

CENPS-OP-DMMO

MEMORANDUM FOR RECORD

9 September 1994

(91-2-00014)

SUBJECT: DETERMINATION OF THE SUITABILITY OF DREDGED MATERIAL TESTED UNDER PSDDA GUIDELINES FOR THE PORT OF EVERETT SOUTH TERMINAL BARGE BERTH DREDGING PROJECT FOR DISPOSAL AT THE PSDDA PORT GARDNER OPEN-WATER NONDISPERSIVE SITE.

1. The Port of Everett proposes to dredge 183,000 cubic yards of sediments to develop its South Terminal Barge Berth facility. The following summary reflects the PSDDA agencies' (Corps, Department of Ecology, Department of Natural Resources and the Environmental Protection Agency) suitability determination for disposal of this material at the PSDDA Port Gardner open-water nondispersive site.
2. The PSDDA agencies ranked the project area "high", based on the guidance provided in the PSDDA Management Plan Report, Phase II (page A-10) for the East Waterway in Everett.
3. A partial characterization (PC) was conducted in 1992 for sediments in the vicinity of the proposed South Terminal barge berth. Attachment 1 provides details of the ranking determination resulting from the PC. The outcome of the PC can be summarized as follows:
 - a) a large volume (100,000+ CY) of contaminated sawdust was identified. The sawdust was found unsuitable for open-water disposal.
 - b) the native sediment underlying post-industrial sediment was found to be suitable for open-water disposal with no additional testing required.
 - c) post-industrial sediments in the vicinity of South Terminal, aside from the sawdust, were ranked according to the PC results. The wood/silt fraction was ranked "moderate", while the sand/wood fraction was ranked "low-moderate".
4. A sampling and analysis plan, based on the rankings from the PC, was developed for full characterization and approved by the PSDDA agencies 29 October 1993.
5. Eight dredged material management units (DMMUs) were characterized. Sediments from 17 sampling locations were composited into eight (C1 through C8) lab samples. The PSDDA agencies allowed vertical compositing for this project because the PC showed similar patterns of chemical distribution throughout the post-industrial sediments, regardless of depth.
6. The chemistry data indicated that six of the DMMUs (C1, C3, C4, C5, C6 and C7) had at least one detected exceedance of the PSDDA screening levels (SL). DMMUs C2 and C8 each had a single undetected SL exceedance. DMMU C1 had a detection limit exceedance of the maximum level (ML) for benzoic acid. There were no other ML exceedances, and no bioaccumulation trigger (BT) exceedances. See Attachment 2 for a tabulated summary of physical/chemical testing data.

7. The detected and undetected SL exceedances would have triggered the requirement for biological testing of all eight DMMUs under the tiered testing approach. In this case, concurrent chemical and biological testing were conducted for all DMMUs. The amphipod 10-day acute toxicity test, echinoderm sediment larval combined mortality and abnormality test, the *Neanthes* 20-day biomass test, and the Microtox bacterial luminescence test were conducted. PSDDA interpretation guidelines specified in the Phase II Management Plan Report (Sept 1989), modified by changes made at the second, fourth and sixth annual review meetings, were used to evaluate the bioassay data.

8. Because of the presence of woody material mixed with the sediment, and potential non-treatment effects for *Rhepoxynius abronius*, the Port of Everett elected to conduct side-by-side testing of *Rhepoxynius abronius* and *Ampelisca abdita* for the amphipod test.

9. The control sediment for the *Rhepoxynius* and *Neanthes* bioassays was collected at West Beach, the control sediment for *Ampelisca* from Narragansett RI, while the seawater control for the sediment larval test came from the National Marine Fisheries Service facility at Mukilteo. Five reference sediments were used during the first round of testing, four from Carr Inlet and one from West Beach. Three additional reference sediments from Carr Inlet were used during subsequent retests. See Attachment 3 for test and reference grainsize matchups.

