



January 10, 2019

John Greene, PMP  
Senior Environmental Planner  
King County Metro Transit  
201 South Jackson St., MS KSC-TR-0431  
Seattle, Washington 98104-3856

Via Email: [jgreene@kingcounty.gov](mailto:jgreene@kingcounty.gov)  
Cc: Lisa Gilbert; [LGilbert@parametrix.com](mailto:LGilbert@parametrix.com)

**RE: Groundwater Sampling at King County Metro South Base Facilities  
11911 E. Marginal Way S., Seattle WA 98168**

**King County Transit Contract E00426E16  
Work Order #38 – South Facilities Groundwater Resample  
PBS Project #41241.0239**

Dear Mr. Greene:

PBS Engineering and Environmental Inc. (PBS) as subconsultant to Parametrix performed well development and groundwater sampling of four wells at the South Base facility at the request of King County Metro Transit (Metro). Work was conducted in accordance with King County Transit Contract E00426E16 Work Order #38 dated December 6, 2019.

Work Order #38 provides for redevelopment of four on-site wells, and collection and analysis of groundwater samples from monitoring wells DW-3, DW-4, SB-7, and SB-8 at Metro's South Facilities, located at 11911 E Marginal Way S, Tukwila, WA 98168. The site is in Ecology's database of known or suspected contaminated sites (Facility Site ID 8422289 and Cleanup Site ID 7790).

Parametrix had previously sampled the four wells named above on September 23, 2019. At that time, field personnel noted that well DW-3 was broken at the surface, that wells DW-4 and SB-8 had petroleum odors, and that wells SB-7 and SB-8 were quickly pumped dry. Heavy oil- and diesel-range Total Petroleum Hydrocarbons (TPH) in exceedance of Model Toxics Control Act Method A cleanup levels was found to be present in the sample from well SB-8. TPH was not detected at or above laboratory reporting limits in samples from wells DW-3, DW-4, or SB-7.

#### **WELL REDEVELOPMENT – DECEMBER 6, 2019**

PBS was on site on December 6, 2019 to redevelop the on-site wells using a down-well pump and disposable bailers to remove sediment and attempt to improve water yields from the screened intervals of the wells. Water removed from the wells was disposed of in the site's oil/water disposal vault at the direction of Mr. Talon Swanson, the site manager. At wells SB-7 and SB-8, clean tap water was added via 5-gallon buckets (and subsequently removed) in order to loosen sediments within the wells.

Approximately 40 to 50 gallons of water were removed from the two 6-inch diameter wells located within the site's underground storage tank (UST) system footprint (DW-3 and DW-4). The water pumped from those wells was very turbid at the start of redevelopment but cleared up after extended pumping. No oily sheen or petroleum odor was observed during redevelopment of those wells.

Approximately 35 to 40 gallons of water were removed from the 2-inch monitoring well SB-7, near the southwestern corner of the site. The water from that well was initially very turbid, with slow recharge/pumping rates. No hydrocarbon sheen or odor was observed in the water initially removed from the well. Adding tap water and surging the well with the down-well pump and a bailer appeared to loosen and remove accumulated sediment. By the end of approximately 1.5 hours of development effort, the well was producing water much more rapidly, and the water was clear.

Approximately 25 to 30 gallons of water were introduced and then removed from well SB-8, near the northeastern corner of the site. Water initially removed via bailer from that well was moderately turbid and light orange in color, with a distinct hydrocarbon odor and oily globules floating on the surface. Water recharge/pumping rate was very poor. PBS added clean tap water 5-gallons at a time in an effort to dislodge sediments from the well screen and encourage water circulation. This water was subsequently removed via pumping. However, after approximately two hours of redevelopment effort, no significant increase in recharge/pumping rate was observed.

#### **WELL SAMPLING – DECEMBER 17, 2019**

The redeveloped wells were sampled by PBS on December 17, 2019. The wells were purged and sampled using low flow sampling methods, utilizing a peristaltic pump. The field parameters pH, specific conductance, dissolved oxygen and temperature were measured and recorded using a YSI meter in each well during purging, and samples were obtained after those parameters had stabilized (see Attachment A – Sample Field Logs).

Depth to groundwater was measured at each sampled well and ranged from 4.84 to 5.80 feet below ground surface. See Table 1 for depth to water level measurements. Purge water was disposed of in the same vault utilized during PBS' well redevelopment effort. The recharge rates were observed to be very rapid in wells DW-3, DW-4, and SB-7. No hydrocarbon odors were observed in association with water from any of these wells. The recharge rate in well SB-8 remained very slow and a minor sheen was observed on water purged from well SB-8.

