Summary Report for Petroleum Plume Remediation and Monitoring
You & I Market
Pacific Beach, Washington

Prepared for
Washington State
Department of Ecology
Toxics Cleanup Program

October 22, 2012
17800-33

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Prepared by
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SUMMARY REPORT FOR
PETROLEUM PLUME REMEDIATION AND MONITORING
YOU & I MARKET
PACIFIC BEACH, WASHINGTON

INTRODUCTION

This groundwater monitoring summary report is part of Hart Crowser's environmental support services related to remediating petroleum contamination at the You & I Market (Site). The work described herein was completed in general accordance with our August 23, 2012, Scope of Work Confirmational Soil Sampling and Groundwater Monitoring at the You & I Market in Pacific Beach, Washington. The purpose of the project was to monitor the groundwater at the You & I property by collecting groundwater samples for chemical analysis from the six groundwater monitoring wells on the Site.

SITE DESCRIPTION

The You & I Market, formerly known as Joe's Market, is located at 51 Main Street in the town of Pacific Beach, Washington (Figure 1). The Site is located on the southwest corner of Main Street and Second Street in an area of mixed residential and commercial use (Figure 2). The lot area is 12,480 square feet. The Land Use Code is 55-Retail Trade-Automotive, Marine Craft, Aircraft, and Accessories-Gas Stations, which is the current as well as the planned future use.

The Site is paved, with a gravel alley located along the southern border of the property. The property slopes gently down to the southeast and is less than one-half mile east of the Pacific Ocean. The market is served by the city municipal water system with an underground line located in the center of the alley. An underground drainage line is located beneath the edge of the street along the south and east sides of the Site.

The Site has been identified by the Washington State Department of Ecology (Ecology) Toxics Cleanup Program as an active Leaking Underground Storage Tank (LUST) site. The Site name is listed as "You and I Market" with Ecology ID No. 434203 and Underground Storage Tank (UST) No. 2514. Its status was listed as "Awaiting Cleanup" on July 17, 1995.

SITE BACKGROUND AND HISTORY

The Site is currently used as a gasoline station and convenience store. We understand that in 1995, three underground storage tanks (USTs) were removed: one 8,000-gallon UST, one 6,000-gallon UST, and one 4,000-gallon UST, which formerly contained leaded gasoline, unleaded gasoline, and diesel fuel, respectively. The UST removal was documented in the "UST Removal Report" submitted to Ecology by Anderson Petroleum Services, Inc. At the time of the UST removal, two new USTs consisting of a 10,000-gallon unleaded regular gasoline tank and a 6,000-gallon premium unleaded/4,000-gallon diesel fuel split tank were installed.

In 1997, during excavation of a utility vault, workers with Century Tel Company noted strong petroleum odors in the soil. The excavation was approximately 100 feet southeast of the Site, across Second Street. In January 1998, AA Enviro Assessment Inc. (AEA 1998) conducted a site investigation. A second investigation was conducted in November 2000 by Northwest Testing Company (NWT 2000). Both reports documented weathered gasoline and diesel contamination exceeding MTCA Method A soil cleanup levels beneath and around the pump islands. The petroleum plume was observed to extend over 100 feet southeast of the pump island, passing under Second Street to the utility vault. Most of the soil contamination was observed between 4 to 9 feet below ground surface. Petroleum contamination was also encountered south of the USTs. The lateral extent of the petroleum plume off the Site was not defined by these studies.

In July 2009, the current owner of the property, Mr. David Koh, contracted with Environmental Services Network (ESN) to advance six soil borings at the Site and to analyze soil and groundwater collected from these borings. We understand that there was no official report, but the analytical results from the laboratory confirmed the presence of gasoline-range hydrocarbons that exceeded MTCA Method A cleanup levels in soil and groundwater southeast of the pump island.

In January 2010, during a heavy rainfall event, Ecology received a report of fuel "bubbling up" from the ground on the east side of the pump island concrete pad. The fuel was observed flowing south down Second Street into a storm drain located a few hundred yards away. This storm drain empties into nearby Joe Creek, which flows into the Pacific Ocean.

In February and March 2011, Hart Crowser completed 13 push probes and installed six 2-inch-diameter groundwater monitoring wells to further establish the nature and extent of petroleum contamination in the soil and groundwater at

the Site and adjacent properties. Petroleum contamination was identified up to 120 feet southeast downgradient of the pump island, the suspected source area.

