February 10, 2022

RH2 Engineering
Attn: Paul Cross
114 Columbia Point Drive, Suite C
Richland, Washington 99352

Re: November 2021 Twice Yearly Groundwater Monitoring Event
Ben Franklin Transit, 1000 Columbia Trail, Richland, WA
PBS Project No. 64529.000

Dear Mr. Cross:

PBS Engineering and Environmental Inc. (PBS) is pleased to provide the results of this Twice-Yearly Groundwater Monitoring Event (GME) conducted at the Ben Franklin Transit site (BFT) in November 2021. This sampling event was the second GME conducted in 2021. All sampling was conducted by request from BFT and RH2 Engineering and in accordance with our subcontract with RH2 Engineering. The sampling scope has been conducted in accordance with correspondence from the Washington Department of Ecology (Ecology).

VOLUNTARY CLEANUP PROGRAM

The site has been designated Facility ID #319 and Cleanup Site # 7012 by Ecology.

This site was managed as an Independent Cleanup site and joined the Ecology Voluntary Cleanup Program (VCP) on January 2, 2018. The site has a VCP project ID of CE0486. The VCP is used by Ecology to provide technical consultation for cleanup sites. When site cleanup requirements are met, Ecology can issue a No Further Action (NFA) designation letter that indicates compliance with the Model Toxics Control Act (MTCA) requirements.

BACKGROUND

PBS understands the BFT facility had underground storage tanks (USTs) located on the site, which contained diesel, gasoline, motor oil, transmission fluid, waste oil, and antifreeze. The tanks were installed in 1986, along with nine leak detection monitoring wells, designated as MW-A through MW-I.

Reportedly in 1990, a release of diesel fuel occurred due to a leaking pressurized valve in a fuel supply line. The release, of unknown size, was reported to Ecology. A site hazard assessment was undertaken by DPRA/SAIC in 1991 with the installation of monitoring wells MW-1 and MW–2, and completion of soil borings SB-3 and SB–4. According to the *Site Characterization Ben Franklin Transit Facility* report prepared by GeoEngineers (1993): subsurface petroleum-related soil and groundwater contamination was present in the north central portion of the property, in the vicinity of the USTs, fuel dispensing island, and bus fueling and parking area. The approximate extent of contamination underlying the site was illustrated in Figure 4 of this report, which showed the approximate limit of petroleum-related soil and/or groundwater contamination at concentrations greater than MTCA Method A cleanup levels.

GeoEngineers conducted additional work at BFT in 1992, with the installation of monitoring wells MW-3 through MW-14, and the completion of soil borings SB-5 and SB–6. Wells appear to have been placed in downgradient and/or cross gradient locations, except for MW-12. MW-12 was located as an upgradient well to the USTs to identify any upgradient/offsite petroleum contamination coming onto the site from an upgradient source. The *August 2005 Groundwater Monitoring Report* for BFT (GeoEngineers 2005) detailed the groundwater sampling that occurred in August 2005 at selected wells, and summarized previous sampling conducted since 1992 (Table 2, 2005). Results of the August 2005 sampling found that only MW-14 had gasoline range and diesel range hydrocarbons that exceeded the MTCA Method A groundwater levels. MW-12, the upgradient well, was also sampled in August 2005 and water from this well did not exceed MTCA Method A groundwater levels for petroleum hydrocarbons. According to this report, the gasoline range organics were likely an overlap from diesel range hydrocarbons and should not be interpreted as a gasoline release.

During the summer of 2006, the USTs and associated piping were taken out of service and decommissioned by Shannon & Wilson and others. A report detailing the decommissioning and site assessment (Shannon & Wilson 2006) details groundwater sampling from existing wells, and the use of a geoprobe to collect soil samples at the site of the USTs and the diesel and waste oil piping. Samples were collected at or near the groundwater interface. Analytical results found four subsurface locations north and west of the USTs where MTCA Method A clean-up levels for diesel range hydrocarbons in soil were exceeded. The report attributes the soil contamination to previously released hydrocarbons as discussed above, and not to the USTs. The fueling of fleet buses now is from an aboveground storage tank complex located on the east side of the facility.

PREVIOUS GROUNDWATER SAMPLING RESULTS

PBS conducted four consecutive quarters of groundwater sampling in each of the following years: 2006, 2007 and 2008 at the site. PBS conducted one quarter of sampling in 2009; PBS understands there was no further groundwater monitoring at the site until 2017. The monitoring wells that PBS sampled were selected by BFT, and were monitoring wells MW-3, MW-4, MW-5, MW-6, MW-13, and MW-14. A concentration of diesel range hydrocarbons of 1,000 micrograms per liter (ug/L) was detected in monitoring well MW-14 in February 2009. This exceeded the MTCA Method A cleanup level of 500 ug/L. There were no other detections above the laboratory method reporting limits for gasoline range, BTEX, diesel or heavy oil range hydrocarbons in any of the sampled wells in 2009. Total lead was not sampled by PBS during any of the sampling events.

During the sampling in 2006-2008, PBS had observed a general pattern of higher petroleum concentrations in November, as seen in results from MW-9 and MW-14. This trend indicated that a smear zone of petroleum contaminant existed in the soil that was remobilized during the irrigation driven seasonal rise in groundwater elevations. This was likely the case with the diesel range contamination detected in MW-14 over the MTCA regulatory limit in February 2009.

Monitoring wells MW-13, MW-14, and MW–7, are located on the north side of the site, and had had the lowest water table elevations, indicating a northward groundwater flow in 2009. This finding was in general agreement with water level data collected by PBS at the site in 2006, 2007 and 2008.

PBS resumed sampling at the site in September 2017 in accordance with the letter from Ecology mentioned above. PBS sampled nine monitoring wells, with the results presented in a report to RH2 Engineering dated May17, 2017. Based on the findings of this sampling, and after discussions with BFT and Ecology, a reduced scope of work was agreed on for continued quarterly sampling. RH2 Engineering prepared a letter to Ecology dated December 1, 2017, requesting that the scope of work be reduced to sampling five monitoring wells. Ecology concurred in an email dated December 1, 2017 to the reduced scope. PBS sampled the following five monitoring wells: MW-5, MW-6, MW-8, MW-13 and MW-14 for three consecutive quarters in 2018.

