

**DEQ SITE ASSESSMENT PROGRAM - STRATEGY RECOMMENDATION**

**Site Name:** Willamette Cove

**Site CERCLIS Number:** None

**DEQ ECSI Number:** 2066

**Site Address:** Foot of N Edgewater St.  
Portland, OR 97203

**Recommendation By:** Gil Wistar, Voluntary Cleanup and Site  
Assessment Section, DEQ Northwest Region

**Approved By:** Michael E. Rosen, Manager, Voluntary  
Cleanup and Site Assessment Section, DEQ  
Northwest Region

**Date:** July 24, 1997

NOTE: This strategy recommendation is a DEQ *Preliminary Assessment Equivalent (PAE)*, since it summarizes documents with PA-caliber information on site history, contamination, and exposure pathways.

**Background:** Willamette Cove encompasses 27 acres of vacant land along the Willamette River in the St. Johns section of Portland, (Figures 1 and 2). It is located immediately downstream from the McCormick and Baxter (M&B) wood-treating site (ECSI #74), where operations from 1945 to 1991 caused significant contamination of soil, groundwater, and river sediments with arsenic, polynuclear aromatic hydrocarbons (PAHs), pentachlorophenol (PCP), dioxins, dibenzofurans, and other compounds. In June 1994, the U.S. Environmental Protection Agency (EPA) added M&B to the National Priorities (Superfund) List; DEQ has taken the lead in site characterization and cleanup. Contaminated groundwater and sediments have migrated from M&B onto the upstream edge of Willamette Cove, and remedial activities associated with M&B sediments will extend onto Willamette Cove. DEQ has informed past and present owners of Willamette Cove that the agency will not hold them liable for contamination that has migrated from M&B.

Willamette Cove's industrial uses date back to the 1930s. Industrial activities ended by the late the 1960s, and the site has been vacant since then. The following types of facilities operated at Willamette Cove during its active period: 1) a wood barrel manufacturer (cooperage) and lumber mill at the east end of the site; 2) ship building and repair (Port of Portland drydocks)

in the central and eastern portions; and 3) a plywood mill at the west end. In the late 1980s or early 1990s, Grayco Resources sold the property to the Portland Development Commission (PDC), which sold it to the Trust for Public Land in March 1994. METRO, the Portland area's regional government body, bought Willamette Cove in February 1996 and plans to preserve the property as undeveloped greenspace.

### 1988-89 Site Assessments

In 1988, prior to selling the property to PDC, Grayco hired Sweet-Edwards/EMCON (EMCON) to perform a Level I Environmental Site Assessment (ESA), which documented the site's general industrial history and enumerated several potential environmental concerns:

1. Leaks/spills from railcars traveling along the elevated Burlington Northern rail trestle forming the eastern site boundary, or from railcars using the Union Pacific tracks along the northern site boundary;
2. Leakage of diesel fuel from Union Pacific's pipeline that runs parallel to its tracks along the northern site boundary;
3. Leaks, spills or disposal of hydrocarbons or other hazardous substances from machine shops, electrical shops, or chemical storage areas used by past occupants;
4. Possible soil contamination from rubbish disposal and from use of parts of the site as "squatter" campsites; and
5. Migration of contaminants such as creosote, PCP, and metals such as arsenic, copper, and chrome from the M&B site.

This led to a Level II ESA, consisting of a geophysical survey and soil and groundwater sampling. The geophysical survey revealed the presence of above-ground and buried concrete foundations and floors, bunkers, building debris, and water lines and drainage systems, but turned up no evidence of underground storage tanks. The survey also found a partially buried brick sump near the northeast corner of what had been a drydock foundry.

In December 1988 and January 1989, EMCON collected soil and groundwater samples from 23 borings installed throughout the property (boring locations are shown on Figure 3). EMCON advanced most borings to slightly below water table depth, which averaged 25 feet across the site. Taking soil samples at 5-foot intervals and using a photoionization detector (PID) to screen for volatile organic compounds (VOCs), EMCON selected one sample from each boring for laboratory analysis (the interval with the highest PID reading). Samples were analyzed for polychlorinated biphenyls (PCBs), total organic halides (TOX - an inexpensive screening method for VOCs), and oil & grease. During on-site follow-up work

in January 1989, samples from borings 15 through 19 (Figure 3) were analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX) and total petroleum hydrocarbons (TPH) in gasoline and diesel ranges.