Samples were collected in laboratory-supplied containers, placed in a cooler with ice, and transported to Fremont Analytical Laboratory in Seattle, Washington under chain-of-custody documentation. Samples were analyzed for Gasoline-range TPH and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) by Method NWTPH Gx/EPA 8021B, and for Diesel and Heavy Oil-range TPH by Method NWTPH-Dx.

#### **FINDINGS**

PBS observed that well SB-8 is located beneath a large and actively utilized garbage dumpster. There was some detritus and possible staining observed on the asphalt surface in the general vicinity of SB-8. PBS did not observe evidence of other potential sources of petroleum in proximity of SB-8 during the December 6 or 17, 2019 site visits (See Attachment B – Site Photographs).

PBS submitted a total of four groundwater samples for laboratory analysis. Copies of the laboratory reports and sample chain-of-custody forms are presented in Attachment C. Sampling results and applicable comparison

criteria for groundwater are summarized in Table 1. Results of groundwater analyses performed are summarized below.

- TPH in the heavy/lube oil range (TPH-HO) was detected in sample SB-8 at a concentration of 399 µg/L. That concentration is below (i.e. compliant with) the MTCA Method A cleanup level for TPH-HO (500 µg/L).
- No analytes were detected above the laboratory reporting limits in the other samples.

## CONCLUSIONS

Based on the findings of the previous and current groundwater sampling events, heavy oil-range hydrocarbons are present in groundwater at the well SB-8 location. Well SB-8 is located beneath a large and actively utilized garbage dumpster and could thus be exposed to improperly discarded fluids if the dumpster leaks. No other site uses observed near that well are likely to be the source of a heavy oil release to groundwater.

If more certainty regarding the origin of the oil detected in well SB-8 is desired, PBS would recommend a limited subsurface investigation including several push-probe borings in the vicinity of that well.

## LIMITATIONS

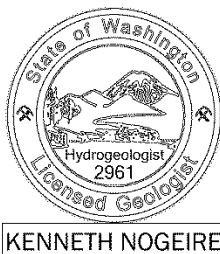
PBS has prepared this report for use by King County Metro Transit and Parametrix. This report is not intended for use by others without the written consent of those parties. Our interpretation of groundwater conditions in this study was based on field observations and analytical data from the known sampling events.

## PBS ENGINEERING AND ENVIRONMENTAL INC.

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Mike Bagley, LG  
Project Geologist

Reviewed By:



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Ken Noeire, LHG  
Senior Hydrogeologist

### Attachments:

Figures: Vicinity Map/Site Plan (courtesy of Parametrix)

Table: Groundwater Analytical Results and Water Level Data

Attachment A: Sample Field Logs

Attachment B: Site Photographs

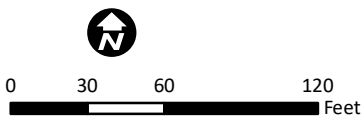
Attachment C: Laboratory Report and Chain-of-Custody Documentation

## Figures





**Parametrix**  
Source: King County



- Project Location
- ⬮ Monitoring Well Location (approx.)

**Figure 2**  
Monitoring Well Locations  
King County Metro Transit South Base Facility Annex

## Table

**TABLE 1**  
**Groundwater Analytical Results and Water Level Data**  
 KC Metro South Base Annex  
 Tukwila, Washington  
 PBS Project No. 41241.023

Sample Identification	Date	Depth to Water	TPH - Dx µg/L	TPH - Oil µg/L	TPH-Gasoline µg/L	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L
DW-3	9/23/2019	5.21	<260	<410	<100	<1	<1	<1	<1
	12/17/2019	4.84	<49.9	<99.8	<50.0	<1	<1	<1	<1
DW-4	9/23/2019	5.58	<270	<430	<100	<1	<1	<1	<1
	12/17/2019	5.15	<49.7	<99.4	<50.0	<1	<1	<1	<1
SB-7	9/23/2019	5.66	<280	<440	<100	<1	<1	<1	<1
	12/17/2019	5.23	<49.8	<99.7	<50.0	<1	<1	<1	<1
SB-8	9/23/2019	6.28	470	<b>670</b>	<400	<4	<4	<4	<4
	12/17/2019	5.80	<49.8	399	<50.0	<1	<1	<1	<1
<b>Screening Levels:</b>		<b>MTCA Method A Cleanup Levels</b>	<b>500</b>	<b>500</b>	<b>1,000</b>	<b>5</b>	<b>1,000</b>	<b>700</b>	<b>1,000</b>

Notes:

TPH - Dx = Total Petroleum Hydrocarbons in the diesel range

<## indicates analyte not detected at or above given laboratory reporting limit

µg/L - micrograms per liter

TPH - total petroleum hydrocarbons

Depth to Water measured from north side of well casing

- = not analyzed

Gasoline cleanup level is presented for the circumstance in which benzene is not detected

**bold** = analyte detected at concentrations above Screening Levels

Samples obtained on 9/23/2019 were collected by others (Parametrix Inc.)

