CENPS-OP-DMMO

MEMORANDUM FOR RECORD 9 September 1994

SUBJECT: DETERMINATION OF THE SUITABILITY OF DREDGED MATERIAL TESTED UNDER PSDDA GUIDELINES FOR THE PORT OF EVERETT PIERS 1 AND 3 MAINTENANCE DREDGING PROJECT FOR DISPOSAL AT THE PSDDA PORT GARDNER OPEN-WATER NONDISPERSIVE SITE.

1. The Port of Everett proposes to maintenance dredge 51,000 cubic yards of sediments from the north side of Pier 1 and south side of Pier 3. 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 sampling and analysis plan was developed for full characterization and approved by the PSDDA agencies 2 September 1993.

5. Eleven dredged material management units (DMMUs) were characterized. Uncomposited surface sediments from six locations on the north side of Pier 1 were collected to form DMMUs 1 through 6. Subsurface sediments from two locations on the north side of Pier 1 were composited to form DMMU 7. Uncomposited surface sediments from three locations on the south side of Pier 3 were collected to form DMMUs 8 though 10. Subsurface sediments from two locations on the south side of Pier 3 were composited to form DMMU 11 (see Figures 7 and 8 of the sampling and analysis plan).

6. The chemistry data indicated that two of the DMMUs (10 and 11) had no detected or undetected exceedances of the PSDDA screening levels (SL). All other DMMUs had multiple SL exceedances. In addition, DMMUs 3 and 7 each had three exceedances of PSDDA maximum levels (ML) and were found unsuitable for open-water disposal in the absence of Tier IV evaluation data. DMMU 3 also had a single bioaccumulation trigger (BT) exceedance. No other DMMUs had ML or BT exceedances. See Attachment 1 for a tabulated summary of testing data.

7. The SL exceedances for 9 of the 11 DMMUs triggered the requirement for biological testing of these DMMUs under the tiered testing approach. In addition, biological testing was conducted for DMMU 10 by mistake. The amphipod 10-day acute toxicity test, echinoderm sediment larval combined mortality and abnormality (effective mortality) 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 proximity of this project to the barge berth area on the south side of Pier 1, an area where woody material is mixed with sediment, the Port of Everett elected to conduct side-by-side testing of *Rhepoxynius abronius* and *Ampelisca abdita* for the amphipod test. *Rhepoxynius abronius* is known to be sensitive to fine-grain sediments, while *Ampelisca abdita* is not.

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. Three reference sediments were used during the first round of testing, two from Carr Inlet and one from West Beach. Three additional reference sediments from Carr Inlet were used during subsequent retests. See Attachment 2 for test and reference grainsize matchups.

10. Attachment 1 includes the results of biological testing, while Attachment 2 tallies "hits" in the bioassays. In the amphipod test, woody debris was not a problem as it was for the South Terminal barge berth. Both *Ampelisca abdita* and *Rhepoxynius abronius* exhibited hits for the same two DMMUs (6 and 8). *Ampelisca abdita* exhibited hits under the single-hit rule for these two DMMUs, while *Rhepoxynius abronius* exhibited hits under the two-hit rule. Attachments 1 and 2 reflect the *Ampelisca* results. The magnitude of the hits was irrelevant in this case; these two DMMUs would have been found unsuitable for open-water disposal regardless of the amphipod species used in the interpretation.

11. In the *Neanthes* 20-day biomass test, Carr Inlet Ref 8 failed to meet the performance standard of at least 80% of the control sediment biomass. Ref 8 was therefore rejected from use for the interpretation of this bioassay. Test sediments that would have been compared to Ref 8 were instead compared to Ref 4 and Ref 9. The interpretation for these DMMUs was exactly the same, regardless of whether Ref 4 or Ref 9 was used for comparison. The results are found in Attachment 2.

12. The larval test, using *Strongylocentrotus purpuratus*, experienced quality control problems, with poor results for the Carr Inlet reference sediments and most of the test sediments. A retest was conducted using *Dendraster excentricus* for the two test sediments (DMMU 1 and 5) whose overall pass/fail interpretation was still in question at the time of the retest. The retest was conducted in concert with a retest of South Terminal barge berth test sediments. Both DMMU 1 and 5 scored hits under the single-hit rule in the retest.

