

November 16, 2018

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Hydrogeologist  
Washington State Department of Ecology  
Eastern Regional Office  
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**Re: 2018 Soil and Grab Groundwater Data Submittal - Supplemental Remedial Investigation and Feasibility Study**

Tesoro Pasco Bulk Fuel Terminal  
2900 Sacajawea Park Road  
Pasco, Washington  
Cleanup Site ID: 4867  
Facility Site ID: 55763995

Dear Mr. Loftenius:

This data submittal has been prepared by AECOM on behalf of Tesoro Logistics Operations, LLC. for the Tesoro Pasco Bulk Fuel Terminal (Site) located in Pasco, Washington.

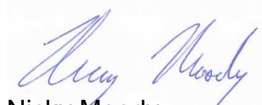
Between September 4, 2018 and October 15, 2018, in accordance with the supplemental remedial investigation and feasibility study work plan documents which are listed under the references below, AECOM and CEECON oversaw the drilling of five borings (AB-1, AB-2, AB-3, AB-5 and AB-6) and the installation of five monitoring wells (MW-15 through MW-19) and four vapor extraction wells (VE-1 through VE-4). During the drilling activities, 69 soil samples and five grab groundwater samples were collected and submitted to TestAmerica Seattle for analysis.

The revised groundwater monitoring and sampling program with the new monitoring and vapor extraction wells is provided as Table 1; a revised site map with the approximate (pre-survey) locations of the new borings and wells is provided as Figure 1; soil and grab groundwater sample analytical results are included in the attached Tables 2 and 3 with the attached laboratory reports; and draft boring logs and well construction logs are also attached. The results in Tables 2 and 3 are provided as draft; the data quality review is still in process and should be completed in early December 2018.

If you have any questions or require additional information, please contact me at (503) 478-2765.

Sincerely,

AECOM



Nicky Moody  
Project Manager

**References:**

- CEECON, 2016. *Supplemental RI/FS Work Plan*. Former Chevron Pipe Line Company Pasco Bulk Terminal, Pasco, Washington. March 31.
- CEECON, 2017. *Addendum to Supplemental Remedial Investigation Feasibility Study*. Andeavor - Tesoro Logistics (Former Chevron) Pasco Bulk Fuel Terminal, Pasco, Washington. December 10.
- CEECON, 2018a. *Proposed New Groundwater Monitoring Well/Soil Boring Locations for the Addendum to Supplemental Remedial Investigation Feasibility Study*. Andeavor – Tesoro Logistics (Former Chevron) Pasco Bulk Fuel Terminal, 2900 Sacajawea Park Road, Pasco, Washington 99301. April 11.
- CEECON, 2018b. *Proposed Additional Vapor-Extraction Wells to be included with those in the Addendum to Supplemental Remedial Investigation Feasibility Study*. Andeavor - Tesoro Logistics (Former Chevron) Pasco Bulk Fuel Terminal, Pasco, Washington. September 6.

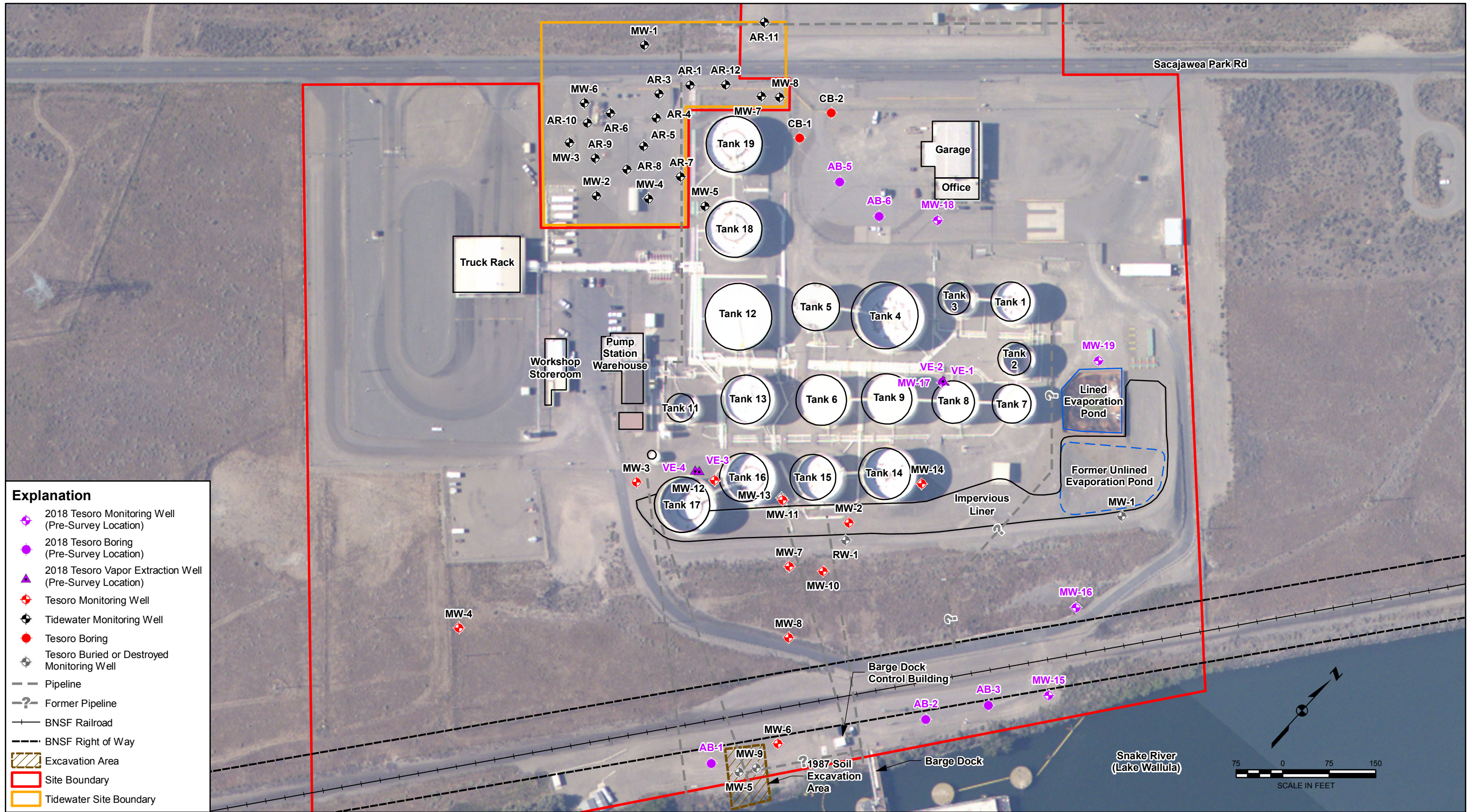
**Attachments:**

- Figure 1. 2018 Boring and Monitoring Wells
- Table 1. Groundwater Monitoring and Sampling Program Summary
- Table 2. DRAFT 2018 Soil Analytical Data
- Table 3. DRAFT 2018 Grab Groundwater Analytical Data
- DRAFT Boring/Well Logs
- Laboratory Analytical Reports and Chain of Custody Forms

**cc:**

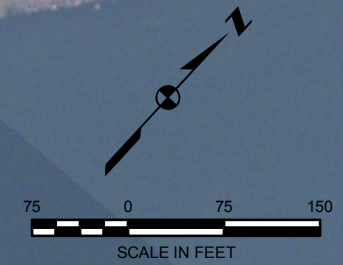
- Anastasia E. Duarte, Tesoro Refining and Marketing Company, 3450 S. 344th Way, Suite 135, Auburn, WA (electronic copy only)
- Michael Hodges, CEECON Testing, Inc., 434 North Canal Street, Suite Six, South San Francisco, CA 94080 (electronic copy only)

