2023 Groundwater Monitoring Report

Tidewater Fuel Leak Site
2900 Sacajawea Park Road
Pasco, Washington 99301
Facility ID 39378684
Cleanup Site ID 2331

For
Tidewater Terminal Company

October 9, 2023

GeoEngineers
Earth Science + Technology

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File No. 09991-005-02

October 9, 2023

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1.0 INTRODUCTION

This report presents results of the June 2023 groundwater quality monitoring event conducted at the Tidewater Terminal Company (Tidewater) Fuel Leak Site in Pasco, Washington (herein referred to as "site"). Site groundwater has been contaminated with petroleum hydrocarbons resulting from a July 2000 leak of unleaded gasoline from one of Tidewater's fuel transfer lines located near groundwater monitoring well AR-1. The historical release resulted in localized degradation of groundwater quality within the unconfined groundwater zone beneath the site. Groundwater monitoring has been conducted on an annual basis at the site since the execution of a November 22, 2016 Consent Decree (No. 16-250951-11) to observe and document trends in groundwater conditions and quality.

The site is located on a 3-acre easement that crosses the 33-acre Pasco Bulk Terminal currently owned by Marathon Petroleum Corporation (Marathon). The site is located approximately as shown on Figure 1 - Vicinity Map, at 2900 Sacajawea Park Road, Pasco, Washington 99301. Locations of groundwater monitoring wells and groundwater elevations are presented on Figure 2 - Site Plan and Groundwater Elevations, June 27, 2023. The 2023 monitoring event was performed in accordance with the Compliance Monitoring Plan (CMP) dated November 30, 2017 (CH2M, 2017) and approved by the Washington Department of Ecology (Ecology) on December 8, 2017.

1.1. Purpose

This data summary report has been prepared by GeoEngineers, Inc. (GeoEngineers) to document the field measured parameters and chemical analytical results from the June 27 through June 29, 2023 groundwater monitoring event conducted at the site. As described in the CMP, the purpose of annual groundwater monitoring at the Site is to monitor indicator substances and secondary indicator parameters for the effectiveness of monitored natural attenuation (MNA) as the selected cleanup action for the site (CH2M, 2017). Indicator substances from the CMP include benzene, toluene, ethylbenzene, and total xylenes (BTEX), and gasoline, diesel, and heavy oil-range total petroleum hydrocarbons (TPHg, TPHd, and TPHo). Secondary indicator parameters include ferrous iron, manganese, methane, and sulfate, and will be used in conjugation with field parameters dissolved oxygen, oxidation reduction potential, and pH to evaluate the effectiveness of MNA at the site. The CMP provides the cleanup levels for indicator substances for the site (Table 1 of the CMP). The Sampling and Analysis Plan (Appendix A of the CMP, Table A-2) provides a full list of analytical parameters.

1.2. Objectives

As required by the Consent Decree and defined in the Cleanup Action Plan (CAP), the CMP describes the monitoring locations, methods, frequency, analytical parameters, and reporting obligations required to ensure that the Ecology-selected cleanup objectives established in the CAP are eventually met (i.e., MNA, coupled with passive bioventing and institutional controls). To this end, this annual report summarizes the results of protection/performance water quality monitoring within and surrounding localized areas of residual contamination near the historical release. The sampling approach is described in the Sampling and Analysis Plan (Appendix A) of the CMP (CH2M, 2017) and was designed to collect samples from compliance wells located within the site monitoring network (Figure 2).

This data summary report includes a summary of field activities, sampling methods and field observations, and a summary of analytical results. All fieldwork and laboratory analyses were performed in general accordance with the Sampling and Analysis Plan as included in the 2017 CMP.

2.0 GROUNDWATER MONITORING PROGRAM

The current Tidewater compliance monitoring network includes one upgradient monitoring well (AR-1), three sentinel wells (MW-4, MW-6, and MW-8), one source area well (AR-1), and one downgradient interior plume well (AR-8). Annual groundwater monitoring activities generally include measuring the depth to groundwater in the eleven site monitoring wells listed in Table 1 - Groundwater Elevations and Field Parameter Readings, measuring water quality parameters, collecting groundwater samples from the six compliance monitoring wells, submitting samples to an analytical laboratory for chemical analysis, interpreting data and trends on field and laboratory findings, and preparing this report.

Prior to 2021, well AR-4 was monitored as the downgradient interior plume source area well. During the 2020 groundwater monitoring event, a submersible sampling pump became stuck near the bottom of the 88-foot deep well. As documented in the 2020 monitoring report (Jacobs, 2021), efforts to retrieve the pump were unsuccessful and Tidewater proposed to replace it in the CMP with well AR-1. Since AR-1 no longer contains separate-phase hydrocarbons (SPH), it can be used to evaluate natural attenuation rates within the source area. Measurable SPH has not been detected in AR-1 since 2010.

On July 21, 2021, representatives of GeoEngineers and Tidewater observed video camera deployment into wells AR-1 and AR-4 by Environmental West Exploration of Spokane, Washington. The video showed damage to the casing of AR-4 at approximately 5 feet below ground surface (bgs). The casing of AR-1 appeared to be intact. Subsequently, an aboveground steel monument set in concrete was constructed over AR-4 by Environmental West Exploration, a Washington licensed well driller, to support its long-term use for groundwater level monitoring.

Also on July 21, 2021, a caliper survey was conducted in well AR-1, which showed the well casing to be relatively straight and intact. Well AR-1 was re-developed by purging approximately five (5) casing volumes from the well. Details of the camera investigation, caliper survey, purging observations, and other well repair activities were presented in the 2021 groundwater monitoring report (GeoEngineers, 2021).

On July 23, 2021, GeoEngineers notified Ecology concerning the condition of AR-4 and requested adopting AR-1 as a compliance sampling well. On July 26, 2021, Ecology approved the request via email. Since the 2021 groundwater monitoring event, well AR-1 has been sampled as the source area well. AR-4 is monitored for SPH and depth to groundwater.

2.1. Groundwater Measurements and Elevations

The 2023 groundwater monitoring was conducted by GeoEngineers personnel on June 27, June 28, and June 29, 2023. Groundwater levels in all eleven wells listed in Table 1 of the CMP were measured prior to purging and sampling the six compliance wells. The water table interface in all 11 CMP wells were carefully gauged for SPH using an oil-water interface probe. The presence of SPH was not detected in the site's monitoring wells during the 2023 monitoring event.

Groundwater levels were measured from the top of casing of each well. Groundwater measurements were recorded on the groundwater field forms in Appendix A Field Forms. Groundwater measurements are provided in Table 1. Depths to water for all measured wells at the site ranged from 78.42 feet below top of casing in well MW-4 to 83.40 feet bgs in well MW-7. Well AR-12 was dry in June 2023.

Based on depth-to-water measurements, groundwater elevations were calculated and are shown in Table 1. Groundwater elevations at the Site ranged from 343.85 feet above mean seal level (AMSL) in wells MW-5, MW-7, and MW-8 to 343.90 feet AMSL in well AR-1.

The groundwater gradient for the site is flat with less than 0.001 foot/feet (ft/ft) variation between upgradient and downgradient wells. These groundwater elevations are consistent with historical measurements. Groundwater elevations measured during the 2023 monitoring event were approximately 0.065 feet higher than were measured in June 2022. However, since 2010 groundwater elevations have declined 0.7 feet on average. The groundwater flow direction to the south was inferred based on historical groundwater elevations and groundwater plume geometry. Historical groundwater elevations are included in Appendix B.

2.2. Groundwater Monitoring

Groundwater samples were collected from the following six (6) CMP network wells (listed in Table 2 of the CMP): AR-1, AR-8, AR-11, MW-4, MW-6, and MW-8. Groundwater samples were collected using a 2-inch diameter portable submersible pump powered by a direct current (DC) power battery with new polyethylene tubing at each well. Following purging and sampling in each well, the submersible pump and water level probe were decontaminated using a phosphate-free detergent and rinsed with de-ionized water.

Wells were generally sampled in order based on historical concentrations of petroleum hydrocarbons and starting with the lowest historical concentrations of petroleum hydrocarbons and moving to the highest. The order of sampling during the June 2023 monitoring event was AR-11, AR-8, MW-4, MW-6, MW-8, and AR-1.

Well sampling was performed in accordance with the Sampling and Analysis Plan using low-flow sampling techniques. Field parameters recorded on field forms for each well are summarized in Table 1. Well Sampling Forms are provided in Appendix A of this report. Wells were purged until field parameters stabilized over three (3) consecutive 5-minute intervals. Groundwater samples were collected in laboratory-provided sample containers and placed immediately in an iced cooler under chain of custody protocol. Ferrous iron concentrations were field measured using a Hach 890 colorimeter at the time of collecting samples and recorded on the Well Sampling Forms (Appendix A). Field measurements of ferrous iron are summarized in Table 1.

Field duplicates, matrix spike/matrix spike duplicates, and equipment rinsate blanks were collected as quality control for field and laboratory procedures as specified in the Quality Assurance Project Plan (QAPP) (Appendix B of the CMP). The field duplicate sample was collected from well MW-8, and the matrix spike duplicate was collected from well MW-6. Purge water was collected during sampling activities, contained in a labeled 55-gallon drum, and stored at the site within a secured area pending characterization by groundwater results and disposal at the Tidewater Snake River Terminal.

3.0 RESULTS

Groundwater samples collected on June 27, 28, and 29, 2023 were labeled, placed in a cooler with ice, and delivered under chain-of-custody protocol to Anatek Laboratories (Anatek) of Spokane, Washington. Groundwater samples were analyzed for the analytes (indicator substances) listed in Table 2 of the CMP as follows:

- Gasoline-range total petroleum hydrocarbon (TPHg) by NWTPH-Gx; and diesel-range total petroleum hydrocarbons (TPHd)/oil-range total petroleum hydrocarbons (TPHo) by NWTPH-Dx.
- Benzene, toluene, ethylbenzene, and xylenes (collectively BTEX) by EPA Method 8260D.

Groundwater concentrations of petroleum hydrocarbons and BTEX for the June 2023 monitoring event are detailed by well below. Analytical results are provided in Table 2. Laboratory reports are provided in Appendix C.

- AR-11: Petroleum hydrocarbons and BTEX were not detected above laboratory method detection limits (MDL). AR-11 is characterized as the upgradient well for the site in the CMP.
- MW-4: Petroleum hydrocarbons and BTEX were not detected above laboratory MDLs. MW-4 is characterized as a downgradient sentinel well for the site.
- MW-6: Petroleum hydrocarbons and BTEX were not detected above laboratory MDLs. MW-6 is characterized as a downgradient sentinel well for the site.
- MW-8: Diesel- and oil-range organics were not detected in well MW-8. Gasoline-range organics were detected at a concentration of 8,900 micrograms per liter (µg/L). This concentration exceeded the Model Toxics Control Act (MTCA) cleanup level of 800 µg/L. Toluene, ethylbenzene, and total xylenes were detected at concentrations less than corresponding MTCA cleanup levels. Benzene was not detected in well MW-8 above laboratory MDLs. MW-8 is characterized as a cross-gradient sentinel well for the site.
- AR-8: Diesel- and oil-range organics were not detected in well AR-8. Gasoline-range organics were detected at a concentration of 3,360 µg/L, exceeding the MTCA cleanup level. Ethylbenzene and total xylenes were detected at concentrations less than corresponding MTCA cleanup levels. Benzene and toluene were not detected in well AR-8 above laboratory MDLs. AR-8 is characterized as a downgradient plume well for the site.
- AR-1: Oil-range organics were not detected in well AR-1. Gasoline-range organics were detected at a concentration of 85,000 µg/L, exceeding the MTCA cleanup level. Diesel-range organics were detected at a concentration of 6,010 µg/L, although its detection appears to be weathered gasoline. AR-1 is located near the 2000 release and represents the primary interior plume source area well. Other detected concentrations are listed below:
    - Benzene was detected at 723 µg/L and exceeded the MTCA cleanup level of 5 µg/L.
    - Toluene was detected at 3,800 µg/L and exceeded the MTCA cleanup level of 1,000 µg/L.
    - Ethylbenzene was detected at a concentration below the MTCA cleanup level.
    - Total xylenes were detected at 6,740 µg/L and exceeded the MTCA cleanup level of 1,000 µg/L.

In addition to the indicator substances, groundwater samples were analyzed for secondary indicator parameters manganese, sulfate, nitrate, methane and ferrous iron to determine if MNA processes are still occurring at the site. Natural attenuation analytes are provided in Table 2. A summary of MNA parameters as follows:

- Manganese—Manganese was detected in wells AR-1, AR-8, AR-11, and MW-8. Manganese concentrations were highest in wells AR-8 and AR-1 at 1.05 milligrams per liter (mg/L) and 2.21 mg/L, respectively. Sentinel wells without petroleum hydrocarbons exhibited much lower manganese levels ranging from <0.001 to 0.00487 mg/L.
- Sulfate—Sulfate concentrations ranged from 9 to 173 mg/L in the sentinel wells and 54 mg/L in the source area. In general, concentrations of sulfate are lower in wells containing petroleum hydrocarbons. The unusually low level of sulfate in AR-11 during the 2023 event appears to be an anomaly.
- Nitrate: Nitrate concentrations ranged from 0.550 to 30.8 mg/L in the sentinel wells and 1.29 mg/L in the source area. In general, concentrations of nitrate are lower in wells containing petroleum hydrocarbons. Like sulfate, the unusually low level of nitrate in AR-11 during the 2023 event appears to be an anomaly.
- Methane—Methane was detected at concentrations of 6.69 and 67.9 µg/L in AR-8 and AR-1, respectively. Methane was not detected in the remaining wells.
- Iron—Ferrous iron was not detected in any of the June 2023 groundwater samples using laboratory Standard Method (SM) 3500. Field measurements of soluble ferrous iron are discussed in Section 3.2.

3.1. Quality Assurance Summary

Quality assurance samples were collected by GeoEngineers in the field (e.g., field duplicates, equipment blank, and trip blanks). Additionally, the analytical laboratory performed quality assurance on samples during analysis.

3.1.1. Field Quality Assurance Samples

A field duplicate was collected from MW-8 during the June 2023 event. The relative percent difference (RPD) for the field duplicate sample collected at MW-8 was within acceptable limits for all analytes. An equipment rinsate sample (MW-8-ER-2306) was also collected by GeoEngineers field staff from the submersible pump and oil/water interface probe during the sampling event to check field decontamination procedures. No analytes were detected for the equipment blank, indicating decontamination procedures were generally effective and no cross contamination is suspected. No analytes were detected in the trip blanks.

3.1.2. Laboratory Quality Assurance Samples

Laboratory performance criteria for calibration, precision (as measured by laboratory duplicate samples), and accuracy (as measured by spike and surrogate recovery and laboratory control sample analysis) were reviewed. Laboratory quality assurance results indicate laboratory quality control requirements were met for the analyses performed.

3.1.3. Assessment

Based on our review of the laboratory quality assurance results, no data were rejected or qualified.

3.2. Water Quality Field Parameters

During groundwater sampling, field parameters were recorded to provide additional details of water quality. Dissolved oxygen (DO), pH, oxidation-reduction potential (ORP) and soluble ferrous iron were recorded and provide additional data as to if biodegradation processes are occurring. Negative ORP field values, which indicate the potential of reducing conditions, were recorded in AR-1, AR-8, AR-11, MW-4, MW-6, and MW-8. Low DO readings, which indicate increasing anaerobic conditions, were recorded in AR-1 and AR-8. Field pH readings ranged from 7.72 (AR-1) to 8.15 (MW-6). Field concentrations of ferrous iron ranged from 0.00 mg/L in MW-6 to 1.74 mg/L in well AR-1. Field concentrations of iron were generally higher in wells with higher petroleum hydrocarbon concentrations. Field parameters are recorded on the well sampling field sheets in Appendix A and are provided in Table 1.

4.0 CONCLUSIONS

No petroleum hydrocarbons were detected in wells AR-11, MW-4, or MW-6 during the June 2023 monitoring event. This data supports the conclusion that the petroleum hydrocarbon plume remains stable within the monitoring network.

Detected concentrations of TPHg, and toluene, ethylbenzene and total xylenes in wells MW-8 and AR-8 during the June 2023 monitoring event were generally consistent with previous events. Field parameter data indicate that wells with historic and existing petroleum hydrocarbon detections showed negative ORP values (indicating potential for reducing conditions), lower DO readings (indicating presence of anaerobic conditions). Historical groundwater monitoring results are provided in Appendix D. Time series plots for benzene and TPH-g are provided in Appendix E.

Well AR-1 is located within the center of the petroleum hydrocarbon plume directly downgradient for the release area, had the highest TPHg and BTEX concentrations at the site. TPHg, benzene, toluene, and xylenes exceeded MTCA cleanup levels. This is consistent with previous monitoring events. Hydrocarbons detected in the diesel range were attributed to weathered gasoline, which is consistent with the 2000 release of unleaded gasoline.

A qualitative assessment of biodegradation of petroleum hydrocarbons by indigenous microbes through aerobic and/or anaerobic respiration was performed using geochemical parameters of groundwater samples collected from monitoring wells located within the source area (AR-1) and downgradient/cross-gradient plume wells (AR-8 and MW-8) and comparing those results with the results of similar analyses from groundwater samples collected from non-impacted sentinel wells (MW-4, MW-6 and AR-11). During microbial respiration, electrons are transferred from an electron donor (petroleum hydrocarbons) to an electron acceptor. In the process, naturally abundant electron acceptors in the aquifer are reduced (e.g., DO, nitrate, and sulfate) while products of biodegradation increase (dissolved manganese and methane). Consistent with previous sampling events, the geochemical parameters of the 2023 groundwater samples confirm that aerobic and anaerobic biodegradation of petroleum indicator substances is occurring in groundwater at the site. Specifically, by-products of microbial respiration (dissolved manganese and methane) were higher in wells with petroleum hydrocarbons as opposed to wells that have not had petroleum hydrocarbon detections. Conversely, electron acceptors (DO, nitrate, and sulfate) were lower in wells AR-1, AR-8, and MW-8, than wells where petroleum hydrocarbons were historically not detected.

As requested by Ecology, GeoEngineers evaluated the natural attenuation rate of residual petroleum contamination at the site. GeoEngineers used BIOSCREEN Natural Attenuation software for quantitative estimates of restoration timeframes. This software, programmed in the Microsoft Excel spreadsheet environment and based on the Domenico analytical solute transport model, simulates advection, dispersion, adsorption, and aerobic decay, as well as anaerobic reactions that have been shown to be the dominant biodegradation processes at many petroleum release sites. BIOSCREEN assumes that microbial kinetics are relatively fast and that the rate of biodegradation is mostly limited by the time required to replenish electron acceptors in the plume. Using a hydraulic conductivity for fine sand of 20 feet/day, a measured hydraulic gradient of 0.001 foot/feet, and a typical effective porosity of 0.29, the estimated seepage velocity or interstitial groundwater velocity through the source area is 0.07 feet/day (Table 1). Individual BTEX compounds were modeled in BIOSCREEN to evaluate predicted biodegradation at the site. TPHg was not modeled as necessary values are not available for the complex and inconsistent mixture of individual components of petroleum products. The current mass of BTEX compounds was estimated using the maximum recent concentrations, a source thickness of 1 foot, and a radius of 300 feet. The BIOSCREEN software uses a spatial model, including concentrations in adjacent wells, to simulate compound and electron acceptors movement through the modeled system.

Table 1. BIOSCREEN input values

Variable	Value	Units	Citation
Hydraulic Conductivity	20	feet per day	Fine sand value in 2023 CAP (Ecology)
Hydraulic Gradient	0.001	foot per foot	Value from within range from 2023 CAP (Ecology)
Porosity	0.29	--	Fine sand value (Das, B., Advanced Soil Mechanics. Taylor & Francis, London & New York, 2008)
Fraction of Organic Carbon	0.0012	--	Interstate Technology and Regulatory Council, NAPL Site Characterization and Tool Selection Appendix I-1
Plume Length and Width	300	feet	Estimated plume radius
Source Thickness	1	feet	Estimated plume thickness
Current Mass		kilograms	Estimated using maximum recent concentration and approximate plume volume.
Benzene	54		
Toluene	136		
Ethylbenzene	12		
Total Xylenes	108		
K_{oc}		liters per kilogram	EPA BIOSCREEN Appendix Table K-1
Benzene	59		
Toluene	182		
Ethylbenzene	363		
Total Xylenes	386		
Half Life (BTEX)	0.65	years	Field setting average half-life (USGS, Description, Properties, and Degradation of Selected Volatile Organic Compounds Detected in Ground Water—A Review of Selected Literature, 2006)
Delta Oxygen	8.44	milligrams per liter	Calculated from recent groundwater monitoring event data.
Delta Nitrate	20.52		
Observed Ferrous Iron	0.7		
Delta Sulfate	99.8		
Observed Methane	0.167		

The calculated site hydraulic gradient influences the predicted time until cleanup levels are achieved. Any significant change in hydraulic gradient at the site could prolong, or decrease, the length of time needed to achieve cleanup levels at the site. Using the above input values, including the calculated site hydraulic gradient of 0.001 ft/ft, BTEX constituent cleanup levels are predicted to be achieved within 50 or fewer years. Benzene is estimated to achieve cleanup levels within 35 years, while total xylenes are estimated to achieve cleanup leaves within 14 years. Toluene was found to be the slowest to achieve cleanup levels in multiple modeling scenarios at 50 years. Table 2 shows the predicted years before cleanup levels are achieved for each BTEX constituent.

Table 2. Predicted Time Until Cleanup Level Achievement Using BIOSCREEN Instantaneous Reaction Model

Compound	Cleanup Level	Units	Predicted Years Until Cleanup Level Achieved
Benzene	0.005	milligrams per liter	35
Toluene	1		50
Ethylbenzene	0.700		Ethylbenzene is currently under CUL
Total Xylenes	1		14

A copy of the BIOSCREEN input and output for each BTEX compound is provided in Appendix E.

The results of the June 2023 monitoring event continue to support the conclusions presented in the September 2011 Remedial Investigation/Feasibility Study Report (CH2M/URS, 2011) as follows:

- The hydraulic gradient at the site is relatively flat with limited fluctuations.
- The petroleum hydrocarbon source in the vadose zone has been addressed through remedial activities.
- Residual dissolved-phase petroleum hydrocarbons remain on site and within localized areas of the former SPH plume. These areas include monitoring wells AR-1, AR-4, AR-8, and MW-8.
- The lateral extent of the dissolved-phase plume has been stable since active remedial actions were discontinued.
- Measured concentrations of field parameters and analytical results of natural attenuation constituents, as well as the stable lateral extent and concentration of petroleum hydrocarbons in sampled wells, suggest that biodegradation processes continue at the site.
- Restoration timeframe is limited by the flat hydraulic gradient and inability to replenish electron acceptors in the source area. However, the flat hydraulic gradient is keeping the plume from expanding. Since implementation of the CMP in 2018, the extent of the plume has not changed.

5.0 RECOMMENDATIONS (YEAR 2024)

We recommend continuing to monitor according to the CMP, including the continuation of AR-1 compliance sampling in place of AR-4. The next groundwater monitoring event is scheduled for June 2024.

6.0 LIMITATIONS

GeoEngineers has prepared this report for use by Tidewater Terminal Company for the Fuel Leak Site in Pasco, Washington. Our services were conducted in general accordance with our proposal dated April 4, 2023.

Within the limitations of scope, schedule and budget, our services were executed in accordance with generally accepted practices in the field of environmental monitoring in this area at the time this report was prepared. No warranty or other conditions expressed or implied should be understood. Report limitations and guidelines for use are included in Appendix F.

We appreciate the opportunity to provide these continued services to Tidewater. Please call Kurt Harrington, PE at 503.502.1831 if you have questions regarding the contents of this report.

7.0 REFERENCES

CH2M/URS 2011. Remedial Investigation/Feasibility Study Report for the NWTC Pasco Terminal, Pasco, Washington. September 29.

CH2M 2017. Compliance Monitoring Plan for The Tidewater Fuel Leak Site, Pasco. October 3.

U.S. Environmental Protection Agency (EPA) 1997. BIOSCREEN Natural Attenuation Decision Support System, User's Manual Version 1.4. July 1997.

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GeoEngineers 2021. 2021 Groundwater Monitoring Report for the Tidewater Fuel Leak Site, Pasco, Washington. December 10, 2021.

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TABLES

GeoEngineers

Table 1. Groundwater Elevations and Field Parameter Readings

Tidewater Fuel Leak Site Compliance Monitoring Program

Well	Date Monitored [1]	Reference Point Elevation (ft)	Depth to Water (ft btc)	Groundwater Elevation (ft)	Temp (°C)	pH	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Ferrous Iron (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Comments
AR-1	6/29/2023	423.88 [3]	79.98	343.90	20.4	7.72	0.15	-589.7	1.74	1.191	14.0	--
AR-8	6/27/2023	423.02	79.13	343.89	21.2	7.80	0.38	-492.2	0.46	0.919	19.0	--
AR-11	6/27/2023	422.62	78.74	343.88	20.9	8.16	8.15	-252.6	0.10	0.932	8.6	--
MW-4	6/28/2023	422.29	78.42	343.87	18.3	7.94	7.53	-193.3	0.15	0.947	2.3	--
MW-6	6/28/2023	422.50	78.62	343.88	18.0	8.15	8.12	-229.4	0.00	0.917	3.1	Also collected MS/MSD Lab QC Sample
MW-8	6/28/2023	427.15	83.30	343.85	18.9	7.94	5.66	-321.8	0.09	0.840	2.7	Also collected Field Duplicate and Equipment Rinsate Samples
Water Levels Only												
AR-4	6/27/2023	426.51 [2]	82.62	343.89	--	--	--	--	--	--	--	--
AR-7	6/27/2023	425.44	81.55	343.89	--	--	--	--	--	--	--	--
AR-12	6/27/2023	425.50	Dry	--	--	--	--	--	--	--	--	--
MW-5	6/27/2023	425.02	81.17	343.85	--	--	--	--	--	--	--	--
MW-7	6/27/2023	427.25	83.40	343.85	--	--	--	--	--	--	--	--

Notes:

1 - All water level measurements were conducted on June 27, 2023. Groundwater samples were collected on June 27, 28, and 29, 2023.

2 - Reference point elevation was resurveyed on July 27, 2021.

3 - Reference point elevation was resurveyed on June 1, 2022.

" -- " = Not applicable, not available, and/or not measured.

Reference point elevation is top of PVC casing; all elevations are in feet above mean sea level (NAVD88).

