

SITE HAZARD ASSESSMENT

WORKSHEET 1

Summary Score Sheet

SITE INFORMATION:

Barbee Mill Company

4101 Lake Washington Boulevard North
Renton, King County, WA 98065

Section/Township/Range: Sec 32/T24N/R05E

Latitude: 47° 31' 44" Longitude: 122° 12' 7"

Ecology Facility Site ID No.: 76716221

Site scored/ranked for the August 20, 2008 update
July 30, 2008

BACKGROUND/SITE DESCRIPTION

The Barbee Mill Company site (hereinafter referred to as site), located on the eastern shore of Lake Washington at the mouth of May Creek, is comprised of two properties situated between the lake and Lake Washington Boulevard North. The property with the primary environmental impact, Barbee Mill, is located at 4101 Lake Washington Boulevard. A small area of the adjoining property to the north (Quendall Terminals, a former wood treating facility and currently a federal Superfund site) has also been impacted. Property adjoining the site to the east and south consists primarily of residential housing. An active Burlington Northern rail line extends across the east edge of the property.

The site property has been developed since the 1920's, first with a small lumber mill and then a combined lumber mill/shipyard operation. The shipyard closed some time after World War II, and the lumber mill was expanded. Most of the lumber mill equipment was removed in 2005/2006, with the remainder removed in 2007. A housing development is currently under construction by Conner Homes LLC, purchaser of the site property in 2007.

Much of the site property appears to have been within Lake Washington prior to development, and was filled to create the present-day land surface. Surface geologic conditions at the property originally consisted of 5 to 10 feet of mixed fill (silty sand, silt, sawdust, and silty gravel) over a 20 to 30 foot thick deposit of complexly interbedded lacustrine and alluvial sediment (predominantly sand and silt with interbedded peat). Recent fill placement at the property has raised site grades and total fill thicknesses are now between 10 and 20 feet. These fill and lacustrine/alluvial deposits overlie glacial outwash sands and gravels.

The originally very shallow water table, 2 to 7 feet below ground surface (bgs), is now between 5 and 12 feet bgs because of the ground surface being raised. Shallow groundwater discharges directly into Lake Washington. A zone of preferential discharge appears to be present in the northeast corner of the

property extending onto the Quendall Terminals property. This zone is thought to represent a former May Creek channel.

Most residential water supply within a two mile radius of the site is by public water supply, however there is a small number of private domestic wells noted in the Ecology database. Based on the site's location, it is likely that the vast majority of these wells would be upgradient of the site, and the shallow water table there.

Environmental Investigations/Sampling

Remedial action reportedly began at the site in the mid-1990's with a series of soil, ground water and sediment investigations. Data collected during these and subsequent investigations confirmed that soils beneath the site property were contaminated with various organic and inorganic substances, and that offshore sediment in Lake Washington contained excessive wood debris. Shallow ground water beneath the site and the adjoining property to the north (Quendall Terminals) was also documented as being contaminated, primarily with arsenic, and was discharging directly into Lake Washington.

In 1999 and 2003, offshore sediments were removed from Lake Washington and stockpiled on the upland portion of the site. The Washington State Department of Ecology (Ecology) issued a no further action (NFA) determination on February 23, 2003, for the sediment that contained elevated concentrations of wood waste and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and a follow-up April 23, 2003, letter from Ecology indicated that the stockpiled sediment was suitable for unrestricted use. The entire site waterfront underwent restoration in December 2005/January 2006 including removing shoreline structures and modifying the shoreline to construct a new beach.

In 2006, soils contaminated with arsenic and zinc were cleaned up in several discrete upland areas in the northern portion of the site, with excavations to a maximum depth of 15 feet over an area approximately 700 feet long by 220 feet wide. Contaminated ground water was removed during the excavation process and discharged to the Metro sewer system. Contaminated soils were disposed of off-site.

Confirmatory samples taken following the soil removal showed that remaining concentrations of arsenic in soil were below the cleanup level for direct contact, but potentially above the cleanup level for groundwater protection. Remaining concentrations of zinc were below both the cleanup level for both direct contact and ground water protection.

Other cleanups in 2006 involved soil removal from isolated pockets of diesel (as total petroleum hydrocarbons, or TPH-diesel) and pentachlorophenol (PCP) contamination (the East TPH area, West TPH Area, and PCP area). Confirmatory samples taken following removal indicated no remaining concentrations of diesel or PCP in soil above cleanup levels. In the East TPH Area and the West TPH Area, ground water had also contained TPH-diesel at concentration above cleanup levels. Although the soil cleanup likely resulted in ground water cleanup, this has never been confirmed.

