SUBSURFACE INVESTIGATION REPORT

OPLC Tacoma Junction

2660 Frank Albert Road East

Fife, Washington

Antea Group Project No. WATJUAA261
November 17, 2016

Prepared for:
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1.0 INTRODUCTION

1.1 Purpose and Scope of Work

On behalf of Olympic Pipeline Company (OPLC), Antea®Group (Antea Group) conducted a subsurface investigation at the OPLC's Tacoma Junction Facility located at 2660 Frank Albert Road East, Fife, Pierce County, Washington (hereinafter referred to as the "Site"). This subsurface investigation was performed in response to the Early Notice Letter Regarding the Release of Hazardous Substances issued by the Washington State Department of Ecology (Ecology) on December 21, 2015. The objective of the investigation was to document shallow soil and groundwater conditions around the perimeter of the Site and to delineate the extent of petroleum contamination identified during 2015 excavation activities.

The investigation scope of work included the following:

- Preparing a site-specific Health and Safety Plan (HASP);
- Holding a Task Risk Assessment (TRA) meeting with onsite subcontractors;
- Completing TRAs for the associated work;
- Placing a call to the Utility Notification Center requesting the marking of all public utilities;
- Contracting a private utility locator to identify all private utilities at the site;
- Pre-clearing the soil boring locations to a minimum of 6.5 feet below ground surface (bgs) using a vacuum truck and air-knife;
- Installing five soil borings to delineate soil and groundwater around the perimeter of the Site;
- Completing the soil borings as groundwater monitoring wells (MW-1 through MW-5);
- Collecting soil samples and submitting the samples for quantitative chemical analyses;
- Surveying the top of casing elevations of onsite monitoring wells;
- Performing groundwater sampling activities for each onsite monitoring well;
- Interpreting the data obtained; and
- Preparing this report.

1.2 Site Description

The Site is an active OPLC facility that has been operating since 1965. The Site was listed on Ecology's *Confirmed and Suspected Contaminated Sites List* on October 15, 2015. The site is approximately 0.3 acres in size and located adjacent to a Union Pacific Railroad (UPR) rail yard on the west side of Frank Albert Road East, and south of 20th

Street East in Fife, Washington. A Site Location Map is presented as Figure 1. Frank Albert Road East runs north-south between 20th Street East and North Levee Road East. The Site is located within an industrial zoned area which is occupied by warehouses, a rail yard, and undeveloped fields. The north property boundary of the Site is bound by a drainage ditch and railroad tracks. The east property boundary is located at the toe of a slope that leads up to Frank Albert Road East. Beyond the south and west borders of the Site are undeveloped fields. Site features include a control building, a storm water retention vault, and pipeline equipment. A Site Map detailing the structures is presented as Figure 2.

The surface of the Site consists of gravel with the exception of concrete secondary containment located beneath above-ground pipeline equipment. The topography of the Site is generally flat. The Site elevation is approximately 15 feet above sea level. The nearest surface water bodies are the drainage ditch running along the UPR line, a water retention pond on the east side of Frank Albert Road East, approximately 410 feet to the east-southeast of the Site, and Wapato Creek, located approximately 900 feet to the north-northeast. The Puyallup River is located approximately 1,770 feet to the south, and flows into Commencement Bay approximately 1.5 miles to the north.

1.3 Previous Investigations

1.3.1 August 2015 – Site Discovery and Independent Remedial Action

On August 3, 2015, OPLC personnel directed an excavation associated with a facility upgrade project. The project scope included the installation of a new control building, secondary containment, a storm water retention vault, the removal of an existing pressure relief sump, and the removal and replacement of an aboveground section of 8" diameter pipe. The excavation work was being conducted to replace the aboveground pipe with a new section of 8" diameter belowground pipe. While excavating the trench for the belowground pipe, OPLC personnel noted petroleum odors and soil staining in a section of the trench. Upon discovery, OPLC personnel contacted Antea Group to collect soil samples to confirm the presence or absence of petroleum hydrocarbons. On the evening of August 3, 2015, Antea Group personnel collected two soil samples and three water samples from the excavation. Laboratory analysis results indicated concentrations of total petroleum hydrocarbons as gasoline (TPH-G), benzene, ethylbenzene, and total xylenes in both soil samples above the respective Model Toxics Control Act (MTCA) Method A Cleanup Levels. Petroleum hydrocarbons were detected in one water sample in the form of TPH-G, total petroleum hydrocarbons as diesel (TPH-D), and benzene at concentrations above the respective MTCA Method A Cleanup Levels. Between August 4 and August 13, 2015, excavation work continued in order to remove contaminated soil to the maximum extent possible without compromising onsite structures. Following the over-excavation work, 12 additional soil samples were collected to document conditions at the limits of the excavation. Of these samples, 4 contained TPH-G and/or benzene at concentrations exceeding the respective MTCA Method A Cleanup Levels.

On August 17, 2015, the northeastern portion of the excavation was expanded for additional soil removal. The limit of the excavation was dictated by the presence of quarry spalls which were used as the bedding for the

drainage ditch which runs along the northern property boundary. The drainage ditch serves as an outlet for the pond located on the east side of Frank Albert Rd E and flows consistently. As the excavation limit approached the side of the drainage ditch, an increasing volume of water flowed into the excavation. Digging to the north was stopped when it appeared that water flow from the ditch would lead to sidewall instability. Two additional soil samples were collected on August 17, 2015 and contained concentrations of TPH-G and/or TPH-D in excess of the respective MTCA Method A Cleanup levels. On August 18 and 19, 2015, soil from within the foundation of the former control building was removed. The western portion of the excavation was also extended along the 8" pipe to remove any additional impacted soil. On August 19, 2015, four soil samples were collected from the western portion of the excavation and from the base of the former control building foundation. Petroleum hydrocarbons in the form of TPH-G and/or benzene were detected in each sample at concentrations in excess of the respective MTCA Method A Cleanup Levels. Upon reaching the practical limits of the excavation in each direction, the excavation was backfilled with quarry spalls and pit run, compacted and finished to grade with crushed gravel. During excavation activities a total of 302.49 tons of petroleum impacted soil was removed from the Site and transported to Roosevelt Landfill in Roosevelt, WA and Regional Disposal Intermodal in Seattle, WA for disposal. A total of 1,200 gallons of water was removed from the excavation and transported to the PRS Group in Tacoma, WA for disposal.

Additional information regarding soil excavation and sampling activities may be found in Antea Group's October 12, 2015 *Site Discovery and Independent Remedial Action Report*.

2.0 PROJECT ACTIVITIES

2.1 Drilling and Soil Sampling

The subsurface investigation included advancing a total of five Geoprobe® soil borings to maximum depths of 13 to 14 feet bgs and completing the borings as monitoring wells MW-1 through MW-5. Monitoring well locations are shown on the Site Map (Figure 2).

Cascade Drilling, Inc. (Cascade), of Woodinville, Washington completed the soil borings and subsequent well installation activities. Pre-clearance activities were conducted on June 13, 2016. Cascade cleared each location with a vacuum truck and air-knife to a minimum depth of 6.5 feet bgs. A shallow soil sample was collected at 3 feet bgs using a hand auger advanced into the undisturbed soil ahead of the pre-cleared boring in MW-4. Gravel backfill material was encountered from the ground surface to approximately 4 feet bgs in borings MW-1, MW-2, and MW-3 and water was encountered at approximately 3 feet bgs, therefore shallow soil samples were not collected for laboratory analysis. MW-5 was installed through a 6 foot length of 6 inch PVC which had been placed in the August 2015 excavation prior to backfilling and contained no soil. Drilling and well installation activities were conducted using a Geoprobe drill rig on June 13 and 14, 2016. The hand auger and Geoprobe tooling were washed with soap and water followed by a clean water rinse before each use.

Soil samples were collected from 6.5 feet bgs to the maximum depth explored using a new acetate liner for each sample to characterize subsurface lithology. Antea Group personnel observed and logged the borings using the Unified Soil Classification System. After collection, each soil sample was field screened for the presence of volatile organic compounds with a photoionization detector (PID) to aid in the facilitation of selecting representative soil samples for chemical analysis. One composite soil sample and one water sample were collected and submitted to ALS Environmental (ALS) in Everett, Washington for quantitative chemical analyses in accordance with chain-of-custody documentation for waste disposal profiling. One soil sample was collected from monitoring well MW-4 at 3 feet bgs and submitted to Test America, Inc. (Test America) of Tacoma, Washington and analyzed for the presence of benzene, toluene, ethylbenzene, xylenes (BTEX), TPH-G, TPH-D, and total petroleum hydrocarbons as oil (TPH-O).

The field procedures used during the investigation are provided in Appendix A. Boring logs describing soil horizons, sample recovery, PID screening values, and well completion details are presented in Appendix B.

2.2 Monitoring Well Completion

The monitoring wells were constructed of 2-inch diameter Schedule 40 PVC prepacked casings with 10 feet of 0.010 inch slotted screen. Each monitoring well was completed to 13 feet bgs. The borings for MW-1 and MW-2 were installed to 14 feet. In order to install these two wells to 13 feet bgs, the Geoprobe® was withdrawn one foot to allow the native soil to close the bottom one foot of the borings. Wells MW-3, MW-4, and MW-5 were set at 13 feet bgs, the terminal depth of the borings. Since prepacked wells were installed, the annular space from 6.5 to 13 feet bgs was filled entirely by the outer stainless steel mesh screen which surrounds the well casing. Sand was used to fill the air-knife clearance from 2 to 6.5 feet bgs, followed by a 1 foot seal of hydrated bentonite chips and 1 foot of concrete. The monitoring wells were completed to ground surface using flush-mounted well monuments.

2.3 Well Development

The newly installed monitoring wells were developed on June 14, 2016, utilizing a down well pump to extract a minimum of ten casing volumes or a volume at which the groundwater became translucent or transparent. Development water was placed in a labeled 55 gallon drum onsite in preparation for removal. A slow groundwater recharge rate was observed in monitoring wells MW-2, MW-3, and MW-4. Wells MW-1 and MW-5 were installed in previously excavated areas and therefore provided a faster recharge rate.

2.4 Groundwater Sampling

On June 29, 2016, Antea Group conducted a groundwater monitoring and sampling event. Groundwater samples were collected from all onsite monitoring wells (MW-1 through MW-5) utilizing the low flow sampling method. The low flow sampling method includes a peristaltic pump, dedicated silicon and polyethylene tubing. The silicon tubing is used for the section around the rotor head of the peristaltic pump while the dedicated polyethylene tubing is used in the monitoring well. Each well is then purged at a slow speed until the field parameters stabilize.

The field parameters are recorded at 3 to 5 minute intervals until stabilization is observed. Field parameters include turbidity, temperature, specific conductivity, pH, oxidation reduction potential (ORP), and dissolved oxygen (DO). After stabilization of the field parameters, groundwater samples are collected directly from the polyethylene tubing into the appropriate laboratory supplied containers and place in a cooler with ice. Five groundwater samples were submitted to Test America for quantitative hydrocarbon analyses in accordance with chain-of-custody documentation.

During the June 29, 2016 groundwater sampling event, the depth to groundwater at the Site ranged from 1.49 to 2.49 feet bgs. Groundwater gradient was calculated to flow to the west and southeast with gradients of approximately 0.035 and 0.025 feet per linear foot, respectively.

2.5 Investigation-Derived Waste

Investigation-derived waste in the form of soil cuttings and decontamination/development water generated from the subsurface investigation were temporarily stored onsite in 55-gallon drums. The drums were securely sealed and stored on the OPLC property. On June 29, 2016, Cascade removed the 2 drums of purge and decontamination water from the Site and transported them to Stericycle of Tacoma, Washington (Stericycle) who then coordinated the transportation, treatment, and disposal of the waste water. On July 13, 2016, Cascade removed 2 drums of soil cuttings from the Site and transported them to Stericycle who coordinated the transportation, treatment, and disposal of the soil cuttings. The waste disposal documentation is presented as Appendix C.

2.6 Surveying

The location and elevation of the top of casing for each well was surveyed on June 14, 2016. MW-1 was arbitrarily assigned an elevation of 100.00 feet above mean sea level. The top of casing elevation of all other wells was then surveyed relative to MW-1. Elevations were surveyed to the nearest 0.01 foot.

3.0 PROJECT RESULTS

3.1 Regional Hydrogeologic Conditions

The topography of the Site is generally flat, is located at approximately 15 feet above mean sea level, and the surrounding topography slopes to the south and the east. The Site is located in an area consisting predominately of Quaternary Alluvium. The alluvium was transported and deposited by the Puyallup River. Alluvium consists mostly of unconsolidated clay, silt, sand and gravel valley fill. The alluvium ranges from loose to medium density and may contain interbeds of marsh, peat, artificial fill, and glacial deposits (Washington State Department of Natural Resources Geological Map of Washington by J. Eric Schuster, 2005).

3.2 Subsurface Lithologic Conditions

Based on Antea Group's field observations, the Site soils generally consist of clay, silty sand and sandy silt. These observations are consistent with the geological classification of the area. Boring logs detailing the observed soils are included as Appendix B.

3.3 Quantitative Soil Analyses

Test America analyzed the soil sample collected from MW-4 for the presence of the following constituents:

- TPH-G by Northwest Method NWTPH-Gx:
- TPH-D and TPH-O by Northwest Method NWTPH-Dx;
- BTEX by Environmental Protection Agency (EPA) Method 8260C.