10. Attachment 2 includes the results of biological testing, while Attachment 3 tallies "hits" in the bioassays. As anticipated in the amphipod bioassay, *Rhepoxynius abronius* was affected by the unusual nature of the South Terminal sediments which contained fine woody debris mixed with silt and sand. *Ampelisca abdita*, on the other hand, experienced no difficulties and no hits were exhibited. The PSDDA agencies agreed to use the *Ampelisca* results for the amphipod test in lieu of the *Rhepoxynius* results.

11. Two batches of the *Neanthes* 20-day biomass test were run. In batch 1, only C5 and C8 exhibited mean individual biomasses less than 80% of the control, thereby necessitating a comparison to reference. Both C5 and C8 matched up well with two reference sediments: C5 was well-matched with Ref 1 and Ref 7, while C8 was well-matched with Ref 4 and Ref 5. The PSDDA agencies agreed to pool the results for these two pairs of references for comparison with their respective test sediment. This approach resulted in a hit under the two-hit rule for C5 and no hit for C8.

Due to a shortage of organisms during the first batch, C2 was tested along with five reference sediments in a second batch. One of the five C2 beakers was not inoculated with organisms; the mean individual biomass in the remaining four beakers was greater than 80% of the control. Therefore, C2 was scored a non-hit.

12. The larval test, using *Strongylocentrotus purpuratus*, experienced quality control problems, with poor results for all test and reference sediments. A retest was conducted using *Dendraster excentricus*. There was a single hit for C1 under the two-hit rule.

13. In the Microtox test, QA/QC problems forced two separate retests of some of the test sediments. In the original test, C8 exhibited a hit under the two-hit rule. An evaluation of the five replicates at the highest concentration resulted in no other hits for any of the other DMMUs. However, further evaluation revealed a discrepancy between the results of the dilution series for three of the DMMUs and the five replicates at the highest concentration for these test sediments. Two retests were necessary to resolve the discrepancy, and in the end, none of the three DMMUs exhibited hits.

14. In summary, the PSDDA-approved sampling and testing plan was followed, and quality assurance, quality control guidelines specified by PSDDA were generally complied with. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the PSDDA program. Based on the results of the chemical and biological testing, the following consensus decision was made by the PSDDA agencies:

All 183,000 cubic yards proposed for dredging from the Port of Everett Barge Berth Development project are suitable for disposal at the Port Gardner open-water nondispersive site. This includes 94,300 cubic yards characterized during the FC and 88,700 cubic yards of underlying native material.

15. Based on the "low-moderate" to "moderate" ranking for this project and the lack of major ongoing sources of contamination, under PSDDA recency guidelines the data collected for the full characterization of project sediments are valid for 5-7 years after the sampling date. If a "changed condition" (eg. after a spill event) occurs between the date of this suitability determination and the time of dredging, the PSDDA agencies will determine whether additional sampling and testing are required prior to dredging.

16. This memorandum documents the suitability of proposed dredged sediments for disposal at a PSDDA open-water disposal site. This suitability determination does not constitute final agency approval of the project.

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TACHMENT 2

PORT OF EVERETT
 SOUTH TERMINAL BARGE BERTH
 2-00014
 CHEMICALS EXCEEDING
 WADA GUIDELINE VALUES,
 ANALYSIS DATA
 AND INTERPRETATION

Guideline Values

METALS (ppm dry wt):	SL	BT	ML	C1	C2	C3	C4	C5	C6	C7	C8
cadmium	0.96	---	9.6				1.65	1.64	1.16	1.53	
copper	81	---	810					90.6		90.2	
lead	66	---	660				67				
zinc	160	---	1600			227					

ORGANICS (ppb dry wt):

