



## **PROGRESS REPORT - THIRD QUARTER 2012**

Fred Meyer Property (aka Bethel Texaco, Facility Site ID #2641)

Port Orchard, Washington

Ecology Site ID #2555, Agreed Order No. DE 9040

Prepared for:

**Fred Meyer Stores, Inc.**

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**Washington State Department of Ecology**

Toxics Cleanup Program

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Prepared by:

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Project No. 9-61M-102820



September 21, 2012

Project No. 9-61M-102820

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Carrie Pederson  
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Dear Mr. Hermann and Ms. Pederson:

**Re: Progress Report - Third Quarter 2012  
Fred Meyer Property (aka Bethel Texaco, Facility Site ID #2614)  
1900 SE Sedgewick Road  
Port Orchard, Washington  
Ecology Site ID #2555, Agreed Order No. DE 9040**

AMEC Environment & Infrastructure, Inc. (AMEC) is pleased to submit this Progress Report for the above referenced Site as provided in Agreed Order No. DE 9040. This report summarizes the results of the groundwater quality monitoring and other activities conducted at the Site during the third quarter of 2012. We appreciate the opportunity to assist Fred Meyer in implementing this project. If you have any questions or comments regarding this report, please contact the undersigned at (503) 639 3400.

Sincerely,

**AMEC Environment & Infrastructure, Inc.**

Dennis Sullivan, PG  
Senior Geologist

**Reviewed by:**

Kurt Harrington, PE  
Project Manager

Attachments  
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**PROGRESS REPORT**  
**THIRD QUARTER 2012**  
Fred Meyer Property (aka Bethel Texaco, Facility Site ID #2614)  
Port Orchard, Washington

**1.0 INTRODUCTION**

AMEC Environment & Infrastructure, Inc. (AMEC) has prepared this Progress Report on behalf of Fred Meyer Stores, Inc. (Fred Meyer) to document groundwater quality monitoring and remediation system maintenance performed by AMEC at the Fred Meyer-Port Orchard service station (Site) on August 8, 2012. The Report is being prepared and submitted pursuant to Agreed Order No. DE 9040, Section VIII.H

The Site is located at the southeastern corner of the intersection of SE Sedgewick Road and Bethel Road SE in Port Orchard, Washington (Figure 1). Historical releases from a pre-1990 underground storage tank (UST) system associated with Bethel Texaco service station (facility Site ID #2614) that formerly occupied the Site have impacted underlying soil and groundwater. Between 1999 and 2001, the Site was redeveloped with the existing Fred Meyer branded fuel station.

Release Identification number 2555 has been assigned to the Site by the Washington State Department of Ecology (Ecology). Previous investigations and remedial efforts conducted at the Site are documented in the Remedial Investigation Report (AMEC, 2010a). Cleanup action alternatives for treating residual petroleum-related contamination in subsurface soil and groundwater beneath the Site are evaluated and the most feasible cleanup action is identified in the Cleanup Action Plan (AMEC, 2010b). Continued operation of the existing air sparging (AS) and soil vapor extraction (SVE) system will continue until concentrations of contaminants of potential concern (COPCs) remaining in soil and groundwater beneath the Site are reduced to levels less than the Model Toxics Control Act (MTCA) Method A cleanup standards. An Agreed Order governing the site remediation (No. DE 9040) was signed on May 10, 2012 (State of Washington Department of Ecology, 2012).

**2.0 STATUS OF SUBSURFACE REMEDIATION SYSTEMS, ON-SITE ACTIVITIES, AND DEVIATIONS FROM CAP OR SCHEDULE**

AMEC has operated an air sparging/soil vapor extraction (AS/SVE) system at the site since March 2000. The current air sparging (AS) and vapor extraction (VE) points are shown on Figure 2. A



description of the original system design, installation, and operations is presented in AMEC's third quarter 2004 Quarterly Site Report dated January 20, 2005 (AMEC, 2005). Because of damage incurred during construction of the Fred Meyer branded fuel station and expansion of adjacent roadways from 1999 into the early 2000s, the AS groundwater treatment system was completely offline between August 2002 and February 21, 2009 and the SVE system operated at a limited capacity from July 2001 through June 2006. During June 2006, further damage to the SVE system's aboveground components resulted in the SVE component becoming inoperable.

AMEC conducted an assessment of the AS/SVE system during a Site visit on June 19, 2008, and began a series of system repairs and optimization steps as detailed in the Progress Report - First Quarter 2012 (AMEC, 2012a). During October 2008, four shallow groundwater monitoring wells (MW-108A, MW-109, MW-110, and MW-111) were installed in place of wells that had been inadvertently destroyed during construction activities in 1999 and 2000.

To increase flow in the sparging system, the AS manifold was modified to separate high-flow and low-flow sparge points in January 2012 (AMEC, 2012a). The high-flow sparge points (AS-1 and AS-10) were connected to low-pressure/high-volume rotary vane compressor #2 and the low-flow sparge points (AS-5, AS-6, and AS-7) were connected to a newly installed high-pressure/low-volume air compressor. Rotary vane compressor #1 and sparge points AS-2, AS-3, AS-4, AS-8, and AS-9 were taken off off-line. On April 10, 2012, additional modifications were made to the AS system to focus the air flow to the area near MW-103 and MW-110 (AMEC, 2012b). AS-7 was taken off-line while AS-5 and AS-6 remained connected to the high-pressure compressor installed previously. Sparge point AS-9 was connected to a second new high-pressure compressor.

## **2.1 ON-SITE ACTIVITIES DURING REPORTING PERIOD**

In addition to groundwater monitoring (Section 3.0), the following onsite activities were conducted during the period covered by this Progress Report. On the August 8 site visit, AMEC noted that the rotary vane compressor #2 had become inoperable due to damaged and jammed impellers. Because of this, sparge points AS-1 and AS-10 are now off-line. The two high-pressure/low-volume compressors continue to supply air flow to sparge points AS-5, AS-6, and AS-9.

## **2.2 DEVIATIONS FROM CAP OR SCHEDULE**

During this reporting period, there were no deviations from the required tasks under the Agreed Order or from the Corrective Action Plan (CAP), and no deviations in schedule.

### **3.0 GROUNDWATER MONITORING**

Third quarter 2012 groundwater quality monitoring was conducted on August 8, 2012. Construction details for the Site's groundwater monitoring and remediation wells are summarized in Table 1. Field logs are provided in Appendix A. Sampling methodology and monitoring results are discussed below.

#### **3.1 SITE HYDROGEOLOGY**

Depth-to-water measurements were recorded in monitoring wells MW-103, MW-105, MW-108A, MW-109, MW-110, and MW-111 to the nearest 0.01-foot from the top of the well casing (TOC) using an electronic water level indicator. The measurements were converted to elevations relative to mean sea level (msl) using surveyed TOC elevations. Groundwater elevation data for measured wells are presented in Table 2 and approximate groundwater elevation contours are depicted on Figure 2.

The calculated groundwater elevations suggest that the direction of shallow groundwater flow at the Site was directed to the west-southwest. AMEC calculated a shallow groundwater gradient of approximately 0.06 vertical feet per lateral foot (ft/ft) between monitoring wells MW-109 and MW-111 for the monitoring event.

#### **3.2 GROUNDWATER SAMPLING**

Groundwater samples were collected from monitoring wells MW-103, MW-105, MW-108A, MW-109, MW-110, and MW-111 using low-flow techniques on August 8, 2012. Prior to sampling, groundwater was purged from each monitoring well using a direct-current electric submersible pump equipped with a check-valve and an attached disposable sample bailer. Water quality indicator parameters including temperature, hydrogen ion concentration (pH), dissolved oxygen, specific conductivity, and oxidation-reduction potential were measured using field instrumentation and recorded on groundwater sampling logs (Appendix A). Purging continued until values of the indicator parameters stabilized, indicating that formation water was entering the well casing and sampling intake. Samples were transferred from the bailer to laboratory supplied containers, labeled, stored with ice in an insulated container, and transported under chain-of-custody protocol to Apex Labs, Inc. in Tigard, Oregon. Non-disposable sampling equipment was decontaminated between uses by scrubbing in an Alconox detergent solution, followed by two successive deionized water rinses.

### 3.2.1 Analytical Program

The groundwater samples were analyzed for gasoline-range organics (GRO) by Northwest Method Total Petroleum Hydrocarbon-Gasoline (NWTPH-Gx) and for selected volatile organic compounds (VOCs) by U.S. Environmental Protection Agency (EPA) Method 8260B. Photocopies of the analytical report and the chain-of-custody documents are provided in Appendix B. The analytical data for the August 8, 2012 sample event will be entered into Ecology's Environmental Information Management System (EIM), as required by Agreed Order No. 9040 (Ecology, 2012). A historical summary of COPCs detected in groundwater from May 1991 through August 2012 is presented in Appendix C.

Concentrations of constituents measured in the groundwater samples were compared to screening criteria developed on the basis of Ecology's MTCA regulations. MTCA Method A screening criteria were used when available for detected constituents. These MTCA methods provide conservative cleanup levels for use in routine cleanup actions and are used herein as screening tools.

### 3.2.2 Analytical Results and Cleanup Levels

The analytical results for groundwater samples collected on August 8, 2012, are summarized in Table 2 and depicted on Figure 3. GRO and three VOCs were detected in two wells sampled at the Site. No other VOC compounds were detected above their respective laboratory method reporting limits (MRLs) in the groundwater samples tested:

- GRO was reported in MW-103 (2,490 micrograms per liter [ $\mu\text{g/L}$ ]) and MW-110 (1,630  $\mu\text{g/L}$ ) at concentrations exceeding the MTCA Method A criteria of 800  $\mu\text{g/L}$ .
- Ethylbenzene, total xylenes, and naphthalene were reported in MW-103 and MW-110 at concentrations below the respective MTCA Method A criteria.

### 3.2.3 Non-Aqueous Phase Liquid - Not Present

Neither measurable non-aqueous phase liquid (NAPL) nor a petroleum related sheen were observed in groundwater samples collected from monitoring wells MW-103, MW-105, MW-108A, MW-109, MW-110 and MW-111 during the third quarter 2012 event.

### 3.2.4 Data Trends

The patterns of GRO and VOCs observed in MW-103 and MW-110 exhibit seasonal variations, and appear to be inversely correlated with groundwater levels to some extent. The pattern of GRO and VOCs reported in MW-103 and MW-110 in August 2012 were similar to those observed during third-quarter sampling events in the past.



In MW-109, benzene decreased from 0.510 µg/L in May 2012, to less than the MRL in the August 8, 2012 sampling event. Concentrations of GRO and all other VOCs remained below their respective MRLs in MW-109.

The GRO and VOC concentrations in the remaining three wells (MW-105, MW-108A, and MW-111) remained below MRLs. Neither GRO nor VOCs have been detected in MW-105 since the June 2008 monitoring event or in MW-108A since installation and initial sampling in January 2009.

### **3.2.5 Quality Assurance/Quality Control**

AMEC reviewed the laboratory's analytical reports (Appendix B) to assess overall data quality. The data has not been limited by qualifiers and is usable as reported for the purposes of this report.

## **4.0 AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM MONITORING**

AS/SVE system monitoring and maintenance visits were conducted on June 14 and August 8, 2012. The SVE system was operating at 100% on arrival on August 8, 2012. AMEC measured total VOC concentrations in return air, vacuum pressure, and flow velocity for each of the five SVE wells located at the Site and for the total system. Total VOC concentrations were measured using a photoionization detector (PID) calibrated to isobutylene. Total influent VOCs were measured as 0.0 parts per million (ppm). A vacuum gauge reading of 60 inches of water was observed for each of the SVE wells. A combined flow rate of 260 cubic feet per minute (cfm) was estimated from measured vacuum and the manufacturer's blower curve. Based on the VOC system influent concentrations and volumetric flow rates at the beginning and end of the monitoring period, the SVE remediation system removed approximately 0 pounds (lbs) of volatile constituents from the subsurface over the 90-day monitoring period. The system has removed an estimated 973 pounds of VOCs from subsurface soil since its installation and start up in 2000 (Table 3).

On the August 8 site visit, AMEC noted that the rotary vane compressor #2 had become inoperable due to damaged and jammed impellers. Because of this, sparge points AS-1 and AS-10 are now off-line. The two high-pressure/low-volume compressors continue to supply air flow to sparge points AS-5, AS-6, and AS-9.

AMEC measured air flow rates in each of the three active AS wells on August 8, 2012. Air flow in the AS conveyance lines ranged from 2 to 5 cubic feet per minute (cfm) with a mean value of 3 cfm. AMEC measured dissolved oxygen (DO) content in each of the six groundwater monitoring wells located at the Site on August 8, 2012. DO levels ranged from 0.64 milligrams per liter (mg/L) in monitoring well MW-111 to 11.46 mg/L in monitoring well MW-110.

DO levels measured in the groundwater monitoring wells since reactivation of the AS system during February 2009 are summarized in Table 4. A review of the data suggests that oxygen concentrations in groundwater have increased markedly in several wells following recent system modifications. Since the December 7, 2011 monitoring event, oxygen concentrations have remained elevated in all wells, with the exception of downgradient MW-111. The higher oxygen concentrations observed in monitoring wells suggest that the system modifications have been successful and the air sparging system is delivering air into the groundwater as intended. An additional benefit from air sparging operation is that increased oxygenation of the groundwater should spur increases in bioremediation of the gasoline constituents.