O:\60569792 (Tesoro Logistics Pasco-2018)\900-CAD\_GIS\20 GIS-Graphics\MXD\Fig 1 2018 Boring and Well Locations.mxd



**Explanation**

- ◆ 2018 Tesoro Monitoring Well (Pre-Survey Location)
- 2018 Tesoro Boring (Pre-Survey Location)
- ▲ 2018 Tesoro Vapor Extraction Well (Pre-Survey Location)
- ◆ Tesoro Monitoring Well
- ◆ Tidewater Monitoring Well
- Tesoro Boring
- ◆ Tesoro Buried or Destroyed Monitoring Well
- Pipeline
- ?- Former Pipeline
- BNSF Railroad
- - - BNSF Right of Way
- Excavation Area
- Site Boundary
- Tidewater Site Boundary



**2018 BORING AND WELL LOCATIONS**

TESORO LOGISTICS OPERATIONS, LLC  
TESORO PASCO BULK FUEL TERMINAL  
PASCO, WASHINGTON



60569792

**FIGURE 1**

**Table 1. Groundwater Monitoring and Sampling Program Summary**  
 Tesoro Pasco Bulk Fuel Terminal  
 Pasco, Washington

Well Type	Well ID	Well Status	Install Date	Total Boring Depth (feet bgs)	TOC Elevation (feet MSL) (1)	Well Diameter (inches)	Well Screen Interval (feet below bgs)	Screen Length (feet)	Monitoring and Sampling Program															
									Measure Depth to Groundwater (During 1st/2nd SA)	Collect Samples (During 1st SA)	Collect Samples (During 2nd SA)	TPH-g, TPH-d, & TPH-o (NWTPH-Gx and NWTPH-Dx)	VOCs: BTEX+N, EDB, & EDC (EPA 8260C)	Fuel Oxygenates		Field Parameters (pH, Cond., DO, Temp. & ORP)	Ferrous Iron & Nitrate (Field Test Kits)	Natural Attenuation			QA/QC Samples			
														DIPE, ETBE, MTBE, TBA, & TAME (EPA 8260C)	Ethanol & Methanol (EPA 8015C)			Dissolved Manganese (lab filtered) (200.7 Rev 4.4 - Metals)	Sulfate (EPA Method 300)	Alkalinity (SM 2320B)		Methane (RSK 175)		
Monitoring Wells	MW-1	Abandoned	11/1983	93.9	419.40	4	73.9 - 93.9	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	MW-2	Active	11/1983	83.3	417.28	4	63.3 - 83.3	20	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	
	MW-3	Active	11/1983	94.95	423.42	4	74.95 - 94.95	20	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
	MW-4	Active	11/1983	76.75	412.09	4	56.75 - 76.75	20	X	X	--	1st SA	1st SA	1st SA	1st SA	1st SA	--	--	--	--	--	--	--	
	MW-5	Well destroyed	1986	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-6	Active	11/17/1986	23.5	358.61	2	8.5 - 23.5	15	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--
	MW-7	Active	11/18/1986	79	411.40	2	57 - 77	20	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
	MW-8	Active	11/25/1986	56	383.91	2	29 - 54	25	X	X	--	1st SA	1st SA	1st SA	1st SA	1st SA	1st SA	1st SA	1st SA	1st SA	1st SA	1st SA	1st SA	--
	MW-9	Well destroyed	11/20/1986	26	--	2	10 - 25	15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-10	Active	1/6/1989	78.25	407.91	4	55 - 78	23	X	X	--	1st SA	1st SA	1st SA	1st SA	1st SA	--	--	--	--	--	--	--	
	MW-11	Active	1/16/1989	84.5	423.48	2	75 - 85	10	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
	MW-12	Active	1/17/1989	85	423.65	2	33 - 60 / 75 - 85	37	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	duplicate
	MW-13	Well always dry	1/17/1989	48	424.07	2	18.5 - 47.5	29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-14	Active	1/17/1989	82.5	421.97	2	82.5	36	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
	MW-15	Active	9/5/2018	23.5	TBD	2	8.5 - 23.5	15	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
	MW-16	Active	9/6/2018	30	TBD	2	20 - 30	10	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
	MW-17	Active	9/8/2018	83	TBD	2	73 - 83	10	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
	MW-18	Active	10/11/2018	87	TBD	2	72 - 87	15	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
	MW-19	Active	10/12/2018	87	TBD	2	72 - 87	15	X	X	X	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	1st/2nd SA	--	--	--	--	--	--	--	
Recovery Wells	RW-1	Abandoned	1/4/1989	105	417.29	8	64 - 98	34	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Vapor Extraction Wells	VE-1	Active	9/6/2018	25	TBD	2	15 - 25	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	VE-2	Active	9/6/2018	40	TBD	2	30 - 40	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	VE-3	Active	9/8/2018	40	TBD	2	30 - 40	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	VE-4	Active	9/9/2018	25	TBD	2	15 - 25	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

**Notes:**  
 The wells listed in red are the 2018 newly installed monitoring and vapor extraction wells  
 (1) On July 12, 2018, the wells were resurveyed by Stratton Surveying and Mapping, P.C. The horizontal datum = Washington State Plane South Zone North American Datum 1983(1991). The vertical datum = North American Vertical Datum 29.

**Acronyms:**  
 -- = Not applicable or not sampled  
 BTEX = benzene, toluene, ethylbenzene, and total xylenes  
 Cond = conductivity  
 DG = down-gradient  
 DIPE = di-isopropyl ether  
 DO = dissolved oxygen  
 EDB = ethylene dibromide (1,2 dibromoethane)  
 EDC = ethylene dichloride (1,2 dichloroethane)  
 EPA = US Environmental Protection Agency  
 ETBE = ethyl tertiary-butyl ether  
 MSL = mean sea level  
 MTBE = methyl tertiary-butyl ether  
 ORP = oxidation reduction potential  
 QA = quality assurance  
 QC = quality control  
 SA = semiannual  
 SM = Standard Methods  
 SVE = soil vapor extraction  
 TAME = tertiary-amyl methyl ether  
 TBA = tertiary-butanol  
 Temp = temperature  
 TOC = top of casing  
 TPH = total petroleum hydrocarbons  
 TPH-g = gasoline range hydrocarbons (as analyzed by Northwest Method NWTPH-Gx)  
 TPH-d = diesel range hydrocarbons (as analyzed by Northwest Method NWTPH-Dx)  
 TPH-o = motor oil range hydrocarbons (as analyzed by Northwest Method TPH-Rx without silica gel cleanup)  
 UG = up-gradient  
 VOC = volatile organic compounds