13. In the Microtox bioassay, QA/QC problems forced a retest of one of the test sediments. In the original test, DMMU 2 and 9 exhibited hits 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 two of the DMMUs (5 and 8) and the five replicates at the highest concentration for these test sediments. DMMU 8 had already failed testing based on the

Neanthes 20-day and amphipod bioassays. However, a retest of DMMU 5 was necessary to resolve the discrepancy (DMMU 5 was simultaneously being subjected to a retest for the larval bioassay). QA/QC problems were again encountered in the retest. An additional retest was unnecessary because DMMU 5 exhibited a hit under the single-hit rule in the larval retest and was found unsuitable for open-water disposal.

14. Only two DMMUs passed PSDDA disposal guidelines for open-water disposal. These were DMMUs 10 and 11, the two DMMUs without any SL exceedances (DMMU 10 exhibited a single hit under the two-hit rule for the 20-day test, without a corroborating hit for any other bioassay). All other test sediments were found unsuitable for open-water disposal (see Attachment 2).

15. 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 34,000 cubic yards (DMMUs 1, 2, 3, 4, 5, 6 and 7) proposed for dredging from the north side of Pier 1 were found unsuitable for open-water disposal. The 7,000 cubic yards on the south side of Pier 3, represented by DMMUs 8 and 9, were also found unsuitable for open-water disposal. The 10,000 cubic yards from the south side of Pier 3, represented by DMMUs 10 and 11 are suitable for disposal at the Port Gardner open-water nondispersive site.

16. Based on the "high" ranking for this project, under PSDDA recency guidelines the data collected for the full characterization of project sediments are valid for 2 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.

17. 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.

Port of Everett
Piers 1 and 3 Maintenance Dredging

Concur:

10/13/94
Date

David Kendall, Ph.D
Seattle District Corps of Engineers

9/9/94
Date

David Fox
Seattle District Corps of Engineers

10/12/94
Date

Justine Barton
Environmental Protection Agency, Region X

9/22/93
Date

Sandra Manning
Washington Department of Ecology

9/21/94
Date

Deborah Lester
Washington Department of Natural Resources

Copies Furnished:

DMMO file/CENPS-OP
Dennis Gregoire/Port of Everett
Pat Cagney/CENPS-EN-PL-ER
Cliff Whitmus/Pentec
Teresa Michelsen/Ecology
Justine Barton/EPA
Sandra Manning/Ecology
Deborah Lester/DNR
Terry Williams/Tulalip Tribes
Jack Gossett/CENPS-OP-RG

ATTACHMENT 1

PORT OF EVERETT PIERS 1 & 3
CHEMICALS EXCEEDING
PSDDA GUIDELINE VALUES,
BIOASSAY DATA
AND INTERPRETATION

	Guideline Values			DMMUs 202 203 207										
METALS (ppm dry wgt):	SL	BT	ML	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11
Cadmium	0.96	---	9.6		1.27	2.3	1.5	1.13	1.5	1.0	1.35	1.13		
Copper	81	---	810	81.5	83.9	102					106			
Lead	66	---	660	78	68	91	67				95			
Mercury	0.21	1.5	2.1								.26 E			
Zinc	160	---	1600			211		195						
ORGANICS (ppb dry wgt):														
2-Methylnaphthalene	67	---	670			140	90		91	320	110	92 U		
Acenphthene	63	---	630	120	130	580	130		260	1200*	170	92 U		
Acenaphthylene	64	---	640			81	77 U			68 U	69	92 U		
Fluorene	64	---	640	140	160	780*	140		260	790*	230	92 U		
Naphthalene	210	---	2100			340	480		340	1300	440			
Phenanthrene	320	---	3200	500	530	1800	340		670	870 L	890			
Anthracene	130	---	1300	140	260	1900*	200		350	510 L	240			
Total LPAH	610	---	6700	918	1327	5621	1380		2022	4990	2149			
Fluoranthene	630	4600	6300		1400	6100	710		1900	1400 L	1500			
Pyrene	430	---	7300		940 L	3100 L	750		1300	1100	1200 L			
Benzo(a)anthracene	450	---	4500		600	2300					710			
Chrysene	670	---	6700			2400				690	860			
Dibenzo(a,h)anthracene	120	---	1200			210								
Benzofluoranthenes	800	---	8000			3000					1000			
Benzo(a)pyrene	680	4964	6800			1100								
Indeno(1,2,3-c,d)pyrene	69	---	5200		100	380	96		120 G	84	140	96 L		
Total HPAH	1800	---	51000		4497	18900	2776		5106	4827	5927	2036		
Hexachlorobenzene	23	168	230		42 U	57 U	38 U			68 U	49 U	92 U		
2-Methylphenol	20	---	72		42 U	57 U	38 U			68 U	49 U	46 U		
2,4-Dimethylphenol	29	---	50		42 U	57 U*	38 U				49 U	46 U		
4-Methylphenol	120	---	1200		250		390				280			
Pentachlorophenol	100	504	---		210 U	280 U	380 U			340 U	250 U	460 U		
Benzoic acid	216	---	690		420 U	570 U				680 U	490 U	460 U		
Benzyl alcohol	10	---	73		42 U	57 U	38 U		36 UG	68 U	49 U	46 U		
Dibenzofuran	54	---	540	66	140	410	120		200	700*	180	92 U		
Hexachlorobutadiene	29	212	290		42 U	57 U	77 U			68 U	49 U	92 U		
N-Nitrosodiphenylamine	28	161	220		42 U	57 U	77 U			68 U	49 U	92 U		
Total DDT	6.9	50	69		10.6									
Total PCBs ?	130	---	2500		340		100 UG	40 U				100 UG		
		(38)		8	25	30	24	3	14	22	29	17	0	0
				51	52	53	54	55	56					