Thus the site has been defined by the extent of contamination caused by the following releases:

- Arsenic and zinc in soil and ground water
- Arsenic in sediment (suspected)
- PCP in soil
- TPH-Diesel

Based on a review of independent remedial action reports and supporting documentation, Ecology determined in December 2007 that the substantive requirements under the Model Toxics Control Act had been met for the following releases:

- Zinc in soil
- PCP in soil
- TPH-Diesel in soil

However, the reported remedial actions were not sufficient to address the following releases, and further action would be required:

- Arsenic in soil and ground water
- Arsenic in sediment (suspected)
- Zinc in ground water
- TPH-Diesel in ground water

The site was listed on the Ecology Confirmed and Suspected Contaminated Sites List on December 10, 1998, under the Voluntary Cleanup Program (VCP). Ecology Opinion Letters sent in June 2006 and October 2007, and the site entering into a Formal Agreement with Ecology, resulted in the rescinding of the VCP status by Ecology on January 15, 2008, and being given a site status of Awaiting Site Hazard Assessment (SHA). A site drive-by was made in July 2008 to confirm environmental features of the site regarding containment features such as paving and buildings.

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 and in groundwater, the air route is not applicable for WARM scoring for this site. Thus, only the surface water groundwater routes will be scored.

ROUTE SCORES:

Surface Water/Human Health: 22.4
Air/Human Health: NS
Groundwater/Human Health: 21.9

Surface Water/Environmental.: 39.7
Air/Environmental: NS

OVERALL RANK: 3

WORKSHEET 2
Route Documentation

1. SURFACE WATER ROUTE

- a. List those substances to be considered for scoring: Source: 1,2
Arsenic, total petroleum hydrocarbons-diesel (TPH-diesel), zinc
- b. Explain basis for choice of substance(s) to be used in scoring.
These substances were detected on-site in either surface/subsurface soil and/or groundwater samples in significant concentrations with respect to their MTCA Method A Cleanup Levels and are potentially available to this route of concern, with contaminated groundwater known to discharge to the adjacent surface water (Lake Washington).
- c. List those management units to be considered for scoring: Source 1-3
Subsurface soils and groundwater.
- d. Explain basis for choice of unit to be used in scoring:
The contaminating substances were detected on-site in either subsurface soil and/or groundwater samples in significant concentrations.

2. AIR ROUTE – NOT SCORED

- a. List those substances to be considered for scoring: Source:
- b. Explain basis for choice of substance(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. GROUNDWATER ROUTE

- a. List those substances to be considered for scoring: Source: 1,2
Arsenic, total petroleum hydrocarbons-diesel (TPH-diesel), zinc
- b. Explain basis for choice of substance(s) to be used in scoring:
These substances were detected on-site in either surface/subsurface soil and/or groundwater samples in significant concentrations with respect to their MTCA Method A Cleanup Levels and are potentially available to this route of concern.
- c. List those management units to be considered for scoring: Source: 1-3
Surface and subsurface soils and groundwater.
- d. Explain basis for choice of unit to be used in scoring:
The contaminating substances were detected on-site in surface or subsurface soil and groundwater samples in significant concentrations.

WORKSHEET 4
Surface Water 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	Arsenic	10	8	763 (rat)	5	0.001 (RfD)	5	A=1	1.75 = 7	7
2	TPH-diesel	160	4	490 (rat)	5	0.004 (RfD)	3	ND	ND	-
3	Zinc	4000	2	ND	-	0.2	1	ND	ND	-

* Potency Factor

Source: 1,2,4

Highest Value: 8

(Max = 10)

Plus 2 Bonus Points? -

Final Toxicity Value: 8

(Max = 12)

1.2 Environmental Toxicity (X) Freshwater () Marine					
	Substance	Acute Water Quality Criteria		Non-Human Mammalian Acute Toxicity	
		(µg/L)	Value	(mg/kg)	Value
1	Arsenic	360	4	-	-
2	TPH-diesel	2300	2	-	-
3	Zinc	120	4	-	-

* Fresh/Marine

Source: 1,2,4

Highest Value: 4

(Max = 10)

1.3 Substance Quantity	
Explain Basis: Unknown, use default value = 1	Source: <u>1,2,5</u> Value: 1 (Max = 10)

2.0 MIGRATION POTENTIAL

		Source	Value
	Containment: Maximum value of 10 points scored.		
2.1	Explain basis: Adjacent to surface water, adjacent sediments suspected to be contaminated by upland source, site shallow groundwater discharges to surface water.	1-3,5	<u>10</u> (Max = 10)
2.2	Surface Soil Permeability: Piped to, adjacent to surface water	1-3	<u>7</u> (Max = 7)
2.3	Total Annual Precipitation: 34.8"	6	<u>3</u> (Max = 5)
2.4	Max 2yr/24hr Precipitation: 2.0" – 2.5"	5	<u>3</u> (Max = 5)
2.5	Flood Plain: Not in flood plain	1-3	<u>0</u> (Max = 2)
2.6	Terrain Slope: Ditched/piped/culverted (stormwater drains) = 3	1-3	<u>3</u> (Max = 5)