1-Methylnaphthalene	67	---	670	83 U			130 U		190	140	
acenaphthene	63	---	630	100			130 U	89	340	290	
acenaphthylene	64	---	640	83 U			130 U		130	92 U	
fluorene	64	---	640	140			130 U	73	380	340	
fluoranthene	210	---	2100	350					1300	660	
phenanthrene	320	---	3200	390					1000	770	
anthracene	130	---	1300	160					310	320	
total LPAH	610	---	6700	1140				782	3650	2520	
fluoranthene	630	4600	6300	690					1100	1100	
fluorene	430	---	7300	610 L					960 L	1000 L	
benzo(a,h)anthracene	120	---	1200				130 U				
benzo(1,2,3-c,d)pyrene	69	---	5200	90 L			160 L	74	190	130 L	
total HPAH	1800	---	51000	2600			2140	1893	3670	4150	
1,2,4-Trichlorobenzene	6.4	---	64				14 U	16 UG			
hexachlorobenzene	23	168	230	41 U			130 U	58 U	33 U	46 U	
diethyl phthalate	97	---	---				130 U		100 U		
1-Methylphenol	20	---	72	41 U			44 U	58 U	33 U	46 U	
2,4-Dimethylphenol	29	---	50	41 U			44 U		33 U	46 U	
3-Methylphenol	120	---	1200	410			130 U		300	670	
2,4,6-Trichlorophenol	100	504	---	410 U			220 U	290 U	500 U	460 U	
phenol	120	876	1200				130 U				
benzoic acid	216	---	690	830 U*			440 U	580 U		460 U	
benzyl alcohol	10	---	73	41 U	38 UG	38 UG	44 U	58 U	33 U	46 U	36 UG
2-benzofuran	54	---	540	110			130 U	63	310	260	
hexachlorobutadiene	29	212	290	83 U			130 U	58 U	100 U	92 U	
4-Nitrosodiphenylamine	28	161	220	83 U			130 U	58 U	100 U	92 U	
total DDT	6.9	50	69				7.2 UG				
total PCBs	130	---	2500				150 UG				

* = Exceeds ML

ATTACHMENT 3
 PORT OF EVERETT SOUTH TERMINAL BARGE BERTH
 91-2-00014
 BIOASSAY INTERPRETATION

Sample ID	Chemical Hits	Reference Sediment Match	Amphipod ¹ 10-Day Mortality	Neanthes 20-Day Biomass	Microtox	Sediment ² Larval	Total Hits	Pass/Fail
C1	---	Ref 5/D34	--- ³	--- ⁴	--- ⁵	X	X	Pass
C2	---	Ref 5	--- ³	--- ⁴	--- ³	--- ³	---	Pass
C3	---	Ref 5/D34	--- ³	--- ⁴	X	--- ³	X	Pass
C4	---	Ref 1/6/7	--- ³	--- ⁴	--- ⁵	--- ³	---	Pass
C5	---	Ref 1/6/7	--- ³	X	--- ³	--- ³	X	Pass
C6	---	Ref 1/6/7	--- ³	--- ⁴	--- ⁵	--- ³	---	Pass
C7	---	Ref 1/6/7	--- ³	--- ⁴	--- ⁵	--- ³	---	Pass
C8	---	Ref 4/5	--- ³	---	X	--- ³	X	Pass

¹*Ampelisca abdita*

²*Dendraster excentricus*

³Test sediment was not greater than 20% over control; no reference comparison required

⁴Test sediment was not less than 80% of control; no reference comparison required

