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## TECHNICAL MEMORANDUM

To: Mr. Aaron Wilcox  
From: Jonathan Horowitz, PE  
Date: October 22, 2015  
Subject: **Handy Mart - Groundwater Monitoring Results**

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### INTRODUCTION

HydroCon Environmental, LLC (HydroCon) is submitting this technical memorandum to Wilcox & Flegel to document the work completed at 1410 Ocean Beach Highway in Longview, Washington (the site) in September 2015. The work was conducted according to our Master Services Agreement (MSA), dated July 11, 2014.

### FIELD ACTIVITIES

On September 24, 2015, HydroCon personnel mobilized to the site to perform the groundwater monitoring. Upon arrival at the site, the well cap on each well was removed and the water level was allowed to equilibrate prior to measuring the depth to water (DTW). The depth to water in each well was measured using a clean electronic water level indicator. Water levels were measured at the scribed reference mark (north end of the top of the PVC casing) at each well. A table detailing the groundwater levels and elevations and a figure indicating the groundwater flow direction are included in the attachments. Depth to water in the wells ranged from 9.54 to 10.98 feet below top of casing. Groundwater elevations were calculated based on an arbitrary measuring point. Based on the measured groundwater elevations, the groundwater flows towards the southwest at an approximate gradient of 0.003 feet/foot.

HydroCon purged monitoring wells MW-1 through MW-3 with a low flow peristaltic pump equipped with new length of LDPE tubing attached to a new length of silicone tubing. Field parameters (pH, temperature and specific conductivity) were measured and recorded on a Groundwater Sample Collection field form along with the depth to water measurements (included in the attachment). Purging was completed when the field parameters had stabilized.

Samples were collected immediately after purging and placed in labeled laboratory-prepared sample bottles. The samples were shipped in an iced cooler along with chain-of-custody documentation to the project laboratory for analysis.

A total of three groundwater samples were collected for laboratory analysis. Each sample was analyzed for the following set of parameters:

- Gasoline Range Organics (GRPH) by Northwest Method NWTPH-Gx; and

- 
- Benzene, Toluene, Ethylbenzene, and Total Xylenes (BTEX) by EPA Method 8021B.

## SAMPLING RESULTS

GRPH was detected at concentrations above the laboratory Method Reporting Limits (MRLs) in one of the samples (from MW-2) submitted; however, the detected concentration was below the applicable MTCA Method A Cleanup Level. Benzene was detected at a concentration of 6.1 micrograms per liter ( $\mu\text{g/L}$ ) in the sample from MW-1. This concentration exceeds the MTCA Method A Cleanup Level of 5  $\mu\text{g/L}$ . Toluene and total xylenes were detected above the MRLs in the sample submitted from MW-2; however the detected concentrations were below the applicable MTCA Method A Cleanup Levels. A summary data table and the laboratory report are included in the attachments.

## DISCUSSION

Based on the analytical results, HydroCon recommends the following:

- The next round of monitoring should be conducted during the fourth quarter of 2015.
- Based on the exceedance of benzene during this sampling event quarterly groundwater monitoring should continue until four consecutive quarters with no detected concentrations exceeding MTCA Method A Cleanup Levels have been achieved.

## QUALIFICATIONS

HydroCon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. HydroCon makes no warranties, either express or implied, regarding the findings, conclusions or recommendations. Please note that HydroCon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of the report.

Findings and conclusions resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, nondetectable or not present during these services, and we cannot represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this monitoring. Subsurface conditions may vary from those encountered at specific sampling locations or during other surveys, tests, assessments, investigations, or exploratory services; the data, interpretations and findings are based solely upon data obtained at the time and within the scope of these services.

This report is intended for the sole use of **Wilcox & Flegel**. This report may not be used or relied upon by any other party without the written consent of HydroCon. The scope of services performed in execution of this evaluation may not be appropriate to satisfy the needs of other users, and use or re-use of this document or the findings, conclusions, or recommendations is at the risk of said user.

The conclusions presented in this report are, in part, based upon subsurface sampling performed at selected locations and depths. There may be conditions between borings or samples that differ significantly from those presented in this report and which cannot be predicted by this study.

## CLOSING

We appreciate the opportunity to perform these services for Groat Brothers, Inc. Please contact the undersigned at (360) 703-6079 if you have any questions regarding the information provided in this letter report.

Sincerely,

The HydroCon logo, consisting of the word "Hydro" in blue and "Con" in green, with a stylized water drop icon.A handwritten signature in blue ink, appearing to read "Jonathan Horowitz".