Field parameter readings represent final stabilized readings obtained during low-flow purge immediately prior to collection of water-quality sample.

ft = feet

ft btc = feet below top of casing

°C = degrees celsius

mg/L = milligrams per liter

mV = millivolts

mS/cm = millisiemens per centimeter

NTU = Nephelometric Turbidity Units

Table 2. Groundwater Quality Data

Tidewater Fuel Leak Site Compliance Monitoring Program

Well Sample ID Sample Date				AR-11 AR-11-2306 6/27/2023	MW-4 MW-4-2306 6/28/2023	MW-6 MW-6-2306 6/28/2023	MW-8 MW-8-2306 6/28/2023	FD (MW-8) MW-8-FD-2306 6/28/2023	AR-8 AR8-2306 6/27/2023	AR-1 AR1-2306 6/29/2023	Equipment Blank MW-8-ER-2306 6/28/2023
Field Parameters	**Method**	**Units**	**MTCA CUL [1]**								
pH	Field Probe	units	--	8.16	7.94	8.15	7.94	--	7.80	7.72	--
Temperature	Field Probe	°C	--	20.9	18.3	18.0	18.9	--	21.2	20.4	--
Conductivity	Field Probe	mS/cm	--	0.932	0.947	0.917	0.840	--	0.919	1.191	--
Dissolved Oxygen	Field Probe	mg/L	--	8.15	7.53	8.12	5.66	--	0.38	0.15	--
Oxygen Reduction Potential	Field Probe	mV	--	-252.6	-193.3	-229.4	-321.8	--	-492.2	-589.7	--
Turbidity	Field Probe	NTU	--	8.6	2.3	3.1	2.7	--	19.01	14.0	--
Ferrous Iron	Field Screen	mg/L	--	0.10	0.15	0.00	0.09	--	0.46	1.74	--
Petroleum Hydrocarbons											
Benzene	EPA 624.1	µg/L	5	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	**723**	<0.500
Toluene	EPA 624.1	µg/L	1,000	<0.500	<0.500	<0.500	**1.53**	**1.76**	<0.500	**3,800**	<0.500
Ethylbenzene	EPA 624.1	µg/L	700	<0.500	<0.500	<0.500	**45.5**	**65.0**	**48.0**	**434**	<0.500
Total Xylenes	EPA 624.1	µg/L	1,000	<0.500	<0.500	<0.500	**607**	**855**	**55.6**	**6,740**	<0.500
TPH-Gasoline Range	NWTPH-Gx	µg/L	800	<200	<200	<200	**8,900**	**7,800**	**3,360**	**85,000**	<200
TPH-Diesel Range	NWTPH-Dx	µg/L	500	<160	<160	<160	<160	<160	<160	**6,010 [2]**	<160
TPH-Heavy Range	NWTPH-Dx	µg/L	500	<400	<400	<400	<400	<400	<400	<400	<400
MNA Parameters											
Manganese	EPA 200.8	mg/L	--	0.00487	<0.00100	<0.00100	0.283	0.272	1.05	2.21	--
Sulfate	EPA 300.0	mg/L	--	8.56	173	147	113.0	113.0	53.4	54.1	--
Nitrate	EPA 300.0	mg/L	--	0.550	30.8	29.8	22.4	22.6	2.29	1.29	--
Methane	RSK-175 MOD	µg/L	--	<0.65	<0.65	<0.65	<0.65	<0.65	6.69	67.9	--
Ferrous Iron	SM-3500	mg/L	--	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--

Notes:

[1] From the November 2016 Cleanup Action Plan Table 1.

[2] Diesel range detection does not appear to be target compound. Analyst indicates detection appears to be weathered gasoline.

MNA field parameter readings represent final stabilized readings obtained during low-flow purge immediately prior to collection of water-quality sample.

BOLD = Detection

Grey shading = Exceeds MTCA Cleanup Level

Non-detect values reported as "<" laboratory method detection limit.

" -- " = Not applicable, not available, and/or not measured.

MTCA CUL = Model Toxics Control Act Cleanup Level

°C = degrees celsius

µg/L = micrograms per liter

mg/L = milligrams per liter

mV = millivolts

mS/cm = millisiemens per centimeter

NTU = Nephelometric Turbidity Units

FIGURES

GeoEngineers

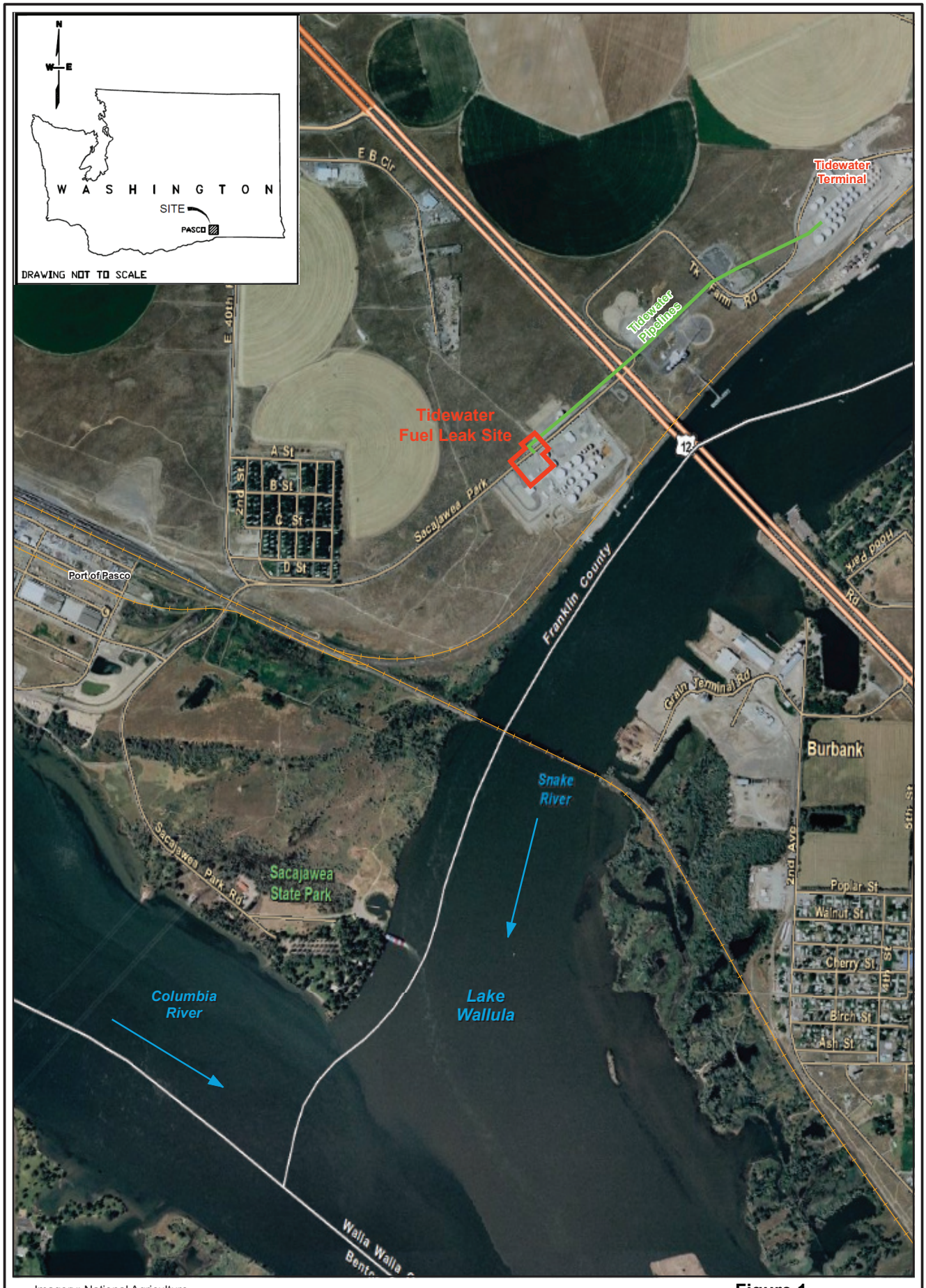


Figure 1
Site Location
Compliance Monitoring
Tidewater Fuel Leak Site
Pasco, WA

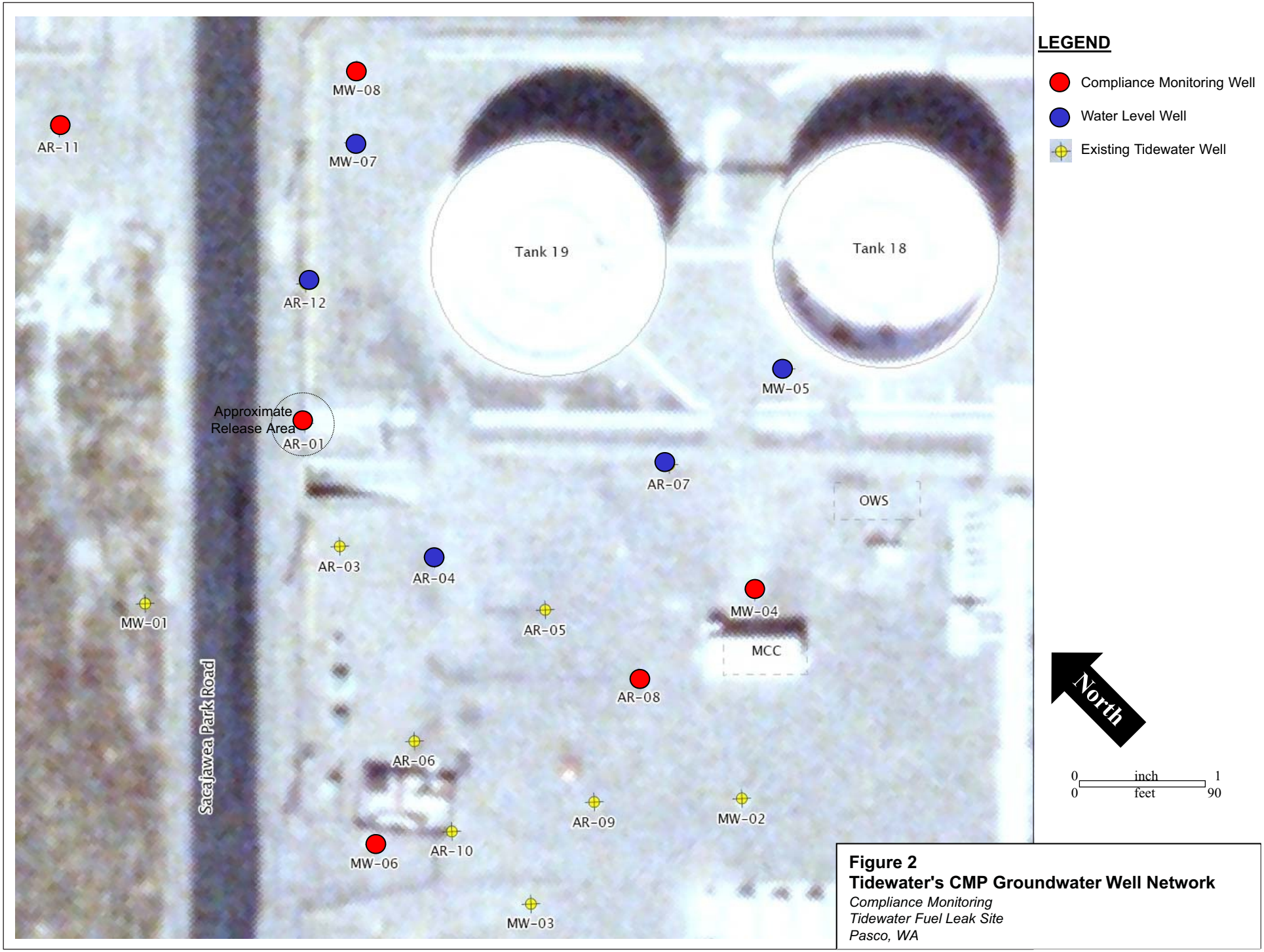


Figure 2
Tidewater's CMP Groundwater Well Network
Compliance Monitoring
Tidewater Fuel Leak Site
Pasco, WA

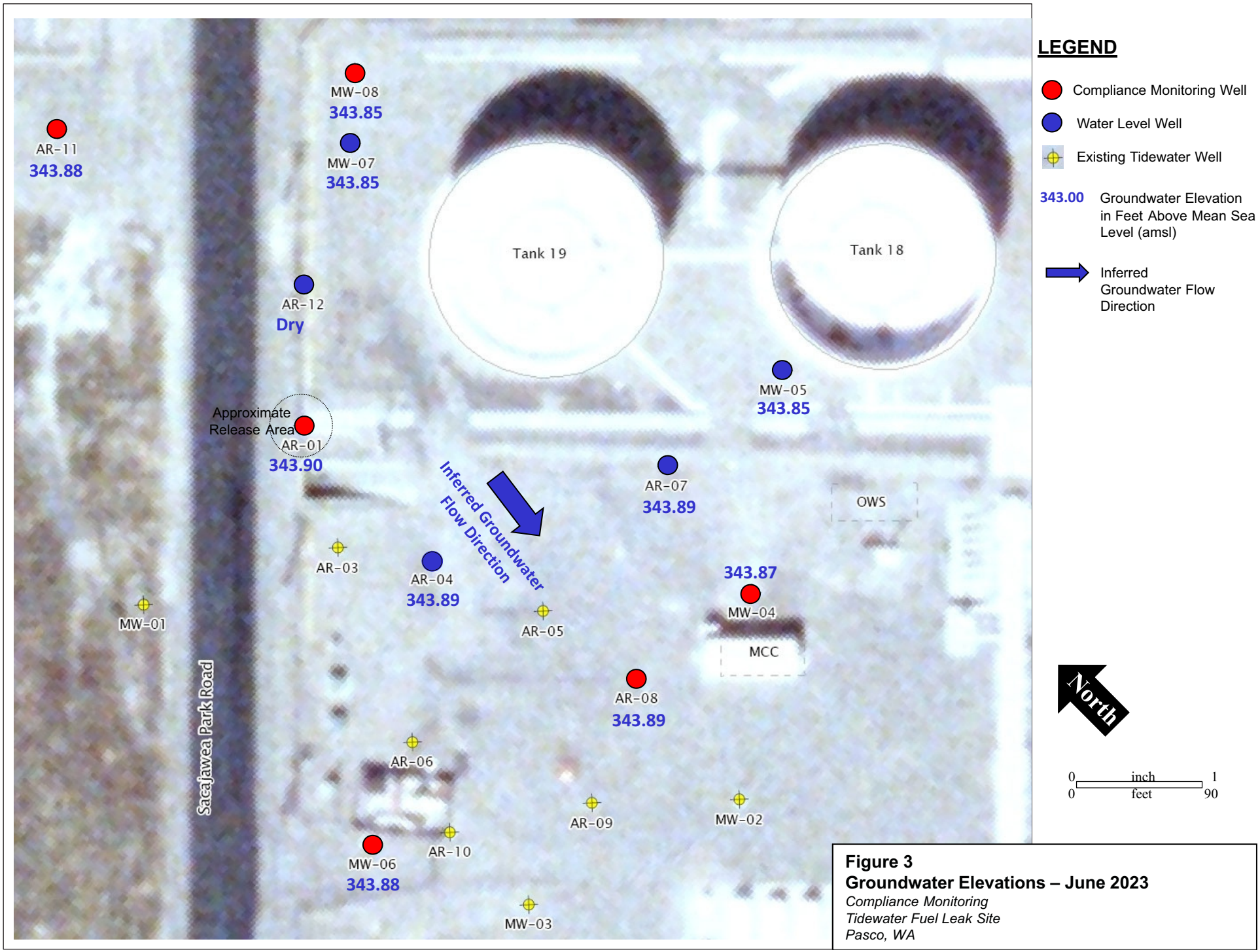
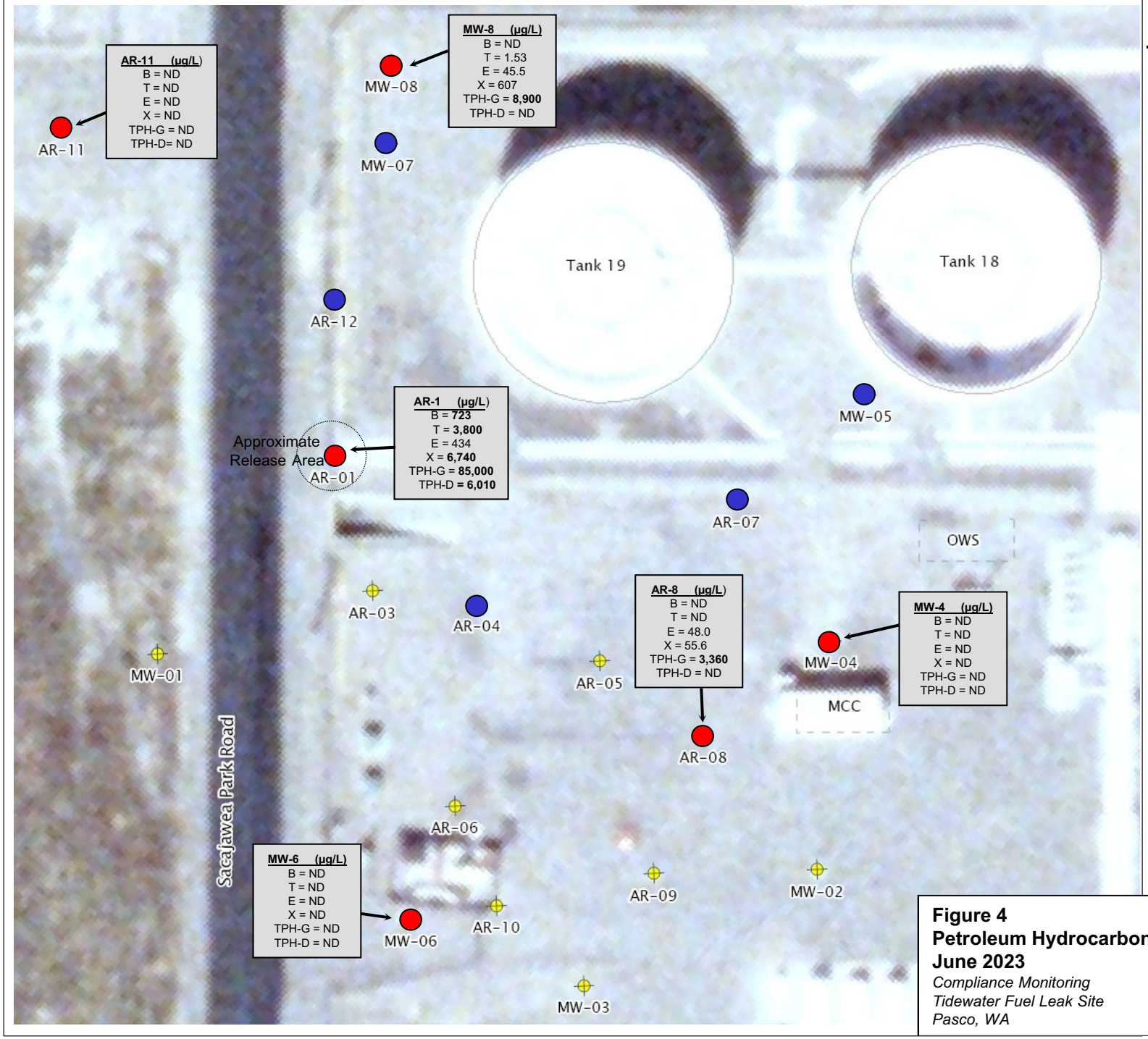


Figure 3
Groundwater Elevations – June 2023
Compliance Monitoring
Tidewater Fuel Leak Site
Pasco, WA



LEGEND

- Compliance Monitoring Well
- Water Level Well
- Existing Tidewater Well

µg/L – micrograms per liter
BOLD = MCL exceedance
ND = Analyte not detected

B = Benzene
T = Toluene
E = Ethylbenzene
X = Total xylenes
TPH-G = Gasoline
TPH-D = Diesel

North

0 inch 1
0 feet 90

Figure 4
Petroleum Hydrocarbons in Groundwater
June 2023
Compliance Monitoring
Tidewater Fuel Leak Site
Pasco, WA

APPENDICES

GeoEngineers

APPENDIX A
Field Forms

GeoEngineers

5820 S Kelly Ave Suite B
Portland, OR 97239
503-906-6577

Field Report

			File Number: 09991-005-02
	Project: Tidewater – Marathon Pasco Terminal GWM		Date: June 27, 2023
	Owner: Marathon	Time of Arrival: 07:45	Report Number: 1
Prepared by: Colin Watson	Location: Pasco, WA	Time of Departure: 14:50	Page: 1 of 1
Purpose of visit: GWM	Weather: Mostly Sunny, 75˚F	Travel Time: :45	Permit Number: 008740

Upon arrival to the site I assessed personal safety hazards: ☒ Yes or ☐ Referred to Site Safety Plan and Safety Tailgate if applicable

Safety Hazards Were Addressed by : ☒ Donning PPE, and observing safety standards

Crew Members:

GeoEngineers, Inc. Field Representative: Colin Watson

Summary of Activities:

07:45 Arrive at the terminal office. Meet with Cody (Marathon Operator) and discuss site procedures. Permit and air quality meter issued. Walk to the main well area with Cody to look at access.

08:35 Call John Hofbauer (Tidewater) to get access to AR-1 and a drum to leave in IDW area.

08:50 Begin gauging wells (see gauging sheet)

10:15 Set up at AR-11 and begin GWM (see monitoring data sheets)

12:55 Set up at AR-8 and begin sampling

14:55 Return meter, close permit, and leave site.

☑ **THIS FIELD REPORT IS PRELIMINARY** A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those indicated in a preliminary report.	**FIELD REPRESENTATIVE** **Colin Watson**	**DATE** **6/28/2023**
☐ **THIS FIELD REPORT IS FINAL** A final report is an instrument of professional service. Any conclusions drawn from this report should be discussed with and evaluated by the professional involved.	**REVIEWED BY**	**DATE**

Attachments:
Distribution:

Project: Pasco Terminal
Client: Tidewater
Sampler: CW

Date: 6/27/23
Permit: 008740

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
AR-11	8:44		78.74'		
AR-8	9:12		79.13'		
MW-4	9:18		78.42'		
MW-5	9:25		81.17'		
MW-8	9:33		83.30'		
MW-7	9:38		83.40'		
AR-12	9:42		DRY		
AR-7	9:49		81.55'		
MW-6	9:55		78.62		
AR-4	10:01		82.62'		
AR-1	10:17		79.98'		

GeoEngineers

5820 S Kelly Ave Suite B
Portland, OR 97239
503-906-6577

Field Report

File Number:		
09991-005-02		
Project: Tidewater – Marathon Pasco Terminal GWM		**Date:** June 28, 2023
Owner: Marathon	**Time of Arrival:** 07:45	**Report Number:** 1
Prepared by: Colin Watson	**Location:** Pasco, WA	**Time of Departure:** 14:50	**Page:** 1 of 1
Purpose of visit: GWM	**Weather:** Mostly Cloudy to Sunny, 75-93˚F	**Travel Time:** :45	**Permit Number:** 008740

Upon arrival to the site I assessed personal safety hazards: ☒ Yes or ☐ Referred to Site Safety Plan and Safety Tailgate if applicable

Safety Hazards Were Addressed by : ☒ Donning PPE, and observing safety standards

Crew Members:

GeoEngineers, Inc. Field Representative: Colin Watson

Summary of Activities:

07:45 Arrive at the terminal office. Air meter and permit issued by Cody (Marathon Operator). Call John Hofbauer (Tidewater) for access to IDW area.

08:15 Set up at MW-4 and begin GWM (see monitoring data sheets).

10:00 Set up at MW-6 and begin sampling, including MSD-2306.

11:45 Lunch and A/C break.

12:05 Begin loading gear to MW-8. Samples include FD-2306 and ER-2306. Equipment rinsate sample collected using distilled water rinsed over Monsoon Pro pump.

14:50 Return meter, close permit, and leave site.

☑ **THIS FIELD REPORT IS PRELIMINARY** A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those indicated in a preliminary report.	**FIELD REPRESENTATIVE** Colin Watson	**DATE** 6/28/2023
☐ **THIS FIELD REPORT IS FINAL** A final report is an instrument of professional service. Any conclusions drawn from this report should be discussed with and evaluated by the professional involved.	**REVIEWED BY**	**DATE**

Attachments:
Distribution:

GeoEngineers

5820 S Kelly Ave Suite B
Portland, OR 97239
503-906-6577

Field Report

File Number:	
09991-005-02	

Project:		Date:
Tidewater – Marathon Pasco Terminal GWM		June 29, 2023
Owner:	Time of Arrival:	Report Number:
Marathon	07:20	1
Prepared by:	Location:	Time of Departure:	Page:
Colin Watson	Pasco, WA	10:30	1 of 1
Purpose of visit:	Weather:	Travel Time:	Permit Number:
GWM	Sunny, 75-85˚F	:20	N/A

Upon arrival to the site I assessed personal safety hazards: ☒ Yes or ☐ Referred to Site Safety Plan and Safety Tailgate if applicable

Safety Hazards Were Addressed by : ☒ Donning PPE, and observing safety standards

Crew Members:

GeoEngineers, Inc. Field Representative: Colin Watson

Summary of Activities:

07:20 Call John Hofbauer (Tidewater) for access to AR-1 and IDW area.

07:35 Set up at AR-1 and begin GWM (see monitoring data sheets).

08:35 While reading parameters at AR-1, YSI ProDSS stops showing pH and ORP. I reset the YSI, emptied the flow-through cell and resumed readings. Turbidity was not dropping below 10 after 1 hour of pumping, but parameters were stable, so I began collecting the sample.

10:20 Collect IDW sample to deliver to APEX Lab in Tigard.

10:30 Lock gate and leave site.