**Table 2. DRAFT 2018 Soil Analytical Data**  
 Tesoro Pasco Bulk Fuel Terminal  
 Pasco, Washington

Location	Sample ID	Sample Date	Sample Depth (ft bgs)	Total Petroleum Hydrocarbons			VOCs and Lead Scavengers							Fuel Oxygenates				
				TPH-g	TPH-d	TPH-o	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB	EDC	DIPE	ETBE	MTBE	TBA	TAME
<b>Ecology's MTCA Method A Cleanup Levels (for Soil) (1)(2)</b>				30/100	2,000	2,000	30	7,000	6,000	9,000	5,000	5	NE	NE	NE	100	NE	NE
<b>Units:</b>				mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
<b>Subsurface Soil Samples</b>																		
AB-1	AB1-180904-(6-6.5)	9/4/2018	6-6.5	3.4 U	14 U	<b>28 J</b>	11 U	20 U	16 U	22 U	42 U	5.6 U	8.1 U	23 U	14 U	8.8 U	910 U	14 U
	AB1-180904-(10-11.5)	9/4/2018	10-11.5	2.5 U	11 U	<b>19 J</b>	8.2 U	15 U	13 U	16 U	30 U	4.1 U	5.9 U	17 U	10 U	6.5 U	660 U	9.9 U
	AB1-180904-(12.5-14)	9/4/2018	12.5-14	2.7 U	15 U	<b>40 J</b>	9.0 U	16 U	14 U	18 U	33 U	4.5 U	6.5 U	18 U	11 U	7.1 U	730 U	11 U
AB-2	AB2-180905-(5-5.5)	9/5/2018	5-5.5	2.5 U	12 U	17 U	8.2 U	15 U	12 U	16 U	31 U	4.1 U	6.0 U	17 U	11 U	6.5 U	670 U	10 U
	AB2-180905-(15-16.5)	9/5/2018	15-16.5	2.7 U	14 U	20 U	8.9 U	16 U	14 U	17 U	33 U	4.4 U	6.4 U	18 U	11 U	7.0 U	720 U	11 U
AB-3	AB3-180905-(10-11.5)	9/5/2018	10-11.5	2.5 U	13 U	19 U	8.4 U	15 U	11 U	16 U	31 U	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U
	AB3-180905-(15-16.5)	9/5/2018	15-16.5	2.2 U	14 U	<b>33 J</b>	7.4 U	13 U	9.4 U	14 U	27 U	3.7 U	5.3 U	15 U	9.4 U	5.8 U	600 U	8.9 U
AB-5	AB5-181012-(5-7)	10/12/2018	5-7	2.6 U	11 U	<b>24 J</b>	8.5 U	15 U	10 U	17 U	32 U	4.2 U	6.1 U	17 U	11 U	6.7 U	690 U	10 U
	AB5-181012-(12-17)	10/12/2018	12-17	2.6 U	12 U	17 U	8.5 U	15 U	10 U	17 U	32 U	4.3 U	6.2 U	17 U	11 U	6.7 U	690 U	10 U
	AB5-181012-(21-23)	10/12/2018	21-23	2.4 U	12 U	17 U	7.9 U	14 U	9.4 U	15 U	29 U	3.9 U	5.7 U	16 U	10 U	6.2 U	640 U	9.5 U
	AB5-181012-(31-33)	10/12/2018	31-33	2.5 U	13 U	18 U	8.4 U	15 U	10 U	16 U	31 U	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U
	AB5-181012-(41-43)	10/12/2018	41-43	2.8 U	14 U	20 U	9.1 U	16 U	11 U	18 U	34 U	4.5 U	6.6 U	19 U	12 U	7.2 U	740 U	11 U
	AB5-181013-(55-57)	10/13/2018	55-57	2.7 U	13 U	29 U	8.8 UJ	16 UJ	11 UJ	17 UJ	33 UJ	4.4 UJ	6.4 UJ	18 UJ	11 UJ	6.9 UJ	710 UJ	11 UJ
	AB5-181013-(65-67)	10/13/2018	65-67	2.5 U	13 U	38 U	8.3 U	15 U	9.9 U	16 U	31 U	4.2 U	6.0 U	17 U	11 U	6.6 U	670 U	10 U
	AB5-181013-(69-71)	10/13/2018	69-71	3.0 U	16 U	<b>70</b>	9.9 U	17 U	12 U	19 U	37 U	4.9 U	7.1 U	20 U	13 U	7.8 U	800 U	12 U
AB-6	AB5-181013-(81-83)	10/13/2018	81-83	2.3 U	13 U	39 U	7.6 U	14 U	9.1 U	15 U	28 U	3.8 U	5.5 U	16 U	9.7 U	6.0 U	620 U	9.2 U
	AB6-181013-(5-7)	10/13/2018	5-7	2.7 U	13 U	36 U	9.0 U	16 U	11 U	18 U	34 U	4.5 U	6.5 U	18 U	12 U	7.1 U	730 U	11 U
	AB6-181013-(12-17)	10/13/2018	12-17	2.4 U	12 U	22 U	7.8 U	14 U	9.4 U	15 U	29 U	3.9 U	5.7 U	16 U	10 U	6.2 U	640 U	9.5 U
	AB6-181013-(23-25)	10/13/2018	23-25	2.5 U	13 U	20 U	8.4 U	15 U	10 U	16 U	31 U	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U
	AB6-181013-(35-37)	10/13/2018	35-37	2.8 U	<b>13 J</b>	<b>180</b>	9.2 U	16 U	11 U	18 U	34 U	4.6 U	6.7 U	19 U	12 U	7.3 U	750 U	11 U
	AB6-181013-(43-45)	10/13/2018	43-45	2.7 U	13 U	44 U	9.0 UJ	16 UJ	11 UJ	18 UJ	33 UJ	4.5 UJ	6.5 UJ	18 UJ	11 UJ	7.1 UJ	730 UJ	11 UJ
	AB6-181013-(47-49)	10/13/2018	47-49	3.6 U	16 U	51 U	12 U	21 U	14 U	24 U	45 U	6.0 U	8.7 U	25 U	15 U	9.5 U	980 U	15 U
	AB6-181013-(61-63)	10/13/2018	61-63	3.2 U	15 U	51 U	11 U	19 U	13 U	21 U	40 U	5.3 U	7.7 U	22 U	14 U	8.4 U	860 U	13 U
MW-15	AB6-181013-(71-73)	10/13/2018	71-73	2.6 U	13 U	38 U	8.5 U	15 U	10 U	17 U	31 U	4.2 U	6.1 U	17 U	11 U	6.7 U	690 U	10 U
	AB6-181013-(79-81)	10/13/2018	79-81	3.0 U	15 U	47 U	9.8 U	17 U	12 U	19 U	36 U	4.9 U	7.1 U	20 U	12 U	7.7 U	790 U	12 U
MW-16	AB4-180905-(5-5.5)	9/5/2018	5-5.5	2.5 U	13 U	18 U	9.9 U	18 U	12 U	19 U	37 U	5.0 U	7.2 U	20 U	13 U	7.8 U	810 U	12 U
	AB4-180905-(10-11.5)	9/5/2018	10-11.5	2.4 U	12 U	<b>18 J</b>	9.4 U	17 U	11 U	18 U	35 U	4.7 U	6.8 U	19 U	12 U	7.4 U	760 U	11 U
	AB4-180905-(23.5-24.8)	9/5/2018	23.5-24.8	2.5 U	14 U	<b>43 J</b>	9.2 U	16 U	11 U	18 U	<b>63 J</b>	<b>5.3 J</b>	6.6 U	19 U	12 U	7.2 U	740 U	11 U
MW-17	MW-16-180906-(10-11.5)	9/6/2018	10-11.5	2.5 U	12 U	18 U	8.2 U	15 U	9.8 U	16 U	30 U	4.1 U	5.9 U	17 U	10 U	6.4 U	660 U	9.9 U
	MW-16-180906-(15-16.5)	9/6/2018	15-16.5	<b>25</b>	<b>38 J</b>	<b>85</b>	8.4 U	15 U	15 U	16 U	<b>470</b>	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U
	MW-16-180906-(20-21.5)	9/6/2018	20-21.5	<b>3.4 J</b>	13 U	18 U	8.4 U	15 U	10 U	16 U	31 U	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U
MW-17	MW17-180907-(5-6.5)	9/7/2018	5-6.5	<b>2.4 J</b>	12 U	<b>34 J</b>	7.8 U	14 U	9.7 U	15 U	29 U	3.9 U	5.6 U	16 U	9.9 U	6.1 U	630 U	9.4 U
	MW17-180907-(10-11.5)	9/7/2018	10-11.5	<b>78 J</b>	13 U	<b>19 J</b>	9.5 U	17 U	11 U	19 U	35 U	4.7 U	6.8 U	19 U	12 U	7.5 U	770 U	11 U
	MW17-180907-(15-16.5)	9/7/2018	15-16.5	3.4 U	14 U	20 U	11 U	20 U	15 U	22 U	42 U	5.6 U	8.1 U	23 U	14 U	8.8 U	910 U	14 U
	MW17-180907-(20-21.5)	9/7/2018	20-21.5	<b>63 J</b>	13 U	19 U	10 U	18 U	12 U	20 U	37 U	5.0 U	7.2 U	20 U	13 U	7.9 U	810 U	12 U
	MW17-180907-(25-26.5)	9/7/2018	25-26.5	<b>4.3 J</b>	<b>33 J</b>	<b>48 J</b>	9.3 U	17 U	12 U	18 U	35 U	4.7 U	6.7 U	19 U	12 U	7.4 U	760 U	11 U
	MW17-180907-(30-31.5)	9/7/2018	30-31.5	2.8 U	13 U	18 U	9.2 U	16 U	11 U	18 U	34 U	4.6 U	6.6 U	19 U	12 U	7.2 U	740 U	11 U
	MW17-180907-(35-36.5)	9/7/2018	35-36.5	<b>5.0 J</b>	13 U	18 U	9.1 U	16 U	11 U	18 U	34 U	4.5 U	6.6 U	19 U	12 U	7.2 U	740 U	11 U
	MW17-180907-(40-41.5)	9/7/2018	40-41.5	--	13 U	18 U	--	--	--	--	--	--	--	--	--	--	--	--
	MW17-180907-(45-46.5)	9/7/2018	45-46.5	2.8 U	13 U	18 U	9.1 UJ	16 UJ	13 UJ	18 UJ	34 UJ	4.5 UJ	6.6 UJ	19 UJ	12 UJ	7.2 UJ	740 UJ	11 UJ
	MW17-180907-(50-51.5)	9/7/2018	50-51.5	2.7 U	13 U	<b>21 J</b>	9.0 U	16 U	12 U	18 U	34 U	4.5 U	6.5 U	18 U	11 U	7.1 U	730 U	11 U
	MW17-180907-(55-56.5)	9/7/2018	55-56.5	2.8 U	12 U	<b>21 J</b>	9.4 U	17 U	12 U	18 U	35 U	4.7 U	6.8 U	19 U	12 U	7.4 U	760 U	11 U
	MW17-180907-(60-61.5)	9/7/2018	60-61.5	<b>3.2 J</b>	12 U	<b>18 J</b>	9.3 U	17 U	11 U	18 U	35 U	4.7 U	6.7 U	19 U	12 U	7.4 U	760 U	11 U
	MW17-180907-(65-66.5)	9/7/2018	65-66.5	<b>28 J</b>	12 U	<b>23 J</b>	8.6 U	15 U	13 U	17 U	32 U	4.3 U	6.2 U	18 U	11 U	6.8 U	700 U	10 U
	MW17-180907-(70-71.5)	9/7/2018	70-71.5	<b>11</b>	13 U	<b>24 J</b>	8.3 U	15 U	10 U	16 U	31 U	4.2 U	6.0 U	17 U	11 U	6.6 U	680 U	10 U
	MW17-180907-(75-76.5)	9/7/2018	75-76.5	2.6 U	12 U	17 U	8.6 U	15 U	10 U	17 U	32 U	4.3 U	6.2 U	18 U	11 U	6.8 U	700 U	10 U
	MW17-180907-(80-81.5)	9/7/2018	80-81.5	<b>3.7 J</b>	13 U	<b>29 J</b>	8.0 U	14 U	12 U	16 U	30 U	4.0 U	5.8 U	16 U	10 U	6.3 U	650 U	9.7 U