⁵Light enhancement; considered non-toxic; no reference comparison required

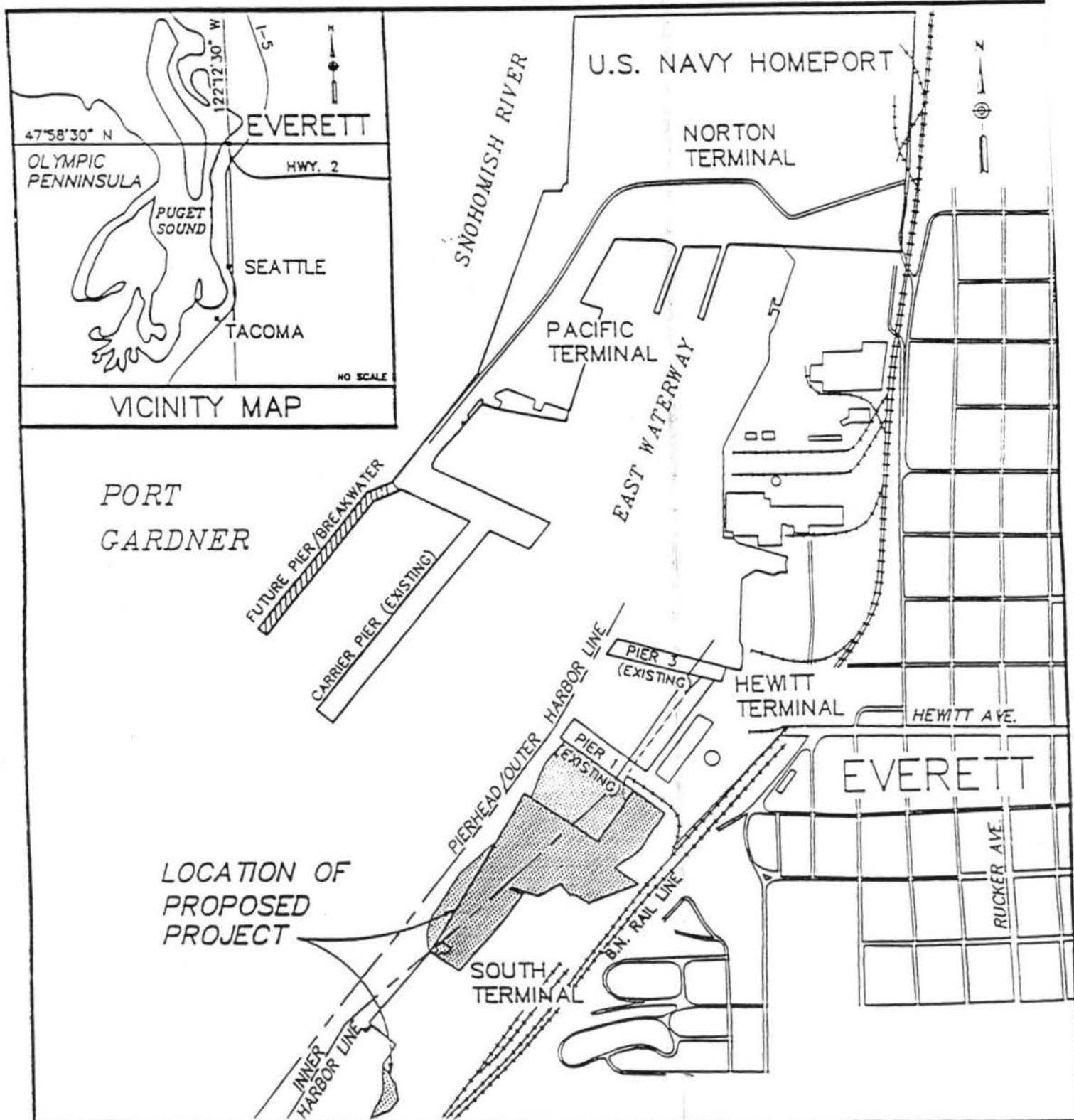
