Site Hazard Assessment
Worksheet 1
Summary Score Sheet

SITE INFORMATION

Name: Breakwater Marina
Address: 5603 N. Water Front Dr.
City: Tacoma **County:** Pierce **State:** WA **Zip:** 98407
Section/Township/Range: Section 10, Township 21N, Range 02E
Latitude: 47° 18' 15.80"N **Longitude:** 122° 30' 45.74"W
Facility Site ID Number: 1794148

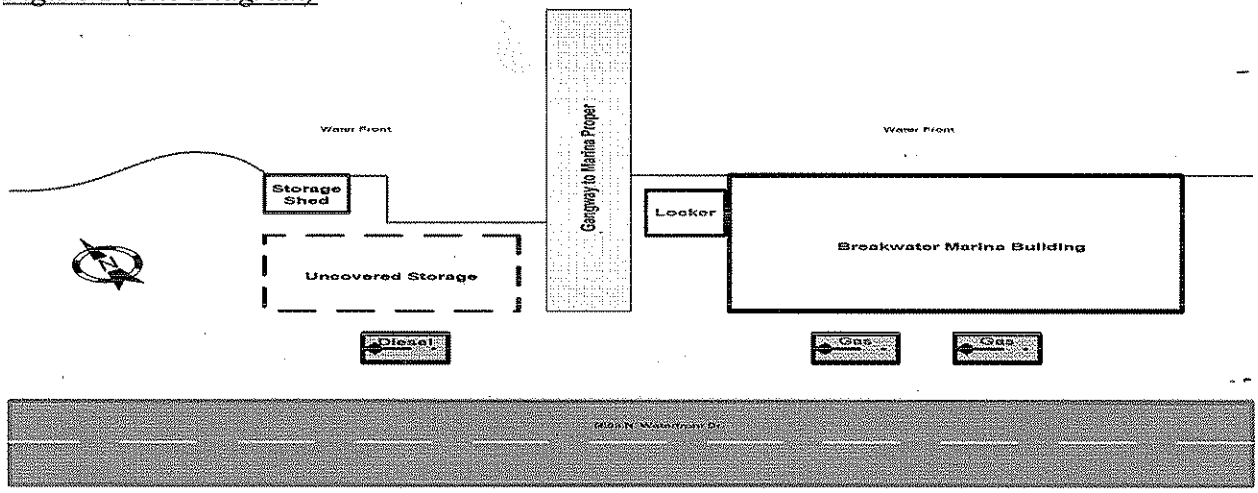
Site assessed/ranked for the August 22, 2007 update

Site Description (Include management areas, substances of concern, and quantities):

The Breakwater Marina site sits on the eastern edge of a 647.86 acre parcel, APN 0221103000. The site consists of the Breakwater Marina building, an uncovered storage area, a storage shed, a locker, a gangway to the marina proper, and a small parking lot area. In the subsurface of the parking lot area rests three (3) underground storage tanks (USTs), which will be the focus of this site hazard assessment. See Figure 1 (Site Diagram) below.

The subject site rests at approximately twenty (20) feet above sea level. A paved two-lane road, North Waterfront Drive, serves as the west border, and Puget Sound serves as the eastern border. To the north lies the Tacoma Yacht Club, and the southern border is the paved two lane road, North Waterfront Drive. To the west, across the paved two-lane road, North Water Front Drive, the land surface rises steeply, serving as the eastern edge of Point Defiance Park.

Figure 1 (Site Diagram)



The real property parcel is owned by the Tacoma Metropolitan Park Board, who leases a small segment (the subject site) to the Tacoma Yacht Club. The Tacoma Yacht Club sub-leases the subject site to the Breakwater Marina. The real property parcel is classified as "Park", and the subject site is located along the eastern edge of Point Defiance Park across from North Waterfront Drive.

Subsurface Geology

Site characterization information contained in the Phase II Site Assessment, prepared by Northwest Environmental Solutions, Inc. (NES), states "The soil was consistent with SM (Silty Sands, Sand Silt Mixtures) to GC (Clayey Sands, Gravel-Sand-Silt Mixtures) as described in the Unified Soil Classification System. The Phase II Site Assessment also reports encountering groundwater "at various depths ranging from 7 ft to 9 ft" below ground surface.

Recent Site History

In December 2005, NES began the decommissioning and assessment of three (3) USTs located at the subject site. The north UST most recently contained diesel and the two southern USTs most recently contained gasoline. Fill tubes and turbine were removed and all three (3) USTs were pumped and triple rinsed by Marine Vacuum Services. NES stated in the Phase II Site Assessment that eight hundred fifty (850) gallons of waste fuel and water were removed and transported to the Marine Vacuum Services facility.