**Table 2. DRAFT 2018 Soil Analytical Data**  
 Tesoro Pasco Bulk Fuel Terminal  
 Pasco, Washington

Location	Sample ID	Sample Date	Sample Depth (ft bgs)	Total Petroleum Hydrocarbons			VOCs and Lead Scavengers							Fuel Oxygenates				
				TPH-g	TPH-d	TPH-o	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB	EDC	DIPE	ETBE	MTBE	TBA	TAME
<b>Ecology's MTCA Method A Cleanup Levels (for Soil) (1)(2)</b>				<b>30/100</b>	<b>2,000</b>	<b>2,000</b>	<b>30</b>	<b>7,000</b>	<b>6,000</b>	<b>9,000</b>	<b>5,000</b>	<b>5</b>	<b>NE</b>	<b>NE</b>	<b>NE</b>	<b>100</b>	<b>NE</b>	<b>NE</b>
MW-18	MW18-181011-(5-7)	10/11/2018	5-7	2.7 U	13 U	18 U	8.8 U	16 U	11 U	17 U	33 U	4.4 U	6.4 U	18 U	11 U	6.9 U	710 U	11 U
	MW18-181011-(12-17)	10/11/2018	12-17	2.8 U	15 U	<b>28 J</b>	9.4 U	17 U	11 U	18 U	35 U	4.7 U	6.8 U	19 U	12 U	7.4 U	760 U	11 U
	MW18-181011-(17-19)	10/11/2018	17-19	2.4 U	12 U	<b>31 J</b>	7.9 U	14 U	9.4 U	15 U	29 U	3.9 U	5.7 U	16 U	10 U	6.2 U	640 U	9.5 U
	MW18-181011-(29-31)	10/11/2018	29-31	2.5 U	13 U	18 U	8.1 UJ	14 UJ	9.7 UJ	16 UJ	30 UJ	4.1 UJ	5.9 UJ	17 UJ	10 UJ	6.4 UJ	660 UJ	9.8 UJ
	MW18-181011-(43-45)	10/11/2018	43-45	3.0 U	12 U	18 U	9.9 U	18 U	12 U	19 U	37 U	5.0 U	7.2 U	20 U	13 U	7.8 U	800 U	12 U
	MW18-181011-(49-51)	10/11/2018	49-51	2.8 U	14 U	20 U	9.2 U	16 U	11 U	18 U	34 U	4.6 U	6.7 U	19 U	12 U	7.3 U	750 U	11 U
	MW18-181011-(59-61)	10/11/2018	59-61	3.7 U	15 U	<b>39 J</b>	12 U	22 U	15 U	24 U	45 U	6.1 U	8.8 U	25 U	16 U	9.6 U	990 U	15 U
	MW18-181011-(75-77)	10/11/2018	75-77	3.0 U	14 U	<b>23 J</b>	10 U	18 U	12 U	20 U	37 U	5.0 U	7.3 U	20 U	13 U	7.9 U	810 U	12 U
MW-19	MW19-181012-(5-7)	10/12/2018	5-7	2.5 U	12 U	<b>55</b>	8.3 U	15 U	9.9 U	16 U	31 U	4.1 U	6.0 U	17 U	11 U	6.5 U	670 U	10 U
	MW19-181012-(7-9)	10/12/2018	7-9	2.6 U	14 U	<b>25 J</b>	8.6 U	15 U	10 U	17 U	32 U	4.3 U	6.3 U	18 U	11 U	6.8 U	700 U	10 U
	MW19-181012-(17-22)	10/12/2018	17-22	2.7 U	12 U	<b>30 J</b>	8.9 U	16 U	11 U	17 U	33 U	4.4 U	6.4 U	18 U	11 U	7.0 U	720 U	11 U
	MW19-181012-(22-27)	10/12/2018	22-27	2.4 U	12 U	24 U	7.9 U	14 U	9.4 U	15 U	29 U	3.9 U	5.7 U	16 U	10 U	6.2 U	640 U	9.5 U
	MW19-181012-(31-33)	10/12/2018	31-33	2.5 U	13 U	37 U	8.2 U	15 U	9.8 U	16 U	30 U	4.1 U	5.9 U	17 U	10 U	6.5 U	660 U	9.9 U
	MW19-181012-(43-45)	10/12/2018	43-45	3.0 U	13 U	19 U	9.9 U	18 U	12 U	19 U	37 U	4.9 U	7.2 U	20 U	13 U	7.8 U	800 U	12 U
	MW19-181012-(47-49)	10/12/2018	47-49	3.0 U	14 U	29 U	10 U	18 U	12 U	20 U	37 U	5.0 U	7.2 U	20 U	13 U	7.9 U	810 U	12 U
	MW19-181012-(59-61)	10/12/2018	59-61	2.6 U	14 U	<b>30 J</b>	8.4 U	15 U	10 U	17 U	31 U	4.2 U	6.1 U	17 U	11 U	6.7 U	690 U	10 U
VE-3	VE3-180908-(10-11.5)	9/8/2018	10-10.5	2.7 U	13 U	<b>20 J</b>	8.8 U	16 U	11 U	17 U	33 U	4.4 U	6.4 U	18 U	11 U	7.0 U	720 U	11 U
	VE3-180908-(20-21.5)	9/8/2018	20-21.5	2.6 U	12 U	17 U	8.6 U	15 U	10 U	17 U	32 U	4.3 U	6.2 U	18 U	11 U	6.8 U	700 U	10 U
	VE3-180908-(30-31.5)	9/8/2018	30-31.5	5.7 U	13 U	18 UJ	19 U	34 U	23 U	37 U	71 U	9.5 U	14 U	39 U	24 U	15 U	1,500 U	23 U
	VE3-180908-(40-41.5)	9/8/2018	40-40.5	3.0 U	13 U	<b>19 J</b>	9.8 U	17 U	12 U	19 U	36 U	4.9 U	7.1 U	20 U	12 U	7.7 U	790 U	12 U
VE-4	VE4-180908-(5-5.5)	9/8/2018	5-5.5	2.8 U	13 U	18 U	9.4 U	17 U	11 U	18 U	35 U	4.7 U	6.8 U	19 U	12 U	7.4 U	760 U	11 U