**Attachment A**  
**Sample Field Logs**



WELL PURGING INFORMATION									
<div> <div><input type="checkbox"/></div> <div>Time elapsed</div> </div> <div> <div><input checked="" type="checkbox"/></div> <div>actual</div> </div>	DTW (feet)	Temp. ( C )	Dissolved oxygen (mg/L)	<div>Specific conductivity</div> <div> <div><input type="checkbox"/></div> <div>mS/cm</div> </div> <div> <div><input checked="" type="checkbox"/></div> <div>µS/cm</div> </div>	pH	ORP (mV)	Turbidity (NTU)	Observations	<div>Volume purged</div> <div> <div><input checked="" type="checkbox"/></div> <div>ltr</div> </div> <div> <div><input type="checkbox"/></div> <div>gal</div> </div>
<b>1038</b>	<b>4.84</b>	<b>11.4</b>	<b>90.4</b>	<b>450.5</b>	<b>6.67</b>	<b>4.9</b>	-	-	<b>0.5</b>
<b>1041</b>	<b>4.84</b>	<b>11.4</b>	<b>34.0</b>	<b>450.3</b>	<b>6.70</b>	<b>14.4</b>	-	-	<b>1.5</b>
<b>1044</b>	<b>4.84</b>	<b>11.4</b>	<b>31.3</b>	<b>448.8</b>	<b>6.71</b>	<b>25.3</b>	-	-	<b>2.6</b>
<b>1047</b>	<b>4.84</b>	<b>11.4</b>	<b>29.2</b>	<b>449.8</b>	<b>6.70</b>	<b>35.1</b>	-	-	<b>3.6</b>
Total Volume Purged									3.6

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Revised 2/23/2015


[illegible]

**FIELD OBSERVATIONS / NOTES** (such as well head condition, groundwater color, sediment load, recovery, sheen, odor, equipment)

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Signature of Field Personnel: NWD



	<b>PBS Engineering and Environmental Inc.</b>  <b>GROUNDWATER SAMPLING FORM (YSI Pro)</b>	<b>Project No:</b> 41241.023  <b>Project Name/Location:</b> KCM South Base Annex Groundwater Resample  <b>Date:</b> 12/17/19	
		<b>Monitoring Well ID</b>	<b>SB-8</b>
<b>Initial DTW (feet bgs)</b>	5.80	<b>Sample ID (if not well ID)</b>	
<b>Screen Interval (feet bgs)</b>	6-16	<b>Sample Time</b>	<b>1456</b>
<b>Well depth (feet bgs)</b>	16	<b>QC Sample type:</b> _____ <input checked="" type="checkbox"/> Not collected ID _____ Time _____	
<b>Depth of pump/tubing inlet (feet bgs)</b>	6.0		
<b>Sampling method (describe pump or sampler)</b>	Peristaltic Pump	<b>Field Personnel</b>	<b>NWD</b>
<b>Purge Rate (L/min)</b>	0.1	<b>Weather Conditions</b>	<b>Overcast, ~42° F</b>

WELL PURGING INFORMATION									
Time <input type="checkbox"/> elapsed <input checked="" type="checkbox"/> actual	DTW (feet)	Temp. ( C )	Dissolved oxygen (mg/L)	Specific conductivity <input type="checkbox"/> mS/cm <input checked="" type="checkbox"/> µS/cm	pH	ORP (mV)	Turbidity (NTU)	Observations	Volume purged <input checked="" type="checkbox"/> ltr <input type="checkbox"/> gal
1441	6.20	13.7	42.5	859	6.32	-30.6	-	see below	1.0
1444	7.85	13.7	43.0	860	6.32	-28.7	-	-	2.0
1447	7.60	13.6	45.7	849	6.35	-23.5	-	-	2.2
Total Volume Purged									3.8

<b>FIELD OBSERVATIONS / NOTES</b> (such as well head condition, groundwater color, sediment load, recovery, sheen, odor, equipment)
Very slow recharge rate color is brown/yellow, no odor, very slight visible sheen
Signature of Field Personnel: NWD

# **Attachment B**

## **Site Photographs**



Photo 1. Turbid water being pumped out of well DW-4.



Photo 2. Turbid water being pumped out of well DW-3.





Photo 3. Setting of SB-8 (well is under dumpster).



Photo 4. Groundwater sampling at SB-8. Some possible staining visible near well.