* = Exceeds ML
underlined = Exceeds BT

(Carbon normalized)

ATTACHMENT 1

PORT OF EVERETT PIERS 1 & 3
CHEMICALS EXCEEDING
PSDDA GUIDELINE VALUES,
BIOASSAY DATA
AND INTERPRETATION

	DMMUs											West Beach	Carr Inlet	Carr Inlet	Carr Inlet	Carr Inlet	Carr Inlet
CONVENTIONALS:	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	Ref 4	REF 8	REF 9	A37	C24	D34
Percent Fines	4	24	38	23	10	56	16	26	23	4	2	4	58	49	41	38	27
Bulk Ammonia (mg/kg)	NT	53.4	87.9	22.8	22.1	90.5	47.1	27.6	14.3	5.6	2.5	3.5	1.1	5	17.0	17.0	15.0
Bulk Sulfides (mg/kg)	3.5 U	406 G	7590 G	81.1 G	522 G	496 G	98.2 U	651 G	2190 G	3.4 U	3.1 U	7.6	12	22	29.0	15.0	30.0
TOC (%)	1.1	2.4	5.2	2.9	0.8	2.5	1.2	4.11	6.9	0.9	.3	0.2	0.4	0.7	0.5	0.5	0.5

BIOASSAYS:																	
Amphipod test - Ampelisca abdita (% mortality)	10	20	NT	8	17	52	13	74	10	11	NT	NT	12	7	NT	NT	NT
Larval retest - D. excentricus (% eff mort)	41.3	NT	NT	NT	31.3	NT	NT	NT	NT	NT	NT	0	NT	NT	0.7	5.1	12.4
Neanthes (individual biomass in mg)	10.18	9.42	NT	6.95	9.80	10.44	7.67	5.93	7.76	11.36	NT	17.03	QA	15.95	NT	NT	NT
Microtox (% light diminution) - original test	LE	30.7	NT	LE	QA	LE	LE	QA	22	LE	NT	NT	LE	LE	NT	NT	NT
Microtox (% light diminution) - retest	NT	NT	NT	NT	QA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	8.5

LE = light enhancement (non-toxic)
QA = quality assurance problem, data discarded
NT = not tested