Results of the August 2018 GME found that monitoring well MW-6 had diesel range hydrocarbons above the MTCA Method A cleanup level. Detections of hydrocarbons above laboratory RLs was observed in monitoring wells MW-5 and MW-13.

Based on the results of the August 2018 sampling, Ecology recommended twice-yearly sampling in an email dated May 1, 2018, until the diesel range hydrocarbons in monitoring well MW-6 were below the Method A cleanup level. The twice-yearly sampling was recommended to begin in May 2019 when historically high petroleum concentrations had been observed. This would be followed by quarterly sampling in an effort to obtain four consecutive quarters of groundwater results below the Method A cleanup levels. The sampling conducted in May 2019 was the first twice-yearly sampling event following this Ecology recommendation.

CURRENT MONITORING EVENT

The sampling event was conducted on November 8, 2021, with groundwater samples collected from monitoring wells MW-5, MW-6, MW-8, MW-13, and MW-14.

The following analyses were conducted on groundwater samples from the monitoring wells:

- Total Petroleum Hydrocarbons gasoline range (TPH-Gx);
- TPH-Dx (Diesel range and motor oil range compounds);
- Gasoline constituents’ benzene, toluene, ethylbenzene, and xylenes (BTEX);
- Total lead (unfiltered).

Prior to sampling, the depth to water was measured in each well using an interface meter. PBS sampled the monitoring wells following PBS’ standard operating procedure for low-flow sampling, which is included as an attachment.

Groundwater samples were collected in laboratory-prepared sample containers and stored in a cooler with ice. The collected samples were submitted to the Friedman and Bruya Laboratory in Seattle, Washington, within specified holding times. The samples were delivered to the laboratory under chain-of-custody. The laboratory analytical report is included with this report as an attachment

Groundwater parameters for conductivity, pH, temperature, dissolved oxygen and oxidation reduction potential (ORP), were collected at the time of sampling and are included in Table 1.

November 2021 Results

The monitoring well locations are shown on Figure 1 as well as groundwater elevation contours as measured during the GME. The November 2021 analytical results are presented on Figure 2 along with the respective monitoring well locations.

Diesel range hydrocarbons were found in monitoring well MW-6 at a concentration of 2,600 µg/L. This result exceeds the MTCA Method A cleanup level of 500 ug/L for diesel range hydrocarbons. Diesel range hydrocarbons were detected in monitoring well MW-13 at the MTCA Method A cleanup level of 500 µg/L, and in monitoring wells MW-5, MW-8 and MW-14 above laboratory reporting limits (RLs), but below the MCTA Method A cleanup level.

Monitoring well MW-6 had a detection of gasoline range hydrocarbons. The detection was above the laboratory RL but below the applicable Method A cleanup level. BTEX was detected in monitor well MW-6 at concentrations below the applicable Method A cleanup levels.

Monitoring well MW-13 had a detection of motor oil range hydrocarbons. The detection was above the laboratory RL but below the applicable Method A cleanup level. Lead was not detected in any of the monitor wells above the laboratory RL.

Quality Control Sampling

Duplicate Groundwater Sample

A groundwater duplicate sample was collected from monitoring well MW-6 during the sampling event. Both the duplicate sample and the compliance sample had detections of diesel range hydrocarbons above the MTCA Method A cleanup level of 500 µg/L. MW-6 had a concentration of 2,600 µg/L and the duplicate had a concentration of 2,100 µg/L. The relative percent difference between the parent sample and duplicate is 10.6%, and within the commonly used control criteria of 20%, so no data qualifiers are required.

The concentration of gasoline range hydrocarbons in both the duplicate sample and compliance sample were above the laboratory RL, but below the MTCA Method A cleanup level. MW-6 had a concentration of 240 µg/L and the duplicate had a concentration of 270 µg/L. The relative percent difference between the parent sample and duplicate is 11.8%, and within the commonly used control criteria of 20%, so no additional data qualifiers are required.

The concentration of ethylbenzene in both the duplicate sample and compliance sample were above the laboratory RL, but below the MTCA Method A cleanup level. MW-6 had a concentration of 2.5 µg/L and the duplicate had a concentration of 2.7 µg/L. The relative percent difference between the parent sample and duplicate is 7.7%, and within the commonly used control criteria of 20%, so no additional data qualifiers are required.

Benzene, toluene, xylenes, and lead were not detected in the duplicate sample or compliance sample at concentrations above the laboratory RL. The duplicate sample and the analytical results are presented in Table 1.

All laboratory quality assurance results for all samples were reported as being within established acceptance criteria.

Site Hydrogeology

The measured depths to groundwater in the wells ranged from 5.95 to 10.42 feet below ground surface. The water levels were higher in MW-5 and MW-6 and lower in MW-8, MW-13, and MW-14 during the November 2021 event as compared to May 2021. The greatest change was observed in monitoring well MW-14, which was 0.17 feet lower in November 2021 as compared to May 2021. Groundwater elevations were used to determine the direction of groundwater flow, which was found to be approximately North 46º West. The northwest flow direction is consistent with previous groundwater flow directions. The gradient was calculated as 0.013 foot per foot.

CONCLUSIONS

Based on the findings of investigation conducted on Site, the following conclusions are made:

- This was the second twice-yearly sampling event conducted by PBS in 2021.
- Petroleum impacted groundwater above the MTCA Method A cleanup level for diesel range hydrocarbons was detected in monitoring well MW-6. The TPH-Dx levels in MW-6 appear to be trending upward since May 2019, with a low concentration of 360 µg/L in May 2019 and a high concentration of 2,600 µg/L in November 2021.
- Petroleum impacted groundwater at the MTCA Method A cleanup level for diesel range hydrocarbons was detected in monitoring well MW-13.
- There were detections of diesel range hydrocarbons in monitoring wells MW-5, MW-8 and MW-14 that were above the laboratory RL, but below cleanup levels.
- There was a detection of motor oil range hydrocarbons in monitoring well MW-13 that was above the laboratory RL, but below cleanup levels.
- The laboratory report had qualified the groundwater sample results from monitoring well MW-13 and MW-14 with an “x” qualifier as noted in Table 1. This qualifier indicates the sample does not match the standards used for laboratory calibration. This qualifier can indicate the presence of organic material in the sample such as leaves, bark or litter, or the presence of weathered fuel due to degradation over time. In PBS’ judgement it appears the qualifier is due more to the presence of weathered petroleum hydrocarbons than the presence of naturally occurring organic material.