## 5.0 SUMMARY

The results of the third quarter 2012 monitoring event are summarized as follows:

1. The shallow groundwater piezometric surface was evaluated using the compliance points installed in 2008. Similar to previous monitoring events, the gradient was directed to the west-southwest with an estimated magnitude of 0.06 ft/ft.
2. Neither measurable NAPL nor sheen was observed. NAPL and sheen have not been observed in the monitoring wells since 1999.
3. The SVE system was 100 percent operational during the third quarter 2012 reporting period.
4. DO levels measured in the groundwater monitoring wells have increased markedly in several wells following AS system modifications to increase air flow and focus the air flow to the area near MW-103 and MW-110. Between the September 27, 2011 monitoring event and the August 8, 2012 monitoring event, oxygen concentrations have generally increased in all monitoring wells, except down-gradient MW-111. These higher oxygen concentrations suggest that the system modifications have been successful and the air sparging system is delivering air (and oxygen) into the system as intended.
5. On August 8, 2012, GRO was detected in MW-103 (2,490 µg/L) and MW-110 (1,630 µg/L) at concentrations exceeding the MTCA Method A criteria of 800 µg/L. GRO was not detected above the laboratory method reporting limit in the remaining Site groundwater monitoring wells.
6. Ethylbenzene, total xylenes, and naphthalene were reported in MW-103 and MW-110 at concentrations below the respective MTCA Method A criteria. VOCs were not detected above their respective laboratory method reporting limits in the remaining Site groundwater monitoring wells.



## 6.0 FUTURE PLANNED ACTIVITIES AND DELIVERABLES

During the next reporting period, AMEC will continue to conduct monthly maintenance checks on the AS and SVE systems to ensure they are operating properly. AMEC plans to repair the rotary vane compressor #2 in October 2012 and restore air flow into sparge points AS-1 and AS-10. AMEC will conduct the next quarterly groundwater and quality samples visit within the fourth quarter of 2012, and will submit the next Progress Report within 45 days of receiving finalized lab results, all in accordance with the requirements of Agreed Order No. 9040 (Ecology, 2012).

## 7.0 CLOSING

AMEC appreciates the opportunity to be of service to Fred Meyer on this project. If you have any questions, or if we can be of further assistance, please contact the undersigned at (503) 639-3400.

**AMEC Environment & Infrastructure, Inc.**

**Reviewed by:**

A handwritten signature in black ink, appearing to read "Dennis Sullivan".

Dennis Sullivan, PG  
Senior Geologist

A handwritten signature in black ink, appearing to read "Kurt Harrington".

Kurt Harrington, PE  
Project Manager

DS/KH/cw



## REFERENCES

AMEC Earth & Environmental, Inc., 2005. Quarterly Site Report - Third Quarter 2004, Fred Meyer Property, Port Orchard, Washington. January 20, 2005.

AMEC Earth & Environmental, Inc., 2010a, Remedial Investigation Report, Fred Meyer Stores, Inc. - Port Orchard Site, 1900 SE Sedgwick Road, Port Orchard, Washington, Ecology Site ID #96424236 (formerly J5E03), May 4, 2010.

AMEC Earth & Environmental, Inc., 2010b, Cleanup Action Plan, Fred Meyer Stores, Inc. - Port Orchard Site, 1900 SE Sedgwick Road, Port Orchard, Washington, Ecology Site ID #96424236 (formerly J5E03), May 4, 2010.

AMEC Environment & Infrastructure, Inc. 2012a. Progress Report - Fourth Quarter 2011 & First Quarter 2012, Fred Meyer Property (aka Bethel Texaco, Facility Site ID #2614), 1900 SE Sedgwick Road, Port Orchard, Washington. March 8, 2012.

AMEC Environment & Infrastructure, Inc. 2012b. Progress Report - Second Quarter 2012, Fred Meyer Property (aka Bethel Texaco, Facility Site ID #2614), 1900 SE Sedgwick Road, Port Orchard, Washington. July 2, 2012.

State of Washington Department of Ecology (Ecology), 2012. Agreed Order No. 9040 for Final Cleanup Action and Compliance Monitoring. May 10, 2012.



## LIMITATIONS

This report was prepared exclusively for Fred Meyer Stores, Inc. (Fred Meyer) and its agents by AMEC Environment & Infrastructure, Inc. (AMEC). The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in AMEC services and are based on: i) information available at the time of preparation; ii) data supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended for use by Fred Meyer, for the Site at 1900 SE Sedgewick Road, Port Orchard, Washington only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

The findings contained herein are relevant to the dates of the AMEC Site visits and should not be relied upon to represent conditions later. In the event that changes in the nature, usage, or layout of the property or nearby properties are made, the conclusions and recommendations contained in this report may not be valid. If additional information becomes available, it should be provided to AMEC so the original conclusions and recommendations can be modified as necessary.

**TABLES**

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**TABLE 1**  
**Well Construction Summary**  
**Fred Meyer Facility, Port Orchard, Washington**

Well ID	Install Date	Top of Casing Elevation (feet msl)	Boring Depth (feet bgs)	Casing Diameter (inches)	Screen Interval (feet bgs)
<b>Active Monitoring Wells</b>					
MW-103	5/6/91	311.70	32	4	12-32
MW-105	11/10/99	310.46	30	2	10-30
MW-108A	10/1/08	310.38	30	2	15-30
MW-109	10/02/08	310.48	32	2	15-30
MW-110	10/1/08	312.77	30	2	15-30
MW-111	10/1/08	310.62	40	2	25-40
<b>Vapor Extraction Wells</b>					
VE-1^	11/4/99	NA	15	0.75	~7.5-15
VE-2^	11/4/99	NA	15	0.75	~7.5-15
VE-3	11/3/99	NA	15	0.75	7.5-15
VE-4	11/3/99	NA	15	0.75	7.5-15
VE-5	11/3/99	NA	15	0.75	7.5-15
<b>Air-Sparging Wells</b>					
AS-1^	11/4/99	NA	~35	0.75	~30-35
AS-2^	11/4/99	NA	~35	0.75	~30-35
AS-3^	11/4/99	NA	~35	0.75	~30-35
AS-4^	11/4/99	NA	~35	0.75	~30-35
AS-5	11/3/99	NA	~35	0.75	30-35
AS-6	11/3/99	NA	~35	0.75	30-35
AS-7	11/3/99	NA	~35	0.75	30-35
AS-8^	11/3/99	NA	~35	0.75	~30-35
AS-9	11/3/99	NA	~35	0.75	30-35
AS-10	11/3/99	NA	~35	0.75	30-35
<b>Destroyed and Decommissioned Monitoring Wells</b>					
MW-1S	10/15/90	312.56	38.5	2	18.5-38.5
MW-1D	10/15/90	313.00	79.5	2	34.5-80
MW-2S	10/23/90	304.53	38	2	18-38
MW-2D	10/23/90	301.13	78	2	43-78
MW-101	5/13/91	not reported	79	2	60-79
MW-102	5/13/91	not reported	81	2	61-81
MW-104	5/6/91	not reported	not reported	2	not reported
MW-106*	11/10/99	311.73	30	2	10-30
MW-107*	11/9/99	310.59	30	2	10-30
MW-108*	11/9/99	309.94	30	2	10-30

Notes:

- msl: Mean sea level
- bgs: Below ground surface
- ^: Well at 45° angle
- \*: Well was destroyed during construction of the fueling station
- NA: not applicable
- ~: approximately

**TABLE 2**  
**Groundwater Elevations and Analytical Results**  
**Detected Constituents - Third Quarter 2012 Monitoring Event**  
**Fred Meyer Facility, Port Orchard, Washington**

Well No.	Date	Gasoline Range Organics	Volatile Organic Compounds								Groundwater Levels			Final Dissolved Oxygen
			Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	EDC	EDB	Naphthalene	Casing Elev.	Depth to Water	Water Elev.	
CAS RN		not applicable	71-43-2	108-88-3	100-41-4	1330-20-7	1634-04-4	107-06-2	106-93-4	91-20-3				
		(µg/L)	(µg/L)								(feet msl)	(feet toc)	(feet msl)	(mg/L)
<b>MTCA Method A</b>		<b>800</b>	<b>5</b>	<b>1,000</b>	<b>700</b>	<b>1,000</b>	<b>20</b>	<b>5</b>	<b>0.01</b>	<b>160</b>				
Well ID	Date													
MW-103	12/7/2011	<b>664</b>	0.250 U	1.00 U	<b>1.78</b>	<b>6.55</b>	1.00 U	0.500 U	0.500 U	2.00 U	311.70	20.05	291.65	6.24
MW-103	1/12/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	311.70	20.70	291.00	6.97
MW-103	5/10/2012	<b>108</b>	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	311.70	21.28	290.42	7.42
MW-103	8/8/2012	<b>2,490</b>	0.250 U	1.00 U	<b>4.30</b>	<b>27.0</b>	1.00 U	0.500 U	0.500 U	<b>3.04</b>	311.70	22.61	289.09	9.92
MW-105	12/7/2011	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.46	18.51	291.95	2.70
MW-105	1/12/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.46	18.34	292.12	3.80
MW-105	5/10/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.46	16.28	294.18	6.55
MW-105	8/8/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.46	19.72	290.74	8.00
MW-108A	12/7/2011	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.38	23.05	287.33	0.62
MW-108A	1/12/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.38	23.17	287.21	1.97
MW-108A	5/10/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.38	21.03	289.35	2.94
MW-108A	8/8/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.38	22.80	287.58	2.81
MW-109	12/7/2011	<b>137</b>	<b>46.9</b>	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.48	15.99	294.49	2.57
MW-109	1/12/2012	100 U	<b>4.81</b>	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.48	15.76	294.72	3.40
MW-109	5/10/2012	100 U	<b>0.510</b>	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.48	14.48	296.00	4.00
MW-109	8/8/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.48	17.91	292.57	4.96
MW-110	12/7/2011	<b>1,230</b>	0.250 U	1.00 U	<b>40.0</b>	<b>40.3</b>	1.00 U	0.500 U	0.500 U	<b>7.28</b>	312.77	20.23	292.54	3.54
MW-110	1/12/2012	100 U	0.250 U	1.00 U	0.500 U	<b>2.63</b>	1.00 U	0.500 U	0.500 U	2.00 U	312.77	20.22	292.55	7.50
MW-110	5/10/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	312.77	20.63	292.14	9.44
MW-110	8/8/2012	<b>1,630</b>	0.250 U	1.00 U	<b>3.21</b>	<b>8.45</b>	1.00 U	0.500 U	0.500 U	<b>3.41</b>	312.77	21.50	291.27	11.46
MW-111	12/7/2011	100 U	<b>0.340</b>	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.62	30.77	279.85	9.08
MW-111	1/12/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.62	30.97	279.65	8.95
MW-111	5/10/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.62	28.90	281.72	0.52
MW-111	8/8/2012	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	2.00 U	310.62	29.90	280.72	0.64

Notes:

- CAS RN: Chemical Abstracts Service Registry Number
- MTCA Method A: Washington Department of Ecology Model Toxics Control Act Method A cleanup standards
- MTBE: methyl tert-butyl ether
- EDC: 1,2-dichloroethane
- EDB: 1,2-dibromoethane
- µg/L: micrograms per liter
- mg/L: milligrams per liter
- feet msl = feet above mean sea level
- feet toc = feet below top of well casing
- Bold** values indicate constituent detected at concentration greater than laboratory reporting limit
- Red** values indicate the concentration exceeds the MTCA Method A cleanup level
- U: The analyte was not detected above method reporting limit presented in table



