Annual Groundwater Monitoring Report (April 2022 – January 2023)

KCHA Former Park Lake Homes
Maintenance Center Site
9800 8th Avenue SW
Seattle, Washington
VCP No. NW3033

for
King County Housing Authority

March 22, 2023

GeoEngineers
Earth Science + Technology

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GeoEngineers
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9800 8th Avenue SW
Seattle, Washington
VCP No. NW3033

File No. 1329-003-29

March 22, 2023

Prepared for:

King County Housing Authority
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Prepared by:

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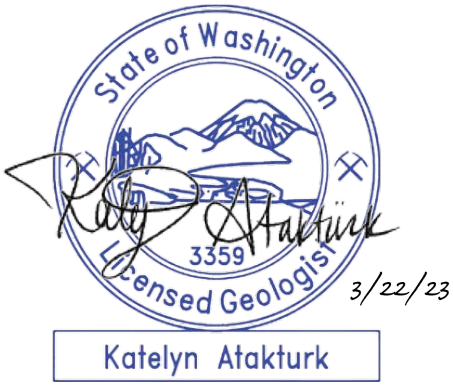

Dana L. Carlisle, PE
Principal

KRA:DLC:ch

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION AND BACKGROUND

This report presents the cleanup actions and quarterly groundwater monitoring completed between April 2022 and January 2023 at King County Housing Authority's (KCHA) Former Park Lake Homes Maintenance Center Site (Site), 9800 8th Avenue SW in Seattle, Washington. The Site is entered into Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program (VCP), VCP Site No. NW3033. The location of the Site relative to surrounding physical features is shown in the Vicinity Map, Figure 1. The general layout of the Site and surrounding areas is shown in the Site Plan, Figure 2.

The Maintenance Center was removed in 2004/2005 and an independent Model Toxics Control Act (MTCA) cleanup of contaminated soil was completed by KCHA in 2005 (GeoEngineers 2005). After the 2005 cleanup action, the majority of soil underlying the former Maintenance Center was subsequently removed to depths up to 16 feet below original grade during excavation for the temporary Central Valley area 4 (CV4) construction stormwater pond (later backfilled, area shown in orange shading in Figure 2) and for the permanent Central Valley area 3 (CV3) water quality vault (area shown in yellow shading in Figure 2). The Site was redeveloped in 2006 with housing, parking, new underground utilities and common areas associated with KCHA's Greenbridge project. No evidence of contaminated soil was reported by KCHA representatives, contractors, or by GeoEngineers, Inc. (GeoEngineers) during geotechnical construction observation, soil removal for the CV4 construction stormwater pond, and the CV3 water quality vault. KCHA intends to own and manage the areas within the Site for the foreseeable future.

The Site was entered into the VCP in late 2015, with a request for a No Further Action (NFA) determination on the former Maintenance Center cleanup completed by KCHA. Ecology provided a "Further Action" letter to KCHA dated June 6, 2016, requesting groundwater characterization at the Site. In 2017, Ecology approved KCHA's scope of work for Site groundwater characterization. KCHA subsequently installed two monitoring wells (MW-1 and MW-2) in July 2017 to monitor groundwater conditions downgradient of the area where the soil cleanup was conducted at the Maintenance Center. The results of 2017, 2018 and 2019 groundwater monitoring were submitted to Ecology (GeoEngineers 2018 and GeoEngineers 2020). In 2019 Ecology concurred that chemical analytical sampling of MW-1 groundwater was no longer required. In June 2020, Ecology concurred with KCHA's request to discontinue testing organochlorine pesticides from MW-2 based on four consecutive quarterly samples meeting cleanup levels. As of mid-2020, the only contaminant at the Site exceeding the MTCA cleanup level was petroleum hydrocarbons (diesel and heavy oil-range) in MW-2 groundwater.

In-situ injection groundwater treatment was conducted on Site during the 2nd and 3rd quarters of 2020 to treat the area surrounding MW-2 as the contamination source location was locally undefined. Quarterly groundwater monitoring continued at MW-2 in 2020, 2021 and 2022 with intermittent use of an Oxygen Releasing Compound (ORC) sock at MW-2 to further enhance petroleum degradation (GeoEngineers 2021 and 2022). A trend of decreasing concentrations of dissolved-phase petroleum hydrocarbons in MW-2 groundwater has been evident over time, and particularly after enhanced in-situ treatment efforts in 2020.

This monitoring report presents the results of groundwater monitoring conducted between April 2022 and January 2023, which includes groundwater elevations at MW-1 and MW-2, groundwater sampling at MW-2 and use of the ORC sock at MW-2.

2.0 SCOPE OF SERVICES

The scope of services included the following:

1. Measure groundwater water levels in MW-1 and MW-2 for four quarterly events.
2. Collect groundwater samples and measure groundwater parameters from MW-2 using low-flow sampling methods and submit the groundwater samples for chemical analysis of diesel-range petroleum hydrocarbons (DRPH) and oil-range petroleum hydrocarbons (ORPH) by Northwest Method NWTPH-Dx. Beginning in October 2022, the NWTPH-Dx analysis of MW-2 groundwater was done both with and without the silica gel cleanup (SGC).
3. Install a new replacement ORC sock in MW-2 in April 2022.

3.0 ORC TREATMENT SOCK

A new ORC treatment sock was installed in MW-2 on April 20, 2022 prior to the groundwater monitoring event on April 26, 2022. After the ORC sock installation, initial dissolved oxygen (DO) concentrations in MW-2 purge water were measured at levels similar to DO at MW-1 (2 to 6 milligrams per liter [mg/L), a well outside of the dissolved-phase petroleum plume (Table 2). Stabilized DO levels at MW-2 were less than 1 mg/L during subsequent monitoring events. During each groundwater monitoring event the treatment sock was removed, and groundwater was allowed to equilibrate prior to sampling.

4.0 GROUNDWATER MONITORING

4.1. Groundwater Conditions

Quarterly groundwater monitoring events were conducted on April 26, July 25, and October 13, 2022 and January 12, 2023. Groundwater monitoring field procedures are described in Appendix A.

Based on the quarterly events for the past 12 months, groundwater elevations at both wells MW-1 and MW-2 fluctuate approximately 3 to 4 feet seasonally, between Elevations 396 and 402 feet (NAVD88). Based on the past several years of groundwater monitoring, the highest groundwater elevations occur during the wet season (September through April) and the lowest elevations occur during the dry season (May through August). Depths to groundwater and groundwater elevations are summarized in Table 1, and groundwater elevation data for MW-2 are presented in Figure 3. Based on previous environmental and geotechnical reports for the KCHA Property (GeoEngineers 2007 and 2015) the local groundwater flow direction beneath the Site is to the south.

4.2. Groundwater and Wastewater pH

Groundwater parameters obtained during each monitoring event are reported in Table 2. Purge water generated from quarterly monitoring events was taken to Marine Vacuum Services Inc. for permitted disposal (Appendix B). The pH of groundwater has consistently been less than the dangerous waste threshold (<12.5 pH) for the past 14 quarterly monitoring events (May 2019 through January 2023) and shows a decreasing trend toward background levels.

4.3. Groundwater Chemical Analytical Results

Groundwater samples were analyzed by an Ecology approved laboratory, OnSite Environmental, Inc. in Redmond, Washington. Groundwater analytical results are summarized in Table 3. Figure 3 illustrates groundwater chemical analytical results over time in relation to KCHA's active treatment events and groundwater elevation fluctuation. Prior groundwater monitoring has indicated that increases in DRPH and ORPH concentrations often occur during times of higher groundwater elevations. Laboratory chemical analytical reports are provided in Appendix C.

4.3.1. NWTPH-Dx

Consistent with Ecology's Implementation Memorandum #4 (Ecology, 2004), DRPH and ORPH in MW-2 groundwater were summed and compared to the MTCA Method A cleanup level for petroleum hydrocarbons. Although petroleum hydrocarbons (as the sum of DRPH and ORPH) were detected at concentrations greater than the MTCA Method A cleanup level of 0.5 mg/L in all four sampling events during the reporting period, the detected concentrations steadily decreased from 1.9 mg/L to 0.54 mg/L, which is only slightly above the MTCA Method A cleanup level.

4.3.2. NWTPH-Dx with Silica Gel Cleanup (SGC)

The NWTPH-Dx analysis with silica gel cleanup (SGC) was added to the groundwater sampling program starting in October 2022 to remove biogenic organic compounds (BOCs) prior to sample analysis. The applicability of the NWTPH-Dx with SGC will be evaluated for the Site going forward as discussed further below. Petroleum hydrocarbons (as the sum of DRPH and ORPH) were not detected in the MW-2 groundwater samples analyzed with the SGC.

5.0 DISCUSSION AND RECOMMENDATIONS

Quarterly groundwater monitoring at MW-2 was completed between April 2022 and January 2023 at the Former Park Lake Homes Maintenance Center. Groundwater pH levels remained below the dangerous waste threshold (<12.5 pH) for all quarterly sampling events and no dangerous waste wastewater was generated.