Nine (9) soil samples were collected at various depths from the area surrounding the USTs for assessment purposes. One (1) groundwater sample was collected from the area at the southern most UST at a depth of ten (10) bgs.

Environmental samples collected from the two gasoline USTs were analyzed for TPH-Gas, Benzene, Toluene, Ethylbenzene, Xylenes (BTEX compounds) and Total Lead. Environmental samples collected from the area around the diesel UST were analyzed for TPH-Oil and TPH-Diesel. See Figure 2 (Sample Location Diagram) for specific sample locations and Tables 1-3 for sample results.

Figure 2 (Sample Location Diagram)

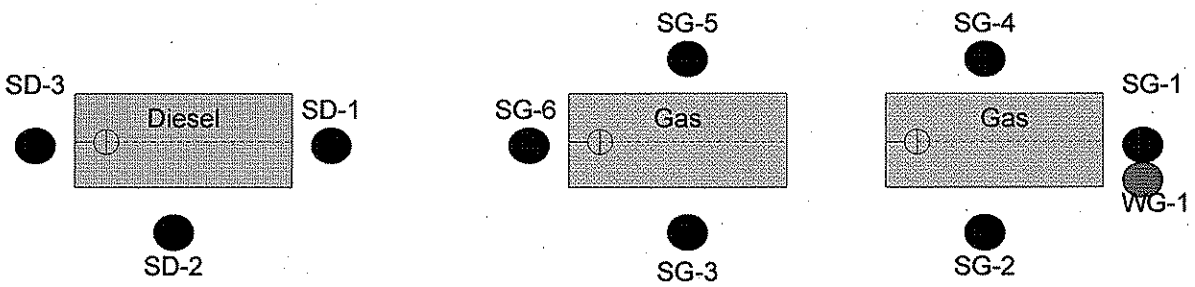


Table 1

Gasoline Tanks Soil Sample Results (mg/kg)							
Sample ID	SG-1	SG-2	SG-3	SG-4	SG-5	SG-6	MTCA Method A Cleanup Levels (mg/kg)
Sample Depth	10ft bgs	6ft bgs	8ft bgs	8ft bgs	6ft bgs	6ft bgs	
NWTPH-Gas	< 5.0	< 5.0	33	8	< 5.0	< 5.0	100
Benzene	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.03
Ethylbenzene	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	6
MTBE	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.1
Toluene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.52	7
Xylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	9
Total Lead	N/A	N/A	18	N/A	N/A	N/A	250

Table 2

Diesel Tank Soil Sample Results (mg/kg)				
Sample ID	SD-1	SD-2	SD-3	MTCA Method A Cleanup Levels (mg/kg)
Sample Depth	6ft bgs	8ft bgs	8ft bgs	
NWTPH-Oil	< 100	< 100	< 100	2,000
NWTPH-Diesel	< 10	< 10	**3500 mg/kg**	2,000

Table 3

Gas Tank Water Sample Results (ug/l)		
Sample ID	WG-1	MTCA Method A Cleanup Levels (ug/l)
Sample Depth	10ft bgs	
NWTPH - Oil	N/A	500
NWTPH-Diesel	N/A	500
NWTPH-Gas	<50	800
Benzene	<1.0	5
Ethylbenzene	<1.0	6
MTBE	<1.0	20
Toluene	<1.0	1000
Xylene	<2.0	1000
Total Lead	**210**	15

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):

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

Soil samples collected at the north former diesel UST location were analyzed for TPH-diesel and TPH-oil. Sample "SD-3" indicated elevated levels of diesel. As outlined in WAC 173-340-900 (Table 830-1), when diesel range hydrocarbons are encountered additional analytical sampling (BTEX, cPAH's) is required. There is no information contained in the site file indicating that this additional sampling was performed.

Although the specific contamination documented onsite is primarily subsurface, the subject site's location and proximity to Puget Sound and Point Defiance Park should be considered.

ROUTE SCORES:

Surface Water/Human Health: **NS**

Surface Water/Environ. **NS**

Air/Human Health: **NS**

Air/ Environmental: **NS**

Ground Water/Human Health: **21.3**

OVERALL RANK: 5

Worksheet 2--Route Documentation

1. SURFACE WATER ROUTE: *Not Scored*

a. List those substances to be considered for scoring: **Source:** ____
b. Explain basis for choice of substances(s) to be used in scoring:
c. List those management units to be considered for scoring: **Source:** ____
d. Explain basis for choice of unit to be used in scoring:

2. AIR ROUTE: *Not Scored*

a. List those substances to be considered for scoring: **Source:** ____
b. Explain basis for choice of substances(s) to be used in scoring:
c. List those management units to be considered for scoring: **Source:** ____
d. Explain basis for choice of unit to be used in scoring:

3. GROUND WATER ROUTE:

a. List those substances to be considered for scoring: **Source: 1,2**

TPH as diesel
Lead

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

TPH- diesel will be scored due to concentrations detected in soil above current MTCA Method A Cleanup Levels for unrestricted land use, and because it was available to the groundwater route through less than perfect containment.