☑ **THIS FIELD REPORT IS PRELIMINARY** A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those indicated in a preliminary report.	**FIELD REPRESENTATIVE** **Colin Watson**	**DATE** **6/29/2023**
☐ **THIS FIELD REPORT IS FINAL** A final report is an instrument of professional service. Any conclusions drawn from this report should be discussed with and evaluated by the professional involved.	**REVIEWED BY**	**DATE**

Attachments:
Distribution:

WELL MONITORING DATA SHEET

GeoEngineers

Well ID:	AR-11	Job Number:	—
Client:	Tidewater - Pasco Terminal	Date:	6/27/23
Project:	GWM 6/23	Sampler:	CW
Weather:	Pt. Sunny - 80°	Time In/Out:	1025 - 1250

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other: —	Well Depth:	86.5	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	78.74	Water Column Length:	—
Well Cap Lock Present:	(Yes) No	Screened Interval:	73-88	Purge Volume:	—

Comments: —

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)				
Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters

PURGING DATA

Purge Method:	Monsoon Pro	Pump Intake Depth:	83' - mid-screen
Sampling Method:	Low-flow	Tubing Material & Type:	LDPE (NEW) / DEDICATED

Time	Volume Purged (liters)	Purge Rate (L/min)	DTW (btc)	Turbidity (NTU)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
				+/- 10% /10 NTU	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1152	—	0.25	78.74	46.59	8.16	19.6	931	8.18	-254.4	Cloudy
1157	—	0.25	78.74	33.58	8.19	20.3	933	8.17	-257.3	Cloudy
1202	—	0.25	78.74	15.29	8.16	20.2	933	8.16	-251.2	Clear
1207	—	0.25	78.74	9.45	8.12	20.3	931	8.17	-247.7	Clear
1212	—	0.25	78.74	8.58	8.16	20.9	932	8.15	-252.6	Clear

Field Ferrous Iron: 0.10 mg/L

PURGING DATA

Sample ID:	AR-11-2306	Sampling Flow Rate:	0.25		Analytical Laboratory:	Anatek
Sample Time:	1212	Final Depth to Water:	78.74		Regulator Setting:	16.8 V
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
1 x 1L	HCl	Dx	—	—	—	—
4 x 40	HCl	VOC / 6X	—	—	—	—
1 x 40	HCl	CH_4	—	—	—	—
2 x 250	—	Fe/Mn	—	—	—	—
1 x 125	—	NO_3/SO_4	—	—	—	—

NOTES/ADDITIONAL COMMENTS

Equipment: Monsoon Pro, YSI Pro DSS, Hach Dr 890

Begin pumping at 1135

WELL MONITORING DATA SHEET

GeoEngineers

Well ID:	AR-8	Job Number:	—
Client:	Tidewater - Pasco Terminal	Date:	6/27/23
Project:	GWM 6/2023	Sampler:	CW
Weather:	Sunny - 88°	Time In/Out:	1300 - 1440

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other: —	Well Depth:	8	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	79.13'	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	78'-85'	Purge Volume:	—

Comments: —

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)				
Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters

PURGING DATA

Purge Method:	Monsoon Pro	Pump Intake Depth:	82' - mid-screen
Sampling Method:	Low-flow	Tubing Material & Type:	LDPE (NEW) / DEDICATED

Time	Volume Purged (liters)	Purge Rate (L/min)	DTW (btc)	Turbidity (NTU)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
				+/- 10% /10 NTU	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1325	—	0.25	79.13	41.1	8.18	20.1	960	1.12	-383.1	Cloudy
1330	—		79.13	27.44	7.86	20.9	949	0.63	-420.6	Cloudy
1335	—		79.13	21.58	7.80	21.7	944	0.56	-454.9	Clear
1340	—		79.19	18.26	7.80	21.3	940	0.49	-476.8	Clear
1345	—		79.13	18.45	7.77	21.2	932	0.42	-475.2	
1350	—		79.13	18.11	7.79	20.6	926	0.37	-491.7	
1355	—		79.13	18.02	7.80	20.4	924	0.35	-502.2	
1400	—		79.13	18.66	7.82	20.7	923	0.32	-503.9	
1405	—		79.13	19.01	7.80	21.2	919	0.38	-492.2	

Field Ferrous Iron: 0.46 mg/L

PURGING DATA

Sample ID:	AR-8-2306	Sampling Flow Rate:	0.25	Analytical Laboratory:		Anatek
Sample Time:	1405	Final Depth to Water:	79.13	Regulator Setting:		16.7
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
5x 40	HCl	VOC/Gx/CH_4	—			
1x 1L	HCl	Dx	—			
2x 250	—	Fe/Mn	—			
1x 125	—	NO_3/SO_4	—			

NOTES/ADDITIONAL COMMENTS

Equipment: Monsoon Pro, YSI Pro DSS, Hach Dr 890

Begin pumping at 1320

WELL MONITORING DATA SHEET

GeoEngineers

Well ID:	MW-4	Job Number:	—
Client:	Tidewater - Pasco Terminal	Date:	6/28/23
Project:	Gwm 06/2023	Sampler:	CW
Weather:	Mostly Cloudy, 75°	Time In/Out:	0815 - 0940

WELL DATA

Monument Type:	(Flush-mount)/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other: —	Well Depth:	89'	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	78.42	Water Column Length:	—
Well Cap Lock Present:	(Yes) No	Screened Interval:	75-89'	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters

PURGING DATA

Purge Method:	Monsoon Pro	Pump Intake Depth:	84'-Mid-screen
Sampling Method:	Low-flow	Tubing Material & Type:	LDPE (NEW) / DEDICATED

Time	Volume Purged (liters)	Purge Rate (L/min)	DTW (btc)	Turbidity (NTU)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
				+/- 10% /10 NTU	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
0837	—	0.25	78.42	5.05	7.98	18.4	944	7.71	-161.9	Clear
0842	—	0.25	78.42	4.58	7.90	18.7	948	7.62	-194.7	Clear
0847	—	0.25	78.42	3.19	7.91	19.1	949	7.58	-202.5	Clear
0852	—	0.25	78.42	2.49	7.92	18.3	948	7.52	-189.2	Clear
0857	—	0.25	78.42	2.28	7.92	18.3	947	7.52	-189.7	Clear
0902	—	0.25	78.42	2.33	7.94	18.3	947	7.53	-193.3	Clear
Field Ferrous Iron: 0.15										

PURGING DATA

Sample ID:	MW-4-2306	Sampling Flow Rate:	0.25		Analytical Laboratory:		Anatek
Sample Time:	0902	Final Depth to Water:	78.42		Regulator Setting:		CW ~~16.2~~ 16.4
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
5 x 40	HCl	VOC/Gr/CH_4	—	—	—	—	—
1 x 1L	HCl	Dx	—	—	—	—	—
1 x 250	—	~~FACT~~ CW Fe	—	—	—	—	—
1 x 250	—	Mn	—	—	—	—	—
1 x 125	—	NO_3/SO_4	—	—	—	—	—

NOTES/ADDITIONAL COMMENTS

Equipment: Monsoon Pro, YSI Pro DSS, Hach Dr 890

Begin pumping at 0830

WELL MONITORING DATA SHEET

GeoEngineers

Well ID:	MW-6	Job Number:	—
Client:	Tidewater - Pasco Terminal	Date:	6/28/23
Project:	GWM 6/2023	Sampler:	CW
Weather:	Pt Sunny, 80°	Time In/Out:	1000 – 1140

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other: —	Well Depth:	90'	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	78.62	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	75-90'	Purge Volume:	—

Comments: —

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)				
Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters

PURGING DATA

Purge Method:	Monsoon Pro	Pump Intake Depth:	84' - Mid-Screen
Sampling Method:	Low-Flow	Tubing Material & Type:	LDPE (NEW) / DEDICATED

Time	Volume Purged (liters)	Purge Rate (L/min)	DTW (btc)	Turbidity (NTU)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
				+/- 10% /10 NTU	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1025	—	0.25	78.62	6.82	8.25	17.7	919	8.18	-156.6	Clear
1030	—	0.25	78.62	6.99	8.25	18.0	918	8.15	-217.7	Clear
1035	—	0.25	78.62	4.35	8.16	18.1	918	8.14	-237.3	Clear
1040	—	0.25	78.62	3.48	8.15	18.1	917	8.13	-235.6	Clear
1045	—	0.25	78.62	3.16	8.15	18.1	917	8.13	-234.7	Clear
1050	—	0.25	78.62	3.14	8.15	18.0	917	8.12	-229.4	Clear
Field Ferrous Iron: 0.00 mg/L										

PURGING DATA

Sample ID:	MW-6-2306+	Sampling Flow Rate:	0.25	Analytical Laboratory:		Anatek
Sample Time:	1050	Final Depth to Water:	78.62	Regulator Setting:		16.3
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
5 x 40	HCl	VOC/6x/CH4	—	—	—	—
1 x 1L	HCl	~~and~~ Dx	—	—	—	—
2 x 250	—	~~TDS~~ Mn/Fe	—	—	—	—
1 x 125	—	NO3/SO4	—	—	—	—
4 x 40	HCl	VOC/6x	—	—	MSD	MW-6-MSD-2306
1 x 1L	HCl	Dx	—	—	MSD	MW-6-MSD-2306

NOTES/ADDITIONAL COMMENTS

Equipment: Monsoon Pro, YSI Pro DSS, Hach Dr 890

Begin pumping at 1020

WELL MONITORING DATA SHEET

GeoEngineers

Well ID:	MW-8	Job Number:	—
Client:	Tidewater - Pasco Terminal	Date:	6/28/23
Project:	GWM 6/2023	Sampler:	CW
Weather:	Sunny, 85°	Time In/Out:	1210 - 1425

WELL DATA

Monument Type:	Flush-mount / Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other: —	Well Depth:	93' TOC	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	83.30	Water Column Length:	—
Well Cap Lock Present: CW	Yes / No	Screened Interval:	7540 bgs	Purge Volume:	—

Comments: —

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)				
Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters

PURGING DATA

Purge Method:	Monsoon Pro	Pump Intake Depth:	88' - Mid-Screen
Sampling Method:	Low-flow	Tubing Material & Type:	LDPE (NEW) / DEDICATED

Time	Volume Purged (liters)	Purge Rate (L/min)	DTW (btc)	Turbidity (NTU)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
				+/- 10% /10 NTU	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1241	—	0.25	83.30	6.88	8.00	18.0	735	2.44	-268.2	Clear
1246	—	0.25	83.30	4.42	7.89	18.6	781	3.49	-327.5	Clear
1251	—	0.25	83.30	3.98	7.89	18.8	796	3.94	-330.2	Clear
1256	—	0.25	83.30	3.65	7.90	18.6	811	4.55	-326.4	Clear
1301	—	0.25	83.30	3.94	7.90	18.9	829	5.11	-323.6	Clear
1306	—	0.25	83.30	2.99	7.91	19.0	831	5.30	-320.1	Clear
1311	—	0.25	83.30	2.78	7.99	18.9	840	5.60	-327.2	Clear
1316	—	0.25	83.30	2.74	7.94	18.9	840	5.66	-321.8	clear

Field Ferrous Iron: 0.09 mg/L

PURGING DATA

Sample ID:	MW-8-2306	Sampling Flow Rate:	0.25	Analytical Laboratory:		Anatek
Sample Time:	1316	Final Depth to Water:	83.30	Regulator Setting:		16.3
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
5x40 X2	HCl	VOC/6x/CH4	—	—	—	MW-8-FD-2306	—
1x1L X2	HCl	Dx	—	—	—	MW-8-FD-2306	—
2x250 X2	—	Mn/Fe	—	—	—	MW-8-FD-2306	—
1x125 X2	—	NO3/SO4	—	—	—	MW-8-FD-2306	—
4x40	HCl	CW ~~VOC~~/6x/BTEX	—	—	—	—	MW-8-ER-2306
1x1L	HCl	Dx/Dil	—	—	—	—	MW8-ER-2306

NOTES/ADDITIONAL COMMENTS

Equipment: Monsoon Pro, YSI Pro DSS, Hach Dr 890 CW

Begin pumping at ~~1241~~ 1237

WELL MONITORING DATA SHEET

GeoEngineers

Well ID:	AR-1	Job Number:	—
Client:	Tidewater - Pasco Terminal	Date:	6/29/23
Project:	GWM 6/2023	Sampler:	CW
Weather:	Sunny, 75°	Time In/Out:	0730 - 0920

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other: —	Well Depth:	88'	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	79.98'	Water Column Length:	—
Well Cap Lock Present:	(Yes) No	Screened Interval:	73'-88'	Purge Volume:	—

Comments: —

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters

PURGING DATA

Purge Method:	Monsoon Pro	Pump Intake Depth:	84' - Mid-screen
Sampling Method:	Low-flow	Tubing Material & Type:	LDPE (NEW) / DEDICATED

Time	Volume Purged (liters)	Purge Rate (L/min)	DTW (btc)	Turbidity (NTU)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
				+/- 10% /10 NTU	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
0805	—	0.25	79.98	29.35	7.72	18.4	1148	0.76	-393.2	Cloudy
0810	—	↓	79.98	13.29	7.68	18.4	1177	0.38	-450.1	
0815	—		79.98	14.69	7.62	18.5	1178	0.25	-533.5	
0820	—		79.98	16.35	7.79	19.2	1182	0.21	-561.1	
0825	—		79.98	17.02	7.74	19.8	1183	0.21	-556.8	
0830	—		79.98	18.11	7.92	20.2	1182	0.21	-506.5	
0835	—		79.98	17.79	—	20.3	1183	0.24	—	
0840	—		—	—	—	—	—	—	—	—
0845	—		79.98	27.33	7.64	19.6	1198	0.27	-503.1	
0850	—		79.98	22.41	7.71	19.5	1195	0.18	-538.9	
0855	—		79.97	17.48	7.73	20.0	1192	0.16	-575.1	
0900	—		79.98	15.29	7.71	20.2	1192	0.15	-578.2	
0905	—	↓	79.98	13.95	7.72	20.4	1191	0.15	-589.7	

Field Ferrous Iron: 1.74 mg/L

PURGING DATA

Sample ID:	AR-1-2306	Sampling Flow Rate:	0.25		Analytical Laboratory:		Anatek
Sample Time:	0905	Final Depth to Water:	79.98		Regulator Setting:		16.3
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
5 x 40		VOC/6x/CH4	—				
1 x 1L		DX	—				
2 x 250		Mn/Fe	—				
1 x 125		NO3/SO4	—				

NOTES/ADDITIONAL COMMENTS

Equipment: Monsoon Pro, YSI Pro DSS, Hach Dr 890

0835 - YSI pH + ORP probe inactive - restart, empty flow cell

Begin pumping at 0800

0840 - No readings while resetting YSI

APPENDIX B
Historical Groundwater Elevations

Appendix B - Historical Groundwater Elevation Measurements

Tidewater Fuel Leak Site Compliance Monitoring Program

Well	Date Measured	Reference Point Elevation (feet NGVD)	Depth to Water (feet)	Product Thickness (feet)	Groundwater Elevation (feet NGVD)	Groundwater Elevation Change from Previous Event (feet)
AR-1	6/29/2010	425.80	81.28	0.01	344.52	--
	12/16/2010		81.70	sheen	344.10	0.42
	5/28/2014		79.56	sheen	346.24	2.14
	5/1/2018[2]	423.99	79.38	0	344.61	1.63
	6/25/2019		80.13	0	343.86	0.75
	6/24/2020		79.83	0	344.16	0.3
	7/27/2021		80.83	0	343.16	1
	6/1/2022[4]	423.88	80.05	0	343.83	0.67
	6/27/2023		79.98	0	343.90	0.07
AR-2[1]	6/29/2010	--	--	--	--	--
	12/16/2010	--	--	--	--	--
	5/28/2014	--	--	--	--	--
AR-3[1]	6/29/2010	428.01	--	--	--	--
	12/15/2010		--	--	--	--
	5/28/2014		--	--	--	--
AR-4	6/29/2010	426.47	81.90	0	344.57	--
	12/15/2010		82.38	0	344.09	0.48
	5/28/2014		81.99	0	344.48	0.39
	5/1/2018		81.93	0	344.54	0.06
	6/25/2019		82.76	0	343.71	0.83
	6/24/2020		82.52	0	343.95	0.24
	7/27/2021[3]		83.47	0	343.00	0.95
	6/1/2022		82.69	0	343.78	0.78
	6/27/2023		82.62	0	343.85	0.07
AR-5	6/29/2010	423.08	78.52	0	344.56	--
	12/15/2010		79.00	0	344.08	0.48
	5/28/2014		78.62	0	344.46	0.38
AR-6	6/29/2010	425.17	80.61	0	344.56	--
	12/15/2010		81.11	0	344.06	0.5
	5/28/2014		80.72	0	344.45	0.39
AR-7	6/29/2010	425.44	80.82	sheen	344.62	--
	12/16/2010		81.33	sheen	344.11	0.51
	5/28/2014		80.96	0	344.48	0.37
	5/1/2018		80.92	0	344.52	0.04
	6/25/2019		81.68	0	343.76	0.76
	6/24/2020		81.41	0	344.03	0.27
	7/27/2021		82.39	0	343.05	0.98
	6/1/2022		81.63	0	343.81	0.76
	6/27/2023		81.55	0	343.89	0.08
AR-8	6/29/2010	423.02	78.43	0	344.59	--
	12/15/2010		78.94	0	344.08	0.51
	5/28/2014		78.50	0	344.52	0.44
	5/1/2018		78.43	0	344.59	0.07
	6/25/2019		79.29	0	343.73	0.86
	6/24/2020		78.99	0	344.03	0.3
	7/27/2021		80.01	0	343.01	1.02
	6/1/2022		79.19	0	343.83	0.82
	6/27/2023		79.13	0	343.89	0.06
AR-9	6/29/2010	423.05	78.46	0	344.59	--
	12/15/2010		78.95	0	344.10	0.49
	5/28/2014		78.60	0	344.45	0.35
AR-10	6/29/2010	422.59	78.01	0	344.58	--
	12/14/2010		78.50	0	344.09	0.49
	5/28/2014		78.13	0	344.46	0.37
AR-11	6/29/2010	422.62	78.00	0	344.62	--
	12/15/2010		78.49	0	344.13	0.49
	5/28/2014		78.15	0	344.47	0.34
	5/1/2018		78.09	0	344.53	0.06
	6/25/2019		78.83	0	343.79	0.74
	6/24/2020		78.54	0	344.08	0.29
	7/27/2021		79.59	0	343.03	1.05
	6/1/2022		78.79	0	343.83	0.8
	6/27/2023		78.74	0	343.88	0.05
AR-12	6/29/2010	425.50	80.96	sheen	344.54	--
	12/16/2010		dry	--	--	--
	5/28/2014		dry	--	--	--
	5/1/2018		81.02	0	344.48	0.06
	6/25/2019		dry	--	--	--
	6/24/2020		81.50	0	344.00	0.48
	7/27/2021		dry	--	--	--
	6/1/2022		dry	--	--	--
	6/27/2023		dry	--	--	--
MW-4	6/29/2010	422.29	77.72	0	344.57	--
	12/15/2010		78.22	0	344.07	-0.5
	5/29/2014		77.82	0	344.47	0.4
	5/1/2018		77.80	0	344.49	0.02
	6/25/2019		78.52	0	343.77	-0.72
	6/24/2020		78.24	0	344.05	0.28
	7/27/2021		79.28	0	343.01	-1.04
	6/1/2022		78.48	0	343.81	0.8
	6/27/2023		78.42	0	343.87	0.06
MW-5	6/29/2010	425.02	80.48	0	344.54	--
	12/15/2010		80.95	0	344.07	-0.47
	5/29/2014		80.59	0	344.43	0.36
	5/1/2018		80.51	0	344.51	0.08
	6/25/2019		81.29	0	343.73	-0.78
	6/24/2020		80.97	0	344.05	0.32
	7/27/2021		82.02	0	343.00	-1.05
	6/1/2022		81.24	0	343.78	0.78
	6/27/2023		81.17	0	343.85	0.07
MW-6	6/28/2010	422.50	77.92	0	344.58	--
	12/14/2010		78.41	0	344.09	-0.49
	5/28/2014		77.99	0	344.51	0.42
	5/1/2018		77.98	0	344.52	0.01
	6/25/2019		78.72	0	343.78	-0.74
	6/24/2020		78.44	0	344.06	0.28
	7/27/2021		79.47	0	343.03	-1.03
	6/1/2022		78.68	0	343.82	0.79
	6/27/2023		78.62	0	343.88	0.06
MW-7	6/29/2010	427.25	82.74	sheen	344.51	--
	12/16/2010		83.19	0	344.06	-0.45
	5/29/2014		82.79	0	344.46	0.4
	5/1/2018		82.78	0	344.47	0.01
	6/25/2019		83.55	0	343.70	-0.77
	6/24/2020		83.26	0	343.99	0.29
	7/27/2021		84.23	0	343.02	-0.97
	6/1/2022		83.47	0	343.78	0.76
	6/27/2023		83.40	0	343.85	0.07
MW-8	6/29/2010	427.15	82.62	sheen	344.53	--
	12/16/2010		83.09	0	344.06	-0.47
	5/29/2014		82.69	0	344.46	0.4
	5/1/2018		82.61	0	344.54	0.08
	6/25/2019		83.44	0	343.71	-0.83
	6/24/2020		83.16	0	343.99	0.28
	7/27/2021		84.13	0	343.02	-0.97
	6/1/2022		83.36	0	343.79	0.74
	6/27/2023		83.30	0	343.85	0.06

Notes:

1 - Well not part of CMP program

2 - Well was re-surveyed in December 2018

3 - Reference point elevation was resurveyed on July 27, 2021.

4 - Reference point elevation was resurveyed on June 1, 2022.

" -- " = Not applicable, not available, and/or not measured.

Reference point elevation is top of PVC casing; all elevations are in feet above mean sea level (NAVD88).

APPENDIX C
Analytical Laboratory Reports

Anatek Labs, Inc.

1282 Alturas Drive - Moscow, ID 83843 - (208) 883-2839 - email moscow@anateklabs.com
504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - email spokane@anateklabs.com

Client:	GeoEngineers, Inc.- Portland	Work Order:	WDF1491
Address:	5820 S Kelly Ave Suite B	Project:	Pasco Terminal
	Portland, OR 97239	Reported:	10/2/2023 11:17
Attn:	Kurt Harrington		

Analytical Results Report

Sample Location:	AR-11-2306		
Lab/Sample Number:	WDF1491-01	Collect Date:	06/27/23 12:12
Date Received:	06/27/23 10:19	Collected By:	Colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N	0.550	mg/L	0.500	6/28/23 15:04	AAI	EPA 300.0	
Sulfate	8.56	mg/L	0.750	7/3/23 22:28	AAI	EPA 300.0	
Total Metals							
Iron (II)	ND	mg/L	0.0100	6/28/23 16:21	AAI	SM 3500-Fe B	*
Metals by ICP-MS							
Manganese	0.00487	mg/L	0.00100	7/7/23 16:59	Metals	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	7/6/23 21:13	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/6/23 21:13	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/6/23 21:13	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*71.8%*		*50-150*	*7/6/23 21:13*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	ND	mg/L	0.200	7/3/23 23:33	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*91.9%*		*70-130*	*7/3/23 23:33*	*BKP*	*NWTPH-Gx*	
Benzene	ND	ug/L	0.500	7/3/23 23:33	BKP	EPA 624.1	*
Ethylbenzene	ND	ug/L	0.500	7/3/23 23:33	BKP	EPA 624.1	*
m+p-Xylene	ND	ug/L	0.500	7/3/23 23:33	BKP	EPA 624.1	*
o-Xylene	ND	ug/L	0.500	7/3/23 23:33	BKP	EPA 624.1	*
Toluene	ND	ug/L	0.500	7/3/23 23:33	BKP	EPA 624.1	*
Surrogate: 1,2-Dichlorobenzene-d4	*102%*		*70-130*	*7/3/23 23:33*	*BKP*	*EPA 624.1*	
Surrogate: 1,2-Dichloroethane-d4	*105%*		*70-130*	*7/3/23 23:33*	*BKP*	*EPA 624.1*	
Surrogate: 4-Bromofluorobenzene	*99.2%*		*70-130*	*7/3/23 23:33*	*BKP*	*EPA 624.1*	
Surrogate: Toluene-d8	*101%*		*70-130*	*7/3/23 23:33*	*BKP*	*EPA 624.1*	

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Sample Location:	AR-8-2306		
Lab/Sample Number:	WDF1491-02	Collect Date:	06/27/23 14:05
Date Received:	06/02/22 12:22	Collected By:	colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N	2.29	mg/L	0.100	6/28/23 15:24	ELS	EPA 300.0	
Sulfate	53.4	mg/L	0.300	7/8/23 6:40	AAI	EPA 300.0	
Total Metals							
Iron (II)	ND	mg/L	0.0100	6/28/23 16:21	AAI	SM 3500-Fe B	*
Metals by ICP-MS							
Manganese	1.05	mg/L	0.00100	7/7/23 17:02	Metals	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	7/6/23 22:08	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/6/23 22:08	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/6/23 22:08	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*79.6%*		*50-150*	*7/6/23 22:08*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	3.36	mg/L	0.200	7/4/23 0:02	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*83.0%*		*70-130*	*7/4/23 0:02*	*BKP*	*NWTPH-Gx*	
Benzene	ND	ug/L	0.500	7/4/23 0:02	BKP	EPA 624.1	*
Ethylbenzene	48.0	ug/L	25.0	7/5/23 19:28	BKP	EPA 624.1	*
m+p-Xylene	14.5	ug/L	0.500	7/4/23 0:02	BKP	EPA 624.1	*
o-Xylene	41.1	ug/L	0.500	7/4/23 0:02	BKP	EPA 624.1	*
Toluene	ND	ug/L	0.500	7/4/23 0:02	BKP	EPA 624.1	*
Surrogate: 1,2-Dichlorobenzene-d4	*108%*		*70-130*	*7/4/23 0:02*	*BKP*	*EPA 624.1*	
Surrogate: 1,2-Dichloroethane-d4	*99.4%*		*70-130*	*7/4/23 0:02*	*BKP*	*EPA 624.1*	
Surrogate: 4-Bromofluorobenzene	*89.6%*		*70-130*	*7/4/23 0:02*	*BKP*	*EPA 624.1*	
Surrogate: Toluene-d8	*101%*		*70-130*	*7/4/23 0:02*	*BKP*	*EPA 624.1*	

Sample Comment: Hit on sample does not appear to be a target compound, appears to be gasoline. -BAN

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Authorized Signature,

Brock Gerger For Kathleen Sattler, Laboratory Manager

M2	Matrix spike recovery was low; the associated blank spike recovery was acceptable. Potential matrix effect.
PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDF1179 - W Ions										
Blank (BDF1179-BLK1)					Prepared & Analyzed: 6/28/2023					
Nitrate-N	ND		0.100	mg/L						
LCS (BDF1179-BS1)					Prepared: 6/28/2023 Analyzed: 6/29/2023					
Nitrate-N	4.15			mg/L	4.00		104	90-110		
LCS (BDF1179-BS2)					Prepared & Analyzed: 6/29/2023					
Nitrate-N	4.12			mg/L	4.00		103	90-110		
Matrix Spike (BDF1179-MS1)		**Source: WDF0522-03**			Prepared & Analyzed: 6/29/2023					
Nitrate-N	4.00		0.100	mg/L	4.00	ND	100	80-120		
Matrix Spike Dup (BDF1179-MSD1)		**Source: WDF0522-03**			Prepared & Analyzed: 6/29/2023					
Nitrate-N	4.04		0.100	mg/L	4.00	ND	101	80-120	1.02	20
Batch: BDG0060 - W Ions										
Blank (BDG0060-BLK1)					Prepared & Analyzed: 7/3/2023					
Nitrate-N	ND		0.100	mg/L						
Sulfate	ND		0.150	mg/L						
Blank (BDG0060-BLK2)					Prepared & Analyzed: 7/3/2023					
Nitrate-N	ND		0.100	mg/L						
Sulfate	ND		0.150	mg/L						
LCS (BDG0060-BS1)					Prepared & Analyzed: 7/3/2023					
Nitrate-N	4.13			mg/L	4.00		103	90-110		
Sulfate	4.22			mg/L	4.00		106	90-110		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0060 - W Ions (Continued)										
LCS Dup (BDG0060-BSD1)					Prepared & Analyzed: 7/5/2023					
Nitrate-N	4.12			mg/L	4.00		103	90-110	0.436	20
Sulfate	3.94			mg/L	4.00		98.6	90-110	6.93	20
Matrix Spike (BDG0060-MS1)		**Source: WDG0021-01**			Prepared & Analyzed: 7/3/2023					
Nitrate-N	3.84		0.100	mg/L	4.00	ND	95.9	80-120		
Sulfate	13.4		0.150	mg/L	4.00	9.79	91.3	80-120		
Matrix Spike Dup (BDG0060-MSD1)		**Source: WDG0021-01**			Prepared & Analyzed: 7/3/2023					
Nitrate-N	3.85		0.100	mg/L	4.00	ND	96.3	80-120	0.416	20
Sulfate	13.5		0.150	mg/L	4.00	9.79	91.6	80-120	0.104	20
Batch: BDG0207 - W Ions										
Blank (BDG0207-BLK1)					Prepared & Analyzed: 7/7/2023					
Sulfate	ND		0.150	mg/L						
Blank (BDG0207-BLK2)					Prepared & Analyzed: 7/8/2023					
Sulfate	ND		0.150	mg/L						
LCS (BDG0207-BS1)					Prepared: 7/6/2023 Analyzed: 7/7/2023					
Sulfate	4.15			mg/L	4.00		104	90-110		
LCS (BDG0207-BS2)					Prepared & Analyzed: 7/6/2023					
Sulfate	3.96			mg/L	4.00		99.0	90-110		