**TABLE 3**  
**Soil Vapor Extraction System Monitoring Data**  
**Fred Meyer Facility, Port Orchard, Washington**

Date	Monitoring Days	Operational Days	% Operational	Total Influent VOC Level <sup>1</sup>	Vacuum <sup>2</sup>	Total Flow Velocity	Bleed Flow Velocity	Total Recovered Flow Rate <sup>3</sup>	Volatile Removal Rate at End of Period	Estimated VOCs Removed for Period	Estimated VOCs Removed to Date
				(ppmv)	(inches H2O)	(feet per minute)	(cfm)	(lbs./day)	(pounds)		
3/1/00	-	-	-	105.0	90	1,200	0	105	2.31	0	0
5/24/00	84	84	100%	160.9	> 100	1,000	0	87	2.95	221	221
8/17/00	85	85	100%	66.1	75	NA	0	220	3.05	255	476
10/19/00	63	63	100%	17.9	34	NA	0	320	1.20	134	610
12/13/00	55	55	100%	62.2	> 100	1,000	0	87	1.14	64	674
2/22/01	71	71	100%	4.0	71	NA	0	225	0.19	47	721
3/19/01	25	25	100%	28.3	90	NA	0	160	0.95	14	736
AMEC finds that select SVE wells were destroyed during expansion of the Bethel Road SE and SE Sedgewick Road right-of-ways adjacent to site.											
6/28/01	101	101	100%	11.2	80	NA	0	200	0.47	72	807
9/23/01	87	43	49%	4.2	100	NA	0	120	0.11	12	820
12/11/01	79	39	49%	0.0	100	NA	0	120	0.00	2.1	822
3/20/02	99	50	51%	1.4	100	NA	0	120	0.04	0.9	823
6/11/02	83	29	35%	0.0	90	NA	0	160	0.00	0.5	823
AS system is completely off-line as a result of damages incurred during site redevelopment											
9/25/02	106	106	56%	0.0	90	2,600	0	227	0.00	0	823
12/12/02	78	78	50%	2.7	90	2,500	0	218	0.12	4.8	828
4/1/03	110	110	100%	6.0	80	3,000	0	262	0.33	25	853
6/22/03	82	82	100%	0.0	100	NA	0	120	0.00	14	867
9/23/03	93	93	100%	0.0	60	4,100	0	358	0.00	0	867
12/17/03	85	85	100%	0.0	70	3,800	0	331	0.00	0	867
3/31/04	105	0	0%	0.0	0	0	0	0	0.00	0	867
6/29/04	90	90	100%	0.0	60	4,100	0	358	0.00	0	867
9/29/04	92	92	100%	0.0	60	4,100	0	358	0.00	0	867
11/9/04	41	41	100%	0.0	55	4,300	0	375	0.00	0	867
3/10/05	121	121	100%	0.0	50	4,500	0	393	0.00	0	867
6/21/05	103	103	100%	0.0	55	2,000	0	174	0.00	0	867
9/23/05	94	94	100%	0.0	100	NA	0	120	0.00	0	867
12/1/05	69	69	100%	0.0	100	NA	0	120	0.00	0	867
3/9/06*	98	unknown	unknown	0.0	0	0	0	0	0.00	0	867
SVE system is completely off-line as a result of damages to blower.											
6/8/06**	91	0	0%	0.0	0	0	0	0	0.00	0	867
9/22/06	106	0	0%	0.0	0	0	0	0	0.00	0	867
12/12/06	81	0	0%	0.0	0	0	0	0	0.00	0	867
3/28/07	106	0	0%	0.0	0	0	0	0	0.00	0	867
6/13/07	77	0	0%	0.0	0	0	0	0	0.00	0	867
8/28/07	76	0	0%	0.0	0	0	0	0	0.00	0	867
11/28/07	92	0	0%	0.0	0	0	0	0	0.00	0	867
4/15/08	139	0	0%	0.0	0	0	0	0	0.00	0	867
6/19/08	65	0	0%	0.0	0	0	0	0	0.00	0	867
9/16/08	89	0	0%	0.0	0	0	0	0	0.00	0	867
1/24/09	130	0	0%	0.0	0	0	0	0	0.00	0	867
AS/SVE System Repaired and Restarted on 02/20/09											
2/21/09	28	1	100%	28.3	90	6,000	1,200	175	0.00	0	867
3/28/09	35	35	100%	31.2	90	6,000	1,200	175	1.15	40	907
6/11/09***	75	70	93%	4.0	90	6,000	1,200	175	0.15	45	952
9/10/09	91	91	100%	0.5	100	6,000	1,200	150	0.02	7.4	959
1/22/10	134	134	100%	0.6	54	6,000	1,200	285	0.04	3.5	963
3/5/10	42	42	100%	0.5	100	6,000	1,200	150	0.02	1.1	964
6/10/10****	97	97	50%	0.2	100	6,000	1,000	150	0.01	1.1	965
9/9/10	91	91	100%	0.6	100	4,000	2,000	150	0.02	1.1	966
12/6/10	88	88	100%	0.4	100	4,300	1,700	150	0.01	1.4	968
3/29/11*****	113	113	100%	0.4	100	5,000	1,000	150	0.01	1.4	969
6/21/11***	84	42	50%	0.6	90	4,300	2,500	175	0.02	0.7	970
One AS blower and one blower connector replaced on 6/21/11											
9/27/11	98	98	100%	0.9	100	4,000	1,500	150	0.03	2.5	972
12/7/11	71	71	100%	0.0	90	6,000	1,500	175	0.00	1.0	973
1/12/12*****	36	0	0%	0.0	0	0	0	0	0.00	0.0	973
5/10/12	119	119	100%	0.0	60	6,000	1,500	260	0.00	0.0	973
8/8/12	90	90	100%	0.0	60	6,000	1,500	260	0.00	0.0	973

Notes:

VOC: volatile organic compounds

1: Reflects VOC concentration of total system influent at monitoring event arrival time based on photoionization detector measurement.

2: Reflects vacuum measurements collected at total system influent intake at monitoring event arrival time

3: Volumetric flows through December 2005 are determined from total flow velocity if available or from measured vacuum and manufacturer's blower curves if vacuum not available. Volumetric flows from February 2009 are determined from measured vacuum and manufacturer's blower curves, not from velocity data due to uncertainty with field measurer

NA: measurement not taken

PID: photoionization detector

ppmv: parts per million by volume

cfm: cubic feet per minute

\*: The knock out tank and all piping were full of water upon arrival for this monitoring day. Normal system readings could not be taken

\*\* : The system was off upon arrival and departure from the site. The SVE blowers did not work properly

\*\*\*: The VES blower was off upon arrival and turned on at departure.

\*\*\*\*: The discharge pipe was melted at arrival; damaged sometime between 1Q2010 event and 2Q2010 event.

\*\*\*\*\*: Air sparging blower #1 was off on arrival and departure due to failed connector.

\*\*\*\*\*: Air sparging blower #1 was off on arrival due tripped circuit breaker.

**TABLE 4**  
**Air Sparging System Performance Monitoring Data**  
**Fred Meyer, Port Orchard, Washington**

Monitoring Well	Date	Groundwater Depth Below Top of Casing (Feet)	Groundwater Elevation (Feet)	Final Dissolved Oxygen (mg/L)	Gasoline-Range Organics (µg/L)
MW-103	<i>AS/SVE Systems Reactivated on 02/21/09</i>				
	3/28/2009	18.16	293.54	1.50	80 U
	6/11/2009	18.61	293.09	2.34	100 U
	9/10/2009	21.47	290.23	8.71	179
	1/22/2010	19.31	292.39	1.66	1,320
	3/5/2010	18.30	293.40	1.31	100 U
	6/10/2010	19.44	292.26	1.94	403
	9/9/2010	21.86	289.84	0.78	7,430
	12/6/2010	20.60	291.10	0.72	4,060
	3/29/2011	15.75	295.95	0.81	100 U
	6/21/2011	18.06	293.64	0.51	100 U
	9/27/2011	21.12	290.58	1.41	4,330
	12/7/2011	20.05	291.65	6.24	664
	1/12/2012	20.70	291.00	6.97	100 U
5/10/2012	21.28	290.42	7.42	108	
8/8/2012	22.61	289.09	9.92	2,490	
MW-105	<i>AS/SVE Systems Reactivated on 02/21/09</i>				
	3/28/2009	17.17	293.29	1.58	80 U
	6/11/2009	17.63	292.83	1.29	100 U
	9/10/2009	21.48	288.98	3.30	80 U
	1/22/2010	17.46	293.00	7.66	80 U
	3/5/2010	16.98	293.48	1.38	100 U
	6/10/2010	18.11	292.35	2.59	100 U
	9/9/2010	20.62	289.84	1.91	100 U
	12/6/2010	19.22	291.24	1.89	100 U
	3/29/2011	14.22	296.24	0.96	100 U
	6/21/2011	16.20	294.26	0.93	100 U
	9/27/2011	20.28	290.18	2.57	100 U
	12/7/2011	18.51	291.95	2.70	100 U
	1/12/2012	18.34	292.12	3.80	100 U
5/10/2012	16.28	294.18	6.55	100 U	
8/8/2012	19.72	290.74	8.00	100 U	
MW-108A	<i>AS/SVE Systems Reactivated on 02/21/09</i>				
	3/28/2009	22.70	287.76	1.21	80 U
	6/11/2009	23.42	287.04	1.07	100 U
	9/10/2009	25.52	284.86	0.75	80 U
	1/22/2010	22.69	287.69	2.57	80 U
	3/5/2010	21.13	289.25	1.21	100 U
	6/10/2010	21.48	288.90	0.36	100 U
	9/9/2010	23.50	286.88	1.02	100 U
	12/6/2010	23.15	287.23	1.20	100 U
	3/29/2011	17.62	292.76	0.85	100 U
	6/21/2011	19.89	290.49	0.84	100 U
	9/27/2011	22.95	287.43	0.46	100 U
	12/7/2011	23.05	287.33	0.62	100 U
	1/12/2012	23.17	287.21	1.97	100 U
5/10/2012	21.03	289.35	2.94	100 U	
8/8/2012	22.80	287.58	2.81	100 U	

**TABLE 4**  
**Air Sparging System Performance Monitoring Data**  
**Fred Meyer, Port Orchard, Washington**

Monitoring Well	Date	Groundwater Depth Below Top of Casing (Feet)	Groundwater Elevation (Feet)	Final Dissolved Oxygen (mg/L)	Gasoline-Range Organics (µg/L)
MW-109	<i>AS/SVE Systems Reactivated on 02/21/09</i>				
	3/28/2009	16.13	294.33	0.99	80 U
	6/11/2009	16.27	294.19	0.74	100 U
	9/10/2009	19.77	290.71	1.95	80 U
	1/22/2010	15.25	295.23	6.44	80 U
	3/5/2010	15.23	295.25	0.85	100 U
	6/10/2010	16.20	294.28	1.86	100 U
	9/9/2010	18.92	291.56	0.97	100 U
	12/6/2010	16.71	293.77	0.79	100 U
	3/29/2011	13.30	297.18	0.67	100 U
	6/21/2011	14.70	295.78	0.65	100 U
	9/27/2011	18.86	291.62	0.60	100 U
	12/7/2011	15.99	294.49	2.57	<b>137</b>
	1/12/2012	15.76	294.72	3.40	100 U
5/10/2012	14.48	296.00	4.00	100 U	
8/8/2012	17.91	292.57	4.96	100 U	
MW-110	<i>AS/SVE Systems Reactivated on 02/21/09</i>				
	3/28/2009	16.44	294.02	1.10	<b>162</b>
	6/11/2009	--	--	6.31	100 U
	9/10/2009	22.60	290.17	9.68	80 U
	1/22/2010	19.76	293.01	6.19	<b>687</b>
	3/5/2010	18.56	294.21	2.16	100 U
	6/10/2010	19.94	292.83	1.13	100 U
	9/9/2010	22.30	290.47	3.55	<b>1,880</b>
	12/6/2010	20.63	292.14	3.85	<b>371</b>
	3/29/2011	17.33	295.44	1.53	<b>442</b>
	6/21/2011	19.52	293.25	1.07	100 U
	9/27/2011	21.86	290.91	4.45	<b>4,020</b>
	12/7/2011	20.23	2912.54	3.54	<b>1,230</b>
	1/12/2012	20.22	292.55	7.50	100 U
5/10/2012	20.63	292.14	9.44	100 U	
8/8/2012	21.50	291.27	11.46	<b>1,630</b>	
MW-111	<i>AS/SVE Systems Reactivated on 02/21/09</i>				
	3/28/2009	32.04	278.42	0.80	80 U
	6/11/2009	31.44	279.02	0.67	100 U
	9/10/2009	32.02	278.60	1.17	80 U
	1/22/2010	31.52	279.10	8.58	80 U
	3/5/2010	29.76	280.86	0.57	100 U
	6/10/2010	28.85	281.77	0.26	100 U
	9/9/2010	30.19	280.43	0.65	100 U
	12/6/2010	31.02	279.60	0.80	100 U
	3/29/2011	26.71	283.91	0.70	100 U
	6/21/2011	27.31	283.31	0.40	100 U
	9/27/2011	29.73	280.89	0.57	100 U
	12/7/2011	30.77	279.85	9.08	100 U
	1/12/2012	30.97	279.65	8.95	100 U
5/10/2012	28.90	281.72	0.52	100 U	
8/8/2012	29.90	280.72	0.64	100 U	
<b>MTCA Method A Cleanup Standard</b>					<b>800</b>

**Notes:**

MTCA Method A: Washington Department of Ecology Model Toxics Control Act Method A screening criteria

mg/L : milligrams per liter

µg/L : micrograms per liter

AS/SVE : air sparging and soil vapor extraction

**Bold** values indicate concentrations detected above laboratory reporting limit

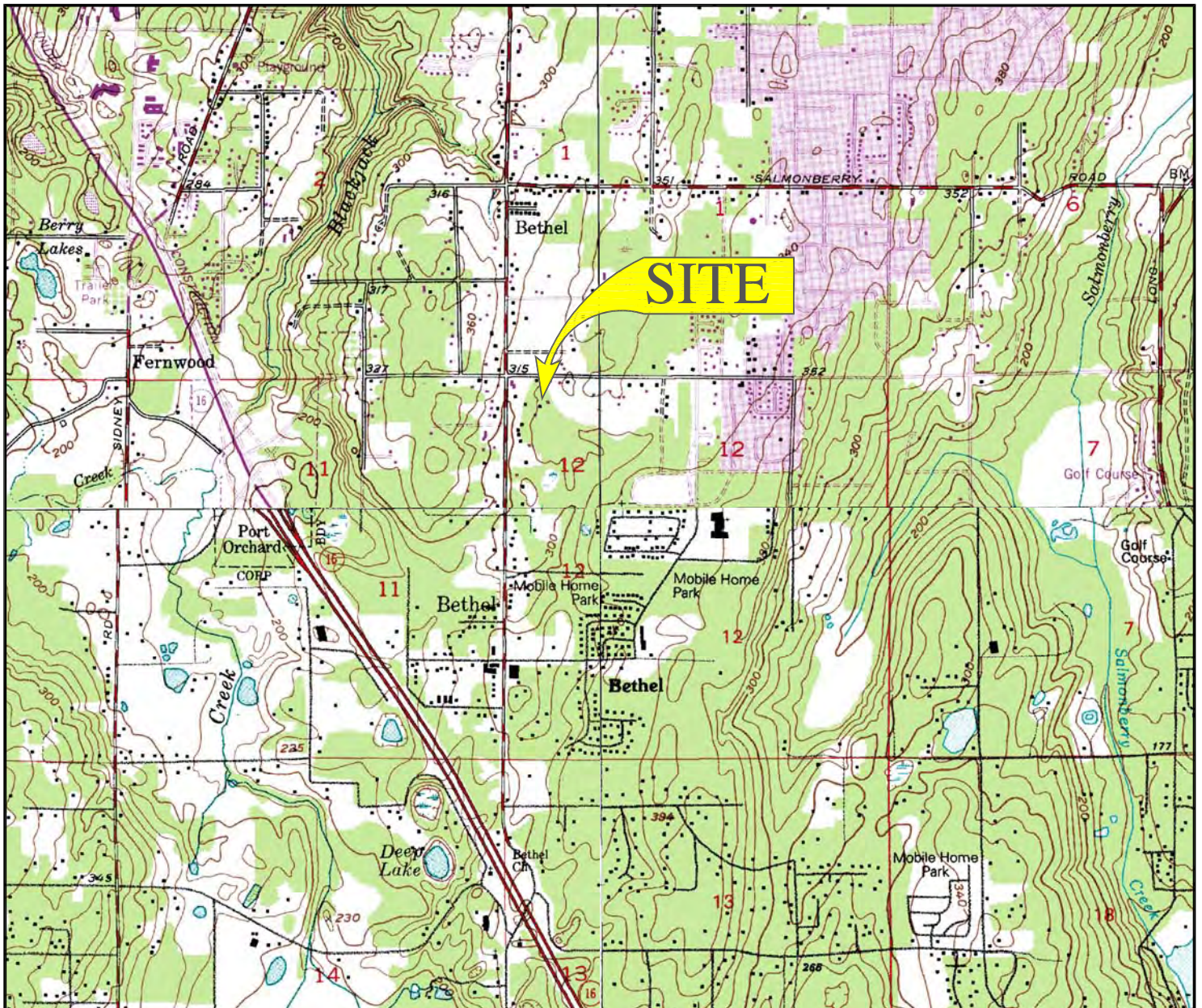
**Red** values indicate the concentration exceeds the MTCA Method A cleanup standard

