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13 February 2017

Mr. Shane DeGross
Manager Environmental Remediation
BNSF Railway Company
605 Puyallup Avenue
Tacoma, Washington 98421

Subject: November 2016 Groundwater Compliance Monitoring Report
BNSF D Street Oil Pipeline Site
Tacoma, Washington
K/J Project 1696039.00

Dear Mr. DeGross:

This report presents the results of the November 2016 groundwater compliance monitoring completed at the BNSF Railway Company (BNSF) D Street Oil Pipeline Site in Tacoma, Washington (Site). The Site is located along the former alignment of an oil pipeline that was used to transport bunker oil from bulk storage tanks located north of the intersection of East 15th Street and D Street, to what is now the Tacoma Rail Yard located south and east of the intersection of East 21st Street and East D Street (Figure 1).

Background and Purpose

This groundwater sampling event was conducted as required by the Washington State Department of Ecology (Ecology) as part of a 5-year (Periodic) review to be conducted in 2016 in accordance with Washington Administrative Code (WAC) 173-340-420. The groundwater compliance monitoring is intended to monitor chemicals of concern (COCs) and natural attenuation parameters in groundwater following completion of the final remedial action in December 2009 (GeoEngineers 2010). The monitoring activities and this report are required by a Consent Decree (CD), dated 5 August 2008, between BNSF and Ecology (Pierce County Superior Court Action No. 08 2 11105 4).

The concentrations of COCs are evaluated at the Conditional Point of Compliance (CPOC) relative to Site cleanup levels (CULs) identified in the *Final Remedial Investigation (RI)/Feasibility Study (FS) Report* dated 4 April 2007 and the *Final Cleanup Action Plan* (CAP) dated 14 November 2007 (GeoEngineers 2007). Monitoring wells MW-2 through MW-5, MW-8, MW-9, and MW-11, collectively known as 'the D Street wells', serve to define the CPOC identified in the CAP (Figure 2).

The RI/FS and CAP identified the COCs for groundwater at the Site as petroleum hydrocarbons [quantified as Bunker Range Petroleum Hydrocarbons (BRPH)], carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and naphthalene. Model Toxics Control Act (MTCA) CULs for groundwater were selected for use at this Site, as defined in the CAP, and are summarized as:

- Petroleum hydrocarbons (quantified as BRPH): 0.5 milligrams per liter (mg/L)
- Total cPAHs (as determined using toxicity equivalency methodology as required in WAC 173-340-708(8)): 0.1 micrograms per liter (µg/L)
- Naphthalene: 160 µg/L.

Ecology Correspondence

In June 2011, the Ecology Site Manager, Mr. Marv Coleman, approved a request to discontinue annual groundwater monitoring at the Site. As part of that approval, Ecology noted that because the Site has institutional controls applied to it, a 5-year review will be required (Ecology 2011). According to Ecology, prior to the 5-year review, an additional round of groundwater sampling is required, along with an inspection of physical barriers put in place during remedial excavations. The planned installation locations of these physical barriers were provided in the *Engineering Design Report* (EDR) and were to be located surrounding the western ends of the Home Electric Building and Supervalu Building, along East D Street between East 18th Street and East 19th Street (GeoEngineers 2008).

Ecology indicated in a 2015 email that they would consider approving abandonment of the D Street wells after the 5-year review was completed (Ecology 2015a). This is consistent with previous correspondence with GeoEngineers' staff, where Ecology indicated they would consider terminating the CD after the 5-year review (GeoEngineers 2011).

In a follow-up letter to Mr. Bruce Sheppard (BNSF), dated 29 April 2015, Ecology indicated no further remedial action was necessary at the Site by some of the potentially liable parties (PLPs), including the Washington State Department of Transportation, the City of Tacoma, John Backus Home Electric, and 1815 D Street LLC. This NFA did not apply to BNSF, and the letter noted "*further remedial action is still necessary under MTCA and the consent decree to control and monitor remaining contamination and periodically review conditions at the site*" (Ecology 2015b). The letter noted that Ecology considers cleanup required at the Site under the CD to be complete, but post-cleanup actions are still required, including sampling of the D Street wells as part of the 5-year review, and inspecting physical barriers put in place during remedial excavations.

Field Methods

Per Ecology's request, a Site inspection was conducted on 19 August 2016. This included a visual inspection for evidence of recent ground disturbance activities in areas where subsurface physical barriers were installed during remedial excavations. The condition of Site monitoring

wells was also noted during the inspection. No evidence of recent ground disturbance was observed in areas surrounding the subsurface physical barriers.

Because the D Street wells are located in traffic lanes along East D Street, accessing the wells requires a Right-of-Way (ROW) permit from the City of Tacoma. Prior to conducting well development and sampling activities, Kennedy/Jenks Consultants obtained ROW Permit No. RCON16-0282 and subcontracted with a licensed traffic control services provider.

The D Street monitoring wells had not been accessed or sampled since 2011; as such, they were redeveloped prior to sampling on 21 November 2016. Development of the wells was accomplished by a combination of surging and over-pumping each well to remove accumulated sediment and clean the well screen. Wells MW-2, MW-4, MW-5, MW-8, MW-9, and MW-11 were purged using a 12-volt submersible well pump and dedicated polyethylene tubing. The submersible pump was decontaminated between each well using an Alconox® detergent wash and tap water rinse, followed by a distilled water rinse. Monitoring well MW-3 could not be purged using the submersible pump because the casing was partially blocked approximately 3 feet below the top of casing. The source of the obstruction could not be determined, but the casing was still open enough to allow passage of a water level meter and polyethylene tubing. As such, well MW-3 was surged as much as possible using the polyethylene tubing, and was purged using a peristaltic pump until the water was clear. Wells MW-2, MW-4, MW-5, MW-8, MW-9, and MW-11 were purged until each well was producing clear water after surging. Approximately 5 well volumes of water were purged from each well. Purge water was placed into 55-gallon drums, labeled, and temporarily stored at the nearby Tacoma Rail Yard for offsite disposal.

Groundwater samples were collected for laboratory analysis in general accordance with the 9 July 2008 Compliance Monitoring Plan (CMP) as presented in the EDR. The November 2016 groundwater compliance monitoring samples were collected on 30 November 2016, primarily during an outgoing tide, as measured by the National Oceanic and Atmospheric Administration's Commencement Bay Tidal Station 9446484. Although the CMP does not specify when groundwater samples will be collected in regards to tidal stage, samples were collected primarily during an outgoing tide to limit the potential for tidally-induced groundwater gradients to bias conditions observed at the CPOC.

The groundwater samples were collected following low-flow sampling guidelines to minimize the suspension of particulates in the samples. Groundwater samples were collected using a peristaltic pump with new, dedicated polyethylene tubing at each well. Groundwater samples were collected by pumping at flow rates of less than 0.5 liters per minute from the approximate mid-point of the screened interval in each well.

A YSI water quality meter was used with an inline flow-through cell to monitor electrical conductivity, dissolved oxygen (DO), pH, oxidation-reduction potential (ORP) and temperature. Turbidity was measured using a stand-alone Micro TPI turbidity meter. As noted in the CMP, ambient groundwater conditions were assumed to have been reached once three consecutive

measurements of temperature, pH, and conductivity were within 10 percent of each other, and the turbidity is approximately 5 nephelometric turbidity units (NTUs) or less.

Once the water quality parameters had stabilized, the flow-through-cell was disconnected and the groundwater samples were collected in laboratory-provided containers. The samples were placed into a cooler with ice and shipped under chain-of-custody protocol to ESC Lab Sciences of Mt. Juliet, Tennessee, a Washington State accredited environmental laboratory. The groundwater samples were submitted for analysis of:

- Diesel Range Petroleum Hydrocarbons by Method NWTPH-Dx with silica gel cleanup
- PAHs by U.S. Environmental Protection Agency (EPA) Method 8270D-SIM
- Manganese by EPA Method 6020
- Nitrates by EPA Method 9056A
- Sulfates by EPA Method 9056A
- Total Alkalinity by EPA Method 2320 B-2011.

Natural attenuation parameter data were collected to monitor Site conditions as described in the CMP.

Purge water from well development and groundwater sampling was placed into labeled 55-gallon drums for future waste characterization and offsite disposal.