Although petroleum hydrocarbons (as the sum of DRPH and ORPH) were detected at concentrations greater than the MTCA Method A cleanup level in all four sampling events during the reporting period, the detected concentrations steadily decreased from 1.9 mg/L down to 0.54 mg/L, which is only slightly above the MTCA Method A cleanup level of 0.5 mg/L.

An ORC sock has been utilized in monitoring well MW-2 intermittently from April 2021 to January 2023 to facilitate the degradation of petroleum hydrocarbons. Based on favorable results during the reporting period and to commence groundwater compliance monitoring going forward, ORC treatment at MW-2 will be discontinued in 2023 before the next monitoring event.

NWTPH-Dx analysis of the October 2022 and January 2023 groundwater samples at MW-2 included the SGC sample preparation procedure; DRPH and ORPH were not detected in the NWTPH-Dx analysis with SGC. Ecology's Guidance for Remediation of Petroleum Contaminated Sites (Ecology 2016) indicates that the SGC procedure may be used with the NWTPH-Dx analytical method to minimize the potential for interference by naturally occurring non-petroleum organic matter in groundwater. Although naturally

occurring organic matter is not common in groundwater and was not observed during MW-1 or MW-2 drilling, fill is known to have been used at the Site and therefore we recommend evaluating potential interferences of this type for the KCHA Site for compliance groundwater monitoring over the next year. The evaluation results will be presented in the next annual groundwater monitoring report. We recommend implementing the following for the NWTPH-Dx analysis of MW-2 groundwater in accordance with Ecology's 2016 guidance Section 7.3 "Petroleum Hydrocarbons" and recent guidance from the Pollution Liability Insurance Agency (PLIA) (PLIA 2022) regarding the use of SGC:

- Analyze MW-2 groundwater samples by NWTPH-Dx with and without SGC during each of the next four quarterly groundwater monitoring events.
- Quantify total organic carbon (TOC) by United States Environmental Protection Agency (EPA) Method 5310 in MW-1 and MW-2 groundwater samples in April 2023. Groundwater from MW-1 will be analyzed for TOC to evaluate whether biogenic organic compounds (BOCs) are present at this uncontaminated background sample at levels that could create analytical interference.
- Evaluate whether BOCs are present in Site groundwater and review petroleum hydrocarbon chromatograms for each sample.
- Assess applicability of the NWTPH-Dx with SGC for the Site.

Groundwater monitoring data from the past quarterly events will be uploaded to Ecology's Environmental Information database (EIM) as required under the VCP.

The next Site groundwater monitoring event is scheduled for April 2023.

6.0 LIMITATIONS

We have prepared this letter report for use by KCHA. This report may be provided to regulatory agencies for review and information. Our services were completed in accordance with our contract with KCHA. No other party may rely on the product of our services unless we agree in advance and in writing to such reliance. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix D "Report Limitations And Guidelines For Use" for additional information pertaining to the use of this report.

7.0 REFERENCES

GeoEngineers, Inc. 2005. Independent Cleanup of Petroleum-Contaminated Soil, KCHA Maintenance Center Former Park Lake Homes, King County, Washington, September 12, 2005.

GeoEngineers, Inc. 2007. Update Report: Geotechnical Engineering Services, Greenbridge Hope VI Redevelopment Project, January 12, 2007.

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GeoEngineers, Inc. 2020. Annual Groundwater Characterization Report 2019, KCHA Former Park Lake Homes Maintenance Facility, Seattle, Washington, January 22, 2020.

GeoEngineers, Inc. 2021. Groundwater Monitoring and Independent Cleanup Report, KCHA Former Park Lake Homes Maintenance Facility, Seattle, Washington, February 5, 2021.

GeoEngineers, Inc. 2022. Annual Groundwater Monitoring Report 2021, KCHA Former Park Lake Homes, Maintenance Center Site, Seattle, Washington, April 1, 2022.

Pollution Liability Insurance Agency (PLIA) 2022. Silica Gel Cleanup Analytical Methods, Policy Number 5.0. Date effective: February 7, 2022.

Washington State Department of Ecology (Ecology) 2004. Implementation Memorandum #4, Determining Compliance with Method A Cleanup Levels for Diesel and Heavy Oil, Publication No. 04-09-086, Published June 2004.

Washington State Department of Ecology (Ecology). 2016. "Guidance for Remediation of Petroleum Contaminated Sites", Toxics Cleanup Program, Publication No, 10-09-057, June 2016.

Washington State Department of Ecology (Ecology). 2017. Email response from Warfel, Michael, Site Manager of Voluntary Cleanup Program, "VCP NW3033, Park Lake Homes Maintenance Facility - Follow up," May 30, 2017.

Washington State Department of Ecology (Ecology). 2019. Warfel, Michael, Site Manager of Voluntary Cleanup Program, "NW3033 Opinion Letter," March 19, 2019.

Table 1

Monitoring Well Groundwater Elevation Data

Former Park Lake Homes Maintenance Center

Seattle, Washington

Monitoring Well Identification[1] (TOC Elevation in feet NAVD88)[2]	Date measured	Depth to Water (feet bgs)	Groundwater Elevation (feet NAVD88)	Well Screen (feet bgs)	
				Top	Bottom
MW-1 (407.41)	08/28/17	9.64	397.77	5	20
	12/01/17	7.37	400.04		
	04/30/18	8.12	399.29		
	07/18/18	9.81	397.60		
	10/18/18	10.18	397.23		
	02/19/19	7.19	400.22		
	05/15/19	9.33	398.08		
	08/16/19	10.64	396.77		
	11/22/19	10.66	396.75		
	02/14/20	6.71	400.7		
	05/05/20	9.33	398.08		
	08/21/20	10.70	396.71		
	01/08/21	6.41	401.00		
	05/04/21	7.66	399.75		
	09/22/21	10.43	396.98		
	12/15/21	7.49	399.92		
	04/26/22	7.98	399.43		
	07/21/22	9.10	398.31		
	10/13/22	10.94	396.47		
	01/23/23	7.93	399.48		
MW-2 (408.58)	08/28/17	7.99	400.59	5	20
	12/01/17	6.57	402.01		
	04/30/18	7.27	401.31		
	07/18/18	8.96	399.62		
	10/18/18	9.15	399.43		
	02/19/19	7.00	401.58		
	05/15/19	8.20	400.38		
	08/16/19	9.47	399.11		
	11/22/19	10.09	398.49		
	02/14/20	6.20	402.38		
	04/10/20	7.72	400.86		
	05/05/20	8.27	400.31		
	08/21/20	9.56	399.02		
	01/08/21	6.69	401.89		
	05/04/21	7.97	400.61		
	09/22/21	9.33	399.25		
	12/15/21	6.90	401.68		
	04/26/22	7.23	401.35		
	07/21/22	8.33	400.25		
	10/13/22	9.73	398.85		
	01/23/23	6.76	401.82		

Notes:

[1] Monitoring well locations are shown on Figure 2.

[2] Elevations measured by Goldsmith Land Development Services on May 19, 2019.

NAVD88 = North American Vertical Datum of 1988

TOC = top of casing

bgs = below ground surface

Table 2

Groundwater Field Parameter Data

Former Park Lake Homes Maintenance Center

Seattle, Washington

Sample ID[1]	Date	pH	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Redox Potential (mV)	Turbidity (NTU)
Monitoring Well MW-1						
MW-1-170828	08/28/17	6.76	310.9	2.56	198.2	4.0
MW-1-171201	12/01/17	7.91	257.5	4.41	188.2	4.1
MW-1-180430	04/30/18	8.18	234.9	4.64	186.7	4.3
MW-1-180718	07/18/18	7.77	239.2	3.26	146.5	4.6
MW-1-181018	10/18/18	7.68	238.7	4.14	159.6	3.2
MW-1-190219	02/19/19	7.82	283.2	6.04	245.7	3.5
Monitoring Well MW-2						
MW-2-170828	08/28/17	12.59	2,463	0.06	-324.9	3.1
MW-2-171201	12/01/17	12.72	2,106	0.07	-202.5	3.7
MW-2-180430	04/30/18	12.88[2]	1,839	0.17	-91.3	3.1
MW-2-180718	07/18/18	12.84[2]	2,081	0.08	-213.6	4.7
MW-2-181018	10/18/18	12.64[2]	2,121	0.07	-311.8	4.1
MW-2-190219	02/19/19	12.95[2]	1,742	0.09	-212.3	3.6
MW-2-190515	05/15/19	12.31	1,795	0.13	-220.2	3.3
MW-2-190816	08/16/19	11.70	1,986	0.08	-235.9	3.2
MW-2-191122	11/22/19	12.12	1,872	0.08	-254.3	4.2
MW-2-200214	02/14/20	11.33	1,622	0.20	-226.1	4.8
MW-2-200507	05/07/20	10.19	1,747	0.27	20.5	3.2
MW-2-200821	08/21/20	10.44	2,197	4.80	105.3	8.6
MW-2-210108	01/08/21	11.58	1,827	5.23	102.1	24
MW-2-210504	05/04/21	11.88	1,360	7.48	-151.1	5.8
MW-2-210922	09/22/21	11.02	1,240	5.96	-170.1	5.0
MW-2-211215	12/15/21	11.90	1,700	0.44	-88.9	8.8
MW-2-220426	04/26/22	12.04	1,611	0.89	-83.1	9.9
MW-2-220721	07/21/22	11.65	1,575	0.93	-64.6	9.9
MW-2-221013	10/13/22	11.27	1,951	0.81	-39.0	8.3
MW-2-230123	01/12/23	10.97	1,946	0.74	-41.0	7.5

Notes:

[1] Monitoring well locations are shown on Figure 2.