U : The analyte was not detected above the laboratory method reporting limit presented

"--" : not measured

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**FIGURES**



- Heavy-duty
- Medium-duty
- Light-duty
- Unimproved dirt
- U.S. Route
- State Route
- Interstate Route

**BREMERTON WEST, WASH. BREMERTON EAST, WASH.**

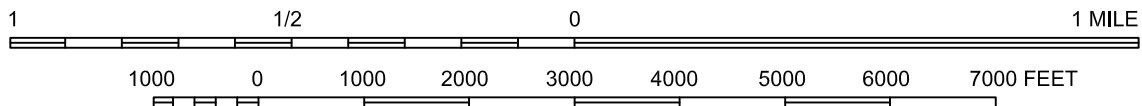
47122-E6-TF-024 N4730-W12230/7.5  
 1953 1953  
 PHOTOREVISED 1981 PHOTOREVISED 1981  
 DMA 1479 II SERIES V891 DMA 1479 II SERIES V891

**BURLEY, WASH.**

47122-D6-TF-024  
 1953  
 PHOTOREVISED 1994  
 DMA 1478 II NW-SERIES V891

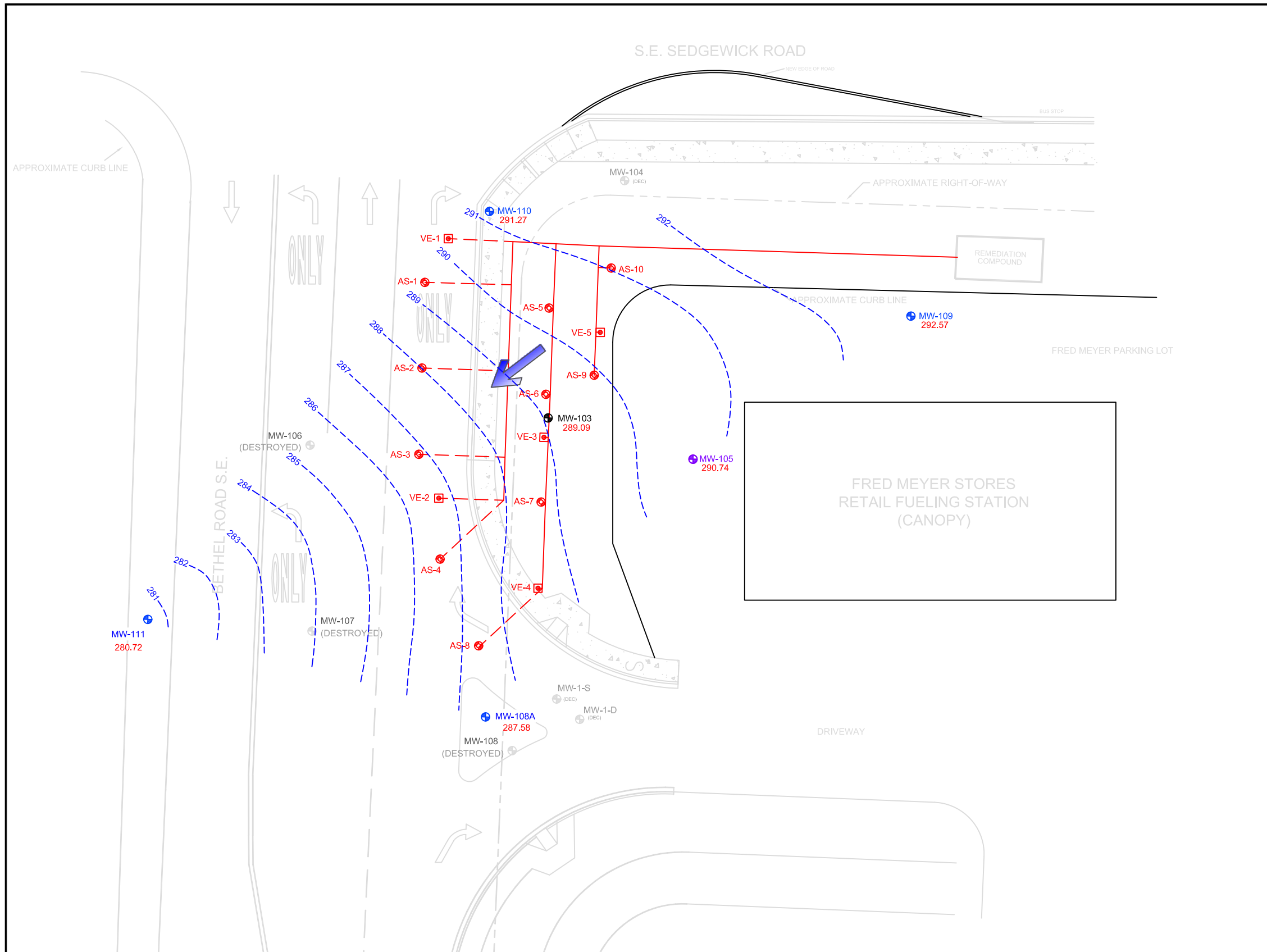
**OLALLA, WASH.**

47122-D5-TF-024  
 1953  
 PHOTOREVISED 1981  
 DMA 1478 I NE SERIES V891



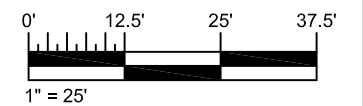
SOURCE: USGS QUAD SHEET: BREMERTON WEST, BREMERTON EAST, BURLEY AND OLALLA, WASH.

<p><b>AMEC</b>          7376 S.W. Durham Road          Portland OR. U.S.A. 97224</p>				<p>CLIENT:  <b>FRED MEYER</b></p>	
<p>PROJECT:  <b>FRED MEYER - PORT ORCHARD</b></p>		<p>DWN BY:          PM/SD</p>	<p>DATUM:          -</p>	<p>DATE:          SEPTEMBER 2012</p>	
<p>TITLE:  <b>SITE LOCATION MAP</b></p>		<p>CHK'D BY:          DS</p>	<p>REV. NO.:          -</p>	<p>PROJECT NO.:          9-61M-10282-0</p>	
		<p>PROJECTION:          -</p>	<p>SCALE:          1:24,000</p>	<p>FIGURE NO.:          1</p>	



**LEGEND**

- AS-10 AIR SPARGING WELL NUMBER AND APPROXIMATE LOCATION
- VE-5 VAPOR EXTRACTION WELL NUMBER AND APPROXIMATE LOCATION
- MW-103 ACTIVE 4" DIAMETER MONITORING WELL (ECOLOGY, 1991)
- MW-105 ACTIVE 2" DIAMETER MONITORING WELL (AGRA, 1999)
- MW-110 ACTIVE 2" DIAMETER MONITORING WELL (AMEC, 2008)
- MW-104 MONITORING WELL DECOMMISSIONED (DEC)
- MW-108 MONITORING WELL DESTROYED BY CONSTRUCTION ACTIVITIES (DESTROYED)
- 291.87 SPOT GROUNDWATER SURFACE ELEVATION IN FEET
- REMEDIATION SYSTEM TRENCH
- ANGLED WELL LOCATION
- APPROXIMATE GROUNDWATER ELEVATION CONTOUR IN FEET
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW



SOURCE: AHBL CIVIL AND STRUCTURAL ENGINEERS,  
FILE NAME: 98169-B.dwg.

CLIENT:

**FRED MEYER**

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**AMEC**  
7376 S.W. Durham Road  
Portland, OR. U.S.A. 97224

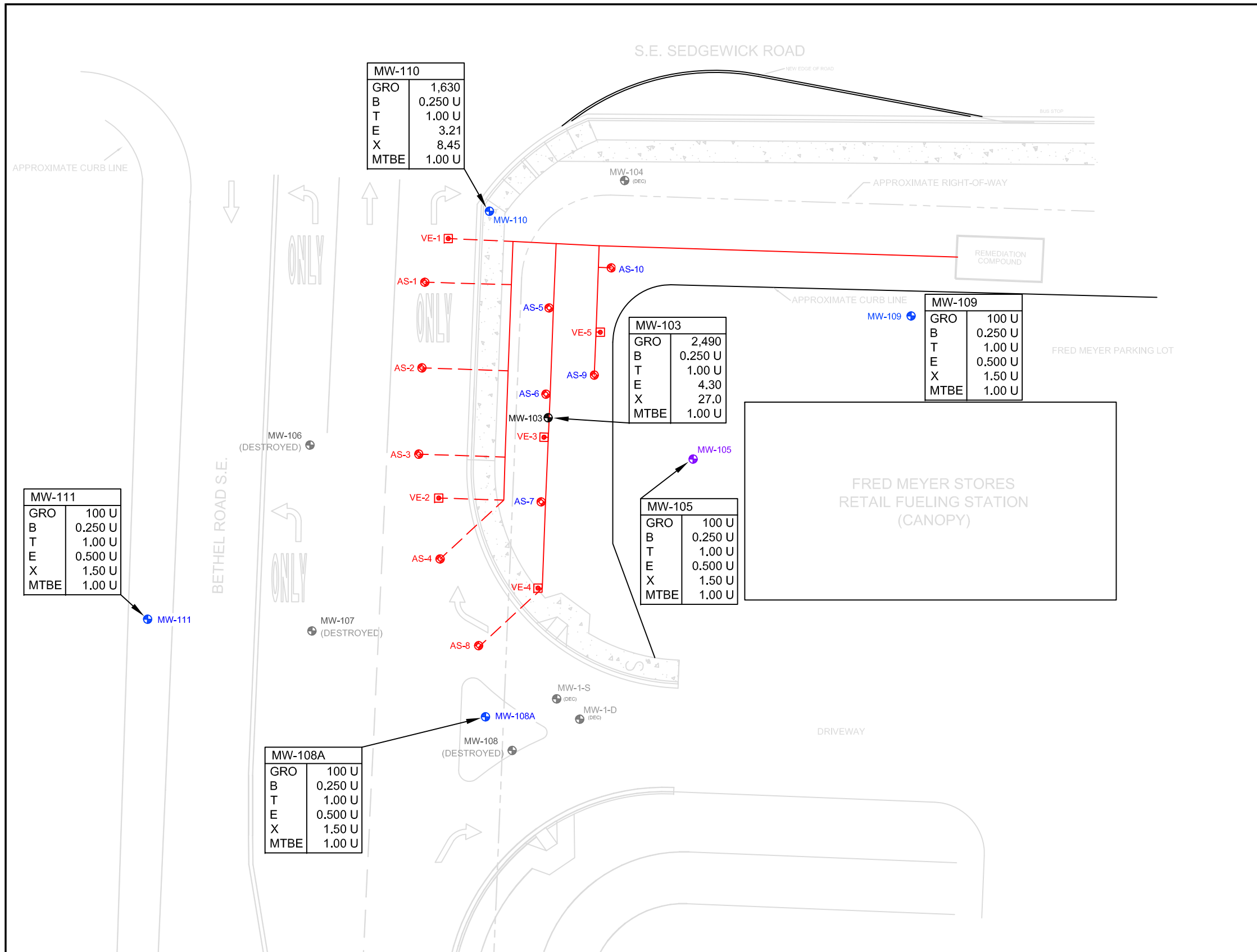
DWN BY: PM/SD  
CHK'D BY: JE  
DATUM: -  
PROJECTION: -  
SCALE: 1"=25'

PROJECT: **FRED MEYER - PORT ORCHARD**

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TITLE: **GROUNDWATER ELEVATIONS - AUGUST 8, 2012**

DATE: SEPTEMBER 2012  
PROJECT NO.: 9-61M-10282-0  
REV. NO.: -  
FIGURE NO.: 2



MW-110	
GRO	1,630
B	0.250 U
T	1.00 U
E	3.21
X	8.45
MTBE	1.00 U

MW-103	
GRO	2,490
B	0.250 U
T	1.00 U
E	4.30
X	27.0
MTBE	1.00 U

MW-109	
GRO	100 U
B	0.250 U
T	1.00 U
E	0.500 U
X	1.50 U
MTBE	1.00 U

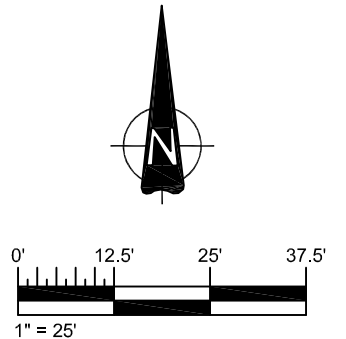
MW-105	
GRO	100 U
B	0.250 U
T	1.00 U
E	0.500 U
X	1.50 U
MTBE	1.00 U