No PCBs were found in soil samples above the detection limit of 1 mg/kg. With the exception of two samples, TOX results were either non-detect or reported at the detection limit of 1 mg/kg (samples from borings 2 and HA-2 contained 2 mg/kg TOX). Oil & grease was found above the 200 mg/kg detection limit in four samples (borings 2, 8, HA-2, HA-3), at between 520 and 680 mg/kg. No gasoline, diesel, or BTEX was found above detection limits in the selected borings (<5 mg/kg for gasoline and diesel, <0.05 mg/kg for BTEX).

EMCON collected groundwater samples from borings 1 through 14, 17, 19, and HA-4 (Figure 3). Two or more groundwater samples were collected from several borings, to enable comparisons between unfiltered and filtered metals and PCB data. Groundwater testing parameters are shown in Table 1 (attached).

With respect to organic analytes, borings 12 and 13 contained 2.5 and 1.6 ug/L PCBs, respectively. Follow-up groundwater sampling near these locations (borings 14 and 19) found no detectable PCBs. Based on this result and on the lack of PCB detections in soil, EMCON concluded that the low levels of PCBs in water from borings 12 and 13 were insignificant. TOX was detected in all groundwater samples tested, with levels ranging from 7 to 45 ug/L; the testing lab indicated that TOX values below 50 ug/L were statistically insignificant, due to potential sample interference and method uncertainty. No PCP or PAHs were found in water samples. To test for possible contaminant migration from M&B, water from borings 2 and 6 was also analyzed for VOCs; none were detected. No VOCs or pesticides were found in water from boring 17. An oily sheen was noted in water samples from five borings on the west side of the site (9, 10, 12, 13, and 19); further testing on the sample from boring 19 suggested that oil-range hydrocarbons from past industrial activities had caused the sheens in these samples.

Groundwater from many of the borings contained metals, as shown in the table below. In comparing results from filtered and unfiltered water samples, EMCON concluded that dissolved metals were the best indicator of site contamination, and that dissolved metals appeared not to be an environmental concern.

<b>METAL CONCENTRATIONS IN GROUNDWATER, 12/88 (ug/L)</b>								
<u>Sample</u>	<u>Arsenic</u>	<u>Cadmium</u>	<u>Chromium</u>	<u>Copper</u>	<u>Lead</u>	<u>Mercury</u>	<u>Nickel</u>	<u>Zinc</u>
Boring 1*	7	30	540	2,100	210	0.6	560	2,200
Boring 2*	12	10	250	930	300	<0.2	270	1,400
Boring 3*	25	50	1,800	3,000	410	1.4	2,100	7,100
Boring 4*	17	5	210	510	230	1.9	260	860
Boring 5*	12	<5	66	140	52	0.3	69	240
Boring 17*	3	<5	29	140	29	2.2	64	270

METAL CONCENTRATIONS IN GROUNDWATER, 12/88 (ug/L)								
Sample	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Boring 6**	<2	<5	<5	<10	<2	<0.2	<10	15
Boring 7**	<2	<5	<5	<10	<2	<0.2	<10	18
Boring 8**	<2	<5	<5	<10	<2	<0.2	<10	23
Boring 9**	<2	<5	<5	<10	8	<0.2	11	110
Boring 10**	<2	<5	<5	<10	3	0.2	<10	14
Boring 11**	<2	<5	<5	<10	3	0.2	<10	16
Boring 12**	<2	<5	<5	<10	<2	0.2	<10	26
Boring 13**	<2	<5	<5	<10	5	0.2	11	18
Boring 17**	<1	<5	<5	<10	<1	<0.2	<20	24
HA-4**	<2	<5	<5	<10	2	<0.2	<10	<10

\* Unfiltered sample (total metals)

\*\* Filtered sample (dissolved metals)

### 1995-96 Supplemental ESA and Qualitative Risk Assessment

Prior to selling the property to METRO, the Trust for Public Land asked EMCON to conduct further sampling at Willamette Cove and refine conclusions from its previous study. In October 1995, EMCON divided the site into three areas, based on past industrial uses, and sampled soil and groundwater from land, and near-shore sediment from the Willamette River, as shown on Figure 4. Area 1 had been the location of a plywood mill; Area 2 the former Port of Portland drydocks and repair shops and later a lumber mill; and Area 3 had been the location of a wood barrel and vat manufacturer.

