

SITE HAZARD ASSESSMENT
WORKSHEET 1
Summary Score Sheet

SITE INFORMATION:

Olympic Water and Sewer Inc.
781 Walker Way
Port Ludlow, WA 98365
Parcel # 821084004

Ecology Facility Site ID No.: 62223345
Section/Township/Range: SE ¼ Section 8 Township 28N Range 1E
Latitude: 47.92813 Longitude: -122.69877

Site scored/ranked for the August 2011 update

April 26, 2011

SITE DESCRIPTION: The subject property is owned by Olympic Water and Sewer Incorporated (OWSI), a private utility that services Port Ludlow, a resort/retirement community located along the Hood Canal. The site, approximately 2.2 acres in size, is located at 781 Walker Way in a wooded rural- residential neighborhood in Port Ludlow. Approximately ½ acre of the site has been developed and consists of unpaved land that gently slopes to the southwest. There are three structures on the property: an approximately 20 ft.x50 ft. maintenance office/shop/garage; a single-wide trailer used for storage; and a 20 ft.x10 ft. pump-house along the northwestern fence-line which houses Well #2, a group-A public water well. There is an asphalt driveway that runs down the middle of the developed area from Walker Way to approximately the storage trailer.

The lot is bordered by a ravine on the west, a residential property to the south, by a road (Walker Way) to the north, and a flat, wooded area and small road to the east. The western half of the property is wooded and contains a ravine with a seasonal stream/ drainage that the Department of Natural Resources classifies as fish habitat. This water drains to Port Ludlow Bay and Puget Sound.

Soils are of the Cassolary- Everett complex, generally consisting of well-drained soils. A well log from Well #2, however, shows brown sandy clay from 49 ft. to 79 ft., brown cemented sand and gravel to 105 ft., brown sandy clay to 121ft., brown clay to 137 ft., brown and blue clay to 205 ft., then gray gravelly hard pan to 212 ft.

The property was developed by its previous owner, Pope and Talbot Development Incorporated, in 1968. Pope and Talbot used the site to house a corporate office and garage/shop for property development and utilities. Their original office structure is no longer there. They installed three underground storage tanks for gasoline to service their utility trucks and maintenance vehicles. A 1000- gallon UST was under the shop, a 2000-gallon UST was just outside the west wall of the shop, and a 2000- gallon UST was approximately 40 ft. to the south of the shop.

In 1985, the property was sold to Pope Resources, LLC, who removed all three USTs in 1990. Soil sampling from the floors of the excavations under the two USTs under/alongside the shop showed soil contamination with TPH levels above Model Toxics Control Act (MTCA) clean-up levels of 100 mg/kg. (TPH **3000** mg/kg and **963** mg/kg). Soil samples from the third excavation site to the south showed no contamination. Contaminated soil was then removed from the area of the two shop USTs except where it might compromise the shop structure. The area under the 1000- gal UST was only excavated to 10 ft. below ground surface (bgs). Re-testing of the area below the shop floor after excavation indicated remaining soil at the bottom of the excavation with TPH of **1237** mg/kg, approximately twelve times MTCA clean-up levels.

Well #2 is one of five active wells owned by OWSI. Water from well #2 is combined with water from two other wells (3 and 4N) to serve 592 houses in one region of Port Ludlow. Well #2 is approximately 100' from the shop and its former USTs. It has been tested periodically for volatile organics and none have been detected to date. Well #2 is losing production.

In 2009 OWSI proposed to drill a replacement well at the site (well #17), approximately 100 ft. to the south of the shop and approximately 50 ft. from the southernmost former UST site. On April 20, 2009 the contracted well-drillers, Hallocene Drilling, encountered water at approximately 50 ft. and halted for the day. The next day they returned to the site and smelled gasoline at the well site. No further drilling was done and both a water and soil sample were obtained from the well. A water sample was also obtained from Well #2.

The water sample results from Well #17 revealed gasoline at **5530** ug/L, and benzene at **948** ug/L, levels well above their respective MTCA Method A clean-up levels of 800 ug/L and 5 ug/L. Toluene, ethylbenzene, and xylenes were found as well, though below MTCA. The soil sample showed benzene at 0.27 mg/kg, just below MTCA Clean-up level of 0.3 mg/kg, and Toluene at 0.011. None of the other components of BTEX were detected in the soil. Well #2 was tested for volatile organic compounds (VOCs) and none were detected.