To treat both the source area soil and the downgradient soil and groundwater, chemical and biological oxidants and biological nutrients were injected at 70 locations. The chemical oxidant consists of an ionic exchange resin that breaks down petroleum hydrocarbons to fatty acids, releasing the hydrocarbons from the soil matrix. The biological oxidants and nutrients provide mobile and immobile electron acceptors and vital nutrients over an extended period of time (several months to years). These amendments are only consumed when needed by native microbes that have already adapted to Site conditions.

SITE GEOLOGY AND HYDROGEOLOGY

The geology encountered during the push-probe investigation varied across the Site. The Fill unit consisted of silty, sandy gravel to gravelly, sandy silt and varied in thickness from 0.5 to 4 feet. The soil under the Fill consists of clayey Silt, sandy Silt, and silty Sand units. The soil under the pump island and UST areas consist of the Fill unit over the clayey Silt unit over the silty Sand unit. The soil east of Second Street consists of the Fill unit over the sandy Silt, Sand, or Silt units. The southern and eastern soil consists of the Fill unit over the clayey Silt unit over an organic Silt unit. The thickness of each unit varies across the Site.

Groundwater was encountered at depths ranging from 1 to 6 feet during the push-probe explorations. This shallow groundwater appears to be perched water. Groundwater was present in the Site monitoring wells at a depth of 0.15 to 3.02 feet during the March event, and a depth of 4.26 to 6.17 feet during the September event. Current and previous water level measurement data are presented in Table 2. Figure 3 illustrates relative groundwater elevations and shows that groundwater is flowing southeast toward Joe Creek, which is consistent with Site topography and the orientation of the petroleum hydrocarbon plume.

GROUNDWATER MONITORING ACTIVITIES

Groundwater monitoring activities were completed on September 19, 2012. Field measurements and groundwater samples were collected for laboratory analysis from the six groundwater monitoring wells (MW-1 through MW-6) at the Site. The samples were analyzed for gasoline- and diesel-range total petroleum hydrocarbons (TPH), and benzene, toluene, ethylbenzene, and xylenes (BTEX) during both monitoring events.

The depth to groundwater measured from the top of the casing (TOC) in the six wells for each monitoring event is presented in Table 1. Groundwater flow direction for data collected on September 19, 2012, is shown on Figure 2.

Low-flow purging and sampling techniques (less than 500 milliliters per minute) were used to purge each monitoring well. Groundwater from each well was purged using a peristaltic pump until the field parameters (pH, temperature, specific conductivity, and turbidity) stabilized before collecting the sample. Final stabilized measurements are presented on Table 2. Groundwater samples were collected from each well using clean dedicated tubing. Groundwater samples were transferred from the pump tubing directly into sampling containers. Samples were placed in a cooled ice chest and hand delivered the next day for chemical analysis to Libby Environmental of Olympia, Oregon.

GROUNDWATER MONITORING RESULTS

Groundwater Monitoring Results

Groundwater analytical results are presented in Table 3. The complete laboratory report and chain of custodies are presented in Appendix B.

- Gasoline-range hydrocarbons (TPH-Gx) were detected in MW-1 and MW-2 at concentrations of 74,000 and 20,900 µg/L, respectively. Gasoline-range hydrocarbons were detected in wells MW-1 and MW- 2 during both the March and September sampling events at concentrations exceeding MTCA Method A cleanup level of 800 µg/L. The MW-1 and MW-2 TPH-Gx concentrations increased over the September 2011 analytical results of 23,330 and 4,200 µg/L, respectively. No other wells contained gasoline-range hydrocarbons at concentrations exceeding the Method A groundwater cleanup level.

- Diesel-range hydrocarbons (TPH-Dx) were below the method detection limit of 200 µg/L. This represents a significant decrease from the previously measured concentrations in MW-1 and MW-2 of 2,750 and 1,230 µg/L, respectively.

- Oil-range hydrocarbons were included as part of the diesel analysis for both sampling events, and were not detected at or above the reporting limit in any of the samples from the six wells.

