Aspect CONSULTING

MEMORANDUM

Project No.: 100014-001-12

May 23, 2011

To: Brian Gouran, Port of Bellingham

From: Jay Chennault, PE, LHG
Hydrogeologist

Dave Heffner, PE
Associate Remediation Engineer

Re: **Well Installation and Initial Round of Post-Removal-Action Groundwater Compliance Monitoring, Former NW Fuel Site**

In late 2010, petroleum contaminated soil (PCS) was excavated from Areas A and B of the former Northwest Fuel Company (NW Fuel) site located at 2800 Roeder Avenue in Bellingham, Washington. The cleanup action was conducted by the Port of Bellingham (Port) as an independent remedial action under the Model Toxics Control Act (MTCA), with input from the Washington State Department of Ecology (Ecology) via the Voluntary Cleanup Program (VCP; #NW2287). Groundwater monitoring wells MW-1 through MW-6, located within the excavation footprint, were decommissioned as part of the cleanup action, as discussed in the *Soil Removal Action, Areas A and B* report dated May 10, 2011. This technical memorandum documents installation of three new monitoring wells (MW-11 through MW-13) and completion of an initial round of post-removal-action groundwater compliance monitoring. Well installation and monitoring activities were completed in general accordance with the *Post-Construction Groundwater Compliance Monitoring Plan* dated March 22, 2011.

Installation of Monitoring Wells

Groundwater monitoring wells MW-11, MW-12, and MW-13 were installed on April 5, 2011, at the locations shown on Figure 1. A licensed driller installed the wells in accordance with Washington State monitoring well construction standards and under the direction of a licensed hydrogeologist from Aspect Consulting. Geologic logs and as-built well construction diagrams are provided in Appendix A.

The three borings were advanced to a depth of approximately 15 feet below ground surface (bgs) using a direct-push probe rig. Soil cuttings were drummed for future disposal. One soil sample was collected from each boring for chemical analysis. Samples from MW-11 and MW-12 were collected from depth intervals where field indications of petroleum-impacted soils were present. Since there were no such indications in the upgradient MW-13 boring, the MW-13 soil sample was collected from the approximate water table depth. (See Table 1 for sampling intervals.) The samples were immediately stored in a cooler with ice packs to maintain their temperature at or below 4°C, which was subsequently transported to Friedman and Bruya, Inc.

The soil samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8021b, for gasoline-range total petroleum hydrocarbon (TPH) by Method NWTPH-Gx, and for diesel- and oil-range TPH by Method NWTPH-Dx Extended. Results are summarized in Table 1, and the laboratory reports are included in Appendix B. TPH, primarily in the diesel range, was detected in the MW-11 and MW-12 soil samples at concentrations in excess of the Area A-specific soil cleanup level of 2,671 milligrams per kilogram (mg/kg). Concentrations of all analytes were below detection limits in the MW-13 soil sample.

Monitoring wells were constructed in each boring using ¾-inch-diameter Schedule 40 PVC casing, with 0.010-inch-wide slotted screens installed from three to 13 feet bgs. This screened depth interval was determined to span the unsaturated zone and the top of the aquifer, based on conditions encountered at the time of drilling and on historical water levels measured in nearby monitoring wells. The screens were pre-packed with 20-40 sand and wrapped with 0.011-inch stainless steel mesh. 10-20 sand was placed from the borehole bottom to approximately one foot above the top of the screen. Bentonite chips were placed from the top of the sand pack to approximately one foot bgs. A concrete surface seal was then placed above the bentonite seal. The wells were completed with five-inch-diameter steel flush-mount monuments.

Following installation, each well was developed to remove fine-grained material from inside the well casing and filter pack, and to improve hydraulic communication between the well screen and the surrounding water-bearing formation. Investigation-derived liquids, including monitoring well development water and decontamination solutions, were drummed for future disposal.

Top-of-casing elevations for the new monitoring wells were surveyed (relative to the same arbitrary site datum used for the previously installed wells) to an accuracy of 0.01 foot by Aspect personnel (Table 2).

Groundwater Monitoring

On April 6, 2011, groundwater was monitored in both the new wells (MW-11 through MW-13) and the pre-existing wells (MW-7 through MW-10). Depths-to-groundwater were measured, and groundwater elevations were then calculated by subtracting the depth-to-groundwater measurements from the top-of-casing elevations. Calculated groundwater elevations are provided in Table 2, and inferred groundwater elevation contours are illustrated on Figure 1.

Prior to sampling, each well was purged at approximately 0.35 liter per minute using a peristaltic pump with dedicated tubing. During purging, field parameters including temperature, specific conductance, dissolved oxygen, pH, and oxidation/reduction potential (ORP) were monitored until they stabilized. Final field parameter values for each well are presented in Table 3. All purge water was drummed for future disposal.