Analytical Results

Monitoring wells MW-2 through MW-5 and MW-8, MW-9, and MW-11 were sampled on 30 November 2016. Analytical results are summarized in Table 1, and the laboratory analytical report is included as Attachment A. A data validation summary is included in Attachment B.

Petroleum Hydrocarbons

Diesel-range and residual-range petroleum hydrocarbons were not detected at concentrations greater than the laboratory reporting limit in any of the groundwater samples collected during the November 2016 groundwater compliance monitoring.

cPAHs

cPAHs were not detected at concentrations greater than the laboratory reporting limit in any of the groundwater samples collected during the November 2016 groundwater compliance monitoring.

Naphthalene

Naphthalene, 1-methyl-naphthalene, and 2-methyl-naphthalene were not detected at concentrations greater than the laboratory reporting limit in any of the groundwater samples collected during the November 2016 groundwater compliance monitoring.

Natural Attenuation Parameters

The primary natural attenuation parameters (pH, conductivity, temperature, DO, and ORP) collected in the field during the November 2016 groundwater compliance monitoring were variable across the Site and similar to results from the last monitoring event in February 2011 (GeoEngineers 2011). The measured parameters continue to indicate conditions are generally favorable for natural attenuation of any residual hydrocarbons that may potentially remain at the Site.

Secondary natural attenuation parameters (manganese, total alkalinity, nitrate, and sulfate) are also variable and similar to those observed during the last groundwater compliance monitoring event in 2011. These parameters also continue to indicate conditions are favorable for natural attenuation of any residual BRPHs that potentially remain at the Site.

Conclusion

Diesel and heavy oil range hydrocarbons, PAHs, and cPAHs were not detected above the laboratory reporting limits in any of the groundwater samples collected from the D Street wells during the November 2016 groundwater compliance monitoring event. The results of the November 2016 groundwater compliance monitoring are consistent with the results of the 2010 and 2011 events. The November 2016 groundwater compliance monitoring results indicate that the Site is in compliance with the MTCA CULs established in the CD.

Based on our evaluation of the historical compliance monitoring results, it is our opinion that the conditions for site cleanup as described in both the CD and the CMP have been met. As it appears the goals identified in the CD and the CMP have been achieved, we recommend discontinuing the groundwater compliance monitoring program, finalizing the 5-year review, permanently abandoning the D Street monitoring wells, and terminating the CD.

Very truly yours,

KENNEDY/JENKS CONSULTANTS

Nathan Moxley, LG, LHG
Project Manager

Ty C. Schreiner
Vice President

cc: Marv Coleman, Washington State Department of Ecology

Attachments:

Table 1 Summary of Groundwater Compliance Monitoring Analytical Results
Table 2 Summary of Groundwater Compliance Monitoring Natural Attenuation Parameters
Figure 1: Vicinity Map
Figure 2: Site Map
Attachment A: Laboratory Analytical Report and Chain-of-Custody Documentation
Attachment B: Data Quality Assessment Summary

References

GeoEngineers. 2007. Draft Final Cleanup Action Plan; The BNSF Oil Pipeline Site, Tacoma, Washington. 14 November.

GeoEngineers. 2008. Engineering Design Report, The BNSF Oil Pipeline, Tacoma, Washington. 9 July.

GeoEngineers. 2010. Final Remedial Action Report; The BNSF Oil Pipeline Site, Tacoma, Washington. 28 May.

GeoEngineers. 2011. Email from Nick Rohrbach (GeoEngineers) to Matt Wells (Tupper Mack Wells PLLC) and Bruce Sheppard (BNSF) summarizing conversation with Marv Coleman (Ecology). 7 July 2011.

Washington State Department of Ecology. 2011. Letter to Bruce Sheppard re: February 2011 Groundwater Compliance Monitoring Report. BNSF Oil Pipeline Site, Tacoma, WA, 15 June 2011. BNSF D Street Pipeline FSID# 2923141.

Washington State Department of Ecology. 2015a. Email from Marv Coleman (Ecology) to Laura Himes (Kennedy/Jenks Consultants). 20 May 2015.

Washington State Department of Ecology. 2015b. Letter to Bruce Sheppard re: Status of Consent Decree No 08 2 1115 4 and No Further Action to complete Cleanup of the BNSF D Street Pipeline Site. 29 April 2015.

Tables

TABLE 1

SUMMARY OF GROUNDWATER COMPLIANCE MONITORING ANALYTICAL RESULTS
November 2016 Compliance Monitoring
November 30, 2016
BNSF D Street Pipeline, Tacoma, Washington

Monitoring Well ID	Total Petroleum Hydrocarbons[a] (mg/L)		Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)[b] (µg/L)							PAHs[b] (µg/L)		
	Diesel Range	Heavy Oil Range	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) flouranthene	Benzo(k) flouranthene	Chrysene	Dibenz(a,h) anthracene	Indeno (1,2,3-cd)pyrene	1-Methyl-naphthalene	2-Methyl-naphthalene	Naphthalene
MW-2	0.250 U	0.500 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.500 U	0.500 U	0.500 U
D-1	0.250 U	0.500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.250 U	0.250 U	0.250 U
MW-3	0.250 U	0.500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.250 U	0.250 U	0.250 U
MW-4	0.250 U	0.500 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.500 U	0.500 U	0.500 U
MW-5	0.250 U	0.500 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.500 U	0.500 U	0.500 U
MW-8	0.250 U	0.500 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.500 U	0.500 U	0.500 U
MW-9	0.250 U	0.500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.250 U	0.250 U	0.250 U
MW-11	0.250 U	0.500 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.500 U	0.500 U	0.500 U
MTCA Method A Cleanup Levels	0.5	0.5	0.1 [c]							160 [d]		

Notes:

(a) Analyzed by Washington State Department of Ecology Method NWTPH-Dx.

(b) Analyzed by U.S. Environmental Protection Agency (EPA) Method 8270-SIM.

(c) Cleanup level for cPAHs is defined as the total toxic equivalent concentration of benzo(a)pyrene, as defined in WAC 173-340-708(8)(e).

(d) Cleanup level is a total value for naphthalene, 1-methyl naphthalene, and 2-methyl naphthalene.

Duplicate sample 'D-1' was collected from MW-2.

mg/L = milligrams per liter

µg/L = micrograms per liter

MTCA = Washington State Department of Ecology Model Toxics Control Act (WAC 173-340)

U = Not detected at or greater than the laboratory reporting limits

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TABLE 2

SUMMARY OF GROUNDWATER COMPLIANCE MONITORING NATURAL ATTENUATION PARAMETERS
November 2016 Compliance Monitoring
November 30, 2016
BNSF D Street Pipeline, Tacoma, Washington

Monitoring Well ID	Water Quality Parameters						Natural Attenuation Parameters (mg/L)				
	pH	Conductivity (mS/cm)	Turbidity (NTU)	Temperature (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Manganese (total)	Manganese (dissolved)	Alkalinity	Nitrate	Sulfate
MW-2	6.7	556.8	20.86	13.36	0.41	-102.8	1.170	1.260	314	0.102	77.3
D-1	--	--	--	--	--	--	1.140	1.260	258	0.104	77.6
MW-3	6.6	4991	6.5	12.85	0.98	-108.1	2.090	2.400	332	0.100 U	59.6
MW-4	6.3	2708	4.45	12.29	0.90	-185.0	1.460	1.390	323	0.100 U	5 U
MW-5	6.6	4870	0.76	12.58	1.04	-239.2	0.643	0.648	391	0.100 U	18.8
MW-8	6.4	3318	0.82	12.38	0.64	-201.6	0.304	0.332	252	0.100 U	1,360
MW-9	7.0	1451	6.9	13.22	0.93	-154.8	0.260	0.251	349	0.100 U	5 U
MW-11	6.4	2884	0.22	11.46	0.89	-282.0	0.569	0.586	311	11.500	1,100

Notes:

Duplicate sample 'D-1' was collected from MW-2.

mS/cm = microsiemens per centimeter

NTU = Nephelometric Turbidity Unit

°C = degrees celcius

ORP = oxidation-reduction potential

mg/L = milligrams per liter

mV = millivolts

U = Not detected at or above laboratory reporting limits

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Figures

Path: N:\Projects\2013\D Street Pipeline Tacoma\GIS\Vicinity Map.mxd Printed by: AliceRobinson

Source:

Legend

Approximate Site Extent

N

0 1,000 2,000

Scale: Feet

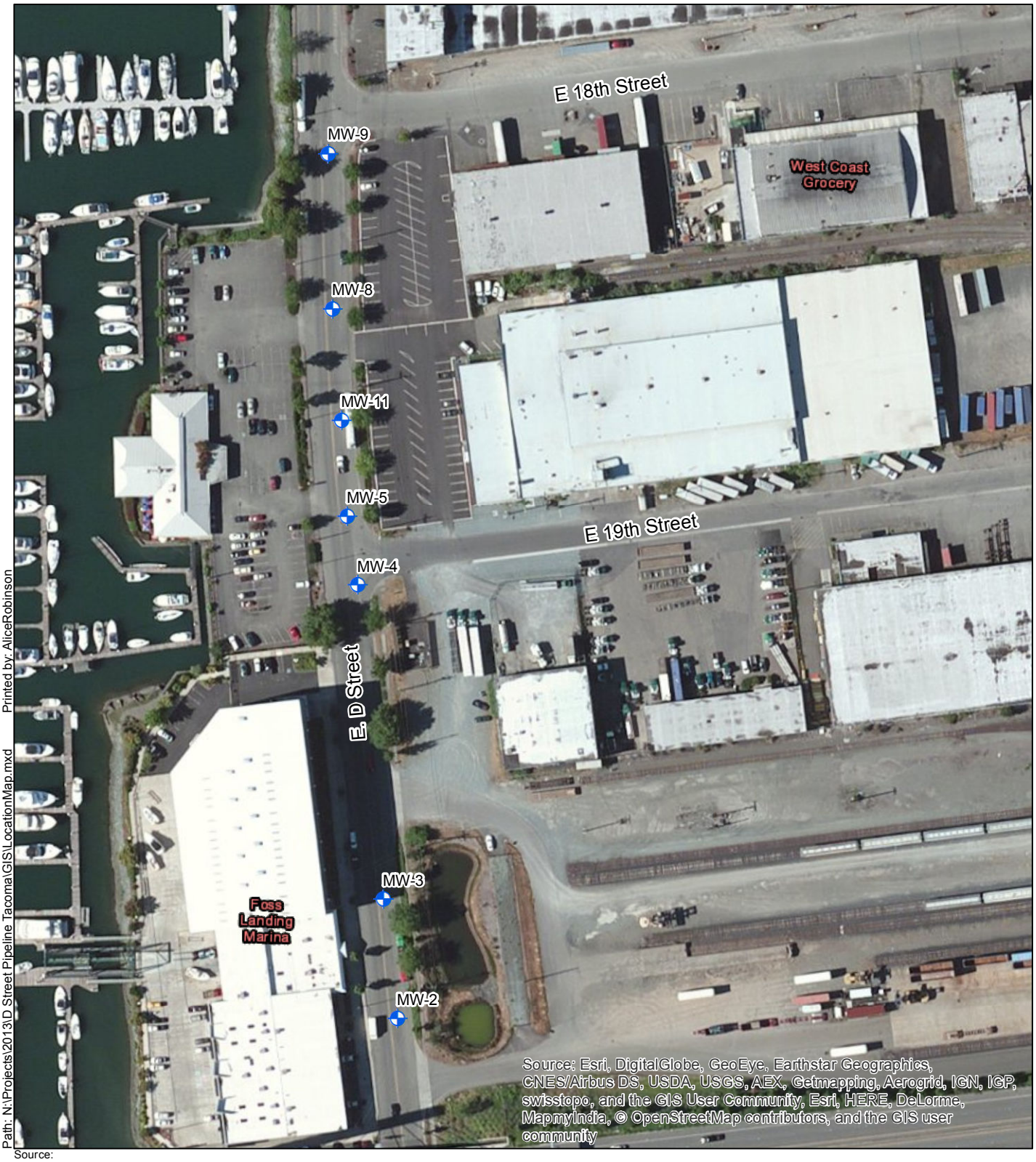
Kennedy/Jenks Consultants

BNSF D Street Oil Pipeline Site
Tacoma, Washington

Vicinity Map

1696039*00
December 2016

Figure 1



Path: N:\Projects\2013\D Street Pipeline Tacoma\GIS\LocationMap.mxd Printed by: AliceRobinson

Source:

Legend

Monitoring Well Location and Designation

N

0 75 150

Scale: Feet

Kennedy/Jenks Consultants

BNSF D Street Oil Pipeline Site
Tacoma, Washington

Site Map

1696039*00
December 2016

Figure 2

Attachment A

Laboratory Analytical Report and Chain-of-Custody Documentation

ANALYTICAL REPORT

December 09, 2016

Kennedy/Jenks Con-BNSF Region 1

Sample Delivery Group:	L875470
Samples Received:	12/01/2016
Project Number:	1696039.00
Description:	BNSF - D St. Wells
Site:	D STREET PIPELINE
Report To:	Nathan Moxley 32001 32nd Avenue South, Ste 100 Federal Way, WA 98001

Entire Report Reviewed By:

Mark W. Beasley
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

MW-9-20161130 L875470-01 GW

Collected by: Alexander Lesher
Collected date/time: 11/30/16 08:55
Received date/time: 12/01/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG931185	1	12/02/16 12:44	12/03/16 14:58	LAT
Metals (ICPMS) by Method 6020	WG931186	1	12/01/16 20:20	12/02/16 12:19	LAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG931662	1	12/04/16 07:13	12/05/16 02:59	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX	WG931238	1	12/02/16 08:12	12/03/16 11:54	TRF
Wet Chemistry by Method 2320 B-2011	WG931302	1	12/02/16 07:48	12/02/16 07:48	AMC
Wet Chemistry by Method 9056A	WG931112	1	12/01/16 14:17	12/01/16 14:17	SAM

MW-8-20161130 L875470-02 GW

Collected by: Alexander Lesher
Collected date/time: 11/30/16 10:00
Received date/time: 12/01/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG931185	1	12/02/16 12:44	12/03/16 15:02	LAT
Metals (ICPMS) by Method 6020	WG931186	1	12/01/16 20:20	12/02/16 10:42	LAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG931662	2	12/04/16 07:13	12/05/16 03:20	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX	WG931238	1	12/02/16 08:12	12/03/16 12:10	TRF
Wet Chemistry by Method 2320 B-2011	WG931302	1	12/02/16 07:57	12/02/16 07:57	AMC
Wet Chemistry by Method 9056A	WG931112	1	12/01/16 14:47	12/01/16 14:47	SAM
Wet Chemistry by Method 9056A	WG931112	50	12/01/16 15:03	12/01/16 15:03	SAM

MW-11-20161130 L875470-03 GW

Collected by: Alexander Lesher
Collected date/time: 11/30/16 10:40
Received date/time: 12/01/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG931185	1	12/02/16 12:44	12/03/16 15:12	LAT
Metals (ICPMS) by Method 6020	WG931186	1	12/01/16 20:20	12/02/16 12:23	LAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG931662	2	12/04/16 07:13	12/05/16 03:42	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX	WG931238	1	12/02/16 08:12	12/03/16 12:27	TRF
Wet Chemistry by Method 2320 B-2011	WG931302	1	12/02/16 08:05	12/02/16 08:05	AMC
Wet Chemistry by Method 9056A	WG931112	5	12/01/16 15:18	12/01/16 15:18	SAM
Wet Chemistry by Method 9056A	WG931536	20	12/03/16 12:57	12/03/16 12:57	SAM

MW-5-20161130 L875470-04 GW

Collected by: Alexander Lesher
Collected date/time: 11/30/16 11:15
Received date/time: 12/01/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG931185	1	12/02/16 12:44	12/03/16 14:40	LAT
Metals (ICPMS) by Method 6020	WG931186	1	12/01/16 20:20	12/02/16 12:26	LAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG931662	2	12/04/16 07:13	12/05/16 04:04	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX	WG931238	1	12/02/16 08:12	12/03/16 12:44	TRF
Wet Chemistry by Method 2320 B-2011	WG931302	1	12/02/16 08:14	12/02/16 08:14	AMC
Wet Chemistry by Method 9056A	WG931112	1	12/01/16 16:04	12/01/16 16:04	SAM