# **Attachment C**

## **Laboratory Report and Chain of Custody Documentation**



**Fremont**  
*Analytical*

3600 Fremont Ave. N.  
Seattle, WA 98103  
T: (206) 352-3790  
F: (206) 352-7178  
info@fremontanalytical.com

**PBS Engineering & Environmental**  
Mike Bagley  
214 E Galer St. Suite 300  
Seattle, WA 98102

**RE: KC Metro South Base GW Resample**  
**Work Order Number: 1912305**

December 23, 2019

**Attention Mike Bagley:**

Fremont Analytical, Inc. received 5 sample(s) on 12/17/2019 for the analyses presented in the following report.

***Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.***  
***Gasoline by NWTPH-Gx***  
***Volatile Organic Compounds by EPA Method 8260D***

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes  
Project Manager

**CC:**  
Nathan Dickey

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**CLIENT:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample  
**Work Order:** 1912305

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**Work Order Sample Summary**

<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date/Time Received</b>
1912305-001	DW-3	12/17/2019 10:48 AM	12/17/2019 2:52 PM
1912305-002	DW-4	12/17/2019 11:20 AM	12/17/2019 2:52 PM
1912305-003	SB-7	12/17/2019 10:10 AM	12/17/2019 2:52 PM
1912305-004	SB-8	12/17/2019 1:56 PM	12/17/2019 2:52 PM
1912305-005	Trip Blank	12/16/2019 8:28 AM	12/17/2019 2:52 PM

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**CLIENT:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample

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**I. SAMPLE RECEIPT:**

Samples receipt information is recorded on the attached Sample Receipt Checklist.

**II. GENERAL REPORTING COMMENTS:**

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

**III. ANALYSES AND EXCEPTIONS:**

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

**Qualifiers:**

- \* - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

**Acronyms:**

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate





## Analytical Report

Work Order: 1912305

Date Reported: 12/23/2019

**Client:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample  
**Lab ID:** 1912305-001  
**Client Sample ID:** DW-3

**Collection Date:** 12/17/2019 10:48:00 AM

**Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b><u>Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.</u></b>				Batch ID: 26870		Analyst: DW
Diesel (Fuel Oil)	ND	49.9		µg/L	1	12/19/2019 11:42:42 PM
Heavy Oil	ND	99.8		µg/L	1	12/19/2019 11:42:42 PM
Surr: 2-Fluorobiphenyl	71.6	50 - 150		%Rec	1	12/19/2019 11:42:42 PM
Surr: o-Terphenyl	75.2	50 - 150		%Rec	1	12/19/2019 11:42:42 PM
<b><u>Gasoline by NWTPH-Gx</u></b>				Batch ID: 26885		Analyst: CR
Gasoline	ND	50.0		µg/L	1	12/20/2019 7:38:05 PM
Surr: Toluene-d8	103	65 - 135		%Rec	1	12/20/2019 7:38:05 PM
Surr: 4-Bromofluorobenzene	98.8	65 - 135		%Rec	1	12/20/2019 7:38:05 PM
<b><u>Volatile Organic Compounds by EPA Method 8260D</u></b>				Batch ID: 26885		Analyst: CR
Benzene	ND	1.00		µg/L	1	12/19/2019 3:52:30 PM
Toluene	ND	1.00		µg/L	1	12/19/2019 3:52:30 PM
Ethylbenzene	ND	1.00		µg/L	1	12/19/2019 3:52:30 PM
m,p-Xylene	ND	1.00		µg/L	1	12/19/2019 3:52:30 PM
o-Xylene	ND	1.00		µg/L	1	12/19/2019 3:52:30 PM
Surr: Dibromofluoromethane	102	45.4 - 152		%Rec	1	12/19/2019 3:52:30 PM
Surr: Toluene-d8	105	40.1 - 139		%Rec	1	12/19/2019 3:52:30 PM
Surr: 1-Bromo-4-fluorobenzene	98.1	64.2 - 128		%Rec	1	12/19/2019 3:52:30 PM



**Client:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample  
**Lab ID:** 1912305-002  
**Client Sample ID:** DW-4