**Notes:**

Values in **bold** were detected above the limit

     = Yellow shaded detections exceed Ecology's MTCA Method A Cleanup Level for Soil

     = Grey shaded values are limits that exceed Ecology's MTCA Method A Cleanup Level for Soil.

-- = not sampled or not submitted for this analyte

(1) Ecology's MTCA Method A Soil Cleanup Levels for Industrial Properties (Washington Administrative Code 173-340-900 Table 745-1)

(2) Ecology's TPH-g MTCA Method A Soil Cleanup Level for Industrial Properties has two levels. If benzene is present in soil, the level is 30 mg/kg; if no detectable benzene, the level is 100 mg/kg.

**Acronyms:**

DIPE = di-isopropyl ether

Ecology = Washington State Department of Ecology

EDB = 1,2-Dibromoethane

EDC = 1,2-Dichloroethane

ETBE = ethyl tertiary-butyl ether

ft bgs = feet below ground surface

J = Estimated Concentration

mg/kg = milligram per kilogram

MTBE = Methyl tertiary-butyl ether

MTCA = Model Toxics Control Act

NE = MTCA Method A screening levels have not been established.

NR = Analysis requested but not reported by laboratory.

TAME = tertiary-amyl methyl ether

TBA = tertiary-butanol or t-butyl alcohol

TPH = total petroleum hydrocarbon

TPH-g = gasoline range hydrocarbons (as analyzed by Northwest Method NWPTH-Gx)

TPH-d = diesel range hydrocarbons (as analyzed by Northwest Method NWTPH-Dx)

TPH-o = motor oil range hydrocarbons (as analyzed by Northwest Method TPH-Dx)

U = Analyte not detected above limit shown. Starting with data collected since September 2018, the limit shown is the method detection limit.

VOC = Volatile organic compounds

**Table 3. DRAFT 2018 Grab Groundwater Analytical Data**  
 Tesoro Pasco Bulk Fuel Terminal  
 Pasco, Washington

Location	Sample ID	Sample Date	Total Petroleum Hydrocarbons			VOCs and Lead Scavengers							Fuel Oxgenates							
			TPH-g	TPH-d	TPH-o	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol	
<b>Ecology's MTCA Method A Cleanup Levels (for groundwater) (2)(3)</b>			800/1,000	500	500	5	1,000	700	1,000	160	0.01	5	NE	NE	20	NE	NE	NE	NE	
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	mg/L
AB1	AB1-180904-W	9/4/2018	70 U	<b>280</b>	<b>220 J</b>	0.20 U	0.17 U	0.19 U	0.58 U	0.21 U	0.21 U	0.20 U	0.17 U	0.21 U	0.17 U	3.9 U	0.17 U	--	--	
AB2	AB2-180905-W	9/5/2018	70 U	<b>97 J</b>	<b>130 J</b>	0.20 U	0.17 U	0.19 U	0.58 U	0.21 U	0.21 U	0.20 U	0.17 U	0.21 U	0.17 U	3.9 U	0.17 U	--	--	
AB3	AB3-180905-W	9/5/2018	70 U	69 U	100 U	0.20 U	0.17 U	0.19 U	0.58 U	0.21 U	0.21 U	0.20 U	0.17 U	0.21 U	0.17 U	3.9 U	0.17 U	--	--	
AB5	AB5-181013-W	10/13/2018	100 U	<b>200</b>	<b>270 J</b>	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	--	--	
AB6	AB6-181013-W	10/13/2018	100 U	<b>72 J</b>	100 U	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	--	--	

**Notes:**

Values in **bold** were detected above the limit

     = Yellow shaded detections exceed the Ecology MTCA Cleanup Level

     = Grey shaded values are limits that exceed the Ecology MTCA Cleanup Level

-- = not sampled; not submitted for this analyte; or not gauged

(2) Ecology's MTCA Method A Cleanup Levels for Groundwater (Washington Administrative Code 173-340-900 Table 720-1)

(3) Ecology's TPH-g MTCA Method A Cleanup Levels for Groundwater has two levels. If benzene is present in groundwater, the level is 800 ug/L; if no detectable benzene in groundwater, the level is 1,000 ug/L.

**Acronyms:**

µg/L = microgram per liter

DIPE = di-isopropyl ether

Ecology = Washington State Department of Ecology

EDB = 1,2-Dibromoethane

EDC = 1,2-Dichloroethane

ETBE = ethyl tertiary-butyl ether

J = Estimated Concentration

mg/L = milligram per liter

MTBE = Methyl tertiary-butyl ether

MTCA = Model Toxics Control Act

NA = not analyzed

NE = MTCA Method A screening levels have not been established.

TAME = tertiary-amyl methyl ether

TBA = tertiary-butanol or t-butyl alcohol

TOC = top of casing

TPH = total petroleum hydrocarbon

TPH-g = gasoline range hydrocarbons (as analyzed by Northwest Method NWPTH-Gx)

TPH-d = diesel range hydrocarbons (as analyzed by Northwest Method NWTPH-Dx)

TPH-o = motor oil range hydrocarbons (as analyzed by Northwest Method TPH-Dx)

U = Analyte not detected above limit shown. Starting with data collected since September 2018, the limit shown is the method detection limit.