Jonathan Horowitz, PE  
Project Engineer



## Figures

Figure 1 – Site Location Map

Figure 2 – Site Features Map

Figure 3 – Groundwater Analytical Results

Figure 4 – Groundwater Elevations and Contour Map

## Tables

Table 1 – Summary of Groundwater Elevations

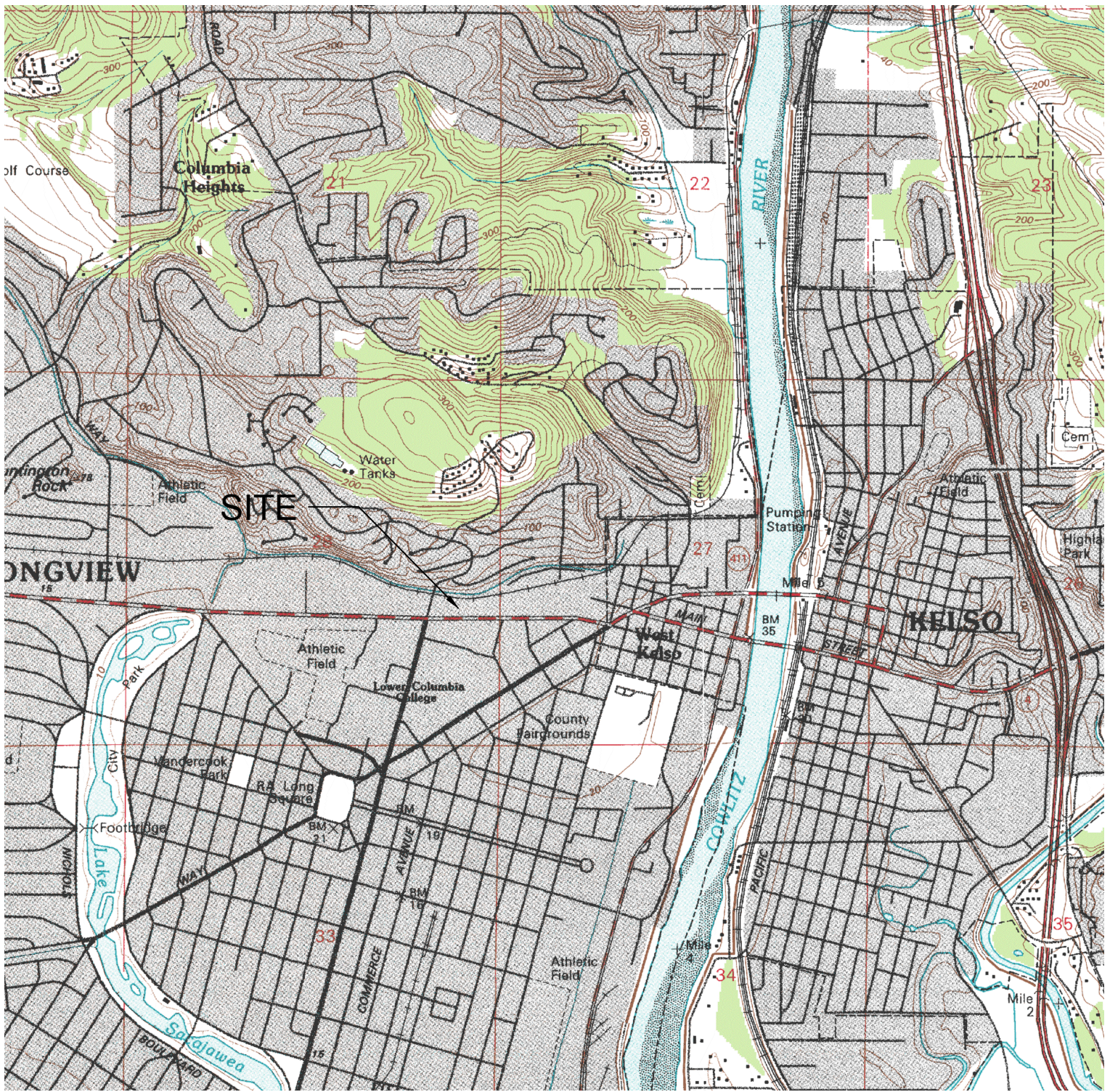
Table 2 – Summary of Current Groundwater Analytical Results