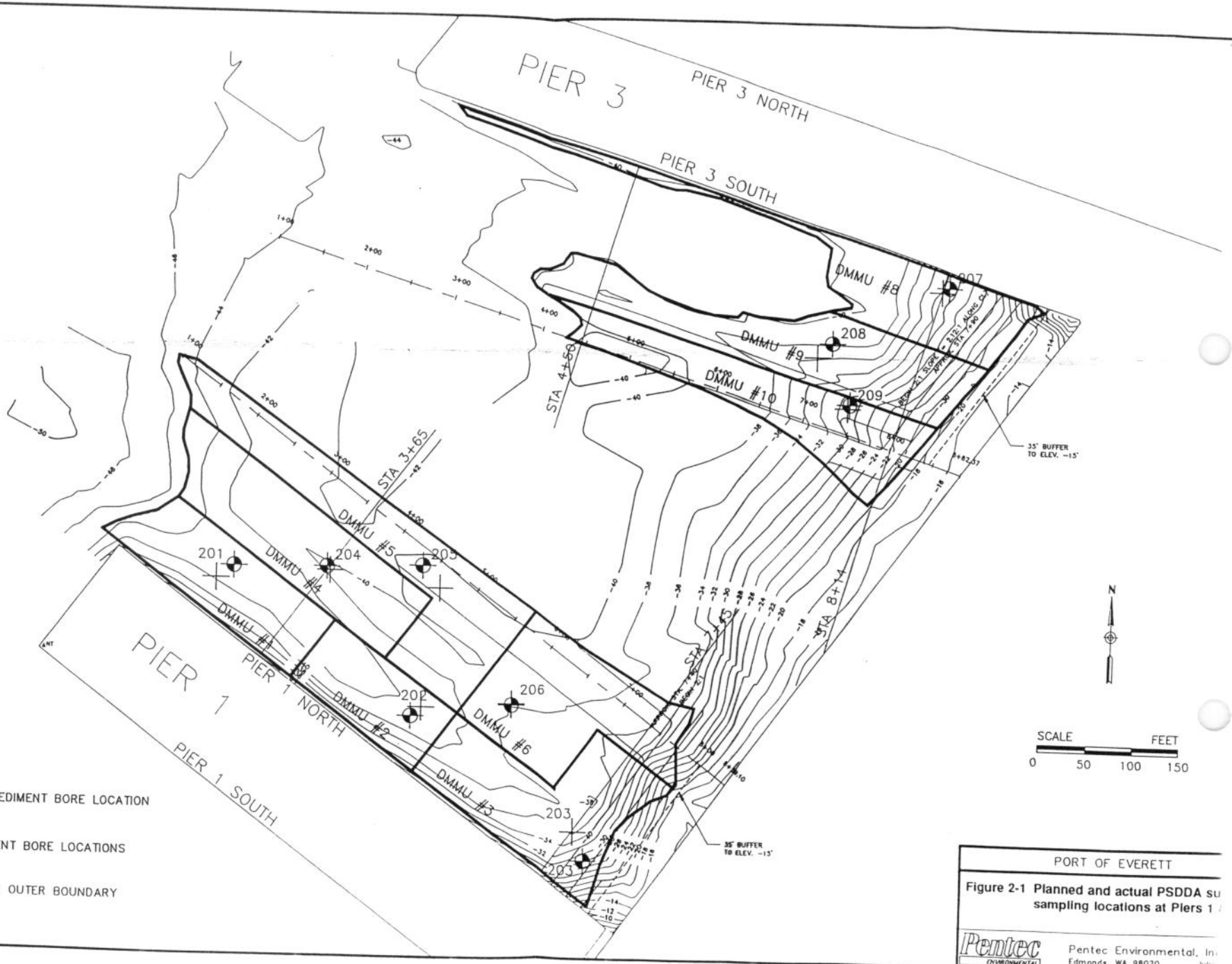
INTERPRETATION:											
Volume (cubic yards):	4000	4000	4000	4000	4000	4000	10000	3000	4000	3000	7000
Pass/Fail:	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Pass

ATTACHMENT 2
PORT OF EVERETT PIERS 1 & 3 MAINTENANCE DREDGING
BIOASSAY INTERPRETATION

DAIS ID	Sample ID	Chemical Hits	Reference Sediment Match	Amphipod[1] 10-Day Mortality	Neanthes 20-Day Biomass	Microtox	Sediment Larval	Total Hits	Pass/Fail
S1	DMMU 1	---	Ref 4	---[4]	X	---[6]	XX[3]	XX+	Fail
S2	DMMU 2	---	Ref 8	---[4]	X[5]	X	QA[2]	XX	Fail
S3	DMMU 3	XX	N/A	NT	NT	NT	NT	XX	Fail
S4	DMMU 4	---	Ref 8	---[4]	XX[5]	---[6]	---[2,4]	XX	Fail
S5	DMMU 5	---	Ref 4	---[4]	X	QA	XX[3]	XX+	Fail
S6	DMMU 6	---	Ref 9	XX	X	---[6]	QA[2]	XX+	Fail
C1	DMMU 7	XX	Ref 4/8	---[4]	XX[5]	---[6]	---[2,4]	XX+	Fail
S7	DMMU 8	---	Ref 8	XX	XX[5]	QA	QA[2]	XX+	Fail
S8	DMMU 9	---	Ref 8	---[4]	XX[5]	X	QA[2]	XX+	Fail
S9	DMMU 10	---	Ref 4	---[4]	X	---[6]	---[2,4]	X	Pass
C2	DMMU 11	---	N/A	NT	NT	NT	NT	---	Pass