  There was a detection of gasoline range hydrocarbons in monitoring well MW-6 that was below the cleanup level. BTEX was detected in monitoring well MW-6 below the respective cleanup levels.

- No lead was detected above the laboratory RL in any of the sampled monitor wells.

RECOMMENDATIONS

With regard to the current status of groundwater quality monitoring on Site, PBS recommends that consideration is given to the following:

- PBS recommends continued sampling of the five monitoring wells to maintain the twice-yearly sampling schedule. The next monitoring event should be scheduled for May 2022.
- PBS recommends BFT keep a copy of this report for their records.

LIMITATIONS

Findings and conclusions must be considered not as scientific certainties, but as opinions based on professional judgment concerning the significance of the data gathered during the course of monitoring. The site as a whole may have other contamination that was not characterized by this study. PBS is not able to represent that the site or adjoining land contain no hazardous waste, oil or other latent conditions beyond that detected or observed by PBS. Other than this, no warranty is implied or intended.

We appreciate the opportunity to provide this report. If you have any questions or need further services, please contact us at 509.942.1600.

Prepared and submitted by:

Digitally signed by Patrick Brice
Date: 2022.02.11 08:17:00 -08'00'

Patrick Brice
Environmental Engineering Staff

Thomas J Mergy

Digitally signed by Thomas Mergy
Date: 2022.02.11 08:31:28 -08'00'

Reviewed by:
Thomas Mergy, LHG
Principal Hydrogeologist

Attachments:
- Figure 1 Site Plan and Groundwater Contours November 2021
- Figure 2 Groundwater Analytical Data May 2019-November 2021
- Table 1. Monitoring Wells MW-5, MW-6, MW-8, MW-13 MW-14 Sample Results and Groundwater Parameters 2018-2021
- PBS Low Flow Sampling Procedure
- Laboratory Report and Sample Chain of Custody Form

LEGEND

⊕ MW-1	MONITORING WELL NUMBER AND APPROXIMATE LOCATION
345.00 — —	GROUNDWATER CONTOUR
◀—	GROUNDWATER FLOW DIRECTION (N46°W) AND GRADIENT (0.013)
345.29	GROUNDWATER ELEVATON AS MEASURED 11/8/2021

N

Scale 1" = 30'

0' 15' 30' 60'

PREPARED FOR: RH2 ENGINEERING

PBS

SITE PLAN AND GROUNDWATER CONTOURS NOVEMBER 2021

1000 COLUMBIA PARK TRAIL
RICHLAND, WASHINGTON

JAN 2022
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FIGURE
1

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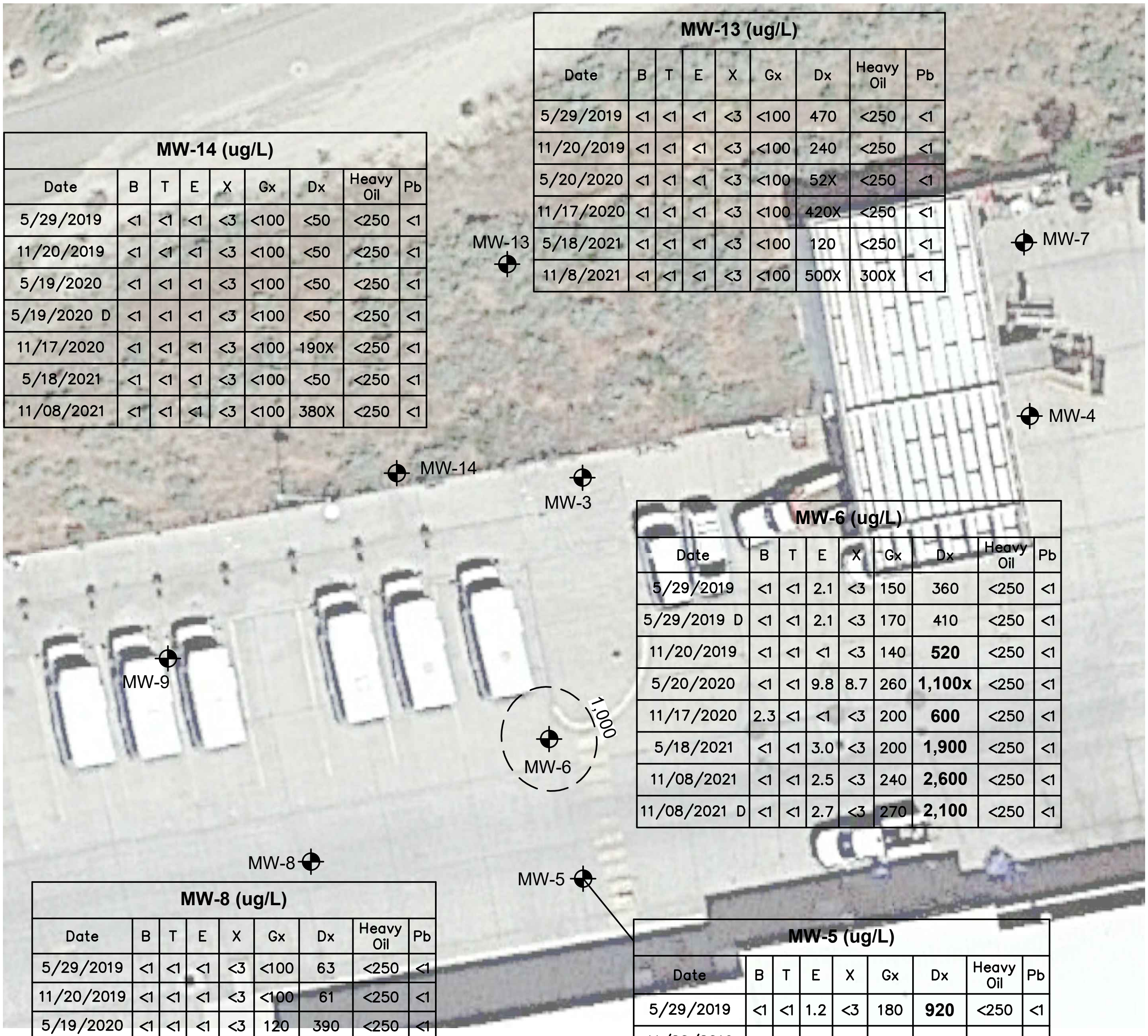