VOC = Volatile organic compounds

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring AB1</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>9/4/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Hollow Stem Auger</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>20.0 feet</b>
Drill Rig Type: <b>Track Mounted</b>	Drilling Contractor: <b>Environmental West</b>	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>12.5</b>	Sampling Method(s): <b>Hand Auger/Split Spoon</b>	Hammer Data: <b>140 lb hammer; 30" drop</b>
Borehole Backfill: <b>Bentonite chips</b>	Location: <b>See location figure</b>	

Elevation, feet	Depth, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	REMARKS
		Type	Number	Recovery, inches	PID, ppm				
	0						Air-knifed to 6 feet below ground surface.		
	10	S-1	6			SP	<b>SAND</b> Brown, fine to medium, moist, medium dense. No odor. [5-5-5]	Sample AB1-180904-(6-6.5)	
		S-2	18	0		SP	Grades to moist to wet. No odor. [8-12-12]	Sample AB1-180904-(10-11.5)	
		S-3				SM	<b>SILTY SAND</b> Brown, fine to medium, wet, very loose. Slight odor. [2-1-0]	Sample AB1-180904-(12.5-14)	
		S-4		0		SP	<b>SAND</b> Brown, fine to medium, trace silt, wet, loose. No odor. [1-2-3]		
	20	S-5				SP			
	30						Boring terminated at 20 feet below ground surface.		
	40								
	50								
	60								
	70								
	80								
	90								



<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring AB2</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>9/5/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Hollow Stem Auger</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>20.0 feet</b>
Drill Rig Type: <b>Track Mounted</b>	Drilling Contractor: <b>Environmental West</b>	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>14</b>	Sampling Method(s): <b>Hand Auger/Split Spoon</b>	Hammer Data: <b>140 lb hammer; 30" drop</b>
Borehole Backfill: <b>Bentonite chips</b>	Location: <b>See location figure</b>	

Elevation, feet	Depth, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	REMARKS
		Type	Number	Recovery, inches	PID, ppm				
0							Air-knifed to 5 feet below ground surface.		
	5	S-1	6	0		SP	<b>SAND</b> Brown, fine to medium, dry, loose. No odor.	Sample AB2-180904-(6-6.5)	
	10	S-2	18	0		SP	Grades to moist, medium dense. No odor. [5-8-8]		
	15	S-3	18	0		SP	Grades to trace silt, wet, very loose. No odor.	Sample AB2-180905-(15-16.5)	
20						MLS	<b>SANDY SILT</b> Brown, wet, medium dense. No odor. [6-8-9] Boring terminated at 21.5 feet below ground surface.		
30									
40									
50									
60									
70									
80									
90									

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring AB3</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>9/5/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Hollow Stem Auger</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>20.0 feet</b>
Drill Rig Type: <b>Track Mounted</b>	Drilling Contractor: <b>Environmental West</b>	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>14</b>	Sampling Method(s): <b>Hand Auger/Split Spoon</b>	Hammer Data: <b>140 lb hammer; 30" drop</b>
Borehole Backfill: <b>Bentonite chips</b>	Location: <b>See location figure</b>	

Elevation, feet	Depth, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	REMARKS
		Type	Number	Recovery, inches	PID, ppm				
0							Air-knifed to 5 feet below ground surface.		
	5	S-1	6	0		SP	<b>SAND</b> Brown, fine to medium, trace silt, trace rounded gravel, moist, loose. No odor.		
	10	S-2	18	0		SP	Grades to less silt. [5-5-6]	▼	
	15	S-3	18	0		SM	<b>SILTY SAND</b> Brown, fine to medium, wet, very loose. No odor. [1-3-3]	▼	
	20						Boring terminated at 20 feet below ground surface.		
	30								
	40								
	50								
	60								
	70								
	80								
	90								

**Project: Tesoro Pasco**  
**Project Location: Pasco, WA**  
**Project Number:**

**Log of Boring AB4/MW-15**

Sheet 1 of 1

Date(s) Drilled	9/5/2018	Logged By	Michaela McCoog	Checked By	Jeremy Haney
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type		Total Depth of Borehole	23.5 feet
Drill Rig Type	Track Mounted	Drilling Contractor	Environmental West	Approximate Surface Elevation	
Groundwater Level and Date Measured	15	Sampling Method(s)	Hand Auger/Split Spoon	Hammer Data	140 lb hammer; 30" drop
Borehole Backfill	Monitoring well	Location	See location figure		

Elevation, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	Depth, feet	Type	Number	Recovery, inches					
0							Air-knifed to 4.92 feet below ground surface.		
5		S-1	6	0		SP	<b>SAND</b> Brown, fine to medium, moist, loose. No odor.		Sample AB4-180905-(5-5.5)
10		S-2	18				Grades to medium dense. No odor.		Sample AB4-180905-(10-11.5)
15		S-3	18			SM	<b>SILTY SAND</b> Brown, fine to medium, wet, very loose. No odor.		
20		S-4	15	0		SM	<b>SILT</b> Brown, trace fine sand, wet, soft. No odor.		
25		S-5	14	0		SM-GM	<b>SANDY SILT</b> Brown, some rounded gravel, trace small rock chips, wet, very dense. No odor.		Sample AB4-180905-(23-24.8)
24.8							Boring terminated at 24.8 feet below ground surface.		
30									
40									
50									
60									
70									
80									
90									

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring AB-5</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>10/12/2018 - 10/13/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Sonic Speed Sonar 15k</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>87.0 feet</b>
Drill Rig Type:	Drilling Contractor:	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>77</b>	Sampling Method(s): <b>Sonic Sleeves</b>	Hammer Data:
Borehole Backfill: <b>Bentonite chips</b>	Location: <b>See location figure</b>	

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	REMARKS		
		Type	Number	Recovery, inches					PID, ppm	
	0						Air-knifed to 5 feet below ground surface.			
	5	☒ S-1	1.58	4.4	[Patterned Box]	SP	<b>SAND</b> Brown, fine to medium, loose, dry. Grades to poorly sorted.	Sample AB5-181012-(5-7)		
	7.5	☒ S-2	2.5	5.2						
	10			6.8						Sample AB5-181012-(12-17), AB5-181012-(12-17)-D
	17.5	☒ S-3	4	7.1						
	20			6.9						Sample AB5-181012-(21-23)
	22.5			9.3						
	24			8.3						
	26			9.1						
	27.5	☒ S-4	6	2.7						Grades to medium dense, poorly graded.
	30			3.0						Sample AB5-181012-(31-33)
	32.5			4.7						
	34			3.1						
	35.5			3.2						
	37	☒ S-5	10	3.9			Grades to slightly moist.			
	40			2.8				Sample AB5-181012-(41-43)		
	42.5			4.5						
	44			3.3						
	45.5			3.7						
	47	☒ S-6	7.5	5.2			Grades to trace silt, moist.			
	50			5.4						
	52.5			4.1						
	54			5.1						
	55.5			5.5				Sample AB5-181013-(55-57), AB5-181013-(55-57)-MS/MSD		
	57	☒ S-7	6	3.5						
	60			3.9						
	62.5			4.5						
	64			4.6				Sample AB5-181013-(65-67)		
	65.5			5.3						
	67	☒ S-8	9	4.8				Sample AB5-181013-(69-71)		
	70			5.0						
	72.5			4.0						
	74			4.5						
	75.5			4.7						
	77	☒ S-9	9	2.9		SP	<b>SAND</b> Brown to dark brown, fine to medium, trace coarse sand, medium dense, moist to wet.			
	79			2.8		SP	<b>SAND</b> Dark brown to dark gray, fine to coarse, some gravel, medium dense, wet. Slight odor.	Sample AB5-181013-(81-83)		
	81			3.4		SP	<b>SAND</b> Dark gray, fine to coarse with rounded gravel, trace rounded cobbles, medium dense, wet. Slight odor.	Sample AB5-181013-W, AB5-181013-W-D		
	83			3.2						
	85			3.2						
	87						Boring terminates at 87 feet below ground surface.			