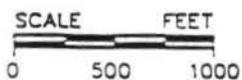
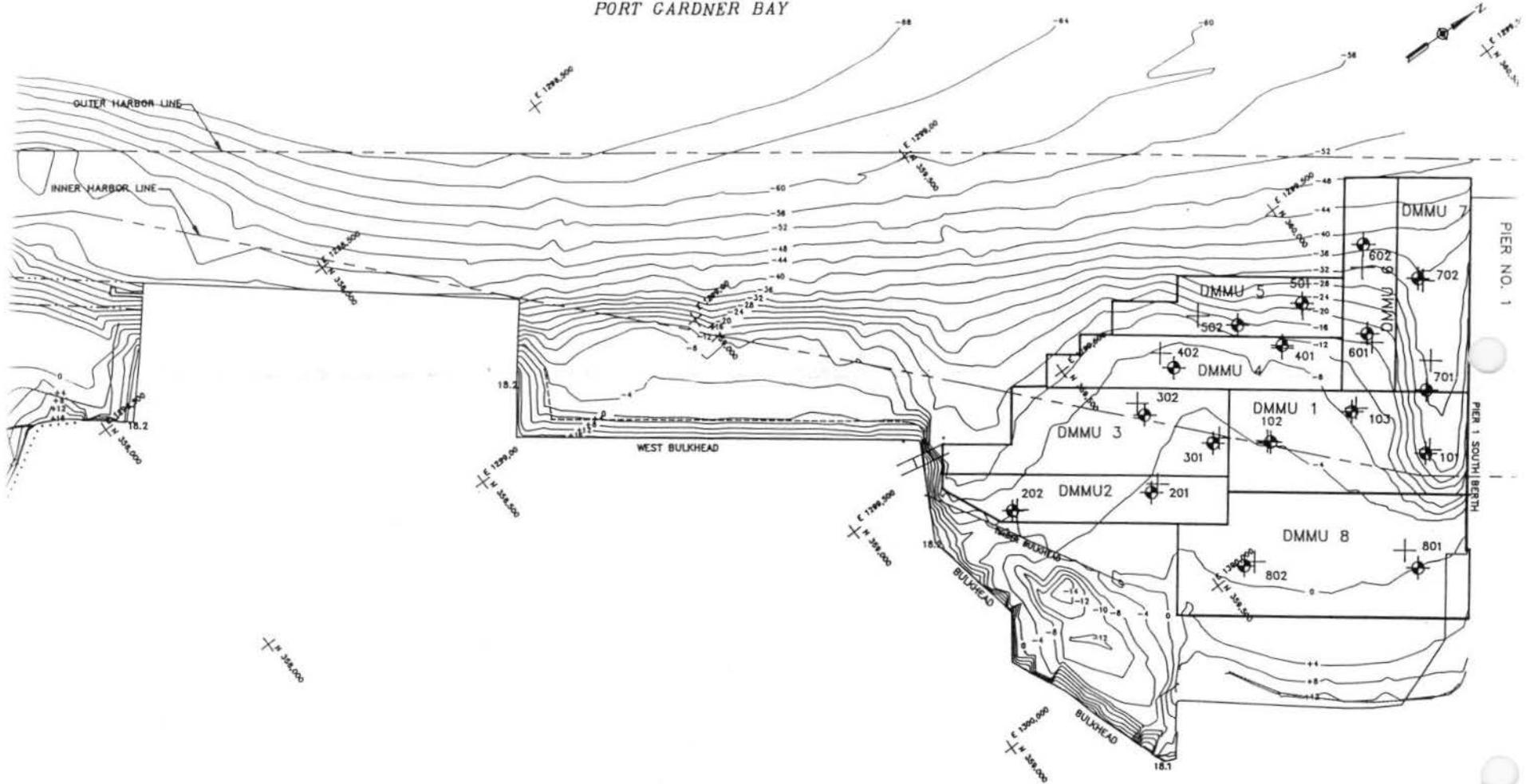