Analyte Found 4/21/09 Sampling	Well #17 Water Sample Result (ug/L)	MTCA A ULU* (ug/L)	Well #17 Soil Sample Result (mg/kg)	MTCA A ULU* (mg/kg)
Benzene	948	5	0.27	0.3
Ethylbenzene	62	700	<.05	6
Toluene	208	1,000	.011	7
Xylenes	153	1,000	<0.15	9
Gasoline range organics with benzene	5530	800	<10	30

*MTCA A ULU refers to the Model Toxics Control Act Table 740-1 Method A Soil Cleanup Levels for Unrestricted Land Use

OWSI hired SLR International in the spring of 2010 to conduct a Site Characterization. Four soil borings were drilled on April 12, 2010: three at the shop site of the two former USTs, and one to the north of the storage trailer. Four water-monitoring wells were then installed in June 2010:

- MW#1 – Along western edge of shop, adjacent to the excavation site of the 2 former USTs
- MW#2 – Western side of pad (approx. 120' south of well #2, just north of the storage trailer)
- MW#3 – Along southern fence-line (43' south of well #17)

- MW#4 – Northern edge of property in middle of driveway.

Groundwater sampling from the monitoring wells was conducted on June 14 as well as October 20, 2010. Water from monitoring wells 1 and 2 consistently exceeded Model Toxics Control Act (MTCA) Method-A clean-up levels for benzene and gasoline range organics (GRO). MW2 had particularly high levels of benzene (2,100 and 1,300 ppb- MTCA clean-up level is 5 ppb), and GRO (8,400 and 3,900 ppb-MTCA clean-up levels are 800 ppb). MW1 and MW2 tested positive for toluene and ethylbenzene on both dates, and MW2 was above MTCA levels for ethylbenzene on June 14.

Well Number	Date Collected	Analytical Results (ug/L)					
		Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	Gasoline Range Organics
MTCA Method A Cleanup Levels		5	1,000	700	1,000	160	800
MW-1	6-14-2010	110	45	1.10	186	<1	990
	10-20-2010	520	140	110	221	15	1,900
MW-2	6-14-2010	2,100	620	960	650	100	8,400
	10-20-2010	1,300	290	430	530	35	3,900
MW-3	6-14-2010	0.36	<1	<1	<3	<1	<100
	10-20-2010	<0.35	<1	<1	<3	<1	<100
MW-4	6-14-2010	<0.35	<1	<1	<3	<1	<100
	10-20-2010	<0.35	<1	<1	<3	<1	<100

Soil testing was conducted from samples obtained while drilling monitoring wells in the spring of 2010. The initial boring for MW1(1B) and soil borings from wells 2 and 3 all showed soil contamination above MTCA Method-A cleanup levels for benzene, and MW1-B was also above MTCA for GRO.

Soil Boring Number	Approximate Sample Depth (feet)	Date Collected	Analytical Results (mg/Kg)				
			Benzene	Toluene	Ethylbenzene	Total Xylenes	GRO
MTCA Method A Cleanup Levels			0.03	7	6	9	30
MW-1B	24.5-25	4-14-2010	0.49	5.7	1.2	6.7	140
MW-1	40-40.3	6-8-2010	<0.03	<0.05	<0.05	<0.15	<2
	55-55.5	6-8-2010	<0.03	<0.05	<0.05	<0.15	<2
MW-2	40-40.3	6-9-2010	0.21	0.062	0.11	0.066	2.90
	55.5-55.8	6-9-2010	0.21	<0.05	<0.05	<0.15	<2
MW-3	30.5-30.9	6-9-2010	<0.03	<0.05	<0.05	<0.15	<2
	45.5-45.9	6-10-2010	0.036	<0.05	<0.05	<0.15	<2
MW-4	30.5-31	6-10-2010	<0.03	<0.05	<0.05	<0.15	<2
	55-55.5	6-11-2010	<0.03	<0.05	<0.05	<0.15	<2

SPECIAL CONSIDERATIONS (include limitations in site file data or data which cannot be accommodated in the model, but which are important in evaluating the risk associated with the site, or any other factor(s) over-riding a decision of no further action for the site):

Well #2 is a Class A public water well, the water of which is combined with that of two other wells to serve 592 residences in Port Ludlow.

The site characterization by SLR International did not include soil, sediment, or water sampling from the gully on the western portion of the property, which is down gradient from the wells and former USTs. This gully is classified by the Department of Natural Resources as fish habitat and it empties into Port Ludlow Bay, a commercial shellfish area.

Due to the contamination documented on-site being primarily subsurface, the air route is not applicable for WARM scoring for this site. Thus, only the groundwater and surface water routes will be scored.

ROUTE SCORES:

Surface Water/Human Health: NS

Air/Human Health: NS

Groundwater/Human Health: 55.79

Surface Water/Environmental: NS

Air/Environmental: NS

OVERALL RANK: 2

WORKSHEET 2
Route Documentation

1. **SURFACE WATER ROUTE** - *Not Scored*

2. **AIR ROUTE** - *Not Scored*

3. **GROUNDWATER ROUTE**

a. List those substances to be considered for scoring: Source: 3

Gasoline Range Organics, Benzene, Ethylbenzene, lead

b. Explain basis for choice of substance(s) to be used in scoring:

These substances were detected in on-site subsurface soil and groundwater samples associated with the site in concentrations exceeding their respective MTCA cleanup levels. Testing for lead was not performed but can be assumed to be present given the age of the gasoline tanks.

c. List those management units to be considered for scoring: Source: 3

Subsurface soils and groundwater.

d. Explain basis for choice of unit to be used in scoring:

Gasoline Range Organics, Benzene and Ethylbenzene were detected in on-site subsurface soil and/or groundwater samples in concentrations exceeding their respective MTCA cleanup levels. Given the likelihood of leaded gasoline, lead may be presumed to be present as well.