MW-4-20161130 L875470-05 GW

Collected by: Alexander Lesher
Collected date/time: 11/30/16 11:55
Received date/time: 12/01/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG931185	1	12/02/16 12:44	12/03/16 15:16	LAT
Metals (ICPMS) by Method 6020	WG931186	1	12/01/16 20:20	12/02/16 12:30	LAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG931662	2	12/04/16 07:13	12/05/16 04:26	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX	WG931238	1	12/02/16 08:12	12/03/16 13:00	TRF
Wet Chemistry by Method 2320 B-2011	WG931302	1	12/02/16 08:23	12/02/16 08:23	AMC
Wet Chemistry by Method 9056A	WG931112	1	12/01/16 16:35	12/01/16 16:35	SAM

MW-3-20161130 L875470-06 GW

Collected by: Alexander Lesher
Collected date/time: 11/30/16 12:30
Received date/time: 12/01/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG931185	1	12/02/16 12:44	12/03/16 15:19	LAT
Metals (ICPMS) by Method 6020	WG931186	5	12/01/16 20:20	12/02/16 14:23	LAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG931662	1	12/04/16 07:13	12/05/16 04:48	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX	WG931238	1	12/02/16 08:12	12/03/16 13:17	TRF
Wet Chemistry by Method 2320 B-2011	WG931302	1	12/02/16 08:31	12/02/16 08:31	AMC
Wet Chemistry by Method 9056A	WG931112	1	12/01/16 16:50	12/01/16 16:50	SAM

MW-2-20161130 L875470-07 GW

Collected by: Alexander Lesher
Collected date/time: 11/30/16 13:05
Received date/time: 12/01/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG931185	1	12/02/16 12:44	12/03/16 15:23	LAT
Metals (ICPMS) by Method 6020	WG931186	1	12/01/16 20:20	12/02/16 12:37	LAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG931662	2	12/04/16 07:13	12/05/16 05:09	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX	WG931238	1	12/02/16 08:12	12/03/16 13:33	TRF
Wet Chemistry by Method 2320 B-2011	WG931302	1	12/02/16 10:27	12/02/16 10:27	AMC
Wet Chemistry by Method 9056A	WG931112	1	12/01/16 17:06	12/01/16 17:06	SAM

D-1-20161130 L875470-08 GW

Collected by: Alexander Lesher
Collected date/time: 11/30/16 00:00
Received date/time: 12/01/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG931185	1	12/02/16 12:44	12/03/16 15:27	LAT
Metals (ICPMS) by Method 6020	WG931186	1	12/01/16 20:20	12/02/16 13:39	LAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG931662	1	12/04/16 07:13	12/05/16 05:31	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX	WG931238	1	12/02/16 08:12	12/03/16 13:50	TRF
Wet Chemistry by Method 2320 B-2011	WG931302	1	12/02/16 10:37	12/02/16 10:37	AMC
Wet Chemistry by Method 9056A	WG931112	1	12/01/16 17:21	12/01/16 17:21	SAM

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Mark W. Beasley
Technical Service Representative

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Alkalinity	349000		20000	1	12/02/2016 07:48	WG931302

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate	ND		100	1	12/01/2016 14:17	WG931112
Sulfate	ND		5000	1	12/01/2016 14:17	WG931112

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Manganese	260		5.00	1	12/03/2016 14:58	WG931185
Manganese,Dissolved	251		5.00	1	12/02/2016 12:19	WG931186

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	ND		250	1	12/03/2016 11:54	WG931238
Residual Range Organics (RRO)	ND		500	1	12/03/2016 11:54	WG931238
(S) o-Terphenyl	*127*		*50.0-150*		*12/03/2016 11:54*	WG931238

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Anthracene	ND		0.0500	1	12/05/2016 02:59	WG931662
Acenaphthene	ND		0.0500	1	12/05/2016 02:59	WG931662
Acenaphthylene	ND		0.0500	1	12/05/2016 02:59	WG931662
Benzo(a)anthracene	ND		0.0500	1	12/05/2016 02:59	WG931662
Benzo(a)pyrene	ND		0.0500	1	12/05/2016 02:59	WG931662
Benzo(b)fluoranthene	ND		0.0500	1	12/05/2016 02:59	WG931662
Benzo(g,h,i)perylene	ND		0.0500	1	12/05/2016 02:59	WG931662
Benzo(k)fluoranthene	ND		0.0500	1	12/05/2016 02:59	WG931662
Chrysene	ND		0.0500	1	12/05/2016 02:59	WG931662
Dibenz(a,h)anthracene	ND		0.0500	1	12/05/2016 02:59	WG931662
Fluoranthene	ND		0.0500	1	12/05/2016 02:59	WG931662
Fluorene	ND		0.0500	1	12/05/2016 02:59	WG931662
Indeno(1,2,3-cd)pyrene	ND		0.0500	1	12/05/2016 02:59	WG931662
Naphthalene	ND		0.250	1	12/05/2016 02:59	WG931662
Phenanthrene	ND		0.0500	1	12/05/2016 02:59	WG931662
Pyrene	ND		0.0500	1	12/05/2016 02:59	WG931662
1-Methylnaphthalene	ND		0.250	1	12/05/2016 02:59	WG931662
2-Methylnaphthalene	ND		0.250	1	12/05/2016 02:59	WG931662
2-Chloronaphthalene	ND		0.250	1	12/05/2016 02:59	WG931662
(S) Nitrobenzene-d5	*98.4*		*45.1-170*		*12/05/2016 02:59*	WG931662
(S) 2-Fluorobiphenyl	*103*		*57.7-153*		*12/05/2016 02:59*	WG931662
(S) p-Terphenyl-d14	*103*		*53.2-156*		*12/05/2016 02:59*	WG931662

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Alkalinity	252000		20000	1	12/02/2016 07:57	WG931302

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate	ND		100	1	12/01/2016 14:47	WG931112
Sulfate	1360000		250000	50	12/01/2016 15:03	WG931112

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Manganese	304		5.00	1	12/03/2016 15:02	WG931185
Manganese,Dissolved	332	O1	5.00	1	12/02/2016 10:42	WG931186

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	ND		250	1	12/03/2016 12:10	WG931238
Residual Range Organics (RRO)	ND		500	1	12/03/2016 12:10	WG931238
(S) o-Terphenyl	*130*		*50.0-150*		*12/03/2016 12:10*	WG931238

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Anthracene	ND		0.100	2	12/05/2016 03:20	WG931662
Acenaphthene	ND		0.100	2	12/05/2016 03:20	WG931662
Acenaphthylene	ND		0.100	2	12/05/2016 03:20	WG931662
Benzo(a)anthracene	ND		0.100	2	12/05/2016 03:20	WG931662
Benzo(a)pyrene	ND		0.100	2	12/05/2016 03:20	WG931662
Benzo(b)fluoranthene	ND		0.100	2	12/05/2016 03:20	WG931662
Benzo(g,h,i)perylene	ND		0.100	2	12/05/2016 03:20	WG931662
Benzo(k)fluoranthene	ND		0.100	2	12/05/2016 03:20	WG931662
Chrysene	ND		0.100	2	12/05/2016 03:20	WG931662
Dibenz(a,h)anthracene	ND		0.100	2	12/05/2016 03:20	WG931662
Fluoranthene	ND		0.100	2	12/05/2016 03:20	WG931662
Fluorene	ND		0.100	2	12/05/2016 03:20	WG931662
Indeno(1,2,3-cd)pyrene	ND		0.100	2	12/05/2016 03:20	WG931662
Naphthalene	ND		0.500	2	12/05/2016 03:20	WG931662
Phenanthrene	ND		0.100	2	12/05/2016 03:20	WG931662
Pyrene	ND		0.100	2	12/05/2016 03:20	WG931662
1-Methylnaphthalene	ND		0.500	2	12/05/2016 03:20	WG931662
2-Methylnaphthalene	ND		0.500	2	12/05/2016 03:20	WG931662
2-Chloronaphthalene	ND		0.500	2	12/05/2016 03:20	WG931662
(S) Nitrobenzene-d5	*90.2*		*45.1-170*		*12/05/2016 03:20*	WG931662
(S) 2-Fluorobiphenyl	*93.0*		*57.7-153*		*12/05/2016 03:20*	WG931662
(S) p-Terphenyl-d14	*101*		*53.2-156*		*12/05/2016 03:20*	WG931662

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Alkalinity	311000		20000	1	12/02/2016 08:05	WG931302

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate	11500		500	5	12/01/2016 15:18	WG931112
Sulfate	1100000		100000	20	12/03/2016 12:57	WG931536