Quantitative laboratory analyses did not indicate concentrations of petroleum hydrocarbons in excess of MTCA Method A Cleanup Levels or laboratory MRLs in the soil sample. It should be noted that the laboratory indicated the soil sample was prepped or analyzed beyond the specified holding time. The results of the soil analyses are summarized in Table 1 and on the Soil Analytical Data Map presented as Figure 3. The laboratory analytical reports are included in Appendix D.

3.4 Quantitative Groundwater Analyses

Test America analyzed the groundwater samples for the presence of the following constituents:

- TPH-G by Northwest Method NWTPH-Gx;
- TPH-D and TPH-O by Northwest Method NWTPH-Dx;
- BTEX by EPA Method 8260C; and
- Total Lead by EPA Method 6020A.

Quantitative laboratory analyses did not indicate concentrations of petroleum hydrocarbons in excess of MTCA Method A Cleanup Levels in the groundwater samples collected from wells MW-1 and MW-3 through MW-5. Concentrations of TPH-G, TPH-D, and benzene exceeded the respective MTCA Method A Cleanup Levels in well MW-2. Concentrations of TPH-G, TPH-D, and benzene in well MW-2 were detected at 2,300 micrograms per liter (µg/L), 810 µg/L, and 100 µg/L, respectively. A groundwater elevation contour map is presented as Figure 4. The results of the groundwater analyses are summarized in Table 2 and the Groundwater Analytical Data Map is presented as Figure 5. The groundwater laboratory analytical report is included in Appendix E.

4.0 SUMMARY

Antea Group contracted Cascade to complete the installation of five groundwater monitoring wells at OPLC's Tacoma Junction Facility. On June 13, 2016, Cascade utilized a vacuum truck and air knife to pre-clear five soil boring locations to a depth of 6.5 feet bgs. During pre-clearance, a hand auger was advanced into undisturbed soil ahead of the air knife to collect a soil sample from MW-4 for quantitative chemical analyses. Due to the presence of fill and the shallow nature of groundwater, soil samples for quantitative chemical analyses were not collected from MW-1 through MW-3, and MW-5. On June 13 and 14, 2016, a Geoprobe drill rig was used to advance each boring to its terminal depth of 13 to 14 feet bgs. Soil samples for lithologic characterization were collected continuously from 6.5 feet bgs to the terminal depth of each boring during drilling using new, single use acetate liners. The soil borings were subsequently completed as groundwater monitoring wells MW-1 through MW-5. On June 14, 2016, monitoring wells MW-1 through MW-5 were developed. One soil sample was collected during the investigation and submitted to Test America for quantitative chemical analyses.

Laboratory analytical results did not indicate concentrations of petroleum hydrocarbons in excess of MTCA Method A Cleanup Levels in the one soil sample collected from boring MW-4. It should be noted that the laboratory indicated the soil sample was prepped or analyzed beyond the specified holding time. On June 29, 2016, groundwater samples were collected from monitoring wells MW-1 through MW-5. Laboratory analytical results for groundwater indicated e presence of TPH-G, TPH-D, and benzene in MW-2 exceeding the respective MTCA Method A Cleanup Levels at concentrations of 2,300 µg/L, 810 µg/L, and 100 µg/L, respectively. Samples collected from monitoring wells MW-1, MW-3, MW-4, and MW-5 did not contain concentrations of petroleum hydrocarbons in excess of MTCA Method A Cleanup Levels.

5.0 REFERENCES

Geologic Map of Washington State, Washington State Department of Natural Resources, 2005
Site Discovery and Independent Remedial Action Report, Antea Group, October 12, 2015

6.0 REMARKS

The recommendations contained in this report represent Antea USA, Inc.'s professional opinions based upon the currently available information and are arrived at in accordance with currently accepted professional standards. This report is based upon a specific scope of work requested by the client. The contract between Antea USA, Inc. and its client outlines the scope of work, and only those tasks specifically authorized by that contract or outlined in this report were performed. This report is intended only for the use of Antea USA, Inc.'s client and anyone else specifically identified in writing by Antea USA, Inc. as a user of this report. Antea USA, Inc. will not and cannot be liable for unauthorized reliance by any other third party. Other than as contained in this paragraph, Antea USA, Inc. makes no express or implied warranty as to the contents of this report.

Eric Sanchez
Project Professional

Date: November 17, 2016

Reviewed by:

Megan Richard, LG
Project Manager

Date: November 17, 2016

Matthew Miller, LG
Senior Project Manager

Date: November 17, 2016

cc: Ms. Kirsten Alvarez, Washington State Department of Ecology, Southwest Regional Office
File, Antea Group

Tables

Table 1
Soil Analytical Data
OPLC Tacoma Junction
2660 Frank Albert Road E
Fife, WA

		CONSTITUENT	B	T	E	X	TPH-G	TPH-D	TPH-O
		UNIT	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
MTCA METHOD A CLEANUP LEVELS			0.03	7	6	9	30/100*	2000	2000
Sample ID	Date	Depth (Feet BGS)							
MW-4-3	6/13/2016	3	< 0.014H	< 0.035H	< 0.035H	< 0.17H	3.5	< 26	< 52

Notes:
B = Benzene
T = Toluene
E = Ethyl benzene
X = Xylenes, Total
BTEX constituents analyzed by EPA Method 8260C
TPH-G = Total petroleum hydrocarbons as gasoline by Northwest Method NWTPH-Gx
TPH-D = Total petroleum hydrocarbons as diesel by Northwest Method NWTPH-Dx
TPH-O = Total petroleum hydrocarbons as oil by Northwest Method NWTPH-Dx
30/100* = 100 mg/kg if no detectable levels of Benzene in the sample - otherwise 30 mg/kg
<1.0 = Concentrations were not detected above the laboratory method reporting limit
mg/Kg = milligrams per kilogram
Feet BGS = Feet below ground surface
MTCA = Model Toxics Control Act
Results in **bold** indicate concentrations in excess of MTCA Method A Cleanup Levels
H = Sample was prepped or analyzed beyond the specified holding time

TABLE 2
Groundwater Gauging Data
OPLC Tacoma Junction
2660 Frank Albert Road E
Fife, WA

Well I.D.	Date	GROUNDWATER ELEVATION DATA					
		TOC Elevation (ft)	Water Level Depth (ft)	LNAPL Depth (ft)	LNAPL Thickness (ft)	Water Level Elevation* (ft)	Qualifiers
MW-1	6/29/2016	100.00	1.82	NP	--	98.18	--
MW-2	6/29/2016	99.59	2.49	NP	--	97.10	--
MW-3	6/29/2016	99.91	1.98	NP	--	97.93	--
MW-4	6/29/2016	99.70	2.20	NP	--	97.50	--
MW-5	6/29/2016	99.60	1.49	NP	--	98.11	--

Notes:
TOC - Top of Casing
ft - feet
NP - No Product
LNAPL - Light Non-Aqueous Phase Liquid
* - Corrected for LNAPL if present (assumes LNAPL specific gravity = 0.75)
-- No Information Available

Table 3
Groundwater Analytical Data
Tacoma Junction
2660 Frank Albert Road E
Fife, WA

CONSTITUENT UNIT		B ug/L	T ug/L	E ug/L	X ug/L	TPH-G ug/L	TPH-D ug/L	TPH-O ug/L	Lead ug/L
MTCA METHOD A CLEANUP LEVELS		5	1000	700	1000	*1000/800	500	500	15
Well ID	Date								
MW-1	6/29/2016	< 20	< 20	< 30	< 30	< 50	160	< 250	10
MW-2	6/29/2016	**100**	6.9	56	92	**2300**	**810**	< 250	< 2.0
MW-3	6/29/2016	< 2.0	< 2.0	< 3.0	< 3.0	< 50	< 110	< 250	< 2.0
MW-4	6/29/2016	< 2.0	< 2.0	< 3.0	< 3.0	< 50	110	< 250	< 2.0
MW-5	6/29/2016	< 2.0	< 2.0	< 3.0	< 3.0	300	230	< 250	< 2.0

Notes:
B = Benzene
T = Toluene
E = Ethyl benzene
X = Xylenes, Total
BTEX constituents analyzed by EPA Method 8260C
TPH-G = Total petroleum hydrocarbons as gasoline by Northwest Method NWTPH-Gx
TPH-D = Total petroleum hydrocarbons as diesel by Northwest Method NWTPH-Dx
TPH-O = Total petroleum hydrocarbons as oil by Northwest Method NWTPH-Dx
Lead = Total Lead by EPA Method 6020A
*1,000/800 ug/L if no detectable levels of Benzene in the sample - otherwise 800 ug/L
<1.0 = Concentrations were not detected above the laboratory method reporting limit.
ug/L = Micrograms per liter
MTCA = Model Toxics Control Act
Results in **bold** indicate concentrations in excess of MTCA Method A Cleanup Levels