Lead will be scored due to concentrations detected in groundwater above current MTCA Method A Cleanup Levels for unrestricted land use, and because it was available to the groundwater route through less than perfect containment.

c. List those management units to be considered for scoring: **Source: 1,2**

Contaminated soil, capped, with no liner or leachate collection system.

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

Contaminated soil verified by laboratory results in contact with groundwater, and contaminated groundwater verified by laboratory results.

Worksheet 6 – Ground Water Route

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

	Substance	Drinking Water Standard (ug/l)	Val	Acute Toxicity (mg/kg-bw)	Val	Chronic Toxicity (mg/kg/day)	Val	Carcino-genicity WOE PF*	Val
1	Lead	5	8	NA	ND	0.001 (NOAEL)	10	ND	ND
2	TPH (Diesel)	160	4	490 (Rat)	5	.004	3	--	ND
3									
4									
5									
6									

***Potency Factor**

Source: 2, 3

Highest Value: 10 (Max=10)

Plus 2 Bonus Points? 0

Final Toxicity Value: 10 (Max=12)

1.2 Mobility (Use numbers to refer to above listed substances)

Cations/Anions:	OR	Solubility (mg/1):
1= Lead = 2		1=
2=		2= TPH (Diesel) =30mg/l = 1
3=		3=
4=		4=
5=		5=
6=		6=
		Source: 2, 3 **Value:** 2 (Max=3)

1.3 Substance Quantity: Estimated 9,000 Gallons

Explain basis: Information contained in the file indicates that each of the three tanks are 3000 gallons in volume. Scoring is based on "the once filled volume of the unit"

Source: 1, 2

Value: 5 (Max=10)

Worksheet 6 (cont'd)

2.0 MIGRATION POTENTIAL

2.1	**Containment:** Contaminated soil and groundwater, capped. **Explain basis:** No liner (3); maintained cover w/o ponding (0); no leachate collection system (2)	**Source:** 1, 2	**Value:** 5 (Max = 10)
2.2	**Net precipitation:** (Nov. – Apr.) 19.1 inches (25.5" – 6.4")	**Source:** 2, 9	**Value:** 2 (Max = 5)
2.3	**Subsurface hydraulic conductivity:** Sand and Gravel	**Source:** 1, 2	**Value:** 4 (Max = 4)
2.4	**Vertical depth to ground water:** 0 **feet**	**Source:** 1, 2	**Value:** 8 (Max = 8)

3.0 TARGETS

3.1	**Ground water usage:** Federally designated sole source aquifer.	**Source:** 2, 11	**Value:** 10 (Max = 10)
3.2	**Distance to nearest drinking water well:** 11,903 **feet**	**Source:** 2, 11	**Value:** 0 (Max = 5)
3.3	**Population served within 2 miles:** √ **pop.** = √ 0 = 0	**Source:** 2, 8, 11	**Value:** 0 (Max = 100)
3.4	**Area irrigated by (groundwater) wells within 2 miles:** **(0.75)** √ 16 **No. acres** = 3	**Source:** 2, 6	**Value:** 3 (Max = 50)

4.0 RELEASE

Explain basis for scoring a release to ground water: Contaminated groundwater verified by analytical sample results.	**Source:** 1, 2	**Value:** 5 (Max = 5)

Breakwater Marina
Sources Used in Scoring

1. Tacoma-Pierce County Health Department Site Hazard Assessment File/Ecology TCP File

2. Washington State Department of Ecology, WARM Scoring Manual, April 1992.

3. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992.

4. U.S. Department of Interior Geological Survey Topographical Map

5. Soil Survey of Pierce County, U.S.D.A. Soil Conservation Service

6. Water Rights Application Tracking System (WRATS), Ecology

7. Department of Ecology/Tacoma-Pierce County Health Department Well Logs

8. Washington State Department of Health Public Water Supply System

9. Washington Climate for Pierce County, National Weather Service Forecast Office

10. Department of Fish and Wildlife, Catalog of Washington Streams and Salmon

11. Pierce County Geographic Information System Countyview Database