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0106 - W 3010 Digest										
Blank (BDG0106-BLK1)					Prepared: 7/6/2023 Analyzed: 7/7/2023					
Manganese	ND		0.00100	mg/L						
LCS (BDG0106-BS1)					Prepared: 7/6/2023 Analyzed: 7/7/2023					
Manganese	0.0509		0.00100	mg/L	0.0500		102	85-115		
Matrix Spike (BDG0106-MS1)		**Source: WDF1669-01**			Prepared: 7/6/2023 Analyzed: 7/7/2023					
Manganese	0.109		0.00100	mg/L	0.0500	0.0605	96.3	70-130		
Matrix Spike Dup (BDG0106-MSD1)		**Source: WDF1669-01**			Prepared: 7/6/2023 Analyzed: 7/7/2023					
Manganese	0.110		0.00100	mg/L	0.0500	0.0605	99.7	70-130	1.54	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0097 - W TPH-Dx										

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0097 - W TPH-Dx (Continued)										
Blank (BDG0097-BLK1)					Prepared & Analyzed: 7/6/2023					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*0.147*	*mg/L*	*0.200*		*73.6*	*50-150*		
LCS (BDG0097-BS1)					Prepared & Analyzed: 7/6/2023					
Diesel	1.44		0.160	mg/L	2.06		70.0	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*0.168*	*mg/L*	*0.200*		*84.1*	*50-150*		
Matrix Spike (BDG0097-MS1)		**Source: WDF1491-01**			Prepared & Analyzed: 7/6/2023					
Diesel	0.821	M2	0.160	mg/L	2.06	ND	39.8	70-130		
Lube Oil	ND	M2	0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane		*M2*	*0.143*	*mg/L*	*0.200*		*71.5*	*50-150*		
Matrix Spike Dup (BDG0097-MSD1)		**Source: WDF1491-01**			Prepared & Analyzed: 7/6/2023					
Diesel	0.924	M2	0.160	mg/L	2.06	ND	44.8	70-130	11.9	20
Lube Oil	ND	M2	0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane		*M2*	*0.151*	*mg/L*	*0.200*		*75.6*	*50-150*		

Quality Control Data
(Continued)

Volatiles

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0025 - VOC										
Blank (BDG0025-BLK1)					Prepared & Analyzed: 7/3/2023					
Benzene	ND		0.500	ug/L						
Ethylbenzene	ND		0.500	ug/L						
Toluene	ND		0.500	ug/L						
m/p Xylenes (MCL for total)	ND		0.500	ug/L						
o-Xylene (MCL for total)	ND		0.500	ug/L						
Surrogate: Toluene-d8			*20.5*	*ug/L*	*20.0*		*102*	*70-130*		
Surrogate: 4-Bromofluorobenzene			*18.9*	*ug/L*	*20.0*		*94.6*	*70-130*		
Surrogate: 1,2-Dichloroethane-d4			*21.4*	*ug/L*	*20.0*		*107*	*70-130*		
Surrogate: 1,2-Dichlorobenzene-d4			*20.2*	*ug/L*	*20.0*		*101*	*70-130*		
LCS (BDG0025-BS1)					Prepared & Analyzed: 7/3/2023					
Benzene	9.90		0.500	ug/L	10.0		99.0	80-120		
Ethylbenzene	10.5		0.500	ug/L	10.0		105	80-120		
Toluene	8.76		0.500	ug/L	10.0		87.6	80-120		
m/p Xylenes (MCL for total)	21.5		0.500	ug/L	20.0		108	80-120		
o-Xylene (MCL for total)	10.8		0.500	ug/L	10.0		108	80-120		
Surrogate: Toluene-d8			*17.6*	*ug/L*	*20.0*		*88.2*	*70-130*		
Surrogate: 4-Bromofluorobenzene			*21.1*	*ug/L*	*20.0*		*106*	*70-130*		
Surrogate: 1,2-Dichloroethane-d4			*19.8*	*ug/L*	*20.0*		*98.8*	*70-130*		
Surrogate: 1,2-Dichlorobenzene-d4			*19.7*	*ug/L*	*20.0*		*98.6*	*70-130*		

Batch: BDG0026 - VOC

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Quality Control Data
(Continued)

Volatiles (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0026 - VOC (Continued)										
Blank (BDG0026-BLK1)					Prepared & Analyzed: 7/3/2023					
Gasoline	ND		0.200	mg/L						
Surrogate: 4-Bromofluorobenzene			*0.0189*	*mg/L*	*0.0200*		*94.6*	*70-130*		
LCS (BDG0026-BS1)					Prepared & Analyzed: 7/3/2023					
Gasoline	0.980		0.200	mg/L	1.00		98.0	80-120		
Surrogate: 4-Bromofluorobenzene			*0.0178*	*mg/L*	*0.0200*		*88.9*	*70-130*		

ANATEK LABS

Chain of Custody Record

Anatek La
1282 Alturas Drive, Moscow
504 E Sprague Ste D, Spokane

WDF1491

Due: 07/13/23

Turn Arc

Please refer to our normal turn around
www.anateklabs.com/pricing-lists

✓ Normal
__ Next Day*
__ 2nd Day*
__ Other*_____

__ Phone
__ Email

*All rush order requests must have prior approval

Company Name: GeoEngineers	Project Manager: Kurt Harrington
Address: 5820 S. Kelly Ave Suite B	Project Name & #: Pasco Terminal
City: Portland State: OR Zip: 97239	Purchase Order #: 009991-005-02
Phone: 503-906-6577	Sampler Name & Phone: Colin Watson 503-756-6285
Email Address(es): kharrington@geoengineers.com	

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative: # of Containers	Sample Volume	BTEX 8260	NWTPH-Gx	NWTPH-Dx	Ferrous Fe	Mn	SO_4, NO_3	Methane	NWTPH-Dil		
	AR-11-2306	6/27/23-1212	H_2O	9		X	X	X	X	X	X	X	X		
	AR-8-2306	6/27/23-1405	H_2O	9		X	X	X	X	X	X	X	X		

Note Special Instructions/Comments

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
No VOC Head Space?	Y	N
Cooler?	Y	N
Ice/Ice Packs Present?	Y	N

Temperature (°C): 7.4 IR Gun
Number of Containers: 18
Shipped Via: FedEx C/I
Preservative: HCl 230439-2 pH<2 2879
Date & Time:
Inspected By:

	Printed Name	Signature	Company	Date	Time
Relinquished by	Colin Watson		GeoEngineers	6/27/23	1530
Received by	Joseph Appin		Anatek	6/28/23	1019
Relinquished by					
Received by					
Relinquished by					
Received by					

Samples submitted to Anatek Labs may be subcontacted to other accredited labs if necessary. This message serves as notice of this possibility. Subcontracted analyses will be clearly noted on the analytical report.

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

05 July 2023

Kathy Sattler
Anatek Labs, Inc. Spokane
504 East Sprague, Suite D
Spokane, WA 99202

RE: WDF1491 (WDF1491)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23G0039	N/A

Shelly Fishel

Digitally signed by Shelly Fishel
Date: 2023.07.05 17:55:01 -07'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

Shelly Fishel, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

23G0039

Anatek Labs, Inc.

SUBCONTRACT ORDER

1282 Alturas Drive - Moscow, ID 83843 - (208) 8832839 - Fax (208) 8829246 - email moscow@anateklabs.com
504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Sending Laboratory:

Anatek Labs, Inc.- Spokane
504 E Sprague Ave, Suite D
Spokane, WA 99202
Phone: 509-838-3999
Fax: 509-838-4433

Project Manager: Kathleen Sattler
kathy@anateklabs.com

Subcontracted Laboratory:

Analytical Resources LLC
4611 S. 134TH Place, Suite 100
Tukwila, WA 98168
Phone: (206) 695-6200
Fax: (206) 695-6202

Work Order: WDF1491

Analysis	Due	Expires	Comments
Lab Sample ID: WDF1491-01 ***Water*** ***Sampled: 06/27/2023 12:12***			
Client Sample Name: AR-11-2306			
W Methane	07/11/2023	07/11/2023 12:12	
Containers Supplied:			
Lab Sample ID: WDF1491-02 ***Water*** ***Sampled: 06/27/2023 14:05***			
Client Sample Name: AR-8-2306			
W Methane	07/11/2023	07/11/2023 14:05	
Containers Supplied:			

Released By 6/29/23 Date

Received By 07/03/23 Date

Anatek Labs, Inc. Spokane	Project: WDF1491	
504 East Sprague, Suite D	Project Number: WDF1491	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WDF1491-01	23G0039-01	Water	27-Jun-2023 12:12	03-Jul-2023 10:50
WDF1491-02	23G0039-02	Water	27-Jun-2023 14:05	03-Jul-2023 10:50

Anatek Labs, Inc. Spokane	Project: WDF1491	
504 East Sprague, Suite D	Project Number: WDF1491	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:51

Work Order Case Narrative

Client: Anatek Labs, Inc. Spokane
Project: WDF1491
Work Order: 23G0039

Sample receipt

Samples as listed on the preceding page were received 03-Jul-2023 10:50 under ARI work order 23G0039. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Volatile Gases - MEE by RSK175

The sample(s) were analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The blank spike and blank spike duplicate (BS/LCS and BSD/LCSD) spike recoveries and relative percent difference (RPD) were within control limits.

WORK ORDER

23G0039

Samples will be discarded 90 days after submission of a final report unless other instructions are received

Client: Anatek Labs, Inc. Spokane | **Project Manager: Shelly Fishel**

Project: WDF1491 | **Project Number: WDF1610**

Report To:
Anatek Labs, Inc. Spokane
Kathy Sattler
504 East Sprague, Suite D
Spokane, WA 99202
Phone: (509) 838-3999
Fax: -

Invoice To:
Anatek Labs, Inc.
Cheri Price Accounting Department
1282 Alturas Drive
Moscow, ID 83843
Phone :(208) 883-2839
Fax: -

Date Due: 18-Jul-2023 18:00 (10 day TAT)

Received By: Phillip Bates | Date Received: 03-Jul-2023 10:50

Logged In By: Rowan Miller | Date Logged In: 03-Jul-2023 13:32

Samples Received at **22.1°C**

Intact, properly signed and dated custody seals attached to outside of cooler(s)	No	Custody papers included with the cooler	Yes
Custody papers properly filled out (ink, signed, analyses requested, etc)	Yes	Was a temperature blank included in the cooler	No
Was sufficient ice used (if appropriate)	No	All bottles sealed in individual plastic bags	No
All bottles arrived in good condition (unbroken)	Yes	All bottle labels complete and legible	Yes
Number of containers listed on COC match number received	Yes	Bottle labels and tags agree with COC	Yes
Correct bottles used for the requested analyses	Yes	All VOC vials free of air bubbles	No
Analyses/bottles require preservation (attach preservation sheet excluding VOC)	No	Sufficient amount of sample sent in each bottle	Yes
Sample split at ARI	No		

23G0039-01 WDF1491-01 [Water] Sampled 27-Jun-2023 12:12 Methane only version

RSK-175 Dissolved Gases (MEE)	07/18/2023	10	7/11/2023

23G0039-02 WDF1491-02 [Water] Sampled 27-Jun-2023 14:05 Methane only version

RSK-175 Dissolved Gases (MEE)	07/18/2023	10	7/11/2023

Preservation Confirmation

Container ID	Container Type	pH
23G0039-01 A	VOA Vial, Amber, 40 mL, HCL	Bubble
23G0039-02 A	VOA Vial, Amber, 40 mL, HCL	Bubble

Preservation Confirmed By _____ Date _____

Reviewed By _____ Date _____

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Anatek Spokane
Project Name: WDF1491
COC No(s): _____ NA
Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____
Assigned ARI Job No: 23G0039
Tracking No: 1Z20A95V0322019691 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 22.1

Time 10:50

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 90092088

Cooler Accepted by: PIB Date: 7/03/23 Time: 10:50

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used?	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:		
Was sufficient ice used (if appropriate)?	NA	YES	NO
How were bottles sealed in plastic bags?	Individually	Grouped	Not
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Were the sample(s) split by ARI? NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: [illegible] Date: 7/3/23 Time: 1332 Labels checked by: [illegible]

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

cooler received with ice melted.

By: PIB Date: 07/03/23

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 23G0039

Cooler#: _____ **Temperature(°C):** 22.1

Sample ID	Bottle Count	Bottle Type
Samples received above 6°C		

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Completed by: PIB Date: 07/03/23 Time: 10:50

Anatek Labs, Inc. Spokane	Project: WDF1491	
504 East Sprague, Suite D	Project Number: WDF1491	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:51

WDF1491-01

23G0039-01 (Water)

Dissolved Gases

Method: EPA RSK-175 — Sampled: 06/27/2023 12:12

Instrument: FID6 Analyst: LH — Analyzed: 07/05/2023 09:34

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap) — Extract ID: 23G0039-01 A

Preparation Batch: BLG0026 — Sample Size: 10 mL

Prepared: 07/05/2023 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Methane	74-82-8	1	0.65	ND	ug/L	U
Surrogate: Propane			*62-122 %*	*89.7*	*%*	

Anatek Labs, Inc. Spokane	Project: WDF1491	
504 East Sprague, Suite D	Project Number: WDF1491	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:51

WDF1491-02

23G0039-02 (Water)

Dissolved Gases

Method: EPA RSK-175 — Sampled: 06/27/2023 14:05

Instrument: FID6 Analyst: LH — Analyzed: 07/05/2023 09:52

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap) — Extract ID: 23G0039-02 A

Preparation Batch: BLG0026 — Sample Size: 10 mL

Prepared: 07/05/2023 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Methane	74-82-8	1	0.65	6.69	ug/L	
Surrogate: Propane			*62-122 %*	*89.0*	*%*	

Anatek Labs, Inc. Spokane	Project: WDF1491	
504 East Sprague, Suite D	Project Number: WDF1491	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:51

Analysis by: Analytical Resources, LLC

Dissolved Gases - Quality Control

Batch BLG0026 - EPA RSK-175

Instrument: FID6 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLG0026-BLK1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 08:19						
Methane	ND	0.65	ug/L							U
Surrogate: Propane	1600		ug/L	*1800*		*88.8*	*62-122*			
LCS (BLG0026-BS1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 07:43						
Methane	695	0.65	ug/L	656		106	80-120			
Surrogate: Propane	1790		ug/L	*1800*		*99.4*	*62-122*			
LCS Dup (BLG0026-BSD1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 08:01						
Methane	685	0.65	ug/L	656		104	80-120	1.44	30	
Surrogate: Propane	1730		ug/L	*1800*		*96.2*	*62-122*			

Anatek Labs, Inc. Spokane	Project: WDF1491	
504 East Sprague, Suite D	Project Number: WDF1491	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:51

Certified Analyses included in this Report

Analyte	Certifications
EPA RSK-175 in Water	
Methane	NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025

Anatek Labs, Inc. Spokane	Project: WDF1491	
504 East Sprague, Suite D	Project Number: WDF1491	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:51

Notes and Definitions

U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Anatek Labs, Inc.

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Client:	GeoEngineers, Inc.- Portland	Work Order:	WDF1605
Address:	5820 S Kelly Ave Suite B	Project:	Pasco Terminal
	Portland, OR 97239	Reported:	10/6/2023 16:26
Attn:	Kurt Harrington		

Analytical Results Report

Sample Location:	MW-6-2306		
Lab/Sample Number:	WDF1605-01	Collect Date:	06/28/23 10:50
Date Received:	06/29/23 10:20	Collected By:	Colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N	29.8	mg/L	0.200	6/29/23 19:11	AAI	EPA 300.0	
Sulfate	147	mg/L	1.50	7/7/23 11:09	AAI	EPA 300.0	
Total Metals							
Iron (II)	ND	mg/L	0.0100	6/29/23 15:44	AAI	SM 3500-Fe B	*
Metals by ICP-MS							
Manganese	ND	mg/L	0.00100	7/6/23 14:08	JLG	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	7/10/23 20:55	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/10/23 20:55	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/10/23 20:55	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*79.7%*		*50-150*	*7/10/23 20:55*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	ND	mg/L	0.200	7/7/23 15:32	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*93.6%*		*70-130*	*7/7/23 15:32*	*BKP*	*NWTPH-Gx*	
Benzene	ND	ug/L	0.500	7/7/23 15:32	BKP	EPA 624.1	*
Ethylbenzene	ND	ug/L	0.500	7/7/23 15:32	BKP	EPA 624.1	*
m+p-Xylene	ND	ug/L	0.500	7/7/23 15:32	BKP	EPA 624.1	*
o-Xylene	ND	ug/L	0.500	7/7/23 15:32	BKP	EPA 624.1	*
Toluene	ND	ug/L	0.500	7/7/23 15:32	BKP	EPA 624.1	*
Surrogate: 1,2-Dichlorobenzene-d4	*104%*		*70-130*	*7/7/23 15:32*	*BKP*	*EPA 624.1*	
Surrogate: 4-Bromofluorobenzene	*99.8%*		*70-130*	*7/7/23 15:32*	*BKP*	*EPA 624.1*	
Surrogate: Toluene-d8	*102%*		*70-130*	*7/7/23 15:32*	*BKP*	*EPA 624.1*	

Anatek Labs, Inc.

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504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - email spokane@anateklabs.com

Sample Location:	MW-6-MSD-2306		
Lab/Sample Number:	WDF1605-02	Collect Date:	06/28/23 10:50
Date Received:	06/29/23 10:20	Collected By:	Colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Hydrocarbons							
Diesel	ND	mg/L	0.160	7/10/23 21:50	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/10/23 21:50	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/10/23 21:50	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*76.1%*		*50-150*	*7/10/23 21:50*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	ND	mg/L	0.200	7/7/23 16:03	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*93.7%*		*70-130*	*7/7/23 16:03*	*BKP*	*NWTPH-Gx*	
Benzene	ND	ug/L	0.500	7/7/23 16:03	BKP	EPA 624.1	*
Ethylbenzene	ND	ug/L	0.500	7/7/23 16:03	BKP	EPA 624.1	*
m+p-Xylene	ND	ug/L	0.500	7/7/23 16:03	BKP	EPA 624.1	*
o-Xylene	ND	ug/L	0.500	7/7/23 16:03	BKP	EPA 624.1	*
Toluene	ND	ug/L	0.500	7/7/23 16:03	BKP	EPA 624.1	*
Surrogate: 1,2-Dichlorobenzene-d4	*106%*		*70-130*	*7/7/23 16:03*	*BKP*	*EPA 624.1*	
Surrogate: 4-Bromofluorobenzene	*99.3%*		*70-130*	*7/7/23 16:03*	*BKP*	*EPA 624.1*	
Surrogate: Toluene-d8	*102%*		*70-130*	*7/7/23 16:03*	*BKP*	*EPA 624.1*	

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Sample Location:	MW-4-2306		
Lab/Sample Number:	WDF1605-03	Collect Date:	06/28/23 09:02
Date Received:	06/29/23 10:20	Collected By:	Colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N	30.8	mg/L	0.200	6/29/23 19:30	AAI	EPA 300.0	
Sulfate	173	mg/L	1.50	7/7/23 11:48	AAI	EPA 300.0	
Total Metals							
Iron (II)	ND	mg/L	0.0100	6/29/23 15:44	AAI	SM 3500-Fe B	*
Metals by ICP-MS							
Manganese	ND	mg/L	0.00100	7/6/23 14:25	JLG	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	7/10/23 22:46	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/10/23 22:46	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/10/23 22:46	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*80.9%*		*50-150*	*7/10/23 22:46*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	ND	mg/L	0.200	7/7/23 16:33	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*92.7%*		*70-130*	*7/7/23 16:33*	*BKP*	*NWTPH-Gx*	
Benzene	ND	ug/L	0.500	7/7/23 16:33	BKP	EPA 624.1	*
Ethylbenzene	ND	ug/L	0.500	7/7/23 16:33	BKP	EPA 624.1	*
m+p-Xylene	ND	ug/L	0.500	7/7/23 16:33	BKP	EPA 624.1	*
o-Xylene	ND	ug/L	0.500	7/7/23 16:33	BKP	EPA 624.1	*
Toluene	ND	ug/L	0.500	7/7/23 16:33	BKP	EPA 624.1	*
Surrogate: 1,2-Dichlorobenzene-d4	*105%*		*70-130*	*7/7/23 16:33*	*BKP*	*EPA 624.1*	
Surrogate: 4-Bromofluorobenzene	*100%*		*70-130*	*7/7/23 16:33*	*BKP*	*EPA 624.1*	
Surrogate: Toluene-d8	*102%*		*70-130*	*7/7/23 16:33*	*BKP*	*EPA 624.1*	

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Authorized Signature,

Brock Gerger For Kathleen Sattler, Laboratory Manager

M2	Matrix spike recovery was low; the associated blank spike recovery was acceptable. Potential matrix effect.
PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0154 - W Ions										
Blank (BDG0154-BLK1)					Prepared & Analyzed: 7/6/2023					
Nitrate-N	ND		0.100	mg/L						
Sulfate	ND		0.150	mg/L						
LCS (BDG0154-BS1)					Prepared & Analyzed: 7/6/2023					
Nitrate-N	4.12			mg/L	4.00		103	90-110		
Sulfate	3.96			mg/L	4.00		99.0	90-110		
LCS (BDG0154-BS2)					Prepared & Analyzed: 7/7/2023					
Nitrate-N	4.15			mg/L	4.00		104	90-110		
Sulfate	4.15			mg/L	4.00		104	90-110		
Matrix Spike (BDG0154-MS1)		**Source: WDG0021-02**			Prepared & Analyzed: 7/7/2023					
Nitrate-N	7.59		0.100	mg/L	4.00	3.44	104	80-120		
Sulfate	57.8		0.150	mg/L	4.00	61.4	NR	80-120		
Matrix Spike Dup (BDG0154-MSD1)		**Source: WDG0021-02**			Prepared & Analyzed: 7/7/2023					
Nitrate-N	7.59		0.100	mg/L	4.00	3.44	104	80-120	0.0132	20
Sulfate	57.9		0.150	mg/L	4.00	61.4	NR	80-120	0.166	20

Quality Control Data

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0112 - W ICP-MS										
Blank (BDG0112-BLK1)					Prepared & Analyzed: 7/6/2023					
Manganese	ND		0.00100	mg/L						
LCS (BDG0112-BS1)					Prepared & Analyzed: 7/6/2023					
Manganese	0.0450		0.00100	mg/L	0.0500		90.0	85-115		
Matrix Spike (BDG0112-MS1)		**Source: WDF1548-02**			Prepared & Analyzed: 7/6/2023					
Manganese	0.0508		0.00100	mg/L	0.0500	ND	102	70-130		
Matrix Spike (BDG0112-MS3)		**Source: WDG0011-02**			Prepared & Analyzed: 7/6/2023					
Manganese	0.0802		0.00100	mg/L	0.0500	0.0288	103	70-130		
Matrix Spike Dup (BDG0112-MSD1)		**Source: WDF1548-02**			Prepared & Analyzed: 7/6/2023					
Manganese	0.0533		0.00100	mg/L	0.0500	ND	107	70-130	4.95	20
Matrix Spike Dup (BDG0112-MSD3)		**Source: WDG0011-02**			Prepared & Analyzed: 7/6/2023					
Manganese	0.0778		0.00100	mg/L	0.0500	0.0288	98.1	70-130	2.92	20

Quality Control Data

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0143 - W TPH-Dx										

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0143 - W TPH-Dx (Continued)										
Blank (BDG0143-BLK1)					Prepared & Analyzed: 7/10/2023					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*0.155*	*mg/L*	*0.200*		*77.6*	*50-150*		
LCS (BDG0143-BS1)					Prepared & Analyzed: 7/10/2023					
Diesel	1.55		0.160	mg/L	2.06		75.2	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*0.158*	*mg/L*	*0.200*		*79.0*	*50-150*		
Matrix Spike (BDG0143-MS1)		**Source: WDF1605-03**			Prepared & Analyzed: 7/10/2023					
Diesel	1.17	M2	0.160	mg/L	2.06	ND	56.6	70-130		
Lube Oil	ND	M2	0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane		*M2*	*0.165*	*mg/L*	*0.200*		*82.6*	*50-150*		
Matrix Spike Dup (BDG0143-MSD1)		**Source: WDF1605-03**			Prepared & Analyzed: 7/10/2023					
Diesel	0.960	M2	0.160	mg/L	2.06	ND	46.6	70-130	19.3	20
Lube Oil	ND	M2	0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane		*M2*	*0.154*	*mg/L*	*0.200*		*77.2*	*50-150*		

Quality Control Data
(Continued)

Volatiles

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0142 - VOC										
Blank (BDG0142-BLK1)					Prepared & Analyzed: 7/7/2023					
Benzene	ND		0.500	ug/L						
Ethylbenzene	ND		0.500	ug/L						
Toluene	ND		0.500	ug/L						
m/p Xylenes (MCL for total)	ND		0.500	ug/L						
o-Xylene (MCL for total)	ND		0.500	ug/L						
LCS (BDG0142-BS1)					Prepared & Analyzed: 7/7/2023					
Benzene	9.57		0.500	ug/L	10.0		95.7	80-120		
Ethylbenzene	9.49		0.500	ug/L	10.0		94.9	80-120		
Toluene	9.86		0.500	ug/L	10.0		98.6	80-120		
m/p Xylenes (MCL for total)	19.3		0.500	ug/L	20.0		96.3	80-120		
o-Xylene (MCL for total)	9.59		0.500	ug/L	10.0		95.9	80-120		
Matrix Spike (BDG0142-MS1)		**Source: MDG0060-01**			Prepared & Analyzed: 7/7/2023					
Benzene	8.58		0.500	ug/L	10.0	ND	85.8	70-130		
Ethylbenzene	9.08		0.500	ug/L	10.0	ND	90.8	70-130		
Toluene	9.65		0.500	ug/L	10.0	ND	96.5	70-130		
m/p Xylenes (MCL for total)	19.1		0.500	ug/L	20.0	ND	95.6	67-130		
o-Xylene (MCL for total)	9.74		0.500	ug/L	10.0	ND	97.4	66-130		
Matrix Spike Dup (BDG0142-MSD1)		**Source: MDG0060-01**			Prepared & Analyzed: 7/7/2023					
Benzene	8.25		0.500	ug/L	10.0	ND	82.5	70-130	3.92	25

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Quality Control Data
(Continued)

Volatiles (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0142 - VOC (Continued)										
Matrix Spike Dup (BDG0142-MSD1)	**Source: MDG0060-01**				Prepared & Analyzed: 7/7/2023					
Ethylbenzene	8.77		0.500	ug/L	10.0	ND	87.7	70-130	3.47	25
Toluene	9.19		0.500	ug/L	10.0	ND	91.9	70-130	4.88	25
m/p Xylenes (MCL for total)	18.2		0.500	ug/L	20.0	ND	90.9	67-130	5.04	25
o-Xylene (MCL for total)	9.35		0.500	ug/L	10.0	ND	93.5	66-130	4.09	25
Batch: BDG0144 - VOC										
Blank (BDG0144-BLK1)					Prepared & Analyzed: 7/7/2023					
Gasoline	ND		0.200	mg/L						
Surrogate: 4-Bromofluorobenzene			*0.0196*	*mg/L*	*0.0200*		*97.9*	*70-130*		
LCS (BDG0144-BS1)					Prepared & Analyzed: 7/7/2023					
Gasoline	0.990		0.200	mg/L	1.00		99.0	80-120		
Surrogate: 4-Bromofluorobenzene			*0.0186*	*mg/L*	*0.0200*		*93.0*	*70-130*		

ANATEK LABS

Chain of Custody Record

Anatek L
1282 Alturas Drive, Mosco
504 E Sprague Ste D, Spoka

WDF1605

Due: 07/14/23

Turn A

Please refer to our normal... www.anateklabs.com/pricing-lists

X Normal __Next Day* __2nd Day* __Other*_____ __Phone __Email

*All rush order requests must have prior approval

Company Name: GeoEngineers	Project Manager: Kurt Harrington
Address: 5820 S. Kelly Ave Ste. B	Project Name & #: Pasco Terminal
City: Portland State: OR Zip: 97239	Purchase Order #: 0009991-005-02
Phone: 503-906-6577	Sampler Name & Phone: Colin Watson 503-756-6285
Email Address(es): kharrington@geoengineers.com	

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	Preservative: BTEX 8260	NWTPH-Gx	NWTPH-Dx	Ferrous Fe	Mn	SO_4, NO_3	Methane	NWTPH-Gx
	MW-6-2306	6/28/23 1050	H_2O	9	-	X	X	X	X	X	X	X	X
	MW-6-MSD-2306	6/28/23 1050	H_2O	5	-	X	X	X					X
	MW-4-2306	6/28/23 0902	H_2O	9	-	X	X	X	X	X	X	X	X

Note Special Instructions/Comments

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
No VOC Head Space?	~~Y~~	~~N~~
Cooler?	(Y)	N
Ice/Ice Packs Present?	(Y)	N

Temperature (°C): 2.8 IRC

Number of Containers:

Shipped Via: FedEx c/i

Preservative: HCl 2300439-2 pH 2 or 2 ✓

Date & Time:

Inspected By:

	Printed Name	Signature	Company	Date	Time
Relinquished by	Colin Watson		GeoEngineers	6/28/23	1530
Received by	Joseph Boppin		Anatek Labs	6/29/23	1020
Relinquished by					
Received by					
Relinquished by					
Received by					

Samples submitted to Anatek Labs may be subcontacted to other accredited labs if necessary. This message serves as notice of this possibility. Subcontracted analyses will be clearly noted on the analytical report.

