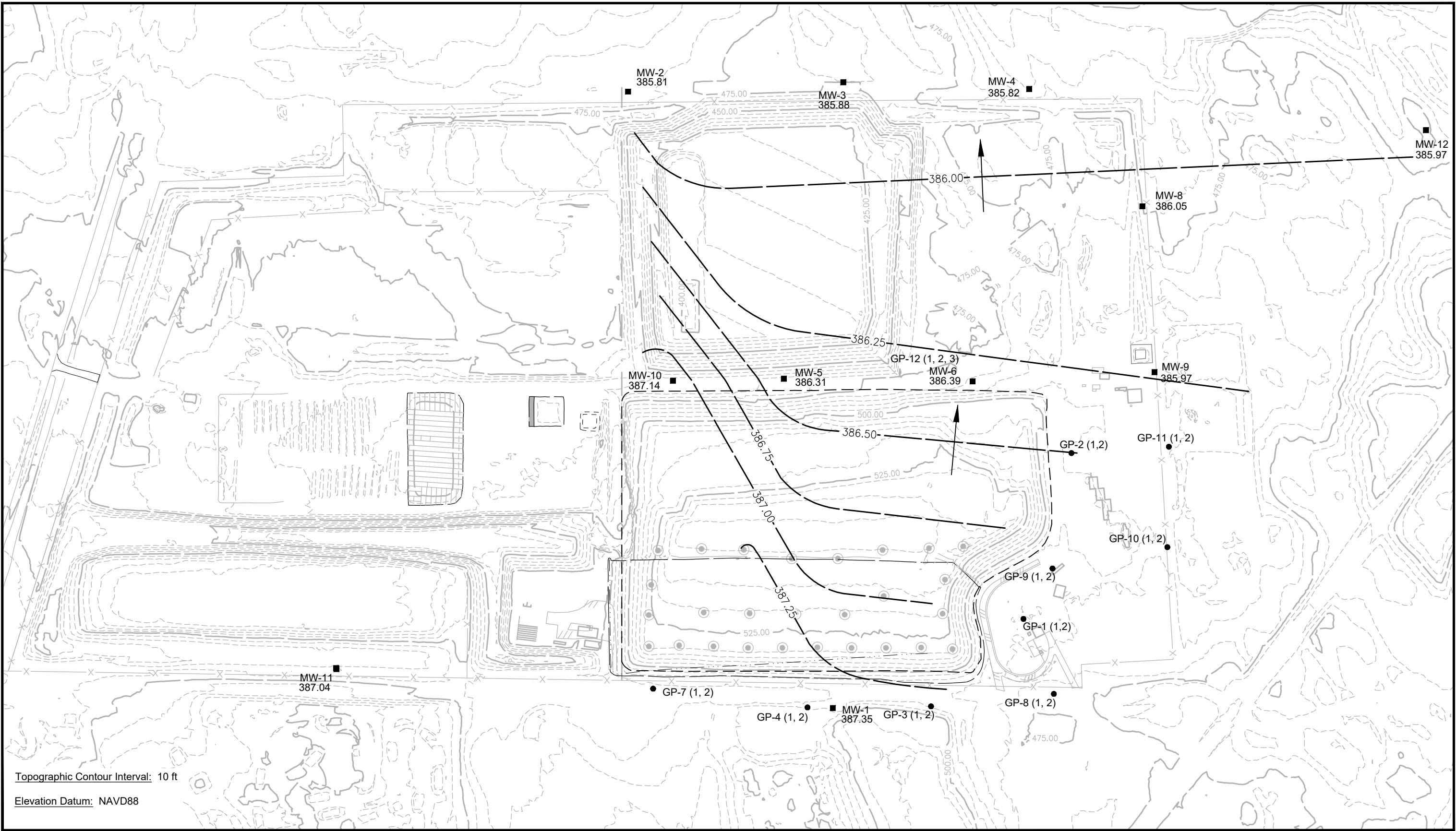
¹Northing and Easting will be updated with new survey data