Once field parameters stabilized, laboratory-supplied sample containers were filled directly from the pump discharge tubing using the same pumping flow rate. Samples were immediately stored in a cooler with ice packs to maintain their temperature at or below 4°C, which was subsequently transported to Friedman and Bruya, Inc.

The water samples were analyzed for BTEX by EPA Method 8021b, for gasoline-range TPH by Method NWTPH-Gx, and for diesel- and oil-range TPH by Method NWTPH-Dx Extended. Results are summarized in Table 4 along with the results of previous monitoring rounds. The laboratory report for the current round is included in Appendix B.

Table 4 also lists groundwater cleanup levels for protection of surface water, which are the cleanup levels applicable to this site. Current-round cleanup level exceedences were detected as follows:

- Concentrations of TPH in the gasoline and diesel ranges exceed the corresponding cleanup levels in the sample from MW-12; and
- The concentration of TPH in the diesel range exceeds the corresponding cleanup level in the sample from MW-8.

Well MW-8 is approximately downgradient of Well MW-12.

Limitations

Work for this project was performed and this memorandum prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of the Port of Bellingham for specific application to the referenced property. This memorandum does not represent a legal opinion. No other warranty, expressed or implied, is made.

Attachments

Table 1 – Soil Sampling Results
Table 2 – Post-Removal-Action Groundwater Elevations
Table 3 – Post-Removal Action Groundwater Field Parameters
Table 4 – Summary of Petroleum Hydrocarbons in Groundwater Monitoring Wells
Figure 1 – Well Location Map and Groundwater Elevation Contours on April 6, 2011
Appendix A – Geologic Logs and As-Built Well Construction Diagrams
Appendix B – Laboratory Report

V:\100014 Port of Bellingham\Deliverables\GW Compliance Monitoring\GW Results Memo\NWF TechMemo_final_23May11.doc

Table 1 - Soil Sampling Results

Former NW Fuel Company Site, Bellingham, Washington

Exploration ID:	MW-11	MW-12	MW-13
Depth Interval in Feet:	5 to 6	4.5 to 5.5	5 to 6
Sampling Date:	04/05/11	04/05/11	04/05/11
BTEX Compounds			
Benzene	0.02 U	2.3	0.02 U
Toluene	0.02 U	0.88	0.02 U
Ethylbenzene	0.02 U	0.85	0.02 U
Total Xylenes	0.11	2.7	0.06 U
Total Petroleum Hydrocarbon			
Gasoline-Range	14	410	2 U
Diesel-Range	5,200	8,000	50 U
Motor Oil-Range	250 U	250 U	250 U
Total[(2)]	**5,339**	**8,535**	151

TPH Total petroleum hydrocarbon
U Not detected at specified reporting limit

Notes:
1) All concentrations are in milligrams per kilogram (mg/kg).
2) Total TPH is calculated as the sum of TPH detected in the gasoline, diesel, and motor oil ranges. For non-detect results, one-half of the reporting limit is used in the calculation. Values in **bold** exceed the Area A-specific cleanup level of 2,671 mg/kg.

Table 2 - Post-Removal-Action Groundwater Elevations

Former NW Fuel Company Site, Bellingham, Washington

Well ID:	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13
Installation Date:	12/29/05	07/24/06	07/24/06	07/24/06	04/05/11	04/05/11	04/05/11
TOC Elevation[(2)]:	10.88	11.01	11.03	10.96	10.40	10.54	10.94
Date of Measurement	Groundwater Elevation[(2)]						
04/06/11	5.16	5.61	5.54	5.45	5.88	6.02	6.51

TOC Top of well casing

Notes:

1) Groundwater monitoring wells MW-1 through MW-6 were decommissioned during the October/November 2010 soil removal action. For groundwater elevations measured prior to the removal action, refer to the *Site Investigation Report* (dated 11/14/06) and the *Focused Feasibility Study and Cleanup Action Plan* (dated 5/4/10).
2) Elevations are in feet, and are relative to an arbitrary datum of 10.00 feet established at former well MW-5 TOC.

Table 3 - Post-Removal-Action Groundwater Field Parameters

Former NW Fuel Company Site, Bellingham, Washington

Well ID	Date Sampled	Temperature (degrees C)	Specific Conductance (mS/cm^2)	Dissolved Oxygen (mg/L)	pH	ORP (mV)
MW-7	4/6/2011	10.5	0.484	1.0	7.2	45
MW-8	4/6/2011	10.2	0.556	0.3	8.3	-127
MW-9	4/6/2011	10.0	0.617	0.3	8.2	-81
MW-10	4/6/2011	10.8	0.554	0.2	8.6	-94
MW-11	4/6/2011	7.6	0.554	0.9	7.8	-45
MW-12	4/6/2011	8.4	0.574	1.0	7.6	-66
MW-13	4/6/2011	9.7	0.557	0.4	7.8	-10

ORP Oxidation/reduction potential

Notes:

1) Field parameters are generally measured whenever groundwater samples are collected for chemical analysis.