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

05 July 2023

Kathy Sattler
Anatek Labs, Inc. Spokane
504 East Sprague, Suite D
Spokane, WA 99202

RE: WDF1610 (WDF1610)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23G0038	N/A

Shelly Fishel
Digitally signed by Shelly Fishel
Date: 2023.07.05 17:49:32 -07'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Shelly Fishel, Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

23G0038

SUBCONTRACT ORDER

Anatek Labs, Inc.

1282 Alturas Drive - Moscow, ID 83843 - (208) 8832839 - Fax (208) 8829246 - email moscow@anateklabs.com
504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Sending Laboratory:

Anatek Labs, Inc.- Spokane
504 E Sprague Ave, Suite D
Spokane, WA 99202
Phone: 509-838-3999
Fax: 509-838-4433

Project Manager: Kathleen Sattler
kathy@anateklabs.com

Subcontracted Laboratory:

Analytical Resources LLC
4611 S. 134TH Place, Suite 100
Tukwila, WA 98168
Phone: (206) 695-6200
Fax: (206) 695-6202

Work Order: WDF1610

Analysis	Due	Expires	Comments
Lab Sample ID: WDF1610-01 ***Water*** ***Sampled: 06/28/2023 13:16***			
Client Sample Name: MW-8-2306			
W Methane	07/12/2023	07/12/2023 13:16	
Containers Supplied:			
Lab Sample ID: WDF1610-02 ***Water*** ***Sampled: 06/28/2023 13:16***			
Client Sample Name: MW-8-FD-2306			
W Methane	07/12/2023	07/12/2023 13:16	
Containers Supplied:			

Released By _____ Date 6/29/23

Received By Philip _____ Date 07/03/23

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WDF1610-01	23G0038-01	Water	28-Jun-2023 13:16	03-Jul-2023 10:50
WDF1610-02	23G0038-02	Water	28-Jun-2023 13:16	03-Jul-2023 10:50

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

Work Order Case Narrative

Client: Anatek Labs, Inc. Spokane
Project: WDF1610
Work Order: 23G0038

Sample receipt

Samples as listed on the preceding page were received 03-Jul-2023 10:50 under ARI work order 23G0038. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Volatile Gases - MEE by RSK175

The sample(s) were analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The blank spike and blank spike duplicate (BS/LCS and BSD/LCSD) spike recoveries and relative percent difference (RPD) were within control limits.

Analytical Resources, LLC
Analytical Chemists and Consultants

Printed: 7/3/2023 1:46:55PM

WORK ORDER

23G0038

Samples will be discarded 90 days after submission of a final report unless other instructions are received

Client: Anatek Labs, Inc. Spokane | **Project Manager: Shelly Fishel**

Project: WDF1610 | **Project Number: WDF1610**

Report To:
Anatek Labs, Inc. Spokane
Kathy Sattler
504 East Sprague, Suite D
Spokane, WA 99202
Phone: (509) 838-3999
Fax: -

Invoice To:
Anatek Labs, Inc.
Cheri Price Accounting Department
1282 Alturas Drive
Moscow, ID 83843
Phone :(208) 883-2839
Fax: -

Date Due: 18-Jul-2023 18:00 (10 day TAT)

Received By: Phillip Bates | Date Received: 03-Jul-2023 10:50

Logged In By: Nora Cate | Date Logged In: 03-Jul-2023 13:32

Samples Received at **22.1°C**

Intact, properly signed and dated custody seals attached to outside of cooler(s)	No	Custody papers included with the cooler	Yes
Custody papers properly filled out(in, signed, analyses requested etc)	Yes	Was a temperature blank included in the cooler	No
Was sufficient ice used (if appropriate)	No	All bottles sealed in individual plastic bags	No
All bottles arrived in good condition(unbroken)	Yes	All bottle labels complete and legible	Yes
Number of containers listed on COC match number received	Yes	Bottle labels and tags agree with COC	Yes
Correct bottles used for the requested analyses	Yes	All VOC vials free of air bubbles	No
Analyses/bottles require preservation (attach preservation sheet excluding VOC).	No	Sufficient amount of sample sent in each bottle	Yes
Sample split at ARI	No		

23G0038-01 WDF1610-01 [Water] Sampled 28-Jun-2023 13:16 Methane only version

RSK-175 Dissolved Gases (MEE)	07/18/2023	10	7/12/2023

23G0038-02 WDF1610-02 [Water] Sampled 28-Jun-2023 13:16 Methane only version

RSK-175 Dissolved Gases (MEE)	07/18/2023	10	7/12/2023

Preservation Confirmation

Container ID	Container Type	pH
23G0038-01 A	VOA Vial, Amber, 40 mL, HCL	
23G0038-02 A	VOA Vial, Amber, 40 mL, HCL	bubble

NC
Preservation Confirmed By

07/03/23
Date

Reviewed By

Date

23G NC 07/03/23

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Anatek Spokane
Project Name: WDF1610
COC No(s): _____ (NA)
Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____
Assigned ARI Job No: 23G0038
Tracking No: 1220A95V0322019691 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 22.1

Time 10:50

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 90092058

Cooler Accepted by: FEB Date: 7/03/23 Time: 10:50

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used?	(Bubble Wrap) Wet Ice Gel Packs Baggies Foam Block Paper Other:		
Was sufficient ice used (if appropriate)?	NA	YES	(NO)
How were bottles sealed in plastic bags?	Individually	(Grouped)	(Not)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	(NA)	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	(NO)
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	(NA)		

Were the sample(s) split by ARI? (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: NO Date: 07/03/23 Time: 13:32 Labels checked by: _____

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

cooler received with ice melted.

By: FEB Date: 07/03/23

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 23G0038

Cooler#: _____ **Temperature(°C):** 22.1

Sample ID	Bottle Count	Bottle Type
Samples received		
above 6°C		

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Completed by: PIB Date: 07/03/23 Time: 10:50

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

WDF1610-01

23G0038-01 (Water)

Dissolved Gases

Method: EPA RSK-175 — Sampled: 06/28/2023 13:16

Instrument: FID6 Analyst: LH — Analyzed: 07/05/2023 08:58

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap) — Extract ID: 23G0038-01 A

Preparation Batch: BLG0026 — Sample Size: 10 mL

Prepared: 07/05/2023 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Methane	74-82-8	1	0.65	ND	ug/L	U
Surrogate: Propane			*62-122 %*	*70.1*	*%*	

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

WDF1610-02

23G0038-02 (Water)

Dissolved Gases

Method: EPA RSK-175 — Sampled: 06/28/2023 13:16
Instrument: FID6 Analyst: LH — Analyzed: 07/05/2023 09:16

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap) — Extract ID: 23G0038-02 A
Preparation Batch: BLG0026 — Sample Size: 10 mL
Prepared: 07/05/2023 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Methane	74-82-8	1	0.65	ND	ug/L	U
Surrogate: Propane			*62-122 %*	*90.5*	*%*	

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

Analysis by: Analytical Resources, LLC

Dissolved Gases - Quality Control

Batch BLG0026 - EPA RSK-175

Instrument: FID6 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLG0026-BLK1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 08:19						
Methane	ND	0.65	ug/L							U
Surrogate: Propane	1600		ug/L	*1800*		*88.8*	*62-122*			
LCS (BLG0026-BS1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 07:43						
Methane	695	0.65	ug/L	656		106	80-120			
Surrogate: Propane	1790		ug/L	*1800*		*99.4*	*62-122*			
LCS Dup (BLG0026-BSD1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 08:01						
Methane	685	0.65	ug/L	656		104	80-120	1.44	30	
Surrogate: Propane	1730		ug/L	*1800*		*96.2*	*62-122*			

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

Certified Analyses included in this Report

Analyte	Certifications
EPA RSK-175 in Water	
Methane	NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

Notes and Definitions

U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Anatek Labs, Inc.

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504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - email spokane@anateklabs.com

Client:	GeoEngineers, Inc.- Portland	Work Order:	WDF1654
Address:	5820 S Kelly Ave Suite B	Project:	Pasco Teminal
	Portland, OR 97239	Reported:	10/6/2023 16:42
Attn:	Kurt Harrington		

Analytical Results Report

Sample Location:	AR-1-2306		
Lab/Sample Number:	WDF1654-01	Collect Date:	06/29/23 09:05
Date Received:	06/30/23 10:38	Collected By:	Colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N	1.29	mg/L	0.100	6/30/23 16:50	AAI	EPA 300.0	
Sulfate	54.1	mg/L	0.300	7/7/23 7:30	AAI	EPA 300.0	
Total Metals							
Iron (II)	ND	mg/L	0.0100	6/30/23 15:20	AAI	SM 3500-Fe B	*
Metals by ICP-MS							
Manganese	2.21	mg/L	0.00100	7/7/23 17:09	Metals	EPA 200.8	
Hydrocarbons							
Diesel	6.01	mg/L	0.160	7/6/23 23:02	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/6/23 23:02	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/6/23 23:02	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*75.0%*		*50-150*	*7/6/23 23:02*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	85.0	mg/L	10.0	7/13/23 23:18	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*103%*		*70-130*	*7/13/23 23:18*	*BKP*	*NWTPH-Gx*	
Benzene	723	ug/L	50.0	7/7/23 18:35	BKP	EPA 624.1	*
Ethylbenzene	434	ug/L	50.0	7/7/23 18:35	BKP	EPA 624.1	*
m+p-Xylene	3850	ug/L	50.0	7/7/23 18:35	BKP	EPA 624.1	*
o-Xylene	2890	ug/L	50.0	7/7/23 18:35	BKP	EPA 624.1	*

Sample Comment: WDF1654-01 Hit on sample does not appear to be a targe compound, appears to be gasoline and/or JP-4 or another type of Jet fuel. - BAN

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Authorized Signature,

Brock Gerger For Kathleen Sattler, Laboratory Manager

M2	Matrix spike recovery was low; the associated blank spike recovery was acceptable. Potential matrix effect.
PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0017 - W Ions										
Blank (BDG0017-BLK1)					Prepared & Analyzed: 6/30/2023					
Nitrate-N	ND		0.100	mg/L						
LCS (BDG0017-BS1)					Prepared & Analyzed: 6/30/2023					
Nitrate-N	4.20			mg/L	4.00		105	90-110		
LCS Dup (BDG0017-BSD1)					Prepared & Analyzed: 7/1/2023					
Nitrate-N	4.19			mg/L	4.00		105	90-110	0.0954	20
Batch: BDG0154 - W Ions										
Blank (BDG0154-BLK1)					Prepared & Analyzed: 7/6/2023					
Sulfate	ND		0.150	mg/L						
LCS (BDG0154-BS1)					Prepared & Analyzed: 7/6/2023					
Sulfate	3.96			mg/L	4.00		99.0	90-110		
LCS (BDG0154-BS2)					Prepared & Analyzed: 7/7/2023					
Sulfate	4.15			mg/L	4.00		104	90-110		
Matrix Spike (BDG0154-MS1)		**Source: WDG0021-02**			Prepared & Analyzed: 7/7/2023					
Sulfate	57.8		0.150	mg/L	4.00	61.4	NR	80-120		
Matrix Spike Dup (BDG0154-MSD1)		**Source: WDG0021-02**			Prepared & Analyzed: 7/7/2023					
Sulfate	57.9		0.150	mg/L	4.00	61.4	NR	80-120	0.166	20

Quality Control Data

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0106 - W 3010 Digest										
Blank (BDG0106-BLK1)					Prepared: 7/6/2023 Analyzed: 7/7/2023					
Manganese	ND		0.00100	mg/L						
LCS (BDG0106-BS1)					Prepared: 7/6/2023 Analyzed: 7/7/2023					
Manganese	0.0509		0.00100	mg/L	0.0500		102	85-115		
Matrix Spike (BDG0106-MS1)		**Source: WDF1669-01**			Prepared: 7/6/2023 Analyzed: 7/7/2023					
Manganese	0.109		0.00100	mg/L	0.0500	0.0605	96.3	70-130		
Matrix Spike Dup (BDG0106-MSD1)		**Source: WDF1669-01**			Prepared: 7/6/2023 Analyzed: 7/7/2023					
Manganese	0.110		0.00100	mg/L	0.0500	0.0605	99.7	70-130	1.54	20

Quality Control Data

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0097 - W TPH-Dx										

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0097 - W TPH-Dx (Continued)										
Blank (BDG0097-BLK1)					Prepared & Analyzed: 7/6/2023					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*0.147*	*mg/L*	*0.200*		*73.6*	*50-150*		
LCS (BDG0097-BS1)					Prepared & Analyzed: 7/6/2023					
Diesel	1.44		0.160	mg/L	2.06		70.0	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*0.168*	*mg/L*	*0.200*		*84.1*	*50-150*		
Matrix Spike (BDG0097-MS1)		**Source: WDF1491-01**			Prepared & Analyzed: 7/6/2023					
Diesel	0.821	M2	0.160	mg/L	2.06	ND	39.8	70-130		
Lube Oil	ND	M2	0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane		*M2*	*0.143*	*mg/L*	*0.200*		*71.5*	*50-150*		
Matrix Spike Dup (BDG0097-MSD1)		**Source: WDF1491-01**			Prepared & Analyzed: 7/6/2023					
Diesel	0.924	M2	0.160	mg/L	2.06	ND	44.8	70-130	11.9	20
Lube Oil	ND	M2	0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane		*M2*	*0.151*	*mg/L*	*0.200*		*75.6*	*50-150*		

Quality Control Data
(Continued)

Volatiles

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0142 - VOC										
Blank (BDG0142-BLK1)					Prepared & Analyzed: 7/7/2023					
Benzene	ND		0.500	ug/L						
Ethylbenzene	ND		0.500	ug/L						
m/p Xylenes (MCL for total)	ND		0.500	ug/L						
o-Xylene (MCL for total)	ND		0.500	ug/L						
LCS (BDG0142-BS1)					Prepared & Analyzed: 7/7/2023					
Benzene	9.57		0.500	ug/L	10.0		95.7	80-120		
Ethylbenzene	9.49		0.500	ug/L	10.0		94.9	80-120		
m/p Xylenes (MCL for total)	19.3		0.500	ug/L	20.0		96.3	80-120		
o-Xylene (MCL for total)	9.59		0.500	ug/L	10.0		95.9	80-120		
Matrix Spike (BDG0142-MS1)		**Source: MDG0060-01**			Prepared & Analyzed: 7/7/2023					
Benzene	8.58		0.500	ug/L	10.0	ND	85.8	70-130		
Ethylbenzene	9.08		0.500	ug/L	10.0	ND	90.8	70-130		
m/p Xylenes (MCL for total)	19.1		0.500	ug/L	20.0	ND	95.6	67-130		
o-Xylene (MCL for total)	9.74		0.500	ug/L	10.0	ND	97.4	66-130		
Matrix Spike Dup (BDG0142-MSD1)		**Source: MDG0060-01**			Prepared & Analyzed: 7/7/2023					
Benzene	8.25		0.500	ug/L	10.0	ND	82.5	70-130	3.92	25
Ethylbenzene	8.77		0.500	ug/L	10.0	ND	87.7	70-130	3.47	25
m/p Xylenes (MCL for total)	18.2		0.500	ug/L	20.0	ND	90.9	67-130	5.04	25
o-Xylene (MCL for total)	9.35		0.500	ug/L	10.0	ND	93.5	66-130	4.09	25

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Quality Control Data
(Continued)

Volatiles (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0142 - VOC (Continued)										
Batch: BDG0144 - VOC										
Blank (BDG0144-BLK1)					Prepared & Analyzed: 7/7/2023					
Gasoline	ND		0.200	mg/L						
Surrogate: 4-Bromofluorobenzene			*0.0196*	*mg/L*	*0.0200*		*97.9*	*70-130*		
LCS (BDG0144-BS1)					Prepared & Analyzed: 7/7/2023					
Gasoline	0.990		0.200	mg/L	1.00		99.0	80-120		
Surrogate: 4-Bromofluorobenzene			*0.0186*	*mg/L*	*0.0200*		*93.0*	*70-130*		

ANATEK LABS

Chain of Custody Record

Anatek
1282 Alturas Drive, Mo
504 E Sprague Ste D, Sp

WDF1654

Due: 07/17/23

Company Name: GeoEngineers	Project Manager: Kurt Harrington
Address: 5820 S. Kelly Ave Ste B	Project Name & #: Pasco Terminal
City: Portland State: OR Zip: 97239	Purchase Order #: 009991-005-02
Phone: 503-906-9577	Sampler Name & Phone: Colin Watson 503-756-6235
Email Address(es): kharrington@geoengineers.com	

Turnaround Time

Please refer to our normal turn around times at www.anateklabs.com/pricing-lists

X Normal
__Next Day*
__2nd Day*
__Other*_____

__Phone
__Email

*All rush order requests must have prior approval

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	Preservative:	BTEX 8260	NWTPH-Gx	NWTPH-Dx	Ferrous Fe	Mn	SO4, NO3	Methane	NWTPH-Oil		
	AR-1-2306	6/29/23 0905	H_2O	9	-		X	X	X	X	X	X	X	X		

Note Special Instructions/Comments

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
No VOC Head Space?	Y	N
Cooler?	(Y)	N
Ice/Ice Packs Present?	(Y)	N

Temperature (°C): 3.5 IR6
Number of Containers:
Shipped Via: fedex
Preservative: HCl 7300439C2 pH 2102979
Date & Time: 6/30/23
Inspected By:

	Printed Name	Signature	Company	Date	Time
Relinquished by	Colin Watson		GeoEngineers	6/29/23	1040
Received by	Joseph Griffin		Anatek	6/30/23	1639
Relinquished by					
Received by					
Relinquished by					
Received by					

Samples submitted to Anatek Labs may be subcontacted to other accredited labs if necessary. This message serves as notice of this possibility. Subcontracted analyses will be clearly noted on the analytical report.

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

11 July 2023

Kathy Sattler
Anatek Labs, Inc. Spokane
504 East Sprague, Suite D
Spokane, WA 99202

RE: WDF1654

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23G0114	N/A

Shelly Fishel

Digitally signed by Shelly Fishel
Date: 2023.07.11 16:47:14 -07'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

Shelly Fishel, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

23G0114

SUBCONTRACT ORDER

Anatek Labs, Inc.

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504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Sending Laboratory:

Anatek Labs, Inc.- Spokane
504 E Sprague Ave, Suite D
Spokane, WA 99202
Phone: 509-838-3999
Fax: 509-838-4433

Project Manager: Kathleen Sattler
kathy@anateklabs.com

Subcontracted Laboratory:

Analytical Resources LLC
4611 S. 134TH Place, Suite 100
Tukwila, WA 98168
Phone: (206) 695-6200
Fax: (206) 695-6202

Work Order: WDF1654

Analysis	Due	Expires	Comments
Lab Sample ID: WDF1654-01 *Water* ***Sampled: 06/29/2023 09:05***			
Client Sample Name: AR-1-2306			
W Methane	07/13/2023	07/13/2023 09:05	
Containers Supplied:			

Released By _____ Date _____

Received By _____ Date 07/07/23 10:30

Anatek Labs, Inc. Spokane	Project: WDF1654	
504 East Sprague, Suite D	Project Number: [none]	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	11-Jul-2023 16:44

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
AR-1-2306 (WDF1654-01)	23G0114-01	Water	29-Jun-2023 09:05	07-Jul-2023 10:30

Anatek Labs, Inc. Spokane	Project: WDF1654	
504 East Sprague, Suite D	Project Number: [none]	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	11-Jul-2023 16:44

Work Order Case Narrative

Client: Anatek Labs, Inc. Spokane
Project: WDF1654
Work Order: 23G0114

Sample receipt

Samples as listed on the preceding page were received 07-Jul-2023 10:30 under ARI work order 23G0114. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Volatile Gases - MEE by RSK175

The sample(s) were analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The blank spike and blank spike duplicate (BS/LCS and BSD/LCSD) spike recoveries and relative percent difference (RPD) were within control limits.

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Anatek Project Name: WDF1654

COC No(s): _____ (NA) Delivered by: Fed-Ex (UPS) Courier Hand Delivered Other: _____

Assigned ARI Job No: 23G0114 Tracking No: 1Z 70A9S063 2193 2635 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1030 2.3

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: T009208

Cooler Accepted by: MD Date: 07/07/23 Time: 1030

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used? ... Bubble Wrap Wet Ice ~~Gel Packs~~ Baggies Foam Block Paper Other:			
Was sufficient ice used (if appropriate)?	NA	YES	(NO)
How were bottles sealed in plastic bags?	Individually	Grouped	(Not)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) ...	(NA)	YES	NO
Were all VOC vials free of air bubbles?	(NA) NC 07/10/23	(YES)	NO
Was sufficient amount of sample sent in each bottle?		(YES)	NO
Date VOC Trip Blank was made at ARI	(NA)		

Were the sample(s) split by ARI? (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: NC Date: 07/10/23 Time: 08:48 Labels checked by: _____

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

Client did not sign C.O.C.

By: MD Date: 07/07/23

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 23G0114

Cooler#: 1 **Temperature(°C):** 22.3°

Sample ID	Bottle Count	Bottle Type
Sample received above 0.0°C		

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Completed by: MP Date: 07/07/23 Time: 10:30

Anatek Labs, Inc. Spokane	Project: WDF1654	
504 East Sprague, Suite D	Project Number: [none]	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	11-Jul-2023 16:44

AR-1-2306 (WDF1654-01)

23G0114-01 (Water)

Dissolved Gases

Method: EPA RSK-175 — Sampled: 06/29/2023 09:05

Instrument: FID6 Analyst: LH — Analyzed: 07/11/2023 08:55

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap) — Extract ID: 23G0114-01 A

Preparation Batch: BLG0160 — Sample Size: 10 mL

Prepared: 07/11/2023 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Methane	74-82-8	1	0.65	67.9	ug/L	
Surrogate: Propane			*62-122 %*	*92.8*	*%*	

Anatek Labs, Inc. Spokane	Project: WDF1654	
504 East Sprague, Suite D	Project Number: [none]	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	11-Jul-2023 16:44

Analysis by: Analytical Resources, LLC

Dissolved Gases - Quality Control

Batch BLG0160 - EPA RSK-175

Instrument: FID6 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLG0160-BLK1)				Prepared: 11-Jul-2023 Analyzed: 11-Jul-2023 07:44						
Methane	ND	0.65	ug/L							U
Surrogate: Propane	1770		ug/L	*1800*		*98.2*	*62-122*			
LCS (BLG0160-BS1)				Prepared: 11-Jul-2023 Analyzed: 11-Jul-2023 07:08						
Methane	700	0.65	ug/L	656		107	80-120			
Surrogate: Propane	1840		ug/L	*1800*		*102*	*62-122*			
LCS Dup (BLG0160-BSD1)				Prepared: 11-Jul-2023 Analyzed: 11-Jul-2023 07:26						
Methane	712	0.65	ug/L	656		108	80-120	1.68	30	
Surrogate: Propane	1910		ug/L	*1800*		*106*	*62-122*			

Anatek Labs, Inc. Spokane	Project: WDF1654	
504 East Sprague, Suite D	Project Number: [none]	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	11-Jul-2023 16:44

Certified Analyses included in this Report

Analyte	Certifications
EPA RSK-175 in Water	
Methane	NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025

Anatek Labs, Inc. Spokane	Project: WDF1654	
504 East Sprague, Suite D	Project Number: [none]	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	11-Jul-2023 16:44

Notes and Definitions

U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Anatek Labs, Inc.