Table 3 – Summary of Historical Groundwater Analytical Results

## Attachments

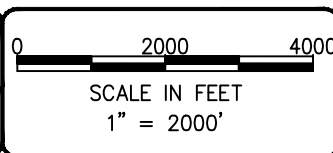
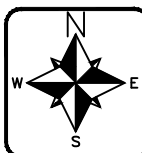
**Attachment A - Groundwater Sample Collection Field Forms**

**Attachment B - Laboratory Report and Chain-of-Custody Documentation**



**NOTE(S):**

1. USGS, KELSO QUADRANGLE  
WASHINGTON  
7.5 MINUTE SERIES (TOPOGRAPHIC)





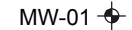
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DWN: MG  
CHK: JH  
APPROVED:  
PRJ. MGR: DB  
PROJECT NO:  
2015-007-1

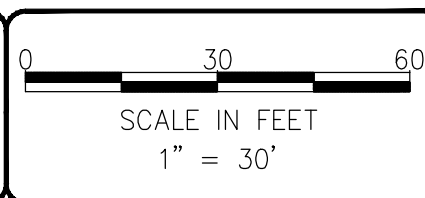
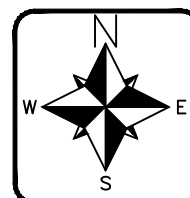
FIGURE 1  
SITE LOCATION  
HANDY MART  
WILCOX & FLEGEL  
1410 OCEAN BEACH HWY  
LONGVIEW, WA