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Manganese	569		5.00	1	12/03/2016 15:12	WG931185
Manganese,Dissolved	586		5.00	1	12/02/2016 12:23	WG931186

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	ND		250	1	12/03/2016 12:27	WG931238
Residual Range Organics (RRO)	ND		500	1	12/03/2016 12:27	WG931238
(S) o-Terphenyl	*128*		*50.0-150*		*12/03/2016 12:27*	WG931238

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Anthracene	ND		0.100	2	12/05/2016 03:42	WG931662
Acenaphthene	ND		0.100	2	12/05/2016 03:42	WG931662
Acenaphthylene	ND		0.100	2	12/05/2016 03:42	WG931662
Benzo(a)anthracene	ND		0.100	2	12/05/2016 03:42	WG931662
Benzo(a)pyrene	ND		0.100	2	12/05/2016 03:42	WG931662
Benzo(b)fluoranthene	ND		0.100	2	12/05/2016 03:42	WG931662
Benzo(g,h,i)perylene	ND		0.100	2	12/05/2016 03:42	WG931662
Benzo(k)fluoranthene	ND		0.100	2	12/05/2016 03:42	WG931662
Chrysene	ND		0.100	2	12/05/2016 03:42	WG931662
Dibenz(a,h)anthracene	ND		0.100	2	12/05/2016 03:42	WG931662
Fluoranthene	ND		0.100	2	12/05/2016 03:42	WG931662
Fluorene	ND		0.100	2	12/05/2016 03:42	WG931662
Indeno(1,2,3-cd)pyrene	ND		0.100	2	12/05/2016 03:42	WG931662
Naphthalene	ND		0.500	2	12/05/2016 03:42	WG931662
Phenanthrene	ND		0.100	2	12/05/2016 03:42	WG931662
Pyrene	ND		0.100	2	12/05/2016 03:42	WG931662
1-Methylnaphthalene	ND		0.500	2	12/05/2016 03:42	WG931662
2-Methylnaphthalene	ND		0.500	2	12/05/2016 03:42	WG931662
2-Chloronaphthalene	ND		0.500	2	12/05/2016 03:42	WG931662
(S) Nitrobenzene-d5	*88.5*		*45.1-170*		*12/05/2016 03:42*	WG931662
(S) 2-Fluorobiphenyl	*92.7*		*57.7-153*		*12/05/2016 03:42*	WG931662
(S) p-Terphenyl-d14	*99.9*		*53.2-156*		*12/05/2016 03:42*	WG931662

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Alkalinity	391000		20000	1	12/02/2016 08:14	WG931302

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate	ND		100	1	12/01/2016 16:04	WG931112
Sulfate	18800		5000	1	12/01/2016 16:04	WG931112

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Manganese	643	V	5.00	1	12/03/2016 14:40	WG931185
Manganese,Dissolved	648		5.00	1	12/02/2016 12:26	WG931186

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	ND		250	1	12/03/2016 12:44	WG931238
Residual Range Organics (RRO)	ND		500	1	12/03/2016 12:44	WG931238
(S) o-Terphenyl	*133*		*50.0-150*		*12/03/2016 12:44*	WG931238

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Anthracene	ND		0.100	2	12/05/2016 04:04	WG931662
Acenaphthene	ND		0.100	2	12/05/2016 04:04	WG931662
Acenaphthylene	ND		0.100	2	12/05/2016 04:04	WG931662
Benzo(a)anthracene	ND		0.100	2	12/05/2016 04:04	WG931662
Benzo(a)pyrene	ND		0.100	2	12/05/2016 04:04	WG931662
Benzo(b)fluoranthene	ND		0.100	2	12/05/2016 04:04	WG931662
Benzo(g,h,i)perylene	ND		0.100	2	12/05/2016 04:04	WG931662
Benzo(k)fluoranthene	ND		0.100	2	12/05/2016 04:04	WG931662
Chrysene	ND		0.100	2	12/05/2016 04:04	WG931662
Dibenz(a,h)anthracene	ND		0.100	2	12/05/2016 04:04	WG931662
Fluoranthene	ND		0.100	2	12/05/2016 04:04	WG931662
Fluorene	ND		0.100	2	12/05/2016 04:04	WG931662
Indeno(1,2,3-cd)pyrene	ND		0.100	2	12/05/2016 04:04	WG931662
Naphthalene	ND		0.500	2	12/05/2016 04:04	WG931662
Phenanthrene	ND		0.100	2	12/05/2016 04:04	WG931662
Pyrene	ND		0.100	2	12/05/2016 04:04	WG931662
1-Methylnaphthalene	ND		0.500	2	12/05/2016 04:04	WG931662
2-Methylnaphthalene	ND		0.500	2	12/05/2016 04:04	WG931662
2-Chloronaphthalene	ND		0.500	2	12/05/2016 04:04	WG931662
(S) Nitrobenzene-d5	*87.1*		*45.1-170*		*12/05/2016 04:04*	WG931662
(S) 2-Fluorobiphenyl	*84.7*		*57.7-153*		*12/05/2016 04:04*	WG931662
(S) p-Terphenyl-d14	*81.4*		*53.2-156*		*12/05/2016 04:04*	WG931662

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Alkalinity	323000		20000	1	12/02/2016 08:23	WG931302

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate	ND		100	1	12/01/2016 16:35	WG931112
Sulfate	ND		5000	1	12/01/2016 16:35	WG931112

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Manganese	1460		5.00	1	12/03/2016 15:16	WG931185
Manganese,Dissolved	1390		5.00	1	12/02/2016 12:30	WG931186

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	ND		250	1	12/03/2016 13:00	WG931238
Residual Range Organics (RRO)	ND		500	1	12/03/2016 13:00	WG931238
(S) o-Terphenyl	*123*		*50.0-150*		*12/03/2016 13:00*	WG931238

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Anthracene	ND		0.100	2	12/05/2016 04:26	WG931662
Acenaphthene	ND		0.100	2	12/05/2016 04:26	WG931662
Acenaphthylene	ND		0.100	2	12/05/2016 04:26	WG931662
Benzo(a)anthracene	ND		0.100	2	12/05/2016 04:26	WG931662
Benzo(a)pyrene	ND		0.100	2	12/05/2016 04:26	WG931662
Benzo(b)fluoranthene	ND		0.100	2	12/05/2016 04:26	WG931662
Benzo(g,h,i)perylene	ND		0.100	2	12/05/2016 04:26	WG931662
Benzo(k)fluoranthene	ND		0.100	2	12/05/2016 04:26	WG931662
Chrysene	ND		0.100	2	12/05/2016 04:26	WG931662
Dibenz(a,h)anthracene	ND		0.100	2	12/05/2016 04:26	WG931662
Fluoranthene	ND		0.100	2	12/05/2016 04:26	WG931662
Fluorene	ND		0.100	2	12/05/2016 04:26	WG931662
Indeno(1,2,3-cd)pyrene	ND		0.100	2	12/05/2016 04:26	WG931662
Naphthalene	ND		0.500	2	12/05/2016 04:26	WG931662
Phenanthrene	ND		0.100	2	12/05/2016 04:26	WG931662
Pyrene	ND		0.100	2	12/05/2016 04:26	WG931662
1-Methylnaphthalene	ND		0.500	2	12/05/2016 04:26	WG931662
2-Methylnaphthalene	ND		0.500	2	12/05/2016 04:26	WG931662
2-Chloronaphthalene	ND		0.500	2	12/05/2016 04:26	WG931662
(S) Nitrobenzene-d5	*88.3*		*45.1-170*		*12/05/2016 04:26*	WG931662
(S) 2-Fluorobiphenyl	*95.1*		*57.7-153*		*12/05/2016 04:26*	WG931662
(S) p-Terphenyl-d14	*90.7*		*53.2-156*		*12/05/2016 04:26*	WG931662

Wet Chemistry by Method 2320 B-2011

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alkalinity	332000		20000	1	12/02/2016 08:31	WG931302

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Nitrate	ND		100	1	12/01/2016 16:50	WG931112
Sulfate	59600		5000	1	12/01/2016 16:50	WG931112

Metals (ICPMS) by Method 6020

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Manganese	2090		5.00	1	12/03/2016 15:19	WG931185
Manganese,Dissolved	2400		25.0	5	12/02/2016 14:23	WG931186