**Collection Date:** 12/17/2019 11:20:00 AM

**Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b><u>Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.</u></b>				Batch ID: 26870		Analyst: DW
Diesel (Fuel Oil)	ND	49.7		µg/L	1	12/20/2019 12:12:55 AM
Heavy Oil	ND	99.4		µg/L	1	12/20/2019 12:12:55 AM
Surr: 2-Fluorobiphenyl	65.2	50 - 150		%Rec	1	12/20/2019 12:12:55 AM
Surr: o-Terphenyl	65.5	50 - 150		%Rec	1	12/20/2019 12:12:55 AM
<b><u>Gasoline by NWTPH-Gx</u></b>				Batch ID: 26885		Analyst: CR
Gasoline	ND	50.0		µg/L	1	12/19/2019 4:23:12 PM
Surr: Toluene-d8	96.1	65 - 135		%Rec	1	12/19/2019 4:23:12 PM
Surr: 4-Bromofluorobenzene	98.9	65 - 135		%Rec	1	12/19/2019 4:23:12 PM
<b><u>Volatile Organic Compounds by EPA Method 8260D</u></b>				Batch ID: 26885		Analyst: CR
Benzene	ND	1.00		µg/L	1	12/19/2019 4:23:12 PM
Toluene	ND	1.00		µg/L	1	12/19/2019 4:23:12 PM
Ethylbenzene	ND	1.00		µg/L	1	12/19/2019 4:23:12 PM
m,p-Xylene	ND	1.00		µg/L	1	12/19/2019 4:23:12 PM
o-Xylene	ND	1.00		µg/L	1	12/19/2019 4:23:12 PM
Surr: Dibromofluoromethane	101	45.4 - 152		%Rec	1	12/19/2019 4:23:12 PM
Surr: Toluene-d8	97.1	40.1 - 139		%Rec	1	12/19/2019 4:23:12 PM
Surr: 1-Bromo-4-fluorobenzene	98.6	64.2 - 128		%Rec	1	12/19/2019 4:23:12 PM



## Analytical Report

Work Order: 1912305

Date Reported: 12/23/2019

**Client:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample  
**Lab ID:** 1912305-003  
**Client Sample ID:** SB-7

**Collection Date:** 12/17/2019 10:10:00 AM

**Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b><u>Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.</u></b>				Batch ID: 26870		Analyst: DW
Diesel (Fuel Oil)	ND	49.8		µg/L	1	12/20/2019 12:43:18 AM
Heavy Oil	ND	99.7		µg/L	1	12/20/2019 12:43:18 AM
Surr: 2-Fluorobiphenyl	79.9	50 - 150		%Rec	1	12/20/2019 12:43:18 AM
Surr: o-Terphenyl	81.2	50 - 150		%Rec	1	12/20/2019 12:43:18 AM
<b><u>Gasoline by NWTPH-Gx</u></b>				Batch ID: 26885		Analyst: CR
Gasoline	ND	50.0		µg/L	1	12/19/2019 4:53:53 PM
Surr: Toluene-d8	102	65 - 135		%Rec	1	12/19/2019 4:53:53 PM
Surr: 4-Bromofluorobenzene	99.7	65 - 135		%Rec	1	12/19/2019 4:53:53 PM
<b><u>Volatile Organic Compounds by EPA Method 8260D</u></b>				Batch ID: 26885		Analyst: CR
Benzene	ND	1.00		µg/L	1	12/19/2019 4:53:53 PM
Toluene	ND	1.00		µg/L	1	12/19/2019 4:53:53 PM
Ethylbenzene	ND	1.00		µg/L	1	12/19/2019 4:53:53 PM
m,p-Xylene	ND	1.00		µg/L	1	12/19/2019 4:53:53 PM
o-Xylene	ND	1.00		µg/L	1	12/19/2019 4:53:53 PM
Surr: Dibromofluoromethane	101	45.4 - 152		%Rec	1	12/19/2019 4:53:53 PM
Surr: Toluene-d8	103	40.1 - 139		%Rec	1	12/19/2019 4:53:53 PM
Surr: 1-Bromo-4-fluorobenzene	99.4	64.2 - 128		%Rec	1	12/19/2019 4:53:53 PM



## Analytical Report

Work Order: 1912305

Date Reported: 12/23/2019

**Client:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample  
**Lab ID:** 1912305-004  
**Client Sample ID:** SB-8

**Collection Date:** 12/17/2019 1:56:00 PM

**Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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**Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.**

Batch ID: 26870

Analyst: DW

Diesel (Fuel Oil)	ND	49.8		µg/L	1	12/20/2019 1:13:34 AM
Heavy Oil	399	99.7		µg/L	1	12/20/2019 1:13:34 AM
Surr: 2-Fluorobiphenyl	76.7	50 - 150		%Rec	1	12/20/2019 1:13:34 AM
Surr: o-Terphenyl	56.2	50 - 150		%Rec	1	12/20/2019 1:13:34 AM

**Gasoline by NWTPH-Gx**

Batch ID: 26885

Analyst: CR

Gasoline	ND	50.0		µg/L	1	12/19/2019 5:55:18 PM
Surr: Toluene-d8	103	65 - 135		%Rec	1	12/19/2019 5:55:18 PM
Surr: 4-Bromofluorobenzene	101	65 - 135		%Rec	1	12/19/2019 5:55:18 PM

**Volatile Organic Compounds by EPA Method 8260D**

Batch ID: 26885

Analyst: CR

Benzene	ND	1.00		µg/L	1	12/19/2019 5:55:18 PM
Toluene	ND	1.00		µg/L	1	12/19/2019 5:55:18 PM
Ethylbenzene	ND	1.00		µg/L	1	12/19/2019 5:55:18 PM
m,p-Xylene	ND	1.00		µg/L	1	12/19/2019 5:55:18 PM
o-Xylene	ND	1.00		µg/L	1	12/19/2019 5:55:18 PM
Surr: Dibromofluoromethane	101	45.4 - 152		%Rec	1	12/19/2019 5:55:18 PM
Surr: Toluene-d8	103	40.1 - 139		%Rec	1	12/19/2019 5:55:18 PM
Surr: 1-Bromo-4-fluorobenzene	101	64.2 - 128		%Rec	1	12/19/2019 5:55:18 PM

**Work Order:** 1912305  
**CLIENT:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample

## QC SUMMARY REPORT

### Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.