Figures

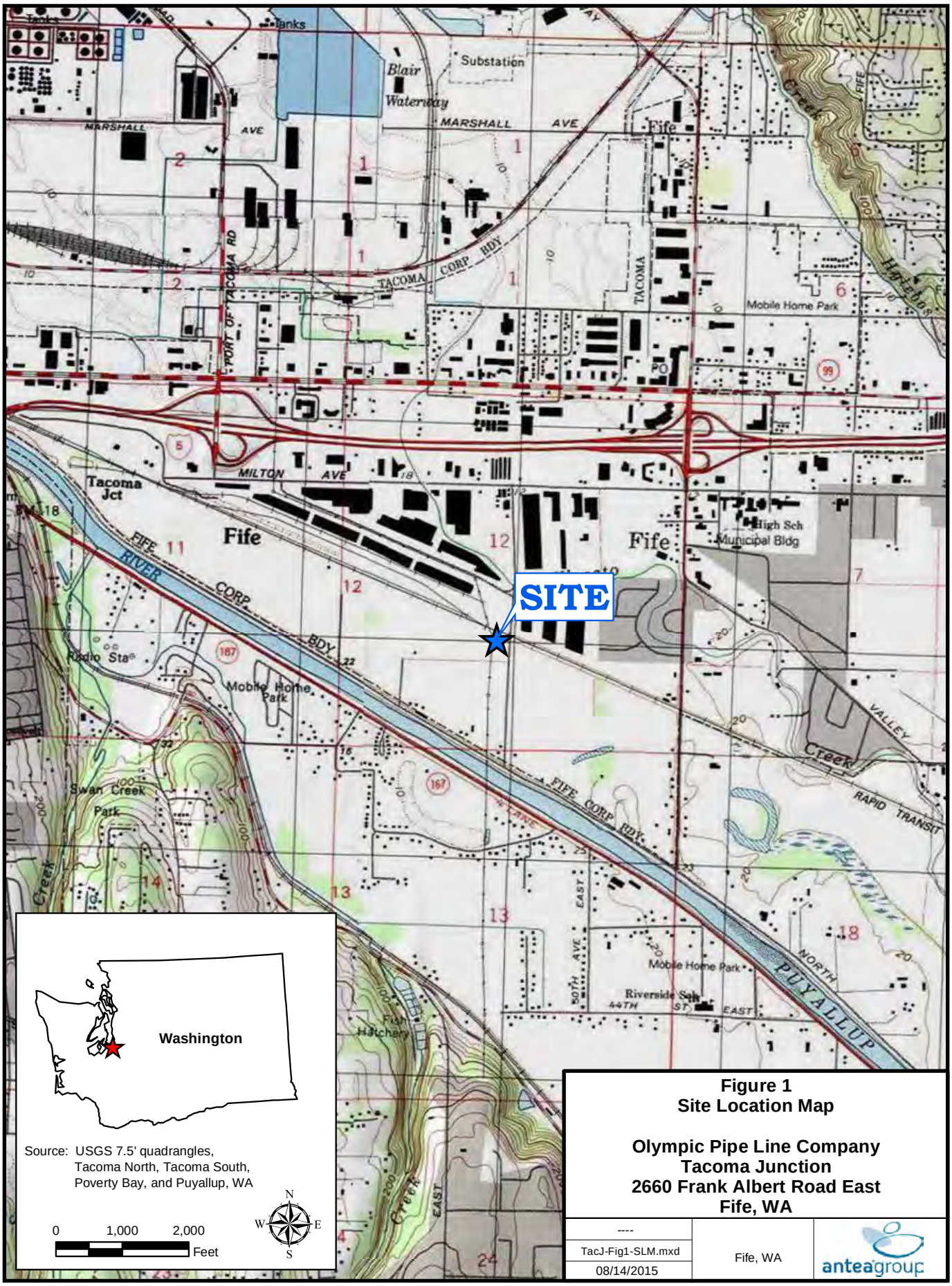


Figure 1
Site Location Map

Olympic Pipe Line Company
Tacoma Junction
2660 Frank Albert Road East
Fife, WA

----	Fife, WA	anteagroup
TacJ-Fig1-SLM.mxd		
08/14/2015		

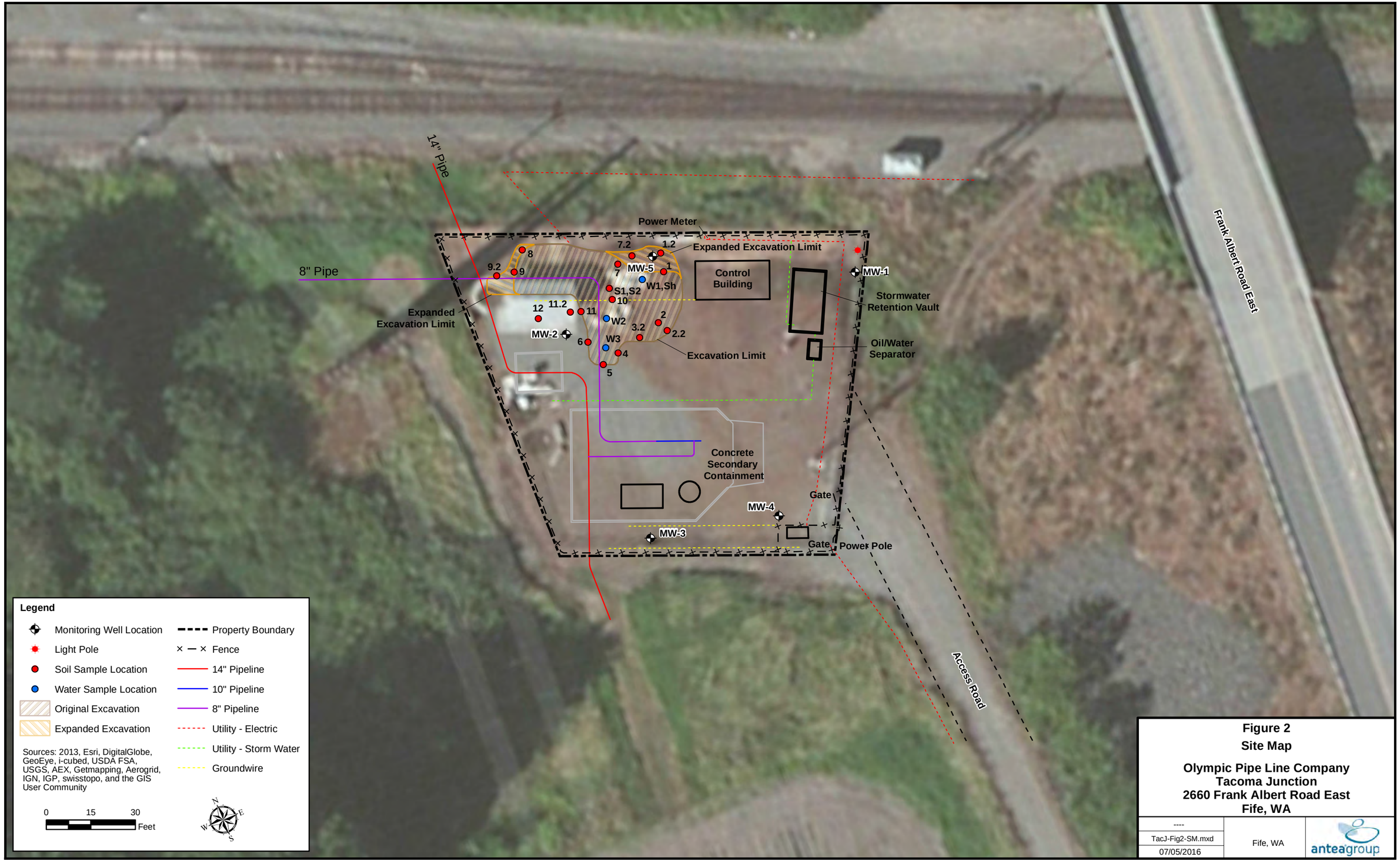
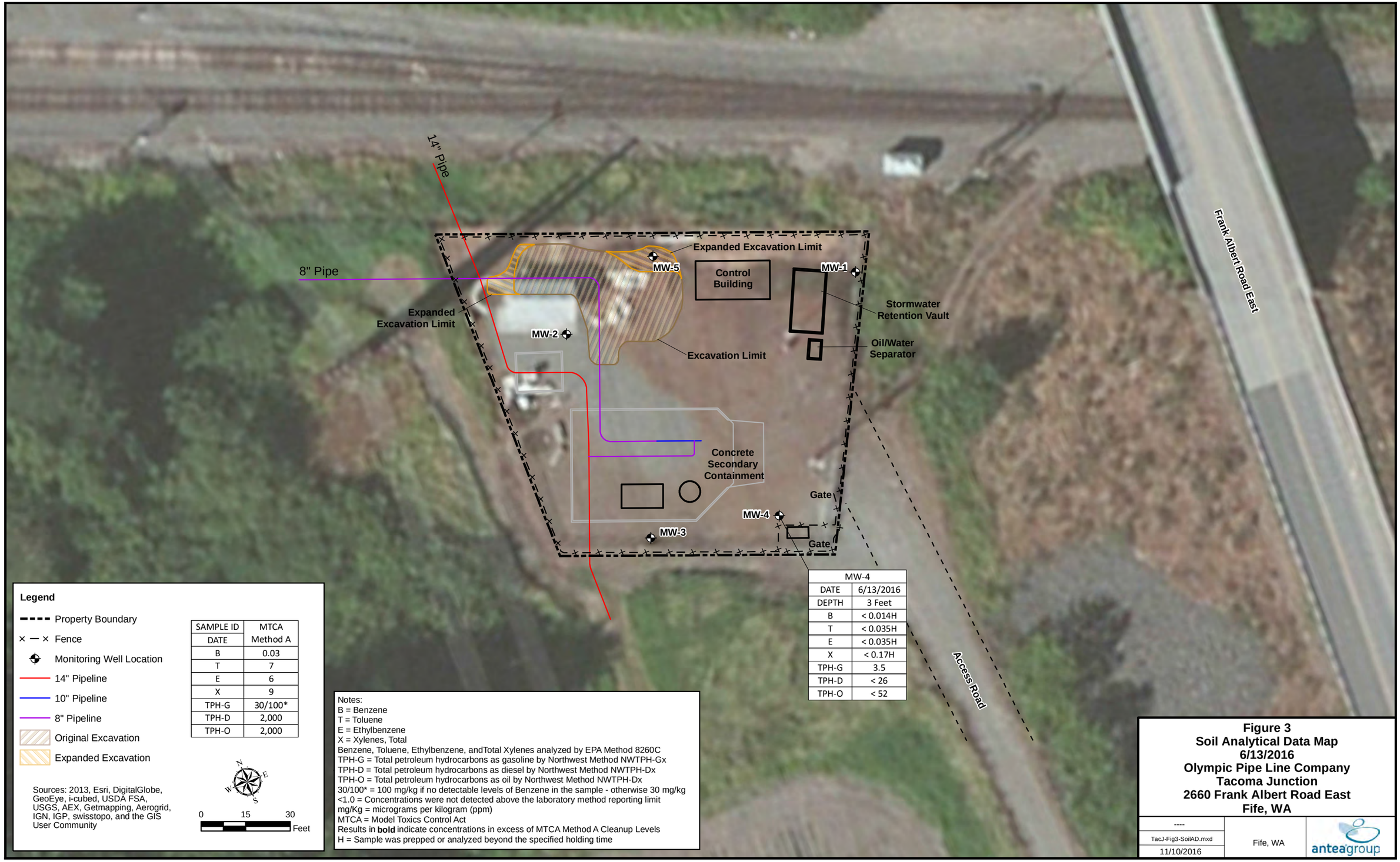


Figure 2
Site Map

Olympic Pipe Line Company
Tacoma Junction
2660 Frank Albert Road East
Fife, WA

----	Fife, WA	anteagroup
TacJ-Fig2-SM.mxd		
07/05/2016		



MW-4	
DATE	6/13/2016
DEPTH	3 Feet
B	< 0.014H
T	< 0.035H
E	< 0.035H
X	< 0.17H
TPH-G	3.5
TPH-D	< 26
TPH-O	< 52

Legend

- Property Boundary
- Fence
- Monitoring Well Location
- 14" Pipeline
- 10" Pipeline
- 8" Pipeline
- Original Excavation
- Expanded Excavation

SAMPLE ID	MTCA
DATE	Method A
B	0.03
T	7
E	6
X	9
TPH-G	30/100*
TPH-D	2,000
TPH-O	2,000

Sources: 2013, Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

N E S W

0 15 30 Feet

Notes:
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes, Total
Benzene, Toluene, Ethylbenzene, andTotal Xylenes analyzed by EPA Method 8260C
TPH-G = Total petroleum hydrocarbons as gasoline by Northwest Method NWTPH-Gx
TPH-D = Total petroleum hydrocarbons as diesel by Northwest Method NWTPH-Dx
TPH-O = Total petroleum hydrocarbons as oil by Northwest Method NWTPH-Dx
30/100* = 100 mg/kg if no detectable levels of Benzene in the sample - otherwise 30 mg/kg
<1.0 = Concentrations were not detected above the laboratory method reporting limit
mg/Kg = micrograms per kilogram (ppm)
MTCA = Model Toxics Control Act
Results in **bold** indicate concentrations in excess of MTCA Method A Cleanup Levels
H = Sample was prepped or analyzed beyond the specified holding time

Figure 3
Soil Analytical Data Map
6/13/2016
Olympic Pipe Line Company
Tacoma Junction
2660 Frank Albert Road East
Fife, WA

----	Fife, WA	anteagroup
TacJ-Fig3-SoilAD.mxd		
11/10/2016		

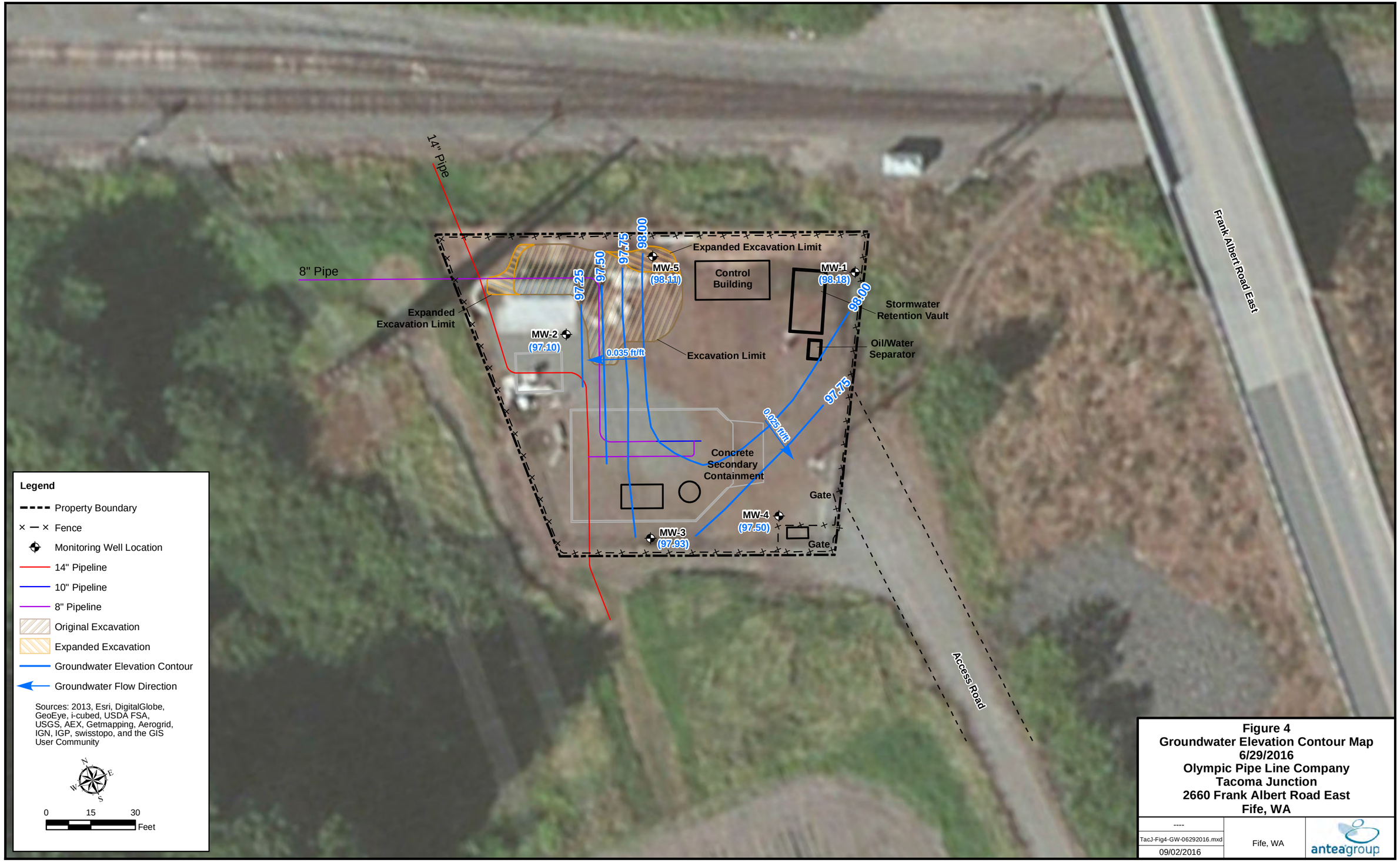
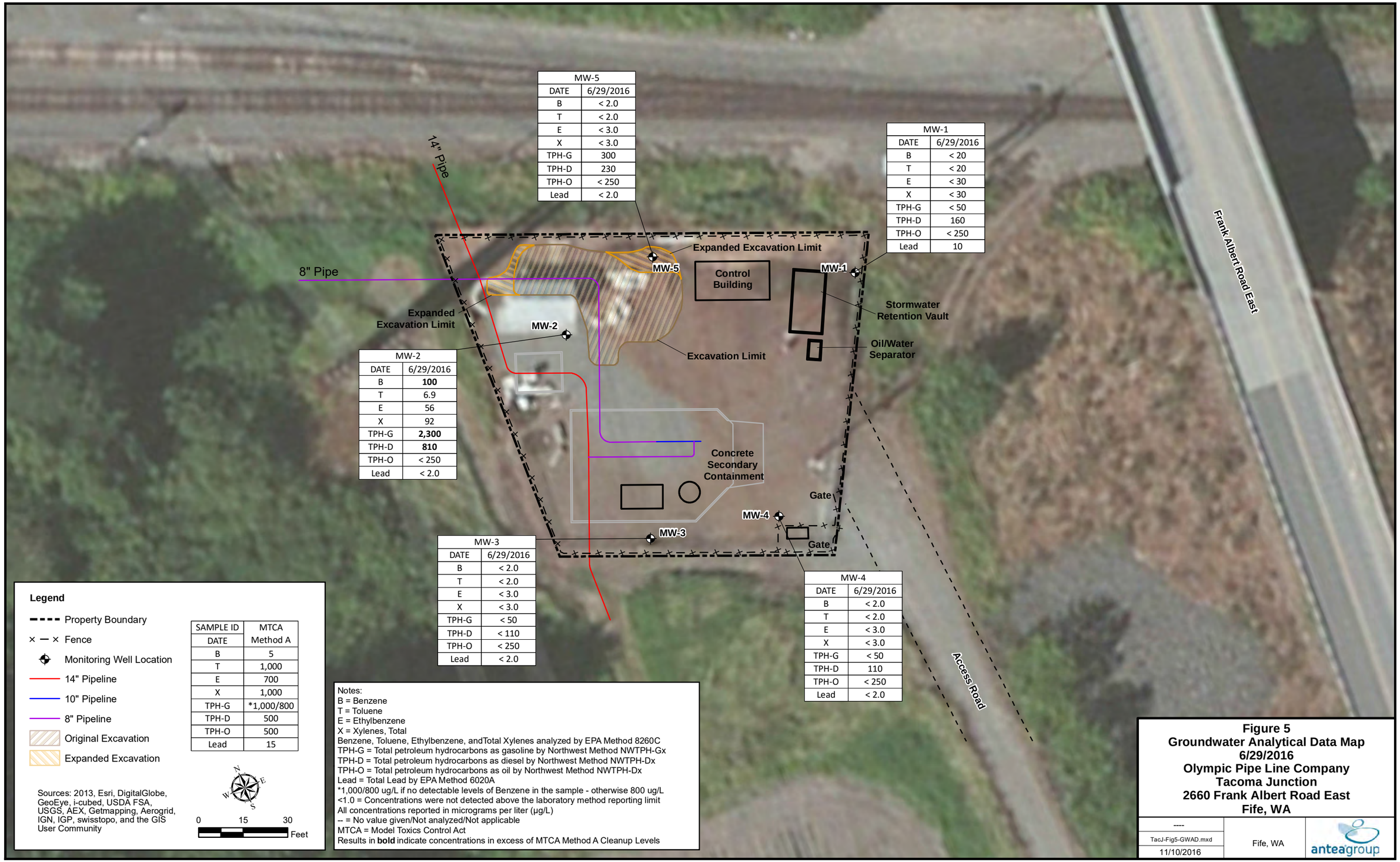