For soil samples, EMCON supervised the installation of 15 4-foot-deep test pits across the site. These test pits, shown as TP-1 through TP-15 on Figure 4, encountered dredge fill (sand and silt with minor amounts of gravel). Some also contained debris fill consisting of: concrete/brick fragments; ceramic parts; wood and charcoal; iron, steel, and other metal pieces; asphalt and possibly coal; plastics; and "unidentified black, non-metallic substances." Soil samples from these test pits were generally composited prior to laboratory analysis (see attached Table 2). Table 3, also attached, shows specific analyses conducted on each sample.

EMCON also collected soil samples at 5-foot intervals from four soil borings (shown as points TB-1 through TB-4 on Figure 4). Samples from each boring were composited before analysis (Table 2), except that the 15-foot samples from TB-1, TB-2, and TB-4 were analyzed discretely. Refer to Table 3 for analyses run on these samples. The borings were installed to between 31.5 and 41.5 feet, corresponding to groundwater depths of 24 to 34 feet. Groundwater grab samples were collected from the bottom of each borehole and sent to the laboratory for hydrocarbon scan, VOCs, semi-volatile organics, PCP (except for boring TB-2), PCBs, and PAHs. Groundwater from TB-4 was also analyzed for dissolved metals.

An Ekman bottom dredge was used to obtain sediment samples from the locations shown in Figure 4. For each of the three areas, EMCON composited subsamples into a single sample for laboratory analysis. As shown in Table 3, these composite samples were analyzed for VOCs, hydrocarbons, semi-volatiles, PCP, PCBs, PAHs, and total metals.

Results from each media (i.e., soil, groundwater, and sediment) are summarized in the following paragraphs. For more detail on sampling data, refer to EMCON's Supplemental ESA.

**Soil.** Contaminants of concern (COCs) were metals in Area 2 (the former Port of Portland shipyard), PAHs in Areas 2 and 3, and PCP in Area 3. A2C2, a composite test pit sample from Area 2, contained 1,890 mg/kg lead, 865 mg/kg zinc, 246 mg/kg copper, 12 mg/kg arsenic, and 9.2 mg/kg mercury. Levels of these metals were significantly higher than in composite test pit samples from other portions of the site; however, EMCON re-analyzed the discrete samples comprising A2C2 (TP-6 through TP-10) for lead only. The highest lead results were 2,870 mg/kg (TP-8) and 1,420 mg/kg (TP-7). PAHs were below detection limits in Area 1, but were found in all samples from Areas 2 and 3. Concentrations of individual carcinogenic PAHs in composite samples from these areas ranged to 2.7 mg/kg (chrysene in sample A3C2). The majority of carcinogenic PAHs in these composite samples exceeded the Oregon Numerical Soil Cleanup Level (OAR 340-122-045) for these compounds, which is 0.1 mg/kg. In general, the highest level of PAHs occurred in sample A3C2 (a composite of TP-11 and TP-12). PCP was found at 5 mg/kg in sample A3C4 (a composite of TP-11 through TP-14) and at 14 mg/kg in TP-15. (The Numerical Soil Cleanup Standard for PCP is 5 mg/kg.) PCP was not detected in other samples from Willamette Cove and occurred at the highest level along the eastern edge of the site, suggesting that this wood preservative may have migrated from M&B.

**Groundwater.** The only VOCs found in groundwater were in TB-1: 25 ug/L trichloroethylene (TCE) and 1 ug/L perchloroethylene (PCE). Hydrocarbons in approximately the same carbon range as 30-weight motor oil were found in groundwater from all four borings, as follows (in ug/L): 2,180 in TB-1; 429 in TB-2; 860 in TB-3; and 544 in TB-4. These groundwater samples also contained PAHs at up to 2.5 ug/L (phenanthrene in TB-1), but most detections were below 1 ug/L. No carcinogenic PAH exceeded 0.3 ug/L. Metals were analyzed for in TB-4 only; this sample contained dissolved zinc at 75 ug/L.