MW-14 (ug/L)

Date	B	T	E	X	Gx	Dx	Heavy Oil	Pb
5/29/2019	<1	<1	<1	<3	<100	<50	<250	<1
11/20/2019	<1	<1	<1	<3	<100	<50	<250	<1
5/19/2020	<1	<1	<1	<3	<100	<50	<250	<1
5/19/2020 D	<1	<1	<1	<3	<100	<50	<250	<1
11/17/2020	<1	<1	<1	<3	<100	190X	<250	<1
5/18/2021	<1	<1	<1	<3	<100	<50	<250	<1
11/08/2021	<1	<1	<1	<3	<100	380X	<250	<1

MW-13 (ug/L)

Date	B	T	E	X	Gx	Dx	Heavy Oil	Pb
5/29/2019	<1	<1	<1	<3	<100	470	<250	<1
11/20/2019	<1	<1	<1	<3	<100	240	<250	<1
5/20/2020	<1	<1	<1	<3	<100	52X	<250	<1
11/17/2020	<1	<1	<1	<3	<100	420X	<250	<1
5/18/2021	<1	<1	<1	<3	<100	120	<250	<1
11/8/2021	<1	<1	<1	<3	<100	500X	300X	<1

MW-6 (ug/L)

Date	B	T	E	X	Gx	Dx	Heavy Oil	Pb
5/29/2019	<1	<1	2.1	<3	150	360	<250	<1
5/29/2019 D	<1	<1	2.1	<3	170	410	<250	<1
11/20/2019	<1	<1	<1	<3	140	**520**	<250	<1
5/20/2020	<1	<1	9.8	8.7	260	**1,100x**	<250	<1
11/17/2020	2.3	<1	<1	<3	200	**600**	<250	<1
5/18/2021	<1	<1	3.0	<3	200	**1,900**	<250	<1
11/08/2021	<1	<1	2.5	<3	240	**2,600**	<250	<1
11/08/2021 D	<1	<1	2.7	<3	270	**2,100**	<250	<1

MW-8 (ug/L)

Date	B	T	E	X	Gx	Dx	Heavy Oil	Pb
5/29/2019	<1	<1	<1	<3	<100	63	<250	<1
11/20/2019	<1	<1	<1	<3	<100	61	<250	<1
5/19/2020	<1	<1	<1	<3	120	390	<250	<1
11/17/2020	<1	<1	<1	<3	<100	<50	<250	<1
5/18/2021	<1	<1	<1	<3	<100	260x	<250	<1
11/8/2021	<1	<1	<1	<3	<100	320	<250	<1

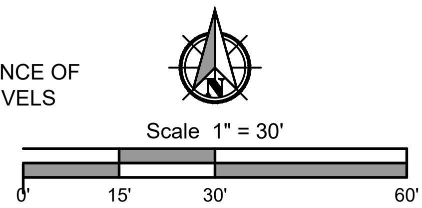
MW-5 (ug/L)

Date	B	T	E	X	Gx	Dx	Heavy Oil	Pb
5/29/2019	<1	<1	1.2	<3	180	**920**	<250	<1
11/20/2019	<1	<1	<1	<3	130	250x	<250	<1
11/20/2019 D	<1	<1	<1	<3	140	**740x**	<250	<1
5/20/2020	<1	<1	<1	<3	170	**500x**	<250	<1
11/17/2020	<1	<1	<1	<3	110	**530**	<250	<1
5/18/2021	<1	<1	<1	<3	<100	250	<250	<1
5/18/2021 D	<1	<1	<1	<3	<100	240	<250	<1
11/08/2021	<1	<1	<1	<3	<100	470	<250	<1

LEGEND

Gx	GAS
Dx	DIESEL
OIL	OIL
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES
Pb	TOTAL LEAD
1,000	DIESEL CONCENTRATION (ug/L)
— — —	DIESEL CONCENTRATION CONTOUR IN GROUNDWATER BASED ON NOVEMBER 2021 SAMPLE RESULTS

NOTE:
BOLD TEXT INDICATES AN EXCEEDANCE OF ONE OR MORE OF THE CLEAN UP LEVELS
D = DUPLICATE SAMPLE



PREPARED FOR: RH2 ENGINEERING

PBS

GROUNDWATER ANALYTICAL DATA MAY 2019-NOVEMBER 2021

1000 COLUMBIA TRAIL DRIVE
RICHLAND, WASHINGTON

JAN 2022
64529.000

FIGURE
2

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Table 1. Monitoring Wells MW-5, MW-6, MW-8, MW-13 MW-14 Sample Results and Groundwater Parameters 2018-2021
Richland, Washington

