SITE HAZARD ASSESSMENT

WORKSHEET 1

Summary Score Sheet

SITE INFORMATION:

US Army WSMC Pier 23
401 Alexander Avenue
Tacoma, Pierce County, WA 98421

Section/Township/Range: Sec 26/T21N/R3E
Latitude: 47° 16' 56" Longitude: 122° 24' 38.9"

Ecology Facility Site ID No.: 54221181

Site scored/ranked for the August 22, 2007 update
August 16, 2007

SITE DESCRIPTION/BACKGROUND

The US Army WSMC Pier 23 site (hereinafter referred to Pier 23, or site) is situated between the Hylebos and Blair Waterways, along the shoreline of Commencement Bay, in an industrial area of the Port of Tacoma (POT) west of downtown Tacoma, WA. Its street address is 401 Alexander Avenue. The site property consists of a 1,261 feet long by 56 feet wide pier on 7.4 acres of submerged land, and three acres of headland, which contains a newer building and parking areas.

The upland area, submerged land under the pier, a 100-foot wide area beyond the edge of the pier, and all water rights are owned by the POT and leased to the U.S. Army Reserve (the Reserve). The Reserve owns, controls, and has command of the pier structure, all facilities on the pier, and all structures and improvements on the upland property.

The pier extends northwest out into Commencement Bay from a steel sheet pile bulkhead. The inboard 606 feet of the pier is of timber construction (1940) supported by approximately 500 creosote-infused timber piles and the outboard 610 feet is of concrete construction (1946).

The marine waters surrounding the pier are sufficiently deep to allow easy access for large vessels, except for approximately the first 50 feet, which is above the tide line at minus tides. A shoreline restoration project was completed in 2005 on the south side of the pier. North of the pier, the shoreline has a mixture of fused metal slag, concrete rubble, and decaying wood and creosoted piles. An intertidal zone composed of gently sloping mudflats is located southwest of the pier property. Rainfall at the upland area passes through a series of storm water drains and an oil water separator before outfalling under the pier into Commencement Bay.

The Department of Defense has had a presence at Pier 23 dating back to the World War II era, when the U.S. Navy's Todd Pacific Shipyard included Pier 23 and the surrounding area. The POT acquired title to the area from the Navy in 1961, and leased different portions of it out to various tenants since then. From 1965 to approximately 1985, Coast Engineering and Equipment Corporation conducted

diesel engine repair activities in the upland area of Pier 23. Other boatbuilding businesses leased various other portions of the site area during the 1980's. The Washington Army National Guard leased the seaward concrete portion of Pier 23 from POT from 1964 – 1995 for vessel moorage and maintenance activities.

ENVIRONMENTAL HISTORY (BRIEF SUMMARY OF PERTINENT EVENTS)

1991: SCS Engineers completed a federal preliminary assessment/site investigation (PA/SI) for Pier 23, and Building 9580 on the upland portion, which concluded that the site had concentrations of total petroleum hydrocarbons and heavy metals in soils that exceeded their respective Washington Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A cleanup levels. Concentrations of mercury, polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs) were found in sediments in excess of sediment standards. Mercury and tributyltin were two major contaminants stated in a September 11, 1992 Ecology memo regarding the review of the PA/SI report.

1995: Pacific Western Services completed a Final Sampling and Analysis Report for Pier 23 to support the transfer of the property lease, equipment, and operations from the National Guard to the Reserve, and concluded that the upland soils and sediments were contaminated with petroleum hydrocarbons, metals, and semivolatile compounds.

1996: Weston screened intertidal sediment sampling data against Commencement Bay/Nearshore Tideflats sediment quality objectives (SQOs), presenting data in terms of the exceedance ratios of these criteria.

1997: U.S. Environmental Protection Agency (EPA) recommends the Reserve work with Ecology under a Defense and State Memorandum of Agreement (DSMOA) in the belief that the site would get cleaned up faster working with the state versus the federal Superfund program.

1998: PNL completed: Draft Remedial Investigation/Feasibility Study (RI/FS) , Pier 23 Remedial Investigation and Baseline Risk Assessment, Commencement Bay, Tacoma, WA, which focused on the sediment contamination with alternatives for remediation including natural recovery and dredging with upland disposal.

2000: PNL feasibility study concluded that 5,050 cubic yards of sediment should be dredged and a layer of "fish mix" gravel placed in the dredged areas. The Reserve was moving forward with plans for work on the pier and the upland area at that same time, and committed itself to coordinate its activities to avoid disruption of any on-going remedial actions.

2001: The project to upgrade the pier facility was split into two phases, with the high tide water line being the demarcation. Phase I was to demolish and replace an old upland building, and Phase II was to upgrade the pier. This was based on the need to award the contract or lose the funding, and since there was not enough time to acquire the necessary environmental permits for in-water work, the contract was awarded for upland work only. The pier upgrade, with a 90% design to rebuild the pier, was put on hold and, as a result, the remediation project that was tied to the pier removal was delayed.