MW-111	
GRO	100 U
B	0.250 U
T	1.00 U
E	0.500 U
X	1.50 U
MTBE	1.00 U

MW-108A	
GRO	100 U
B	0.250 U
T	1.00 U
E	0.500 U
X	1.50 U
MTBE	1.00 U

**LEGEND**

- AS-10 AIR SPARGING WELL NUMBER AND APPROXIMATE LOCATION
  - VE-5 VAPOR EXTRACTION WELL NUMBER AND APPROXIMATE LOCATION
  - MW-103 ACTIVE 4" DIAMETER MONITORING WELL (ECOLOGY, 1991)
  - MW-105 ACTIVE 2" DIAMETER MONITORING WELL (AGRA, 1999)
  - MW-110 ACTIVE 2" DIAMETER MONITORING WELL (AMEC, 2008)
  - MW-104 MONITORING WELL DECOMMISSIONED
  - MW-108 MONITORING WELL DESTROYED BY CONSTRUCTION ACTIVITIES
  - REMEDIATION SYSTEM TRENCH
  - ANGLED WELL LOCATION
- GRO - GASOLINE RANGE ORGANICS (µg/L)  
 B - BENZENE (µg/L)  
 T - TOLUENE (µg/L)  
 E - ETHYLBENZENE (µg/L)  
 X - TOTAL XYLENES (µg/L)  
 MTBE - METHYL-TERT-BUTYL ETHER (µg/L)
- U - ANALYTE NOT DETECTED ABOVE METHOD REPORTING LIMIT PRESENTED IN TABLE.  
 µg/L - micrograms per liter



SOURCE: AHBL CIVIL AND STRUCTURAL ENGINEERS, FILE NAME: 98169-B.dwg.	CLIENT: <b>FRED MEYER STORES</b>	DWN BY: PM/SD	PROJECT: <b>FRED MEYER - PORT ORCHARD</b>	DATE: SEPTEMBER 2012
		CHK'D BY: JE		PROJECT NO.: 9-61M-10282-0
Original figure prepared using color.	<b>AMEC</b> 7376 S.W. Durham Road Portland, OR. U.S.A. 97224 	DATUM: -	TITLE: <b>GROUNDWATER ANALYTICAL RESULTS - AUGUST 8, 2012</b>	REV. NO.: 1
		PROJECTION: -		FIGURE NO.: 3
		SCALE: 1"=25'		



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**APPENDIX A**

Field Data Acquisition Forms



# QUARTERLY SYSTEM & GROUNDWATER MONITORING PROGRAM

Fred Meyer - Port Orchard

S.E. Intersection of SE Sedgewick Road & Bethel Road SE  
Port Orchard, Washington

Project #: 0-61M-10282-0  
Project Manager: Kurt Harrington  
DATE: 8/8/12  
Arrival Time:

TECHNICIAN: Jason Gardner Revised: Jan. 20, 2009

## Groundwater Levels / Product Thickness / Groundwater/Product Pump Operation / 7.5-Gallon Influent Tanks

Monitoring Point	Depth to Water (Feet)	Depth to Product (Feet)	Product Thickness (Feet)	LAB TESTS TO BE RUN		Vacuum (in H <sub>2</sub> O)	General Notes Regarding Well Condition
				NWTPH-Gx 8021*	8260 Suite**		
MW-103	22.61	NO	NA	X	X	NA	Good
MW-105	19.72			X	X		19.720w
MW-108	22.80			X	X		
MW-109	17.91			X	X		
MW-110	21.50			X	X		
MW-111	29.90			X	X		

Interface Corrected Factor: \_\_\_\_\_ feet

## Vapor Extraction System Monitoring

VES Line	Vapor Level (ppm)	Vacuum (inches of water)	Flow (fpm)	VES Lines (ON / OFF)	
				Arrival	Depart
Total Sys. - Arrival	D.O.	60"	1600	ON	
VES-1					ON
VES-2					
VES-3					
VES-4					
VES-5					
Total Sys. - Depart					

VES Blower Model: Gast R7100R-50 PID Type: Co RAK Knockout Tank: \_\_\_\_\_  
 Outlet pipe diameter 2 outlets @ 2" each PID Number: Co Full (YES / NO): NO  
 VES Blower Arrival (ON / OFF): ON PID Calibrated: \_\_\_\_\_ Emptied (YES / NO): NO water  
 VES Blower Depart (ON / OFF): ON Anemometer # 5 Quantity: 0 gallons

## Air Sparging System

Air Sparging Line	Flow (cfm)	AS Lines (ON / OFF)		Air Sparging Line	Flow (cfm)	AS Lines (ON / OFF)	
		Arrival	Departure			Arrival	Departure
AS-1	DOWN	DOWN	DOWN	AS-6	2	ON	ON
AS-2	OFF			AS-7	OFF		
AS-3	OFF			AS-8	OFF		
AS-4	OFF			AS-9	5	ON	ON
AS-5	2	ON	ON	AS-10	DOWN	DOWN	DOWN

Air Sparging System at Arrival (ON / OFF): off Air Sparging System at Departure (ON / OFF):  
 Air Sparging Blower 1# (top) at Arrival (ON / OFF): off Air Sparging Blower 2 (top) at Arrival (ON / OFF):  
 Air Sparging Blower 1# (top) at Depart (ON / OFF): off Air Sparging Blower 2 (top) at Depart (ON / OFF):  
 Total Air Sparging System Pressure at Arrival: \_\_\_\_\_ psi Total Air Sparging System Pressure at Departure: \_\_\_\_\_

- Notes:
- 1) Complete entire form or note reasons for omissions below.
  - 2)
  - 3) SVE system uses one Gast Model R7100R-50 (10-HP, 208-230V, 3-PH, blower)
  - 4) \*\*\* Analytical = NWTPH-Gx / EPA 8260 = BTEX, MTBE, EDC, EDB, Naphthalene, Alkylbenzene suite

Note 1: Rotary Valve Pump end is down now on both units,

Arrival Time: \_\_\_\_\_  
 Departure Time: \_\_\_\_\_ Budget: 6 hours (includes: prep, travel, field, and report)



AMEC Earth & Environmental, Inc.  
**GROUNDWATER  
 SAMPLING FIELD FORM**

Fred Meyer Port Orchard  
 Quarterly Groundwater Monitoring  
 AMEC Job #: 9-61M-10282-0

Date: 8/8/12

Field Personnel: JG

Monitoring Well ID: MW111

Start Time: 16:30

Weather Conditions: overcast

Approx. Air Temp (°F): ~75

**INITIAL WELL DATA & WELL PURGING INFORMATION**

Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Water Level (feet bgs)	Time (0:00 - 23:59)	Volume Purged (gal or liters)
13.35	6.43	173	1.6	1.19	-28.8	29.0	16:30	0
13.29	6.60	170	0.6	0.68	-28.2	31.7	16:50	4
13.29	6.58	170	0.6	0.71	-29.0	31.2	16:55	5
13.26	6.55	170	0.6	0.64	-29.7	31.8	17:00	6L

**Ferrous Iron (2+) using the field kit:**

0.5 inch tubing: 0.020 gallons/linear foot      2" well casing: 0.17 gal/linear foot      Total Purged = 6L

Purge Pumping Rate (approx. L/m): .2 L/M

Approx. Pump/Intake Depth: Screen

Well Yield: High / Moderate / Low

Decontamination Method: Alconox wash with D.I. rinse.

**WELL CONDITION**

Casing Size and Type: 2"

Casing Condition:  OK /  NA / Needs Repairs/Repaired

Lock Condition:  OK /  NA / Needs Repairs/Repaired

Cap Condition:  OK /  NA / Needs Repairs/Repaired

Monument Condition:  OK /  NA / Needs Repairs/Repaired

NOTES:

**SAMPLING INFORMATION / DATA**

QA/QC Sample (circle one): Duplicate    Lab QA/QC    NONE

DC electric pump with attached bailer

Sampling Method (circle one): dedicated Dual Valve Pump

peristaltic pump

Analytical Parameters	Destination Laboratory	Preservative	Bottle size	Number of bottles	Sample ID	Time Sampled
NW TPH-Gx 8021	APEX	HCL & ice	40 ML	3	MW111-080812	17:00
8260 Suite	APEX	HCL & ice	40 ML	2	"	"

Method of Transportation of samples:

All samples were immediately placed into a cooler and packed with ice or "Blue Ice"  YES  NO

Field Observations/Notes of Sampling Event:

Signature of Field Personnel:

Date: 8/8/12



AMEC Earth & Environmental, Inc.  
GROUNDWATER  
SAMPLING FIELD FORM

Fred Meyer Port Orchard  
Quarterly Groundwater Monitoring  
AMEC Job #: 9-61M-10282-0

Date: 8/8/12

Field Personnel: JG  
Start Time: 18:10

Weather Conditions: overcast

Monitoring Well ID: MW105  
Approx. Air Temp (°F): 75

INITIAL WELL DATA & WELL PURGING INFORMATION

Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Water Level (feet bgs)	Time (0:00 - 23:59)	Volume Purged (gal or liters)
13.14	6.02	336	43.6	9.72	+21.4	19.72	18:10	5
13.21	5.84	348	13.7	8.03	+160.7	19.86	18:30	4
13.21	5.83	342	13.1	8.00	+161.2	19.86	18:35	5
13.19	5.83	342	13.8	8.00	+160.5	19.87	18:40	6

Ferrous Iron (2+) using the field kit:

0.5 inch tubing: 0.020 gallons/linear foot      2" well casing: 0.17 gal/linear foot      Total Purged = 60  
 Purge Pumping Rate (approx. L/m): .2 L/M  
 Approx. Pump/Intake Depth: Screen  
 Well Yield: High / ~~Moderate~~ / Low  
 Decontamination Method: Alconox wash with D.I. rinse.

WELL CONDITION

Casing Size and Type: 7"  
 Casing Condition: OK / NA / Needs Repairs/Repaired      Lock Condition: OK / NA / Needs Repairs/Repaired  
 Cap Condition: OK / NA / Needs Repairs/Repaired      Monument Condition: OK / NA / Needs Repairs/Repaired

NOTES:

SAMPLING INFORMATION / DATA

QA/QC Sample (circle one): Duplicate      Lab QA/QC      NONE      DC electric pump-with attached bailer  
 Sampling Method (circle one):      dedicated Dual Valve Pump      peristaltic pump

Analytical Parameters	Destination Laboratory	Preservative	Bottle size	Number of bottles	Sample ID	Time Sampled
NW TPH-Gx 8021	APEX	HCL & ice	40 ML	2	MW105-08082	18:40
8260 Suite	APEX	HCL & ice	40 ML	2	"	"

Method of Transportation of samples:  
 All samples were immediately placed into a cooler and packed with ice or "Blue Ice" YES / NO

Field Observations/Notes of Sampling Event:

Signature of Field Personnel:

Date: 8/8/12



AMEC Earth & Environmental, Inc.  
**GROUNDWATER  
 SAMPLING FIELD FORM**

Fred Meyer Port Orchard  
 Quarterly Groundwater Monitoring  
 AMEC Job #: 9-61M-10282-0

Date: 8/8/12

Field Personnel: JG

Monitoring Well ID: MW103

Start Time: 17:30

Weather Conditions: overcast

Approx. Air Temp (°F): ~75

**INITIAL WELL DATA & WELL PURGING INFORMATION**

Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Water Level (feet bgs)	Time (0:00 - 23:59)	Volume Purged (gal or liters)
13.67	6.78	143	21.6	10.92	+118.5	22.61	17:30	0
13.72	6.78	145	10.4	10.01	+126.9	22.70	17:50	4
13.72	6.72	145	10.6	9.93	+126.8	22.70	17:55	5
13.75	6.72	145	10.6	9.92	+126.3	22.70	18:00	6L

**Ferrous Iron (2+) using the field kit:**

0.5 inch tubing: 0.020 gallons/linear foot      2" well casing: 0.17 gal/linear foot      Total Purged = 6L  
 Purge Pumping Rate (approx. L/m): .2 L/M  
 Approx. Pump/Intake Depth: Screen  
 Well Yield: High / ~~Moderate~~ / Low  
 Decontamination Method: Alconox wash with D.I. rinse.

**WELL CONDITION**

Casing Size and Type: 4"  
 Casing Condition: (OK) NA / Needs Repairs/Repaired      Lock Condition: (OK) NA / Needs Repairs/Repaired  
 Cap Condition: (OK) NA / Needs Repairs/Repaired      Monument Condition: (OK) NA / Needs Repairs/Repaired

**NOTES:**

**SAMPLING INFORMATION / DATA**

QA/QC Sample (circle one): Duplicate      Lab QA/QC: NONE      DC electric pump with attached bailer  
 Sampling Method (circle one): dedicated Dual Valve Pump      peristaltic pump

Analytical Parameters	Destination Laboratory	Preservative	Bottle size	Number of bottles	Sample ID	Time Sampled
NW TPH-Gx 8021	APEX	HCL & ice	40 ML		MW103-080812	18:00
8260 Suite	APEX	HCL & ice	40 ML		MW103-080812	"

Method of Transportation of samples:  
 All samples were immediately placed into a cooler and packed with ice or "Blue Ice" (YES/NO)

**Field Observations/Notes of Sampling Event:**

Signature of Field Personnel:

Date: 8/8/12



AMEC Earth & Environmental, Inc.  
**GROUNDWATER  
 SAMPLING FIELD FORM**

Fred Meyer Port Orchard  
 Quarterly Groundwater Monitoring  
 AMEC Job #: 9-61M-10282-0

Date: 8/8/12

Field Personnel: JG

Monitoring Well ID: MW108

Start Time: 18:55

Weather Conditions: overcast

Approx. Air Temp (°F): 47.5

**INITIAL WELL DATA & WELL PURGING INFORMATION**

Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Water Level (feet bgs)	Time (0:00 - 23:59)	Volume Purged (gal or liters)
13.80	6.64	133	7.4	3.21	+100.2	22.80	18:55	0
13.51	6.65	136	3.8	2.77	+68.4	23.03	19:15	4
13.51	6.65	136	3.9	2.75	+69.1	23.03	19:20	5
13.51	6.65	136	4.0	2.81	+69.2	23.03	19:25	6L

**Ferrous Iron (2+) using the field kit:**

0.5 inch tubing: 0.020 gallons/linear foot

2" well casing: 0.17 gal/linear foot

Total Purged = 6L

Purge Pumping Rate (approx. L/m): .2 L/M

Approx. Pump/Intake Depth: Screen

Well Yield: High / Moderate / Low

Decontamination Method: Alconox wash with D.I. rinse.