Table 4 - Summary of Petroleum Hydrocarbons in Groundwater Monitoring Wells

Former NW Fuel Company Site, Bellingham, Washington

Well ID	Date Sampled	Total Petroleum Hydrocarbon (TPH)			BTEX Compounds			
		Gasoline-Range	Diesel-Range	Motor Oil-Range	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MW-1	01/10/06	**960**	**660** x	250 U	4.8	2.8	30	9
	05/20/08	360	310	250 U	6	5	4	5
MW-2	01/10/06	100 U	200	460	1 U	1 U	1 U	3 U
	05/20/08	100 U	50 U	250 U	1 U	1 U	1 U	3 U
MW-3	01/10/06	110	120	430	10	1 U	1 U	3 U
	05/20/08	420	**2,300**	**780** y	6	5	1	3
MW-4	01/10/06	380	**1,800** x	250 U	**32**	1.2	1.6	4.8
	05/20/08	390	**15,000**	**1,300** y	9	3	2	3
MW-5	01/10/06	100 U	50 U	250 U	1 U	1 U	1 U	3 U
	05/20/08	100 U	58	250 U	1 U	1 U	1 U	3 U
MW-6	01/10/06	**810**	490 x	250 U	**83**	2.3	4.6	4
	05/20/08	**2,000**	**1,300**	250 U	**290**	27	12	17
MW-7	01/10/06	100 U	50 U	250 U	1 U	1 U	1 U	3 U
	05/20/08	100 U	30 U	250 U	1 U	1 U	1 U	3 U
	04/06/11	100 U	50 U	250 U	1 U	2.3	1 U	3 U
MW-8	01/10/06	160	390	250 U	1 U	1 U	1	3 U
	05/20/08	100 U	420	250 U	1 U	1 U	1 U	3 U
	04/06/11	280	**700**	250 U	1 U	2.2	1 U	3 U
MW-9	01/10/06	100 U	50 U	250 U	1 U	1 U	1 U	3 U
	05/20/08	100 U	180	250 U	1 U	2	1 U	3 U
	04/06/11	140	150	250 U	1 U	1.9	1 U	3 U
MW-10	01/10/06	100 U	50 U	250 U	1 U	1 U	1 U	3 U
	05/20/08	100 U	30 U	250 U	1 U	2	1 U	3 U
	04/06/11	600	260	250 U	2.2	5.8	2.3	3.5
MW-11	04/06/11	280	290	250 U	1 U	6.2	1.7	4.1
MW-12	04/06/11	**1,500**	**820**	250 U	5.7	14	3.7	8.5
MW-13	04/06/11	100 U	50 U	250 U	1 U	1 U	1 U	3 U
Groundwater Cleanup Level for Surface Water Protection		800 (3)	500 (3)	500 (3)	23 (4)	15,000 (5)	2,100 (6)	--

-- Not analyzed or not researched

U Not detected at specified reporting limit

x The pattern of peaks present is not indicative of diesel fuel.

y The pattern of peaks present is not indicative of motor oil.

Notes:

1) All concentrations are in micrograms per liter (µg/L). Bolded concentrations exceed groundwater cleanup levels for protection of surface water.