[2] Bulk pH measured from drum water grab sample.

NTU = nephelometric turbidity units

µS/cm = microSiemens per centimeter

mg/L = milligrams per liter

mV = millivolts

-- = not measured

Table 3

Summary of Groundwater Chemical Analytical Data

Former Park Lake Homes Maintenance Center

Seattle, Washington

Sample ID[1]	Sample Year	Sample Date	Total Petroleum Hydrocarbons without SGC[3] (mg/L)				Total Petroleum Hydrocarbons with SGC[3] (mg/L)		
			Gasoline-Range[2]	Diesel-Range	Oil-Range	Sum of Diesel- and Oil-Range Hydrocarbons[4]	Diesel-Range	Oil-Range	Sum of Diesel- and Oil-Range Hydrocarbons[4]
MW-2-170828	2017	08/28/17	<100 U	**0.89**	**2.5**	**3.4**	--	--	--
MW-2-171201		12/01/17	<100 U	**0.83**	**2.2**	**3.0**	--	--	--
MW-2-180430	2018	04/30/18	<100 U	**0.52**	**2.0**	**2.5**	--	--	--
MW-2-180718		07/18/18	<100 U	**0.49**	**1.4**	**1.9**	--	--	--
MW-2-181018		10/18/18	<100 U	**0.70**	**1.7**	**2.4**	--	--	--
MW-2-190219	2019	02/19/19	<100 U	**0.55**	**1.8**	**2.4**	--	--	--
MW-2-190515		05/15/19	--	**0.37**	**0.89**	**1.3**	--	--	--
MW-2-190816		08/16/19	--	**0.53**	**1.1**	**1.6**	--	--	--
MW-2-191122		11/22/19	--	**0.83**	**1.9**	**2.7**	--	--	--
MW-2-200214	2020	02/14/20	--	**0.50**	**1.5**	**2.0**	--	--	--
MW-2-200507		05/07/20	--	**0.56**	**1.2**	**1.8**	--	--	--
MW-2-200821		08/21/20	--	**0.50**	**1.2**	**1.7**	--	--	--
MW-2-210108	2021	01/08/21	--	<0.20 U	<0.21 U	<0.40 U	--	--	--
MW-2-210504		05/04/21	--	<0.20 U	**0.59**	**0.79**	--	--	--
MW-2-210921		09/22/21	--	<0.20 U	<0.20 U	<0.40 U	--	--	--
MW-2-211215		12/15/21	--	**0.34**	**0.81**	**1.2**	--	--	--
MW-2-220426	2022	04/26/22	--	**0.42**	**1.5**	**1.9**	--	--	--
MW-2-220725		07/25/22	--	**0.24**	**0.64**	**0.88**	--	--	--
MW-2-221013		10/13/22	--	<0.20 U	**0.50**	**0.60**[5]	<0.20 U	<0.20 U	<0.40 U
MW-2-230123	2023	01/12/23	--	**0.16**	**0.38**	**0.54**	<0.21 U	<0.21 U	<0.42 U
Groundwater MTCA Method A Cleanup Levels			800/1,000[5]	0.5	0.5	0.5	0.5	0.5	0.5

Notes:

[1] Monitoring well locations are shown on Figure 2.

[2] Gasoline-range hydrocarbons were analyzed by method NWTPH-Gx.

[3] Diesel- and oil-range hydrocarbons were analyzed by method NWTPH-Dx with and without the silica gel cleanup method.

[4] The sum of diesel- and oil-range hydrocarbons is compared to the MTCA Method A cleanup level due to the overlapping chromatogram signature.

[5] The non-detect result is included at half of the value in the summation calculation.

[6] When benzene is present the gasoline range cleanup level is 800 µg/L. When benzene is not present, the range cleanup level is 1000 µg/L.

MTCA = Model Toxics Control Act

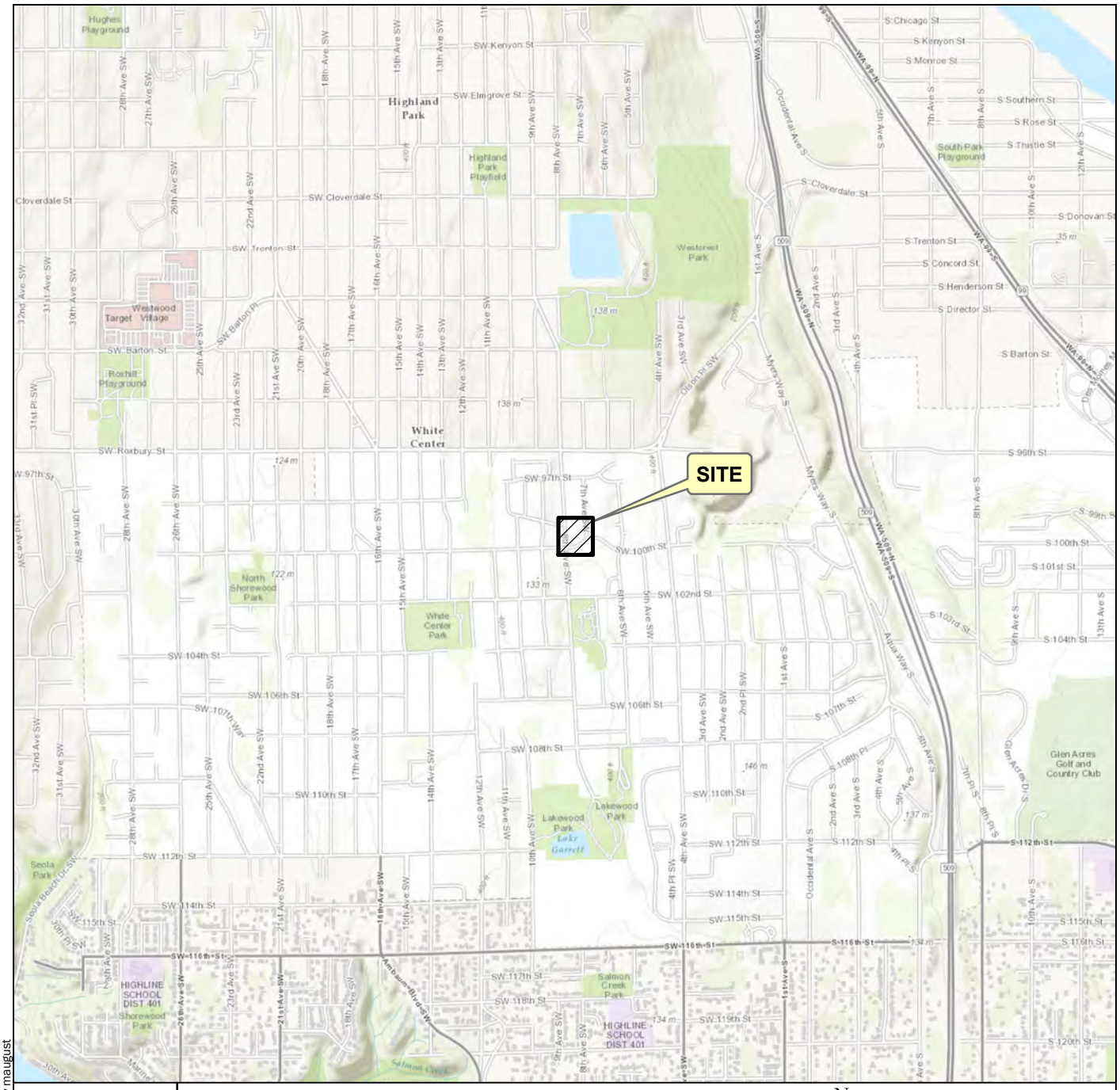
mg/L = milligrams per liter

"–" = not tested

SGC = silica gel cleanup

Bold indicates analyte was detected

Shading indicates analyte was detected at a concentration greater than the MTCA Cleanup Level



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Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2015

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Former Park Lake Homes Maintenance Center
Seattle, Washington