Sample #	Sample Date	Depth to Groundwater (feet)	Groundwter Elevation	Gasoline (µg/L)	BTEX (µg/L)	Diesel/Oil (µg/L)	Lead (µg/L)	pH	Conductivity (micromhos/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (millivolts)
MW-5	1/09/2018	6.00	345.50	140	<1/<1/1.1/<3	430x/<250	<1	7.42	729	11.95	3.38	36.4
	5/9/2018	5.24	346.26	250	<1/<1/1/<3	**560**/<250	<1	7.31	898	16.04	0.56	-189
MW-DUP	5/9/2018			220	<1/<1/<1/<3	500/<250	<1					
	8/29/2018	5.91	345.59	<100	<1/<1/<1/<3	260/<250	<1	6.88	885	20.70	2.13	-80.1
	5/29/2019	5.55	345.95	180	<1/<1/1.2/<3	**920**/<250	<1	7.56	1611	20.38	0.22	13.3
	11/20/2019	6.11	345.39	130	<1/<1/<1/<3	250x/<250	<1	7.10	967	10.00	1.34	-10.9
MW-DUP	11/20/2019			140	<1/<1/<1/<3	**740x**/<250	<1					
	5/20/2020	5.84	345.66	170	<1/<1/<1/<3	**500x**/<250	<1	7.19	922	17.46	0.97	-168
	11/17/2020	5.93	345.57	110	<1/<1/<1/<3	**530**/<250	<1	7.26	1660	17.4	0.14	-224
	5/18/2021	6.25	345.25	<100	<1/<1/<1/<3	250/<250	<1	7.67	1187	17.91	8.91	-50.9
MW-DUP	5/18/2021			<100	<1/<1/<1/<3	240/<250	<1					
	11/08/2021	6.21	345.29	<100	<1/<1/<1/<3	470/<250	<1	8.29	1240	17.32	0.00	-59
MW-6	1/08/2018	6.15	345.37	320	<1/<1/6.6/<3	**1,000x**/<250	<1	7.08	869	11.27	1.87	-119
MW-DUP	1/08/2018			260	<1/<1/2.7/<3	**870x**/<250	<1					
	5/9/2018	5.69	345.83	600	<1/<1/18/15	**1,800**/<250	<1	7.06	1041	16.10	0.64	168
	8/29/2018	6.01	345.51	210	<1/<1/5.7/<3	**540**/<250	<1	6.96	1174	23.57	2.08	-133
MW-DUP	8/28/2018			230	<1/<1/5.8<3	**550**/<250	<1					
	5/29/2019	5.62	345.90	150	<1/<1/2.1/<3	360/<250	<1	7.68	1962	18.77	0.23	-46.8
MW_DUP	5/29/2019			170	<1/<1/2.1/<3	410/<250	<1					
	11/20/2019	6.24	345.28	140	<1/<1/<1/<3	**520x**/<250	<1	7.18	1001	11.30	4.63	-193
	5/20/2020	6.19	345.33	260	<1/<1/9.8/8.7	**1,100x**/<250	<1	7.14	2224	17.39	0.94	-158
	11/17/2020	6.08	345.44	200	<1/<1/2.3/<3	**600J**/<250	<1	6.91	3511	18.3	0.15	-253
MW-DUP	11/17/2020			210	<1/<1/2.4/<3	**830J**/<250	<1					
	5/18/2021	6.49	345.03	200	<1/<1/3.0/<3	**1,900**/<250	<10	6.67	7760	18.37	8.19	-69.8

Sample #	Sample Date	Depth to Groundwater (feet)	Groundwter Elevation	Gasoline (µg/L)	BTEX (µg/L)	Diesel/Oil (µg/L)	Lead (µg/L)	pH	Conductivity (micromhos/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (millivolts)
MW-6	11/08/2021	6.39	345.13	240	<1/<1/2.5/<3	**2,600**/<250	<1	7.79	3680	18.10	0.00	-73
MW-DUP	11/08/2021			270	<1/<1/2.7/<3	**2,100**/<250	<1					
MW-8	1/09/2018	5.76	345.07	<100	<1/<1/<1<3	<50/<250	<1	7.32	579	12.93	6.99	-28.5
	5/8/2018	4.57	346.26	<100	<1/<1/<1<3	110/<250	<1	7.07	1477	18.60	3.01	48.0
	8/28/2018	5.61	345.22	<100	<1/<1/<1<3	<50/<250	<1	7.14	1369	23.90	3.96	96
	5/29/2019	5.23	345.60	<100	<1/<1/<1/<3	63x/<250	<1	7.22	3055	20.02	4.17	78.7
	11/20/2019	5.88	344.95	<100	<1/<1/<1/<3	61x/<250	<1	7.27	968	10.98	2.96	-109
	5/19/2020	5.37	345.46	120	<1/<1/<1/<3	390x/<250	<1	7.15	2260	18.45	0.91	-193
	11/17/2020	5.62	345.21	<100	<1/<1/<1/<3	<50/<250	<1	7.23	1708	18.0	0.46	-170
	5/18/2021	5.89	344.94	<100	<1/<1/<1/<3	260x/<250	<1	7.24	2038	18.83	0.78	-132
	11/08/2021	5.95	344.88	<100	<1/<1/<1/<3	320/<250	<1	8.27	1720	18.16	0.14	-59
MW-13	1/08/2018	10.09	344.53	<100	<1/<1/<1<3	350x/<250	<1	6.87	918	16.13	3.02	20.8
	5/8/2018	9.50	345.12	<100	<1/<1/<1<3	120/<250	<1	6.85	799	16.16	1.23	15.3
	8/28/2018	10.04	344.58	<100	<1/<1/<1<3	360/<250	<1	6.81	1004	19.87	2.42	117
	5/29/2019	9.60	345.02	<100	<1/<1/<1<3	470x/<250	<1	7.55	2216	17.39	0.28	36
	11/20/2019	10.33	344.29	<100	<1/<1/<1/<3	240x/<250	<1	6.94	1342	13.07	1.36	43.5
	5/20/2020	9.82	344.80	<100	<1/<1/<1/<3	52x/<250	<1	7.33	905	15.78	1.48	-34
	11/17/2020	10.10	344.52	<100	<1/<1/<1<3	420x/<250	<1	6.91	2573	20.1	0.53	-143
	5/18/2021	10.31	344.31	<100	<1/<1/<1/<3	120/<250	<1	7.11	2090	16.77	0.50	-40.6
	11/08/2021	10.42	344.20	<100	<1/<1/<1/<3	**500x**/300x	<1	7.90	3400	19.52	0.61	64
MW-14	1/08/2018	7.89	344.61	<100	<1/<1/<1<3	87x/<250	<1	6.93	724	14.72	6.80	61.1
	5/8/2018	6.60	345.90	<100	<1/<1/<1<3	<50/<250	<1	7.03	728	16.99	6.73	89.4
	8/28/2018	7.88	344.62	<100	<1/<1/<1<3	<50/<250	<1	7.25	831	20.74	6.87	114
	5/29/2019	7.40	345.10	<100	<1/<1/<1<3	<50/<250	<1	8.02	846	16.68	5.67	51.8
	11/20/2019	8.19	344.31	<100	<1/<1/<1/<3	<50/<250	<1	7.21	858	12.78	>10	103
	5/19/2020	7.50	345.00	<100	<1/<1/<1/<3	<50/<250	<1	7.24	828	16.71	6.98	-26