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Client:	GeoEngineers, Inc.- Portland	Work Order:	WDF1610
Address:	5820 S Kelly Ave Suite B	Project:	Pasco Terminal
	Portland, OR 97239	Reported:	10/6/2023 16:32
Attn:	Kurt Harrington		

Analytical Results Report

Sample Location:	MW-8-2306		
Lab/Sample Number:	WDF1610-01	Collect Date:	06/28/23 13:16
Date Received:	06/29/23 10:20	Collected By:	Colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N	22.4	mg/L	0.200	6/29/23 18:31	AAI	EPA 300.0	
Sulfate	113	mg/L	1.50	7/7/23 12:28	AAI	EPA 300.0	
Total Metals							
Iron (II)	ND	mg/L	0.0100	6/29/23 15:44	AAI	SM 3500-Fe B	*
Metals by ICP-MS							
Manganese	0.283	mg/L	0.00100	7/6/23 14:28	JLG	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	7/10/23 23:41	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/10/23 23:41	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/10/23 23:41	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*73.6%*		*50-150*	*7/10/23 23:41*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	8.90	mg/L	2.00	7/13/23 20:51	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*126%*		*70-130*	*7/13/23 20:51*	*BKP*	*NWTPH-Gx*	
Benzene	ND	ug/L	0.500	7/7/23 17:04	BKP	EPA 624.1	*
Ethylbenzene	45.5	ug/L	25.0	7/7/23 17:04	BKP	EPA 624.1	*
m+p-Xylene	411	ug/L	25.0	7/7/23 17:04	BKP	EPA 624.1	*
o-Xylene	196	ug/L	25.0	7/7/23 17:04	BKP	EPA 624.1	*
Toluene	1.53	ug/L	0.500	7/7/23 17:04	BKP	EPA 624.1	*

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Sample Location:	MW-8-FD-2306		
Lab/Sample Number:	WDF1610-02	Collect Date:	06/28/23 13:16
Date Received:	06/29/23 10:20	Collected By:	Colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N	22.6	mg/L	0.200	6/29/23 18:57	AAI	EPA 300.0	
Sulfate	113	mg/L	1.50	7/7/23 13:08	AAI	EPA 300.0	
Total Metals							
Iron (II)	ND	mg/L	0.0100	6/29/23 15:44	AAI	SM 3500-Fe B	*
Metals by ICP-MS							
Manganese	0.272	mg/L	0.00100	7/6/23 14:38	JLG	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	7/11/23 0:36	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/11/23 0:36	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/11/23 0:36	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*53.1%*		*50-150*	*7/11/23 0:36*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	7.80	mg/L	2.00	7/13/23 22:20	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*114%*		*70-130*	*7/13/23 22:20*	*BKP*	*NWTPH-Gx*	
Benzene	ND	ug/L	0.500	7/7/23 17:34	BKP	EPA 624.1	*
Ethylbenzene	65.0	ug/L	50.0	7/7/23 17:34	BKP	EPA 624.1	*
m+p-Xylene	578	ug/L	50.0	7/7/23 17:34	BKP	EPA 624.1	*
o-Xylene	277	ug/L	50.0	7/7/23 17:34	BKP	EPA 624.1	*
Toluene	1.76	ug/L	0.500	7/7/23 17:34	BKP	EPA 624.1	*

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Sample Location:	MW-8-ER-2306		
Lab/Sample Number:	WDF1610-03	Collect Date:	06/28/23 13:16
Date Received:	06/29/23 10:20	Collected By:	Colin Watson
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Hydrocarbons							
Diesel	ND	mg/L	0.160	7/11/23 1:32	BAN	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	7/11/23 1:32	BAN	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	7/11/23 1:32	BAN	NWTPH-Dx	
Surrogate: n-Hexacosane	*139%*		*50-150*	*7/11/23 1:32*	*BAN*	*NWTPH-Dx*	
Volatiles							
Gasoline	ND	mg/L	0.200	7/7/23 18:05	BKP	NWTPH-Gx	*
Surrogate: 4-Bromofluorobenzene	*94.1%*		*70-130*	*7/7/23 18:05*	*BKP*	*NWTPH-Gx*	
Benzene	ND	ug/L	0.500	7/7/23 18:05	BKP	EPA 624.1	*
Ethylbenzene	ND	ug/L	0.500	7/7/23 18:05	BKP	EPA 624.1	*
m+p-Xylene	ND	ug/L	0.500	7/7/23 18:05	BKP	EPA 624.1	*
o-Xylene	ND	ug/L	0.500	7/7/23 18:05	BKP	EPA 624.1	*
Toluene	ND	ug/L	0.500	7/7/23 18:05	BKP	EPA 624.1	*

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Authorized Signature,

Brock Gerger For Kathleen Sattler, Laboratory Manager

M2	Matrix spike recovery was low; the associated blank spike recovery was acceptable. Potential matrix effect.
PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0154 - W Ions										
Blank (BDG0154-BLK1)					Prepared & Analyzed: 7/6/2023					
Nitrate-N	ND		0.100	mg/L						
Sulfate	ND		0.150	mg/L						
LCS (BDG0154-BS1)					Prepared & Analyzed: 7/6/2023					
Nitrate-N	4.12			mg/L	4.00		103	90-110		
Sulfate	3.96			mg/L	4.00		99.0	90-110		
LCS (BDG0154-BS2)					Prepared & Analyzed: 7/7/2023					
Nitrate-N	4.15			mg/L	4.00		104	90-110		
Sulfate	4.15			mg/L	4.00		104	90-110		
Matrix Spike (BDG0154-MS1)		**Source: WDG0021-02**			Prepared & Analyzed: 7/7/2023					
Nitrate-N	7.59		0.100	mg/L	4.00	3.44	104	80-120		
Sulfate	57.8		0.150	mg/L	4.00	61.4	NR	80-120		
Matrix Spike Dup (BDG0154-MSD1)		**Source: WDG0021-02**			Prepared & Analyzed: 7/7/2023					
Nitrate-N	7.59		0.100	mg/L	4.00	3.44	104	80-120	0.0132	20
Sulfate	57.9		0.150	mg/L	4.00	61.4	NR	80-120	0.166	20

Quality Control Data

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0112 - W ICP-MS										
Blank (BDG0112-BLK1)					Prepared & Analyzed: 7/6/2023					
Manganese	ND		0.00100	mg/L						
LCS (BDG0112-BS1)					Prepared & Analyzed: 7/6/2023					
Manganese	0.0450		0.00100	mg/L	0.0500		90.0	85-115		
Matrix Spike (BDG0112-MS1)		**Source: WDF1548-02**			Prepared & Analyzed: 7/6/2023					
Manganese	0.0508		0.00100	mg/L	0.0500	ND	102	70-130		
Matrix Spike (BDG0112-MS3)		**Source: WDG0011-02**			Prepared & Analyzed: 7/6/2023					
Manganese	0.0802		0.00100	mg/L	0.0500	0.0288	103	70-130		
Matrix Spike Dup (BDG0112-MSD1)		**Source: WDF1548-02**			Prepared & Analyzed: 7/6/2023					
Manganese	0.0533		0.00100	mg/L	0.0500	ND	107	70-130	4.95	20
Matrix Spike Dup (BDG0112-MSD3)		**Source: WDG0011-02**			Prepared & Analyzed: 7/6/2023					
Manganese	0.0778		0.00100	mg/L	0.0500	0.0288	98.1	70-130	2.92	20

Quality Control Data

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0143 - W TPH-Dx										

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0143 - W TPH-Dx (Continued)										
Blank (BDG0143-BLK1)					Prepared & Analyzed: 7/10/2023					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*0.155*	*mg/L*	*0.200*		*77.6*	*50-150*		
LCS (BDG0143-BS1)					Prepared & Analyzed: 7/10/2023					
Diesel	1.55		0.160	mg/L	2.06		75.2	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*0.158*	*mg/L*	*0.200*		*79.0*	*50-150*		
Matrix Spike (BDG0143-MS1)		**Source: WDF1605-03**			Prepared & Analyzed: 7/10/2023					
Diesel	1.17	M2	0.160	mg/L	2.06	ND	56.6	70-130		
Lube Oil	ND	M2	0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane		*M2*	*0.165*	*mg/L*	*0.200*		*82.6*	*50-150*		
Matrix Spike Dup (BDG0143-MSD1)		**Source: WDF1605-03**			Prepared & Analyzed: 7/10/2023					
Diesel	0.960	M2	0.160	mg/L	2.06	ND	46.6	70-130	19.3	20
Lube Oil	ND	M2	0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane		*M2*	*0.154*	*mg/L*	*0.200*		*77.2*	*50-150*		

Quality Control Data
(Continued)

Volatiles

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0142 - VOC										
Blank (BDG0142-BLK1)					Prepared & Analyzed: 7/7/2023					
Benzene	ND		0.500	ug/L						
Ethylbenzene	ND		0.500	ug/L						
Toluene	ND		0.500	ug/L						
m/p Xylenes (MCL for total)	ND		0.500	ug/L						
o-Xylene (MCL for total)	ND		0.500	ug/L						
LCS (BDG0142-BS1)					Prepared & Analyzed: 7/7/2023					
Benzene	9.57		0.500	ug/L	10.0		95.7	80-120		
Ethylbenzene	9.49		0.500	ug/L	10.0		94.9	80-120		
Toluene	9.86		0.500	ug/L	10.0		98.6	80-120		
m/p Xylenes (MCL for total)	19.3		0.500	ug/L	20.0		96.3	80-120		
o-Xylene (MCL for total)	9.59		0.500	ug/L	10.0		95.9	80-120		
Matrix Spike (BDG0142-MS1)		**Source: MDG0060-01**			Prepared & Analyzed: 7/7/2023					
Benzene	8.58		0.500	ug/L	10.0	ND	85.8	70-130		
Ethylbenzene	9.08		0.500	ug/L	10.0	ND	90.8	70-130		
Toluene	9.65		0.500	ug/L	10.0	ND	96.5	70-130		
m/p Xylenes (MCL for total)	19.1		0.500	ug/L	20.0	ND	95.6	67-130		
o-Xylene (MCL for total)	9.74		0.500	ug/L	10.0	ND	97.4	66-130		
Matrix Spike Dup (BDG0142-MSD1)		**Source: MDG0060-01**			Prepared & Analyzed: 7/7/2023					
Benzene	8.25		0.500	ug/L	10.0	ND	82.5	70-130	3.92	25

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Quality Control Data
(Continued)

Volatiles (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BDG0142 - VOC (Continued)										
Matrix Spike Dup (BDG0142-MSD1)	**Source: MDG0060-01**				Prepared & Analyzed: 7/7/2023					
Ethylbenzene	8.77		0.500	ug/L	10.0	ND	87.7	70-130	3.47	25
Toluene	9.19		0.500	ug/L	10.0	ND	91.9	70-130	4.88	25
m/p Xylenes (MCL for total)	18.2		0.500	ug/L	20.0	ND	90.9	67-130	5.04	25
o-Xylene (MCL for total)	9.35		0.500	ug/L	10.0	ND	93.5	66-130	4.09	25
Batch: BDG0144 - VOC										
Blank (BDG0144-BLK1)					Prepared & Analyzed: 7/7/2023					
Gasoline	ND		0.200	mg/L						
Surrogate: 4-Bromofluorobenzene			*0.0196*	*mg/L*	*0.0200*		*97.9*	*70-130*		
LCS (BDG0144-BS1)					Prepared & Analyzed: 7/7/2023					
Gasoline	0.990		0.200	mg/L	1.00		99.0	80-120		
Surrogate: 4-Bromofluorobenzene			*0.0186*	*mg/L*	*0.0200*		*93.0*	*70-130*		

ANATEK LABS

Chain of Custody Record

Anatek
1282 Alturas Drive, Mo
504 E Sprague Ste D, Spo

WDF1610

Due: 07/14/23

Company Name: GeoEngineers	Project Manager: Kurt Harrington
Address: 5820 S. Kelly Ave Ste B	Project Name & #: Pasco Terminal
City: Portland State: OR Zip: 97234	Purchase Order #: 009991-005-02
Phone: 503-906-6577	Sampler Name & Phone: Colin Watson 503-756-6285
Email Address(es): Kharrington@geoengineers.com	

Turn

Please refer to our normal turn around times at www.anateklabs.com/pricing-lists

- X Normal
- __ Next Day*
- __ 2nd Day*
- __ Other*_____
- __ Phone
- __ Email

*All rush order requests must have prior approval

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	BTEX 8260	NWTPH-Gx	NWTPH-Dx	Ferrous Fe	Total Mn (CW Labs)	SO4, NO3	Methane	NWTPH-Dx
	MW-8-2306	6/28/23 1316	H_2O	9	-	X	X	X	X	X	X	X	X
	MW-8-FD-2306	6/28/23 1316	H_2O	9	-	X	X	X	X	X	X	X	X
	MW-8-ER-2306	6/28/23 1316	H_2O	5	-	X	X	X					X
	Trip Blanks					H	H						

Preservative:

Note Special Instructions/Comments

H= hold trip blanks for PM requested analysis if needed

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
No VOC Head Space?	~~Y~~	~~N~~
Cooler?	Y	N
Ice/Ice Packs Present?	Y	N

Temperature (°C): 2.0 IR6
Number of Containers:
Shipped Via: Fedex c/i
Preservative: HCl 2306439 cn
pH<2 0079
Date & Time:
Inspected By:

	Printed Name	Signature	Company	Date	Time
Relinquished by	Colin Watson		GeoEngineers	6/28/23	1530
Received by	Joseph Biffin		Anatek	6/28/23	1028
Relinquished by					
Received by					
Relinquished by					
Received by					

Samples submitted to Anatek Labs may be subcontacted to other accredited labs if necessary. This message serves as notice of this possibility. Subcontracted analyses will be clearly noted on the analytical report.

Fedex c/i

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

05 July 2023

Kathy Sattler
Anatek Labs, Inc. Spokane
504 East Sprague, Suite D
Spokane, WA 99202

RE: WDF1610 (WDF1610)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23G0038	N/A

Shelly Fishel
Digitally signed by Shelly Fishel
Date: 2023.07.05 17:49:32 -07'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Shelly Fishel, Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

23G0038

SUBCONTRACT ORDER

Anatek Labs, Inc.

1282 Alturas Drive - Moscow, ID 83843 - (208) 8832839 - Fax (208) 8829246 - email moscow@anateklabs.com
504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Sending Laboratory:

Anatek Labs, Inc.- Spokane
504 E Sprague Ave, Suite D
Spokane, WA 99202
Phone: 509-838-3999
Fax: 509-838-4433

Project Manager: Kathleen Sattler
kathy@anateklabs.com

Subcontracted Laboratory:

Analytical Resources LLC
4611 S. 134TH Place, Suite 100
Tukwila, WA 98168
Phone: (206) 695-6200
Fax: (206) 695-6202

Work Order: WDF1610

Analysis	Due	Expires	Comments
Lab Sample ID: WDF1610-01 ***Water*** ***Sampled: 06/28/2023 13:16***			
Client Sample Name: MW-8-2306			
W Methane	07/12/2023	07/12/2023 13:16	
Containers Supplied:			
Lab Sample ID: WDF1610-02 ***Water*** ***Sampled: 06/28/2023 13:16***			
Client Sample Name: MW-8-FD-2306			
W Methane	07/12/2023	07/12/2023 13:16	
Containers Supplied:			

Released By _____ Date 6/29/23

Received By Philip _____ Date 07/03/23

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WDF1610-01	23G0038-01	Water	28-Jun-2023 13:16	03-Jul-2023 10:50
WDF1610-02	23G0038-02	Water	28-Jun-2023 13:16	03-Jul-2023 10:50

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

Work Order Case Narrative

Client: Anatek Labs, Inc. Spokane
Project: WDF1610
Work Order: 23G0038

Sample receipt

Samples as listed on the preceding page were received 03-Jul-2023 10:50 under ARI work order 23G0038. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Volatile Gases - MEE by RSK175

The sample(s) were analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The blank spike and blank spike duplicate (BS/LCS and BSD/LCSD) spike recoveries and relative percent difference (RPD) were within control limits.

Analytical Resources, LLC
Analytical Chemists and Consultants

Printed: 7/3/2023 1:46:55PM

WORK ORDER

23G0038

Samples will be discarded 90 days after submission of a final report unless other instructions are received

Client: Anatek Labs, Inc. Spokane | **Project Manager: Shelly Fishel**

Project: WDF1610 | **Project Number: WDF1610**

Report To:
Anatek Labs, Inc. Spokane
Kathy Sattler
504 East Sprague, Suite D
Spokane, WA 99202
Phone: (509) 838-3999
Fax: -

Invoice To:
Anatek Labs, Inc.
Cheri Price Accounting Department
1282 Alturas Drive
Moscow, ID 83843
Phone :(208) 883-2839
Fax: -

Date Due: 18-Jul-2023 18:00 (10 day TAT)

Received By: Phillip Bates | Date Received: 03-Jul-2023 10:50

Logged In By: Nora Cate | Date Logged In: 03-Jul-2023 13:32

Samples Received at **22.1°C**

Intact, properly signed and dated custody seals attached to outside of cooler(s)	No	Custody papers included with the cooler	Yes
Custody papers properly filled out(in, signed, analyses requested etc)	Yes	Was a temperature blank included in the cooler	No
Was sufficient ice used (if appropriate)	No	All bottles sealed in individual plastic bags	No
All bottles arrived in good condition(unbroken)	Yes	All bottle labels complete and legible	Yes
Number of containers listed on COC match number received	Yes	Bottle labels and tags agree with COC	Yes
Correct bottles used for the requested analyses	Yes	All VOC vials free of air bubbles	No
Analyses/bottles require preservation (attach preservation sheet excluding VOC).	No	Sufficient amount of sample sent in each bottle	Yes
Sample split at ARI	No		

23G0038-01 WDF1610-01 [Water] Sampled 28-Jun-2023 13:16 Methane only version

RSK-175 Dissolved Gases (MEE)	07/18/2023	10	7/12/2023

23G0038-02 WDF1610-02 [Water] Sampled 28-Jun-2023 13:16 Methane only version

RSK-175 Dissolved Gases (MEE)	07/18/2023	10	7/12/2023

Preservation Confirmation

Container ID	Container Type	pH
23G0038-01 A	VOA Vial, Amber, 40 mL, HCL	
23G0038-02 A	VOA Vial, Amber, 40 mL, HCL	bubble

NC
Preservation Confirmed By

07/03/23
Date

Reviewed By

Date

23G NC 07/03/23

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Anatek Spokane
Project Name: WDF1610
COC No(s): _____ (NA)
Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____
Assigned ARI Job No: 23G0038
Tracking No: 1220A95V0322019691 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 22.1

Time 10:50

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 90092058

Cooler Accepted by: FEB Date: 7/03/23 Time: 10:50

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used?	(Bubble Wrap) Wet Ice Gel Packs Baggies Foam Block Paper Other:		
Was sufficient ice used (if appropriate)?	NA	YES	(NO)
How were bottles sealed in plastic bags?	Individually	(Grouped)	(Not)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	(NA)	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	(NO)
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	(NA)		

Were the sample(s) split by ARI? (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: NO Date: 07/03/23 Time: 13:32 Labels checked by: _____

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

cooler received with ice melted.

By: FEB Date: 07/03/23

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 23G0038

Cooler#: _____ **Temperature(°C):** 22.1

Sample ID	Bottle Count	Bottle Type
Samples received		
above 6°C		

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Completed by: PIB Date: 07/03/23 Time: 10:50

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

WDF1610-01

23G0038-01 (Water)

Dissolved Gases

Method: EPA RSK-175 — Sampled: 06/28/2023 13:16

Instrument: FID6 Analyst: LH — Analyzed: 07/05/2023 08:58

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap) — Extract ID: 23G0038-01 A

Preparation Batch: BLG0026 — Sample Size: 10 mL

Prepared: 07/05/2023 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Methane	74-82-8	1	0.65	ND	ug/L	U
Surrogate: Propane			*62-122 %*	*70.1*	*%*	

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

WDF1610-02

23G0038-02 (Water)

Dissolved Gases

Method: EPA RSK-175 — Sampled: 06/28/2023 13:16
Instrument: FID6 Analyst: LH — Analyzed: 07/05/2023 09:16

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap) — Extract ID: 23G0038-02 A
Preparation Batch: BLG0026 — Sample Size: 10 mL
Prepared: 07/05/2023 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Methane	74-82-8	1	0.65	ND	ug/L	U
Surrogate: Propane			*62-122 %*	*90.5*	*%*	

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

Analysis by: Analytical Resources, LLC

Dissolved Gases - Quality Control

Batch BLG0026 - EPA RSK-175

Instrument: FID6 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLG0026-BLK1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 08:19						
Methane	ND	0.65	ug/L							U
Surrogate: Propane	1600		ug/L	*1800*		*88.8*	*62-122*			
LCS (BLG0026-BS1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 07:43						
Methane	695	0.65	ug/L	656		106	80-120			
Surrogate: Propane	1790		ug/L	*1800*		*99.4*	*62-122*			
LCS Dup (BLG0026-BSD1)				Prepared: 05-Jul-2023 Analyzed: 05-Jul-2023 08:01						
Methane	685	0.65	ug/L	656		104	80-120	1.44	30	
Surrogate: Propane	1730		ug/L	*1800*		*96.2*	*62-122*			

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

Certified Analyses included in this Report

Analyte	Certifications
EPA RSK-175 in Water	
Methane	NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025

Anatek Labs, Inc. Spokane	Project: WDF1610	
504 East Sprague, Suite D	Project Number: WDF1610	**Reported:**
Spokane WA, 99202	Project Manager: Kathy Sattler	05-Jul-2023 17:47

Notes and Definitions

U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

APPENDIX D
Historical Groundwater Monitoring Results

Appendix D
Tidewater Fuel Leak Site Historical Groundwater Monitoring Results
Pasco, Washington

Well ID	Date	Benzene (µg/L) MCL 5	Toluene (µg/L) MCL 1,000	Ethylbenzene (µg/L) MCL 700	Total Xylenes (µg/L) 1,000	TPH-G (µg/L) MCL 800/1,000	TPH-D (µg/L) MCL 500	TPH-D - Heavy Oil (µg/L) MCL 500
AR-1	Feb-03	**191**	**2,130**	153	**4,570**	**31,700**	NA	NA
	Jun-03	**77**	**1,340**	179	**3,590**	**20,000**	NA	NA
	Jun-10	NS	NS	NS	NS	NS	NS	NS
	Dec-10	NS	NS	NS	NS	NS	NS	NS
	May-14	NS	NS	NS	NS	NS	NS	NS
	Jun-20	NS	NS	NS	NS	NS	NS	NS
	Jul-21	**1,530**	**3,550**	**730**	**4,850**	**45,200**	**2,700**	**1,200**
	Jun-22	**1,080**	**1,080**	376	**4,750**	**43,600**	*160 U*	*400 U*
	Jun-23	**723**	**3,800**	434	**6,740**	**85,000**	**6,010**	*400 U*
AR-3	Feb-03	**754**	**3,870**	148	**6,350**	**38,900**	NA	NA
	Jun-03	**6,750**	**6,270**	649	**7,170**	**37,400**	NA	NA
	Mar-06	NS	NS	NS	NS	NS	NS	NS
	Nov-07	NS	NS	NS	NS	NS	NS	NS
	Oct-08	NS	NS	NS	NS	NS	NS	NS
	Jun-10	NS	NS	NS	NS	NS	NS	NS
	Dec-10	NS	NS	NS	NS	NS	NS	NS
	May-14	NS	NS	NS	NS	NS	NS	NS
AR-4	Apr-02	**52**	337	13.9	**1,989**	**10,500**	NA	NA
	Jul-02	**90**	816	10.7	705	**6,400**	NA	NA
	Nov-02	**10.3**	118	5.5	345	**3,080**	NA	NA
	Feb-03	*1.0 U*	*1.0 U*	*1.0 U*	4.8	195	NA	NA
	Jun-03	**10.1**	66	10	326	**5,090**	NA	NA
	Sep-03	**797**	70	27	321	**3,430**	NA	NA
	Mar-06	**2,210**	**3,430**	481	**5,600**	**26,600**	**4,400**	NA
	Nov-07	**640**	**2,800**	220	**4,400**	**28,000**	**4,500**	**1,400**
	Oct-08	**340**	**2,100**	170	**2,700**	**17,000**	**2,500**	**5,900**
	Jun-10	**380**	**1,900**	270	**4,400**	**21,000**	**5,300**	**650**
FD (AR-4 Dup)	Jun-10	**370**	**1,800**	250	**4,000**	**20,000**	**3,700**	440
	Dec-10	**350**	**1,400**	230	**3,600**	**17,000**	**3,700**	*260 U*
	May-14	**535**	789	385	**10,290**	**45,900**	*20 U*	*50 U*
	May-18	**141**	15.4	280	**5,450**	**28,100**	*50 U*	*250 U*
	Jun-19	**123**	10.5	305	**4,870**	**22,000**	*100 U*	*500 U*
	Jun-20	**132**	*50 U*	276	**3,780**	**20,100**	*160 U*	*400 U*
AR-5	Jul-02	**379**	**1,010**	17.5	**3,850**	**39,000**	NA	NA
	Nov-02	0.7	10.6	*ND*	124	**2,900**	NA	NA
	Feb-03	4.3	12.2	1	90	**830**	NA	NA
	Jun-03	**15.2**	8.8	3.4	136	**1,740**	NA	NA
	Sep-03	**8.5**	4.6	1.3	33	557	NA	NA
	Dec-03	*1 U*	26.1	14.1	739	**6,010**	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	0.57	250	NA	NA
	Nov-07	NS	NS	NS	NS	NS	NS	NS
	Oct-08	*0.9 U*	*0.9 U*	*0.5 U*	10	65	120	*95 U*
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*250 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	260	730	*270 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	2.09	*100 U*	*20 U*	*50 U*
AR-6	Nov-01	**29.8**	**402**	82	**2,800**	**2,390**	NA	NA
	Apr-02	**713**	559	27	**2,060**	**17,700**	NA	NA
	Jul-02	**1,820**	**3,100**	85	**4,780**	**24,700**	NA	NA
	Nov-02	**104**	289	67	**2,886**	**11,900**	NA	NA
	Feb-03	**531**	**1,280**	93	**2,900**	**23,700**	NA	NA
	Jun-03	**475**	**2,340**	110	**3,750**	**23,500**	NA	NA
	Sep-03	**221**	**3,140**	241	**4,610**	**25,000**	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	6.7	330	260	NA
	Nov-07	0.6	2.5	0.7	73	670	**1,500**	**990**
	Oct-08	NS	NS	NS	NS	NS	NS	NS
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	2.4	*50 U*	*120 U*	*250 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	8.6	81	*120 U*	*240 U*
	May-14	*1.0 U*	*1.0 U*	21.2	331	**4,640**	*20 U*	*50 U*
AR-7	Mar-06	NS	NS	NS	NS	NS	NS	NS
	Nov-07	NS	NS	NS	NS	NS	NS	NS
	Oct-08	NS	NS	NS	NS	NS	NS	NS
	Jun-10	NS	NS	NS	NS	NS	NS	NS
	Dec-10	NS	NS	NS	NS	NS	NS	NS
AR-7	May-14	*1.0 U*	1.4	21	86	1,280	*20 U*	*50 U*
FD (AR-7 Dup)	May-14	*1.0 U*	*1.0 U*	16	65	883	*20 U*	*50 U*