GeoEngineers

Figure 1

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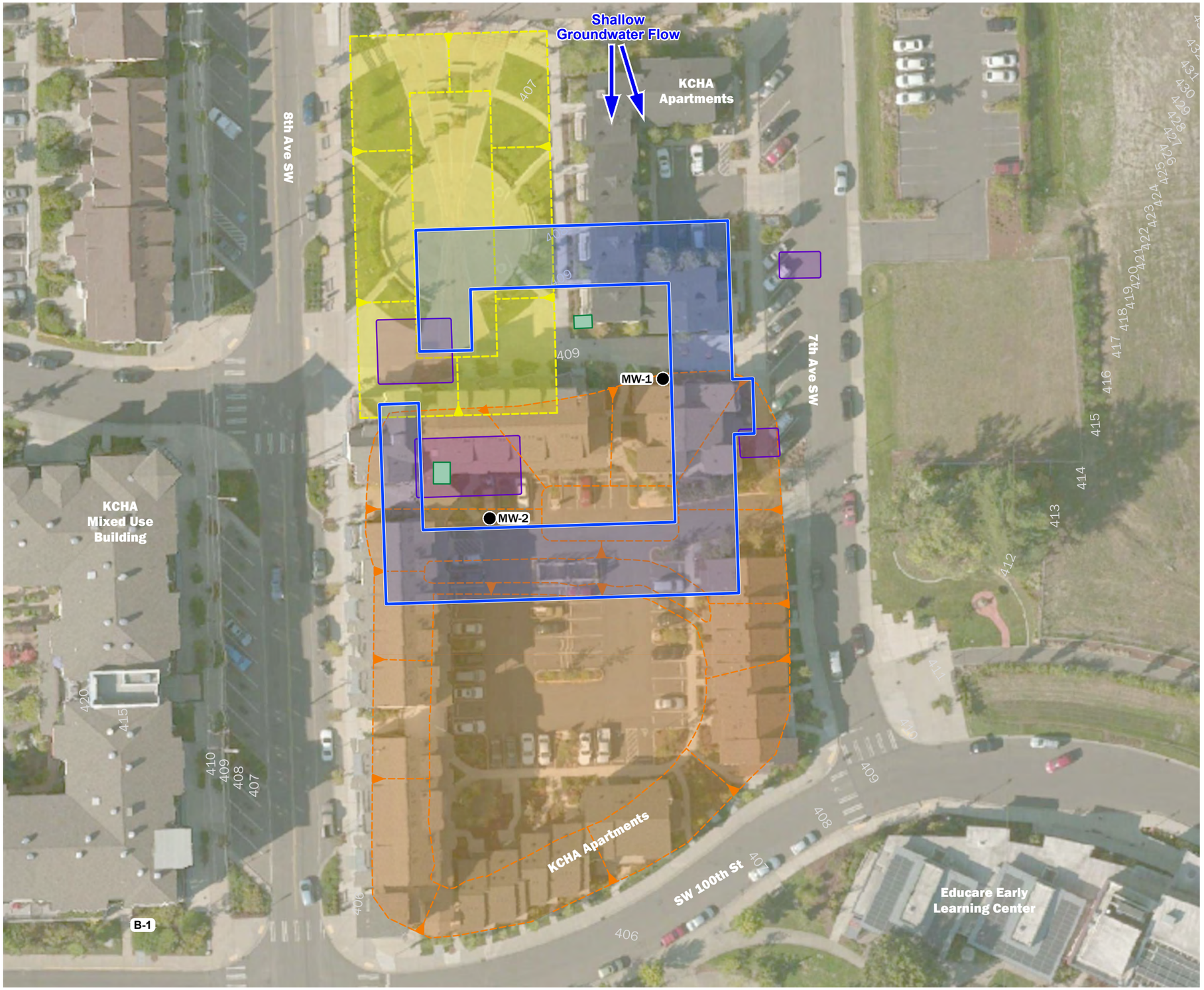

Legend

- MW-1 ● Monitoring Well
- Approximate Footprint of Former Park Lake Homes Maintenance Center Building
- Approximate Location of Removed UST
- Approximate Location of 2005 Remedial Excavations - MTCA Cleanup at Maintenance Center
- Approximate Boundary of Backfilled CV4 Stormwater Pond Excavation
- Excavation for existing Water Quality Vault

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FEET

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source:

- Aerial from Microsoft Bing dated September 2013
- Stormwater Vault and Excavation from "Lake Garrett Sub-Basin Water Quality Vault Plan and Section", Sheet DF-3 by Goldsmith & Associates dated 10/25/2004
- Location of 2005 Remedial Excavations from "Final Cleanup Report, KCHA Maintenance Facility, Former Park Lake Homes, 9900 8th Avenue SW, Seattle, Washington," dated September 7, 2005 for King County Housing Authority, GEI File 1329-003-04
- CV4 Stormwater Pond Excavation Boundary and 2003/2004 Borings from "Geotechnical Engineering Services Greenbridge Hope VI Redevelopment Update Report" by GeoEngineers dated 1/12/2007
- Waterline Connection Location from "BDR Greenbridge Park Water Plan and Profile", Sheet WA-02 by ESM Consulting Engineers dated 4/26/2016

Site Plan

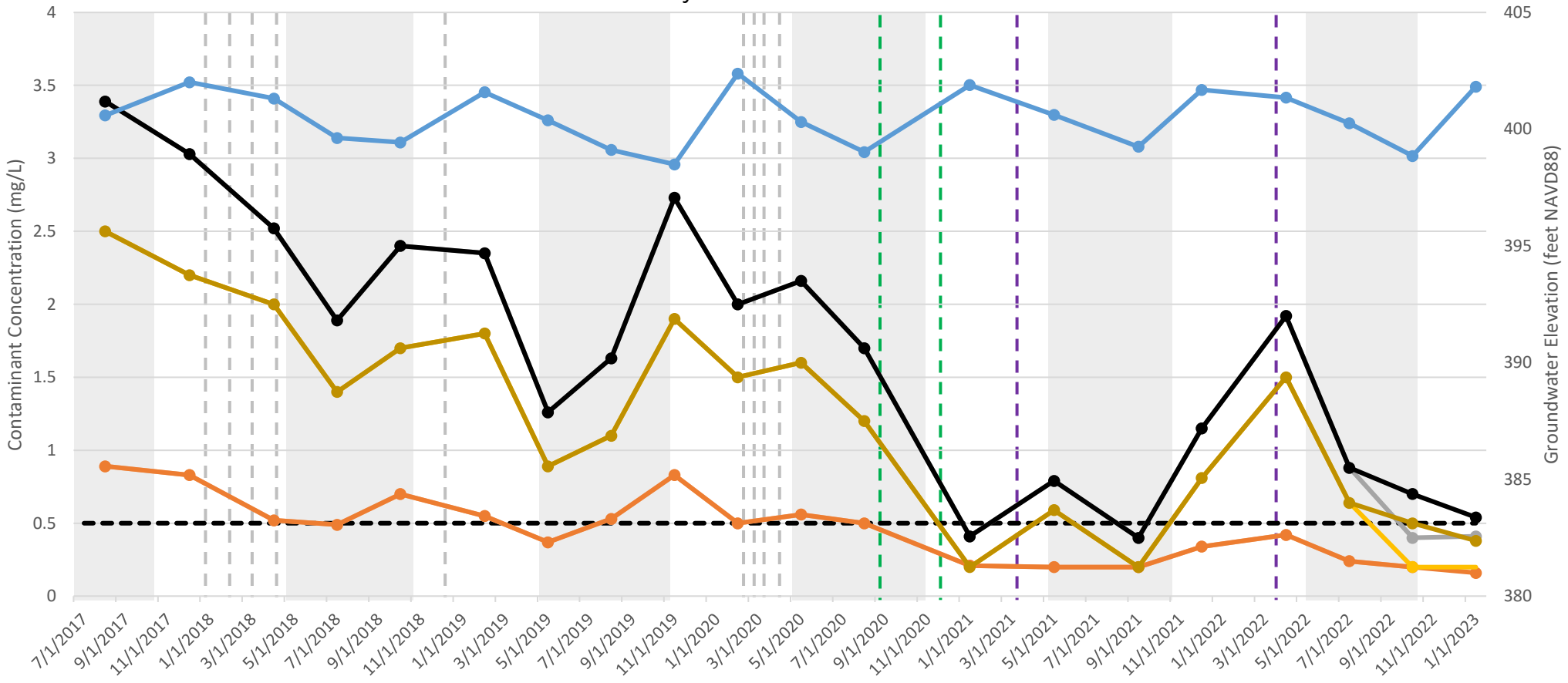
Former Park Lake Homes Maintenance Center
9800 8th Ave SW. Seattle, Washington

GeoEngineers

Figure 2

\\geoengineers.com\WAN\Projects\1\1329003\CAD\29\AnnualGWReport\1329003329_F02_Site Plan