Sample #	Sample Date	Depth to Groundwater (feet)	Groundwter Elevation	Gasoline (µg/L)	BTEX (µg/L)	Diesel/Oil (µg/L)	Lead (µg/L)	pH	Conductivity (micromhos/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (millivolts)
MW-DUP	5/19/2020			<100	<1/<1/<1/<3	<50/<250	<1					
MW-14	11/17/2020	7.84	344.66	<100	<1/<1/<1<3	190x/<250	<1	6.73	1981	19.3	1.95	-98
	5/18/2021	8.06	344.44	<100	<1/<1/<1/<3	<50/<250	<1	7.24	839	16.63	4.69	3.0
	11/08/2021	8.23	344.27	<100	<1/<1/<1/<3	380x/<250	<1	7.95	2730	18.76	1.24	50
MTCA Method A cleanup levels				800/1000	5/1,000/700/1000	500/500	15					

Note: µg/L =Results and cleanup levels in micrograms/Liter

BTEX = Benzene, Toluene, Ethylbenzene, Total Xylenes

Bold results exceed MTCA – Method A Cleanup Levels

< = Constituent not detected above laboratory method detection limit

DUP =duplicate sample

Model Toxics Control Action (MTCA) Method A Cleanup levels are indicated on the last line (The1,000 µg/L cleanup level for gasoline is applicable when no benzene is detected)

*Low pH values are likely due to instrument malfunction and not natural conditions

NS = Not sampled (petroleum and/or lead)

NC = Parameter not collected

x = Laboratory result qualifier; the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

J = Laboratory result qualifier; the sample concentration is estimated due to the relative percent difference between the sample and field duplicate being outside of limits

STANDARD OPERATING PROCEDURE
Sampling Groundwater Monitoring Wells

1 BACKGROUND AND PURPOSE

Groundwater samples are collected from monitoring wells for analysis of physical and chemical parameters, either by using field observations and portable equipment and/or using established laboratory analytical methods. The goal of this process is to obtain groundwater samples that are representative of the aquifer (i.e., avoiding a sample that has been impacted by surface or atmospheric conditions).

Low-flow or zero volume purging and sampling methods were developed to produce samples with the least amount of interference resulting from the collection method. Low-flow purging techniques became the industry standard for collecting a groundwater sample because the methods slow groundwater velocity to the well, minimize turbidity and agitation in the water column, and reduce the volume of purged groundwater requiring disposal. These techniques include the use of pumps dedicated to specific wells or the use of a portable pump system. A zero volume/no purging method requires installation of a collection vessel within the well prior to the sample collection event, allowing the water column within the well to equilibrate with the aquifer prior to retrieving the sample. The appropriate technique is dependent on project-specific goals and data quality requirements. Sampling methodology should be confirmed with the PBS project manager (PM) prior to preparing for groundwater monitoring.

The procedures in this Standard Operating Procedure (SOP) are specific to standard monitoring wells with a single-slotted interval. It is assumed that low-flow purging and sampling protocols are used, although these protocols can be easily adjusted for other sampling methods. Temporary borings advanced for a single field event may be sampled using the techniques presented in this SOP.

2 EQUIPMENT AND SUPPLY LIST

- Well lock keys
- Groundwater Sampling Field Form and Depth to Groundwater Field Form
- Copies of field forms and data tables from previous groundwater monitoring event
- Electronic water level probe or interface probe (if dense or light non-aqueous phase liquids [DNAPL or LNAPL] are potentially present)
- Tubing cutters, knife or scissors (note: some sites do not allow the use of a knife on-site)
- Decontamination equipment
- Measuring cup
- Safety cones
- Bolt cutters
- Replacement well caps, bolts, and padlocks
- Small cup, turkey baster, or large sponge to purge standing water inside well monument
- Fish hooks, stainless steel weight, and fishing line to retrieve objects in the well
- Site map and health and safety plan

- Personal protection equipment (PPE) required for the site, including nitrile gloves (confirm with site-specific health and safety plan)
- Submersible pump or peristaltic pump and associated equipment
- Compressed gas source (nitrogen or air compressor), battery source, or generator and fuel
- Control box
- Disposable tubing, if necessary
- Flow-through cell and water quality parameter meter (e.g. YSI model)
- Buckets or containers for purge water and drum labels
- Sample containers, labels, packaging material
- Coolers and ice for samples

3 PROCEDURE

This section outlines standard procedures used for collecting groundwater samples from a monitoring well. Project Managers may modify or remove tasks as dictated by project needs; for example, turbidity or depth-to-bottom measurements may not be warranted at a site with sufficiently developed wells.

Preparation for a monitoring event begins in the office. The first step is to read the scope of work (e.g., proposal, sampling and analysis plan (SAP), work plan) to determine the number and location of monitoring wells to be sampled, health and safety considerations, quality control (QC) samples needed, sample containers required, and equipment needed for the site (peristaltic pump, bladder pump, both, etc.). Recommended preplanning procedures are as follows:

- Prepare, review, or update Health and Safety Plan (HASP) for the site.
- Obtain appropriate PPE for the site (e.g., hard hat, safety vest, gloves, safety glasses, life vest, flame retardant [FR] shirt or other client-required PPE).
- Determine number and type of samples to be collected.
- Determine which laboratory can meet analytical requirements (required analysis, screening levels).
- Order sample containers from laboratory, making sure to order QC sample containers and at least one extra set of containers. Ensure that a Safety Data Sheet (SDS) is provided for any sample preservative supplied by the laboratory.
- Print all forms needed for sampling event (work plan, HASP, depth to water forms, groundwater sampling forms, labels, chain of custody, etc.).
- Schedule PBS vehicle and equipment use on PBS calendars, as warranted.
- Order rental equipment for sampling event, if not available internally.

After arriving at the site, the following procedures should be followed:

- Don appropriate PPE and place safety cones around the work zone, if required by the HASP or deemed necessary by site conditions.
- Open all of the monitoring wells on-site and wait a minimum of 15 minutes for water levels to approach an equilibrium state with atmospheric pressure before taking any measurements.