²Updated to NAVD88 in accordance with Ecology guidance

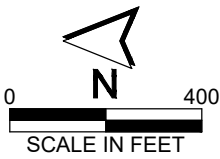
³Resurveyed in December 2019 to reflect monument adjustment during construction at expansion area

This Page Intentionally Left Blank

FILE: BL3820004P04T02-F-G1-4thQ2022 LAYOUT: G1 PATH: U:\FSC\Projects\Clients\3820-City of Richmond\555-3820-004 HornRapid2011EM\995ca\CADD\555-3820-004\Phase 04\Task 02\Figures\ PLOTTED BY: purgubut DATE: Friday, March 10, 2023 4:28:33 PM



Parametrix DATE: Mar 10, 2023 FILE: BL3820004P04T02-F-G1-4thQ2022



LEGEND:

- Approximate extent of refuse
- Approximate site boundary
- Groundwater elevation contour
- Approximate groundwater flow direction

Monitoring Stations

- Monitoring well, with groundwater elevation in ft NAVD88 measured December 7 and 8, 2022
- Gas Probe (1, 2, 3) with variable-depth screens

Figure G4
Potentiometric Surface Map
Fourth Quarter 2022
Horn Rapids Landfill

This Page Intentionally Left Blank

Appendix H

Landfill Gas Data



**HORN RAPIDS LANDFILL
PERIMETER GAS PROBES**

MONITORED DATA				
PROBE	PRESSURE	CH4	O2	CO2
	INCHES W.C.	(% VOL)	(% VOL)	(% VOL)

DATE: 3/24/22

GP-1-1	-0.21	0.0	19.2	1.9
GP-1-2	-0.19	0.0	19.4	1.1
GP-2-1	-0.28	0.6	17.6	0.2
GP-2-2	-0.41	0.6	17.7	1.8
GP-3-1	-0.50	0.0	20.2	1.0
GP-3-2	-0.51	0.1	19.9	1.0
GP-4-1	-0.18	0.2	15.9	0.1
GP-4-2	-0.26	0.4	15.8	0.1
GP-7-1	-0.12	0.2	15.8	0.1
GP-7-2	-0.04	0.0	15.9	0.1
GP-8-1	-0.75	0.0	19.4	0.3
GP-8-2	-0.65	0.1	19.4	0.3
GP-9-1	-0.42	0.2	13.1	8.9
GP-9-2	-0.19	0.1	13.7	2.6
GP-10-1	-0.37	0.0	18.8	1.0
GP-10-2	-0.34	0.0	18.8	0.7
GP-11-1	-0.35	0.0	18.4	0.2
GP-11-2	-0.30	0.0	18.2	0.1
GP-12-1	-0.39	10.6	6.2	19.2
GP-12-2	-0.65	1.7	17.2	4.2
GP-12-3	-0.73	0.8	18.1	0.1
GP-13	-0.31	0.4	18	0.10
GP-14	-0.17	0.5	18	0.10
GP-15	-0.17	0.5	18	0.10

COMMENTS:

Weather: 50° F, clear

Barometer: 29.38 in. of mercury steady

MONITORED DATA				
PROBE	PRESSURE	CH4	O2	CO2
	INCHES W.C.	(% VOL)	(% VOL)	(% VOL)

DATE: 6/15/22

GP-1-1	-0.12	0.2	20.5	0.9
GP-1-2	-0.10	0.2	20.8	0.7
GP-2-1	0.01	4.9	16.1	6.9
GP-2-2	-0.19	0.5	20.7	0.6
GP-3-1	-0.37	0.2	21.4	0.1
GP-3-2	-0.27	0.2	21.4	0.1
GP-4-1	-0.29	0.1	21.3	0.1
GP-4-2	-0.19	0.1	21.1	0.2
GP-7-1	-0.23	0.1	21.3	0.1
GP-7-2	-0.13	0.1	21.2	0.1
GP-8-1	-0.18	0.1	20.9	0.6
GP-8-2	-0.20	0.2	21.2	0.1
GP-9-1	-0.37	0.2	21.2	0.0
GP-9-2	-0.13	0.1	19.3	1.5
GP-10-1	-0.14	0.2	20.1	1.3
GP-10-2	-0.14	0.2	19.2	1.8
GP-11-1	-0.17	0.2	21.0	0.1
GP-11-2	-0.15	0.2	21.1	0.3
GP-12-1	0.03	10.7	5.7	20.1
GP-12-2	-0.08	1.2	18.5	3.0
GP-12-3	-0.05	0.1	20.6	0.1
GP-13	0.05	0.0	21.1	0.0
GP-14	0.08	0.0	21.3	0.0
GP-15	0.24	0.0	21.1	0.0