MW-2 Groundwater Analytical Data and Treatment Plot



Legend:

Remedial Events

- Groundwater Removal Event
- Injection Event
- ORC Sock Replacement
- Dry Season (May through August)

Data Type

- Sum of Diesel & Heavy Oil
- Sum of Diesel & Heavy Oil w/ SGC
- Diesel-Range
- Diesel-Range w/ SGC
- Heavy Oil-Range
- Heavy Oil-Range w/ SGC
- MTCA Method A Cleanup Level
- Groundwater Elevation (feet NAVD88)

Notes:

1. Data Source: Groundwater samples were collected by low-flow Sampling Methods and analyzed at onsite Environmental Laboratory, in Redmond, WA. Lab reports are presented in Appendix B.
2. Abbreviations: mg/L = milligrams per liter, MTCA = Model Toxics Control Act, MW = monitoring well, and ORC = oxygen reducing compound.
3. This plot is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

MW-2 Groundwater Data and Treatment Plot

Former Park Place Homes Maintenance Center
Seattle, Washington

GeoEngineers

Figure 3

1329-003-29 Date Exported: 03/01/2023

APPENDIX A
Field Procedures

APPENDIX A
FIELD PROCEDURES

Groundwater Sample Collection and Handling

Groundwater samples were collected using a peristaltic pump with dedicated Teflon tubing at low-flow sampling rates. The groundwater was pumped at approximately 0.5 liter per minute until the water purged clear, after which the samples were collected at a flow rate of approximately 0.5 liter per minute (low-flow). A YSI water quality meter with flow-through-cell was used to monitor the following parameters during purging:

- Acidity (pH)
- Electrical conductivity (EC)
- Turbidity
- Dissolved oxygen (DO)
- Temperature
- Total dissolved solids (TDS)
- Oxygen reduction potential (ORP)
- Salinity

Collection of water samples began once these parameters were observed to vary by less than 10 percent on three consecutive measurements. Purge water generated during these activities was transferred to the onsite dedicated purge water drum labeled with the date and origin of contents. Incidental waste generated during sampling activities such as gloves, plastic sheeting, paper towels and similar expended and discarded field supplies were disposed of in the local trash receptacle.

The groundwater samples were transferred directly from the tubing outlet to laboratory-prepared sample containers. New nitrile gloves were worn when collecting the groundwater samples. The sample containers were filled completely and placed in a cooler with ice pending transport to the analytical laboratory. Sample labels were completed for each sample. Chain-of-custody procedures were followed in transporting the samples to the laboratory.

Investigative Waste Disposal for Groundwater and Soil

Purge water generated during quarterly sampling events was brought directly to Marine Vacuum Services Inc. for permitted disposal. pH measurements of investigation wastewater are tabulated in Table 2; wastewater pH was below 12.5 during all quarterly sampling events. No drums containing remediation waste remain in the KCHA owned storage facility. Purge water disposal tickets are provided in Appendix C.

APPENDIX B
Disposal Receipts

BILL OF LADING

N° 32052

PRODUCT TRANSPORT MANIFEST

MARINE VACUUM SERVICE, INC.

24 HOUR EMERGENCY PHONE NUMBER (206) 762-0240

FAX NUMBER 206-763-8084

TRUCK NUMBER _____ DATE 4/26/22

TO
DESTINATION
NAME Marine Vacuum Service, Inc.
STREET 1516 South Graham Street
CITY/STATE Seattle, WA 98108

FROM
SHIPPER
NAME Geo Engineers
STREET _____
CITY/STATE Seattle, WA

QUANTITY	PROPER SHIPPING NAME	UN (PLACARD) NUMBER
4 Gallons	Purge Water	
	SLUDGE	

RECEIVER _____ DATE 4/26/22

SHIPPER _____ DATE 4/26/22

NOTE:

Customer warrants that the waste petroleum products being transferred by the above collector do not contain any contaminates including without limitations, pesticides, chlorinated solvents at concentrations greater than 1000 PPM, any detectable levels of PCBs, or any other material classified as dangerous or hazardous waste by 40 CFR Part 261, Subpart C and D (implementing the Federal Resource Conservation and Recover Act), or by any equivalent state dangerous or hazardous substance classification programs. Should laboratory tests find this waste not in compliance with 40 CFR Part 261, customer (generator) agrees to pay for all disposal costs incurred.

BILL OF LADING

PRODUCT TRANSPORT MANIFEST

MARINE VACUUM SERVICE, INC.

24 HOUR EMERGENCY PHONE NUMBER (206) 762-0240

FAX NUMBER 206-763-8084

Nº 32385

Job #1329-003-2

TRUCK NUMBER N/A DATE 07-21-22

TO
DESTINATION
NAME Marine Vacuum Service, Inc.
STREET 1516 South Graham Street
CITY/STATE Seattle, WA 98108

FROM
SHIPPER
NAME Geo Eng.
STREET 9932 8th Ave SW
CITY/STATE Seattle, WA. 98106

QUANTITY	PROPER SHIPPING NAME	UN (PLACARD) NUMBER
6 gls	Purge Water	

SLUDGE

RECEIVER Carl DATE

SHIPPER DATE

NOTE:

Customer warrants that the waste petroleum products being transferred by the above collector do not contain any contaminates including without limitations, pesticides, chlorinated solvents at concentrations greater than 1000 PPM, any detectable levels of PCBs, or any other material classified as dangerous or hazardous waste by 40 CFR Part 261, Subpart C and D (implementing the Federal Resource Conservation and Recover Act), or by any equivalent state dangerous or hazardous substance classification programs. Should laboratory tests find this waste not in compliance with 40 CFR Part 261, customer (generator) agrees to pay for all disposal costs incurred.

BILL OF LADING

PRODUCT TRANSPORT MANIFEST

MARINE VACUUM SERVICE, INC.

N° 32665

24 HOUR EMERGENCY PHONE NUMBER (206) 762-0240

FAX NUMBER 206-763-8084

TRUCK NUMBER ________ DATE 10-15-22

TO		FROM	
DESTINATION NAME	Marine Vacuum Service, Inc.	SHIPPER NAME	GEO Engineer
STREET	1516 South Graham Street	STREET	
CITY/STATE	Seattle, WA 98108	CITY/STATE	

QUANTITY	PROPER SHIPPING NAME	UN (PLACARD) NUMBER
5gal	Waste Water	
	SLUDGE	

RECEIVER MVS Ray DATE 10-15-22 SHIPPER Brad Gredony DATE 10-15-22

NOTE:

Customer warrants that the waste petroleum products being transferred by the above collector do not contain any contaminates including without limitations, pesticides, chlorinated solvents at concentrations greater than 1000 PPM, any detectable levels of PCBs, or any other material classified as dangerous or hazardous waste by 40 CFR Part 261, Subpart C and D (implementing the Federal Resource Conservation and Recover Act), or by any equivalent state dangerous or hazardous substance classification programs. Should laboratory tests find this waste not in compliance with 40 CFR Part 261, customer (generator) agrees to pay for all disposal costs incurred.

BILL OF LADING

N° 33657

PRODUCT TRANSPORT MANIFEST

MARINE VACUUM SERVICE, INC.

24 HOUR EMERGENCY PHONE NUMBER (206) 762-0240

FAX NUMBER 206-763-8084

TRUCK NUMBER _____ DATE 1-12-23

File: 1329-003-29

TO DESTINATION
NAME Marine Vacuum Service, Inc.
STREET 1516 South Graham Street
CITY/STATE Seattle, WA 98108

FROM SHIPPER
NAME Geo Engineers
STREET _____
CITY/STATE _____

QUANTITY	PROPER SHIPPING NAME	UN (PLACARD) NUMBER
1gal	Waste Water	
	SLUDGE	

RECEIVER UVS: Ray DATE 1-12-23

SHIPPER X Brian Colleran DATE 1-12-23

NOTE:

Customer warrants that the waste petroleum products being transferred by the above collector do not contain any contaminates including without limitations, pesticides, chlorinated solvents at concentrations greater than 1000 PPM, any detectable levels of PCBs, or any other material classified as dangerous or hazardous waste by 40 CFR Part 261, Subpart C and D (implementing the Federal Resource Conservation and Recover Act), or by any equivalent state dangerous or hazardous substance classification programs. Should laboratory tests find this waste not in compliance with 40 CFR Part 261, customer (generator) agrees to pay for all disposal costs incurred.

APPENDIX C
Chemical Analytical Data

APPENDIX C
CHEMICAL ANALYTICAL DATA

Analytical Methods

Chain-of-custody procedures were followed during the transport of the soil and groundwater samples to the analytical laboratory. The samples were held in cold storage pending extraction and/or analysis. The analytical results, analytical methods reference and laboratory quality control (QC) records are included in this appendix. The analytical results are also summarized in the text and tables of this report.

