

CENPS-OP-TS

MEMORANDUM FOR RECORD

June 13, 1997

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF DREDGED MATERIAL FROM THE PORT OF EVERETT NCD BERTH APPROACH (97-2-00880) FOR DISPOSAL AT THE PSDDA PORT GARDNER OPEN-WATER NONDISPERSIVE SITE.

1. Two previous Puget Sound Dredged Disposal Analysis (PSDDA) suitability determinations (September 9, 1994 and July 3, 1996) addressed the dredging of 422,000 cubic yards (CY) of sediment for Stage I of the Port of Everett Marine Terminal Improvements Project. Stage I included a berth adjacent to a nearshore confined disposal (NCD) facility for contaminated sediment. The present suitability determination is for: a) material the Port of Everett proposes to dredge from the approach area to the NCD berth; and b) additional dredging volume associated with a change in the design depth from -35 to -40 feet. The following summary reflects the PSDDA agencies' (Corps, Department of Ecology, Department of Natural Resources and the Environmental Protection Agency) suitability determination for the 86,400 CY of material from these two sources.

NCD Berth Approach

2. A sampling and analysis plan (SAP) addressing the NCD berth approach material [1] was submitted to the PSDDA agencies on September 30, 1996 and approved in a letter from the Dredged Material Management Office dated October 11, 1996. Sampling occurred on October 15-16, 1996. Due to an abundance of logs and other debris, sampling was difficult and core recovery rates were relatively low. The lack of adequate sample volume impacted the ability of the biological testing lab to carry out all planned activities, as documented in the following sections.

3. The NCD approach material was ranked "moderate" by the PSDDA agencies on the basis of previous testing of adjacent material (see Attachment 1). The estimated dredged material volume presented in the SAP was 52,100 CY. Previous testing data indicated the lack of chemical distinction between surface (0-4 feet) and subsurface (>4 feet) post-industrial sediment. Therefore, all material was treated as surface material, requiring one dredged material management unit (DMMU) for every 16,000 CY. Four DMMUs (C1 through C4) were established (see Attachment 2), each represented by one or more core samples of post-industrial (wood/silt) sediment taken between the mudline and the depth at which native material (sand) was contacted (see Attachment 3). Based on survey data collected subsequent to sampling, the total volume estimate was decreased to 42,000 CY and it is this revised volume that is reflected in Attachment 3 and which will be carried forward through the remainder of this determination.

4. Sampling and analysis data were submitted to the PSDDA agencies on May 27, 1997 [2]. The chemistry data indicated that all four DMMUs had at least one exceedance of the PSDDA screening levels (SL). There were no maximum level or bioaccumulation trigger exceedances. See Attachment 4 for a summary of physical/chemical testing data.

5. The SL exceedances triggered the requirement for biological testing of all four DMMUs under the tiered testing approach. The amphipod 10-day acute toxicity test, sediment larval combined mortality and abnormality bioassay and the 20-day juvenile infaunal biomass test were conducted.

Due to the presence of woody material mixed with the sediment and potential non-treatment effects for *Rhepoxynius abronius*, the amphipod test was conducted using *Ampelisca abdita*, which had been used successfully in previous testing. *Mytilus trossulus* was used for the sediment larval test after an unsuccessful attempt using *Strongylocentrotus purpuratus*. The biomass test used *Neanthes arenaceodentata*.

The negative control sediments for the *Neanthes* and *Ampelisca* bioassays were collected at West Beach (Whidbey Island, WA) and Narrow River (RI) respectively. The seawater control for the sediment larval test came from Burrard Inlet (Vancouver, B.C.). A single reference sediment from Carr Inlet was used for all three bioassays.

6. On the basis of previous testing, elevated levels of ammonia were anticipated in the test sediment and the Port of Everett elected to use an ammonia purging procedure [4] to reduce the potential for ammonia toxicity in the *Neanthes* biomass test. Two batches were run for this test, one with and one without the ammonia purging protocol. In the purged batch, all treatments were aerated and provided twice daily overlying water renewals until interstitial ammonia concentrations dropped below 15 mg/L. There were no hits in either of the batches. Results from both batches are included in Attachment 5.

7. Two batches were also planned for the amphipod test, one with ammonia purging and one without. The test was originally scheduled to begin on November 21, 1996. However, the original batch of *A. abdita* acquired from Rhode Island exhibited high mortality during the holding period prior to commencing the test and a new batch of organisms were ordered. Since the test beakers had already been prepared, the PSDDA agencies allowed the sediment to remain in the beakers under gentle aeration to reduce ammonia levels while the laboratory awaited shipment of the replacement batch of test organisms.