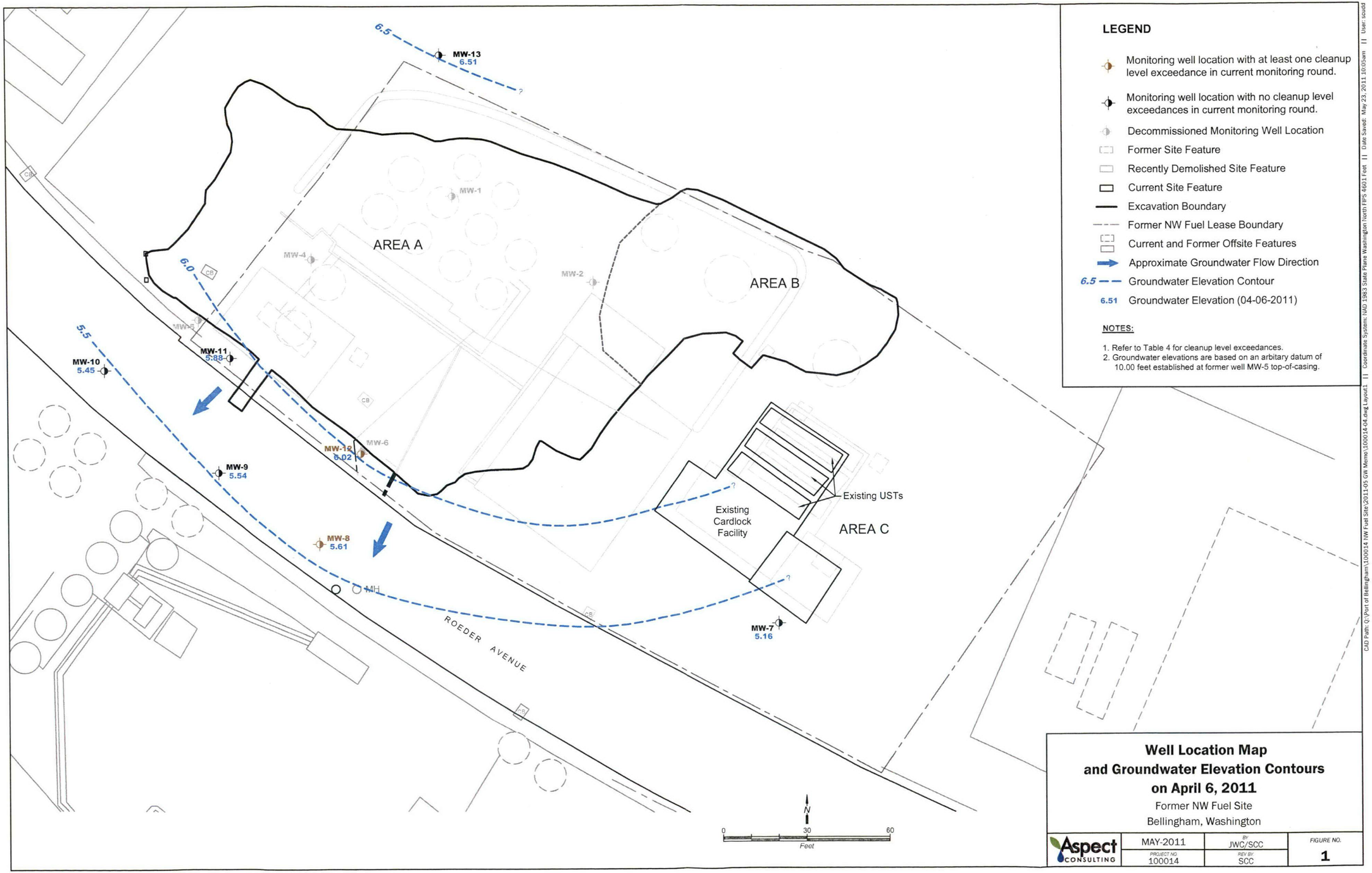
2) Gray-shading indicates that the well was decommissioned during the 2010 soil removal action.

3) MTCA outlines that for petroleum mixtures the Method A groundwater cleanup levels for TPH may be used as surface water cleanup standards (WAC 173-340-730(3)(b)(iii)(C)).

4) Cleanup levels based on MTCA Method B standard formula for surface water (Eqns. 730-1 and 730-2, WAC 173-340-730(3)(b)).

5) Marine Surface Water Cleanup Level for Protection of Aquatic Life from Clean Water Act §304.

6) Marine Surface Water Cleanup Level for Protection of Human Health from Clean Water Act §304.



LEGEND

- Monitoring well location with at least one cleanup level exceedance in current monitoring round.
- Monitoring well location with no cleanup level exceedances in current monitoring round.
- Decommissioned Monitoring Well Location
- Former Site Feature
- Recently Demolished Site Feature
- Current Site Feature
- Excavation Boundary
- Former NW Fuel Lease Boundary
- Current and Former Offsite Features
- Approximate Groundwater Flow Direction
- 6.5 — Groundwater Elevation Contour
- 6.51 Groundwater Elevation (04-06-2011)

NOTES:

1. Refer to Table 4 for cleanup level exceedances.
2. Groundwater elevations are based on an arbitary datum of 10.00 feet established at former well MW-5 top-of-casing.