**WELL CONDITION**

Casing Size and Type: 2"

Casing Condition: (OK) NA / Needs Repairs/Repaired

Lock Condition: (OK) NA / Needs Repairs/Repaired

Cap Condition: (OK) NA / Needs Repairs/Repaired

Monument Condition: (OK) NA / Needs Repairs/Repaired

**NOTES:**

**SAMPLING INFORMATION / DATA**

QA/QC Sample (circle one): Duplicate

Lab QA/QC: (NONE)

DC electric pump with attached bailer

Sampling Method (circle one):

dedicated Dual Valve Pump

(peristaltic pump)

Analytical Parameters	Destination Laboratory	Preservative	Bottle size	Number of bottles	Sample ID	Time Sampled
NW TPH-Gx 8021	APEX	HCL & ice	40 ML	2	MW108-080812	19:25
8260 Suite	APEX	HCL & ice	40 ML	2	"	"

Method of Transportation of samples:

All samples were immediately placed into a cooler and packed with ice or "Blue Ice" (YES/NO)

**Field Observations/Notes of Sampling Event:**

Signature of Field Personnel:

Date: 8/8/12



AMEC Earth & Environmental, Inc.  
**GROUNDWATER  
 SAMPLING FIELD FORM**

Fred Meyer Port Orchard  
 Quarterly Groundwater Monitoring  
 AMEC Job #: 9-61M-10282-0

Date: 8/8/12

Field Personnel: *JK*  
 Start Time: 19:40

Weather Conditions: *overcast*

Monitoring Well ID: *MW109*  
 Approx. Air Temp (°F): *~75*

**INITIAL WELL DATA & WELL PURGING INFORMATION**

Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Water Level (feet bgs)	Time (0:00 - 23:59)	Volume Purged (gal or liters)
13.46	5.65	171	1.6	3.92	+114.2	17.01	19:40	6
13.39	5.60	172	0.9	5.07	+119.6	18.07	20:00	4
13.40	5.60	172	0.9	5.01	+120.2	18.07	20:05	5
13.41	5.63	172	0.9	4.96	+120.8	18.07	20:10	6

**Ferrous Iron (2+) using the field kit:**

0.5 inch tubing: 0.020 gallons/linear foot      2" well casing: 0.17 gal/linear foot      Total Purged = *66*  
 Purge Pumping Rate (approx. L/m): .2 L/M  
 Approx. Pump/Intake Depth: Screen  
 Well Yield: High / *Moderate* / Low  
 Decontamination Method: Alconox wash with D.I. rinse.

**WELL CONDITION**

Casing Size and Type: *2"*  
 Casing Condition: *OK* / NA / Needs Repairs/Repaired      Lock Condition: *OK* / NA / Needs Repairs/Repaired  
 Cap Condition: *OK* / NA / Needs Repairs/Repaired      Monument Condition: *OK* / NA / Needs Repairs/Repaired

**NOTES:**

**SAMPLING INFORMATION / DATA**

QA/QC Sample (circle one): Duplicate      Lab QA/QC *(NONE)*      DC electric pump with attached bailer  
 Sampling Method (circle one): dedicated Dual Valve Pump      *peristaltic pump*

Analytical Parameters	Destination Laboratory	Preservative	Bottle size	Number of bottles	Sample ID	Time Sampled
NW TPH-Gx 8021	APEX	HCL & ice	40 ML	<i>2</i>	<i>MW109-080812</i>	<i>20:10</i>
8260 Suite	APEX	HCL & ice	40 ML	<i>2</i>	<i>1</i>	<i>1</i>

Method of Transportation of samples:  
 All samples were immediately placed into a cooler and packed with ice or "Blue Ice" *(YES)* / NO

**Field Observations/Notes of Sampling Event:**

*[Handwritten notes area]*

Signature of Field Personnel: *[Signature]*

Date: *8/8/12*



AMEC Earth & Environmental, Inc.  
GROUNDWATER  
SAMPLING FIELD FORM

Fred Meyer Port Orchard  
Quarterly Groundwater Monitoring  
AMEC Job #: 9-61M-10282-0

Date: 8/8/12

Field Personnel: JB

Monitoring Well ID: MW 110

Start Time: 20:25

Weather Conditions: overcast

Approx. Air Temp (°F): 75

INITIAL WELL DATA & WELL PURGING INFORMATION

Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Water Level (feet bgs)	Time (0:00 - 23:59)	Volume Purged (gal or liters)
13.36	6.92	138	6.4	12.63	+42.2	21.80	20:25	0
13.43	6.69	138	1.2	11.44	+98.3	21.79	20:45	4
13.47	6.71	138	1.0	11.49	+99.0	21.79	20:50	6
13.48	6.72	138	1.0	11.46	+99.1	21.79	20:55	6L

Ferrous Iron (2+) using the field kit:

0.5 inch tubing: 0.020 gallons/linear foot      2" well casing: 0.17 gal/linear foot      Total Purged = 6L  
Purge Pumping Rate (approx. L/m): .2 L/M  
Approx. Pump/Intake Depth: Screen  
Well Yield: High / ~~Moderate~~ / Low  
Decontamination Method: Alconox wash with D.I. rinse.

WELL CONDITION

Casing Size and Type: 2"  
Casing Condition: OK / NA / Needs Repairs/Repaired      Lock Condition: OK / NA / Needs Repairs/Repaired  
Cap Condition: OK / NA / Needs Repairs/Repaired      Monument Condition: OK / NA / Needs Repairs/Repaired

NOTES:

SAMPLING INFORMATION / DATA

QA/QC Sample (circle one): Duplicate      Lab QA/QC NONE      DC electric pump with attached bailer  
Sampling Method (circle one):      dedicated Dual Valve Pump      peristaltic pump

Analytical Parameters	Destination Laboratory	Preservative	Bottle size	Number of bottles	Sample ID	Time Sampled
NW TPH-Gx 8021	APEX	HCL & ice	40 ML	2	MW110-080812	20:55
8260 Suite	APEX	HCL & ice	40 ML	2	"	"

Method of Transportation of samples:  
All samples were immediately placed into a cooler and packed with ice or "Blue Ice" YES / NO

Field Observations/Notes of Sampling Event:

Signature of Field Personnel:

Date: 8/8/12



---

**APPENDIX B**

Laboratory Analytical Results and Chain-or-Custody Documents



# Apex Labs

12232 S.W. Garden Place  
Tigard, OR 97223  
503-718-2323 Phone  
503-718-0333 Fax

Wednesday, August 22, 2012

Kurt Harrington  
Amec Environment & Infrastructure, Inc  
7376 SW Durham Road  
Portland, OR 97224

RE: Fred Meyer (FMPO) Port Orchard / 901M10282-0

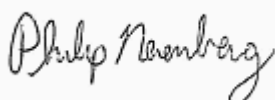
Enclosed are the results of analyses for work order A12H217, which was received by the laboratory on 8/13/2012 at 11:15:00AM.

Thank you for using Apex Labs. We appreciate your business and strive to provide the highest quality services to the environmental industry.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: [pnerenberg@apex-labs.com](mailto:pnerenberg@apex-labs.com), or by phone at 503-718-2323.

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Apex Laboratories



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

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Philip Nerenberg, Lab Director

Amec Environment & Infrastructure, Inc  
7376 SW Durham Road  
Portland, OR 97224

Project: **Fred Meyer (FMPO) Port Orchard**  
Project Number: 901M10282-0  
Project Manager: Kurt Harrington

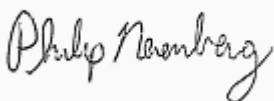
Reported:  
08/22/12 17:37

## ANALYTICAL REPORT FOR SAMPLES

### SAMPLE INFORMATION

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW103-080812	A12H217-01	Water	08/08/12 18:00	08/13/12 11:15
MW111-080812	A12H217-02	Water	08/08/12 17:00	08/13/12 11:15
MW105-080812	A12H217-03	Water	08/08/12 18:40	08/13/12 11:15
MW108-080812	A12H217-04	Water	08/08/12 19:25	08/13/12 11:15
MW109-080812	A12H217-05	Water	08/08/12 20:10	08/13/12 11:15
MW110-080812	A12H217-06	Water	08/08/12 20:55	08/13/12 11:15

Apex Laboratories



Philip Nerenberg, Lab Director

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Amec Environment & Infrastructure, Inc  
 7376 SW Durham Road  
 Portland, OR 97224

Project: Fred Meyer (FMPO) Port Orchard  
 Project Number: 901M10282-0  
 Project Manager: Kurt Harrington

Reported:  
 08/22/12 17:37

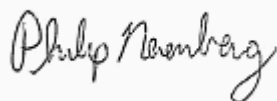
## ANALYTICAL SAMPLE RESULTS

### Gasoline Range Hydrocarbons (Benzene to Naphthalene) by NWTPH-Gx

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>MW103-080812 (A12H217-01)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Gasoline Range Organics	2.49	---	0.100	mg/L	1	08/13/12 23:32	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			Recovery: 99 %	Limits: 50-150 %	"	"	"	
1,4-Difluorobenzene (Sur)			98 %	Limits: 50-150 %	"	"	"	
<b>MW111-080812 (A12H217-02)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/13/12 22:15	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			Recovery: 83 %	Limits: 50-150 %	"	"	"	
1,4-Difluorobenzene (Sur)			89 %	Limits: 50-150 %	"	"	"	
<b>MW105-080812 (A12H217-03)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/13/12 22:40	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			Recovery: 83 %	Limits: 50-150 %	"	"	"	
1,4-Difluorobenzene (Sur)			85 %	Limits: 50-150 %	"	"	"	
<b>MW108-080812 (A12H217-04)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/13/12 23:06	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			Recovery: 84 %	Limits: 50-150 %	"	"	"	
1,4-Difluorobenzene (Sur)			86 %	Limits: 50-150 %	"	"	"	
<b>MW109-080812 (A12H217-05)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/14/12 00:23	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			Recovery: 88 %	Limits: 50-150 %	"	"	"	
1,4-Difluorobenzene (Sur)			87 %	Limits: 50-150 %	"	"	"	
<b>MW110-080812 (A12H217-06)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Gasoline Range Organics	1.63	---	0.100	mg/L	1	08/14/12 00:48	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			Recovery: 90 %	Limits: 50-150 %	"	"	"	
1,4-Difluorobenzene (Sur)			94 %	Limits: 50-150 %	"	"	"	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Philip Nerenberg, Lab Director

Amec Environment & Infrastructure, Inc  
7376 SW Durham Road  
Portland, OR 97224

Project: Fred Meyer (FMPO) Port Orchard  
Project Number: 901M10282-0  
Project Manager: Kurt Harrington

Reported:  
08/22/12 17:37

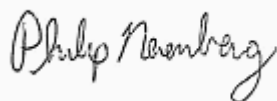
## ANALYTICAL SAMPLE RESULTS

### RBCA Compounds (BTEX+) by EPA 8260B

Analyte	Result	MDL	Reporting			Date Analyzed	Method	Notes
			Limit	Units	Dilution			
<b>MW103-080812 (A12H217-01)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Benzene	ND	---	0.250	ug/L	1	08/13/12 23:32	EPA 8260B	
Toluene	ND	---	1.00	"	"	"	"	
<b>Ethylbenzene</b>	<b>4.30</b>	---	0.500	"	"	"	"	
<b>Xylenes, total</b>	<b>27.0</b>	---	1.50	"	"	"	"	
<b>Naphthalene</b>	<b>3.04</b>	---	2.00	"	"	"	"	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	---	0.500	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	---	0.500	"	"	"	"	
<i>Surrogate: Dibromofluoromethane (Surr)</i>			<i>Recovery: 103 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>1,4-Difluorobenzene (Surr)</i>			<i>107 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>Toluene-d8 (Surr)</i>			<i>91 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>4-Bromofluorobenzene (Surr)</i>			<i>95 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<b>MW111-080812 (A12H217-02)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Benzene	ND	---	0.250	ug/L	1	08/13/12 22:15	EPA 8260B	
Toluene	ND	---	1.00	"	"	"	"	
Ethylbenzene	ND	---	0.500	"	"	"	"	
Xylenes, total	ND	---	1.50	"	"	"	"	
Naphthalene	ND	---	2.00	"	"	"	"	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	---	0.500	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	---	0.500	"	"	"	"	
<i>Surrogate: Dibromofluoromethane (Surr)</i>			<i>Recovery: 96 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>1,4-Difluorobenzene (Surr)</i>			<i>109 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>Toluene-d8 (Surr)</i>			<i>98 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>4-Bromofluorobenzene (Surr)</i>			<i>97 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<b>MW105-080812 (A12H217-03)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Benzene	ND	---	0.250	ug/L	1	08/13/12 22:40	EPA 8260B	
Toluene	ND	---	1.00	"	"	"	"	
Ethylbenzene	ND	---	0.500	"	"	"	"	
Xylenes, total	ND	---	1.50	"	"	"	"	
Naphthalene	ND	---	2.00	"	"	"	"	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	---	0.500	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	---	0.500	"	"	"	"	

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Philip Nerenberg, Lab Director

Amec Environment & Infrastructure, Inc  
 7376 SW Durham Road  
 Portland, OR 97224