The replacement batch of test organisms was received by EVS, the bioassay testing laboratory, on November 26, 1996. However, the replacement organisms were all dead on arrival and a second replacement batch was ordered. In the meantime, the larval bioassay required a retest. The only available sediment was that reserved for the second batch of amphipod testing. Since

the "no purge" amphipod batch had already been compromised due to the extended time under aeration, the sediment that was intended for this batch was used instead for the larval retest.

By the time the second replacement batch of *A. abdita* had been received and acclimated to test conditions, 12 days had passed since sediment had been introduced into the test beakers. Interstitial ammonia levels in all test and reference sediments were already below the target concentration of 15 mg/L. Therefore, no additional ammonia purging was necessary. Results from the amphipod test indicated no toxicity; there were no hits for any of the DMMUs.

8. In the first larval test, using *Strongylocentrotus purpuratus*, the seawater control failed to meet its performance standard of $\leq 30\%$ combined mortality and abnormality. Therefore, the test was rerun using *Mytilus trossulus* and sediment originally reserved for the purged-ammonia amphipod batch. The seawater control in the retest had 30% combined mortality and abnormality, barely meeting its performance standard. In the retest, all test sediments were significantly different from reference. DMMUs C1, C2 and C3 exhibited seawater-normalized combined mortality and abnormality of less than 30% over reference, thus scoring hits under the two-hit rule. DMMU C4 exhibited a seawater-normalized combined mortality and abnormality greater than 30% over reference, thus scoring a hit under the single-hit rule.

9. With a hit under the single-hit rule in the sediment larval test, DMMU C4 failed biological testing. Conversely, DMMUs C1, C2 and C3 passed biological testing, with only one hit each under the two-hit rule in the sediment larval test and no corroborating hits in either of the other two bioassays.

10. In summary, the PSDDA-approved SAP was generally followed with the exception of: a) the lack of a non-purged amphipod batch; b) a deviation from standard storage conditions for sediment used in the sediment larval test; c) the absence of sediment conventional data for the Carr Inlet reference due to the lack of residual sediment to analyze; and d) the absence of contaminant loss data associated with ammonia purging due to the lack of adequate sediment volume to fulfill the experimental design. However, using best professional judgement and a preponderance of evidence approach, the agencies deemed the data sufficient 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:

The 6,000 CY of post-industrial (wood/silt) sediment included in DMMU C4 failed biological testing and is unsuitable for open-water disposal. The remaining 3,900 CY from C4 is native material, which the PSDDA agencies had previously determined (see Attachment 1) to be suitable for open-water disposal. The 32,100 CY from DMMUs C1, C2 and C3 is also suitable for open-water disposal, for a total volume of suitable material of 36,000 CY.

Increased Design Depth

11. Subsequent to sampling and testing, the Port of Everett determined that its dredging needs had changed and proposed increasing the design depth from -35 to -40 feet MLLW. This design modification resulted in an additional 44,400 CY of proposed dredged material. Pentec Environmental prepared a detailed accounting of dredged material volumes, which has been included as Attachment 6.

12. The additional unsuitable material consists of an area outside the original project footprint, which has not been characterized (Pentec unit 9) and a small volume of wood/silt lying below DMMU C4 but above the native horizon (Pentec unit 6). The total volume of these two units is 4,200 CY.

13. All other material either lies below C1, C2 and C3, which have been found suitable for open-water disposal, or is native material. The total additional suitable material (Pentec units 4, 5, 7 and 8) is 40,200 CY.

Combined Suitability Determination

14. The PSDDA agencies have determined that a total of 10,200 CY is unsuitable for open-water disposal. This material will be placed in the NCD fill. The remaining 76,200 CY is suitable for disposal at the Port Gardner PSDDA site.

15. Based on the "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" (e.g. 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 determination of suitability does not preclude the consideration of this material for an appropriate beneficial use. It does not constitute final agency approval of the project. During the public comment period which follows a public notice, the resource agencies will provide input on the overall project. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under section 404(b)(1) of the Clean Water Act. *If a Section 404 permit is issued for this project, a dredging plan must be developed and submitted prior to dredging to the Enforcement Section of the Regulatory Branch of the Seattle District Corps of Engineers. This plan must include technology and methodology which is technically adequate to separate suitable from unsuitable material.*

Port of Everett NCD Berth Approach (97-2-00880)
PSDDA Suitability Determination
June 13, 1997

Concur:

6/16/97
Date

David F. Fox
David Fox, PE
Seattle District Corps of Engineers

6/20/97
Date

Justine Barton
Justine Barton
Environmental Protection Agency, Region X

6-13-97
Date

Vernice Santee
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Washington Department of Ecology

13 JUN 97
Date

Ted A. Benson
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Whitmus/Terry Williams

Port of Everett NCD Berth Approach (97-2-00880)
PSDDA Suitability Determination
June 13, 1997

References:

- [1] Pentec, 1996, *Puget Sound Dredged Disposal Analysis Full Characterization for the Port of Everett NCD Berth Approach Dredging; Sampling and Analysis Plan*, Prepared by Pentec Environmental, Inc. for the Port of Everett.
- [2] Pentec, 1997, *Port of Everett NCD Berth Approach; Puget Sound Dredged Disposal Analysis Sediment Characterization*, Prepared by Pentec Environmental, Inc. for the Port of Everett.
- [3] PSDDA, 1989, *Management Plan Report, Unconfined Open-Water Disposal of Dredged Material, Phase II*. Prepared by the PSDDA agencies.
- [4] EPA/USACE, 1993, *Technical Panel Recommendations Concerning Use of Acute Amphipod Tests in Evaluation of Dredged Material*. Joint Memorandum from EPA and USACE.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-2255

19 November 1992

Operation Division
Dredged Material Management Office

Mr. Dennis Gregoire
Port of Everett
P.O. Box 538
Everett, WA 98206

Reference: 91-2-00014
Port of Everett
South Terminal

Dear Mr. Gregoire:

This letter responds to the Pentec reports entitled Site Characterization Report, South Terminal Expansion and Characterization of Sediments at Port of Everett South Terminal Development Project, both dated October 22, 1992. The data in these reports were collected in fulfillment of requirements for conducting a partial characterization of South Terminal sediments. Suggestions for subarea rankings for full characterization (FC) were presented in section 7 of the Site Characterization Report. These suggested rankings and the PSDDA agencies' response follow:

- 1) A "moderate" ranking was recommended for the wood/silt fraction. The PSDDA agencies concur. There were several samples taken from this fraction which contained chemicals-of-concern (COCs) between $(ML+SL)/2$ and ML. There were no detected exceedances of ML in this fraction. The PC guidelines found in the PSDDA Evaluation Procedures Technical Appendix-Phase I (p.II-64) recommend that COC concentrations in this range constitute a "moderate" rank.
- 2) A "low" ranking was recommended for the sand/wood fraction. the PSDDA agencies would label this as "low-moderate". While there was only one COC present above SL, subareas are ranked on a "worst-case" basis under the EPTA guidelines. The SL exceedance dictates a "low-moderate" ranking in this case.
- 3) The Site Characterization Report recommends no further testing for the sand fraction, as this has been shown to be a "native" deposit. The PSDDA agencies agree. The procedures for delineating "native" sediments, as established in the sampling and analysis plan, were followed. There were no SL exceedances for any COC in the sand fraction. This fact, along with data collected in Port Gardner during the U.S. Navy Homeport project, support the suspension of any additional testing requirements for the sand. The PSDDA

Attachment 1

agencies have the flexibility to reduce sampling and testing requirements for native sediments, as established in the 2nd and 3rd annual review meetings.

4) The sawdust/mudflat subarea (stations 1, 2 and 3) is assumed to be unacceptable for open-water disposal given the numerous exceedances of ML.

These PSDDA-agency ranking recommendations were made after a careful analysis of the chemistry data. They are based, in part, on the following assumptions:

1) The detection limit problems encountered for some samples are a result of matrix interference and do not imply elevated concentrations of these COCs. In the wood/silt fraction, the ML was exceeded in at least one sample for the following chemicals: trichloroethene, tetrachloroethene, ethylbenzene and total xylenes (the volatiles); benzoic acid; 1,2,4-trichlorobenzene; benzyl alcohol; 2,4-dimethylphenol; 2-methylphenol. None of the volatiles, benzoic acid or 1,2,4-trichlorobenzene were detected anywhere on site, with detection limits generally below SL in most samples. The other chemicals had their highest concentrations in the sawdust with generally low levels (detected or undetected) in most other samples. Samples adjoining stations with detection limit problems for these chemicals generally had low levels of these chemicals. There is no reason to believe that the detection limit exceedances of ML in the wood/silt fraction were anything but an artifact of the matrix. A moderate rank for these sediments is therefore justified by the data.