P:\Drafting\2015-007-1 Handy Mart\2015-007-1.dwg 2.17.2014



### LEGEND

-  PROPERTY BOUNDARY
-  BUILDING
-  MONITORING WELL

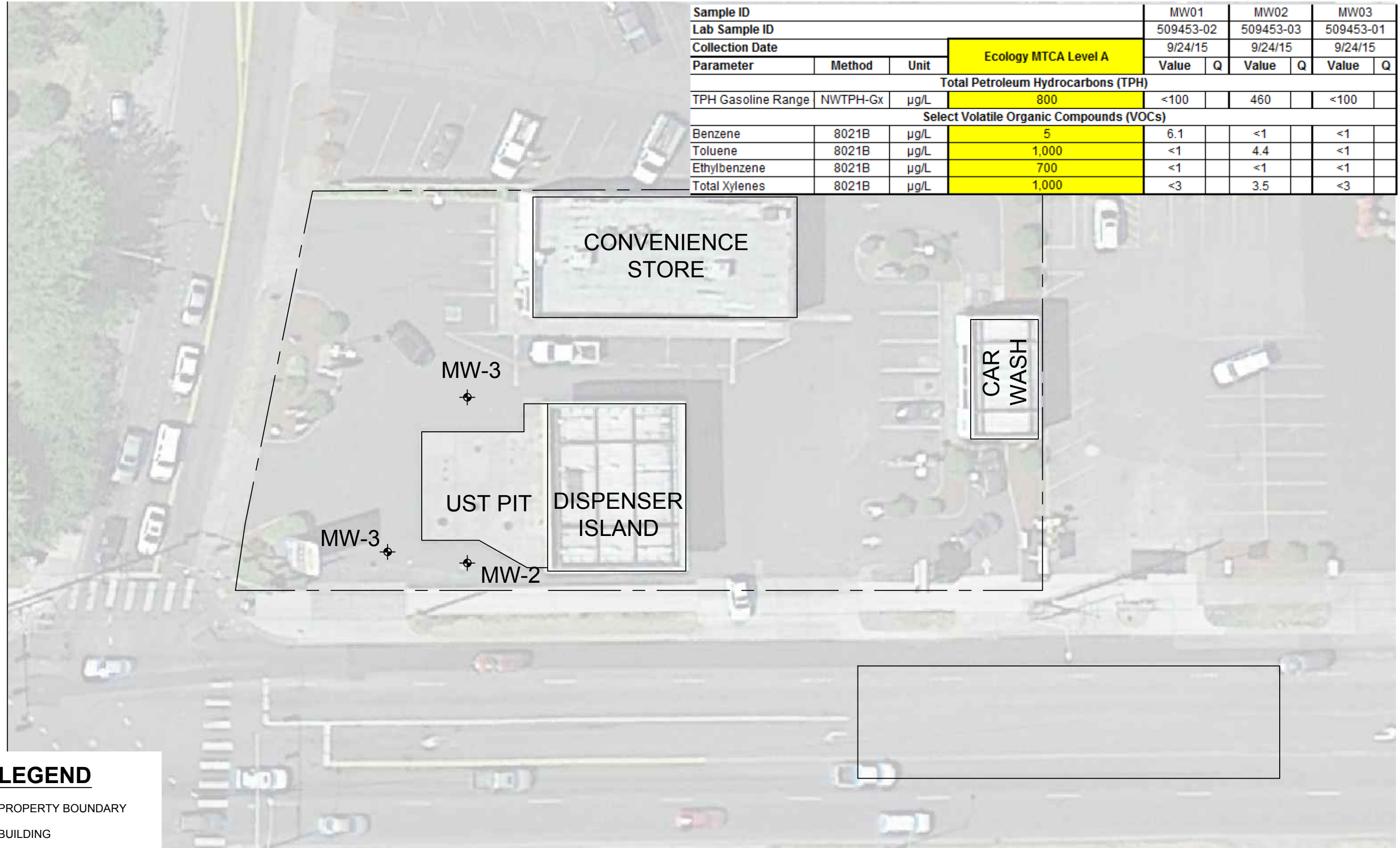


**HydroCon**  
 510 Allen St. Suite B Kelso, WA 98626, Ph (360) 703-6079

DATE: 09-29-15  
 DWN: MG  
 CHK: JH  
 APPROVED:  
 PRJ. MGR: DB  
 PROJECT NO:  
 2015-007-01

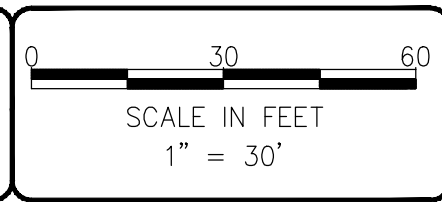
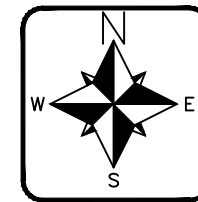
FIGURE 2  
 SITE FEATURES  
 HANDY MART  
 WILCOX & FLEGEL  
 1410 OCEAN BEACH HWY  
 LONGVIEW, WA

Sample ID			MW01	MW02	MW03			
Lab Sample ID			509453-02	509453-03	509453-01			
Collection Date			9/24/15	9/24/15	9/24/15			
Parameter	Method	Unit	Ecology MTCA Level A					
			Value	Q	Value	Q	Value	Q
<b>Total Petroleum Hydrocarbons (TPH)</b>								
TPH Gasoline Range	NWTPH-Gx	µg/L	800	<100		460		<100
<b>Select Volatile Organic Compounds (VOCs)</b>								
Benzene	8021B	µg/L	5	6.1		<1		<1
Toluene	8021B	µg/L	1,000	<1		4.4		<1
Ethylbenzene	8021B	µg/L	700	<1		<1		<1
Total Xylenes	8021B	µg/L	1,000	<3		3.5		<3



**LEGEND**

- PROPERTY BOUNDARY
- BUILDING
- MONITORING WELL



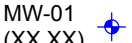
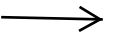


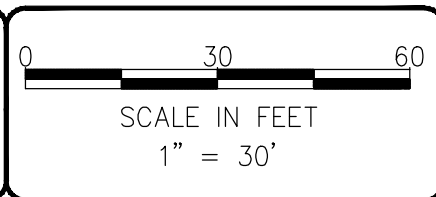
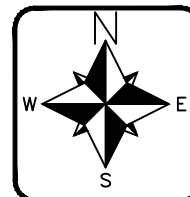
DATE: 10-13-15  
 DWN: MG  
 CHK: JH  
 APPROVED:  
 PRJ. MGR: DB  
 PROJECT NO:  
 2015-007.1

FIGURE 3  
 GROUNDWATER ANALYTICAL RESULTS  
 HANDY MART  
 WILCOX & FLEGEL  
 1410 OCEAN BEACH HWY  
 LONGVIEW, WA



**LEGEND**

-  PROPERTY BOUNDARY
-  BUILDING
-  MW-01 (XX.XX) MONITORING WELL (GROUNDWATER ELEVATION)
-  APPROXIMATE DIRECTION OF GROUNDWATER FLOW



DATE: 10-13-15  
 DWN: MG  
 CHK: JH  
 APPROVED:  
 PRJ. MGR: DB  
 PROJECT NO:  
 2015-007.1

FIGURE 4  
 GROUNDWATER ELEVATIONS & CONTOUR MAP  
 HANDY MART  
 WILCOX & FLEGEL  
 1410 OCEAN BEACH HWY LONGVIEW, WA

**Table 1**  
**Summary of Historical Groundwater Elevations**  
**Handy Mart**  
**Longview, Washington**  
**HydroCon Project Number 2015-007.1**