- Benzene was detected in MW-1 and MW-2 at concentrations of 148 and 502 µg/L, respectively. Benzene was detected in MW-1 and MW- 2 during

both the March and September sampling events at concentrations exceeding the MTCA Method A cleanup levels of 5 µg/L. The MW-1 and MW-2 benzene concentrations increased over the September 2011 analytical results of 28 and 214 µg/L, respectively.

- In March 2012, toluene was detected in MW-1 and MW-2 at concentrations of 98 and 100 µg/L, respectively. In September 2012, toluene was detected in MW-1 and MW-2 at concentrations of 125 and 152 µg/L, respectively. All measured concentrations were below the MTCA Method A cleanup level for toluene of 1,000 µg/L.

- Ethylbenzene was detected in MW-1and MW-2 at concentrations of 915 and 477 µg/L, respectively. Only groundwater monitoring well MW-1 had concentrations above the MTCA Method A cleanup level (700 µg/L) for ethylbenzene. In September 2011, ethylbenzene was detected in MW-1, MW-2, and MW-3 at concentrations of 1,250, 43.2, and 0.66 µg/L, respectively.

- Xylenes were detected in MW-1 and MW-2 at concentrations of 2,780 and 485 µg/L, respectively. Only groundwater monitoring well MW-1 exhibited a concentration above the MTCA Method A cleanup level (1,000 µg/L) for total xylenes. In September 2011, xylenes were detected in MW-1, MW-2, and MW-3 at concentrations of 4,460, 128, and 1.44 µg/L, respectively.

CONCLUSIONS AND POTENTIAL FUTURE REMEDIATION OPTIONS

The recent groundwater analytical results show a significant decrease in diesel-range hydrocarbon concentrations in wells MW-1 and MW-2. Gasoline-range hydrocarbons and benzene measured in MW-1 and MW-2 show a significant increase in concentrations as compared to previous groundwater monitoring events. However, the decrease in gasoline-range hydrocarbon concentrations measured in MW-3 and the non-detect readings in monitoring wells MW-4, MW-5, and MW-6 indicate that the increase identified in MW-1 and MW-2 had has not migrated downgradient.

There are several possible causes for the increase in gasoline and benzene concentrations. The groundwater samples were collected at the likely seasonal low groundwater levels, which may result in the downward migration and accumulation of mobile gasoline. Subsequent groundwater monitoring events will occur as seasonal groundwater levels are elevated and will likely give a better insight into the possibility of seasonal accumulations of petroleum hydrocarbons.

A second possible reason for the increase in the gasoline and benzene concentrations is that the chemical and biological oxidants that were injected as part of the remediation activities released hydrocarbons from the soil matrix to the groundwater as designed to make the hydrocarbons available for biological degradation. The relatively low hydrocarbon concentrations encountered in wells MW-3, MW-4, and MW-5 indicate that the gasoline-range hydrocarbons and benzene have not significantly migrated downgradient. Future groundwater monitoring will indicate if this process is occurring or if additional nutrient application is necessary to further promote hydrocarbon degradation.

The third possible cause for the increase in gasoline-range petroleum hydrocarbons and benzene is a possible ongoing release from the active fueling facility. Subsequent groundwater monitoring will determine if concentrations continue to increase or if the natural degradation process is continuing.

Based on the increase in gasoline-range petroleum hydrocarbons, additional biological amendments may be required in the future. If needed, the existing monitoring well network could be used as injection points. These additions would consist of mixing a soluble biological amendment and injecting into the appropriate upgradient wells and allowing the amendments to be transported by natural groundwater flow. The groundwater could then be monitored downgradient to measure the injection effectiveness.

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Table 1 - Depth to Groundwater Data
You & I Market
Pacific Beach, Washington

Well ID *(Top of Casing Elevation in Feet)*	Date of Measurement	Time of Measurement	Depth to Water in Feet [btoc]	Relative Groundwater Elevation in Feet
Monitoring Wells				
MW-1	30-Mar-11	7:47	3.02	95.71
98.73	28-Sep-11	13:26	6.17	92.56
	19-Sep-12	19:18	8.54	90.19
MW-2	30-Mar-11	7:50	2.49	95.68
98.17	28-Sep-11	13:25	5.71	92.46
	19-Sep-12	18:39	8.00	90.17
MW-3	30-Mar-11	7:45	1.37	94.90
96.27	28-Sep-11	13:24	4.26	92.01
	19-Sep-12	16:05	6.50	89.77
MW-4	30-Mar-11	7:38	1.43	97.08
97.08	28-Sep-11	13:21	4.66	92.42
	19-Sep-12	16:42	7.02	90.06
MW-5	30-Mar-11	7:33	1.48	94.52
96.00	28-Sep-11	13:20	4.55	91.45
	19-Sep-12	17:25	6.75	89.25
MW-6	30-Mar-11	7:41	0.15	100.43
100.58	28-Sep-11	13:22	4.67	95.91
	19-Sep-12	7:55	7.30	93.28