Sample ID: <b>MB-26870</b>		SampType: <b>MBLK</b>		Units: <b>µg/L</b>		Prep Date: <b>12/18/2019</b>			RunNo: <b>56133</b>			
Client ID: <b>MBLKW</b>		Batch ID: <b>26870</b>					Analysis Date: <b>12/19/2019</b>			SeqNo: <b>1118223</b>		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Diesel (Fuel Oil)	ND	49.9									
Heavy Oil	ND	99.8									
Surr: 2-Fluorobiphenyl	62.7		79.85		78.5	50	150				
Surr: o-Terphenyl	67.9		79.85		85.0	50	150				

Sample ID: <b>LCS-26870</b>		SampType: <b>LCS</b>			Units: <b>µg/L</b>		Prep Date: <b>12/18/2019</b>			RunNo: <b>56133</b>		
Client ID: <b>LCSW</b>		Batch ID: <b>26870</b>			Analysis Date: <b>12/19/2019</b>					SeqNo: <b>1118224</b>		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Diesel (Fuel Oil)	848	49.8	996.0	0	85.2	65	135				
Surr: 2-Fluorobiphenyl	65.0		79.68		81.6	50	150				
Surr: o-Terphenyl	63.7		79.68		80.0	50	150				

Sample ID: <b>LCSD-26870</b>		SampType: <b>LCSD</b>			Units: <b>µg/L</b>		Prep Date: <b>12/18/2019</b>			RunNo: <b>56133</b>		
Client ID: <b>LCSW02</b>		Batch ID: <b>26870</b>			Analysis Date: <b>12/19/2019</b>					SeqNo: <b>1118225</b>		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Diesel (Fuel Oil)	774	50.0	999.4	0	77.5	65	135	848.2	9.13	30	
Surr: 2-Fluorobiphenyl	61.1		79.95		76.4	50	150		0		
Surr: o-Terphenyl	60.2		79.95		75.3	50	150		0		

Sample ID: <b>1912257-038ADUP</b>		SampType: <b>DUP</b>			Units: <b>µg/L</b>		Prep Date: <b>12/18/2019</b>			RunNo: <b>56133</b>		
Client ID: <b>BATCH</b>		Batch ID: <b>26870</b>			Analysis Date: <b>12/19/2019</b>					SeqNo: <b>1118571</b>		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Diesel (Fuel Oil)	147	49.9						158.4	7.46	30	
Heavy Oil	ND	99.8						0		30	
Surr: 2-Fluorobiphenyl	66.7		79.88		83.6	50	150		0		
Surr: o-Terphenyl	70.7		79.88		88.5	50	150		0		

**Work Order:** 1912305  
**CLIENT:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample

## QC SUMMARY REPORT

### Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.

Sample ID: <b>1912257-038ADUP</b>		SampType: <b>DUP</b>			Units: <b>µg/L</b>		Prep Date: <b>12/18/2019</b>			RunNo: <b>56133</b>		
Client ID: <b>BATCH</b>		Batch ID: <b>26870</b>			Analysis Date: <b>12/19/2019</b>					SeqNo: <b>1118571</b>		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Sample ID: <b>1912284-001CDUP</b>	SampType: <b>DUP</b>	Units: <b>µg/L</b>			Prep Date: <b>12/18/2019</b>			RunNo: <b>56133</b>			
Client ID: <b>BATCH</b>	Batch ID: <b>26870</b>				Analysis Date: <b>12/19/2019</b>			SeqNo: <b>1118583</b>			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel (Fuel Oil)	ND	49.9						0		30	
Heavy Oil	ND	99.8						0		30	
Surr: 2-Fluorobiphenyl	69.1		79.87		86.5	50	150		0		
Surr: o-Terphenyl	73.9		79.87		92.6	50	150		0		