Figure 4
Groundwater Elevation Contour Map
6/29/2016
Olympic Pipe Line Company
Tacoma Junction
2660 Frank Albert Road East
Fife, WA

----	Fife, WA	anteagroup
TacJ-Fig4-GW-06292016.mxd		
09/02/2016		


MW-5
DATE 6/29/2016
B < 2.0
T < 2.0
E < 3.0
X < 3.0
TPH-G 300
TPH-D 230
TPH-O < 250
Lead < 2.0
MW-1
DATE 6/29/2016
B < 20
T < 20
E < 30
X < 30
TPH-G < 50
TPH-D 160
TPH-O < 250
Lead 10
14" Pipe
8" Pipe
Expanded Excavation Limit
MW-5
MW-1
Control Building
Stormwater Retention Vault
Expanded Excavation Limit
MW-2
Excavation Limit
Oil/Water Separator
Frank Albert Road East
MW-2
DATE 6/29/2016
B 100
T 6.9
E 56
X 92
TPH-G 2,300
TPH-D 810
TPH-O < 250
Lead < 2.0
Concrete Secondary Containment
Gate
MW-4
MW-3
Gate
MW-3
DATE 6/29/2016
B < 2.0
T < 2.0
E < 3.0
X < 3.0
TPH-G < 50
TPH-D < 110
TPH-O < 250
Lead < 2.0
MW-4
DATE 6/29/2016
B < 2.0
T < 2.0
E < 3.0
X < 3.0
TPH-G < 50
TPH-D 110
TPH-O < 250
Lead < 2.0
Access Road
Legend
Property Boundary
Fence
Monitoring Well Location
14" Pipeline
10" Pipeline
8" Pipeline
Original Excavation
Expanded Excavation
SAMPLE ID / DATE
B 5
T 1,000
E 700
X 1,000
TPH-G *1,000/800
TPH-D 500
TPH-O 500
Lead 15
Sources: 2013, Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
N
E
S
W
0 15 30
Feet
Notes:
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes, Total
Benzene, Toluene, Ethylbenzene, andTotal Xylenes analyzed by EPA Method 8260C
TPH-G = Total petroleum hydrocarbons as gasoline by Northwest Method NWTPH-Gx
TPH-D = Total petroleum hydrocarbons as diesel by Northwest Method NWTPH-Dx
TPH-O = Total petroleum hydrocarbons as oil by Northwest Method NWTPH-Dx
Lead = Total Lead by EPA Method 6020A
*1,000/800 ug/L if no detectable levels of Benzene in the sample - otherwise 800 ug/L
<1.0 = Concentrations were not detected above the laboratory method reporting limit
All concentrations reported in micrograms per liter (µg/L)
-- = No value given/Not analyzed/Not applicable
MTCA = Model Toxics Control Act
Results in bold indicate concentrations in excess of MTCA Method A Cleanup Levels
Figure 5
Groundwater Analytical Data Map
6/29/2016
Olympic Pipe Line Company
Tacoma Junction
2660 Frank Albert Road East
Fife, WA

TacJ-Fig5-GWAD.mxd
11/10/2016
Fife, WA
anteagroup

Appendix A

Summary of Field Procedures and Quality Assurance Plan

FIELD PROCEDURES

Discrete soil samples were collected from each boring to characterize site soils with respect to petroleum hydrocarbon impacts. All samples submitted for analyses were collected using a hand auger or a 1.5-inch outside diameter by 48-inch long acetate liner. The samples were labeled and immediately placed in cold storage until submitted to the laboratory for analysis. The soil samples were collected in accordance with EPA Method 5035A. The samples were transported to the laboratory under chain-of-custody procedures to document sample integrity. Laboratory analyses for waste disposal profiling of soil and water generated during the well installation activities was performed by ALS Environmental (ALS) of Everett, Washington. All other laboratory analyses were performed by Test America Laboratories, Inc. (Test America) of Tacoma, Washington.

During the drilling activities, soil samples were screened using a photoionization detector (PID). The PID was a MiniRAE VOC vapor meter equipped with a 10.6 electron volt (eV) ultraviolet (UV) lamp and calibrated to benzene standards with isobutylene for direct readings in parts per million (ppm). The operating range of the detector is from 0 to 15,000 parts per million (ppm) with a minimum detection limit of 0.1 ppm. It should be noted that the PID measurements are considered semi-quantitative data since the instrument detects all organic compounds with ionization potentials less than 10.6 eV. The soil samples were removed from the sampler and placed in plastic bags, sealed and brought to approximately ambient air temperature. The PID probe was inserted into an opening of the plastic bag and the reading noted. The soil within the bag was agitated during the reading process to aid in mobilization of volatile organic vapors. Although the PID is not capable of quantifying or identifying specific organic compounds, it is capable of measuring a variety of organic vapors frequently associated with petroleum hydrocarbons.

ANALYTICAL METHODS

Sample Identification and Chain-of-Custody Procedures

Sample identification and chain-of-custody procedures ensure sample integrity and document sample possession from the time of collection to delivery to the laboratory. Each sample submitted for analysis was labeled and identified with the project number, date and time of sample collection, sampler and sample number unique to the sample. This information, in addition to any field measurements, noted names of onsite personnel, and any other pertinent field observations were recorded in the field notes. All samples were analyzed by ALS or Test America.

Upon arrival at the laboratory, the sample control personnel at the laboratory verified sample integrity and confirmed that the sample was collected in the proper container, packaged correctly, and that there was adequate volume of sample for the required analyses. The laboratory assigned a unique log number for identification of each sample throughout analyses and reporting. The log number was recorded on the chain of custody form and in the legally required logbook maintained in the laboratory. The sample description, date received, client name, and any other relevant information was recorded.

Analytical Quality Assurance

In addition to routine calibration of the analytical instruments with standards and blanks, the analyst is required to run duplicates and spikes on 10 percent of the analyses to insure an added measure of precision and accuracy. Accuracy is also verified through the following:

1. U.S. Environmental Protection Agency (EPA) and State certification programs.
2. Participation in an inter-laboratory or "round-robin" quality assurance program.
3. Verification of results with an alternative method. For example, calcium may be determined by atomic absorption, ion chromatography, or titrimetric methods.

Analytical Methods

The analytical tests performed for this evaluation were chosen based upon standard requirements issued by the Washington State Department of Ecology. Select samples collected during this investigation were analyzed by the following methods:

1. Total petroleum hydrocarbons as gasoline by Northwest Method NWTPH-Gx;
2. Total petroleum hydrocarbons as diesel by Northwest Method NWTPH-Dx;
3. Total petroleum hydrocarbons as oil by Northwest Method NWTPH-Dx;
4. Benzene, toluene, ethylbenzene, xylenes (BTEX) by EPA Method 8260C;
5. Total lead (soil and groundwater) and dissolved lead (groundwater) by EPA Methods 6010C and 6020A.

Appendix B

Boring Logs

	WELL/BORING: MW-1	Unique Ecology Well ID: BJY 056
	INSTALLATION DATE: 6/13/2016	DRILLING METHOD: Geoprobe
	PROJECT: Tacoma Junction	SAMPLING METHOD: Core
	CLIENT: OPLC	BORING DIAMETER: 3.75"
	LOCATION: 2660 Frank Albert Road East	BORING DEPTH: 14'
	CITY: Fife	WELL CASING: SCH 40 PVC 2"
	STATE: WA	WELL SCREEN: 3-13' (0.010)
	DRILLER: Cascade Drilling, Inc.	SAND PACK: 2-13' (10x20)

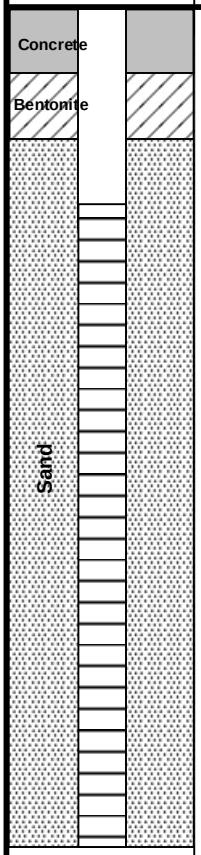
CASING ELEVATION	100.00
SURVEY DATE:	6/14/2016
DTW:	1.75

DESCRIPTION/LOGGED BY: Joe Glover

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Concrete / Bentonite / Sand						1					Surface = Gravel Air-knife/vac to 6.5' bgs.
		▼				2					
	▽		WET	1.9	-	3			GW		GRAVEL: Fill; brown/blue; trace silt; 10% coarse sand; 85% fine to coarse gravel.
						4					
			WET	1.0	-	5					
						6			SM		Silty SAND: gray; 10% silt; 90% fine sand.
						7					
						8					
						9					Same as Above.
			WET	1.6	-	10			CH		CLAY: grayish brown.
						11			SP		SAND: dark gray; 100% fine sand.
			WET	2.4	-	12			CH		CLAY: grayish brown; wood debris.
						13					
						14			SP CH		SAND: gray; 100% fine sand. CLAY: grayish brown.
						15					
						16					
						17					
						18					
						19					
						20					
						21					
						22					

	WELL/BORING: MW-2	Unique Ecology Well ID: BJY 057
	INSTALLATION DATE: 6/13/2016	DRILLING METHOD: Geoprobe
	PROJECT: Tacoma Junction	SAMPLING METHOD: Core
	CLIENT: OPLC	BORING DIAMETER: 3.75"
	LOCATION: 2660 Frank Albert Road East	BORING DEPTH: 14'
	CITY: Fife	WELL CASING: SCH 40 PVC 2"
	STATE: WA	WELL SCREEN: 3-13' (0.010)
	DRILLER: Cascade Drilling, Inc.	SAND PACK: 2-13' (10x20)

CASING ELEVATION	99.59
SURVEY DATE:	6/14/2016
DTW:	2.51



DEPTH (FEET)	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY: Joe Glover
0										Surface = Gravel Air-knife/vac to 6.5' bgs.
3	▽	▼	WET	2.0	-			GW		GRAVEL: Fill; brown/blue; trace silt; 30% fine to coarse sand; 65% gravel.
6			WET	1,739	-			SM		Silty SAND: gray; 65% silt; 35% sand; odor.
9			WET	88	-			SP		SAND: gray; 100% fine sand; odor.
10								CH		CLAY: gray.
11								SP		SAND: dark gray; 100% fine sand; odor.
12			WET	5.6	-					
13								CH		CLAY: gray; wood debris.
14								SP		SAND: dark gray; 100% fine sand; wood debris.