Relative groundwater elevation was calculated from the top of casing at each well based on an assumed elevation of 100.0 feet at a fuel island post on the Site.
btoc - below top of casing

Table 2 - Groundwater Field Parameters
You & I Market
Pacific Beach, Washington

Well ID	Date of Measurement	Temperature in °C	pH	Conductivity in mS/cm	ORP in mV	DO in mg/L
Monitoring Wells						
MW-1	31-Mar-11	--	5.93	0.192	59.0	5.94
	28-Sep-11	17.54	6.57	0.418	-54.0	--
	19-Sep-12	16.3	6.02	0.533	--	0.27
MW-2	1-Mar-11	--	5.90	0.200	51.3	5.39
	28-Sep-11	17.23	6.20	0.300	-332.0	--
	19-Sep-12	16.69	5.92	0.340	--	0.30
MW-3	1-Mar-11	--	5.77	0.122	86.8	7.24
	28-Sep-11	17.61	6.47	2.816	-131.0	--
	19-Sep-12	16.56	5.80	0.193	--	0.30
MW-4	1-Mar-11	--	5.45	0.061	98.0	4.91
	28-Sep-11	17.57	5.67	0.088	118.8	--
	19-Sep-12	15.56	4.92	0.097	--	0.40
MW-5	1-Mar-11	--	5.52	0.102	100.0	7.90
	28-Sep-11	16.25	5.78	0.205	1,058	--
	19-Sep-12	15.73	5.77	0.175	--	0.35
MW-6	1-Mar-11	--	6.03	0.170	116.8	6.57
	28-Sep-11	16.61	5.99	0.447	51.1	1.34
	19-Sep-12	15.60	5.12	0.220	--	0.30

Notes:
1. °C = degrees Celsius.
2. mS/cm = millisiemens per centimeter.
3. mg/L = milligrams per liter.
4. ORP = oxidation reduction potential.
5. mV = millivolts.
6. DO = dissolved oxygen.
7. -- = value not available at the time of sampling.

Table 3 - Groundwater Chemical Analysis Results: TPH, BTEX, Nitrates, and Sulfates
You & I Market
Pacific Beach, Washington

Monitoring Wells		Total Petroleum Hydrocarbons			BTEX					
Sample	Date	Gasoline	Diesel	Oil	Benzene	Toluene	Ethyl benzene	Total Xylenes	Nitrates (as N)	Sulfates
		Concentration in µg/L							mg/L	
MW-1	1-Mar-11	**47,200**	**6,840**	<485	**33**	**98**	**1,400**	**5,220**	--	--
	28-Sep-11	**23,330**	**2,750**	<526	**28**	**95.2**	**1,250**	**4,460**	81	1,180
	19-Sep-12	**74,000**	<200	<400	**148**	**125**	**915**	**2,780**	--	--
MW-2	1-Mar-11	**8,360**	**1,910**	<472	**137**	**100**	**256**	**803**	--	--
	28-Sep-11	**4,200**	**1,230**	<500	**214**	**18.6**	**43.2**	**128**	0.52	3.47
	19-Sep-12	**20,900**	<200	<400	**502**	**152**	**477**	**485**	--	--
MW-3	1-Mar-11	**145**	<236	<472	<0.25	<1	<0.5	<1.5	--	--
	28-Sep-11	**120**	<120	<481	<0.2	<0.5	**0.66**	**1.44**	112	1,920
	19-Sep-12	<100	<200	<400	<1	<2	<1	<3	--	--
MW-4	1-Mar-11	<100	<236	<472	<0.25	<1	<0.5	<1.5	--	--
	28-Sep-11	<80	<100	<500	<0.2	<0.5	<0.5	<1.0	0.49	5.81
	19-Sep-12	<100	<200	<400	<1	<2	<1	<3	--	--
MW-5	1-Mar-11	<100	<245	<490	<0.25	<1	<0.5	<1.5	--	--
	28-Sep-11	<80	<98	<490	<0.2	<0.5	<0.5	<1.0	0.37	17.8
	19-Sep-12	<100	<200	<400	<1	<2	<1	<3	--	--
MW-6	1-Mar-11	<100	<236	<472	<0.25	<1	<0.5	<1.5	--	--
	28-Sep-11	<80	<98	<490	<0.2	<0.5	<0.5	<1.0	13.0	21.8
	19-Sep-12	<100	<200	<400	<1	<2	<1	<3	--	--
Ecology MTCA Method A Standard Table Values										
		800/1,000[4]	500	500	5	1,000	700	1,000		