<b>Monitoring Well ID</b>	<b>Date</b>	<b>TOC Elevation</b>	<b>Depth to Water</b>	<b>Groundwater Elevation</b>
MW-01	9/24/2015	21.12	10.98	10.14
MW-02	9/24/2015	19.98	9.85	10.13
MW-03	9/24/2015	19.63	9.54	10.09

**Notes:**

TOC = Top of well casing



**Table 2**  
**Summary of Groundwater Analytical Results**  
**Handy Mart, Longview, Washington**  
**HydroCon Project Number 2014-007.01**

Sample ID			MW01	MW02	MW03			
Lab Sample ID			509453-02	509453-03	509453-01			
Collection Date			9/24/15	9/24/15	9/24/15			
Parameter	Method	Unit	Value	Q	Value	Q	Value	Q
<b>Ecology MTCA Level A</b>								
<b>Total Petroleum Hydrocarbons (TPH)</b>								
TPH Gasoline Range (G)	NWTPH-Gx	µg/L	800	<100	460		<100	
<b>Select Volatile Organic Compounds (VOCs)</b>								
Benzene	8021B	µg/L	5	6.1	<1		<1	
Toluene	8021B	µg/L	1,000	<1	4.4		<1	
Ethylbenzene	8021B	µg/L	700	<1	<1		<1	
Total Xylenes	8021B	µg/L	1,000	<3	3.5		<3	

**Notes and Qualifiers: (Q; only shown in Table if reported by laboratory)**

\* = Washington State Model Toxics Control Act (MTCA) Method A Cleanup Level for Groundwater (rev. October 12, 2007)

[1] = Gasoline Range Petroleum Hydrocarbons (GRPH) by Northwest Method NWTPH-Gx

[2] = Volatile Organic Compounds (VOCs) by EPA Methods 8021B

< = Indicates compound not detected above the laboratory Method Reporting Limit (MRL) shown.

All values shown are in micrograms per liter (µg/L) (parts per billion).

Highlighted cell indicates compound detected above cited MTCA Method A Cleanup Level.

**Table 3**  
**Summary of Groundwater Analytical Results**  
**Handy Mart, Longview, Washington**  
**HydroCon Project Number 2014-007.01**

Parameter		GRPH [1]	Benzene [2]	Toluene [2]	Ethylbenzene [2]	Total Xylenes [2]
<b>Cleanup Level*</b>		<b>800</b>	<b>5</b>	<b>1,000</b>	<b>700</b>	<b>1,000</b>
Monitoring Well ID	Date Sampled					
MW-1	9/24/15	<100	6.1	<1	<1	<3
MW-2	9/24/15	460	<1	4.4	<1	3.5
MW-3	9/24/15	<100	<1	<1	<1	<3

**Notes:**

**ATTACHMENT A**  
**GROUNDWATER SAMPLE COLLECTION FIELD FORMS**







# GROUNDWATER PURGE AND SAMPLE COLLECTION

Well I.D. Number: MW-3

Project Name (Number): Handy Mart Sample I.D.: MW-3 Time: 1:25  
 Hydrocon Project Number: 2015-007.01 Field Duplicate I.D.: - Time: -  
 Date: 9/24/15 Personnel: JPH

## WELL INFORMATION

Monument condition:  Good  Needs repair: \_\_\_\_\_  Water in Monument  
 Well cap condition:  Good  Replaced  Needs Replacement  Surface Water Well Infiltration  
 Headspace reading:  Not measured PID Reading \_\_\_\_\_ ppm  Odor: \_\_\_\_\_  
 Well diameter:  2-inch  4-inch  6-inch  Other: 3/4"  
 Comments: \_\_\_\_\_

## PURGING INFORMATION

Total well depth: \_\_\_\_\_ ft Bottom:  Hard  Soft  Not measured Screen Interval(s): \_\_\_\_\_  
 Depth to product: \_\_\_\_\_ ft  
 Depth to water: \_\_\_\_\_ ft Intake Depth (BTOC): \_\_\_\_\_ Begin Purging Well: \_\_\_\_\_  
 Casing volume: \_\_\_\_\_ ft (H<sub>2</sub>O) X \_\_\_\_\_ gal/ft = \_\_\_\_\_ gal. X 3 = \_\_\_\_\_ gal.  
 Volume Conversion Factors: 3/4"=0.02 gal/ft 1"=0.04 gal/ft 2"=0.16 gal/ft 4"=0.65 gal/ft 6"= 1.47 gal/ft