[1] *Ampelisca abdita*
[2] *Strongylocentrotus purpuratus*
[3] *Dendraster excentricus* (larval retest)
[4] Test sediment was not greater than 20% over control; no reference comparison required
[5] Ref 8 failed to meet its performance standard of >80% of control; comparison made to other reference sediments
[6] Light enhancement; considered non-toxic; no reference comparison required

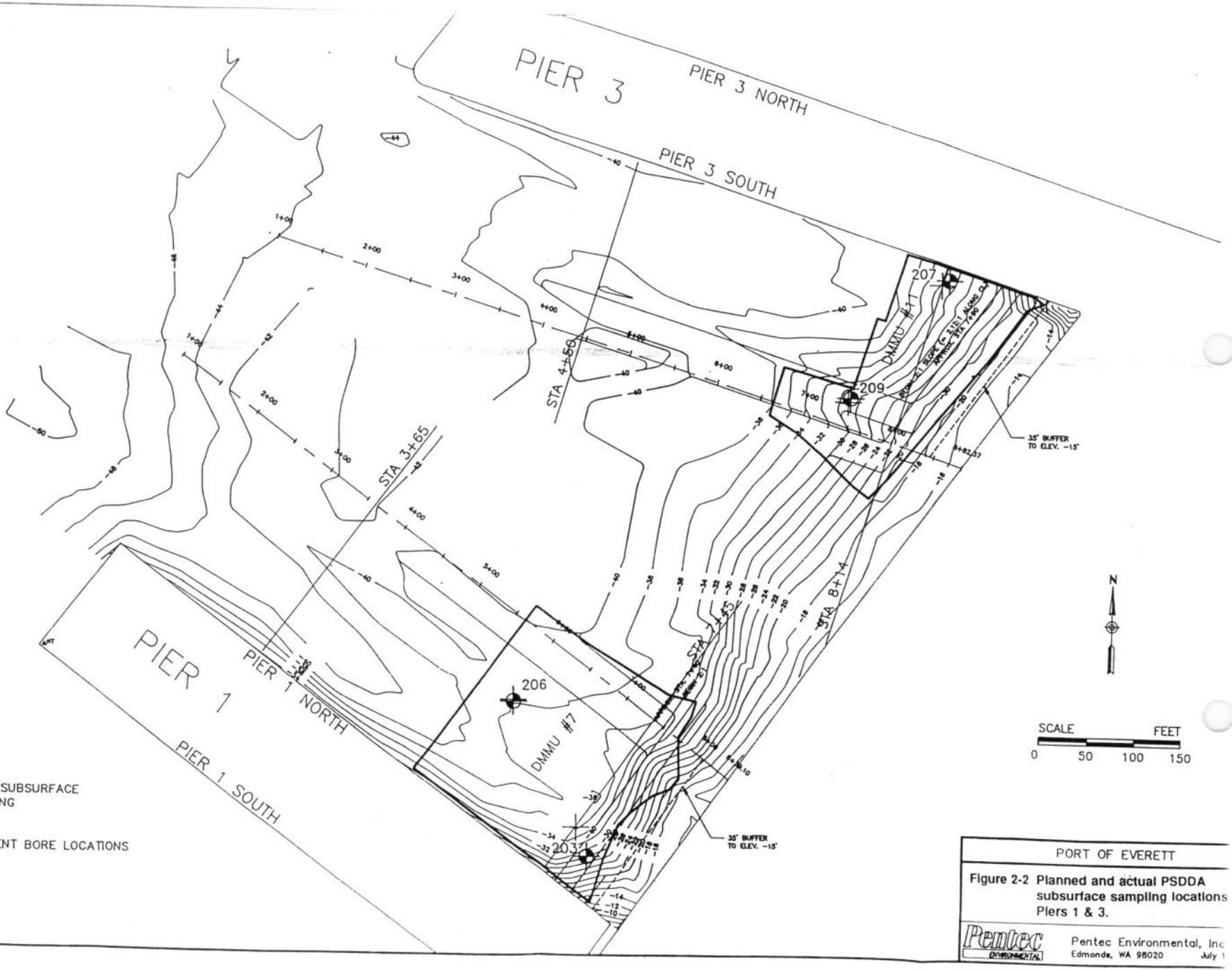
NT = not tested; N/A = not applicable (no bioassays conducted)
QA = quality assurance problem (retest unecessary)