Notes:

1. µg/L = micrograms per liter; mg/L = milligrams per liter.
2. Bold denotes a detected concentration.
3. < = Not detected above the indicated laboratory method reporting limit.
4. MTCA Method A Cleanup Level for Gasoline is 800 µg/L if benzene is present in groundwater and 1,000 µg/L if benzene is not detectable in groundwater.
5. Shaded cells denotes concentration exceeds MTCA Method A standard table values.
6. -- = Sample not analyzed for this parameter.

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0 2,000 4,000

Scale in Feet

N

Source: DeLorme Topo USA®.

You & I Market
Pacific Beach, Washington

Vicinity Map

17800-33 9/12

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Figure
1

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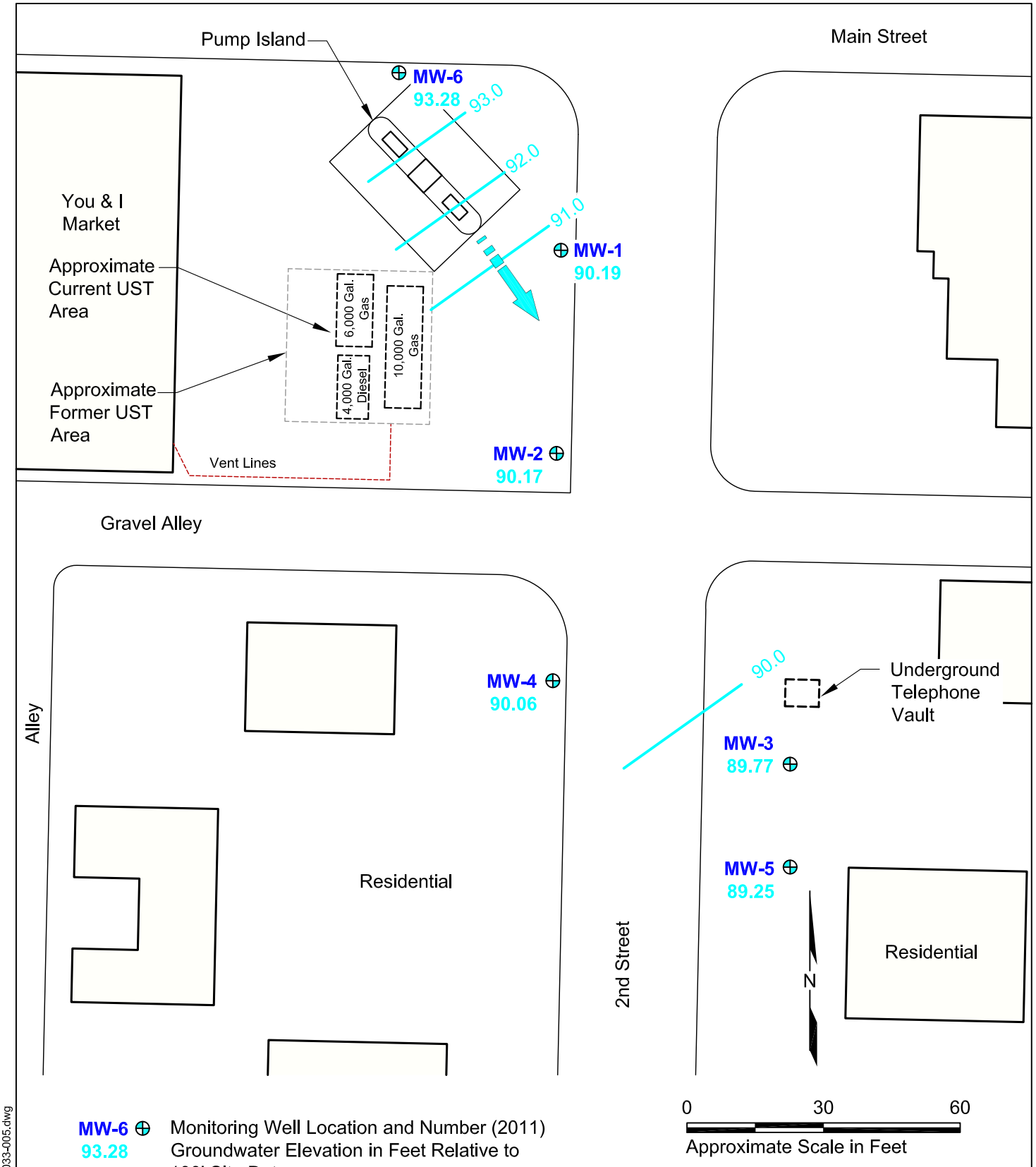