Appendix D
Tidewater Fuel Leak Site Historical Groundwater Monitoring Results
Pasco, Washington

Well ID	Date	Benzene (µg/L) MCL 5	Toluene (µg/L) MCL 1,000	Ethylbenzene (µg/L) MCL 700	Total Xylenes (µg/L) 1,000	TPH-G (µg/L) MCL 800/1,000	TPH-D (µg/L) MCL 500	TPH-D - Heavy Oil (µg/L) MCL 500
AR-8	Jul-02	**47.3**	229	32	918	**5,330**	NA	NA
	Nov-02	**19.2**	**1,070**	384	**4,170**	**57,400**	NA	NA
	Feb-03	**43.8**	577	276	**3,410**	**59,600**	NA	NA
	Jun-03	**1470**	**2,050**	651	**2,760**	**22,700**	NA	NA
	Sep-03	**3,350**	**1,740**	**1,480**	**2,520**	**16,000**	NA	NA
	Nov-07	**8.0**	46	35	610	**7,400**	**23,000**	**<4,700**
	Jun-10	2.0	15	99	420	**3,300**	**2,000**	250
	Dec-10	1.7	26	100	460	**3,700**	**1,500**	*260 U*
FD (AR-8 Dup)	Dec-10	1.7	36	100	590	**3,500**	**1,500**	*280 U*
	May-14	*1.0 U*	11	280	755	**9,570**	*20 U*	*50 U*
FD (AR-8 Dup)	May-14	*1.0 U*	12	312	812	**9,880**	*20 U*	*50 U*
	May-18	*0.5 U*	0.90	145	200	**4,970**	*50 U*	*250 U*
FD (AR-8 Dup)	May-18	*0.5 U*	0.94	150	223	**4,980**	*50 U*	*250 U*
	Jun-19	*0.5 U*	0.53	88.0	157.2	**4,830**	*100 U*	*500 U*
FD (AR-8 Dup)	Jun-19	*0.5 U*	0.53	82.7	147.0	**4,610**	*100 U*	*500 U*
	Jun-20	*1.25 U*	*1.25 U*	61.7	109.7	**3,520**	*160 U*	*400 U*
FD (AR-8 Dup)	Jun-20	*1.25 U*	*1.25 U*	62.6	103.8	**3,220**	*160 U*	*400 U*
	Jul-21	*2.50 U*	*2.50 U*	119	121.5	**4,500**	*160 U*	*400 U*
FD (AR-8 Dup)	Jul-21	*2.50 U*	*2.50 U*	112	129.6	**4,720**	*160 U*	*400 U*
	Jun-22	*0.5 U*	*0.5 U*	25.8	27.8	**1,660**	*160 U*	*400 U*
FD (AR-8 Dup)	Jun-22	*0.5 U*	*0.5 U*	25.6	27.6	**1,650**	*160 U*	*400 U*
	Jun-23	*0.5 U*	*0.5 U*	48.0	55.6	**3,360**	*160 U*	*400 U*
AR-9	Nov-01	*1 U*	*1 U*	*1 U*	*2 U*	*50 U*	NA	NA
FD (AR-9 dup)	Nov-01	*1 U*	*1 U*	*1.1*	*2 U*	*50 U*	NA	NA
	Nov-02	*1 U*	*1 U*	*1 U*	*2 U*	*50 U*	NA	NA
	Dec-03	*1 U*	*1 U*	*1 U*	*2 U*	*50 U*	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	*1 U*	*250 U*	*250 U*	NA
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*130 U*	*270 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*20 U*	*50 U*
AR-10	Nov-01	**54**	13.7	*ND*	221	311	NA	NA
	Apr-02	3.1	*1.0 U*	3.5	*2.0 U*	*50 U*	NA	NA
	Nov-02	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	78	NA	NA
	Feb-03	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Jun-03	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Sep-03	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*250 U*	*250 U*	NA
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*20 U*	*50 U*
AR-11	Mar-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*230 U*	*560 U*
	Aug-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-02	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Dec-03	*1.0 U*	1.9	*1.0 U*	1.1	*50 U*	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*250 U*	*250 U*	NA
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*20 U*	*50 U*
	May-18	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*50 U*	*250 U*
	Jun-19	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*100 U*	*100 U*	*500 U*
	Jun-20	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*100 U*	*160 U*	*400 U*
	Jul-21	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*160 U*	*400 U*
	Jun-22	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*160 U*	*400 U*
	Jun-23	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*200 U*	*160 U*	*400 U*
AR-12	Feb-03	**3,860**	**10,400**	**1,000**	**13,560**	**84,700**	NA	NA
	Jun-03	**3,810**	**8,060**	**731**	**9,190**	**55,100**	NA	NA
	Nov-07	NS	NS	NS	NS	NS	NS	NS
	Oct-08	NS	NS	NS	NS	NS	NS	NS
	Jun-10	NS	NS	NS	NS	NS	NS	NS
	Dec-10	NS	NS	NS	NS	NS	NS	NS
	May-14	NS	NS	NS	NS	NS	NS	NS

Appendix D
Tidewater Fuel Leak Site Historical Groundwater Monitoring Results
Pasco, Washington

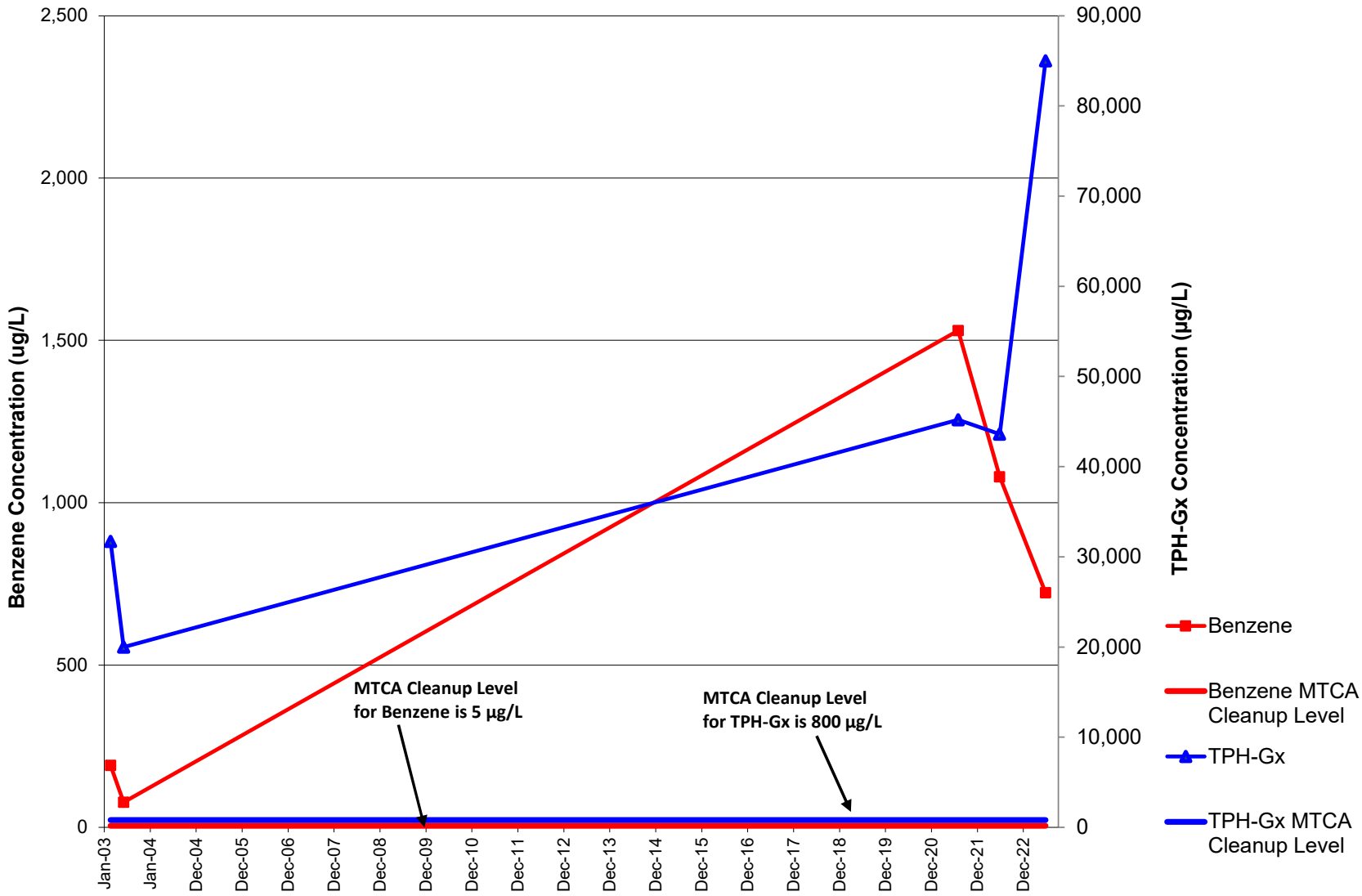
Well ID	Date	Benzene (µg/L) MCL 5	Toluene (µg/L) MCL 1,000	Ethylbenzene (µg/L) MCL 700	Total Xylenes (µg/L) 1,000	TPH-G (µg/L) MCL 800/1,000	TPH-D (µg/L) MCL 500	TPH-D - Heavy Oil (µg/L) MCL 500
MW-1	Mar-01	**20**	21	*1.0 U*	*2 U*	110	*230 U*	*580 U*
	Aug-01	**1,890**	**1,900**	9.5	**1,109**	**5,980**	NA	NA
	Nov-01	**336**	**88**	1 U	**211**	321	NA	NA
	Apr-02	**880**	33	5.3	43	667	NA	NA
	Jul-02	**1,040**	22	41	40	**1,600**	NA	NA
	Nov-02	**434**	36	57	131	**1,040**	NA	NA
	Nov-02	**385**	31	38	95	712	NA	NA
FD (MW-1 dup)	Feb-03	**453**	19.7	43	43.8	263	NA	NA
	Feb-03	**369**	15	32	33.8	240	NA	NA
FD (MW-1 dup)	Jun-03	**240**	131	78	257	**841**	NA	NA
	Jun-03	**131**	68	35	128	**1,420**	NA	NA
FD (MW-1 dup)	Sep-03	**149**	77	38	145	589	NA	NA
	Sep-03	**112**	69	26	NR	431	NA	NA
FD (MW-1 dup)	Dec-03	**20.2**	58	3.1	26	102	NA	NA
	Dec-03	**8.0**	22	1.2	9.3	143	NA	NA
	Mar-06	*0.5 U*	0.71	8.4	8.7	250	*250 U*	NA
FD (MW-1 dup)	Mar-06	*0.5 U*	0.69	6.8	6.1	250	*250 U*	NA
	Nov-07	*0.2 U*	0.20	0.5	*0.6 U*	*50 U*	*190*	**670**
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*20 U*	*50 U*
MW-2	Mar-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*220 U*	*540 U*
	Aug-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-02	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	82	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*250 U*	*250 U*	NA
	Oct-08	*0.2 U*	*0.2 U*	*0.2 U*	*0.6 U*	*50 U*	78	*96 U*
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*250 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*130 U*	*260 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*20 U*	*50 U*
MW-3	Mar-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	270	NA
	Aug-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-02	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	117	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*250 U*	*250 U*	NA
	Oct-08	*0.2 U*	*0.2 U*	*0.2 U*	*0.6 U*	*50 U*	*80 U*	*100 U*
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*140*	*270 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*250 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*20 U*	*50 U*
MW-4	Mar-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*200 U*	*680 U*
	Aug-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-02	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	55	NA	NA
	Dec-03	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*250 U*	*250 U*	NA
	Oct-08	*0.2 U*	*0.2 U*	*0.2 U*	*0.6 U*	*50 U*	*77 U*	*97 U*
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*250 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*140 U*	*280 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*20 U*	*50 U*
	May-18	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*50 U*	*250 U*
	Jun-19	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*100 U*	*100 U*	*500 U*
	Jun-20	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*100 U*	*160 U*	*400 U*
	Jul-21	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*160 U*	*400 U*
	Jun-22	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*160 U*	*400 U*
	Jun-23	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*200 U*	*160 U*	*400 U*
MW-5	Mar-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*200 U*	NA
	Aug-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-02	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	**954**	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*250 U*	**4,300**	NA
	Nov-07	*0.2 U*	*0.2 U*	*0.2 U*	*0.6 U*	*50 U*	**1,300**	**1,100**
	Oct-08	*0.2 U*	*0.2 U*	*0.2 U*	*0.6 U*	*50 U*	91	*98 U*
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*250 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*130 U*	*260 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*100 U*	*500 U*

Appendix D
Tidewater Fuel Leak Site Historical Groundwater Monitoring Results
Pasco, Washington

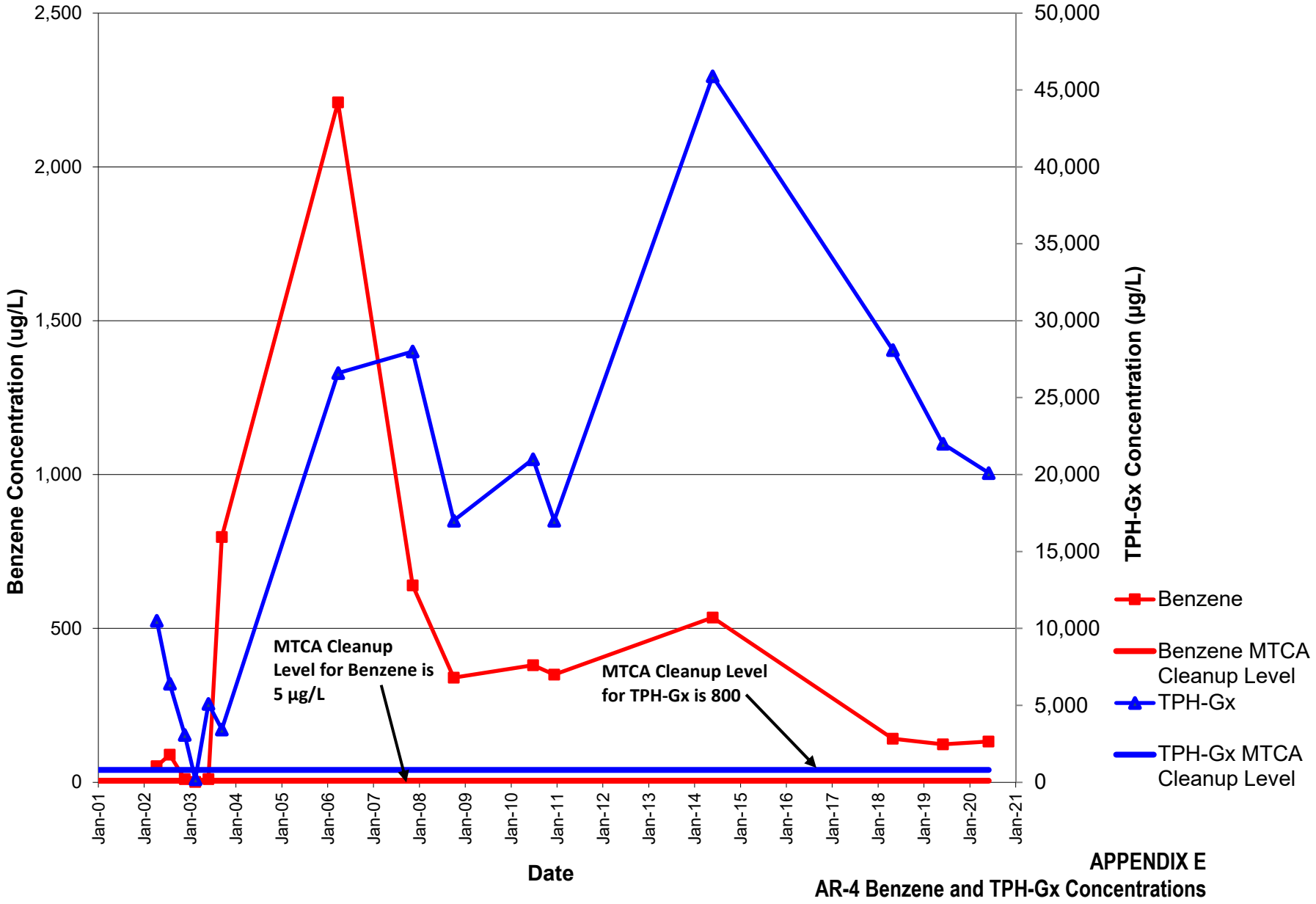
Well ID	Date	Benzene (µg/L) MCL 5	Toluene (µg/L) MCL 1,000	Ethylbenzene (µg/L) MCL 700	Total Xylenes (µg/L) 1,000	TPH-G (µg/L) MCL 800/1,000	TPH-D (µg/L) MCL 500	TPH-D - Heavy Oil (µg/L) MCL 500
MW-6	Mar-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*190 U*	*480 U*
	Aug-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-01	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Nov-02	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	62	NA	NA
	Sep-03	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Dec-03	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	NA	NA
	Mar-06	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*250 U*	*250 U*	NA
	Jun-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	Dec-10	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*50 U*	*120 U*	*240 U*
	May-14	*1.0 U*	*1.0 U*	*1.0 U*	*2.0 U*	*100 U*	*20 U*	*50 U*
	May-18	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*50 U*	*250 U*
	Jun-19	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*145*	*100 U*	*500 U*
	Jun-20	*0.5 U*	*0.5 U*	*0.5 U*	*1.0 U*	*100 U*	*160 U*	*400 U*
	Jul-21	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*160 U*	*400 U*
	Jun-22	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*100 U*	*160 U*	*400 U*
	Jun-23	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*200 U*	*160 U*	*400 U*
MW-7	Mar-01	**990**	**3,000**	130	**1,260**	**11,000,000**	**1,240**	**510**
	Nov-07	**70**	530	53	930	**7,000**	**2,000**	300
	Dec-10	*1.0 U*	4.1	*1.0 U*	27	350	*120 U*	*240 U*
	May-14	**88**	**1,910**	133	**2,702**	**19,200**	*20 U*	*50 U*
MW-8	Mar-01	**5,300**	**17,000**	**1,500**	**10,800**	**77,000,000**	**72,400**	**1,210**
	Feb-03	**3,630**	**8,540**	**931**	**8,450**	**51,500**	NA	NA
	Jun-03	**6,490**	**14,500**	**1,320**	**12,590**	**80,900**	NA	NA
	Mar-06	**183**	**5,440**	452	**5,140**	**25,700**	**8,400**	NA
	Nov-07	**29**	**2,200**	**410**	**5,500**	**36,000**	**6,500**	**1,900 U**
	Dec-10	2.4	500	210	**2,000**	**9,900**	**2,500**	*260 U*
	May-14	*1.0 U*	286	462	**4,920**	**27,000**	*20 U*	*50 U*
	May-18	*0.5 U*	3.8	*0.5 U*	*0.5 U*	**3,540**	*50 U*	*250 U*
	Jun-19	*0.5 U*	8.10	61.8	810	**5,190**	*100 U*	*500 U*
	Jun-20	*10.0 U*	*25 U*	106	**1,241**	**8,130**	*160 U*	*400 U*
	Jul-21	*12.5 U*	15.5	120	**1,357**	**11,300**	*160 U*	*400 U*
	Jun-22	*0.5 U*	2.6	40	**502**	**3,980**	*160 U*	*400 U*
	Jun-23	*0.5 U*	1.53	45.5	**607**	**8,900**	*160 U*	*400 U*
FD (MW-8 dup)	Jun-23	*0.5 U*	1.76	65.0	**855**	**7,800**	*160 U*	*400 U*

Notes:
MCL - Maximum Contaminant Level. Based on Washington Department of Ecology Method A cleanup levels in Table 720-1 of the Model Toxics Control Act, Oct 2007.
µg/L - Micrograms per liter
BOLD - Exceeds MCL
U = Analyte not detected above method reporting limit
J = Analyte value is estimated
NS = Not Sampled for one of the following reasons: insufficient water in well, presence of liquid hydrocarbons, inaccessibility, date was between sampling events, or well no longer in sampling program.
N/A = Not applicable or not available
FD = Field duplicate

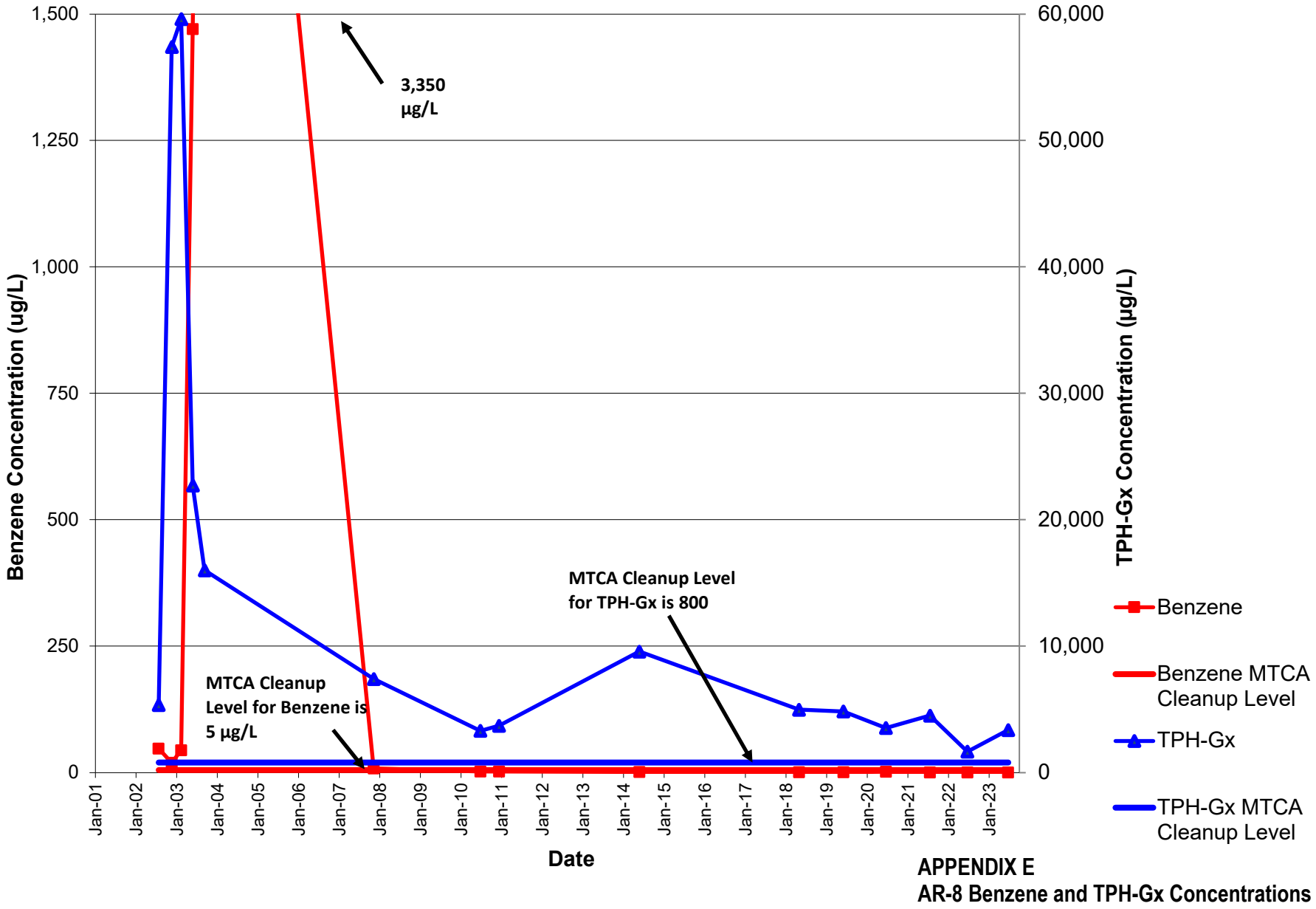
APPENDIX E
Historical Time Series Plots and BIOSCREEN Results



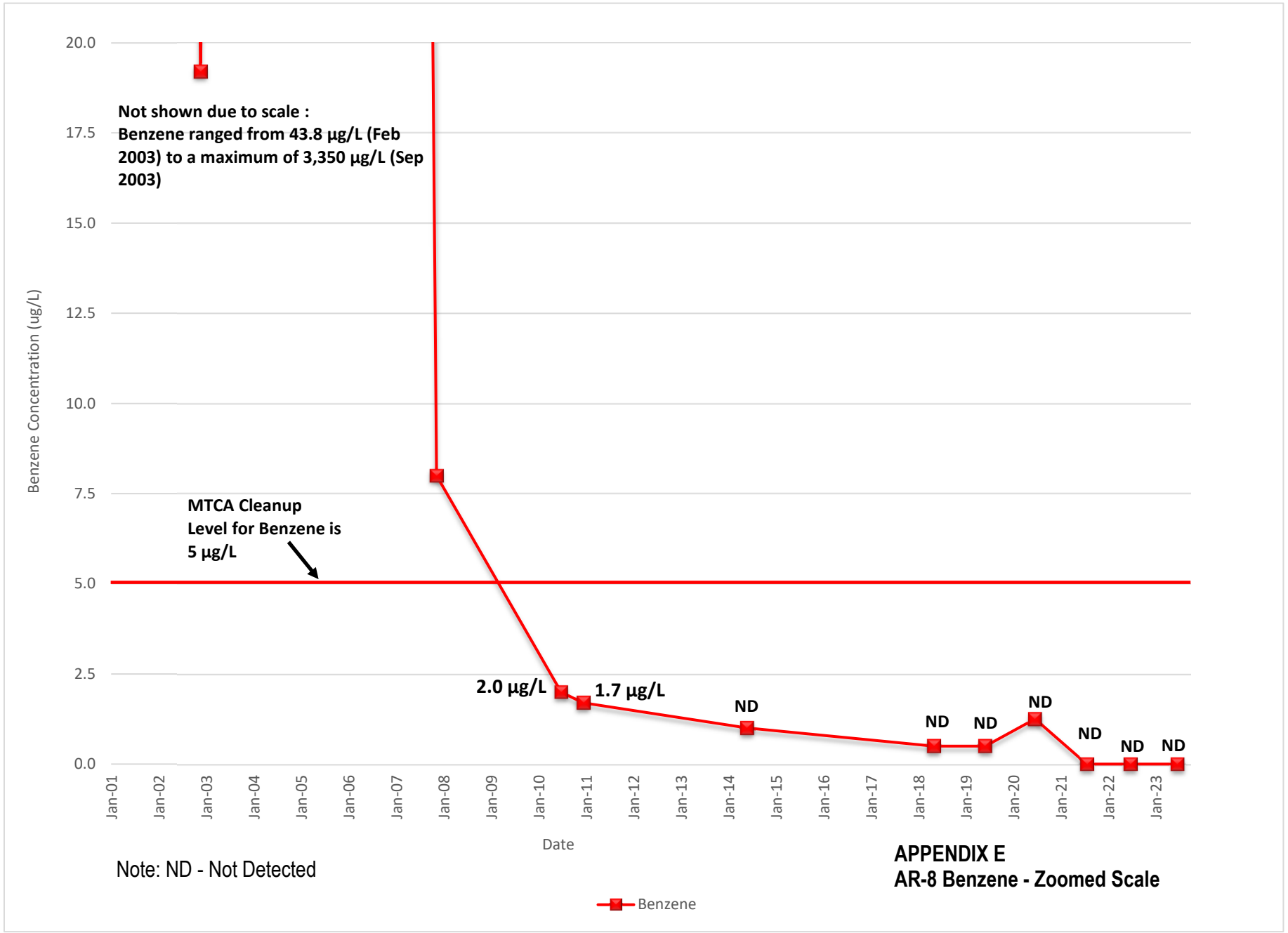
APPENDIX E
AR-1 Benzene and TPH-Gx Concentrations
Tidewater Fuel Leak Site