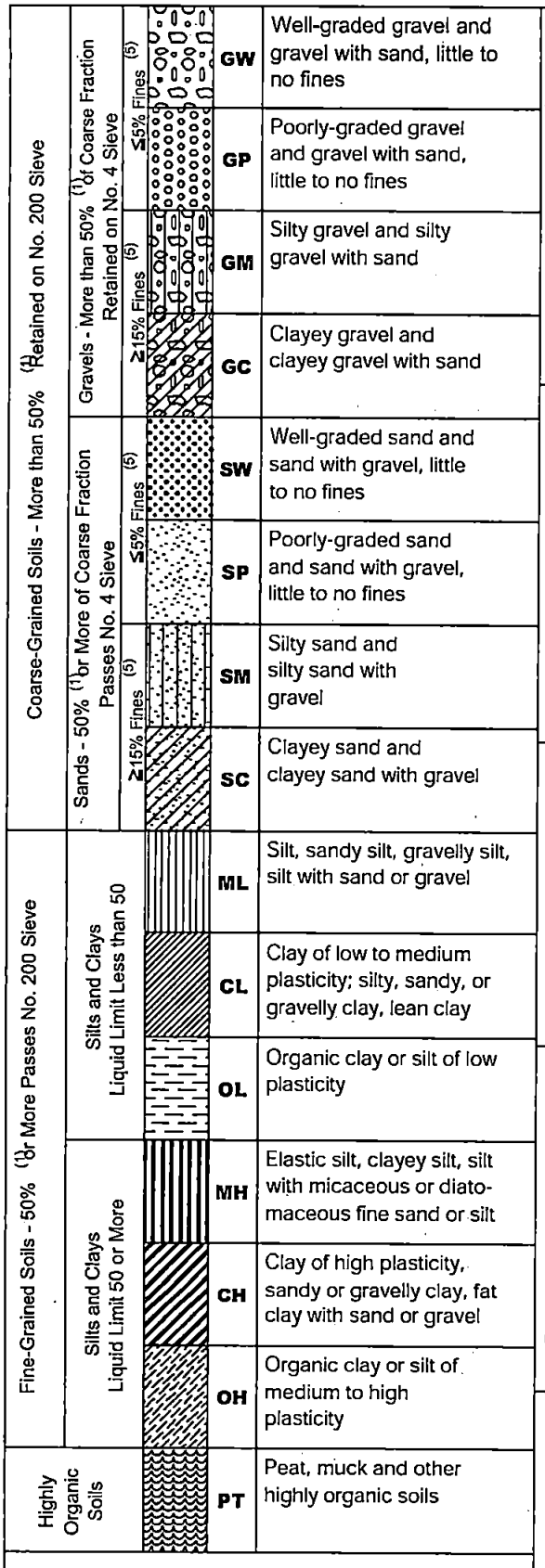
Well Location Map and Groundwater Elevation Contours on April 6, 2011

Former NW Fuel Site
Bellingham, Washington

Aspect Consulting	MAY-2011	BY: JWC/SCC	FIGURE NO. 1
	PROJECT NO. 100014	REV BY: SCC	

Appendix A

Geologic Logs and As-Built Well Construction Diagrams



Terms Describing Relative Density and Consistency

Coarse-Grained Soils	Density	SPT (2) blows/foot
	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50

Fine-Grained Soils	Consistency	SPT (2) blows/foot
	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

- FC = Fines Content
- G = Grain Size
- M = Moisture Content
- A = Atterberg Limits
- C = Consolidation
- DD = Dry Density
- K = Permeability
- Str = Shear Strength
- Env = Environmental
- PID = Photoionization Detector

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

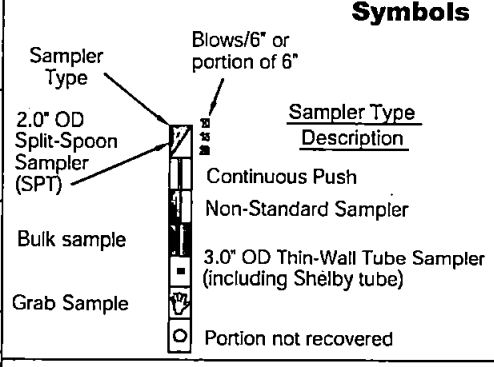
(3) Estimated Percentage

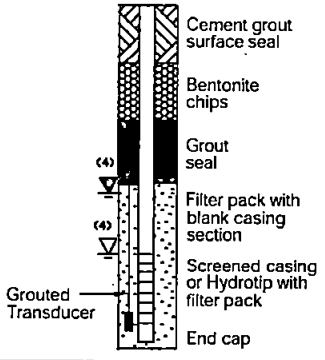
Percentage by Weight	Modifier
<5	Trace
5 to 15	Slightly (sandy, silty, clayey, gravelly)
15 to 30	Sandy, silty, clayey, gravelly)
30 to 49	Very (sandy, silty, clayey, gravelly)

Moisture Content

- Dry - Absence of moisture, dusty, dry to the touch
- Slightly Moist - Perceptible moisture
- Moist - Damp but no visible water
- Very Moist - Water visible but not free draining
- Wet - Visible free water, usually from below water table

Symbols





(1) Percentage by dry weight

(2) (SPT) Standard Penetration Test (ASTM D-1586)

(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)

(4) Depth of groundwater ▽ ATD = At time of drilling ▽ Static water level (date) BGS = below ground surface

(5) Combined USCS symbols used for fines between 5% and 15% as estimated in General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

Aspect CONSULTING

Exploration Log Key

DATE:
DESIGNED BY:
DRAWN BY:
REVISED BY:

PROJECT NO.