COMMENTS:

Weather: 62 to 72° F, clear

Barometer: 29.42 in. of mercury steady

**HORN RAPIDS LANDFILL
PERIMETER GAS PROBES**

MONITORED DATA				
PROBE	PRESSURE	CH4	O2	CO2
	INCHES W.C.	(% VOL)	(% VOL)	(% VOL)

DATE: 9/27/22

GP-1-1	-0.10	0.1	20.4	1.0
GP-1-2	-0.09	0.0	20.7	0.9
GP-2-1	0.00	4.3	16.2	6.8
GP-2-2	-0.17	0.3	20.6	0.4
GP-3-1	-0.35	0.2	21.3	0.1
GP-3-2	-0.23	0.2	21.3	0.1
GP-4-1	-0.31	0.0	21.4	0.2
GP-4-2	-0.18	0.0	21.0	0.2
GP-7-1	-0.21	0.0	21.1	0.1
GP-7-2	-0.11	0.1	21.2	0.1
GP-8-1	-0.17	0.1	20.8	0.5
GP-8-2	-0.20	0.1	21.3	0.1
GP-9-1	-0.34	0.2	21.3	0.0
GP-9-2	-0.11	0.1	19.5	1.3
GP-10-1	-0.13	0.1	19.9	1.4
GP-10-2	-0.14	0.2	19.3	1.6
GP-11-1	-0.16	0.2	21.1	0.1
GP-11-2	-0.16	0.2	21.1	0.2
GP-12-1	0.01	10.5	5.4	20.2
GP-12-2	-0.07	1.3	18.3	3.2
GP-12-3	-0.03	0.1	20.4	0.1
GP-13	0.02	0.1	21.0	0.1
GP-14	0.05	0.2	21.1	0.1
GP-15	0.19	0.2	21.0	0.1

COMMENTS:

Weather: 60 to 74° F, clear

Barometer: 29.36 in. of mercury steady

MONITORED DATA				
PROBE	PRESSURE	CH4	O2	CO2
	INCHES W.C.	(% VOL)	(% VOL)	(% VOL)

DATE: 1/3/23

GP-1-1	-0.18	0.0	20.2	1.0
GP-1-2	-0.18	0.0	20.6	0.7
GP-2-1	-0.20	0.6	17.8	0.2
GP-2-2	-0.31	0.5	17.9	1.8
GP-3-1	-0.46	0.0	20.2	1.0
GP-3-2	-0.42	0.0	20.1	0.9
GP-4-1	-0.32	0.0	20.1	0.9
GP-4-2	-0.44	0.0	19.6	0.9
GP-7-1	-0.29	0.0	21.1	0.1
GP-7-2	-0.16	0.0	21.2	0.1
GP-8-1	-0.21	0.1	20.6	0.6
GP-8-2	-0.41	0.1	20.7	0.4
GP-9-1	-0.43	0.1	21.3	0.1
GP-9-2	-0.19	0.1	19.8	1.0
GP-10-1	-0.19	0.2	19.1	1.8
GP-10-2	-0.20	0.1	19.6	1.5
GP-11-1	-0.21	0.1	21.0	0.1
GP-11-2	-0.19	0.0	19.9	0.3
GP-12-1	-0.28	10.8	5.5	19.6
GP-12-2	-0.20	1.6	17.3	4.5
GP-12-3	-0.19	0.1	20.4	0.1
GP-13	-0.04	0.2	20.9	0.1
GP-14	-0.06	0.3	20.8	0.1
GP-15	-0.02	0.2	21.0	0.1

COMMENTS:

Weather: 37 to 38° F, overcast

Barometer: 29.65 in. of mercury steady