3.0 TARGETS

		Source	Value
3.1	Distance to Surface Water: <1000 feet (adjacent to site)	1-3,9	<u>10</u> (Max = 10)
3.2	Population Served within 2 miles (see WARM Scoring Manual Regarding Direction): 0	7,8	<u>0</u> (Max = 75)
3.3	Area Irrigated by surface water within 2 miles : $(0.75) * \sqrt{\# \text{ acres}} = 0.75 * \sqrt{0} = 0$	7,8	<u>0</u> (Max = 30)
3.4	Distance to Nearest Fishery Resource: <1000 feet (adjacent to site)	1-3,9	<u>12</u> (Max = 12)
3.5	Distance to, and Name(s) of, Nearest Sensitive Environment(s): fishery resource, <1000 feet	1-3,9	<u>12</u> (Max = 12)

4.0 RELEASE

Explain Basis: Sediment contamination suspected, not confirmed.	Source: <u>1,2</u> Value: 0 (Max = 5)
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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 Arsenic	10	8	763 (rat)	5	0.001 (RfD)	5	A=1	1.75 = 7	7	
2 TPH-diesel	160	4	490 (rat)	5	0.004 (RfD)	3	ND	ND	-	
3 Zinc	4000	2	ND	-	0.2	1	ND	ND	-	

* Potency Factor

Source: 1,2,4

Highest Value: 8
(Max = 10)

Plus 2 Bonus Points? =
Final Toxicity Value: 8
(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= $K > 1.0 = 3$	1=
2=	2= $3.0E+01 = 1$
3= $K > 1.0 = 3$	
4	3=
5	4=
6	5=

Source: 1,2,4,5

Value: 3
(Max = 3)

1.3 Substance Quantity:	
Explain basis: : Unknown, use default value = 1	Source: 1,2,4 Value: 1 (Max=10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	Containment (explain basis): Contaminated area capped, scored as a landfill: i) No liner (3); ii) Low permeability cover (1); No leachate collection system (2)	1-3,5	<u>6</u> (Max = 10)
2.2	Net precipitation: 24.6" – 5.9" = 18.7"	6	<u>2</u> (Max = 5)
2.3	Subsurface hydraulic conductivity: Silty sands/sandy gravels	1,2	<u>3</u> (Max = 4)
2.4	Vertical depth to groundwater: Obs. release to groundwater = 0'	1,2,5	<u>8</u> (Max = 8)

1.0 TARGETS

		Source	Value
3.1	Groundwater usage: Public/private supply, unthreatened alts. avail.	7,8	<u>4</u> (Max = 10)
3.2	Distance to nearest drinking water well: 600 – 1300 feet	7,8	<u>4</u> (Max = 5)
3.3	Population served within 2 miles: $\sqrt{126} = 11$	7,8	<u>11</u> (Max = 100)
3.4	Area irrigated by (groundwater) wells within 2 miles: (0.75)* $\sqrt{0}$ acres = 0	7,8	<u>0</u> (Max = 50)

2.0 RELEASE

		Source	Value
	Explain basis for scoring a release to groundwater: Confirmed by presence of many contaminants in groundwater.	1,2,5	<u>5</u> (Max = 5)

SOURCES USED IN SCORING

1. Letter to Robert Cugini, Partial Sufficiency and Further Action Determination under WAC 173-340-515(5) for Barbee Mill Company site, Mark Adams, Ecology NWSRO TCP, December 3, 2007.
2. Cleanup Decision Summary, Barbee Mill, Partial Sufficiency and Further Action, Mark Adams, Ecology NWSRO TCP, November 27, 2007.
3. SHA Site Drive By Visit, Michael Spencer, WA Ecology, July 21, 2008.
4. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992
5. Washington State Department of Ecology, WARM Scoring Manual, April 1992.
6. Washington Climate – Net Rainfall Table
7. Washington State Department of Ecology, Water Rights Application System (WRATS) printout for two-mile radius of site.
8. Washington Department of Health, Sentry Internet Database printout for public water supplies.
9. U.S.G.S. Topo map for site area.
10. Personal memo, Peter Isaksen, Public Health – Seattle & King County, December 19, 2007.