**Sediment.** PAHs, PCP, and metals were the COCs in the three composited sediment samples. Sample A1-SD-1 (Area 1) contained PAHs at levels an order of magnitude above samples from the other two areas. For each sample, the constituent at the highest level was as follows: 2.9 mg/kg chrysene in A1-SD-1; 0.23 mg/kg fluoranthene in A2-SD-2; and 0.37 mg/kg fluoranthene in A3-SD-3.

With respect to PCP, A1-SD-1 contained 16 mg/kg, A2-SD-2 contained 26 mg/kg, and A3-SD-3 contained 18 mg/kg. These samples were collected beyond the downstream edge of M&B's contaminated sediment plume (as defined by PTI Environmental on Figure 4). Nonetheless, as with soil samples, PCP in near-shore sediments may have migrated from M&B. Total metals in sediments appeared to be within or only slightly above background levels for Willamette River sediments found in a U.S. Geological Survey study from 1973. However, because compositing can "mask" hot spots, this data is insufficient to demonstrate that metals in sediments are not elevated.

NOTE: The Supplemental ESA does not discuss butyltin analyses on sediments. However, EMCON's Qualitative Risk Assessment (QRA), Appendix E of the Supplemental ESA, refers to butyltin results for composite sample A2-SD-02. Lab data sheets documenting butyltin analyses were missing from the Supplemental ESA, so I requested copies of this data from EMCON. They showed the following:

tributyltin - 187 ug/kg (ppb);  
dibutyltin - 28 ug/kg;  
butyltin - 11 ug/kg

EMCON plugged sample data from all media into the site-specific QRA alluded to above, and concluded the following about potential site risks to human health and the environment:

- In soil, seven chemicals (five PAHs, arsenic, and lead) exceeded DEQ's Industrial Maximum Allowable Soil Concentrations (OAR 340-122-045) in one or more areas. (EMCON found that residential exposure was not relevant at the site.) Nonetheless, four of the compounds (chrysene, benzo(a)anthracene, and benzo(b)- and (k)fluoranthene) were below EPA Region 3 industrial screening levels, so EMCON concluded that these PAHs were "below levels of regulatory concern." Although arsenic exceeded EPA Region 3 levels, EMCON attributed its presence to regional background conditions. EMCON identified lead, benzo(a)pyrene, and benzo[g,h,i]perylene as COCs in soil, but stated that "adverse effects to humans from exposure to chemicals in soil are not expected under current site conditions." EMCON added that "future plans to develop the site as a riverfront park, which may require a topsoil layer, further reduces the possibility of contact with soil and the associated risk."
- Based on its 1988 well survey, EMCON determined that groundwater was not a source of drinking water in the site vicinity, so that EPA Maximum Contaminant Levels (MCLs) did not apply to the site. EMCON addressed inhalation of volatilized contaminants from contaminated groundwater as a potential threat, concluding that this pathway was not in fact a health

risk because the COCs identified in groundwater were relatively non-volatile PAHs.

- With respect to sediments, EMCON noted that copper, lead, nickel, and zinc exceeded *Threshold Effects Levels* for freshwater sediments established by the province of Ontario, Canada (neither DEQ nor EPA has adopted enforceable cleanup standards for sediments). However, because these metals were below Ontario's *Probable Effect Levels*, EMCON concluded that only the most sensitive receptors in localized areas might be affected. EMCON also mentioned butyltin results, appearing to largely dismiss TBT as a potential threat: "Because the highest concentration measured in site sediment is for the tributyl form [among the three butyltin species], it is possible that the measured concentration may pose an ecological risk. However, in the absence of data on sediment, these chemicals cannot be further categorized."
- EMCON also addressed possible impacts of contamination from M&B on human and environmental health at Willamette Cove. Although the extent and concentrations of potentially harmful contaminants were significant, EMCON concluded that as long as groundwater at M&B were prevented from migrating towards the railroad bridge, and as long as some sort of cap were placed over contaminated sediments from M&B (which extended onto Willamette Cove, as shown on Figure 4) there should be no impacts to Willamette Cove. NOTE: the Record of Decision (ROD) for M&B includes capping of contaminated sediments.

In summary, EMCON concluded that unacceptable health risks to humans or ecological communities at Willamette Cove were not expected, under either current conditions or planned development of the site as a riverfront park.