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		250	1	12/03/2016 13:17	WG931238
Residual Range Organics (RRO)	ND		500	1	12/03/2016 13:17	WG931238
(S) o-Terphenyl	*122*		*50.0-150*		*12/03/2016 13:17*	WG931238

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Anthracene	ND		0.0500	1	12/05/2016 04:48	WG931662
Acenaphthene	ND		0.0500	1	12/05/2016 04:48	WG931662
Acenaphthylene	ND		0.0500	1	12/05/2016 04:48	WG931662
Benzo(a)anthracene	ND		0.0500	1	12/05/2016 04:48	WG931662
Benzo(a)pyrene	ND		0.0500	1	12/05/2016 04:48	WG931662
Benzo(b)fluoranthene	ND		0.0500	1	12/05/2016 04:48	WG931662
Benzo(g,h,i)perylene	ND		0.0500	1	12/05/2016 04:48	WG931662
Benzo(k)fluoranthene	ND		0.0500	1	12/05/2016 04:48	WG931662
Chrysene	ND		0.0500	1	12/05/2016 04:48	WG931662
Dibenz(a,h)anthracene	ND		0.0500	1	12/05/2016 04:48	WG931662
Fluoranthene	ND		0.0500	1	12/05/2016 04:48	WG931662
Fluorene	ND		0.0500	1	12/05/2016 04:48	WG931662
Indeno(1,2,3-cd)pyrene	ND		0.0500	1	12/05/2016 04:48	WG931662
Naphthalene	ND		0.250	1	12/05/2016 04:48	WG931662
Phenanthrene	ND		0.0500	1	12/05/2016 04:48	WG931662
Pyrene	ND		0.0500	1	12/05/2016 04:48	WG931662
1-Methylnaphthalene	ND		0.250	1	12/05/2016 04:48	WG931662
2-Methylnaphthalene	ND		0.250	1	12/05/2016 04:48	WG931662
2-Chloronaphthalene	ND		0.250	1	12/05/2016 04:48	WG931662
(S) Nitrobenzene-d5	*97.9*		*45.1-170*		*12/05/2016 04:48*	WG931662
(S) 2-Fluorobiphenyl	*106*		*57.7-153*		*12/05/2016 04:48*	WG931662
(S) p-Terphenyl-d14	*102*		*53.2-156*		*12/05/2016 04:48*	WG931662

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Alkalinity	314000		20000	1	12/02/2016 10:27	WG931302

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate	102		100	1	12/01/2016 17:06	WG931112
Sulfate	77300		5000	1	12/01/2016 17:06	WG931112

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Manganese	1170		5.00	1	12/03/2016 15:23	WG931185
Manganese,Dissolved	1260		5.00	1	12/02/2016 12:37	WG931186

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	ND		250	1	12/03/2016 13:33	WG931238
Residual Range Organics (RRO)	ND		500	1	12/03/2016 13:33	WG931238
(S) o-Terphenyl	*126*		*50.0-150*		*12/03/2016 13:33*	WG931238

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Anthracene	ND		0.100	2	12/05/2016 05:09	WG931662
Acenaphthene	ND		0.100	2	12/05/2016 05:09	WG931662
Acenaphthylene	ND		0.100	2	12/05/2016 05:09	WG931662
Benzo(a)anthracene	ND		0.100	2	12/05/2016 05:09	WG931662
Benzo(a)pyrene	ND		0.100	2	12/05/2016 05:09	WG931662
Benzo(b)fluoranthene	ND		0.100	2	12/05/2016 05:09	WG931662
Benzo(g,h,i)perylene	ND		0.100	2	12/05/2016 05:09	WG931662
Benzo(k)fluoranthene	ND		0.100	2	12/05/2016 05:09	WG931662
Chrysene	ND		0.100	2	12/05/2016 05:09	WG931662
Dibenz(a,h)anthracene	ND		0.100	2	12/05/2016 05:09	WG931662
Fluoranthene	ND		0.100	2	12/05/2016 05:09	WG931662
Fluorene	ND		0.100	2	12/05/2016 05:09	WG931662
Indeno(1,2,3-cd)pyrene	ND		0.100	2	12/05/2016 05:09	WG931662
Naphthalene	ND		0.500	2	12/05/2016 05:09	WG931662
Phenanthrene	ND		0.100	2	12/05/2016 05:09	WG931662
Pyrene	ND		0.100	2	12/05/2016 05:09	WG931662
1-Methylnaphthalene	ND		0.500	2	12/05/2016 05:09	WG931662
2-Methylnaphthalene	ND		0.500	2	12/05/2016 05:09	WG931662
2-Chloronaphthalene	ND		0.500	2	12/05/2016 05:09	WG931662
(S) Nitrobenzene-d5	*93.4*		*45.1-170*		*12/05/2016 05:09*	WG931662
(S) 2-Fluorobiphenyl	*99.8*		*57.7-153*		*12/05/2016 05:09*	WG931662
(S) p-Terphenyl-d14	*90.4*		*53.2-156*		*12/05/2016 05:09*	WG931662

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Alkalinity	258000		20000	1	12/02/2016 10:37	WG931302

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate	104		100	1	12/01/2016 17:21	WG931112
Sulfate	77600		5000	1	12/01/2016 17:21	WG931112

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Manganese	1140		5.00	1	12/03/2016 15:27	WG931185
Manganese,Dissolved	1260		5.00	1	12/02/2016 13:39	WG931186

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	ND		250	1	12/03/2016 13:50	WG931238
Residual Range Organics (RRO)	ND		500	1	12/03/2016 13:50	WG931238
(S) o-Terphenyl	*128*		*50.0-150*		*12/03/2016 13:50*	WG931238

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Anthracene	ND		0.0500	1	12/05/2016 05:31	WG931662
Acenaphthene	ND		0.0500	1	12/05/2016 05:31	WG931662
Acenaphthylene	ND		0.0500	1	12/05/2016 05:31	WG931662
Benzo(a)anthracene	ND		0.0500	1	12/05/2016 05:31	WG931662
Benzo(a)pyrene	ND		0.0500	1	12/05/2016 05:31	WG931662
Benzo(b)fluoranthene	ND		0.0500	1	12/05/2016 05:31	WG931662
Benzo(g,h,i)perylene	ND		0.0500	1	12/05/2016 05:31	WG931662
Benzo(k)fluoranthene	ND		0.0500	1	12/05/2016 05:31	WG931662
Chrysene	ND		0.0500	1	12/05/2016 05:31	WG931662
Dibenz(a,h)anthracene	ND		0.0500	1	12/05/2016 05:31	WG931662
Fluoranthene	ND		0.0500	1	12/05/2016 05:31	WG931662
Fluorene	ND		0.0500	1	12/05/2016 05:31	WG931662
Indeno(1,2,3-cd)pyrene	ND		0.0500	1	12/05/2016 05:31	WG931662
Naphthalene	ND		0.250	1	12/05/2016 05:31	WG931662
Phenanthrene	ND		0.0500	1	12/05/2016 05:31	WG931662
Pyrene	ND		0.0500	1	12/05/2016 05:31	WG931662
1-Methylnaphthalene	ND		0.250	1	12/05/2016 05:31	WG931662
2-Methylnaphthalene	ND		0.250	1	12/05/2016 05:31	WG931662
2-Chloronaphthalene	ND		0.250	1	12/05/2016 05:31	WG931662
(S) Nitrobenzene-d5	*93.1*		*45.1-170*		*12/05/2016 05:31*	WG931662
(S) 2-Fluorobiphenyl	*99.0*		*57.7-153*		*12/05/2016 05:31*	WG931662
(S) p-Terphenyl-d14	*98.7*		*53.2-156*		*12/05/2016 05:31*	WG931662

Method Blank (MB)

(MB) R3182049-2 12/02/16 07:20

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alkalinity	U		2710	20000

L875488-02 Original Sample (OS) • Duplicate (DUP)

(OS) L875488-02 12/02/16 09:17 • (DUP) R3182049-7 12/02/16 09:26

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	406000	384000	1	6.00		20

L875488-01 Original Sample (OS) • Duplicate (DUP)

(OS) L875488-01 12/02/16 09:34 • (DUP) R3182049-8 12/02/16 09:41

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	432000	419000	1	3.00		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3182049-3 12/02/16 08:39 • (LCSD) R3182049-9 12/02/16 09:55

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alkalinity	100000	102000	103000	102	103	85.0-115			2.00	20

Method Blank (MB)