Report: PORT\_ENV\_PID\_WELL\_LITHOLOGY; File: TESORO - PASCO, WA.GPJ; 11/16/2018 AB-5

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring AB-6</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>10/13/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Sonic Speed Sonar 15k</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>87.0 feet</b>
Drill Rig Type:	Drilling Contractor:	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>77</b>	Sampling Method(s): <b>Sonic Sleeves</b>	Hammer Data:
Borehole Backfill: <b>Bentonite chips</b>	Location: <b>See location figure</b>	

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	REMARKS	
		Type	Number	Recovery, inches					PID, ppm
	0						Air-knifed to 5 feet below ground surface.		
	5	☒ S-1	2	5.0	[Stippled Pattern]	SP	<b>SAND</b> Brown, fine to medium, poorly graded, loose, dry.  Grades to medium dense, moist.  Trace rounded gravel at 31 feet below ground surface.	Sample AB6-181013-(5-7)	
	7.5	☒ S-2	3	9.0					Sample AB6-181013-(12-17)
	17.5			7.0					Sample AB6-181013-(23-25)
	22.5	☒ S-3	6	5.2					
	24.5			5.9					
	25.5			6.1					
	26.5			6.1					
	27.5	☒ S-4	6	5.5					
	28.5			5.6					
	29.5			5.4					
	31.5			5.3					
	32.5			4.3					
	33.5			5.7					
	34.5	☒ S-5	5	3.8			Sample AB6-181013-(35-37), AB6-181013-(35-37)-D		
	35.5			5.3					
	36.5			4.1					
	37.5			5.3					
	38.5	☒ S-6	13	4.5			Sample AB6-181013-(43-45), AB6-181013-(43-45)-MS/MSD		
	39.5			5.9					
	40.5			5.1					
	41.5			3.8					
	42.5			4.9					
	43.5			4.0					
	44.5	☒ S-7	8.5	3.8			Grades to trace silt.		
	45.5			3.1					
	46.5			4.2					
	47.5			3.7					
	48.5			3.1					
	49.5	☒ S-8	8	3.6			Grades to trace to some silt.		
	50.5			5.1					
	51.5			4.7					
	52.5			4.8					
	53.5			5.1					
	54.5	☒ S-9	9.5	5.0	SP	<b>SAND</b> Dark brown, fine to medium, medium dense, wet.	Sample AB6-181013-(79-81)		
	55.5			5.1	SP	<b>SAND</b> Dark brown to dark gray, medium with some fine and some coarse, trace round gravel, medium dense, wet.	Sample AB6-181013-W		
	87					Boring terminates at 87 feet below ground surface.			

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring MW-16</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>9/6/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Hollow Stem Auger</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>30.0 feet</b>
Drill Rig Type: <b>Track Mounted</b>	Drilling Contractor: <b>Environmental West</b>	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>24</b>	Sampling Method(s): <b>Hand Auger/Split Spoon</b>	Hammer Data: <b>140 lb hammer; 30" drop</b>
Borehole Backfill: <b>Monitoring well</b>	Location: <b>See location figure</b>	

Elevation, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	Depth, feet	Type	Number	Recovery, inches					
0							Air-knifed to 5 feet below ground surface.		Post shift PID check showed PID was not working properly due to sensor misplacement. PID measurements are considered invalid.  Sample MW16-180906-(10-11.5)  Sample MW16-180906-(15-16.5), MW16-180906-(15-16.5)-D  Sample MW16-180906-(20-21.5)
5	S-1	6	0	0	SP	<b>SAND</b> Dark brown, fine to medium, moist, loose. No odor. [5-6-4]			
10	S-2	10	0	0					
15	S-3	12	0	0		Grades to medium dense. Slight gasoline/varnish-like odor. [6-4-7]			
20	S-4	12	0	0		Grades to loose. Gasoline/varnish-like odor. [3-4-6]			
25	S-5	12	0	0		Grades to trace silt, wet, medium dense. Gasoline/varnish-like odor. [6-7-6]	▼		
30	S-6	16	0	0		Grades to trace silt, trace fine rounded gravel, trace coarse sand. Slight odor. [8-9-10] Boring terminated at 30 feet below ground surface.			
40									
50									
60									
70									
80									
90									

**Project: Tesoro Pasco**  
**Project Location: Pasco, WA**  
**Project Number:**

# Log of Boring MW-17

Sheet 1 of 1

Date(s) Drilled	9/7/2018	Logged By	Michaela McCoog	Checked By	Jeremy Haney
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type		Total Depth of Borehole	83.0 feet
Drill Rig Type	Track Mounted	Drilling Contractor	Environmental West	Approximate Surface Elevation	
Groundwater Level and Date Measured	77	Sampling Method(s)	Hand Auger/Split Spoon	Hammer Data	140 lb hammer; 30" drop
Borehole Backfill	Monitoring well	Location	See location figure		

Elevation, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	Depth, feet	Type	Number	Recovery, inches					
0							Air-knifed to 5 feet below ground surface.		
		⊗	S-1	18	2.5		<b>SAND</b> Dark brown, fine to medium, moist, loose. No odor. [4-4-4]		Sample MW17-180907-(5-6.5)
10		⊗	S-2	13	0		Grades to brown, trace silt. No odor. [2-3-3]		
		⊗	S-3	18	0.3		Grades to some silt. No odor [3-4-5]		Sample MW17-180907-(15-16.5)
20		⊗	S-4	18	0.8		Grades to trace silt, medium dense. Slight sweet odor. [9-7-8]		Sample MW17-180907-(20-21.5)
		⊗	S-5	16	2.0		[4-6-9]		Sample MW17-180907-(25-26.5)
30		⊗	S-6	18	0.9		Grades to no silt. Slight sweet odor. [6-5-6]		Sample MW17-180907-(30-31.5)
		⊗	S-7	17	0.7		Grades to no odor. [6-7-8]		Sample MW17-180907-(35-36.5)
40		⊗	S-8	18	1.1		Grades to slight sweet odor. [6-9-11]		Sample MW17-180907-(40-41.5)
		⊗	S-9	18	1.1		[5-7-9]		Sample MW17-180907-(45-46.5)
50		⊗	S-10	18	1.4		Grades to no odor. [5-7-7]		Sample MW17-180907-(50-51.5)
		⊗	S-11	15	1.1		[5-8-7]		Sample MW17-180907-(55-56.5), MW17-180907-(55-56.5)-D
60		⊗	S-12	18	1.7		Grades to slight odor. [7-9-9]		Sample MW17-180907-(60-61.5)
		⊗	S-13	18	1.1		[5-9-9]		Sample MW17-180907-(65-66.5)
70		⊗	S-14	18	0.9		[7-10-12]		Sample MW17-180907-(70-71.5)
		⊗	S-15		0.4		Grades to dark brown, trace silt. [10-15-15]		Sample MW17-180907-(75-76.5)
80		⊗	S-16	8	0.6		<b>SAND</b> Dark brown, fine to coarse, some rounded gravel, wet, dense. No odor. [15-18-27]		
							Boring terminates at 83 feet below ground surface.		
90									

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring MW-18</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>10/11/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Sonic Speed Sonar 15k</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>87.0 feet</b>
Drill Rig Type:	Drilling Contractor:	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>77</b>	Sampling Method(s): <b>Sonic Sleeves</b>	Hammer Data:
Borehole Backfill: <b>Monitoring well</b>	Location: <b>See location figure</b>	