**Pathway Summary**: Many elements of the risk assessment prepared for the M&B site apply to Willamette Cove, since the two sites are contiguous. The pathway discussion below is therefore based on the risk assessment summary contained in the ROD for M&B. **The discussion below does not take into account any contamination that has migrated from M&B, since the ROD for M&B already addresses this contamination.**

The most likely exposure pathways associated with contamination from Willamette Cove include, in descending order of significance:

1. Recreational anglers' consumption of fish and crayfish that may have been exposed to or affected by sediment contaminated from historical site activities.
2. Direct contact with or ingestion of contaminated sediments, interstitial pore water, and surface water by: benthic

organisms; crayfish, clams, and other bottom dwellers; and shorebirds and mammals found in the area, such as great blue herons, cormorants, Canada geese, ducks, gulls, beavers, otters, and raccoons.

3. Incidental ingestion of and dermal contact with contaminated sediment (and possibly surface water) related to recreational uses of the beachfront.
4. Direct contact with contaminated site soils through incidental ingestion, inhalation, and contact for future site workers or visitors.
5. Human exposure to contaminated groundwater.

Past industrial uses of the site appear to have contaminated soil, groundwater, and sediments. Ecological impacts from contaminants in sediment, which may bioaccumulate up the food chain and end up affecting recreational anglers, appear to be the greatest site risk. The lowest potential risk is human exposure to groundwater, because: 1) groundwater is not known or likely to be used in the site vicinity; 2) shallow groundwater at the site is diluted as it flows into the Willamette River; and 3) COCs in groundwater are not likely to vaporize and enter the breathing zone at the site. There are no recorded domestic or community wells within 1 mile of the site except a community well at the GASCO site (across the river and downstream from Willamette Cove). This well was completed in 1954, but is not currently used for drinking water.

**Recommendation/Action:** Site Assessment disagrees with EMCON's contention that Willamette Cove presents no unacceptable human or environmental health risks. Rather, Site Assessment believes there is enough data to suggest the site poses potential threats to human health and the environment, but insufficient data to substantiate EMCON's hypothesis that the level of risk is acceptable. A more detailed, quantitative risk assessment is needed to evaluate potential site risks. This document should accurately address current and future site conditions with their associated exposure scenarios.

As discussed above, sediments are the biggest concern, and further evaluation of PAHs, PCP, TBT, and metals in shallow and subsurface sediments is needed. DEQ acknowledges that sediments contaminated with PCP and PAHs could have migrated from M&B, and it will be important to differentiate, to the extent possible, sources of sediment contamination at Willamette Cove. However, based on past use of the site for ship repair, TBT probably originated from on-site activities. Moreover, it is possible that wood preservatives such as PCP may have originated from the former lumber mill. In addition, the distribution of PAHs in sediments (the highest

levels in "Area 1") suggests an on-site source for these contaminants.

Direct contact with contaminated soils is another potential exposure pathway, in light of METRO's intention to preserve the site as undeveloped greenspace with public access. METRO has no plans to actively develop the site, so it's unlikely that any soil or vegetative "cap" would be placed over contaminated soils. The high levels of lead and other metals, as well as artifacts of the old shipyard in Area 2 (e.g., "unidentified black, non-metallic substances") warrant further study.

The source and extent of petroleum and TCE in groundwater from Area 1 should be investigated, since these compounds could enter the river via groundwater flow and settle out in near-shore sediments.

Further state action at Willamette Cove is a medium priority. The site should be added to DEQ's Confirmed Release List and Inventory.

**References:** Site Assessment has reviewed the following principal references in preparing this strategy recommendation:

- Record of Decision, McCormick & Baxter Creosoting Company, Portland Plant, Portland, Oregon, prepared jointly by DEQ and EPA Region 10, 3/96.
- Supplemental Environmental Site Assessment, St. Johns Riverfront Property, Portland, Oregon, EMCON, 1/9/96.
- Level II Environmental Site Assessment, St. Johns Riverfront Property, Portland, Oregon, Sweet-Edwards/EMCON, Inc., 3/15/89.
- A Synoptic Survey of Trace Metals in Bottom Sediments of the Willamette River, Oregon, Rickert et al., U.S. Geological Survey Circular 715-F, 5/77.

**Referrals Within or Outside DEQ:** This site has not been referred to another division of DEQ or to an outside regulatory agency.

**Other:** This site is currently listed on DEQ's ECSI database; it will be updated with information contained in this decision document, and to reflect Site Assessment's decision for further action at the site.