**Work Order:** 1912305  
**CLIENT:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample

## QC SUMMARY REPORT

**Gasoline by NWTPH-Gx**

Sample ID: <b>LCS-26885</b>	SampType: <b>LCS</b>	Units: <b>µg/L</b>			Prep Date: <b>12/19/2019</b>			RunNo: <b>56161</b>			
Client ID: <b>LCSW</b>	Batch ID: <b>26885</b>				Analysis Date: <b>12/19/2019</b>			SeqNo: <b>1118755</b>			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Gasoline	532	50.0	500.0	0	106	65	135				
Surr: Toluene-d8	25.3		25.00		101	65	135				
Surr: 4-Bromofluorobenzene	25.2		25.00		101	65	135				

Sample ID: <b>LCSD-26885</b>		SampType: <b>LCSD</b>			Units: <b>µg/L</b>		Prep Date: <b>12/19/2019</b>			RunNo: <b>56161</b>		
Client ID: <b>LCSW02</b>		Batch ID: <b>26885</b>			Analysis Date: <b>12/19/2019</b>					SeqNo: <b>1118756</b>		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Gasoline	482	50.0	500.0	0	96.4	65	135	531.9	9.80	20	
Surr: Toluene-d8	25.2		25.00		101	65	135		0		
Surr: 4-Bromofluorobenzene	25.5		25.00		102	65	135		0		

Sample ID: <b>MB-26885</b>		SampType: <b>MBLK</b>			Units: <b>µg/L</b>		Prep Date: <b>12/19/2019</b>			RunNo: <b>56161</b>		
Client ID: <b>MBLKW</b>		Batch ID: <b>26885</b>			Analysis Date: <b>12/19/2019</b>					SeqNo: <b>1118757</b>		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Gasoline	ND	50.0									
Surr: Toluene-d8	26.7		25.00		107	65	135				
Surr: 4-Bromofluorobenzene	26.0		25.00		104	65	135				

Sample ID: <b>1912305-003ADUP</b>		SampType: <b>DUP</b>			Units: <b>µg/L</b>		Prep Date: <b>12/19/2019</b>			RunNo: <b>56161</b>		
Client ID: <b>SB-7</b>		Batch ID: <b>26885</b>			Analysis Date: <b>12/19/2019</b>			SeqNo: <b>1118750</b>				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Gasoline	ND	50.0						0		30	
Surr: Toluene-d8	25.7		25.00		103	65	135		0		
Surr: 4-Bromofluorobenzene	25.0		25.00		99.9	65	135		0		

**Work Order:** 1912305  
**CLIENT:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample

## QC SUMMARY REPORT

### Volatile Organic Compounds by EPA Method 8260D

Sample ID: <b>LCS-26885</b>		SampType: <b>LCS</b>		Units: <b>µg/L</b>		Prep Date: <b>12/19/2019</b>			RunNo: <b>56160</b>		
Client ID: <b>LCSW</b>		Batch ID: <b>26885</b>					Analysis Date: <b>12/19/2019</b>			SeqNo: <b>1118743</b>	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	21.0	1.00	20.00	0	105	82.4	131				
Toluene	20.9	1.00	20.00	0	104	75.9	137				
Ethylbenzene	21.7	1.00	20.00	0	109	82.8	132				
m,p-Xylene	41.9	1.00	40.00	0	105	80.7	130				
o-Xylene	20.6	1.00	20.00	0	103	82	126				
Surr: Dibromofluoromethane	25.3		25.00		101	81.1	118				
Surr: Toluene-d8	25.1		25.00		100	85.7	113				
Surr: 1-Bromo-4-fluorobenzene	25.9		25.00		104	84.2	111				

Sample ID: <b>LCSD-26885</b>		SampType: <b>LCSD</b>		Units: <b>µg/L</b>		Prep Date: <b>12/19/2019</b>			RunNo: <b>56160</b>		
Client ID: <b>LCSW02</b>		Batch ID: <b>26885</b>				Analysis Date: <b>12/19/2019</b>			SeqNo: <b>1118744</b>		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	20.7	1.00	20.00	0	103	82.4	131	20.97	1.44	20	
Toluene	20.7	1.00	20.00	0	103	75.9	137	20.89	0.975	20	
Ethylbenzene	21.4	1.00	20.00	0	107	82.8	132	21.70	1.49	20	
m,p-Xylene	41.4	1.00	40.00	0	103	80.7	130	41.90	1.27	20	
o-Xylene	20.6	1.00	20.00	0	103	82	126	20.59	0.251	20	
Surr: Dibromofluoromethane	25.3		25.00		101	81.1	118		0		
Surr: Toluene-d8	25.1		25.00		101	85.7	113		0		
Surr: 1-Bromo-4-fluorobenzene	25.8		25.00		103	84.2	111		0		

Sample ID: <b>MB-26885</b>		SampType: <b>MBLK</b>		Units: <b>µg/L</b>		Prep Date: <b>12/19/2019</b>			RunNo: <b>56160</b>		
Client ID: <b>MBLKW</b>		Batch ID: <b>26885</b>					Analysis Date: <b>12/19/2019</b>			SeqNo: <b>1118745</b>	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	1.00									
Toluene	ND	1.00									
Ethylbenzene	ND	1.00									
m,p-Xylene	ND	1.00									