	WELL/BORING: MW-3	Unique Ecology Well ID: BJY 059
	INSTALLATION DATE: 6/13-14/2016	DRILLING METHOD: Geoprobe
	PROJECT: Tacoma Junction	SAMPLING METHOD: Core
	CLIENT: OPLC	BORING DIAMETER: 3.75"
	LOCATION: 2660 Frank Albert Road East	BORING DEPTH: 13'
	CITY: Fife	WELL CASING: SCH 40 PVC 2"
	STATE: WA	WELL SCREEN: 3-13' (0.010)
	DRILLER: Cascade Drilling, Inc.	SAND PACK: 2-13' (10x20)

CASING ELEVATION	99.91
SURVEY DATE:	6/14/2016
DTW:	1.99

DESCRIPTION/LOGGED BY: Joe Glover

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete / Bentonite / Sand						0					Surface = Gravel Air-knife/vac to 6.5' bgs.
		▼				1					
						2					
	▽		MST	2.2	-	3			GW		Sandy GRAVEL: Fill; brown; trace silt; 15% sand; 80% gravel.
						4					
			WET	49.7	-	5			MH		Clayey SILT: gray; 30% clay; 65% silt; trace very fine sand; slight odor.
						6			SP		Silty SAND: gray; 20% silt; 80% very fine sand.
						7					
						8					
						9					
			WET	0.7	-	10			CH		Sandy Silty CLAY: gray; 70% clay; 20% silt; 10% very fine sand.
									SP		SAND: gray; 100% very fine sand.
						11			CH		Silty CLAY: gray; 70% clay; 30% silt; wood debris.
						12					
			WET	0.6	-	13					Decreasing moisture.
						14					
						15					
						16					
						17					
						18					
						19					
						20					
						21					
						22					

	WELL/BORING: MW-4	Unique Ecology Well ID: BJY 060
	INSTALLATION DATE: 6/13-14/2016	DRILLING METHOD: Geoprobe
	PROJECT: Tacoma Junction	SAMPLING METHOD: Core
	CLIENT: OPLC	BORING DIAMETER: 3.75"
	LOCATION: 2660 Frank Albert Road East	BORING DEPTH: 13'
	CITY: Fife	WELL CASING: SCH 40 PVC 2"
	STATE: WA	WELL SCREEN: 3-13' (0.010)
	DRILLER: Cascade Drilling, Inc.	SAND PACK: 2-13' (10x20)

CASING ELEVATION	99.70
SURVEY DATE:	6/14/2016
DTW:	2.20

DESCRIPTION/LOGGED BY: Joe Glover

WELL/BORING COMPLETION	FIRST	STABILIZED	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete / Bentonite / Sand	▽	▼				1–2					Surface = Gravel Air-knife/vac to 6.5' bgs.
			MST	2.3	-	3–4			SP		Gravelly SAND: Fill; brown; trace silt; 75% medium sand; 20% gravel.
			WET	0.3	-	5–8			SC		Clayey SAND: gray; 35% clay; 65% very fine sand.
						9			CH		CLAY: brownish gray; 100% clay.
			WET	0.3	-	10–11			SC		Clayey SAND: gray; 20% clay; 80% very fine sand.
			WET	0.2	-	12–13			CH		Sandy CLAY: brown; 80% clay; 20% very fine sand; wood debris.
						14–22					

	WELL/BORING: MW-5	Unique Ecology Well ID: BJY 058
	INSTALLATION DATE: 6/13-14/2016	DRILLING METHOD: Geoprobe
	PROJECT: Tacoma Junction	SAMPLING METHOD: Core
	CLIENT: OPLC	BORING DIAMETER: 3.75"
	LOCATION: 2660 Frank Albert Road East	BORING DEPTH: 13'
	CITY: Fife	WELL CASING: SCH 40 PVC 2"
	STATE: WA	WELL SCREEN: 3-13' (0.010)
	DRILLER: Cascade Drilling, Inc.	SAND PACK: 2-13' (10x20)

	CASING ELEVATION	99.60
	SURVEY DATE:	6/14/2016
	DTW:	1.43
	DESCRIPTION/LOGGED BY: Joe Glover	

WELL/BORING COMPLETION	FIRST	STABILIZED	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Concrete / Bentonite / Sand	▽	▼				1–6			GW		Surface = Gravel Previously excavated to 7' Begin sampling @7'
			WET	1,651	-	7–9			SM		Sandy SILT: brownish gray; 65% silt; 35% fine sand; odor.
			WET	50.6	-	10–12			CH		Silty CLAY: brown; 70% clay; 30% silt; wood debris; slight odor.
			WET	1.7	-	13			CH		Same as Above: decreasing moisture.
						14–22					

Appendix C

Waste Disposal Documentation

***24 HOUR EMERGENCY RESPONSE, CALL (877) 577-2669 ***

Stericycle®
Environmental Solutions

SHIPPING PAPER

Lading Manifest: 116331-16

		DELIVERY DATE	JOB # 2440799
SHIPPER / CUSTOMER	Olympic Pipeline Company	POINT OF CONTACT	Megan Richard
ADDRESS	2660 Frank Albert Road East	PHONE #	(206)854-0399
CITY, STATE, ZIP	FIFE, WA 98424		
CARRIER / TRANSPORTER	CASCADE DRILLING	PHONE #	(425)485-8908
CONSIGNEE / FACILITY	BURLINGTON ENVIRONMENTAL, LLC.	POINT OF CONTACT	
ADDRESS	20245 77TH AVENUE SOUTH	PHONE #	(253)872-8030
CITY, STATE, ZIP	KENT, WA 98032		

HM	US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	Containers No.	Containers Type	Total Quantity	UOM
A	MATERIAL NOT REGULATED BY DOT (NON-HAZARDOUS)	2	DM	800	P
B					
C				4	
D					

Special Handling Instruction and Additional Information:

a) 77955B-69 - NON-HAZARDOUS WASTE LIQUID - WA95 (L)

Placards Provided YES_____ NO_____

SHIPPER'S CERTIFICATION: "I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations." I also certify that all times listed above are true and correct.

		MONTH	DAY	YEAR
(SHIPPER) PRINT OR TYPE NAME X Eric Sanchez	SIGNATURE X	6	29	16
(CARRIER/TRANSPORTER) PRINT OR TYPE NAME X	SIGNATURE X	6	29	16
(CONSIGNEE/FACILITY) PRINT OR TYPE NAME X	SIGNATURE X	MONTH	DAY	YEAR

SHIPPER

***24 HOUR EMERGENCY RESPONSE, CALL (877) 577-2669 ***

Stericycle
Environmental Solutions

RECEIVED BY:
AUG 0 8 2016
Antea Group - Seattle, WA

SHIPPING PAPER

Lading Manifest: 132659-16

Pg 1 of 2

DELIVERY DATE	JOB 2455234

SHIPPER / CUSTOMER Olympic Pipeline Company	POINT OF CONTACT Megan Richard
ADDRESS 2660 Frank Albert Road East	PHONE # (206)854-0399
CITY, STATE, ZIP FIFE WA 98424	
CARRIER / TRANSPORTER CASCADE DRILLING	PHONE # (425)485-8908
CONSIGNEE / FACILITY BURLINGTON ENVIRONMENTAL, LLC.	POINT OF CONTACT
ADDRESS 20245 77TH AVENUE SOUTH	PHONE # (253)872-8030
CITY, STATE, ZIP KENT , WA 98032	

HM	US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	Containers No.	Containers Type	Total Quantity	UOM
A	MATERIAL NOT REGULATED BY DOT (NON-HAZARDOUS)	2	DM	1200	P
B					
C	1950				
D					

Special Handling Instruction and Additional Information:

a) 777113-00 - NON-HAZARDOUS IDW SOLIDS (SOIL CUTTINGS) - LF01 (1)

Placards Provided YES_____ NO_____

SHIPPER'S CERTIFICATION: "I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations." I also certify that all times listed above are true and correct.

		MONTH	DAY	YEAR
(SHIPPER) PRINT OR TYPE NAME X Megan Richard As authorized agent for BP	SIGNATURE X MR	7	13	16
(CARRIER/TRANSPORTER) PRINT OR TYPE NAME X	SIGNATURE X Ron Rider	7	13	16
(CONSIGNEE/FACILITY) PRINT OR TYPE NAME X Stephanie Hutchins	SIGNATURE X	7	17	16

CONSIGNEE

'16 JUL 18 AM 2:00

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Environmental Solutions

SHIPPING PAPER

page 2 of 2
132659-16

	DELIVERY DATE	JOB #
		2455234

SHIPPER / CUSTOMER Olympic Pipeline Company	POINT OF CONTACT
ADDRESS	PHONE #
CITY, STATE, ZIP	
CARRIER / TRANSPORTER Burlington Environmental LLC	PHONE #
CONSIGNEE / FACILITY	POINT OF CONTACT
ADDRESS	PHONE #
CITY, STATE, ZIP	

HM	US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	Containers No.	Containers Type	Total Quantity	UOM
A					
B					
C					
D					

Special Handling Instruction and Additional Information:

Placards Provided YES_____ NO_____

SHIPPER'S CERTIFICATION: "I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations." I also certify that all times listed above are true and correct.

		MONTH	DAY	YEAR
(SHIPPER) PRINT OR TYPE NAME X	SIGNATURE X			
(CARRIER/TRANSPORTER) PRINT OR TYPE NAME X Adam Swickard BELC	SIGNATURE X	7	13	14
(CONSIGNEE/FACILITY) PRINT OR TYPE NAME X	SIGNATURE X			

CONSIGNEE

Appendix D

Soil Laboratory Analytical Reports

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-60492-1
Client Project/Site: OPLC - Tacoma Junction

For:
Antea USA, Inc.
4006 148th Ave NE
Redmond, Washington 98052

Attn: Megan Richard

Authorized for release by:
7/6/2016 11:19:36 AM

Robert Greer, Project Manager II
(253)922-2310
robert.greer@testamericainc.com

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the BPLAMP Technical Specifications, applicable federal, state, local regulations and certification requirements as well as the methodologies as described in laboratory SOPs reviewed by the BPLAMP. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain of Custody is included and is an integral part of this report.

Robert Greer
Project Manager II
7/6/2016 11:19:36 AM

Table of Contents

Case Narrative

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60492-1

Job ID: 580-60492-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-60492-1

Receipt
The sample was received on 6/22/2016 9:45 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 9.4º C.

GC/MS VOA
Method(s) 8260C: The following sample was analyzed five minutes outside of analytical holding time due to the instrument auto sampler stopping mid-run: MW-4_3 (580-60492-1).