Analytical Data Review

The laboratory maintains an internal quality assurance program as documented in its laboratory quality assurance manual. The laboratory uses a combination of blanks, surrogate recoveries, duplicates, matrix spike recoveries, matrix spike duplicate recoveries, blank spike recoveries and blank spike duplicate recoveries to evaluate the validity of the analytical results. The laboratory also uses data quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The data quality goals were included in the laboratory reports. The laboratory compared each group of samples with the existing data quality goals and noted any exceptions in the laboratory report. Data quality exceptions documented by the accredited laboratory were reviewed by GeoEngineers. Based on our data quality review, it is our opinion that the laboratory data qualifiers listed are not significant with regard to the use of the data for characterization purposes. The samples/results were considered of acceptable quality for their intended use in this report.

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

April 29, 2022

Katy Atakturk
GeoEngineers, Inc.
2101 4th Avenue, Suite 950
Seattle, WA 98121

Re: Analytical Data for Project 1329-003-29
Laboratory Reference No. 2204-290

Dear Katy:

Enclosed are the analytical results and associated quality control data for samples submitted on April 26, 2022.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: April 29, 2022
Samples Submitted: April 26, 2022
Laboratory Reference: 2204-290
Project: 1329-003-29

Case Narrative

Samples were collected on April 26, 2022 and received by the laboratory on April 26, 2022. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: April 29, 2022
Samples Submitted: April 26, 2022
Laboratory Reference: 2204-290
Project: 1329-003-29

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-2-220426	04-290-01	Water	4-26-22	4-26-22	

Date of Report: April 29, 2022
Samples Submitted: April 26, 2022
Laboratory Reference: 2204-290
Project: 1329-003-29

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-2-220426**					
Laboratory ID:	04-290-01					
Diesel Range Organics	**0.42**	0.20	NWTPH-Dx	4-27-22	4-27-22	N
Lube Oil Range Organics	**1.5**	0.20	NWTPH-Dx	4-27-22	4-27-22	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				

Date of Report: April 29, 2022
Samples Submitted: April 26, 2022
Laboratory Reference: 2204-290
Project: 1329-003-29

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0427W1					
Diesel Range Organics	**ND**	0.16	NWTPH-Dx	4-27-22	4-27-22	
Lube Oil Range Organics	**ND**	0.16	NWTPH-Dx	4-27-22	4-27-22	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*101*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	SB0427W1									
	ORIG	DUP								
Diesel Fuel #2	**0.440**	**0.388**	NA	NA		NA	NA	13	NA	
Surrogate:										
o-Terphenyl						*99*	*85*	*50-150*		

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

X2 - Sample extract treated with a silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

Page 1 of 1

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GeoEngineers
Project Number: 1329-003-29
Project Name: FCHA
Project Manager: Katy Ataturk
Sampled by: Brittany Davis

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☒ Standard (7 Days)
- ☐ _____ (other)

Laboratory Number: 04-290

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664					% Moisture
1	MW-2-220426	4/26/22	1125	W	2				X																		

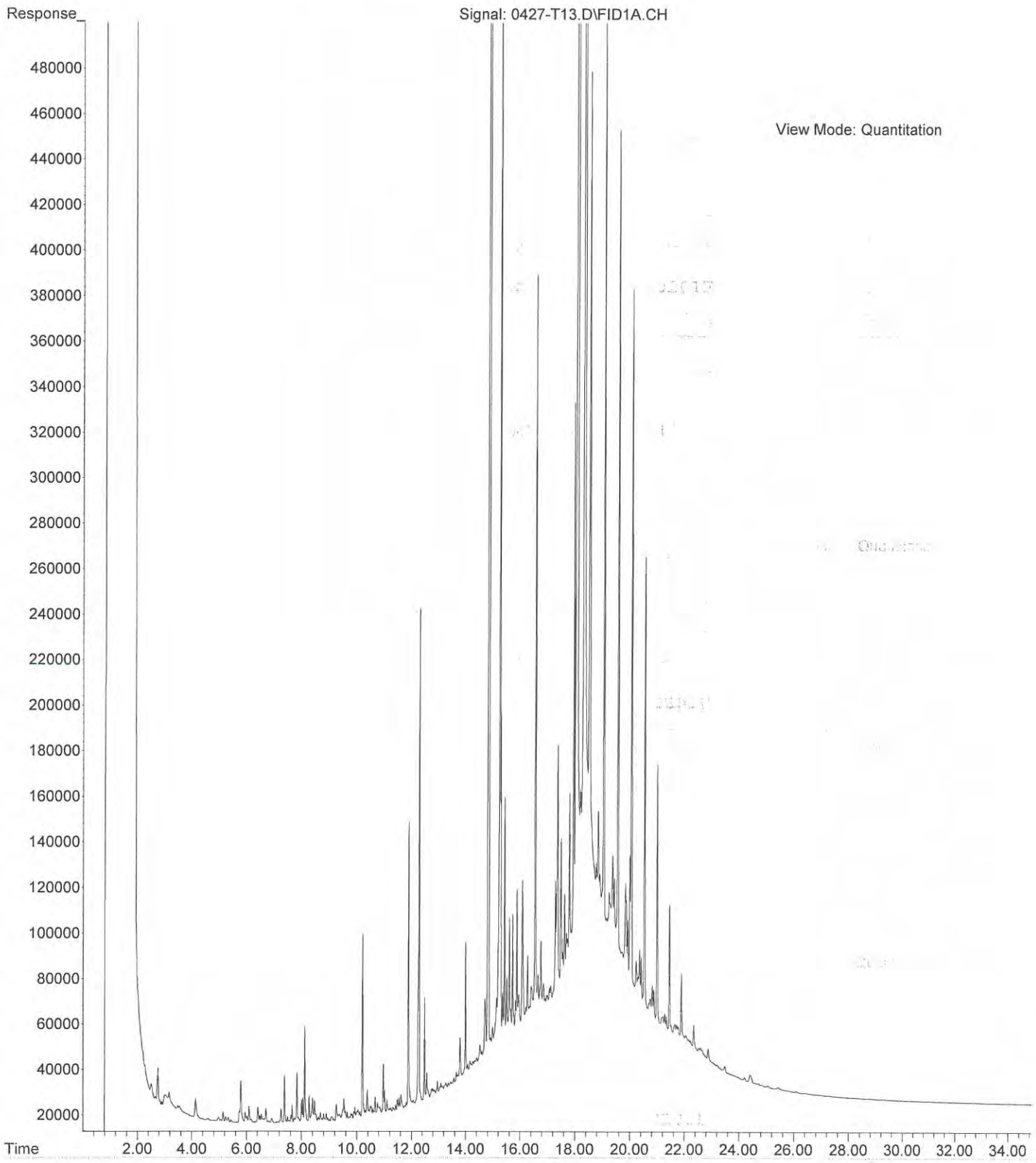
	Signature	Company	Date	Time
Relinquished	Brittany Davis	GeoEngineers	4/26	1300
Received	Nichelle Bakhir	OSE	4/26/22	1300
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

File :X:\DIESELS\Teri\Data\T220427\0427-T13.D
Operator : LIMS import
Acquired : 27 Apr 2022 17:58 using AcqMethod T220201F.M
Instrument : Teri
Sample Name: 04-290-01
Misc Info : Sample
Vial Number: 13



OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

July 28, 2022

Katy Atakturk
GeoEngineers, Inc.
2101 4th Avenue, Suite 950
Seattle, WA 98121

Re: Analytical Data for Project 1329-003-29
Laboratory Reference No. 2207-184

Dear Katy:

Enclosed are the analytical results and associated quality control data for samples submitted on July 21, 2022.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: July 28, 2022
Samples Submitted: July 21, 2022
Laboratory Reference: 2207-184
Project: 1329-003-29

Case Narrative

Samples were collected on July 21, 2022 and received by the laboratory on July 21, 2022. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: July 28, 2022
Samples Submitted: July 21, 2022
Laboratory Reference: 2207-184
Project: 1329-003-29

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-2_072122	07-184-01	Water	7-21-22	7-21-22	

Date of Report: July 28, 2022
Samples Submitted: July 21, 2022
Laboratory Reference: 2207-184
Project: 1329-003-29

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-2_072122**					
Laboratory ID:	07-184-01					
Diesel Range Organics	**0.24**	0.20	NWTPH-Dx	7-25-22	7-25-22	
Lube Oil Range Organics	**0.64**	0.20	NWTPH-Dx	7-25-22	7-25-22	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*82*	*50-150*				

Date of Report: July 28, 2022
Samples Submitted: July 21, 2022
Laboratory Reference: 2207-184
Project: 1329-003-29