## PURGING/DISPOSAL METHOD

Pump type  Peristaltic  Centrifugal  Dedicated Bladder  Non-Dedicated Bladder Other \_\_\_\_\_  
 Bailer type: \_\_\_\_\_ Water Disposal:  Drummed  Remediation System  Other \_\_\_\_\_

## FIELD PARAMETERS

Odor and/or Sheen: \_\_\_\_\_

Time	Water Level (BTOC)	Purge Rate (L/min)	Temp. (°C)	Sp. Cond. (mS/cm) (±3%)	Dissolved Oxygen (±10% or ≤1.00 ±0.2)	pH (SU) (±0.1)	ORP (mV)	Turbidity (NTU) (± 10% or ≤10)
1:05	-		21.2	0.433		6.18	65	
1:10	-		21.8	0.513		6.09	52	
1:15	-		22.2	0.582		6.15	-2	
1:20			22.4	0.581		6.18	-6	
1:25			22.4	0.583		6.18	-12	

Stabilization achieved if three successive measurements for pH, Conductivity and Turbidity and/or Dissolved Oxygen are recorded within their respective stabilization criteria. A minimum of six measurements should be recorded.

Purging Comments: \_\_\_\_\_

## SAMPLE INFORMATION

Container Type	Bottle Count	Preservative	Field Filtered?	Analysis
			No 0.45 0.10	
			No 0.45 0.10	
			No 0.45 0.10	
			No 0.45 0.10	
			No 0.45 0.10	

Sampling Comments: \_\_\_\_\_

**ATTACHMENT B**  
**LABORATORY REPORT AND CHAIN-OF-CUSTODY DOCUMENTATION**

FRIEDMAN & BRUYA, INC.

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ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.  
Yelena Aravkina, M.S.  
Michael Erdahl, B.S.  
Arina Podnozova, B.S.  
Eric Young, B.S.

3012 16th Avenue West  
Seattle, WA 98119-2029  
(206) 285-8282  
fbi@isomedia.com  
www.friedmanandbruya.com

October 1, 2015

Jonathan Horowitz, Project Manager  
HydroCon  
510 Allen St, Suite B  
Kelso, WA 98626

Dear Mr. Horowitz:

Included are the results from the testing of material submitted on September 25, 2015 from the 2015-007-01, F&BI 509453 project. There are 4 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl  
Project Manager

Enclosures  
HDC1001R.DOC



FRIEDMAN & BRUYA, INC.

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ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on September 25, 2015 by Friedman & Bruya, Inc. from the HydroCon 2015-007-01, F&BI 509453 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>HydroCon</u>	PDF Amended
509453 -01	MW-1	= MW2
509453 -02	MW-2	= MW3
509453 -03	MW-3	= MW1

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/01/15  
Date Received: 09/25/15  
Project: 2015-007-01, F&BI 509453  
Date Extracted: 09/25/15  
Date Analyzed: 09/25/15

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES  
FOR BENZENE, TOLUENE, ETHYLBENZENE,  
XYLENES AND TPH AS GASOLINE  
USING METHODS 8021B AND NWTPH-Gx**  
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
MW-1 509453-01	<1	4.4	<1	3.5	460	96
MW-2 509453-02	<1	<1	<1	<3	<100	94
MW-3 509453-03	6.1	<1	<1	<3	<100	94
Method Blank 05-1931 MB	<1	<1	<1	<3	<100	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/01/15

Date Received: 09/25/15

Project: 2015-007-01, F&BI 509453

**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: 509440-06 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	50	<1	95	95	50-150	0
Toluene	ug/L (ppb)	50	<1	95	95	50-150	0
Ethylbenzene	ug/L (ppb)	50	<1	95	94	50-150	1
Xylenes	ug/L (ppb)	150	<3	93	94	50-150	1
Gasoline	ug/L (ppb)	1,000	<100	98	95	53-117	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	93	65-118
Toluene	ug/L (ppb)	50	93	72-122
Ethylbenzene	ug/L (ppb)	50	93	73-126
Xylenes	ug/L (ppb)	150	92	74-118
Gasoline	ug/L (ppb)	1,000	100	69-134

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### **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.
- 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 the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- 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. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.
- j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- 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.