Project: Fred Meyer (FMPO) Port Orchard  
 Project Number: 901M10282-0  
 Project Manager: Kurt Harrington

Reported:  
 08/22/12 17:37

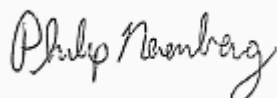
## ANALYTICAL SAMPLE RESULTS

### RBCA Compounds (BTEX+) by EPA 8260B

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>MW105-080812 (A12H217-03)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
<i>Surrogate: Dibromofluoromethane (Surr)</i>			<i>Recovery: 98 %</i>	<i>Limits: 80-120 %</i>	1	"	EPA 8260B	
<i>1,4-Difluorobenzene (Surr)</i>			<i>104 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>Toluene-d8 (Surr)</i>			<i>96 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>4-Bromofluorobenzene (Surr)</i>			<i>99 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<b>MW108-080812 (A12H217-04)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Benzene	ND	---	0.250	ug/L	1	08/13/12 23:06	EPA 8260B	
Toluene	ND	---	1.00	"	"	"	"	
Ethylbenzene	ND	---	0.500	"	"	"	"	
Xylenes, total	ND	---	1.50	"	"	"	"	
Naphthalene	ND	---	2.00	"	"	"	"	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	---	0.500	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	---	0.500	"	"	"	"	
<i>Surrogate: Dibromofluoromethane (Surr)</i>			<i>Recovery: 100 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>1,4-Difluorobenzene (Surr)</i>			<i>103 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>Toluene-d8 (Surr)</i>			<i>90 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>4-Bromofluorobenzene (Surr)</i>			<i>98 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<b>MW109-080812 (A12H217-05)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Benzene	ND	---	0.250	ug/L	1	08/14/12 00:23	EPA 8260B	
Toluene	ND	---	1.00	"	"	"	"	
Ethylbenzene	ND	---	0.500	"	"	"	"	
Xylenes, total	ND	---	1.50	"	"	"	"	
Naphthalene	ND	---	2.00	"	"	"	"	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	---	0.500	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	---	0.500	"	"	"	"	
<i>Surrogate: Dibromofluoromethane (Surr)</i>			<i>Recovery: 96 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>1,4-Difluorobenzene (Surr)</i>			<i>109 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>Toluene-d8 (Surr)</i>			<i>99 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>4-Bromofluorobenzene (Surr)</i>			<i>98 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<b>MW110-080812 (A12H217-06)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Benzene	ND	---	0.250	ug/L	1	08/14/12 00:48	EPA 8260B	
Toluene	ND	---	1.00	"	"	"	"	
<b>Ethylbenzene</b>	<b>3.21</b>	---	0.500	"	"	"	"	

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 Project Manager: Kurt Harrington

Reported:  
 08/22/12 17:37

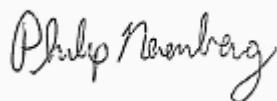
## ANALYTICAL SAMPLE RESULTS

### RBCA Compounds (BTEX+) by EPA 8260B

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>MW110-080812 (A12H217-06)</b>			<b>Matrix: Water</b>		<b>Batch: 1208266</b>			
Xylenes, total	8.45	---	1.50	ug/L	1	"	EPA 8260B	
Naphthalene	3.41	---	2.00	"	"	"	"	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	---	0.500	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	---	0.500	"	"	"	"	
<i>Surrogate: Dibromofluoromethane (Surr)</i>			<i>Recovery: 103 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>1,4-Difluorobenzene (Surr)</i>			<i>109 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>Toluene-d8 (Surr)</i>			<i>96 %</i>	<i>Limits: 80-120 %</i>	"	"	"	
<i>4-Bromofluorobenzene (Surr)</i>			<i>98 %</i>	<i>Limits: 80-120 %</i>	"	"	"	

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Reported:  
08/22/12 17:37

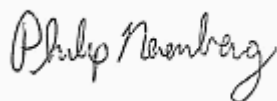
## QUALITY CONTROL (QC) SAMPLE RESULTS

### Gasoline Range Hydrocarbons (Benzene to Naphthalene) by NWTPH-Gx

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1208266 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1208266-BLK1)</b>						Prepared: 08/13/12 17:48 Analyzed: 08/13/12 21:49						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	---
Surr: 4-Bromofluorobenzene (Sur)			Recovery: 82 %	Limits: 50-150 %		Dilution: 1x						
1,4-Difluorobenzene (Sur)			85 %	50-150 %		"						
<b>LCS (1208266-BS2)</b>						Prepared: 08/13/12 17:48 Analyzed: 08/13/12 21:23						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.419	---	0.100	mg/L	1	0.500	---	84	70-130%	---	---	
Surr: 4-Bromofluorobenzene (Sur)			Recovery: 82 %	Limits: 50-150 %		Dilution: 1x						
1,4-Difluorobenzene (Sur)			86 %	50-150 %		"						
<b>Duplicate (1208266-DUP1)</b>						Prepared: 08/13/12 17:48 Analyzed: 08/13/12 23:57						
QC Source Sample: MW103-080812 (A12H217-01)												
NWTPH-Gx (MS)												
Gasoline Range Organics	2.44	---	0.100	mg/L	1	---	2.49	---	---	2	30%	
Surr: 4-Bromofluorobenzene (Sur)			Recovery: 92 %	Limits: 50-150 %		Dilution: 1x						
1,4-Difluorobenzene (Sur)			96 %	50-150 %		"						

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Reported:  
 08/22/12 17:37

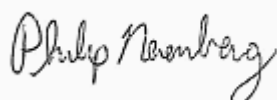
## QUALITY CONTROL (QC) SAMPLE RESULTS

### RBCA Compounds (BTEX+) by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1208266 - EPA 5030B</b>												
<b>Water</b>												
<b>Blank (1208266-BLK1)</b>												
						Prepared: 08/13/12 17:48		Analyzed: 08/13/12 21:49				
<b>EPA 8260B</b>												
Benzene	ND	---	0.250	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	"	"	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	"	"	---	---	---	---	---	---	
m,p-Xylene	ND	---	1.00	"	"	---	---	---	---	---	---	
o-Xylene	ND	---	0.500	"	"	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	"	"	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	"	"	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	"	"	---	---	---	---	---	---	
Isopropylbenzene	ND	---	1.00	"	"	---	---	---	---	---	---	
n-Propylbenzene	ND	---	0.500	"	"	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	1.00	"	"	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	1.00	"	"	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	"	"	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.500	"	"	---	---	---	---	---	---	
<i>Surr: Dibromofluoromethane (Surr) Recovery: 95 % Limits: 80-120 % Dilution: 1x</i>												
<i>1,4-Difluorobenzene (Surr) 106 % 80-120 % "</i>												
<i>Toluene-d8 (Surr) 96 % 80-120 % "</i>												
<i>4-Bromofluorobenzene (Surr) 93 % 80-120 % "</i>												
<b>LCS (1208266-BS1)</b>												
						Prepared: 08/13/12 17:48		Analyzed: 08/13/12 20:58				
<b>EPA 8260B</b>												
Benzene	21.9	---	0.250	ug/L	1	20.0	---	110	70-130%	---	---	
Toluene	19.2	---	1.00	"	"	"	---	96	"	---	---	
Ethylbenzene	19.5	---	0.500	"	"	"	---	97	"	---	---	
m,p-Xylene	38.6	---	1.00	"	"	40.0	---	96	"	---	---	
o-Xylene	19.2	---	0.500	"	"	20.0	---	96	"	---	---	
Xylenes, total	57.8	---	1.50	"	"	60.0	---	96	"	---	---	
Naphthalene	21.6	---	2.00	"	"	20.0	---	108	"	---	---	
Methyl tert-butyl ether (MTBE)	20.6	---	1.00	"	"	"	---	103	"	---	---	
Isopropylbenzene	19.6	---	1.00	"	"	"	---	98	"	---	---	
n-Propylbenzene	21.7	---	0.500	"	"	"	---	109	"	---	---	
1,2,4-Trimethylbenzene	20.5	---	1.00	"	"	"	---	102	"	---	---	
1,3,5-Trimethylbenzene	20.6	---	1.00	"	"	"	---	103	"	---	---	
1,2-Dibromoethane (EDB)	18.4	---	0.500	"	"	"	---	92	"	---	---	
1,2-Dichloroethane (EDC)	18.1	---	0.500	"	"	"	---	90	"	---	---	Q-23

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Philip Nerenberg, Lab Director



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Portland, OR 97224

Project: Fred Meyer (FMPO) Port Orchard  
Project Number: 901M10282-0  
Project Manager: Kurt Harrington

Reported:  
08/22/12 17:37

## QUALITY CONTROL (QC) SAMPLE RESULTS

### RBCA Compounds (BTEX+) by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----	-----------------	-------	------	--------------	---------------	------	-------------	-----	-----------	-------

#### Batch 1208266 - EPA 5030B

#### Water

##### LCS (1208266-BS1)

Prepared: 08/13/12 17:48 Analyzed: 08/13/12 20:58

Surr:	Recovery:	Limits:	Dilution:
Dibromofluoromethane (Surr)	100 %	80-120 %	1x
1,4-Difluorobenzene (Surr)	112 %	80-120 %	"
Toluene-d8 (Surr)	92 %	80-120 %	"
4-Bromofluorobenzene (Surr)	94 %	80-120 %	"

##### Duplicate (1208266-DUP1)

Prepared: 08/13/12 17:48 Analyzed: 08/13/12 23:57

##### QC Source Sample: MW103-080812 (A12H217-01)

##### EPA 8260B

Benzene	ND	---	0.250	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	---	1.00	"	"	---	ND	---	---	---	30%	
Ethylbenzene	4.90	---	0.500	"	"	---	4.30	---	---	13	30%	
m,p-Xylene	26.2	---	1.00	"	"	---	25.7	---	---	2	30%	
o-Xylene	1.49	---	0.500	"	"	---	1.28	---	---	15	30%	
Xylenes, total	27.7	---	1.50	"	"	---	27.0	---	---	3	30%	
Naphthalene	3.08	---	2.00	"	"	---	3.04	---	---	1	30%	M-02
Methyl tert-butyl ether (MTBE)	ND	---	1.00	"	"	---	ND	---	---	---	30%	
Isopropylbenzene	1.42	---	1.00	"	"	---	1.39	---	---	2	30%	
n-Propylbenzene	4.75	---	0.500	"	"	---	4.31	---	---	10	30%	
1,2,4-Trimethylbenzene	126	---	1.00	"	"	---	122	---	---	3	30%	
1,3,5-Trimethylbenzene	43.4	---	1.00	"	"	---	42.5	---	---	2	30%	
1,2-Dibromoethane (EDB)	ND	---	0.500	"	"	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	0.500	"	"	---	ND	---	---	---	30%	

Surr:	Recovery:	Limits:	Dilution:
Dibromofluoromethane (Surr)	97 %	80-120 %	1x
1,4-Difluorobenzene (Surr)	111 %	80-120 %	"
Toluene-d8 (Surr)	93 %	80-120 %	"
4-Bromofluorobenzene (Surr)	96 %	80-120 %	"

##### Matrix Spike (1208266-MS1)

Prepared: 08/13/12 17:48 Analyzed: 08/14/12 01:14

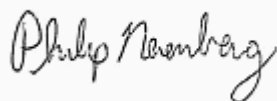
##### QC Source Sample: MW110-080812 (A12H217-06)

##### EPA 8260B

Benzene	21.7	---	0.250	ug/L	1	20.0	ND	108	70-130%	---	---	
Toluene	20.1	---	1.00	"	"	"	ND	100	"	---	---	
Ethylbenzene	22.1	---	0.500	"	"	"	3.21	94	"	---	---	
m,p-Xylene	47.3	---	1.00	"	"	40.0	7.82	99	"	---	---	
o-Xylene	19.8	---	0.500	"	"	20.0	0.630	96	"	---	---	

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 Project Manager: Kurt Harrington

Reported:  
 08/22/12 17:37

## QUALITY CONTROL (QC) SAMPLE RESULTS

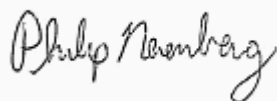
### RBCA Compounds (BTEX+) by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1208266 - EPA 5030B</b>						<b>Water</b>						
<b>Matrix Spike (1208266-MS1)</b>						Prepared: 08/13/12 17:48 Analyzed: 08/14/12 01:14						
<b>QC Source Sample: MW110-080812 (A12H217-06)</b>												
Xylenes, total	67.2	---	1.50	ug/L	"	60.0	8.45	98	"	---	---	
Naphthalene	25.0	---	2.00	"	"	20.0	3.41	108	"	---	---	
Methyl tert-butyl ether (MTBE)	19.8	---	1.00	"	"	"	ND	99	"	---	---	
Isopropylbenzene	24.3	---	1.00	"	"	"	4.20	101	"	---	---	
n-Propylbenzene	32.0	---	0.500	"	"	"	10.2	109	"	---	---	
1,2,4-Trimethylbenzene	51.9	---	1.00	"	"	"	34.8	86	"	---	---	
1,3,5-Trimethylbenzene	35.8	---	1.00	"	"	"	15.5	101	"	---	---	
1,2-Dibromoethane (EDB)	19.3	---	0.500	"	"	"	ND	96	"	---	---	
1,2-Dichloroethane (EDC)	18.2	---	0.500	"	"	"	ND	91	"	---	---	Q-23

<i>Surr: Dibromofluoromethane (Surr)</i>	<i>Recovery: 97 %</i>	<i>Limits: 80-120 %</i>	<i>Dilution: 1x</i>
<i>1,4-Difluorobenzene (Surr)</i>	<i>108 %</i>	<i>80-120 %</i>	<i>"</i>
<i>Toluene-d8 (Surr)</i>	<i>98 %</i>	<i>80-120 %</i>	<i>"</i>
<i>4-Bromofluorobenzene (Surr)</i>	<i>94 %</i>	<i>80-120 %</i>	<i>"</i>