2002: The Phase I upland site improvement project began (and ran through 2004), identifying additional environmental issues which included numerous creosote timbers, buried asbestos and broken pipelines containing residual bunker C, the fuel oil historically used in ships.

2004: HartCrower study confirms PCB contamination of the sediments is more widespread than originally thought.

2005: KEMRON collected additional surface soil and sediment samples at 13 locations to fill data gaps, analyzing for the usual suspects. The data indicated that under pier sediments have also been impacted and that nearshore sediments have been impacted to depths exceeding nine feet below the mudline.

The Pier 23 site was added to Ecology's Confirmed and Suspected Contaminated Sites list on October 2, 2001, with a status of Awaiting Site Hazard Assessment (SHA) and the site owners were notified on March 27, 2007, that an SHA of the site under MTCA, Chapter 173-340-320, would take place.

A site drive-by was made on July 10, 2007, with the general "lay of the land" observed from the vantage of the vastly improved upland area. There has been an overwhelming amount of evidence presented the past 15 years to thoroughly document significant concentrations in sediments at the Pier 23 site of the following contaminants: arsenic, cadmium, copper, lead, mercury, total petroleum hydrocarbons (TPH)-diesel, tributyltin, PCBs, and zinc, so no further sampling is necessary to complete this SHA.

The site will be scored and ranked under the Washington Ranking Method (WARM) based on credible evidence that the site property has had the above contaminant releases to the environment in significantly high concentrations, predominantly in the sediments around the pier, and there is no confirming evidence to date that the full extent of contamination has been determined and cleaned up under MTCA.

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):

It is believed the primary contamination concerns at the site are with the offshore subsurface sediments under and around Pier 23. There is little, if any, obvious sign of historic contamination lying around uncontained on the ground surface. Thus only the surface water and ground water routes will be scored, as the air route would not likely be a significant pathway of concern.

ROUTE SCORES:

Surface Water/Human Health:	**43.3**	Surface Water/Environmental.:	**87.8**
Air/Human Health:	**NS**	Air/Environmental:	**NS**
Groundwater/Human Health:	**61.8**		

OVERALL RANK: 1

WORKSHEET 2
Route Documentation

1. **SURFACE WATER ROUTE**

   a. List those substances to be considered for scoring: Source: 1-3

   Arsenic, cadmium, copper, lead, mercury, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons-diesel (TPH-diesel), tributlytin and zinc

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

   These substances were detected on-site in sediment samples in significant concentrations, and are potentially available to the route of concern.

   c. List those management units to be considered for scoring: Source 1-3,5

   Sediment 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 sediment samples in significant concentrations.

2. **AIR ROUTE – NOT SCORED**

   a. List those substances to be considered for scoring: Source: 1-3

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

   c. List those management units to be considered for scoring: Source: 1-3,5

   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: 1-3

   Arsenic, cadmium, copper, lead, mercury, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons-diesel (TPH-diesel), tributlytin and zinc

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

   These substances were detected on-site in sediment samples in significant concentrations, and are potentially available to the route of concern.

   c. List those management units to be considered for scoring: Source: 1-3,5

   Sediment 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 sediment 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	Cadmium	5	8	225(rat)	5	0.0005 (RfD)	5	ND	ND	-
3	Copper	1300	2	ND	-	0.037 (RfD)	1	ND	ND	-
4	Lead	15	6	ND	-	<0.001 (NOAEL)	10	ND	ND	-
5	Mercury	2	8	ND	-	0.0003 (RfD)	5	ND	ND	-
6	TPH-diesel	160	4	490 (rat)	5	0.004 (RfD)	3	ND	ND	-
7	Tributyltin	ND	-	46 (rat)	10	ND	-	ND	ND	-
8	PCBs	0.5	10	1315(rat)	3	ND	-	B2= 0.8	7.7= 7	6
9	Zinc	4000	2	ND	-	0.2	1	ND	ND	-

* *Potency Factor*

Source: 1-3,6

Highest Value: 10
(Max = 10)

Plus 2 Bonus Points? 2

Final Toxicity Value: 12
(Max = 12)

1.2 Environmental Toxicity ( ) Freshwater (X) Marine					
	Substance	Acute Water Quality Criteria		Non-Human Mammalian Acute Toxicity	
		(µg/L)	Value	(mg/kg)	Value
1	Arsenic	69	6	-	-
2	Cadmium	43	6	-	-
3	Copper	2.9	8	-	-
4	Lead	140	4	-	-
5	Mercury	2.1	8	-	-
6	TPH-diesel	2350	2	-	-
7	Tributylytin	ND	-	46	10
8	PCBs	10	8	-	-
9	Zinc	120	4	-	-

Source: 1-3,6
Highest Value: 10
(Max = 10)