Source: Building locations are based on aerial photographs, former exploration locations from Environmental Characterization Report by Northwest Testing Company (2000) and UST Removal Report by William B. Teitzel (1995).

You & I Market
Pacific Beach, Washington

Relative Groundwater Contour Map
September 2012

17800-33 10/12

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Figure
2

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APPENDIX A
FIELD INJECTION AND GROUNDWATER MONITORING METHODS

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APPENDIX A
FIELD INJECTION AND GROUNDWATER MONITORING METHODS

This appendix documents the processes we used to collect groundwater samples. The discussion includes information on:

- Groundwater Level Measurements;
- Groundwater Sampling;
- Sample Handling and Laboratory Analysis; and
- Investigation-Derived Waste (IDW) Storage and Disposal.

Groundwater Sampling

Groundwater samples were collected from six monitoring wells on March 30 and September 19, 2012, for chemical analysis.

Sampling Equipment

Equipment used for the collection of groundwater samples included:

- pH, specific conductivity, and temperature meters;
- Solinst or equivalent water level indicator;
- Peristaltic pump with disposable polyethylene tubing;
- Laboratory-supplied pre-cleaned and preserved sample containers;
- Coolers with blue ice; and
- Hart Crowser Sample Custody Record and Groundwater Sampling Data forms.

Groundwater Sampling Procedures

Upon arrival at the wellhead, field personnel recorded conditions, and depth to water using a Solinst or equivalent interface probe.

Before sampling, wells were purged and sampled using low-flow groundwater sampling techniques. Purging and sampling were conducted at a depth representing the middle of the screened interval of each well.

Groundwater samples were collected once the field parameters of pH, specific conductivity, temperature, and turbidity stabilized. The sample bottles were filled directly from the polyethylene tubing at low-flow rates (less than 500 milliliters per minute). To prevent cross-contamination of the wells, dedicated disposable polyethylene tubing was used for each groundwater sample, and the

interface probe was decontaminated between well locations using a non-phosphate-based cleaner and deionized water.

Sample Handling and Laboratory Analysis

Groundwater samples collected during the September 19, 2012, sampling event were placed in a cooled ice chest and hand delivered the next day under chain of custody procedures for chemical analysis to Libby Environmental of Olympia, Washington.

The groundwater samples were analyzed for gasoline- and diesel-range total petroleum hydrocarbons by NWTPH-Gx, NWTPH-Dx, respectively, oil-range total petroleum hydrocarbons by NWTPH-Dx; and benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260C.

Investigation-Derived Waste (IDW) Storage and Disposal

Purged groundwater was placed in an IDW drum for storage on site until the four quarters of sampling have been completed.

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APPENDIX B
GROUNDWATER ANALYTICAL REPORTS AND CHAIN OF CUSTODIES

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APPENDIX B
CHEMICAL DATA QUALITY REVIEW AND LABORATORY REPORTS

Chemical Data Quality Review

Six groundwater samples were collected on September 18, 2012. The samples were submitted to Libby Environmental, Inc., in Olympia, Washington, for chemical analysis. The laboratory reported results as Libby Project # L120919-2.