FIGURE NO. A-1

Q:_ACAD Standards\Standard Details\Exploration Log Key A1.dwg

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
100014	MW-11	1 of 1

Project Name:	NW Fuel Company	Ground Surface Elev	~10.7
Location:	Bellingham, WA	Top of Casing Elev.	10.40
Driller/Method:	NW Probe and Drill-Carlos / Direct push	Depth to Water (ft BGS)	~5' ATD
Sampling Method:	Continuous core	Start/Finish Date	3/5/2011

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
1	5"-diam. monument flush-mount in concrete			0			Crushed rock	1
2	Bentonite chips						Moist, gray, sandy GRAVEL (GW); pit run	2
3	PVC Sch 40 3/4"-diameter riser			0				3
4	10-20 sand						Moist, gray SAND (SP); poorly graded fine to medium sand	4
5	▽3/5/2011	MW-11-5-6	BTEX 8021b, NWTPH-Dx, NWTPH-Gx	0			Wet, dark brown, silty SAND (SM)	5
6	PVC Sch 40 3/4"-diameter, 0.010"-slot screen prepacked with 20/40 sand						Sheen and petroleum-like odor, 5'-8'	6
7				0			Wet, gray SILT (ML); trace fine sand	7
8								8
9				0			Wet, gray GRAVEL (GP); trace silt	9
10								10
11				0			Wet, gray SAND (SP); poorly graded medium to coarse sand	11
12								12
13	Threaded plug			0				13
14	10-20 sand						Wet, gray GRAVEL (GP)	14
15				0			Bottom of boring at 15' BGS	15
16								16
17								17
18								18
19								19

Sampler Type:
- ⊘ No Recovery
- ▯ Continuous Core
- ▮ Soil sample

PID - Photoionization Detector

▽ Static Water Level

▽ Water Level (ATD)

Logged by: MV

Approved by: JWC

Figure No. A - 2

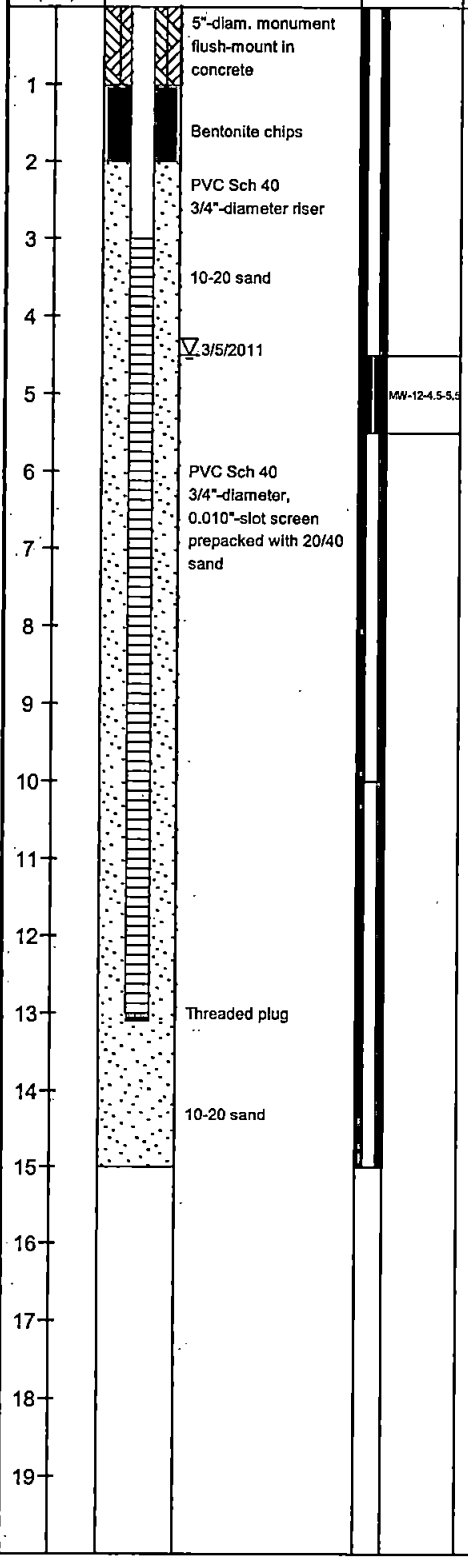
MONITORING WELL NWFUEL.GPJ May 20, 2011

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
100014	MW-12	1 of 1

Project Name:	NW Fuel Company	Ground Surface Elev	~10.8
Location:	Bellingham, WA	Top of Casing Elev.	10.54
Driller/Method:	NW Probe and Drill-Carlos / Direct push	Depth to Water (ft BGS)	~4.5 ATD
Sampling Method:	Continuous core	Start/Finish Date	3/5/2011