(MB) R3181971-1 12/01/16 11:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Nitrate	U		22.7	100
Sulfate	U		77.4	5000

L875470-01 Original Sample (OS) • Duplicate (DUP)

(OS) L875470-01 12/01/16 14:17 • (DUP) R3181971-4 12/01/16 14:32

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	ND	66.7	1	12	J	15
Sulfate	ND	296	1	19	J P1	15

L875474-02 Original Sample (OS) • Duplicate (DUP)

(OS) L875474-02 12/01/16 17:52 • (DUP) R3181971-6 12/01/16 19:55

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	1670	1650	1	1		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3181971-2 12/01/16 11:51 • (LCSD) R3181971-3 12/01/16 12:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Nitrate	8000	7940	7940	99	99	80-120			0	15
Sulfate	40000	39000	39000	97	97	80-120			0	15

L875470-04 Original Sample (OS) • Matrix Spike (MS)

(OS) L875470-04 12/01/16 16:04 • (MS) R3181971-5 12/01/16 16:20

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate	5000	ND	5120	101	1	80-120	
Sulfate	50000	18800	69400	101	1	80-120	

L875474-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L875474-08 12/01/16 20:42 • (MS) R3181971-7 12/01/16 20:57 • (MSD) R3181971-8 12/01/16 21:43

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate	5000	ND	5060	5200	101	104	1	80-120			3	15
Sulfate	50000	ND	52600	51500	105	103	1	80-120			2	15

Method Blank (MB)

(MB) R3182304-1 12/03/16 11:43

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Sulfate	U		77.4	5000

L875736-01 Original Sample (OS) • Duplicate (DUP)

(OS) L875736-01 12/03/16 13:12 • (DUP) R3182304-4 12/03/16 13:27

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Sulfate	5460	5180	1	5		15

L875736-10 Original Sample (OS) • Duplicate (DUP)

(OS) L875736-10 12/03/16 16:26 • (DUP) R3182304-6 12/03/16 16:41

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Sulfate	10200	10200	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3182304-2 12/03/16 11:58 • (LCSD) R3182304-3 12/03/16 12:12

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
Sulfate	40000	38100	39500	95	99	80-120			4	15

L875736-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L875736-02 12/03/16 13:42 • (MS) R3182304-5 12/03/16 13:57

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	ug/l	ug/l	ug/l	%		%	
Sulfate	50000	8280	60600	105	1	80-120	

L875741-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L875741-02 12/03/16 17:41 • (MS) R3182304-7 12/03/16 17:55 • (MSD) R3182304-8 12/03/16 18:10

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Sulfate	50000	8020	60400	60900	105	106	1	80-120			1	15

Method Blank (MB)

(MB) R3182334-1 12/03/16 14:30

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Manganese	U		0.250	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3182334-2 12/03/16 14:33 • (LCSD) R3182334-3 12/03/16 14:37

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
Manganese	50.0	48.8	51.9	98	104	80-120			6	20

L875470-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L875470-04 12/03/16 14:40 • (MS) R3182334-5 12/03/16 14:48 • (MSD) R3182334-6 12/03/16 14:51

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Manganese	50.0	643	700	706	114	126	1	75-125		V	1	20

Method Blank (MB)

(MB) R3182109-1 12/02/16 10:31

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Manganese,Dissolved	U		0.250	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3182109-2 12/02/16 10:35 • (LCSD) R3182109-3 12/02/16 10:38

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
Manganese,Dissolved	50.0	49.9	50.2	100	100	80-120			1	20

L875470-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L875470-02 12/02/16 10:42 • (MS) R3182109-5 12/02/16 10:49 • (MSD) R3182109-6 12/02/16 10:52

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Manganese,Dissolved	50.0	332	387	385	111	106	1	75-125			1	20

Method Blank (MB)

(MB) R3182235-1 12/02/16 15:19

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Diesel Range Organics (DRO)	U		83.3	250
Residual Range Organics (RRO)	U		167	500
(S) o-Terphenyl	*126*			*64.0-146*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3182235-2 12/02/16 15:36 • (LCSD) R3182235-3 12/02/16 15:52

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
Diesel Range Organics (DRO)	750	937	999	125	133	50.0-150			6.43	20
Residual Range Organics (RRO)	750	828	874	110	117	50.0-150			5.35	20
(S) o-Terphenyl				*120*	*128*	*64.0-146*				

Method Blank (MB)

(MB) R3182439-3 12/05/16 01:53

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Anthracene	U		0.0140	0.0500
Acenaphthene	U		0.0100	0.0500
Acenaphthylene	U		0.0120	0.0500
Benzo(a)anthracene	U		0.00410	0.0500
Benzo(a)pyrene	U		0.0116	0.0500
Benzo(b)fluoranthene	U		0.00212	0.0500
Benzo(g,h,i)perylene	U		0.00227	0.0500
Benzo(k)fluoranthene	U		0.0136	0.0500
Chrysene	U		0.0108	0.0500
Dibenz(a,h)anthracene	U		0.00396	0.0500
Fluoranthene	U		0.0157	0.0500
Fluorene	U		0.00850	0.0500
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500
Naphthalene	0.0419	J	0.0198	0.250
Phenanthrene	U		0.00820	0.0500
Pyrene	U		0.0117	0.0500
1-Methylnaphthalene	U		0.00821	0.250
2-Methylnaphthalene	U		0.00902	0.250
2-Chloronaphthalene	U		0.00647	0.250
(S) Nitrobenzene-d5	*97.3*			*33.8-179*
(S) 2-Fluorobiphenyl	*103*			*55.5-150*
(S) p-Terphenyl-d14	*104*			*46.2-163*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3182439-1 12/05/16 01:10 • (LCSD) R3182439-2 12/05/16 01:31

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	2.00	2.48	2.33	124	117	68.9-153			6.10	20
Acenaphthene	2.00	2.19	2.05	110	103	67.7-141			6.38	20
Acenaphthylene	2.00	2.20	2.06	110	103	66.9-141			6.65	20
Benzo(a)anthracene	2.00	2.15	1.99	108	99.6	63.1-147			7.71	20
Benzo(a)pyrene	2.00	2.25	2.13	112	107	62.2-150			5.24	20
Benzo(b)fluoranthene	2.00	2.09	2.02	105	101	58.4-148			3.71	20
Benzo(g,h,i)perylene	2.00	2.30	2.20	115	110	57.4-152			4.55	20
Benzo(k)fluoranthene	2.00	2.23	2.15	112	107	60.5-154			3.94	20
Chrysene	2.00	2.36	2.24	118	112	64.8-155			5.61	20
Dibenz(a,h)anthracene	2.00	2.22	2.12	111	106	53.5-153			4.83	20
Fluoranthene	2.00	2.26	2.11	113	105	68.6-153			7.00	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3182439-1 12/05/16 01:10 • (LCSD) R3182439-2 12/05/16 01:31

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	2.00	2.13	1.98	106	98.9	67.3-141			7.37	20
Indeno(1,2,3-cd)pyrene	2.00	2.28	2.17	114	109	57.0-155			4.73	20
Naphthalene	2.00	2.44	2.28	122	114	66.7-135			6.70	20
Phenanthrene	2.00	2.09	1.97	105	98.3	64.3-143			6.33	20
Pyrene	2.00	2.38	2.21	119	111	60.2-154			7.07	20
1-Methylnaphthalene	2.00	2.44	2.27	122	114	68.3-144			6.96	20
2-Methylnaphthalene	2.00	2.30	2.14	115	107	67.6-143			7.51	20
2-Chloronaphthalene	2.00	2.27	2.12	113	106	69.7-144			6.72	20
(S) Nitrobenzene-d5				*104*	*96.6*	*33.8-179*				
(S) 2-Fluorobiphenyl				*110*	*103*	*55.5-150*				
(S) p-Terphenyl-d14				*106*	*98.7*	*46.2-163*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

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Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
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Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
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Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
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Maine	TN0002	Texas [5]	LAB0152
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Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
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Nebraska	NE-OS-15-05		