- Note the general condition of the well on the depth to groundwater field form. Check well for damage or evidence of tampering, and record pertinent observations. Note any maintenance tasks that should be completed, such as well cap or padlock replacement.
- Collect depth to water measurements from each monitoring well, decontaminating the probe between locations. If possible, gauging should be conducted in order from the least to the most contaminated well. The measurements should be collected from all wells prior to beginning sample collection, unless project scope or site conditions indicate otherwise.
- Measure the depth to water relative to the marking on the well casings. If there is no mark, use the north side of the casing. Record the water level on the depth to groundwater field form. Note if DNAPL or LNAPL is present (this typically requires a meter capable of detecting NAPL-water interfaces). If NAPL is present, additional decontamination procedures will be warranted.
- Measure depth to bottom of well to record if sedimentation in the well has occurred.
- Make sure all information is completed on the depth to groundwater field form and sign and date it.

Sampling a groundwater monitoring well utilizing low-flow techniques relies on stabilization of field water quality parameters to determine when groundwater is representative of aquifer conditions. Measurement of groundwater quality parameters with a water quality parameter meter occurs in a closed system in which groundwater does not come in contact with open air; this is important for valid measurements because dissolved oxygen (DO), oxidation-reduction potential (ORP), and pH measurements can be sensitive to reactions with the atmosphere. A flow-through cell (flow cell) connected to the water quality parameter meter provides this closed system and is used to measure field parameters prior to collecting groundwater samples. Stabilization of selected parameters indicates that collected groundwater is representative of the aquifer and conditions are suitable for sampling to begin. See protocol below for stabilization parameters.

Low-flow purge and sample methods require care when placing a portable pump and/or tubing in the well to minimize disturbance to the water column. Pumping rates must be maintained at 0.1 to 0.5 liter per minute to reduce drawdown; the pump should never be run higher than 0.5 liters per minute prior to sampling.

For monitoring wells, sampling should proceed as follows:

- If using a portable pump setup, slowly lower the pump or tubing to the midpoint of the screen or sample interval. Secure the pump or tubing at the surface to prevent it from moving (not applicable if using dedicated pumps).
- Connect the bladder pump (attaching control box, compressor or nitrogen tank with regulator) or peristaltic pump to flow cell containing water quality parameter probes. Place the water level probe in the well so water levels can be measured as you are pumping. Start the pump and adjust the pumping rate to between 0.1 and 0.5 liters per minute (using a measuring cup to calculate the flow rate). Begin recording readings on the groundwater sampling field form. Be sure to purge the initial volume of water in the tubing before taking a reading.
- During purging, record readings of groundwater parameters (listed below) and water level every 3 to 5 minutes on the groundwater sampling field form. A drawdown of less than 0.3 feet in the water column, once the pumping rate has stabilized, is desirable; however, less permeable aquifer material or a clogged well filter pack may result in a deeper drawdown. At a minimum, the depth-to-water should be stabilized for three consecutive readings taken between 3 to 5 minutes apart (in conjunction with the stabilization of the other parameters). Visually describe and record turbidity. Purging is considered complete when the groundwater parameters have stabilized for three consecutive readings.

Field Parameter	Stabilization Goal
Temperature	+/-3%
Specific Conductance	+/- 3% mS/cm
pH	+/- 0.1 pH units
DO	+/- 10% or +/- 0.3 mg/L
ORP	+/- 10 millivolts
Depth to Water	+/- 0.3 feet

Please note that multi-parameter meters may have a resolution greater than the stabilization goal. Note the meter capabilities. If the field parameters do not stabilize within the stabilization goal, but are within the resolution of the meter, it may be acceptable to collect a sample in this scenario. This MUST be noted on the field form.

- Measure turbidity of the sample water using field instruments prior to sample collection and upon any obvious visual changes in turbidity during sample collection.
- Prior to collecting the water sample, the tubing originating in the well must be disconnected from the influent (inflow) side of the flow cell.
- Directly fill the sample containers from the tubing originating in the well. If you are collecting samples for volatile organic compound (VOC) analysis, you may need to decrease the pump rate to minimize volatilization of compounds from the sample; if this is the case, other samples should be collected first. You may restore the flow rate upon completion of filling sample containers for VOC analysis. Fill unpreserved bottles first. Filtered samples should be collected after all other samples have been collected.
- Groundwater samples collected for VOC analysis must be collected with zero headspace in the sample vial. This can be confirmed by gently tapping the sealed vial against a gloved hand to ensure that air bubbles are not present.
- If a duplicate sample is required for the well, it should be filled concurrently with the regular sample. This is accomplished by alternating bottles of the same type during sample collection (e.g., filling one bottle from each sample, then the second bottle from each sample.)
- Groundwater samples for dissolved metals analysis must be field filtered with a 0.45 micron filter directly connected to the tubing. Mark “field filtered” or “FF” on the bottle label, field form, and chain of custody.
- Prior to filling or just after filling, label each bottle with the project name, sample name, and sample date and time, and make sure it is properly sealed. The sample containers may also be labeled with what analysis will be performed (confirm with Project Manager). Place in a cooler with ice and pack for transportation.
- As necessary, pull pump and discard tubing. Decontaminate the pump based on the decontamination procedures established for the site.
- Make sure all information is completed on the groundwater field form and sign and date it.
- Close and lock the well.
- Contain purge and decontamination water in the appropriate containers as established for the project.
- Dispose of used sampling supplies and other waste in appropriate container as established for the project.

If low-flow sampling is not used at the site, these procedures should be modified as appropriate. The objective is to provide high-quality groundwater samples representative of the aquifer. Modifications to this SOP should keep this objective in mind at all times.

After fieldwork is completed:

- Ensure that chain-of-custody form has necessary information including site name, project manager, sample names, date and time collected, requested analysis, special notes (field filtered, MS/MSD, etc.).
- Scan and save field sheets to project folder on server. Retain original field copies in project folder; these are legal documents and should be retained as per PBS guidelines for document retention.
- Report any sampling or well maintenance issues to the project manager for evaluation and remedy.
- Clean and store PBS equipment for use on next project. Report any equipment damage or malfunctions or missing/depleted calibration solutions to the office equipment manager.
- Ship rental equipment back to vendor immediately to minimize project costs. Borrowed PBS equipment should be returned promptly to the lending office.