Depth / Elevation (feet)	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
1		0			Crushed rock	1
2					Moist, gray SAND (SP); poorly graded fine to medium sand	2
3		0			Wet, dark brown, slightly silty SAND (SM)	3
4						4
5	BTEX 8021b, NWTPH-Dx, NWTPH-Gx	0			Sheen and petroleum-like odor, 4'-8'	5
6					Wet, gray SAND (SW); well graded fine to coarse sand, trace silt, trace gravel	6
7		0			Scattered seashell fragments	7
8						8
9		0				9
10						10
11		0				11
12					Wet, gray, sandy GRAVEL (GP); fine gravel, fine to coarse sand, trace silt	12
13		0				13
14						14
15		0			Bottom of boring at 15' BGS	15
16						16
17						17
18						18
19						19

Sampler Type:
- No Recovery
- Continuous Core
- Soil sample

PID - Photoionization Detector
- Static Water Level
- Water Level (ATD)

Logged by: MV

Approved by: JWC

Figure No. A - 3

_MONITORING WELL NWFUEL.GPJ May 20, 2011

Monitoring Well Construction Log

Aspect Consulting

Project Number	Well Number	Sheet
100014	MW-13	1 of 1

Project Name:	NW Fuel Company	Ground Surface Elev	~11.2
Location:	Bellingham, WA	Top of Casing Elev.	10.94
Driller/Method:	NW Probe and Drill-Carlos / Direct push	Depth to Water (ft BGS)	~5.5 ATD
Sampling Method:	Continuous core	Start/Finish Date	3/5/2011

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
1	5"-diam. monument flush-mount in concrete			0			Crushed rock	1
2	Bentonite chips						Moist, brown to black, slightly silty SAND (SM); well-graded fine to coarse sand, trace fine gravel	2
3	PVC Sch 40 3/4"-diameter riser			0				3
4	10-20 sand							4
5	▽3/5/2011	MW-13-5-6	BTEX 8021b, NWTPH-Dx, NWTPH-Gx	0			Wet, dark brown, sandy GRAVEL (GP); fine gravel, trace silt	5
6	PVC Sch 40 3/4"-diameter, 0.010"-slot screen prepacked with 20/40 sand							6
7				0				7
8								8
9				0				9
10								10
11				0				11
12							Wet, gray SAND (SP); poorly graded fine to medium sand, trace gravel, trace silt	12
13	Threaded plug			0			Bed of slightly sandy SILT (ML) with wood chips	13
14	10-20 sand							14
15				0			Bottom of boring at 15' BGS	15
16								16
17								17
18								18
19								19

Sampler Type:
- ⊠ No Recovery
- ▮ Continuous Core
- ▮ Soil sample

PID - Photoionization Detector
- ▽ Static Water Level
- ▽ Water Level (ATD)

Logged by: MV
Approved by: JWC
Figure No. A - 4

MONITORING WELL NWFUEL.GPJ May 20, 2011

Appendix B

Laboratory Report

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

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Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

April 21, 2011

Jay Chennault, Project Manager
Aspect Consulting
401 2nd Ave S, Suite 201
Seattle, WA 98104

Dear Mr. Chennault:

Included are the results from the testing of material submitted on April 7, 2011 from the NW Fuel 100014, F&BI 104070 project. There are 10 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: data@aspectconsulting.com
ASP0421R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 7, 2011 by Friedman & Bruya, Inc. from the Aspect Consulting NW Fuel 100014, F&BI 104070 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting
104070-01	MW-11-5-6
104070-02	MW-12-4.5-5.5
104070-03	MW-7-040611
104070-04	MW-12-040611
104070-05	MW-11-040611
104070-06	MW-13-040611
104070-07	MW-9-040611
104070-08	MW-8-040611
104070-09	MW-10-040611
104070-10	MW-13-5-6

All quality control requirements were acceptable.

Date of Report: 04/21/11
Date Received: 04/07/11
Project: NW Fuel 100014, F&BI 104070
Date Extracted: 04/08/11
Date Analyzed: 04/16/11

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

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
MW-11-5-6 104070-01	<0.02	<0.02	<0.02	0.11	14	14
MW-12-4.5-5.5 104070-02 1/10	2.3	0.88	0.85	2.7	410	95
MW-13-5-6 104070-10	<0.02	<0.02	<0.02	<0.06	<2	76
Method Blank	<0.02	<0.02	<0.02	<0.06	<2	86

Date of Report: 04/21/11
Date Received: 04/07/11
Project: NW Fuel 100014, F&BI 104070
Date Extracted: 04/11/11
Date Analyzed: 04/12/11 and 04/13/11