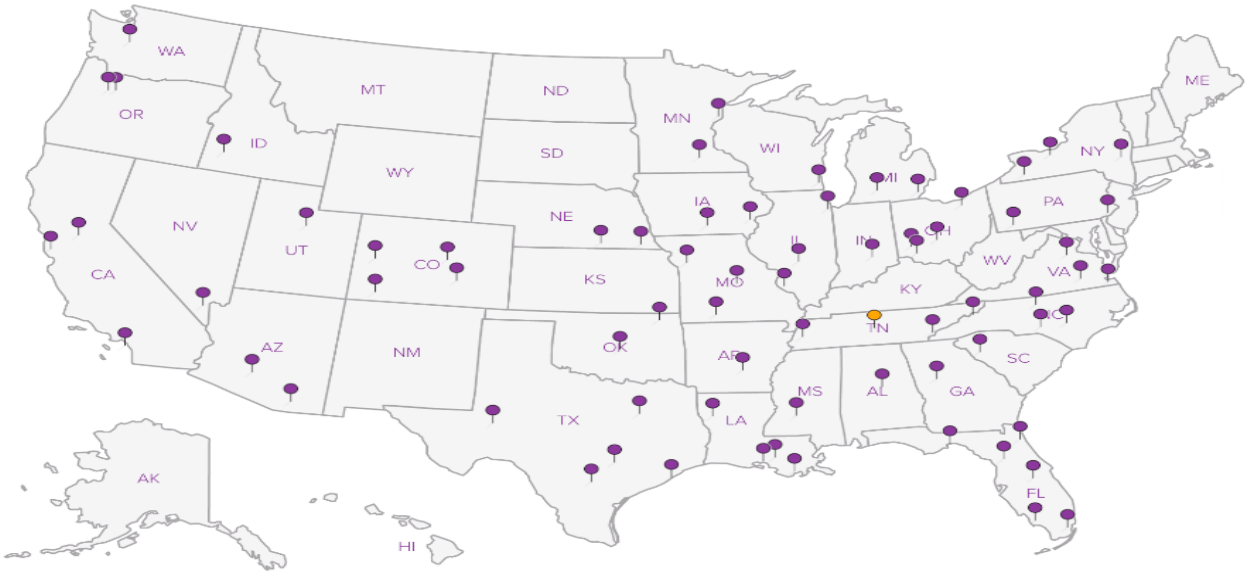
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



TRK: 7066 9126 3501

Kennedy/Jenks Con-BNSF Region 1

32001 32nd Avenue South, Ste 100
Federal Way, WA 98001

Billing Information & Quote Number:
Shane DeGross
605 Puyallup Ave S
Tacoma, WA 98421

Report to: Nathan Moxley

Email To: nathanmoxley@kennedyjenks.com, tyschreiner@kennedyjenks.com

Project Description: BNSF - D St. Wells

City/State Collected: Tacoma, WA

Phone: ~~253-835-6400~~
Fax:

Client Project # 169603900

Lab Project # BNSF1KEN-D ST

Collected by (print): Alexander Lesher

Site/Facility ID # D Street Pipeline

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**ALK, NO3, SO4** 125mlHDPE-NoPres	Dissolved ~~Pb~~ Manganese 250mlHDPE-HNO3	NWTPHDXLVI- w/ SGT 40mlAmb-HCl-BT	PAHSIMLVID 40mlAmb-NoPres-WT	Total ~~Pb~~ Mn 250mlHDPE-HNO3	Rem./Contaminant	Sample # (lab only)
MW-9-20161130	G	GW		11-30-16	0855	7	X	X	X	X	X		-01
MW-8-20161130		GW			1000	7	X	X	X	X	X		02
MW-11-20161130		GW			1040	7	X	X	X	X	X		03
MW-5-20161130		GW			1115	7	X	X	X	X	X		04
MW-4-20161130		GW			1155	7	X	X	X	X	X		05
MW-3-20161130		GW			1230	7	X	X	X	X	X		06
MW-2-20161130		GW			1305	7	X	X	X	X	X		07
TB-1		GW			—	7	X	X	X	X	X		08
D-1-20161130	G	GW			—	7	X	X	X	X	X		09
		GW				7	X	X	X	X	X		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: Manganese not Lead

pH _____ Temp _____

Flow _____ Other _____

Chain of Custody Page 1 of 1

ESC LAB SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L875170
D060

Acctnum: BNSF1KEN
Template: T117672
Prelogin: P576038
TSR: 134 - Mark W. Beasley
PB: 11-9-16 MW
Shipped Via: FedEx Ground

Hold #

Condition: (lab use only) Jw1

COC Seal Intact: ___Y ___N ___NA

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	11-30-16	1500	FedEx Dropoff
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
			12/01/16 9:00

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.4 °C Bottles Received: 57

pH Checked: NCF:

ESC
L·A·B S·C·I·E·N·C·E·S
YOUR LAB OF CHOICE

Cooler Receipt Form

Client: BNSF IKEN	SDG#	187470
Cooler Received/Opened On: 12/01/16	Temperature Upon Receipt:	3.4 °c
Received By: Timiesha Scott		
Signature:		

Receipt Check List	Yes	No	N/A
Were custody seals on outside of cooler and intact?	✓		
Were custody papers properly filled out?	✓		
Did all bottles arrive in good condition?	✓		
Were correct bottles used for the analyses requested?	✓		
Was sufficient amount of sample sent in each bottle?	✓		
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)	✓		
If applicable, was an observable VOA headspace present?		✓	
Non Conformance Generated. (If yes see attached NCF)			

Attachment B

Data Quality Assessment Summary

DATA VALIDATION SUMMARY – L875470
NOVEMBER 2016 SAMPLING EVENT
BNSF D STREET

Laboratory Reports included in Data Validation	Report Date	Sample IDs
ESC L875470 Includes: NWTPH-Dx, PAHs, Alkalinity, Nitrate, Sulfate, Manganese	9 December 2016	Aqueous Samples: MW-9-20161130, MW-8-20161130, MW-11-20161130, MW-5-20161130, MW-4-20161130, MW-3-20161130, MW-2-20161130 Field Duplicate: D-1-20161130 collected at MW-2.

Criteria	(Yes or No)	Comment
Chain-of-Custody – Chain-of-custody protocol followed?	Yes	
Temperature Blank – Sample temperature criteria met?	Yes	Samples arrived at a temperature of 3.4 degrees Celsius (°C), which was within the recommended temperature of 4°C ± 2°.
Holding times – Samples analyzed within specified holding time?	Yes	
Laboratory method blank samples – Analytes present in method blank samples?	Yes	See Note 1 below.
Field/Equipment blank samples – Analytes present in field/equipment blank samples?	Not applicable	Field/equipment blank samples were not necessary and were not submitted with the batch of samples.
Trip blank samples – Analytes present in trip blank samples?	Not applicable	Trip blank samples were not submitted with the batch of samples.
Matrix spikes/matrix spike duplicate samples – Control limits met?	No	See Note 2 below.
Surrogate percent recoveries – Control limits met?	Yes	
Laboratory control sample – Control limits met?	Yes	
Laboratory duplicate samples (if applicable) – Control limits met?	No	See Note 3 below.
Field duplicate samples (if submitted) – Relative percent differences within control limits?	Yes	Primary and field duplicate samples did not contain detectable concentrations of cPAHs or NWTPH-Dx. Results for alkalinity, nitrate, sulfate, and manganese were within 20% RPD.

NOTES

1. Naphthalene was detected at 0.0419 J micrograms per liter (µg/L) in the method blank for batch R3182439. Because naphthalene was not detected above the laboratory method reporting limit (0.05 µg/L) in the field samples, no action was taken.
2. Percent recovery of manganese in the MSD for batch R3182334 was slightly higher than the laboratory control limit. Because the percent recovery was within the laboratory control limit for the MS and LCS/LCSD pair, no action was taken.
3. Laboratory primary/duplicate samples for sulfate (19%) were greater than the 15% RPD limit. However, the reported concentration of 296 µg/L in the laboratory duplicate sample was below the laboratory reporting limit for the primary field sample (5,000 µg/L). Because the primary and laboratory duplicate sample results were below the 5,000 µg/L reporting limit, no action was taken.

DATA VALIDATION SUMMARY – L875470
NOVEMBER 2016 SAMPLING EVENT
BNSF D STREET

SUMMARY

Laboratory report L875470 was reviewed and compared to data quality objectives presented in the *Compliance Monitoring Plan, Remedial Excavation, BNSF Oil Pipeline Site, Tacoma, Washington,* dated 9 July 2008, prepared by GeoEngineers. Overall, the findings with respect to the quality assurance/quality control (QA/QC) data do not adversely affect the use of the analytical results.