**Work Order:** 1912305  
**CLIENT:** PBS Engineering & Environmental  
**Project:** KC Metro South Base GW Resample

## QC SUMMARY REPORT

### Volatile Organic Compounds by EPA Method 8260D

Sample ID: <b>MB-26885</b>	SampType: <b>MBLK</b>	Units: <b>µg/L</b>	Prep Date: <b>12/19/2019</b>	RunNo: <b>56160</b>							
Client ID: <b>MBLKW</b>	Batch ID: <b>26885</b>		Analysis Date: <b>12/19/2019</b>	SeqNo: <b>1118745</b>							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

o-Xylene	ND	1.00									
Surr: Dibromofluoromethane	25.5		25.00		102	45.4	152				
Surr: Toluene-d8	26.3		25.00		105	40.1	139				
Surr: 1-Bromo-4-fluorobenzene	26.0		25.00		104	64.2	128				

Sample ID: <b>1912305-003ADUP</b>		SampType: <b>DUP</b>			Units: <b>µg/L</b>		Prep Date: <b>12/19/2019</b>			RunNo: <b>56160</b>		
Client ID: <b>SB-7</b>		Batch ID: <b>26885</b>			Analysis Date: <b>12/19/2019</b>			SeqNo: <b>1118736</b>				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Benzene	ND	1.00						0		30	
Toluene	ND	1.00						0		30	
Ethylbenzene	ND	1.00						0		30	
m,p-Xylene	ND	1.00						0		30	
o-Xylene	ND	1.00						0		30	
Surr: Dibromofluoromethane	25.4		25.00		102	45.4	152		0		
Surr: Toluene-d8	25.9		25.00		104	40.1	139		0		
Surr: 1-Bromo-4-fluorobenzene	24.9		25.00		99.6	64.2	128		0		

Client Name: **PBS**

Work Order Number: **1912305**

Logged by: **Clare Griggs**

Date Received: **12/17/2019 2:52:00 PM**

### Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? Client

### Log In

3. Coolers are present? Yes ☒ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☒ No ☐
5. Custody Seals present on shipping container/cooler?  
(Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Required ☒
6. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
7. Were all items received at a temperature of  $>0^{\circ}\text{C}$  to  $10.0^{\circ}\text{C}$  \* Yes ☒ No ☐ NA ☐
8. Sample(s) in proper container(s)? Yes ☒ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
10. Are samples properly preserved? Yes ☒ No ☐
11. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
12. Is there headspace in the VOA vials? Yes ☐ No ☒ NA ☐
13. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
14. Does paperwork match bottle labels? Yes ☒ No ☐
15. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
16. Is it clear what analyses were requested? Yes ☒ No ☐
17. Were all holding times able to be met? Yes ☒ No ☐

### Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

### Item Information

Item #	Temp $^{\circ}\text{C}$
Cooler	1.1
Sample	1.2
Temp Blank	2.4

\* Note: DoD/ELAP and TNI require items to be received at  $4^{\circ}\text{C}$  +/-  $2^{\circ}\text{C}$



3600 Fremont Ave N.  
Seattle, WA 98103  
Tel: 206-352-3790  
Fax: 206-352-7178

## Chain of Custody Record & Laboratory Services Agreement

Client: **PBS**

Address: **Seattle**

City, State, Zip:

Telephone:

Fax:

Date: **12/17** Page: **1** of **1**  
Project Name: **KC Metro South Basin Groundwater Sampling**

Laboratory Project No (Internal): **P12305**  
Special Remarks: **cc: Nathan.Dickey@phsust.com**

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Collected by: **N. Dickey**

Location: **Tukwila, WA**

Report To (PM): **Mike Basley**

PM Email: **mike.basley@phsust.com**

Sample Disposal: ☐ Return to client ☒ Disposal by lab (after 30 days)

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/8TEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T)   Dissolved (D)	Anions (C)***	EDB (8011)	Comments
1 DW-3	12/17	1048	GW	X													
2 DW-4	12/17	1120															
3 <del>SS-7</del> SS-7	12/17	1010															
4 SS-8	12/17	1856															
5																	
6																	
7																	
8																	
9																	
10																	

\*Matrix: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

\*\*Metals (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

\*\*\*Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide Iodide O-Phosphate Fluoride Nitrate+Nitrite

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished Date/Time

Received

Date/Time

Relinquished Date/Time

Received

Date/Time

Turn-around Time:  
☒ Standard  
☐ 3 Day  
☐ 2 Day  
☐ Next Day  
Same Day (specify) \_\_\_\_\_