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
MW-7-040611 104070-03	<1	2.3	<1	<3	<100	55
MW-12-040611 104070-04	5.7	14	3.7	8.5	1,500	71
MW-11-040611 104070-05	<1	6.2	1.7	4.1	280	72
MW-13-040611 104070-06	<1	<1	<1	<3	<100	66
MW-9-040611 104070-07	<1	1.9	<1	<3	140	68
MW-8-040611 104070-08	<1	2.2	<1	<3	280	67
MW-10-040611 104070-09	2.2	5.8	2.3	3.5	600	79
Method Blank 01-0672 MB	<1	<1	<1	<3	<100	67

Date of Report: 04/21/11
Date Received: 04/07/11
Project: NW Fuel 100014, F&BI 104070
Date Extracted: 04/08/11
Date Analyzed: 04/09/11

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

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
MW-11-5-6 104070-01	5,200	<250	93
MW-12-4.5-5.5 104070-02	8,000	<250	81
MW-13-5-6 104070-10	<50	<250	79
Method Blank 01-614 MB	<50	<250	87

Date of Report: 04/21/11
Date Received: 04/07/11
Project: NW Fuel 100014, F&BI 104070
Date Extracted: 04/08/11
Date Analyzed: 04/09/11

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 47-140)
MW-7-040611 104070-03	<50	<250	83
MW-12-040611 104070-04	820	<250	88
MW-11-040611 104070-05	290	<250	93
MW-13-040611 104070-06	<50	<250	89
MW-9-040611 104070-07	150	<250	88
MW-8-040611 104070-08	700	<250	93
MW-10-040611 104070-09	260	<250	94
Method Blank 01-615 MB	<50	<250	90

Date of Report: 04/21/11
Date Received: 04/07/11
Project: NW Fuel 100014, F&BI 104070

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

Laboratory Code: 104069-01 (Duplicate)

Analyte	Reporting Units	(Wet Wt) Sample Result	(Wet Wt) Duplicate Result	Relative Percent Difference (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	86	69-120
Toluene	mg/kg (ppm)	0.5	76	70-117
Ethylbenzene	mg/kg (ppm)	0.5	70	65-123
Xylenes	mg/kg (ppm)	1.5	77	66-120
Gasoline	mg/kg (ppm)	20	90	71-131

Date of Report: 04/21/11
Date Received: 04/07/11
Project: NW Fuel 100014, F&BI 104070

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

Laboratory Code: 104070-03 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	2.3	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	89	65-118
Toluene	ug/L (ppb)	50	82	72-122
Ethylbenzene	ug/L (ppb)	50	89	73-126
Xylenes	ug/L (ppb)	150	84	74-118
Gasoline	ug/L (ppb)	1,000	99	69-134

Date of Report: 04/21/11
Date Received: 04/07/11
Project: NW Fuel 100014, F&BI 104070

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

Laboratory Code: 104067-12 (Matrix Spike)

Analyte	Reporting Units	Spike Level	(Wet wt) Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	88	89	63-146	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	91	79-144

Date of Report: 04/21/11
Date Received: 04/07/11
Project: NW Fuel 100014, F&BI 104070

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	101	101	61-133	0

Data Qualifiers & Definitions

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

A1 – More than one compound of similar molecule structure was identified with equal probability.

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

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

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

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc – The compound is a common laboratory and field contaminant.

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

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j – The result is below normal reporting limits. The value reported is an estimate.

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

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

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

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

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

pc – The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr – The sample was received with incorrect preservation. The value reported should be considered an estimate.

ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

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

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

104070

SAMPLE CHAIN OF CUSTODY

ME 04/07/11 VSI/VI/COS

Page # 1 of 1

Send Report To JAY CHENNAULT
Company ASPECT
Address 401 2ND AVE S. # 201
City, State, ZIP SEATTLE, WA 98104
Phone # 206-619-6742 Fax #

SAMPLERS (signature)

PROJECT NAME/NO. NW FUEL 100014

PO #

REMARKS

TURNAROUND TIME
☒ Standard (2 Weeks)
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED: TPH-Diesel Ext	TPH-Gasoline Ext	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS						Notes
MW-11-5-6	01 A-E	4/5/11	9:00	SOIL	5	X	X	X									
MW-12-9.5-5.5	02 A-E	4/5/11	9:30	SOIL	5	X	X	X									
MW-7-040611	03 A-F	4/6/11	8:12	W	6	X	X	X									
MW-12-040611	04 A-F		8:55														NO PRESERVATIVE
MW-11-040611	05 A-F		9:30														
MW-13-040611	06 A-F		10:10														
MW-9-040611	07 A-F		12:25														
MW-8-040611	08 A-F		13:15														
MW-10-040611	09 A-F		14:15														
MW-13-5-6	10 A-E	4/5/11	10:00	SOIL	5	X	X	X									

only per JC 4/8/11

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		MATTHEW VONDERMITE	ASPECT	4/7/11	835
Received by:		Nhan Phan	FEBI	4/7/11	1610
Relinquished by:					
Received by:			Samples received at 2 °C		

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