APPENDIX E
AR-4 Benzene and TPH-Gx Concentrations

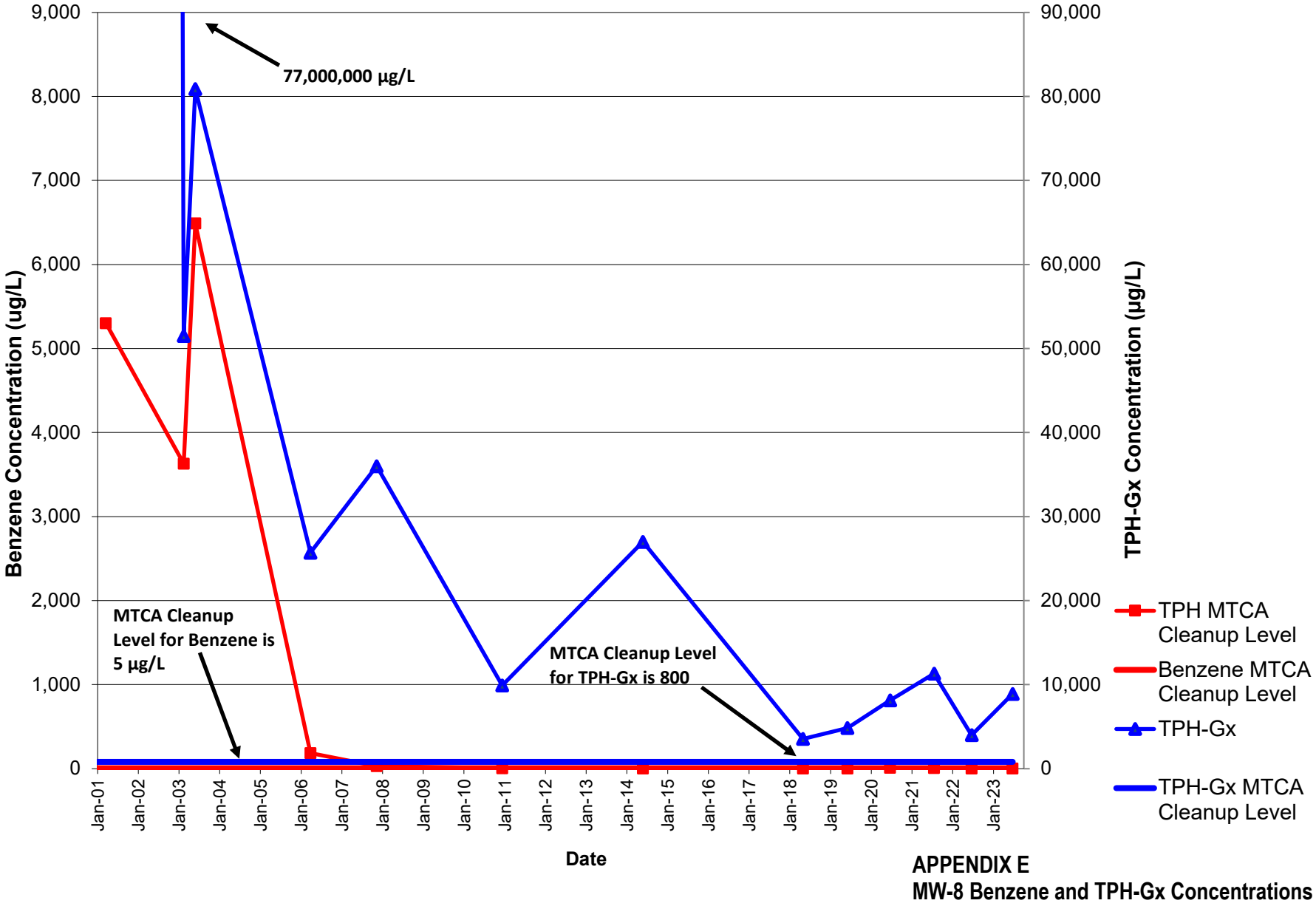


APPENDIX E
AR-8 Benzene and TPH-Gx Concentrations

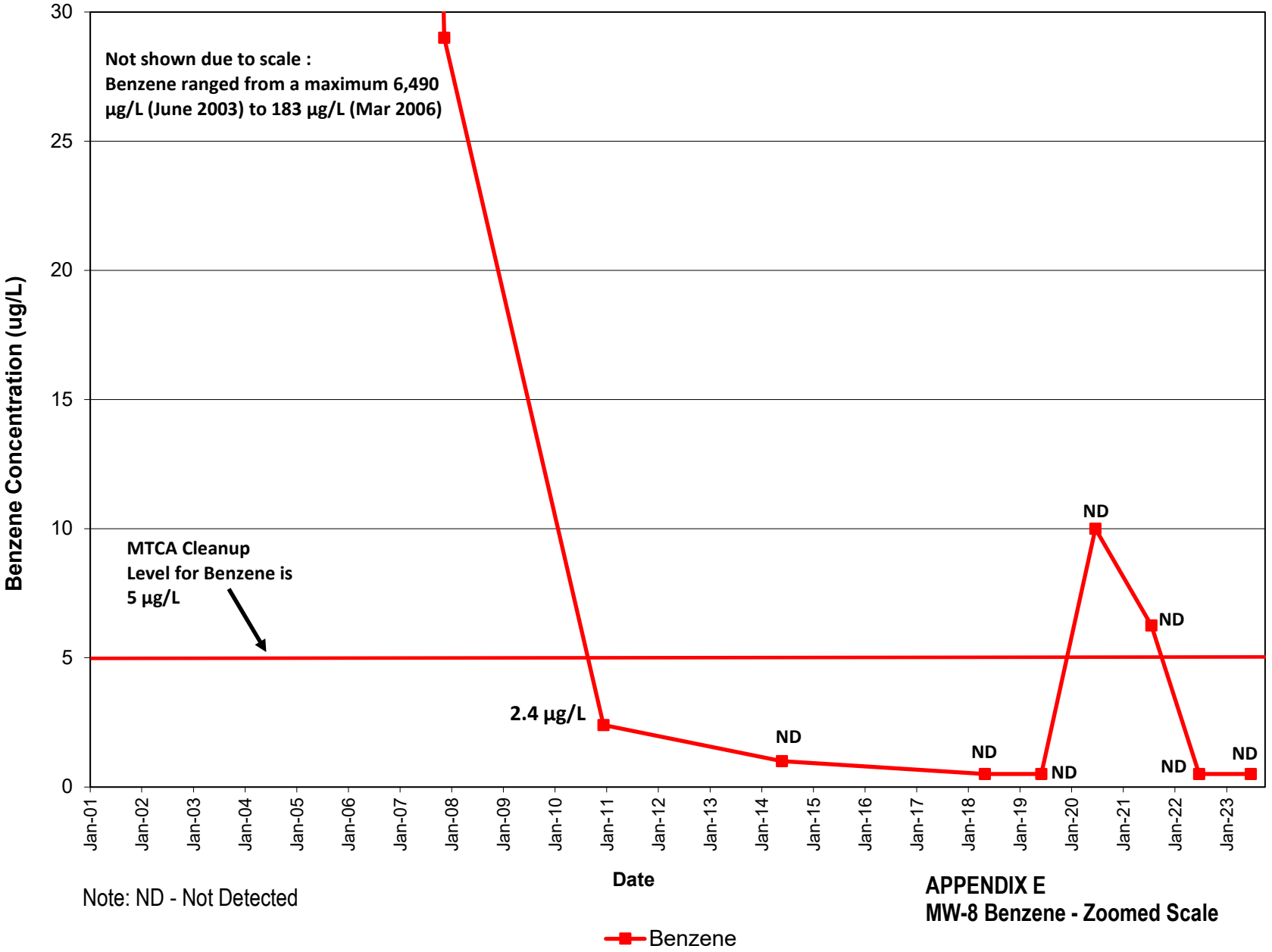


Note: ND - Not Detected

APPENDIX E
AR-8 Benzene - Zoomed Scale



APPENDIX E
MW-8 Benzene and TPH-Gx Concentrations



Note: ND - Not Detected

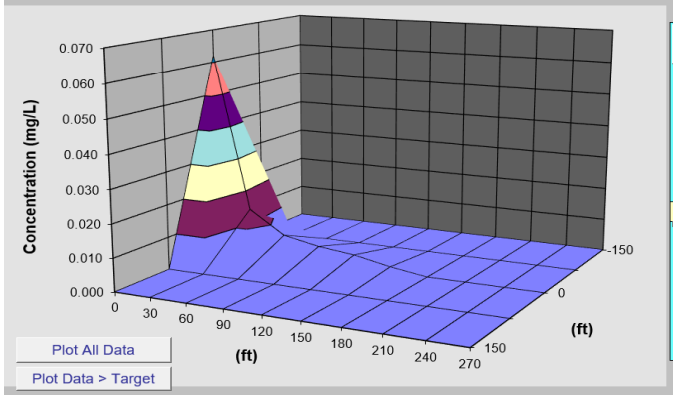
APPENDIX E
MW-8 Benzene - Zoomed Scale

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	30	60	90	120	150	180	210	240	270	300
150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
75	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.062	0.014	0.007	0.005	0.004	0.002	0.000	0.000	0.000	0.000	0.000
-75	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MASS FLUX (mg/day)	4.1E+0	6.1E-1	3.1E-1	2.2E-1	1.6E-1	6.9E-2	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Model to Display: No Degradation | 1st Order Decay | Instantaneous

Time: 35 Years Target Level: 0.005 mg/L Displayed Model: Inst. Reaction



Plot All Data | Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass if No Biodegradation	47.3	(Kg)
- Actual Plume Mass	0.0	(Kg)
= Plume Mass Removed by Biodeg	47.3	(Kg) (100 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-14.1	-34.2	+1.2	-166.5	+0.3	(Kg)

Contam. Mass in Source (t=0 Years)	54.0	(Kg)
Contam. Mass in Source Now (t=35Years)	6.7	(Kg)
Current Volume of Groundwater in Plume	0.1	(ac-ft)
Flowrate of Water Through Source Zone	0.092	(ac-ft/yr)

Mass HELP | Return to Input | Recalculate

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.4*

NWTC PASCO
AR-1 aimed to AR-8
Run Name

Data Input Instructions:
115 (or 0.02) → 1. Enter value directly....or 2. Calculate by filling in grey cells below. (To restore formulas, hit button below).
Variable* → Data used directly in model.
20 → Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	25.2	(ft/yr)
or		or	
Hydraulic Conductivity	K	7.1E-03	(cm/sec)
Hydraulic Gradient	i	0.001	(ft/ft)
Porosity	n	0.29	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	14.3	(ft)
Transverse Dispersivity*	alpha y	1.4	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	320	(ft)

3. ADSORPTION

Retardation Factor*	R	1.4	(-)
or		or	
Soil Bulk Density	rho	1.7	(kg/l)
Partition Coefficient	Koc	59	(L/kg)
FractionOrganicCarbon	foc	1.2E-3	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda		(per yr)
or		or	
Solute Half-Life	t-half	0.65	(year)

or Instantaneous Reaction Model

Delta Oxygen*	DO	8.44	(mg/L)
Delta Nitrate*	NO3	20.52	(mg/L)
Observed Ferrous Iron*	Fe2+	0.7	(mg/L)
Delta Sulfate*	SO4	99.8	(mg/L)
Observed Methane*	CH4	0.16863	(mg/L)

5. GENERAL

Modeled Area Length*	300	(ft)	L
Modeled Area Width*	300	(ft)	W
Simulation Time*	35	(yr)	

6. SOURCE DATA

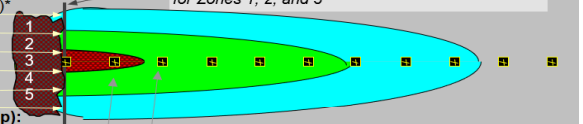
Source Thickness in Sat.Zone* 1 (ft)

Source Zones:

Width* (ft)	Conc. (mg/L)*	
		1
270	0.0001	2
10	0.723	3
270	0.0001	4
0	0	5

Source Halflife (see Help):
10 (Inst. React.) | >1000 (1st Order) (yr)
Soluble Mass 54 (Kg) In Source NAPL, Soil

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	0	30	60	90	120	150	180	210	240	270	300
Concentration (mg/L)	.723									.0	

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE → View Output
RUN ARRAY → View Output

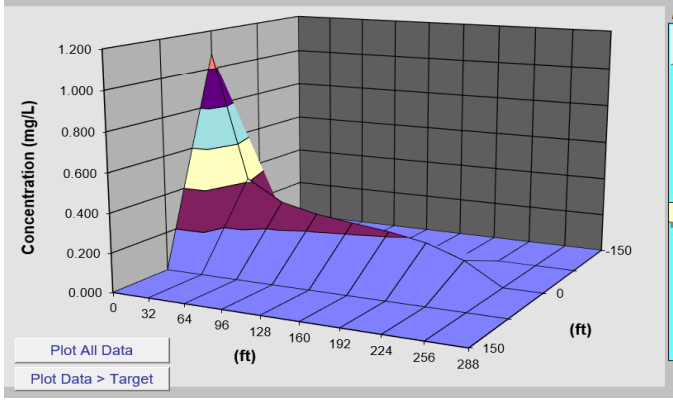
Help | Recalculate
Paste Example Dataset
Restore Formulas for Vs, Dispersivities, R, lambda, other

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓	Distance from Source (ft) 0	32	64	96	128	160	192	224	256	288	320
150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
75	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	1.076	0.417	0.309	0.266	0.241	0.218	0.183	0.115	0.000	0.000	0.000
-75	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MASS FLUX (mg/day)	2.2E+1	1.8E+1	1.3E+1	1.1E+1	1.0E+1	9.3E+0	7.8E+0	4.9E+0	0.0E+0	0.0E+0	0.0E+0

Model to Display: No Degradation | 1st Order Decay | Instantaneous

Time: 50 Years Target Level: 1.000 mg/L Displayed Model: Inst. Reaction



Plot All Data | Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass if No Biodegradation	94.5	(Kg)
- Actual Plume Mass	0.1	(Kg)
= Plume Mass Removed by Biodeg	94.4	(Kg) (100 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-28.1	-68.3	+2.3	-332.1	+0.6	(Kg)

Contam. Mass in Source (t=0 Years)	136.0	(Kg)
Contam. Mass in Source Now (t=50Years)	41.5	(Kg)
Current Volume of Groundwater in Plume	0.1	(ac-ft)
Flowrate of Water Through Source Zone	0.092	(ac-ft/yr)

Mass HELP | Return to Input | Recalculate

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence *Version 1.4*

NWTC PASCO
AR-1 aimed to AR-8
Run Name

Data Input Instructions:
115 → 1. Enter value directly....or
or
0.02 → 2. Calculate by filling in grey cells below. (To restore formulas, hit button below).
Variable* → Data used directly in model.
20 → Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	25.2	(ft/yr)
or		or	
Hydraulic Conductivity	K	7.1E-03	(cm/sec)
Hydraulic Gradient	i	0.001	(ft/ft)
Porosity	n	0.29	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	14.3	(ft)
Transverse Dispersivity*	alpha y	1.4	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	320	(ft)

3. ADSORPTION

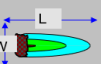
Retardation Factor*	R	2.3	(-)
or		or	
Soil Bulk Density	rho	1.7	(kg/l)
Partition Coefficient	Koc	182	(L/kg)
FractionOrganicCarbon	foc	1.2E-3	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda		(per yr)
or		or	
Solute Half-Life	t-half	0.65	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	8.44	(mg/L)
Delta Nitrate*	NO3	20.52	(mg/L)
Observed Ferrous Iron*	Fe2+	0.7	(mg/L)
Delta Sulfate*	SO4	99.8	(mg/L)
Observed Methane*	CH4	0.16863	(mg/L)

5. GENERAL

Modeled Area Length*	320	(ft)
Modeled Area Width*	300	(ft)
Simulation Time*	50	(yr)



6. SOURCE DATA

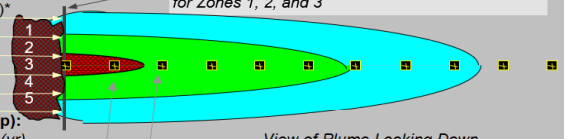
Source Thickness in Sat.Zone* 1 (ft)

Source Zones:

Width* (ft)	Conc. (mg/L)*
270	0.00153
10	3.8
270	0.00153
0	0

Source Halflife (see Help): 30 | >1000 (yr)
Inst. React. | 1st Order
Soluble Mass 136 (Kg)
In Source NAPL, Soil

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)	6.74									.0	
Dist. from Source (ft)	0	32	64	96	128	160	192	224	256	288	320

8. CHOOSE TYPE OF OUTPUT TO SEE:

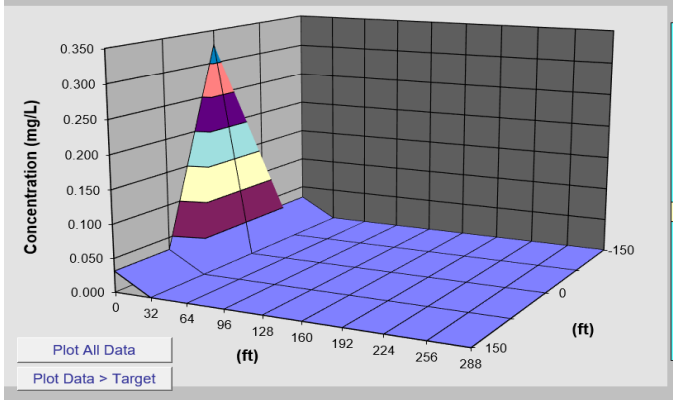
RUN CENTERLINE | View Output
RUN ARRAY | View Output
Help | Recalculate
Paste Example Dataset
Restore Formulas for Vs, Dispersivities, R, lambda, other

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	32	64	96	128	160	192	224	256	288	320
150	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
75	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.328	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-75	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-150	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MASS FLUX (mg/day)	1.6E+1	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Model to Display: No Degradation Model | 1st Order Decay Model | Instantaneous Reaction Model

Time: 1 Years Target Level: 0.700 mg/L Displayed Model: Inst. Reaction



Plot All Data | Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass if No Biodegradation	Can't Calc.	(Kg)
- Actual Plume Mass	Can't Calc.	(Kg)
= Plume Mass Removed by Biodeg	-	(Kg)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-	-	-	-	-	(Kg)

Contam. Mass in Source (t=0 Years)	12.0	(Kg)
Contam. Mass in Source Now (t=1Years)	9.2	(Kg)
Current Volume of Groundwater in Plume	Can't Calc.	(ac-ft)
Flowrate of Water Through Source Zone	Can't Calc.	(ac-ft/yr)

Mass HELP | Return to Input | Recalculate

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.4*

NWTC PASCO
AR-1 aimed to AR-8
Run Name

Data Input Instructions:
115 or 0.02 — 1. Enter value directly....or 2. Calculate by filling in grey cells below. (To restore formulas, hit button below).
Variable* — Data used directly in model.
20 — Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	25.2	(ft/yr)
or		or	
Hydraulic Conductivity	K	7.1E-03	(cm/sec)
Hydraulic Gradient	i	0.001	(ft/ft)
Porosity	n	0.29	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	14.3	(ft)
Transverse Dispersivity*	alpha y	1.4	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	320	(ft)

3. ADSORPTION

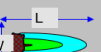
Retardation Factor*	R	3.6	(-)
or		or	
Soil Bulk Density	rho	1.7	(kg/l)
Partition Coefficient	Koc	363	(L/kg)
FractionOrganicCarbon	foc	1.2E-3	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda		(per yr)
or		or	
Solute Half-Life	t-half	0.65	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	8.44	(mg/L)
Delta Nitrate*	NO3	20.52	(mg/L)
Observed Ferrous Iron*	Fe2+	0.7	(mg/L)
Delta Sulfate*	SO4	99.8	(mg/L)
Observed Methane*	CH4	0.16863	(mg/L)

5. GENERAL

Modeled Area Length*	320	(ft)
Modeled Area Width*	300	(ft)
Simulation Time*	1	(yr)



6. SOURCE DATA

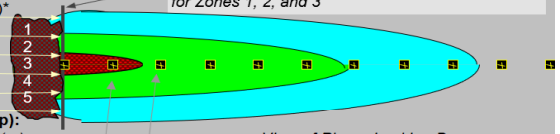
Source Thickness in Sat.Zone* 1 (ft)

Source Zones:

	Width* (ft)	Conc. (mg/L)*
1		
2	270	0.0455
3	10	0.434
4	270	0.0455
5	0	0

Source Halflife (see Help): 3 (yr) | >1000 1st Order
Inst. React.
Soluble Mass 12 (Kg)
In Source NAPL, Soil

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)	.434									.046	
Dist. from Source (ft)	0	32	64	96	128	160	192	224	256	288	320

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output
RUN ARRAY — View Output

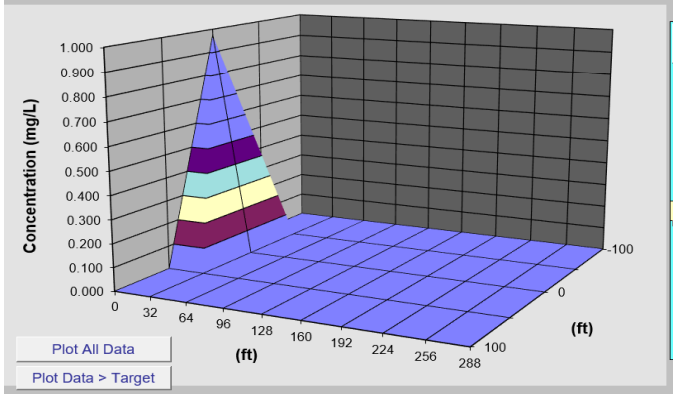
Help | Recalculate
Paste Example Dataset
Restore Formulas for Vs, Dispersivities, R, lambda, other

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	32	64	96	128	160	192	224	256	288	320
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.974	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MASS FLUX (mg/day)	2.2E+2	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Model to Display: No Degradation | 1st Order Decay | Instantaneous

Time: 14 Years Target Level: 1.000 mg/L Displayed Model: Inst. Reaction



Plot All Data | Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass if No Biodegradation	83.1	(Kg)
- Actual Plume Mass	0.0	(Kg)
= Plume Mass Removed by Biodeg	83.1	(Kg) (100 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-0.1	-1.1	+0.0	-45.4	+57.0	(Kg)

Contam. Mass in Source (t=0 Years)	108.0	(Kg)
Contam. Mass in Source Now (t=14Years)	24.9	(Kg)
Current Volume of Groundwater in Plume	0.0	(ac-ft)
Flowrate of Water Through Source Zone	0.092	(ac-ft/yr)

Mass HELP | Return to Input | Recalculate

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence *Version 1.4*

NWTC PASCO / AR-1 aimed to AR-8 — Run Name

Data Input Instructions:
1. Enter value directly....or
2. Calculate by filling in grey cells below. (To restore formulas, hit button below).

Variable* — Data used directly in model.
20 — Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	25.2	(ft/yr)
or		or	
Hydraulic Conductivity	K	7.1E-03	(cm/sec)
Hydraulic Gradient	i	0.001	(ft/ft)
Porosity	n	0.29	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	14.3	(ft)
Transverse Dispersivity*	alpha y	1.4	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	320	(ft)

3. ADSORPTION

Retardation Factor*	R	3.7	(-)
or		or	
Soil Bulk Density	rho	1.7	(kg/l)
Partition Coefficient	Koc	386	(L/kg)
FractionOrganicCarbon	foc	1.2E-3	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda		(per yr)
or		or	
Solute Half-Life	t-half	0.65	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	0.15	(mg/L)
Delta Nitrate*	NO3	1.29	(mg/L)
Observed Ferrous Iron*	Fe2+	0	(mg/L)
Delta Sulfate*	SO4	54.1	(mg/L)
Observed Methane*	CH4	67.9	(mg/L)

5. GENERAL

Modeled Area Length*	320	(ft)
Modeled Area Width*	200	(ft)
Simulation Time*	14	(yr)

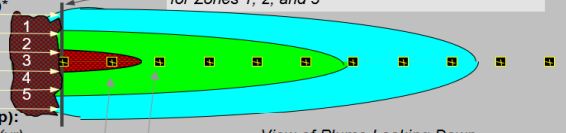
6. SOURCE DATA

Source Thickness in Sat.Zone* 1 (ft)

Source Zones:

	Width* (ft)	Conc. (mg/L)*
1		
2	270	0.607
3	10	6.74
4	270	0.607
5	0	0

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Source Halflife (see Help):

Inst. React.	1st Order	
7	900	(yr)
Soluble Mass	108	(Kg)
In Source NAPL, Soil		

Observed Centerline Concentrations at Monitoring Wells If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	0	32	64	96	128	160	192	224	256	288	320
Concentration (mg/L)	6.74									.056	

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output

RUN ARRAY — View Output

Help | Recalculate

Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

APPENDIX F
Report Limitations and Guidelines for Use

APPENDIX F
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.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by Tidewater Terminal Company. 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 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 Ecology should rely on this environmental 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 has been prepared for the Tidewater Fuel Leak Site in Pasco, 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.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. 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.

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[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

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.

Uncertainty May Remain Even After this Phase II ESA is Completed

No ESA can wholly eliminate uncertainty regarding the potential for contamination in connection with a property. Our interpretation of subsurface conditions in this study is based on field observations and chemical analytical data from widely-spaced sampling locations. It is always possible that contamination exists in areas that were not explored, sampled or analyzed.

Subsurface Conditions Can Change

This environmental report is based on conditions that existed at the time the study was 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, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

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.

Do Not Redraw the Field Forms

Environmental scientists prepare field forms based upon their collected field data. To prevent errors or omissions, the forms included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating forms from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience 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. Geotechnical, Geologic and GeoEnvironmental 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.

GeoEngineers