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0725W1					
Diesel Range Organics	**ND**	0.16	NWTPH-Dx	7-25-22	7-25-22	
Lube Oil Range Organics	**ND**	0.16	NWTPH-Dx	7-25-22	7-25-22	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*80*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	SB0725W1										
	ORIG	DUP									
Diesel Fuel #2	**0.429**	**0.421**	NA	NA		NA		NA	2	NA	
Surrogate:											
o-Terphenyl						*116*	*112*	*50-150*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

X2 - Sample extract treated with a silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GeoEngineers
Project Number: 1329-003-29
Project Name: KCHA
Project Manager: KATY ATKETUKR
Sampled by: BRITTANY DAVIS

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☑ Standard (7 Days)
- ☐ _____ (other)

Laboratory Number: 07-184

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664					% Moisture
1	MW-2_072122	7/21/22	1235	W	2				X																		

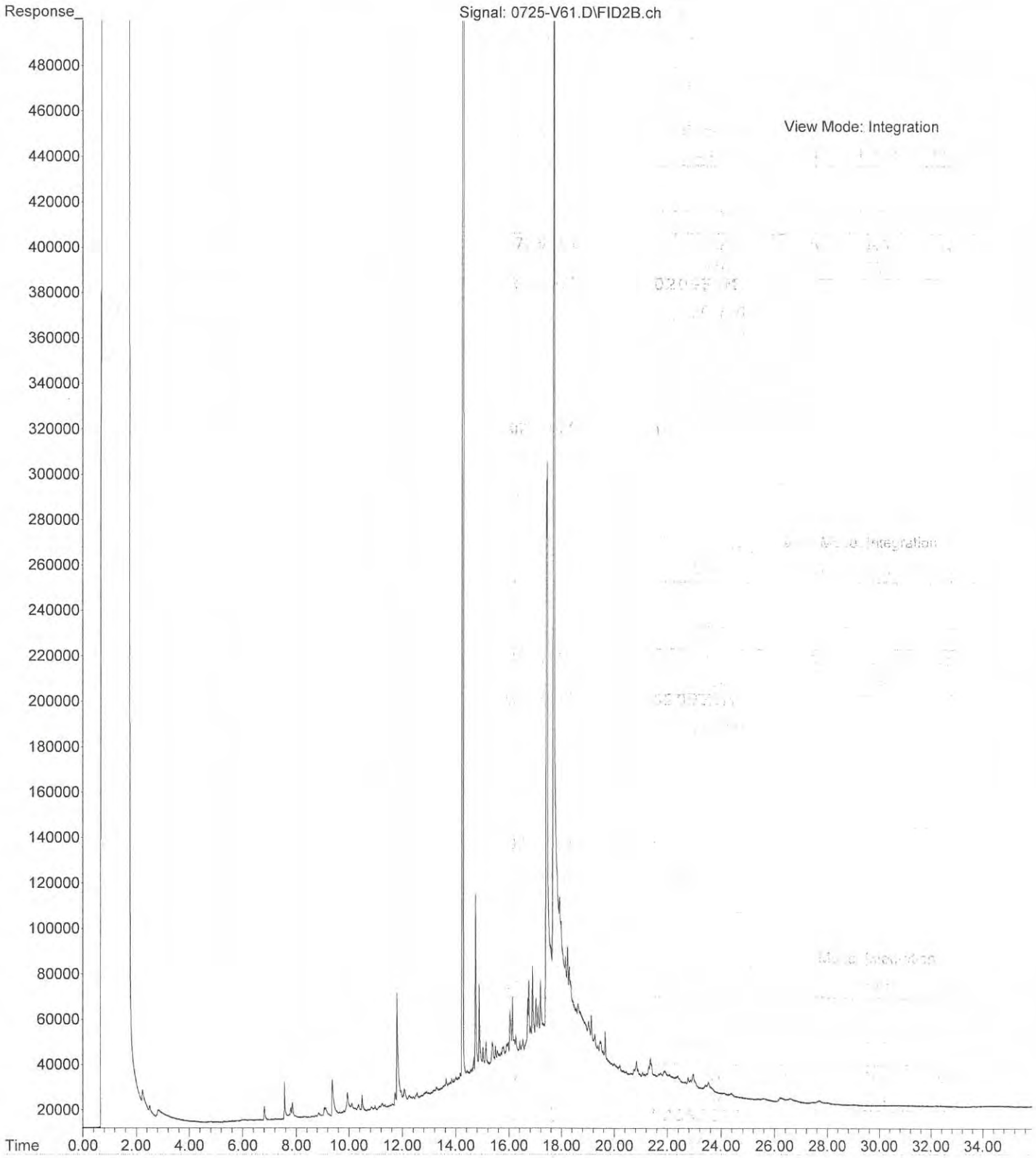
	Signature	Company	Date	Time
Relinquished		GeoEngineers	7/21/22	1355
Received		OSE	7/21/22	1355
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

File :C:\msdchem\2\data\V220725.SEC\0725-V61.D
Operator : LAD
Acquired : 25 Jul 2022 16:26 using AcqMethod V220209F.M
Instrument : Vigo
Sample Name: 07-184-01
Misc Info : RearSamp
Vial Number: 61



OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

October 24, 2022

Katy Atakturk
GeoEngineers, Inc.
2101 4th Avenue, Suite 950
Seattle, WA 98121

Re: Analytical Data for Project 1329-003-29
Laboratory Reference No. 2210-121

Dear Katy:

Enclosed are the analytical results and associated quality control data for samples submitted on October 13, 2022.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: October 24, 2022
Samples Submitted: October 13, 2022
Laboratory Reference: 2210-121
Project: 1329-003-29

Case Narrative

Samples were collected on October 13, 2022 and received by the laboratory on October 13, 2022. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: October 24, 2022
Samples Submitted: October 13, 2022
Laboratory Reference: 2210-121
Project: 1329-003-29

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-2-221013	10-121-01	Water	10-13-22	10-13-22	

Date of Report: October 24, 2022
Samples Submitted: October 13, 2022
Laboratory Reference: 2210-121
Project: 1329-003-29

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-2-221013**					
Laboratory ID:	10-121-01					
Diesel Range Organics	**ND**	0.20	NWTPH-Dx	10-21-22	10-23-22	
Lube Oil Range Organics	**0.50**	0.20	NWTPH-Dx	10-21-22	10-23-22	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*82*	*50-150*				
Client ID:	**MW-2-221013**					
Laboratory ID:	10-121-01					
Diesel Range Organics	**ND**	0.20	NWTPH-Dx	10-21-22	10-23-22	X2
Lube Oil Range Organics	**ND**	0.20	NWTPH-Dx	10-21-22	10-23-22	X2
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*80*	*50-150*				

Date of Report: October 24, 2022
Samples Submitted: October 13, 2022
Laboratory Reference: 2210-121
Project: 1329-003-29

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1021W1					
Diesel Range Organics	**ND**	0.16	NWTPH-Dx	10-21-22	10-21-22	
Lube Oil Range Organics	**ND**	0.16	NWTPH-Dx	10-21-22	10-21-22	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*103*	*50-150*				
Laboratory ID:	MB1021W1					
Diesel Range Organics	**ND**	0.16	NWTPH-Dx	10-21-22	10-23-22	X2
Lube Oil Range Organics	**ND**	0.16	NWTPH-Dx	10-21-22	10-23-22	X2
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*121*	*50-150*				

Analyte	Result		Spike Level	Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	SB1021W1									
	ORIG	DUP								
Diesel Fuel #2	**0.404**	**0.397**	NA	NA		NA	NA	2	NA	
Surrogate:										
o-Terphenyl					*108*	*105*	*50-150*			
Laboratory ID:	SB1021W1									
	ORIG	DUP								
Diesel Fuel #2	**0.377**	**0.364**	NA	NA		NA	NA	4	NA	X2
Surrogate:										
o-Terphenyl					*111*	*111*	*50-150*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

X2 - Sample extract treated with a silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GEOENGINEERS
Project Number: 1329-003-29
Project Name: KCHA
Project Manager: KATY ATAKTURK
Sampled by: BRIAN ANDERSON

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☒ Standard (7 Days)
- ☐ _____ (other)

Laboratory Number: 10-121

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up ☒)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	NWTPH-Dx				% Moisture
1	MW-2-221013	10-13-22	1141	GW	2				X														X				

	Signature	Company	Date	Time
Relinquished	Brian Anderson	GEOENGINEERS	10-13-22	1355
Received		ORE	10/13/22	1335
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

RUN SAMPLE - WITH SILICA GEL CLEANUP. NO ACID AND WITHOUT SILICA GEL CLEANUP

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

January 20, 2023

Katy Atakturk
GeoEngineers, Inc.
2101 4th Avenue, Suite 950
Seattle, WA 98121

Re: Analytical Data for Project 1329-003-29
Laboratory Reference No. 2301-094

Dear Katy:

Enclosed are the analytical results and associated quality control data for samples submitted on January 12, 2023.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: January 20, 2023
Samples Submitted: January 12, 2023
Laboratory Reference: 2301-094
Project: 1329-003-29