Method(s) NWTPH-Gx: Analytical batch 220706 was run with only the secondary source standard for the CCVs, LCS and LCSD. A new primary gas standard was made and failed low: (CCV 580-220706/14), (CCV 580-220706/23) and (CCVRT 580-220706/6).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA
Method(s) NWTPH-Dx: The following samples contained a hydrocarbon pattern in the diesel range; however, the elution pattern was later than the typical diesel fuel pattern used by the laboratory for quantitative purposes: (580-60297-B-8-D) and (580-60297-B-8-E DU).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60492-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: MW-4_3
Date Collected: 06/13/16 11:40
Date Received: 06/22/16 09:45

Lab Sample ID: 580-60492-1
Matrix: Solid
Percent Solids: 93.9

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	H	0.014		mg/Kg	☼	06/27/16 16:46	06/28/16 00:05	1
Toluene	ND	H	0.035		mg/Kg	☼	06/27/16 16:46	06/28/16 00:05	1
Ethylbenzene	ND	H	0.035		mg/Kg	☼	06/27/16 16:46	06/28/16 00:05	1
Xylenes, Total	ND	H	0.17		mg/Kg	☼	06/27/16 16:46	06/28/16 00:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*106*		*52 - 152*	*06/27/16 16:46*	*06/28/16 00:05*	*1*
Toluene-d8 (Surr)	*97*		*79 - 119*	*06/27/16 16:46*	*06/28/16 00:05*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*81 - 121*	*06/27/16 16:46*	*06/28/16 00:05*	*1*
4-Bromofluorobenzene (Surr)	*102*		*79 - 120*	*06/27/16 16:46*	*06/28/16 00:05*	*1*
Dibromofluoromethane (Surr)	*99*		*78 - 118*	*06/27/16 16:46*	*06/28/16 00:05*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	**3.5**		3.5		mg/Kg	☼	06/23/16 14:17	06/24/16 06:22	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*50 - 150*	*06/23/16 14:17*	*06/24/16 06:22*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (>C12-C24)	ND		26		mg/Kg	☼	06/27/16 08:53	06/27/16 21:47	1
Motor Oil (>C24-C32)	ND		52		mg/Kg	☼	06/27/16 08:53	06/27/16 21:47	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*65*		*50 - 150*	*06/27/16 08:53*	*06/27/16 21:47*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**93.9**		0.1		%			06/27/16 18:30	1
Percent Moisture	**6.1**		0.1		%			06/27/16 18:30	1

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-220936/1-A
Matrix: Solid
Analysis Batch: 220939

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 220936

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.016		mg/Kg		06/27/16 16:46	06/27/16 23:37	1
Toluene	ND		0.040		mg/Kg		06/27/16 16:46	06/27/16 23:37	1
Ethylbenzene	ND		0.040		mg/Kg		06/27/16 16:46	06/27/16 23:37	1
Xylenes, Total	ND		0.20		mg/Kg		06/27/16 16:46	06/27/16 23:37	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*105*		*52 - 152*	*06/27/16 16:46*	*06/27/16 23:37*	*1*
Toluene-d8 (Surr)	*97*		*79 - 119*	*06/27/16 16:46*	*06/27/16 23:37*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*81 - 121*	*06/27/16 16:46*	*06/27/16 23:37*	*1*
4-Bromofluorobenzene (Surr)	*102*		*79 - 120*	*06/27/16 16:46*	*06/27/16 23:37*	*1*
Dibromofluoromethane (Surr)	*99*		*78 - 118*	*06/27/16 16:46*	*06/27/16 23:37*	*1*

Lab Sample ID: LCS 580-220936/2-A
Matrix: Solid
Analysis Batch: 220939

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 220936

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	0.803	0.814		mg/Kg		101	70 - 118
Toluene	0.801	0.740		mg/Kg		92	67 - 119
Ethylbenzene	0.803	0.769		mg/Kg		96	66 - 119
m-Xylene & p-Xylene	0.802	0.768		mg/Kg		96	69 - 126
o-Xylene	0.801	0.771		mg/Kg		96	66 - 127
Xylenes, Total	1.60	1.54		mg/Kg		96	70 - 121

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Trifluorotoluene (Surr)	*106*		*52 - 152*
Toluene-d8 (Surr)	*97*		*79 - 119*
1,2-Dichloroethane-d4 (Surr)	*94*		*81 - 121*
4-Bromofluorobenzene (Surr)	*102*		*79 - 120*
Dibromofluoromethane (Surr)	*104*		*78 - 118*

Lab Sample ID: LCSD 580-220936/3-A
Matrix: Solid
Analysis Batch: 220939

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 220936

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	0.803	0.843		mg/Kg		105	70 - 118	4	19
Toluene	0.801	0.751		mg/Kg		94	67 - 119	1	19
Ethylbenzene	0.803	0.798		mg/Kg		99	66 - 119	4	23
m-Xylene & p-Xylene	0.802	0.788		mg/Kg		98	69 - 126	2	23
o-Xylene	0.801	0.788		mg/Kg		98	66 - 127	2	22
Xylenes, Total	1.60	1.58		mg/Kg		98	70 - 121	2	17

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Trifluorotoluene (Surr)	*107*		*52 - 152*
Toluene-d8 (Surr)	*95*		*79 - 119*
1,2-Dichloroethane-d4 (Surr)	*95*		*81 - 121*

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-220936/3-A
Matrix: Solid
Analysis Batch: 220939

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 220936

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*79 - 120*
Dibromofluoromethane (Surr)	*103*		*78 - 118*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-220670/1-A
Matrix: Solid
Analysis Batch: 220706

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 220670

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		4.0		mg/Kg		06/23/16 14:05	06/23/16 23:23	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*50 - 150*	*06/23/16 14:05*	*06/23/16 23:23*	*1*

Lab Sample ID: LCS 580-220670/2-A
Matrix: Solid
Analysis Batch: 220706

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 220670

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline			40.1	33.5		mg/Kg		84	68 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*50 - 150*

Lab Sample ID: LCSD 580-220670/3-A
Matrix: Solid
Analysis Batch: 220706

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 220670

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline			40.1	33.7		mg/Kg		84	68 - 120	1	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*98*		*50 - 150*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-220823/1-A
Matrix: Solid
Analysis Batch: 220895

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 220823

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (>C12-C24)	ND		25		mg/Kg		06/25/16 11:15	06/27/16 13:59	1
Motor Oil (>C24-C32)	ND		50		mg/Kg		06/25/16 11:15	06/27/16 13:59	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: MB 580-220823/1-A
Matrix: Solid
Analysis Batch: 220895

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 220823

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	73		50 - 150	06/25/16 11:15	06/27/16 13:59	1

Lab Sample ID: LCS 580-220823/2-A
Matrix: Solid
Analysis Batch: 220895

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 220823

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
#2 Diesel (>C12-C24)			503	371		mg/Kg		74	70 - 125		
Motor Oil (>C24-C32)			503	464		mg/Kg		92	64 - 127		

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	75		50 - 150

Lab Sample ID: LCSD 580-220823/3-A
Matrix: Solid
Analysis Batch: 220895

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 220823

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (>C12-C24)			503	357		mg/Kg		71	70 - 125	4	16
Motor Oil (>C24-C32)			503	443		mg/Kg		88	64 - 127	5	17

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
o-Terphenyl	71		50 - 150

Method: D 2216 - Percent Moisture

Lab Sample ID: 580-60492-1 DU
Matrix: Solid
Analysis Batch: 220952

Client Sample ID: MW-4_3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Solids	93.9			93.7		%				0.2	20
Percent Moisture	6.1			6.3		%				3	20

Lab Chronicle

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60492-1

Client Sample ID: MW-4_3

Date Collected: 06/13/16 11:40
Date Received: 06/22/16 09:45

Lab Sample ID: 580-60492-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	220952	06/27/16 18:30	CBS	TAL SEA

Client Sample ID: MW-4_3

Date Collected: 06/13/16 11:40
Date Received: 06/22/16 09:45

Lab Sample ID: 580-60492-1
Matrix: Solid
Percent Solids: 93.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			220936	06/27/16 16:46	IWH	TAL SEA
Total/NA	Analysis	8260C		1	220939	06/28/16 00:05	D1R	TAL SEA
Total/NA	Prep	5035			220670	06/23/16 14:17	JW1L	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	220706	06/24/16 06:22	RBL	TAL SEA
Total/NA	Prep	3546			220823	06/27/16 08:53	KZ1	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	220895	06/27/16 21:47	CJ	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60492-1

Laboratory: TestAmerica Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
Washington	State Program	10	C553	02-17-17

The following analytes are included in this report, but certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
8260C	5035	Solid	Xylenes, Total
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids
NWTPH-Dx	3546	Solid	#2 Diesel (>C12-C24)
NWTPH-Dx	3546	Solid	Motor Oil (>C24-C32)

Sample Summary

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60492-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-60492-1	MW-4_3	Solid	06/13/16 11:40	06/22/16 09:45

Atlantic Richfield Company
A BP affiliated company

Laboratory Management Program LaMP Chain of Custody Record

BP/ARC Project Name: Olympic Pipe Line Company
Req Due Date (mm/dd/yy): Standard
Rush TAT: Yes ___ No ___
BP/ARC Facility No: ~~Allen Station~~ Tacoma Junction
Lab Work Order Number:

Lab Name:	Test America	BP/ARC Facility Address:	2660 Frank Albert Road East	Consultant/Contractor:	Antea Group
Lab Address:	Tacoma, WA	City, State, ZIP Code:	Fife WA 98424	Consultant/Contractor Project No:	WATACJC162
Lab PM:	Robert Greer	Lead Regulatory Agency:	WA Department of Ecology	Address:	4006 148th Avenue NE, Redmond, WA 98052
Lab Phone:	253.922.2310	California Global ID No.:	NA	Consultant/Contractor PM:	Megan Richard
Lab Shipping Accnt:	NA	Enfos Proposal No:	008FF-0001 / WR302635	Phone:	P: 425.498.7711 F: 425.869.1892
Lab Bottle Order No:	NA	Accounting Mode:	Provision ___ OOC-BU ___ OOC-RM ✓	Email EDD To:	Megan.Richard@anteagroup.com
Other Info:		Stage: 4_Execute 40	Activity: Project Spend (80)	Invoice To:	BP/ARC X Contractor ___

BP/ARC EBM: Paul Supple
EBM Phone: 657-529-4507
EBM Email: paul.supple@bp.com

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Matrix: Water / Liquid	Matrix: Air / Vapor	Matrix:	No. Containers / Preservative: Total Number of Containers	No. Containers / Preservative: Unpreserved	No. Containers / Preservative: H_2SO_4	No. Containers / Preservative: HNO_3	No. Containers / Preservative: HCl	No. Containers / Preservative: Methanol	No. Containers / Preservative: NaOH zn Acetate	Requested Analyses: 8260BTEX	Requested Analyses: NWTPH-Gx	Requested Analyses: NWTPH-DX (with silica gel)	Requested Analyses:	Requested Analyses:	Requested Analyses:	Requested Analyses:	Requested Analyses:	Requested Analyses:	Requested Analyses:
	MW-4_3	6/13/2016	1140	X				2	1				1		X	X	X							

Report Type & QC Level
Standard Y
Full Data Package ___

Comments
Note: If sample not collected, indicate "No Sample" in comments and single-strike out and initial any preprinted sample description.

580-60492 Chain of Custody

TB AZ Cooler F.L. ~~F.L.~~ Cor 9.4° Unc 9.4°
Cooler Dsc Lg Bubble@Lab 1130
Wet/Packs Packing Bubble
w/o

Sampler's Name:	Eric Sanchez	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company:	Antea Group	Eric Sanchez / Antea	6/21/16	0940	[signature] / TASEA	6/22/16	0945
Shipment Method:	Courier Pickup	Ship Date: 6/22/2016					
Shipment Tracking No:							

Special Instructions:

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: ___ °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

Login Sample Receipt Checklist

Client: Antea USA, Inc.

Job Number: 580-60492-1

Login Number: 60492
List Number: 1
Creator: Gamble, Cathy L

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Appendix E

Groundwater Laboratory Analytical Report

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-60700-1
Client Project/Site: OPLC - Tacoma Junction

For:
Antea USA, Inc.
4006 148th Ave NE
Redmond, Washington 98052

Attn: Megan Richard

Authorized for release by:
7/18/2016 10:40:27 AM

Robert Greer, Project Manager II
(253)922-2310
robert.greer@testamericainc.com

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the BPLAMP Technical Specifications, applicable federal, state, local regulations and certification requirements as well as the methodologies as described in laboratory SOPs reviewed by the BPLAMP. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain of Custody is included and is an integral part of this report.

Robert Greer
Project Manager II
7/18/2016 10:40:27 AM

Table of Contents

Job ID: 580-60700-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-60700-1

Receipt
The samples were received on 6/29/2016 12:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.2º C.

Receipt Exceptions

The reference method requires samples to be preserved to a pH of 2 or less. The following samples were received with insufficient preservation at a pH of 2 or higher: MW-2_20160629 (580-60700-2), MW-3_20160629 (580-60700-3) and MW-5_20160629 (580-60700-5). The samples were preserved to the appropriate pH in the laboratory.

Sample: MW-2_20160629 (580-60700-1): Added 3ml of HNO3 at 1630 on 06-29-16 Lot#0000050770
MW-3_20160629 (580-60700-3): Added 3ml of HNO3 at 1630 on 06-29-16 Lot#0000050770
MW-5_20160629 (580-60700-5): Added 3ml of HNO3 at 1630 on 06-29-16 Lot#0000050770

**Method Blank prepared by adding 3ml HNO3 at 1635 on 06-29-16 Lot#0000050770

GC/MS VOA
Method(s) 8260C: The following sample was diluted due to the abundance of non-target analytes: MW-1_20160629 (580-60700-1). Elevated reporting limits (RLs) are provided.

Method(s) 8260C: The following sample was diluted to bring the concentration of Benzene within the calibration range of the instrument: MW-2_20160629 (580-60700-2). Elevated reporting limits (RLs) are provided.

Method(s) NWTPH-Gx: Analytical batch 580-221098 was run with only the secondary source standard for the CCVs, LCS and LCSD. A new primary gas standard was made and failed low: (CCV 580-221098/11), (CCV 580-221098/18), (CCV 580-221098/25) and (CCVRT 580-221098/4).

Method(s) NWTPH-Gx: Analytical batch 580-221557 was run with only the secondary source standard for the CCVs, LCS and LCSD. A new primary gas standard was made and failed low: (CCV 580-221557/14), (CCV 580-221557/22) and (CCVRT 580-221557/5).

Method(s) NWTPH-Gx: Analytical batch 580-222225 was run with only the secondary source standard for the CCVs, LCS and LCSD. A new primary gas standard was made and failed low: (CCV 580-222225/14) and (CCVRT 580-222225/6).