Elevation, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	Depth, feet	Type Number	Recovery, inches	PI D, ppm					
0							Air-knifed to 5.33 feet below ground surface.		
10	S-1 S-2	20 2	0.1 0.1		SP	<b>SAND</b> Brown, fine to medium, trace fine rounded gravel, poorly graded, loose, dry. Grades to trace fine to medium rounded gravel, poorly graded, moist.	Sample MW18-181011-(5-7)		
20	S-3	4	5.6 0.8 0.5 0.6 1.1		SP	<b>SAND</b> Brown, fine to medium, medium dense, moist.  Grades finer with trace silt. Grades to no silt.	Sample MW18-181011-(12-17)  Sample MW18-181011-(17-19), MW18-181011-(17-19)-D		
30	S-4	6	0.6 0.6 0.4 0.6			Grades to trace silt.	Sample MW18-181011-(29-31), MW18-181011-(29-31)-MS/MSD		
40	S-5	6	0.5 0.4 0.4 0.8 0.7			Grades to trace silt.	Sample MW18-181011-(43-45)		
50	S-6	9.5	4.8 4.9 4.1 3.2 3.0			Grades to poorly graded.	Sample MW18-181011-(49-51)		
60	S-7	8.5	4.8 5.6 4.8 3.6			Grades to some silt.  Grades to trace silt.	Sample MW18-181011-(59-61)		
70	S-8	9.6	5.1 4.1 3.5 4.6 4.0 4.9						
80	S-9	9	4.7 4.1 4.6 4.2		SP	<b>SAND</b> Brown, fine to coarse, some round gravel, trace fine rounded cobbles, wet.  Grades to wet. Grades to some coarse sand and no silt.	Sample MW18-181011-(75-77)		
90			3.7			Boring terminates at 87 feet below ground surface.			



<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring MW-19</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>10/12/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Sonic Speed Sonar 15k</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>87.0 feet</b>
Drill Rig Type:	Drilling Contractor:	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>77</b>	Sampling Method(s): <b>Sonic Sleeves</b>	Hammer Data:
Borehole Backfill: <b>Monitoring well</b>	Location: <b>See location figure</b>	

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
		Type	Number	Recovery, inches					
	0								Air-knifed to 4.83 feet below ground surface.
	5	S-1	2	1.6		SP	<b>SAND</b> Brown, fine to medium, poorly graded, loose, dry.		Sample MW19-181012-(5-7)
	7	S-2	4	0.7		Grades to trace rounded gravel.		Sample MW19-181012-(7-9)	
	10			0.2					
	12			0.2			Grades to trace silt.		
	15			0.5					
	18	S-3	3	1.0					Sample MW19-181012-(17-22)
	20			2.5					Sample MW19-181012-(22-27)
	25			2.3			Grades to trace to some silt, medium dense, moist.		
	28			3.4			Grades to no silt.		Sample MW19-181012-(31-33), MW19-181012-(31-33)-D
	30			3.5					
	32			2.9		Grades to trace silt.			
	35			2.6					
	38			3.9					
	40			3.4					
	42			3.7					
	45			4.4				Sample MW19-181012-(43-45)	
	48	S-4	10	4.8				Sample MW19-181012-(47-49)	
	50			5.6					
	52			5.3					
	55			5.1					
	58	S-5	10	4.6					
	60			3.0				Sample MW19-181012-(59-61)	
	62			3.9					
	65			3.5					
	68			3.8					
	70	S-6	10	3.8		SP	<b>SAND</b> Brown to dark brown, fine to medium, medium dense, moist. Slight petroleum odor.		
	72			8.9					
	75			21.4					
	78			16.1					
	80			26.9		SPG	<b>SAND</b> Dark gray, fine to coarse with fine to coarse rounded gravel, trace cobbles. Strong petroleum odor.		Sample MW19-181012-(75-77)
	82			691					
	85			1141		GWS	<b>GRAVEL</b> Layers of fine to coarse, trace cobbles, trace sand, wet. Strong petroleum odor.		
	87						Boring terminates at 87 feet below ground surface.		

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring VE-1</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>9/6/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Hollow Stem Auger</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>25.0 feet</b>
Drill Rig Type: <b>Track Mounted</b>	Drilling Contractor: <b>Environmental West</b>	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>Not applicable</b>	Sampling Method(s):	Hammer Data: <b>140 lb hammer; 30" drop</b>
Borehole Backfill: <b>Vapor extraction well</b>	Location: <b>See location figure</b>	

Elevation, feet	Depth, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
		Type	Number	Recovery, inches	PID, ppm					
0										
10										
20										
30										
40										
50										
60										
70										
80										
90										

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring VE-2</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>9/7/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Hollow Stem Auger</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>40.0 feet</b>
Drill Rig Type: <b>Track Mounted</b>	Drilling Contractor: <b>Environmental West</b>	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>Not applicable</b>	Sampling Method(s): <b>Hand Auger/Split Spoon</b>	Hammer Data: <b>140 lb hammer; 30" drop</b>
Borehole Backfill: <b>Vapor extraction well</b>	Location: <b>See location figure</b>	

Elevation, feet	Depth, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
		Type	Number	Recovery, inches	PID, ppm					
0								Air-knifed to 5 feet below ground surface.		
10						SP	<b>SAND</b> Brown, fine to medium.	[Well Graphic: Sand pattern]		
20								[Well Graphic: Sand pattern]		
30								[Well Graphic: Sand pattern]		
40								[Well Graphic: Sand pattern]		
50								Boring terminated at 40 feet below ground surface.		
60										
70										
80										
90										

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring VE-3</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>9/8/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Hollow Stem Auger</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>40.0 feet</b>
Drill Rig Type: <b>Track Mounted</b>	Drilling Contractor: <b>Environmental West</b>	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>Not applicable</b>	Sampling Method(s): <b>Hand Auger/Split Spoon</b>	Hammer Data: <b>140 lb hammer; 30" drop</b>
Borehole Backfill: <b>Vapor extraction well</b>	Location: <b>See location figure</b>	

Elevation, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	Depth, feet	Type	Number	Recovery, inches					
0							Air-knifed to 5 feet below ground surface.		
10	☒	S-1	14	6.3		SP	<b>SAND</b> Brown, fine to medium, dry, loose. No odor [3-5-5]	Sample VE3-180908-(10-11.5)	
20	☒	S-2	16	0.2			Grades to moist. No odor. [2-3-5]	Sample VE3-180908-(20-21.5)	
30	☒	S-3	17	0.3			Grades to medium dense. No odor. [3-7-8]	Sample VE3-180908-(30-31.5)	
40	☒	S-4	18	0			[7-8-6] Boring terminated at 40 feet below ground surface.	Sample VE3-180908-(40-41.5)	
50									
60									
70									
80									
90									

<b>Project: Tesoro Pasco</b> <b>Project Location: Pasco, WA</b> <b>Project Number:</b>	<h2 style="margin: 0;">Log of Boring VE-4</h2> <p style="margin: 0;">Sheet 1 of 1</p>
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Date(s) Drilled: <b>9/8/2018</b>	Logged By: <b>Michaela McCoog</b>	Checked By: <b>Jeremy Haney</b>
Drilling Method: <b>Hollow Stem Auger</b>	Drill Bit Size/Type:	Total Depth of Borehole: <b>25.0 feet</b>
Drill Rig Type: <b>Track Mounted</b>	Drilling Contractor: <b>Environmental West</b>	Approximate Surface Elevation:
Groundwater Level and Date Measured: <b>Not applicable</b>	Sampling Method(s): <b>Hand Auger/Split Spoon</b>	Hammer Data: <b>140 lb hammer; 30" drop</b>
Borehole Backfill: <b>Vapor extraction well</b>	Location: <b>See location figure</b>	

Elevation, feet	SAMPLES				Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	Depth, feet	Type Number	Recovery, inches	PID, ppm					
0							Air-knifed to 5 feet below ground surface.		
5	S-1	6	0.5		SP	<b>SAND</b> Brown, fine to medium, moist, loose.	Sample VE4-180908-(5-5.5)		
10									
20									
30							Boring terminated at 25 feet below ground surface.		
40									
50									
60									
70									
80									
90									