Case Narrative

Samples were collected on January 12, 2023 and received by the laboratory on January 12, 2023. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: January 20, 2023
Samples Submitted: January 12, 2023
Laboratory Reference: 2301-094
Project: 1329-003-29

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-2-230112	01-094-01	Water	1-12-23	1-12-23	

Date of Report: January 20, 2023
Samples Submitted: January 12, 2023
Laboratory Reference: 2301-094
Project: 1329-003-29

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-2-230112**					
Laboratory ID:	01-094-01					
Diesel Range Organics	**0.16**	0.10	NWTPH-Dx	1-13-23	1-17-23	
Lube Oil Range Organics	**0.38**	0.21	NWTPH-Dx	1-13-23	1-17-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*91*	*50-150*				
Client ID:	**MW-2-230112**					
Laboratory ID:	01-094-01					
Diesel Range Organics	**ND**	0.21	NWTPH-Dx	1-13-23	1-19-23	X2
Lube Oil Range Organics	**ND**	0.21	NWTPH-Dx	1-13-23	1-19-23	X2
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*95*	*50-150*				

Date of Report: January 20, 2023
Samples Submitted: January 12, 2023
Laboratory Reference: 2301-094
Project: 1329-003-29

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0113W1					
Diesel Range Organics	**ND**	0.080	NWTPH-Dx	1-13-23	1-16-23	
Lube Oil Range Organics	**ND**	0.16	NWTPH-Dx	1-13-23	1-16-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*99*	*50-150*				
Laboratory ID:	MB0113W1					
Diesel Range Organics	**ND**	0.16	NWTPH-Dx	1-13-23	1-16-23	X2
Lube Oil Range Organics	**ND**	0.16	NWTPH-Dx	1-13-23	1-16-23	X2
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*103*	*50-150*				

Analyte	Result		Spike Level	Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	SB0113W1									
	ORIG	DUP								
Diesel Fuel #2	**0.470**	**0.453**	NA	NA		NA	NA	4	NA	
Surrogate:										
o-Terphenyl					*114*	*112*	*50-150*			
Laboratory ID:	SB0113W1									
	ORIG	DUP								
Diesel Fuel #2	**0.515**	**0.463**	NA	NA		NA	NA	11	NA	X2
Surrogate:										
o-Terphenyl					*130*	*121*	*50-150*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

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L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

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U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

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X2 - Sample extract treated with a silica gel cleanup procedure.

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Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
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Phone: (425) 883-3881 • www.onsite-env.com

Company: GEOENGINEERS
Project Number: 1329-003-29
Project Name: KCHA
Project Manager: KATY ATAKTURK
Sampled by: BRIAN ANDERSON

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days)
☐ _____ (other)

Laboratory Number: 01-094

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid/ SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	NWTPH-Dx				% Moisture
	~~MW-2-230112~~	~~1-12-23~~																									
1	MW-2-230112	1-12-23	1300	W	2				X													X					

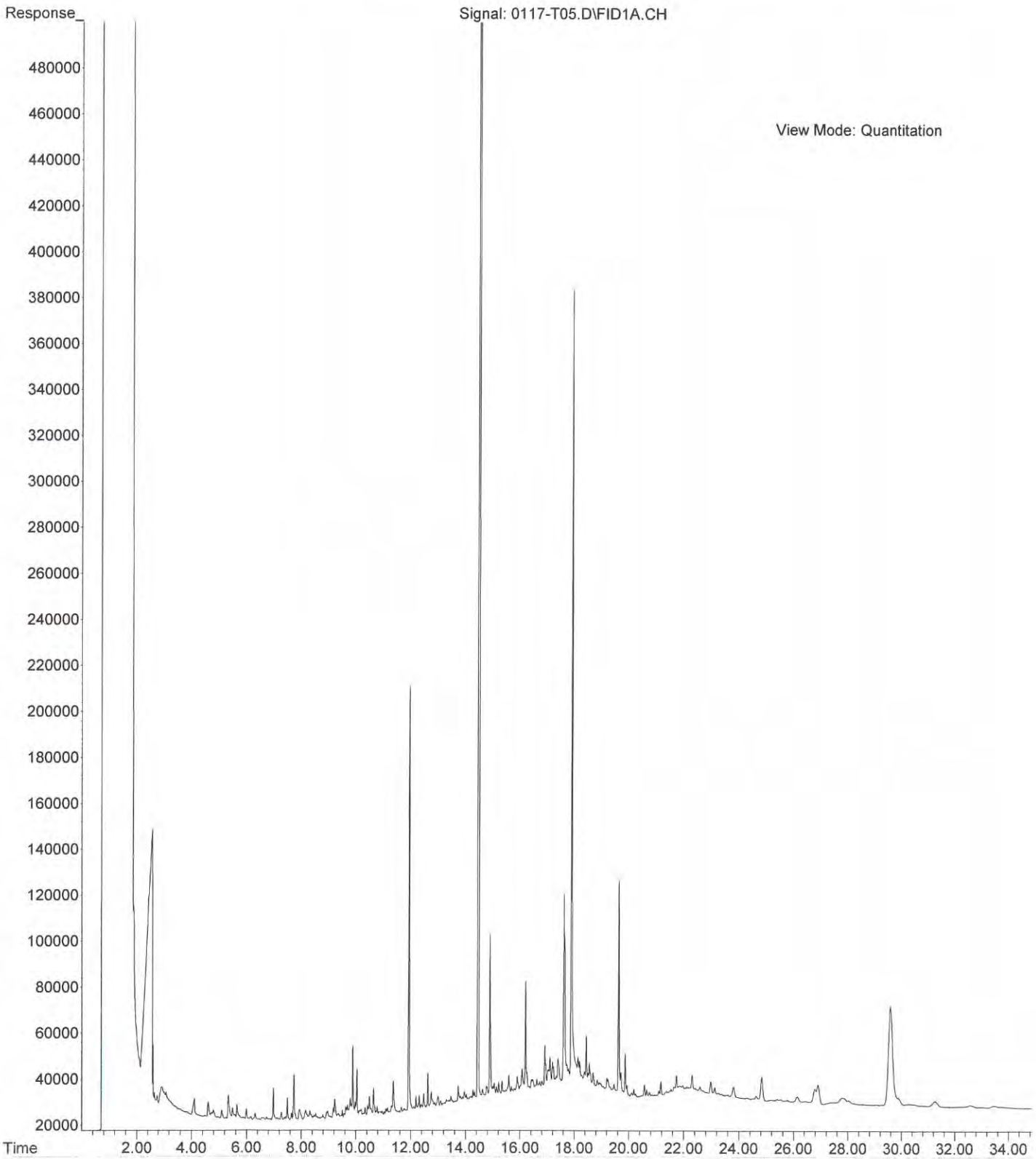
	Signature	Company	Date	Time
Relinquished	Brian Anderson	GEOENGINEERS	1-12-23	1439
Received	Nicholle Bohn	OSE	1/12/23	1439
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
RUN SAMPLE - WITH SILICA GEL CLEANUP - NO ACID AND WITHOUT SILICA GEL CLEAN

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

File :X:\DIESELS\Teri\Data\T230117\0117-T05.D
Operator : LAD
Acquired : 17 Jan 2023 16:19 using AcqMethod T220831F.M
Instrument : Teri
Sample Name: 01-094-01
Misc Info : Sample
Vial Number: 5



APPENDIX D
Report Limitations and Guidelines for Use

APPENDIX D
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geosciences practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Environmental Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of King County Housing Authority (KCHA) and their authorized agents. This report may be reviewed by regulatory agencies. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment or remedial action study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except KCHA should rely on this report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report Is Based on a Unique Set of Project-Specific Factors

This report applies to the Former Park Lake Homes Maintenance Center Site located at 9800 8th Avenue SW located in Seattle, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- Not prepared for you,
- Not prepared for your project,
- Not prepared for the specific site explored, or
- Completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

[1] Developed based on material provided by GBA, The GeoProfessional Business Association; www.gba.org.

Reliance Conditions for Third Parties

No third party may rely on the product of our services unless GeoEngineers agrees in advance, and in writing to such reliance. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations Are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions Can Change

This report is based on conditions that existed at the time our site studies were performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes and slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Soil and Groundwater End Use

The cleanup levels referenced in this report are site- and situation-specific. The cleanup levels may not be applicable for other sites or for other on-site uses of the affected media (soil and/or groundwater). Note that hazardous substances may be present in some of the site soil and/or groundwater at detectable concentrations that are less than the referenced cleanup levels. GeoEngineers should be contacted prior to the export of soil or groundwater from the subject site or reuse of the affected media on site to evaluate

the potential for associated environmental liabilities. We cannot be responsible for potential environmental liability arising out of the transfer of soil and/or groundwater from the subject site to another location or its reuse on site in instances that we were not aware of or could not control.

Most Environmental Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

GeoEngineers