PORT OF EVERETT

Figure 2-1 Planned and actual PSDDA su sampling locations at Piers 1

Pentec Environmental, In
Edmonds, WA 98020 July



RFACE AND SUBSURFACE
DIMENT BORING

TUAL SEDIMENT BORE LOCATIONS

PORT OF EVERETT

Figure 2-2 Planned and actual PSDDA subsurface sampling locations Piers 1 & 3.

Pentec Environmental, Inc
Edmonds, WA 98020 July 1

Table 2-1 Sample locations and coordinates of bore locations of core samples collected at Port of Everett Piers 1 & 3 during November 1993 and April 1994.

DAIS station

DMMU	Sample location		Coordinates: State Plane Coordinates Northing	Coordinates: State Plane Coordinates Easting	Coordinates: Latitude	Coordinates: Longitude	Expected mudline elevation	Proposed dredge depth	Actual mudline elevation	Depth at bottom of stratigraphic unit: Wood/silt[1]		Depth at bottom of stratigraphic unit: Sand/wood[1]	Sample date	Resample date
1	201	1	360,408	1,299,909	47° 58' 46.6" N	122° 13' 25.3" E	-42	-46	-41	-	4	-	11/21/93	4/7/94
2	202	2	360,251	1,300,101	47° 58' 45.1" N	122° 13' 22.5" E	-41	-46	-41	-43		-	11/21/93	
3	203	3	360,101	1,300,287	47° 58' 43.6" N	122° 13' 19.7" E	-34	-46	-34	-40		-	11/20/93	
4	204	4	360,409	1,300,009	47° 58' 46.6" N	122° 13' 23.9" E	-40	-46	-40	-44	2	-	11/24/93	
5	205	5	360,412	1,300,111	47° 58' 46.7" N	122° 13' 22.4" E	-40	-46	-40	-44		-	11/21/93	4/7/94
6	206	6	360,274	1,300,199	47° 58' 45.3" N	122° 13' 21.1" E	-38	-46	-38	-43	2 3	> -47	11/21/93	
7	203		360,101	1,300,287	47° 58' 43.6" N	122° 13' 19.7" E	-34	-46	-34	-40		-	11/20/93	
7	206		360,274	1,300,199	47° 58' 45.3" N	122° 13' 21.1" E	-38	-46	-38	-43	2 3	> -37	11/21/93	
8	207	7	360,719	1,300,677	47° 58' 49.8" N	122° 13' 14.2" E	-30	-41	-30	-35	2	-	11/20/93	
9	208	8	360,657	1,300,551	47° 58' 49.2" N	122° 13' 16.0" E	-36	-41	-38	-43		> -47	11/29/93	
10	209	9	360,592	1,300,571	47° 58' 48.5" N	122° 13' 15.7" E	-29	-41	-30	-35	2	-	11/20/93	
11	207		360,719	1,300,677	47° 58' 49.8" N	122° 13' 14.2" E	-30	-41	-30	-35	2	-	11/20/93	
11	209		360,592	1,300,571	47° 58' 48.5" N	122° 13' 15.7" E	-29	-41	-30	-35	2	-	11/20/93	

00021.045 PIERS 1&3 REVDFT:TABLES 2-1 XLS

1. Depths are rounded to the nearest integer.
2. Depth to bottom of wood/silt based on the free fall depth of the coring device if greater than the depth to bottom of the wood/silt as interpeted on the core log.
3. Two cores driven at station 206. Depths based on data from November 21, 1993.
4. Stratigraphic unit not encounted.