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Philip Nerenberg, Lab Director

Amec Environment & Infrastructure, Inc  
 7376 SW Durham Road  
 Portland, OR 97224

Project: Fred Meyer (FMPO) Port Orchard  
 Project Number: 901M10282-0  
 Project Manager: Kurt Harrington

Reported:  
 08/22/12 17:37

## SAMPLE PREPARATION INFORMATION

### Gasoline Range Hydrocarbons (Benzene to Naphthalene) by NWTPH-Gx

**Prep: EPA 5030B**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1208266							
A12H217-01	Water	NWTPH-Gx (MS)	08/08/12 18:00	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-02	Water	NWTPH-Gx (MS)	08/08/12 17:00	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-03	Water	NWTPH-Gx (MS)	08/08/12 18:40	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-04	Water	NWTPH-Gx (MS)	08/08/12 19:25	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-05	Water	NWTPH-Gx (MS)	08/08/12 20:10	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-06	Water	NWTPH-Gx (MS)	08/08/12 20:55	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00

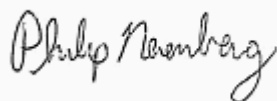
### RBCA Compounds (BTEX+) by EPA 8260B

**Prep: EPA 5030B**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1208266							
A12H217-01	Water	EPA 8260B	08/08/12 18:00	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-02	Water	EPA 8260B	08/08/12 17:00	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-03	Water	EPA 8260B	08/08/12 18:40	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-04	Water	EPA 8260B	08/08/12 19:25	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-05	Water	EPA 8260B	08/08/12 20:10	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00
A12H217-06	Water	EPA 8260B	08/08/12 20:55	08/13/12 17:48	5mL/5mL	5mL/5mL	1.00

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Philip Nerenberg, Lab Director

Amec Environment & Infrastructure, Inc

7376 SW Durham Road  
Portland, OR 97224

Project: **Fred Meyer (FMPO) Port Orchard**

Project Number: 901M10282-0  
Project Manager: Kurt Harrington

Reported:  
08/22/12 17:37

## Notes and Definitions

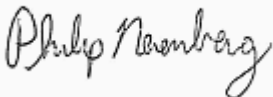
### Qualifiers:

- A-01 Internal Standard recovery is out of acceptance range by less than 10%. Batch QC is accepted based on recoveries for spiked analytes.
- M-02 Due to matrix interference, this analyte cannot be accurately quantified. The reported result is estimated.
- Q-23 Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Data is likely biased high.

### Notes and Conventions:

- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry' designation are not dry weight corrected.
- RPD Relative Percent Difference
- MDL If MDL is not listed, data has been evaluated to the Method Reporting Limit only.
- WMSC Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.
- Batch QC Unless specifically requested, this report contains only results for Batch QC derived from client samples included in this report. All analyses were performed with the appropriate Batch QC (including Sample Duplicates, Matrix Spikes and/or Matrix Spike Duplicates) in order to meet or exceed method and regulatory requirements. Any exceptions to this will be qualified in this report. Complete Batch QC results are available upon request. In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.
- Blank Policy Apex assesses blank data for potential high bias down to a level equal to 1/2 the method reporting limit (MRL), except for conventional chemistry and HCID analyses which are assessed only to the MRL. Sample results flagged with a B or B-02 qualifier are potentially biased high if they are less than ten times the level found in the blank for inorganic analyses or less than five times the level found in the blank for organic analyses.
- For accurate comparison of volatile results to the level found in the blank; water sample results should be divided by the dilution factor, and soil sample results should be divided by 1/50 of the sample dilution to account for the sample prep factor.
- Results qualified as reported below the MRL may include a potential high bias if associated with a B or B-02 qualified blank. B and B-02 qualifications are not applied to J qualified results reported below the MRL.
- QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- \*\*\* Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Apex Laboratories



Philip Nerenberg, Lab Director

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**APPENDIX C**

Summary of Historical Analytical Results









**Appendix C  
Groundwater Elevations and Analytical Results  
Fred Meyer Facility, Port Orchard, Washington**

Well No.	Date	Gasoline-Range Organics	Volatile Organic Compounds							Alkylbenzenes & Naphthalene									Groundwater Levels			
			Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	EDC	EDB	i-PB	n-PB	1,2,4-TMB	1,3,5-TMB	tertbutyl Benzene	sec-butyl Benzene	n-butyl-Benzene	4-IP-Toluene	Naphthalene	Casing Elev.	Depth to Water	NAPL Thick-ness	Water Elev.
			CAS RN	71-43-2	108-88-3	100-41-4	1330-20-7	1634-04-4	107-06-2	106-93-4	98-82-8	103-65-1	95-63-6	108-67-8	98-06-6	135-98-8	104-51-8	99-87-6				
(µg/L)	(µg/L)							(µg/L)														
MTCA Method A	800	5	1,000	700	1,000	20	5	0.01	None	None	None	None	None	None	None	None	160					
MW-110	6/11/09	100 U	0.250 U	0.500 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	2.00 U	312.77	NA	0.00	NA
MW-110	9/10/09	80 U	0.250 U	0.500 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	5.00 U	312.77	22.60	0.00	290.17
MW-110	1/22/10	687	0.250 U	0.500 U	1.04	2.34	1.00 U	0.500 U	0.500 U	0.500 U	0.950	4.79	6.59	0.500 U	1.00 U	1.00 U	1.00 U	5.00 U	312.77	19.76	0.00	293.01
MW-110	3/5/10	100 U	0.250 U	0.500 U	0.500 U	3.00 U	1.00 U	0.500 U	0.500 U	1.00 U	0.500 U	1.13	2.00 U	1.00 U	2.00 U	1.00 U	1.00 U	5.00 U	312.77	18.56	0.00	294.21
MW-110	6/10/10	100 U	0.250 U	0.500 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	312.77	19.94	0.00	292.83
MW-110	9/9/10	1,880	0.250 U	1.00 U	30.3	32.7	1.00 U	0.500 U	0.500 U	6.39	19.9	57.0	37.3	1.00 U	3.20	9.07	4.69	7.40	312.77	22.30	0.00	290.47
MW-110	12/6/10	371	0.250 U	1.00 U	2.36	7.72	1.00 U	0.500 U	0.500 U	1.00 U	0.500 U	5.00	3.50	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	312.77	20.63	0.00	292.14
MW-110	3/29/11	442	0.250 U	1.00 U	2.14	4.82	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	312.77	17.33	0.00	295.44
MW-110	6/21/11	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	312.77	19.52	0.00	293.25
MW-110	9/27/11	4,020	0.250 U	1.00 U	30.6	103	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	8.17	312.77	21.86	0.00	290.91
MW-110	12/7/11	1,230	0.250 U	1.00 U	40.0	40.3	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	7.28	312.77	20.23	0.00	292.54
MW-110	1/12/12	100 U	0.250 U	1.00 U	0.500 U	2.6	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	312.77	20.22	0.00	292.55
MW-110	5/10/12	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	312.77	20.63	0.00	292.14
MW-110	8/8/12	1,630	0.250 U	1.00 U	3.21	8.45	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	3.41	312.77	21.50	0.00	291.27
MW-111	1/24/09	80 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	-	1.00 U	1.00 U	1.00 U	5.00 U	310.62	32.25	0.00	278.37
MW-111	3/28/09	80 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	0.500 U	1.00 U	0.500 U	1.00 U	5.00 U	310.62	32.04	0.00	278.58
MW-111	6/11/09	100 U	0.250 U	0.500 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	2.00 U	310.62	31.44	0.00	279.18
MW-111	9/10/09	80 U	0.250 U	0.500 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	5.00 U	310.62	32.02	0.00	278.60
MW-111	1/22/10	80 U	0.250 U	0.500 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	5.00 U	310.62	31.52	0.00	279.10
MW-111	3/5/10	100 U	0.250 U	0.500 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	1.00 U	0.500 U	1.00 U	2.00 U	1.00 U	2.00 U	1.00 U	1.00 U	5.00 U	310.62	29.76	0.00	280.86
MW-111	6/10/10	100 U	0.250 U	0.500 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	310.62	28.85	0.00	281.77
MW-111	9/9/10	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	310.62	30.19	0.00	280.43
MW-111	12/6/10	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	1.00 U	0.500 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	310.62	31.02	0.00	279.60
MW-111	3/29/11	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	310.62	26.71	0.00	283.91
MW-111	6/21/11	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	310.62	27.31	0.00	283.31
MW-111	9/27/11	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	310.62	29.73	0.00	280.89
MW-111	12/7/11	100 U	0.340	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	310.62	30.77	0.00	279.85
MW-111	1/12/12	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	310.62	30.97	0.00	279.65
MW-111	5/10/12	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	310.62	28.90	0.00	281.72
MW-111	5/10/12	100 U	0.250 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	-	-	-	-	-	-	-	-	2.00 U	310.62	29.90	0.00	280.72
<b>Air Sparging Wells</b>																						
AS-5	9/16/08	80 U	0.205 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	1.00 U	10.0 U	1.00 U	1.00 U	5.00 U	NA	20.25	0.00	NA
AS-9	9/16/08	80 U	0.205 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	1.00 U	10.0 U	1.00 U	1.00 U	5.00 U	NA	24.77	0.00	NA
AS-10	9/16/08	0.0800 U	0.205 U	1.00 U	0.500 U	1.50 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U	0.500 U	10.0 U	1.00 U	1.00 U	5.00 U	NA	23.46	0.00	NA
<b>Destroyed Wells</b>																						
MW-104	05/22/91	1,000	1.0 U	20 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-104	03/25/93	250 U	5.0 U	5.0 U	5.0 U	15 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-104	05/28/97	250 U	1.0 U	1.0 U	1.0 U	3.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-104	02/18/98	120	2.6	1.0	0.88	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-104	8/1999	Abandoned August 1999																				
MW-106	11/2/99	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	311.73	24.95	0.00	286.78
MW-106	3/1/00	100 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	311.73	20.88	0.00	290.85
MW-106	5/24/00	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	311.73	25.93	0.00	285.80
MW-106	7/10/00	50 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	311.73	27.00	0.00	284.73
MW-106	10/19/00	50 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	25 U	311.73	25.63	0.00	286.10
MW-106	12/13/00	50 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	-	-	-	-	-	-	-	-	-	-	-	311.73	26.30	0.00	285.43
MW-106	3/19/01	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	311.73	Dry	Dry	Dry

**Appendix C  
Groundwater Elevations and Analytical Results  
Fred Meyer Facility, Port Orchard, Washington**

Well No.	Date	Gasoline-Range Organics	Volatile Organic Compounds							Alkylbenzenes & Naphthalene									Groundwater Levels					
			Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	EDC	EDB	i-PB	n-PB	1,2,4-TMB	1,3,5-TMB	tertbutyl Benzene	sec-butyl Benzene	n-butyl-Benzene	4-IP-Toluene	Naphthalene	Casing Elev.	Depth to Water	NAPL Thickness	Water Elev.		
CAS RN		not applicable	71-43-2	108-88-3	100-41-4	1330-20-7	1634-04-4	107-06-2	106-93-4	98-82-8	103-65-1	95-63-6	108-67-8	98-06-6	135-98-8	104-51-8	99-87-6	91-20-3						
		(µg/L)	(µg/L)							(µg/L)														
<b>MTCA Method A</b>		<b>800</b>	<b>5</b>	<b>1,000</b>	<b>700</b>	<b>1,000</b>	<b>20</b>	<b>5</b>	<b>0.01</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>160</b>						
MW-106	6/28/01		Well destroyed during roadway paving activities																					
MW-107	11/2/99																				310.59	23.61	0.00	286.98
MW-107	3/1/00	100 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	-	-	310.59	19.46	0.00	291.13
MW-107	5/24/00																				310.59	23.54	0.00	287.05
MW-107	7/10/00	50 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	-	-	310.59	24.79	0.00	285.80
MW-107	10/19/00	50 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	25 U			310.59	23.87	0.00	286.72
MW-107	12/13/00	50 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	-	-	-	-	-	-	-	-	-	-	-	-	-	310.59	24.50	0.00	286.09
MW-107	3/19/01																				310.59	26.67	0.00	283.92
MW-107	6/28/01		Well destroyed during roadway paving activities																					
MW-108	11/2/99																				309.94	22.96	0.00	286.98
MW-108	3/1/00	100 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	-	-	309.94	18.55	0.00	291.39
MW-108	5/24/00																				309.94	22.72	0.00	287.22
MW-108	7/10/00	50 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	-	-	309.94	24.48	0.00	285.46
MW-108	10/19/00	50 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	25 U			309.94	20.46	0.00	289.48
MW-108	12/13/00	50 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	-	-	-	-	-	-	-	-	-	-	-	-	-	309.94	23.47	0.00	286.47
MW-108	3/19/01	50 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	25 U			309.94	25.43	0.00	284.51
MW-108	6/28/01		Well destroyed during roadway paving activities																					

Notes:

MTCA Method A : Washington Department of Ecology Model Toxics Control Act Method A screening criteria

NAPL: non-aqueous phase liquid

MTBE: methyl tert-butyl ether

EDC: 1,2-dichloroethane

EDB: 1,2-dibromoethane

i-PB: isopropylbenzene

n-PB: n-propylbenzene

TMB: trimethylbenzene

\* Corrected field label error for switched MW-103 and MW-105 samples

4-IP-Toulene: 4-isopropyltoluene

µg/L: micrograms per liter

**Bold** values indicate concentrations detected >laboratory reporting limit

NM: not measured

-: The analyte was not tested for by this method

^: not sampled

U: The analyte was not detected above method detection limit presented in table.

**Red** values indicate the concentration exceeds the MTCA Method A cleanup level

MW-105 resurveyed on January 24, 2009 following repairs. Top of casing elevation previously 311.99 feet, now 310.46 feet.