References

Puls, R.W. and M.J. Barcelona. *Groundwater Issue Paper: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. US Environmental Protection Agency, EPA 540-S-95-504 (1996).

Yeskis, D. and Bernard Zavala. *Groundwater Issue Paper: Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers*. US Environmental Protection Agency, EPA 542-S-02-001 (May 2002).

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

November 17, 2021

Patrick Brice, Project Manager
PBS Engineering and Environmental, Inc.
400 Bradley Blvd, Suite 106
Richland, WA 99352

Dear Mr Brice:

Included are the results from the testing of material submitted on November 9, 2021 from the Ben Franklin Transit 64529, F&BI 111150 project. There are 14 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
PBR1117R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 9, 2021 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Ben Franklin Transit 64529, F&BI 111150 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
111150 -01	MW-14
111150 -02	MW-13
111150 -03	MW-8
111150 -04	MW-6
111150 -05	MW-5
111150 -06	MW-DUP

Lead in the 6020B matrix spike and matrix spike duplicate failed the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

All other quality control requirements were acceptable.

Date of Report: 11/17/21
Date Received: 11/09/21
Project: Ben Franklin Transit 64529, F&BI 111150
Date Extracted: 11/12/21
Date Analyzed: 11/15/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
MW-14 111150-01	<1	<1	<1	<3	<100	66
MW-13 111150-02	<1	<1	<1	<3	<100	68
MW-8 111150-03	<1	<1	<1	<3	<100	67
MW-6 111150-04	<1	<1	2.5	<3	240	71
MW-5 111150-05	<1	<1	<1	<3	<100	66
MW-DUP 111150-06	<1	<1	2.7	<3	270	69
Method Blank 01-2539 MB	<1	<1	<1	<3	<100	74

Date of Report: 11/17/21
Date Received: 11/09/21
Project: Ben Franklin Transit 64529, F&BI 111150
Date Extracted: 11/10/21
Date Analyzed: 11/11/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 47-140)
MW-14 111150-01	380 x	<250	101
MW-13 111150-02	500 x	300 x	101
MW-8 111150-03	320	<250	104
MW-6 111150-04	2,600	<250	114
MW-5 111150-05	470	<250	101
MW-DUP 111150-06	2,100	<250	95
Method Blank 01-2610 MB2	<50	<250	100

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-14	Client:	PBS Engineering and Environmental
Date Received:	11/09/21	Project:	Ben Franklin Transit 64529, F&BI 111150
Date Extracted:	11/11/21	Lab ID:	111150-01
Date Analyzed:	11/11/21	Data File:	111150-01.098
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-13	Client:	PBS Engineering and Environmental
Date Received:	11/09/21	Project:	Ben Franklin Transit 64529, F&BI 111150
Date Extracted:	11/11/21	Lab ID:	111150-02
Date Analyzed:	11/11/21	Data File:	111150-02.122
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-8	Client:	PBS Engineering and Environmental
Date Received:	11/09/21	Project:	Ben Franklin Transit 64529, F&BI 111150
Date Extracted:	11/11/21	Lab ID:	111150-03
Date Analyzed:	11/11/21	Data File:	111150-03.123
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6	Client:	PBS Engineering and Environmental
Date Received:	11/09/21	Project:	Ben Franklin Transit 64529, F&BI 111150
Date Extracted:	11/11/21	Lab ID:	111150-04
Date Analyzed:	11/11/21	Data File:	111150-04.124
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-5	Client:	PBS Engineering and Environmental
Date Received:	11/09/21	Project:	Ben Franklin Transit 64529, F&BI 111150
Date Extracted:	11/11/21	Lab ID:	111150-05
Date Analyzed:	11/11/21	Data File:	111150-05.125
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-DUP	Client:	PBS Engineering and Environmental
Date Received:	11/09/21	Project:	Ben Franklin Transit 64529, F&BI 111150
Date Extracted:	11/11/21	Lab ID:	111150-06
Date Analyzed:	11/11/21	Data File:	111150-06.126
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	NA	Project:	Ben Franklin Transit 64529, F&BI 111150
Date Extracted:	11/11/21	Lab ID:	I1-739 mb
Date Analyzed:	11/11/21	Data File:	I1-739 mb.096
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

Date of Report: 11/17/21
Date Received: 11/09/21
Project: Ben Franklin Transit 64529, F&BI 111150

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 111236-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	84	65-118
Toluene	ug/L (ppb)	50	96	72-122
Ethylbenzene	ug/L (ppb)	50	97	73-126
Xylenes	ug/L (ppb)	150	93	74-118
Gasoline	ug/L (ppb)	1,000	100	69-134

Date of Report: 11/17/21
Date Received: 11/09/21
Project: Ben Franklin Transit 64529, F&BI 111150

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	108	104	61-133	4

Date of Report: 11/17/21
Date Received: 11/09/21
Project: Ben Franklin Transit 64529, F&BI 111150

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 111150-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Lead	ug/L (ppb)	10	<1	64 vo	66 vo	75-125	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	ug/L (ppb)	10	96	80-120

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Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

111150

SAMPLE CHAIN OF CUSTODY

ME 11-9-21 VW3/AI2/EO3

Page# 1 of 1

Report To Patrick Brice
Company PBS Engineering & Environmental
Address 400 Bradley Blvd. Suite 106
City, State, ZIP Richland, WA 99352
Phone 509-375-7842 Email Patrick.Brice@PBSUSA.com

SAMPLERS (signature)

PROJECT NAME	PO #
Ben Franklin Transit	64529

REMARKS	INVOICE TO
Project specific RLs? - Yes / No	PBS

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Pb (unfiltered)				Notes
MW-14	01 A-E	11/3/21	1051	water	5	X	X	X					X				
MW-13	02		1137		5	X	X	X					X				
MW-8	03		1407		5	X	X	X					X				
MW-6	04		1316		5	X	X	X					X				
MW-5	05		1242		5	X	X	X					X				
MW-Dup	06		1200		5	X	X	X					X				
Trip Blank	~~07~~ NP		0800		5		X	X									Did not receive NP 11/9/21

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Patrick Brice	PBS	11/8/21	1600
Received by: FedEx: 7751 5261 1906				
Relinquished by:		Samples received at 4 °C		
Received by:	Nhan Phan	FeBI	11/9/21	1130