WORKSHEET 4
Surface Water Route
(Not Scored)

WORKSHEET 5
Air Route
(Not Scored)

WORKSHEET 6
Groundwater Route

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity										
Substance	Drinking Water Standard (µg/L)	Value	Acute Toxicity (mg/ kg-bw)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity		Value	
							WOE	PF*		
1 TPH-G (benzene)	5	8	3306	3	ND	-	A	1	-	
2 Ethylbenzene	700	4	3500	3	0.1	1	-	-	5	
3 Lead	15	6	-	ND	0.001	10	B2	-	ND	

* Potency Factor

Source: 1, 2, 3

Highest Value: 8

(Max = 10)

Plus 2 Bonus Points? 2

Final Toxicity Value: 10

(Max = 12)

1.2 Mobility (use numbers to refer to above listed substances)	
Cations/Anions [Coefficient of Aqueous Migration (K)]	OR Solubility (mg/L)
1=	1= 1.8E+03 =3
2=	2= 1.5E+2 = 2
3 K is 0.1 to 1.0 = 2, present in liquid form = 3	3 =
4=	4=
5=	5=
6=	6=

Source: 1, 2

Value: 3

(Max = 3)

1.3 Substance Quantity:	
<p>Explain basis: Area estimated by SLR to be contaminated with hydrocarbons above MTCA Method A for groundwater is 225'x125' = 28,125 feet. X 3feet assumed depth (per WARM manual) =84,375 cubic feet = 3,125 cubic yards</p>	<p>Source:2, 3 Value:4 (Max=10)</p>

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	Containment (explain basis): leaking USTs (former), no containment, documented soil and water contamination	2, 3, 9	<u>10</u> (Max = 10)
2.2	Net precipitation: 18.92”- 6.1” = 12.82”	2, 10	<u>2</u> (Max = 5)
2.3	Subsurface hydraulic conductivity: SLR report: “dense glacial advance outwash (sand, gravel and silt units)” to approximately 60’	2, 3	<u>4</u> (Max = 4)
2.4	Vertical depth to groundwater: Confirmed groundwater contamination	2,3,9	<u>8</u> (Max = 8)

1.0 TARGETS

		Source	Value
3.1	Groundwater usage: Public supply with alt. sources available for portion, others are private with no alt. sources available.	2, 7, 9	<u>5</u> (Max = 10)
3.2	Distance to nearest drinking water well: <600 feet	2,3,9	<u>5</u> (Max = 5)
3.3	Population served within 2 miles: $\sqrt{\text{Pop.}} = \sqrt{2910} = 54$ (2319 (pl wells) + 591=2910)	7,11,12, 13	<u>54</u> (Max = 100)
3.4	Area irrigated by (groundwater) wells within 2 miles: (0.75)* $\sqrt{105} = 8$	13	<u>8</u> (Max = 50)

2.0 RELEASE

		Source	Value
	Explain basis for scoring a release to groundwater: Confirmed release to groundwater	3,9	<u>5</u> (Max = 5)

SOURCES USED IN SCORING

1. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992
2. Washington State Department of Ecology, Washington Ranking Method (WARM) Scoring Manual, April 1992.
3. Site Characterization Report, Olympic Water and Sewer, Inc. Property, 781 Walker Way, Port Ludlow, WA., December 17, 2010, SLR International Corp.
4. Climate Summary for Chimacum, WA., Western Regional Climate Center, <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa1414> downloaded 3-7-11
5. Isopluvials of 2-Yr. 24 Hr. Precipitation in Tenths of an Inch, NOAA Atlas 2, Volume IX, U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, <http://www.wrcc.dri.edu/pcpnfreq/wa2y24h.gif>, downloaded 3-7-11
6. U.S.G.S. topographical map for area
7. Correspondence between Larry Smith, OWSI and Marjorie Boyd, JCPH, March 3, 2011
8. Map of Commercial and Recreational Shellfish Growing Areas, Puget Sound, January 2009, Washington State Department of Health, www.doh.wa.gov/ehp/sf/Pubs/ai-map.pdf
9. Initial Investigation Report, Washington State Department of Ecology, April 30, 2009
10. Washington Climate Booklet, U.S. Department of Agriculture, Washington State Extension Service, Pullman, WA., December 1972
11. Jefferson County On-Line GIS system for Jefferson County Environmental Health Information (Arcview 10)
12. Sentry Internet Database of Water Wells, Washington State Department of Health
13. Water Right Tracking System, Washington State Department of Ecology. <https://fortress.wa.gov/ecy/wrx/wrtssp1/wrtsmain.aspx?xpage=intro&xnavigate=clear>