Figure 1 Location map.

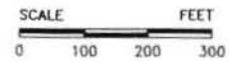


PORT GARDNER BAY



LEGEND

-  502
 PRELIMINARY BORE LOCATIONS
-  502
 ACTUAL SEDIMENT BORE LOCATIONS



PORT OF EVERETT	
Figure 2-1 Planned and actual PSDDA sampl locations at South Terminal.	
	Pentec Environmental, Inc. Edmonds, WA 98020 February 1

Table 2-1 Sample location, coordinates of bore locations of core samples collected at Port of Everett South Terminal during November 1993 and April 1994.

DMMU location	Sample location	Coordinates				Expected mudline elevation	Expected contact elevation	Actual mudline elevation	Actual contact elevation ¹	Proposed dredge depth	Depth at bottom of stratigraphic unit		Sample date	Resample date
		State plane coordinates		Latitude	Longitude						Wood/silt ²	Sand/wood ²		
		Northing	Easting											
1	101	359,963	1,300,054	47° 58' 42.2" N	122° 13' 23.1" E	-24.0	-28.0	-25.0	> -35.0 ³	-46.0	-32.0	> -35.0	11/23/93	4/5/94
	102	359,742	1,299,848	47° 58' 40.0" N	122° 13' 26.1" E	-4.0	-8.0	-4.0	-9.0	-26.0	-6.0	-9.0		4/5/94
	103	359,914	1,299,892	47° 58' 41.7" N	122° 13' 25.5" E	-9.0	-15.0	-9.0	-13.0	-36.0	-12.0	-13.0		4/6/94
2	201	359,502	1,299,789	47° 58' 37.6" N	122° 13' 26.9" E	-4.0	-10.0	-3.5	> -11.0	-11.0	-7.0	> -11.0	11/17/93	4/7/94
	202	359,267	1,299,658	47° 58' 35.3" N	122° 13' 28.7" E	-4.0	-14.0	-5.0	-11.0	-11.0	-7.0	-11.0		
3	301	359,652	1,299,784	47° 58' 39.1" N	122° 13' 27.0" E	-3.0	-9.0	-2.0	-6.0	-26.0	-4.0	-6.0	11/16/93	4/6/94
	302	359,578	1,299,665	47° 58' 38.4" N	122° 13' 28.7" E	-5.0	-16.0	-3.0	> -11.0	-11.0	> -11.0	-		
4	401	359,866	1,299,715	47° 58' 41.2" N	122° 13' 28.1" E	-10.0	-21.0	-10.0	-24.0	-26.0	-22.0	-24.0	11/30/93	4/5/94
	402	359,676	1,299,627	47° 58' 39.3" N	122° 13' 29.3" E	-7.0	-19.0	-7.0	> -17.0	-11.0	> -17.0	-		
5	501	359,943	1,299,674	47° 58' 42.0" N	122° 13' 28.7" E	-20.0	-30.0	-20.0	> -30.0	-26.0	> -30.0	-	11/19/93	4/7/94
	502	359,821	1,299,634	47° 58' 40.8" N	122° 13' 29.2" E	-12.0	-26.0	-12.5	> -27.0	-26.0	-25.0	> -27.0		4/6/94
6	601	360,015	1,299,800	47° 58' 42.7" N	122° 13' 26.9" E	-18.0	-28.0	-18.0	-22.0	-46.0	-21.0	-22.0	11/24/93	4/6/94
	602	360,100	1,299,654	47° 58' 43.5" N	122° 13' 29.0" E	-32.0	-38.0	-32.0	-38.0	-46.0	-36.0	-38.0		4/5/94
7	701	360,036	1,299,943	47° 58' 42.9" N	122° 13' 24.7" E	-32.0	-42.0	-32.0	-36.0 ⁴	-45.0	-38.0 ⁵	-36.0 ⁴	11/24/93	4/5/94
	702	360,146	1,299,766	47° 58' 44.0" N	122° 13' 27.4" E	-34.0	-40.0	-34.0	-37.0	-46.0	-36.0	-37.0		
8	801	359,815	1,300,162	47° 58' 40.8" N	122° 13' 21.5" E	-1.0	-4.0	-1.0	-4.0	-4.0	-	4.0	11/16/93	4/5/94
	802	359,575	1,300,011	47° 58' 38.4" N	122° 13' 23.6" E	-	-	0.0	-3.0	-	-2.0	-3.0		

00021.045.5-TERM REV0FT.TABLES 2-1.XLS

- 1 Top of sand unit.
- 2 Depths are rounded to the nearest integer.
- 3 Stratigraphic unit not encountered.
- 4 Bottom of sand/wood and top of sand interpreted from summary core log.
- 5 Depth to bottom of wood/silt based on the free fall depth of the coring device if greater than the depth to the bottom of the wood/silt as interpreted on the core log.