Method(s) NWTPH-Gx: Surrogate recovery for the following sample was outside control limits: MW-2_20160629 (580-60700-2). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA
Method(s) NWTPH-Dx: The following sample contained a hydrocarbon pattern in the diesel range; however, the elution pattern was later than the typical diesel fuel pattern used by the laboratory for quantitative purposes: MW-1_20160629 (580-60700-1).

Method(s) NWTPH-Dx: The following samples contained a hydrocarbon pattern in the diesel range; however, the elution pattern was earlier than the typical diesel fuel pattern used by the laboratory for quantitative purposes: MW-2_20160629 (580-60700-2) and MW-5_20160629 (580-60700-5).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Job ID: 580-60700-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

Organic Prep
Method(s) 3510C: Extreme emulsion present during extraction for NWTPH-Dx analysis for the following sample: MW-1_20160629 (580-60700-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Qualifiers

GC VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: MW-1_20160629
Date Collected: 06/29/16 09:40
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-1
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		20		ug/L			07/12/16 20:00	10
Toluene	ND		20		ug/L			07/12/16 20:00	10
Ethylbenzene	ND		30		ug/L			07/12/16 20:00	10
Xylenes, Total	ND		30		ug/L			07/12/16 20:00	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*103*		*80 - 141*		*07/12/16 20:00*	*10*
Toluene-d8 (Surr)	*107*		*82 - 122*		*07/12/16 20:00*	*10*
1,2-Dichloroethane-d4 (Surr)	*108*		*65 - 143*		*07/12/16 20:00*	*10*
4-Bromofluorobenzene (Surr)	*99*		*75 - 125*		*07/12/16 20:00*	*10*
Dibromofluoromethane (Surr)	*102*		*77 - 118*		*07/12/16 20:00*	*10*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		50		ug/L			07/13/16 15:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*50 - 150*		*07/13/16 15:06*	*1*
Trifluorotoluene (Surr)	*119*		*50 - 150*		*07/13/16 15:06*	*1*

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	**160**		110		ug/L		07/08/16 13:55	07/12/16 01:11	1
Motor Oil (>C24-C36)	ND		250		ug/L		07/08/16 13:55	07/12/16 01:11	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*58*		*50 - 150*	*07/08/16 13:55*	*07/12/16 01:11*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	**10**		2.0		ug/L		07/01/16 09:01	07/06/16 14:07	5

Client Sample ID: MW-2_20160629
Date Collected: 06/29/16 10:25
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-2
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Toluene	6.9		2.0		ug/L			07/12/16 19:02	1
Ethylbenzene	56		3.0		ug/L			07/12/16 19:02	1
Xylenes, Total	92		3.0		ug/L			07/12/16 19:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*98*		*80 - 141*		*07/12/16 19:02*	*1*
Toluene-d8 (Surr)	*99*		*82 - 122*		*07/12/16 19:02*	*1*
1,2-Dichloroethane-d4 (Surr)	*105*		*65 - 143*		*07/12/16 19:02*	*1*
4-Bromofluorobenzene (Surr)	*105*		*75 - 125*		*07/12/16 19:02*	*1*
Dibromofluoromethane (Surr)	*102*		*77 - 118*		*07/12/16 19:02*	*1*

Method: 8260C - Volatile Organic Compounds by GC/MS - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	100		20		ug/L			07/13/16 12:08	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*101*		*80 - 141*		*07/13/16 12:08*	*10*
Toluene-d8 (Surr)	*106*		*82 - 122*		*07/13/16 12:08*	*10*
1,2-Dichloroethane-d4 (Surr)	*107*		*65 - 143*		*07/13/16 12:08*	*10*
4-Bromofluorobenzene (Surr)	*102*		*75 - 125*		*07/13/16 12:08*	*10*
Dibromofluoromethane (Surr)	*100*		*77 - 118*		*07/13/16 12:08*	*10*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	2300		50		ug/L			06/29/16 20:52	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*158*	*X*	*50 - 150*		*06/29/16 20:52*	*1*
Trifluorotoluene (Surr)	*146*		*50 - 150*		*06/29/16 20:52*	*1*

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	810		110		ug/L		07/02/16 12:23	07/02/16 23:14	1
Motor Oil (>C24-C36)	ND		250		ug/L		07/02/16 12:23	07/02/16 23:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*70*		*50 - 150*	*07/02/16 12:23*	*07/02/16 23:14*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		2.0		ug/L		07/01/16 09:01	07/06/16 14:15	5

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60700-1

Client Sample ID: MW-3_20160629
Date Collected: 06/29/16 11:50
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-3
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0		ug/L			07/12/16 18:33	1
Toluene	ND		2.0		ug/L			07/12/16 18:33	1
Ethylbenzene	ND		3.0		ug/L			07/12/16 18:33	1
Xylenes, Total	ND		3.0		ug/L			07/12/16 18:33	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*103*		*80 - 141*		*07/12/16 18:33*	*1*
Toluene-d8 (Surr)	*98*		*82 - 122*		*07/12/16 18:33*	*1*
1,2-Dichloroethane-d4 (Surr)	*108*		*65 - 143*		*07/12/16 18:33*	*1*
4-Bromofluorobenzene (Surr)	*100*		*75 - 125*		*07/12/16 18:33*	*1*
Dibromofluoromethane (Surr)	*105*		*77 - 118*		*07/12/16 18:33*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		50		ug/L			07/05/16 21:52	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*50 - 150*		*07/05/16 21:52*	*1*
Trifluorotoluene (Surr)	*93*		*50 - 150*		*07/05/16 21:52*	*1*

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		110		ug/L		07/02/16 12:23	07/02/16 23:35	1
Motor Oil (>C24-C36)	ND		250		ug/L		07/02/16 12:23	07/02/16 23:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*69*		*50 - 150*	*07/02/16 12:23*	*07/02/16 23:35*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		2.0		ug/L		07/01/16 09:01	07/06/16 14:11	5

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60700-1

Client Sample ID: MW-4_20160629
Date Collected: 06/29/16 11:10
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-4
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0		ug/L			07/12/16 19:31	1
Toluene	ND		2.0		ug/L			07/12/16 19:31	1
Ethylbenzene	ND		3.0		ug/L			07/12/16 19:31	1
Xylenes, Total	ND		3.0		ug/L			07/12/16 19:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*104*		*80 - 141*		*07/12/16 19:31*	*1*
Toluene-d8 (Surr)	*99*		*82 - 122*		*07/12/16 19:31*	*1*
1,2-Dichloroethane-d4 (Surr)	*105*		*65 - 143*		*07/12/16 19:31*	*1*
4-Bromofluorobenzene (Surr)	*100*		*75 - 125*		*07/12/16 19:31*	*1*
Dibromofluoromethane (Surr)	*107*		*77 - 118*		*07/12/16 19:31*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		50		ug/L			07/05/16 22:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*50 - 150*		*07/05/16 22:25*	*1*
Trifluorotoluene (Surr)	*98*		*50 - 150*		*07/05/16 22:25*	*1*

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	**110**		110		ug/L		07/02/16 12:23	07/02/16 23:56	1
Motor Oil (>C24-C36)	ND		250		ug/L		07/02/16 12:23	07/02/16 23:56	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*69*		*50 - 150*	*07/02/16 12:23*	*07/02/16 23:56*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		2.0		ug/L		07/01/16 09:01	07/06/16 14:20	5

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60700-1

Client Sample ID: MW-5_20160629
Date Collected: 06/29/16 10:05
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-5
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0		ug/L			07/12/16 18:05	1
Toluene	ND		2.0		ug/L			07/12/16 18:05	1
Ethylbenzene	ND		3.0		ug/L			07/12/16 18:05	1
Xylenes, Total	ND		3.0		ug/L			07/12/16 18:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*98*		*80 - 141*		*07/12/16 18:05*	*1*
Toluene-d8 (Surr)	*103*		*82 - 122*		*07/12/16 18:05*	*1*
1,2-Dichloroethane-d4 (Surr)	*107*		*65 - 143*		*07/12/16 18:05*	*1*
4-Bromofluorobenzene (Surr)	*102*		*75 - 125*		*07/12/16 18:05*	*1*
Dibromofluoromethane (Surr)	*99*		*77 - 118*		*07/12/16 18:05*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	**300**		50		ug/L			06/29/16 22:29	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*105*		*50 - 150*		*06/29/16 22:29*	*1*
Trifluorotoluene (Surr)	*108*		*50 - 150*		*06/29/16 22:29*	*1*

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	**230**		110		ug/L		07/02/16 12:23	07/03/16 00:17	1
Motor Oil (>C24-C36)	ND		250		ug/L		07/02/16 12:23	07/03/16 00:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*71*		*50 - 150*	*07/02/16 12:23*	*07/03/16 00:17*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		2.0		ug/L		07/01/16 09:01	07/06/16 14:24	5

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60700-1

Client Sample ID: Method Blank w/3ml HNO3 Added — **Lab Sample ID: 580-60700-6**
Date Collected: 06/29/16 16:35 — **Matrix: Water**
Date Received: 06/29/16 12:25

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		2.0		ug/L		07/01/16 09:01	07/06/16 14:29	5

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-222087/5
Matrix: Water
Analysis Batch: 222087

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0		ug/L			07/12/16 10:19	1
Toluene	ND		2.0		ug/L			07/12/16 10:19	1
Ethylbenzene	ND		3.0		ug/L			07/12/16 10:19	1
Xylenes, Total	ND		3.0		ug/L			07/12/16 10:19	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*103*		*80 - 141*		*07/12/16 10:19*	*1*
Toluene-d8 (Surr)	*99*		*82 - 122*		*07/12/16 10:19*	*1*
1,2-Dichloroethane-d4 (Surr)	*104*		*65 - 143*		*07/12/16 10:19*	*1*
4-Bromofluorobenzene (Surr)	*95*		*75 - 125*		*07/12/16 10:19*	*1*
Dibromofluoromethane (Surr)	*104*		*77 - 118*		*07/12/16 10:19*	*1*

Lab Sample ID: LCS 580-222087/6
Matrix: Water
Analysis Batch: 222087

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.96		ug/L		99	80 - 120
Toluene	10.0	10.4		ug/L		104	75 - 120
Ethylbenzene	10.0	9.85		ug/L		98	75 - 119
m-Xylene & p-Xylene	10.0	10.2		ug/L		101	75 - 119
o-Xylene	10.0	10.2		ug/L		102	74 - 120
Xylenes, Total	20.0	20.4		ug/L		102	75 - 119

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Trifluorotoluene (Surr)	*101*		*80 - 141*
Toluene-d8 (Surr)	*101*		*82 - 122*
1,2-Dichloroethane-d4 (Surr)	*104*		*65 - 143*
4-Bromofluorobenzene (Surr)	*99*		*75 - 125*
Dibromofluoromethane (Surr)	*98*		*77 - 118*

Lab Sample ID: LCSD 580-222087/7
Matrix: Water
Analysis Batch: 222087

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.94		ug/L		99	80 - 120	0	14
Toluene	10.0	9.58		ug/L		96	75 - 120	8	19
Ethylbenzene	10.0	9.74		ug/L		97	75 - 119	1	14
m-Xylene & p-Xylene	10.0	10.2		ug/L		102	75 - 119	0	14
o-Xylene	10.0	10.1		ug/L		101	74 - 120	1	16
Xylenes, Total	20.0	20.3		ug/L		101	75 - 119	0	15

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Trifluorotoluene (Surr)	*98*		*80 - 141*
Toluene-d8 (Surr)	*96*		*82 - 122*
1,2-Dichloroethane-d4 (Surr)	*101*		*65 - 143*

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-222087/7
Matrix: Water
Analysis Batch: 222087

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	100		75 - 125
Dibromofluoromethane (Surr)	101		77 - 118

Lab Sample ID: MB 580-222186/5
Matrix: Water
Analysis Batch: 222186

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0		ug/L			07/13/16 10:13	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		80 - 141		07/13/16 10:13	1
Toluene-d8 (Surr)	99		82 - 122		07/13/16 10:13	1
1,2-Dichloroethane-d4 (Surr)	109		65 - 143		07/13/16 10:13	1
4-Bromofluorobenzene (Surr)	99		75 - 125		07/13/16 10:13	1
Dibromofluoromethane (Surr)	102		77 - 118		07/13/16 10:13	1

Lab Sample ID: LCS 580-222186/6
Matrix: Water
Analysis Batch: 222186

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzene			10.0	9.76		ug/L		97	80 - 120		

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	100		80 - 141
Toluene-d8 (Surr)	103		82 - 122
1,2-Dichloroethane-d4 (Surr)	105		65 - 143
4-Bromofluorobenzene (Surr)	106		75 - 125
Dibromofluoromethane (Surr)	102		77 - 118

Lab Sample ID: LCSD 580-222186/7
Matrix: Water
Analysis Batch: 222186

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene			10.0	9.63		ug/L		96	80 - 120	1	14

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	99		80 - 141
Toluene-d8 (Surr)	94		82 - 122
1,2-Dichloroethane-d4 (Surr)	105		65 - 143
4-Bromofluorobenzene (Surr)	102		75 - 125
Dibromofluoromethane (Surr)	102		77 - 118

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-221098/5
Matrix: Water
Analysis Batch: 221098

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		50		ug/L			06/29/16 12:16	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*50 - 150*		*06/29/16 12:16*	*1*
Trifluorotoluene (Surr)	*115*		*50 - 150*		*06/29/16 12:16*	*1*