1.3 Substance Quantity	
Explain Basis: ca. 5000 cubic yards	Source: 1-3 **Value: 8** (Max = 10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment:** Maximum value of 10 points scored. **Explain basis:** Spill, discharge, contaminated soils/sediments	1, 4,6	**10** (Max = 10)
2.2	**Surface Soil Permeability:** Piped to, adjacent to, surface water	1,4	**7** (Max = 7)
2.3	**Total Annual Precipitation:** 35.3"	7	**3** (Max = 5)
2.4	**Max 2yr/24hr Precipitation:** 2.0" – 2.5"	6	**3** (Max = 5)
2.5	**Flood Plain:** Not in flood plain	1-4	**0** (Max = 2)
2.6	**Terrain Slope:** Site is immediately adjacent to, and located within, surface water	1,4	**5** (Max = 5)

3.0 TARGETS

		Source	Value
3.1	**Distance to Surface Water:** <1000 feet (adjacent to site)	1,4	**10** (Max = 10)
3.2	**Population Served within 2 miles (see WARM Scoring Manual Regarding Direction):** 0	8,9	**0** (Max = 75)
3.3	**Area Irrigated by surface water within 2 miles : (0.75)*√ # acres =** 0.75 * √0 = 0	8,9	**0** (Max = 30)
3.4	**Distance to Nearest Fishery Resource:** <1000 feet	1-4	**12** (Max = 12)
3.5	**Distance to, and Name(s) of, Nearest Sensitive Environment(s):** fishery resource, Commencement Bay <1000 feet	1-4	**12** (Max = 12)

4.0 RELEASE

Explain Basis: Confirmed through documented contamination of on-site sediments	Source: 1-3 **Value: 5** (Max = 5)

WORKSHEET 6
Groundwater Route

2.0 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	Cadmium	5	8	225(rat)	5	0.0005 (RfD)	5	ND	ND	-
3	Copper	1300	2	ND	-	0.037 (RfD)	1	ND	ND	-
4	Lead	15	6	ND	-	<0.001 (NOAEL)	10	ND	ND	-
5	Mercury	2	8	ND	-	0.0003 (RfD)	5	ND	ND	-
6	TPH-diesel	160	4	490 (rat)	5	0.004 (RfD)	3	ND	ND	-
7	Tributyltin	ND	-	46 (rat)	10	ND	-	ND	ND	-
8	PCBs	0.5	10	1315(rat)	3	ND	-	B2= 0.8	7.7= 7	6
9	Zinc	4000	2	ND	-	0.2	1	ND	ND	-

* *Potency Factor*

Source: 1-3,6

Highest Value: 10
(Max = 10)

Plus 2 Bonus Points? 2

Final Toxicity Value: 12
(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 is >1.0 = 3	1=
2= K is >1.0 = 3	2=
3= K is 0.1 – 1.0 = 2	3 =
4= K is 0.1 – 1.0 = 2	4=
5= K is >1.0 = 3	5=
6=	6= 3.0E+01 = 1
7= ND = -	7= ND = -
8=	8= 9.3E+04 = 0
9= K is >1.0 = 3	

Source: 1-3,6
Value: 3
(Max = 3)

1.3 Substance Quantity:	
Explain basis: ca. 5050 cubic yards	Source: 1-3 **Value: 5** (Max=10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment (explain basis):** Spill, discharge, contaminated soil/sediments = 10	1-3,6	**10** (Max = 10)
2.2	**Net precipitation:** 25.5" – 6.4" = 19.1"	7	**2** (Max = 5)
2.3	**Subsurface hydraulic conductivity:** Sands/silty sandy gravels	1-3	**3** (Max = 4)
2.4	**Vertical depth to groundwater:** < 25'	1-3	**8** (Max = 8)

1.0 TARGETS

		Source	Value
3.1	**Groundwater usage:** Public supply, unthreatened alts. avail.	8,9	4 (Max = 10)
3.2	**Distance to nearest drinking water well:** 5000 – 10,000 feet	8,9	1 (Max = 5)
3.3	**Population served within 2 miles:** √>10,000 = 100 (man. Value)	8,9	100 (Max = 100)
3.4	**Area irrigated by (groundwater) wells within 2 miles:** **(0.75)*√0 acres** = 0	8,9	0 (Max = 50)

2.0 RELEASE

	Source	Value
Explain basis for scoring a release to groundwater: Not confirmed for the aquifer of concern	1-3	0 (Max = 5)

SOURCES USED IN SCORING

1. Draft Site History, Pier 23, KEMRON Environmental Services, November 4, 2005.
2. U.S. Army Reserve Pier 23 Project, Tacoma, WA, Slag Characterization and Geotechnical Evaluation, KEMRON Environmental Services, March 24, 2005.
3. Pier 23 Sediment Cleanup, Commencement Bay, Tacoma, WA, Sediment Data Review, KEMRON Environmental Services, January 17, 2005.
4. Ecology SHA Site Drive-by, July 10, 2007.
5. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992
6. Washington State Department of Ecology, WARM Scoring Manual, April 1992.
7. Washington Climate – Net Rainfall Table
8. Washington State Department of Ecology, Water Rights Application System (WRATS) printout for two-mile radius of site.
9. Washington Department of Health, Sentry Internet Database printout for public water supplies.