The samples were analyzed for one or more of the following:

- Gasoline by Ecology Method NWTPH-Gx;
- BTEX by EPA Method 8021B; and
- Diesel and oil by Ecology Method NWTPH-Dx/Dx Extended.

The laboratory performed quality assurance/quality control (QA/QC) reviews on an ongoing basis. Hart Crowser reviewed the data to ensure they met data quality objectives for the project and recorded the results on laboratory quality control summary sheets.

The following criteria were evaluated during the standard data quality review process:

- Holding times;
- Reporting limits;
- Method blanks;
- Surrogate recoveries;
- Laboratory control sample (LCS) recoveries;
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries; and
- Laboratory duplicate relative percent differences (RPDs).

The data were determined to be acceptable for use without qualification. The complete laboratory reports are presented at the end of this report. The data review is summarized in the following pages.

Gasoline by Ecology Method NWTPH-Gx

Holding times and reporting limits were acceptable. No method blank contamination was detected. LCS and MS recoveries were within method control limits. The laboratory duplicate RPD was within control limits or was not applicable when the sample and duplicate were non-detect.

BTEX by EPA Method 8021

Holding times and reporting limits were acceptable. No method blank contamination was detected. LCS and MS/MSD recoveries were within method control limits. The laboratory duplicate RPD was not applicable because the sample and duplicate were non-detect.

Diesel and Oil by Ecology Method NWTPH-Dx/Dx Extended

Holding times and reporting limits were acceptable. No method blank contamination was detected. Surrogate recovery was within laboratory and method control limits. LCS recoveries were within laboratory control limits.

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Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 9/19/12 Page: 1 of 1

Client: Hart Crowser
Project Manager: Ross Stanley
Address: ~~2020~~ 1700 Westlake Ave N, Suite 200
Project Name: Yeon & I Market
Phone: 206 430-8777 Fax: 206 328 5581
Location: Pacific Beach City: Pacific Beach
Client Project #
Collector: Brian Payne Date of Collection: 9/18/12

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260 BTEX	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx BTEX	NWTPH-Dx DX	~~NWTPH-Dx SGC~~	PAH 8270	PCB's 8082	MTCA 5 Metals			Field Notes
1 MW 1		1918		3 VOA/1 Amber			X			X	X							
2 MW 2		1839																
3 MW 3		1605																
4 MW 4		1648																
5 MW 5		1725																
6 MW 6		1955		↓			↓			↓	↓							
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		

Relinquished by:	Date / Time	Received by:	Date / Time
Brian Payne	9/19/12 1200	Mary Lewis	9/19/12 1200
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: Std.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

YOU & I MARKET PROJECT
Hart Crowser, Inc.
Pacific Beach, Washington
Libby Project # L120919-2

Analyses of Gasoline (NWTPH-Gx) & BTEX (EPA Method 8021B) in Water

Sample Number	Date Analyzed	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	Gasoline (µg/l)	Surrogate Recovery (%)
Method Blank	9/20/12	nd	nd	nd	nd	nd	92
LCS	9/20/12	94%	89%				80
MW1	9/21/12	148	125	915	2780	74000	121
MW2	9/21/12	502	152	477	485	20900	102
MW3	9/20/12	nd	nd	nd	nd	nd	93
MW4	9/20/12	nd	nd	nd	nd	nd	93
MW5	9/20/12	nd	nd	nd	nd	nd	88
MW6	9/20/12	nd	nd	nd	nd	nd	85
MW6 MS	9/20/12	81%	87%				77
Practical Quantitation Limit		1	2	1	3	100	

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Trifluorotoluene): 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

YOU & I MARKET PROJECT
Hart Crowser, Inc.
Pacific Beach, Washington
Libby Project # L120919-2

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (µg/l)	Oil (µg/l)
Method Blank	9/21/12	108	nd	nd
MW1	9/21/12	96	nd	nd
MW2	9/21/12	80	nd	nd
MW3	9/21/12	85	nd	nd
MW4	9/21/12	92	nd	nd
MW5	9/21/12	74	nd	nd
MW6	9/21/12	81	nd	nd
MW6 Dup	9/21/12	89	nd	nd
Practical Quantitation Limit			200	400

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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