Lab Sample ID: LCS 580-221098/6
Matrix: Water
Analysis Batch: 221098

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline			1170	1090		ug/L		93	79 - 110		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*105*		*50 - 150*
Trifluorotoluene (Surr)	*110*		*50 - 150*

Lab Sample ID: LCSD 580-221098/7
Matrix: Water
Analysis Batch: 221098

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline			1170	1120		ug/L		96	79 - 110	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*105*		*50 - 150*
Trifluorotoluene (Surr)	*112*		*50 - 150*

Lab Sample ID: MB 580-221557/6
Matrix: Water
Analysis Batch: 221557

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		50		ug/L			07/05/16 16:29	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*50 - 150*		*07/05/16 16:29*	*1*
Trifluorotoluene (Surr)	*103*		*50 - 150*		*07/05/16 16:29*	*1*

Lab Sample ID: LCS 580-221557/7
Matrix: Water
Analysis Batch: 221557

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline			1170	1080		ug/L		92	79 - 110		

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-221557/7
Matrix: Water
Analysis Batch: 221557

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*103*		*50 - 150*
Trifluorotoluene (Surr)	*104*		*50 - 150*

Lab Sample ID: LCSD 580-221557/8
Matrix: Water
Analysis Batch: 221557

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline			1170	1090		ug/L		93	79 - 110	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*105*		*50 - 150*
Trifluorotoluene (Surr)	*105*		*50 - 150*

Lab Sample ID: MB 580-222225/7
Matrix: Water
Analysis Batch: 222225

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		50		ug/L			07/13/16 13:29	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*50 - 150*		*07/13/16 13:29*	*1*
Trifluorotoluene (Surr)	*107*		*50 - 150*		*07/13/16 13:29*	*1*

Lab Sample ID: LCS 580-222225/8
Matrix: Water
Analysis Batch: 222225

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline			1170	1120		ug/L		96	79 - 110		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*107*		*50 - 150*
Trifluorotoluene (Surr)	*110*		*50 - 150*

Lab Sample ID: LCSD 580-222225/9
Matrix: Water
Analysis Batch: 222225

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline			1170	1130		ug/L		97	79 - 110	0	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*106*		*50 - 150*
Trifluorotoluene (Surr)	*112*		*50 - 150*

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-221454/1-B
Matrix: Water
Analysis Batch: 221450

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 221454

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		110		ug/L		07/02/16 12:23	07/02/16 19:17	1
Motor Oil (>C24-C36)	ND		250		ug/L		07/02/16 12:23	07/02/16 19:17	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*68*		*50 - 150*	*07/02/16 12:23*	*07/02/16 19:17*	*1*

Lab Sample ID: LCS 580-221454/2-B
Matrix: Water
Analysis Batch: 221450

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 221454

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2000	1750		ug/L		87	59 - 120
Motor Oil (>C24-C36)	2010	1680		ug/L		84	53 - 129

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*82*		*50 - 150*

Lab Sample ID: LCSD 580-221454/3-B
Matrix: Water
Analysis Batch: 221450

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 221454

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2000	1690		ug/L		84	59 - 120	4	27
Motor Oil (>C24-C36)	2010	1660		ug/L		83	53 - 129	1	19

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*80*		*50 - 150*

Lab Sample ID: MB 580-221887/1-B
Matrix: Water
Analysis Batch: 222017

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 221887

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		110		ug/L		07/08/16 13:55	07/11/16 23:42	1
Motor Oil (>C24-C36)	ND		250		ug/L		07/08/16 13:55	07/11/16 23:42	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*72*		*50 - 150*	*07/08/16 13:55*	*07/11/16 23:42*	*1*

Lab Sample ID: LCS 580-221887/2-B
Matrix: Water
Analysis Batch: 222017

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 221887

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2010	1560		ug/L		78	59 - 120
Motor Oil (>C24-C36)	2010	1660		ug/L		83	53 - 129

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-221887/2-B
Matrix: Water
Analysis Batch: 222017

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 221887

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*77*		*50 - 150*

Lab Sample ID: LCSD 580-221887/3-B
Matrix: Water
Analysis Batch: 222017

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 221887

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)			2010	1580		ug/L		78	59 - 120	1	27
Motor Oil (>C24-C36)			2010	1670		ug/L		83	53 - 129	1	19

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*76*		*50 - 150*

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 580-221345/13-A
Matrix: Water
Analysis Batch: 221741

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 221345

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.40		ug/L		07/01/16 09:01	07/06/16 12:55	1

Lab Sample ID: LCS 580-221345/14-A
Matrix: Water
Analysis Batch: 221741

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 221345

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			1000	998		ug/L		100	80 - 120		

Lab Sample ID: LCSD 580-221345/15-A
Matrix: Water
Analysis Batch: 221741

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 221345

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead			1000	989		ug/L		99	80 - 120	1	20

Lab Sample ID: LCSSRM 580-221345/16-A
Matrix: Water
Analysis Batch: 221741

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 221345

Analyte			Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			1000	995		ug/L		99	80 - 120		

Lab Chronicle

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60700-1

Client Sample ID: MW-1_20160629
Date Collected: 06/29/16 09:40
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		10	222087	07/12/16 20:00	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	222225	07/13/16 15:06	CJ	TAL SEA
Total/NA	Prep	3510C			221887	07/08/16 13:55	JCV	TAL SEA
Total/NA	Cleanup	3630C			221934	07/08/16 18:08	JCV	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	222017	07/12/16 01:11	KZ1	TAL SEA
Total Recoverable	Prep	3005A			221345	07/01/16 09:01	MKN	TAL SEA
Total Recoverable	Analysis	6020A		5	221741	07/06/16 14:07	FCW	TAL SEA

Client Sample ID: MW-2_20160629
Date Collected: 06/29/16 10:25
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	222087	07/12/16 19:02	CJ	TAL SEA
Total/NA	Analysis	8260C	DL	10	222186	07/13/16 12:08	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	221098	06/29/16 20:52	TL1	TAL SEA
Total/NA	Prep	3510C			221454	07/02/16 12:23	MDD	TAL SEA
Total/NA	Cleanup	3630C			221458	07/02/16 14:05	MDD	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	221450	07/02/16 23:14	KZ1	TAL SEA
Total Recoverable	Prep	3005A			221345	07/01/16 09:01	MKN	TAL SEA
Total Recoverable	Analysis	6020A		5	221741	07/06/16 14:15	FCW	TAL SEA

Client Sample ID: MW-3_20160629
Date Collected: 06/29/16 11:50
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	222087	07/12/16 18:33	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	221557	07/05/16 21:52	CJ	TAL SEA
Total/NA	Prep	3510C			221454	07/02/16 12:23	MDD	TAL SEA
Total/NA	Cleanup	3630C			221458	07/02/16 14:05	MDD	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	221450	07/02/16 23:35	KZ1	TAL SEA
Total Recoverable	Prep	3005A			221345	07/01/16 09:01	MKN	TAL SEA
Total Recoverable	Analysis	6020A		5	221741	07/06/16 14:11	FCW	TAL SEA

Client Sample ID: MW-4_20160629
Date Collected: 06/29/16 11:10
Date Received: 06/29/16 12:25

Lab Sample ID: 580-60700-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	222087	07/12/16 19:31	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	221557	07/05/16 22:25	CJ	TAL SEA

Lab Chronicle

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60700-1

Client Sample ID: MW-4_20160629

Lab Sample ID: 580-60700-4

Date Collected: 06/29/16 11:10
Matrix: Water
Date Received: 06/29/16 12:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			221454	07/02/16 12:23	MDD	TAL SEA
Total/NA	Cleanup	3630C			221458	07/02/16 14:05	MDD	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	221450	07/02/16 23:56	KZ1	TAL SEA
Total Recoverable	Prep	3005A			221345	07/01/16 09:01	MKN	TAL SEA
Total Recoverable	Analysis	6020A		5	221741	07/06/16 14:20	FCW	TAL SEA

Client Sample ID: MW-5_20160629

Lab Sample ID: 580-60700-5

Date Collected: 06/29/16 10:05
Matrix: Water
Date Received: 06/29/16 12:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	222087	07/12/16 18:05	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	221098	06/29/16 22:29	TL1	TAL SEA
Total/NA	Prep	3510C			221454	07/02/16 12:23	MDD	TAL SEA
Total/NA	Cleanup	3630C			221458	07/02/16 14:05	MDD	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	221450	07/03/16 00:17	KZ1	TAL SEA
Total Recoverable	Prep	3005A			221345	07/01/16 09:01	MKN	TAL SEA
Total Recoverable	Analysis	6020A		5	221741	07/06/16 14:24	FCW	TAL SEA

Client Sample ID: Method Blank w/3ml HNO3 Added

Lab Sample ID: 580-60700-6

Date Collected: 06/29/16 16:35
Matrix: Water
Date Received: 06/29/16 12:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			221345	07/01/16 09:01	MKN	TAL SEA
Total Recoverable	Analysis	6020A		5	221741	07/06/16 14:29	FCW	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60700-1

Laboratory: TestAmerica Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
Washington	State Program	10	C553	02-17-17

The following analytes are included in this report, but certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
8260C		Water	Xylenes, Total

Sample Summary

Client: Antea USA, Inc.
Project/Site: OPLC - Tacoma Junction

TestAmerica Job ID: 580-60700-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-60700-1	MW-1_20160629	Water	06/29/16 09:40	06/29/16 12:25
580-60700-2	MW-2_20160629	Water	06/29/16 10:25	06/29/16 12:25
580-60700-3	MW-3_20160629	Water	06/29/16 11:50	06/29/16 12:25
580-60700-4	MW-4_20160629	Water	06/29/16 11:10	06/29/16 12:25
580-60700-5	MW-5_20160629	Water	06/29/16 10:05	06/29/16 12:25
580-60700-6	Method Blank w/3ml HNO3 Added	Water	06/29/16 16:35	06/29/16 12:25

Atlantic Richfield Company
A BP affiliated company

Laboratory Management Program LaMP Chain of Custody Record

Loc: 580
60700

BP/ARC Project Name: Olympic Pipe Line Company
Req Due Date (mm/dd/yy): Standard Rush TAT: Yes ___ No X
BP/ARC Facility No: Tacoma Junction
Lab Work Order Number:

Lab Name:	Test America	BP/ARC Facility Address:	2660 Frank Albert Road East	Consultant/Contractor:	Antea Group
Lab Address:	Tacoma, WA	City, State, ZIP Code:	Fife WA 98424	Consultant/Contractor Project No:	WATACJC162
Lab PM:	Robert Greer	Lead Regulatory Agency:	WA Department of Ecology	Address:	4006 148th Avenue NE, Redmond, WA 98052
Lab Phone:	253.922.2310	California Global ID No.:	NA	Consultant/Contractor PM:	Megan Richard
Lab Shipping Accnt:	NA	Enfos Proposal No:	00BFF-0001 / WR302635	Phone:	P: 425.498.7711 F: 425.869.1892
Lab Bottle Order No:	NA	Accounting Mode:	Provision X OOC-BU ___ OOC-RM ___	Email EDD To:	Megan.Richard@anteagroup.com
Other Info:		Stage:	6_OM&M/Other (60) Activity: OM&M Spend (81)	Invoice To:	BP/ARC X Contractor ___

BP/ARC EBM: Paul Supple
EBM Phone: 925-275-3801
EBM Email: paul.supple@bp.com

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Matrix: Water / Liquid	Matrix: Air / Vapor	No. Containers / Preservative: Total Number of Containers	Unpreserved	H_2SO_4	HNO_3	HCl	Methanol	NaOH zn Acetate	Requested Analyses: 8260BTEX	NWTPH-Gx	NWTPH-DX (with silica gel)	Pb Total
	MW-1_20160629	6/29/2016	0940		X		9			1	8			X	X	X	X
	MW-2_20160629	6/29/2016	1025		X		9			1	8			X	X	X	X
	MW-3_20160629	6/29/2016	1150		X		9			1	8			X	X	X	X
	MW-4_20160629	6/29/2016	1110		X		9			1	8			X	X	X	X
	MW-5_20160629	6/29/2016	1005		X		9			1	8			X	X	X	X
	~~Trip Blank~~	6/29/2016			X		6				6			X	X		

Report Type & QC Level
Standard Y
Full Data Package ___

Comments
Note: If sample not collected, indicate "No Sample" in comments and single-strike out and initial any preprinted sample description.

ES

580-60700 Chain of Custody

TB A2 Cooler Cor 5.2 Unc 5.2 w/o
Cooler Dsc Ly Blu/whi @Lab
Wet/Packs Packing Bub
cli dro

Sampler's Name:	Eric Sanchez	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company:	Antea Group	Eric Sanchez / Antea	6/29/16	1225	Tom Blount / TA-Sea	6/29/16	1225
Shipment Method:	Drop-off	Ship Date: 6/29/16					
Shipment Tracking No:							

Special Instructions:

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temperature on Receipt: ___ °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

7/18/2016

BP/ARC LaMP COC Rev. 6 01/01/2005

Login Sample Receipt Checklist

Client: Antea USA, Inc.

Job Number: 580-60700-1

Login Number: 60700
List Number: 1
Creator: Gall, Brandon A

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	