2) The sand, wood/sand, wood/silt and sawdust fractions can be adequately separated during the dredging process. This assumption would need to be validated during full characterization. The criteria by which fractions are delineated and the dredging technology required to separate fractions should be addressed in the full characterization sampling and analysis plan.

PSDDA Full Characterization

PSDDA full characterization may be conducted based on the rankings delineated above. Following are guidelines which should be followed in conducting full characterization:

1) A conceptual dredging plan should form the basis in the establishment of dredged material management units. This plan should address the logistics of separating the various sediment fractions, so that the project can realistically be dredged to correspond to the sampling plan. EPTA defines a dredged material management unit as the "smallest volume of dredged material for which a separate disposal decision can be made. A given volume of sediment can only be considered a management unit if it is capable of being dredged and managed separately from all other sediment in the project." The dredged material management units, as defined in the sampling and analysis plan for full characterization,

should be relatively homogenous. The rationale for demonstrating this fact should be presented in the SAP.

2) The cores taken during the FC should be used to verify that everything above the native sand stratum has been sampled and tested. A contingency plan, including coordination with the PSDDA agencies, should be established in the sampling plan which will allow adjustments in the sampling scheme to accommodate deviations from anticipated conditions. For example, if FC sampling provides information which indicates that the native sand stratum is actually four feet below what is now suggested by the data, then an adjustment would be made to the analysis plan to include this material in the overlying stratum. DMMUs would be adjusted or new DMMUs added to account for this material. The PSDDA agencies recommend that DMMUs established for the FC SAP be capable of accommodating volume adjustments without exceeding DMMU volume limits.

3) The conceptual dredging plan should include dredging the top foot of native sands along with the overlying sediment. This reflects the sampling strategy adopted during the PC and provides for the level of precision inherent in dredging operations and the uncertainty involved in predicting horizon depths.

4) All detection limits must be brought below bioaccumulation triggers (BTs) and MLs. Detection limits above BTs will result in the requirement to conduct bioaccumulation testing. Detection limits above MLs may result in the material being judged unacceptable for open-water disposal. It is anticipated, based on PC data, that some actual SL exceedances will occur for most DMMUs. In the absence of detected exceedances of SL, undetects above SL will trigger the requirement for standard biological testing.

5) One sample from station 13 exceeded the BT for mercury. This was an uncomposited sample and does not necessarily reflect the "in-barge" condition of a dredged material management unit after dredging. Under a "moderate" ranking, up to four surface samples could be composited for one analysis. The level of mercury at this station is of potential concern, however, and it is recommended that this station be revisited as part of the sampling and compositing scheme during the FC.

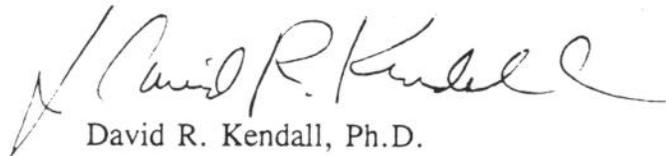
6) If nearshore confined disposal is an option which the Port of Everett wishes to pursue for this material, then testing appropriate for this option should be coordinated with the PSDDA agencies. Sampling and testing for nearshore confined disposal are recommended to be addressed in the same sampling and analysis plan as the full characterization. Issues relevant to nearshore disposal, such as the potential effects of tannin, lignin or other chemicals-of-concern on leachate characteristics and the long-term effects of wood waste in a nearshore fill (eg. methane production), should be coordinated with the agencies through the sampling and analysis plan.

7) Because of anticipated problems in the amphipod test for the wood/silt fraction (due to the high silt content of these sediments), it is recommended that Ampelisca abdita and Rhepoxynius abronius be run either: 1) concurrently; or 2) tiered, with Rhepoxynius being run first with an appropriate reference sediment, and Ampelisca being run only if problems are encountered. A tiered biological testing approach would require advanced planning sufficient to ensure that holding times are not exceeded.

8) Disposal of high wood-content sediments at PSDDA open-water sites is restricted. A rationale for handling woody debris should be presented as part of the sampling and analysis plan. Issues such as possible environmental, aesthetic and economic effects of open-water disposal of woody debris (eg. desorption of COCs, floatable debris, hazards to fishing) should be addressed. A rationale should be presented for determining wood content and a threshold level for prohibition of open-water disposal.

Close coordination with the PSDDA agencies throughout the project is essential due to the complexity of issues which must be resolved, including potential disposal of sediments from outside the South Terminal area into the South Terminal nearshore fill. If you have any questions please contact me or Mr. David Fox at (206) 764-3768.

Sincerely,

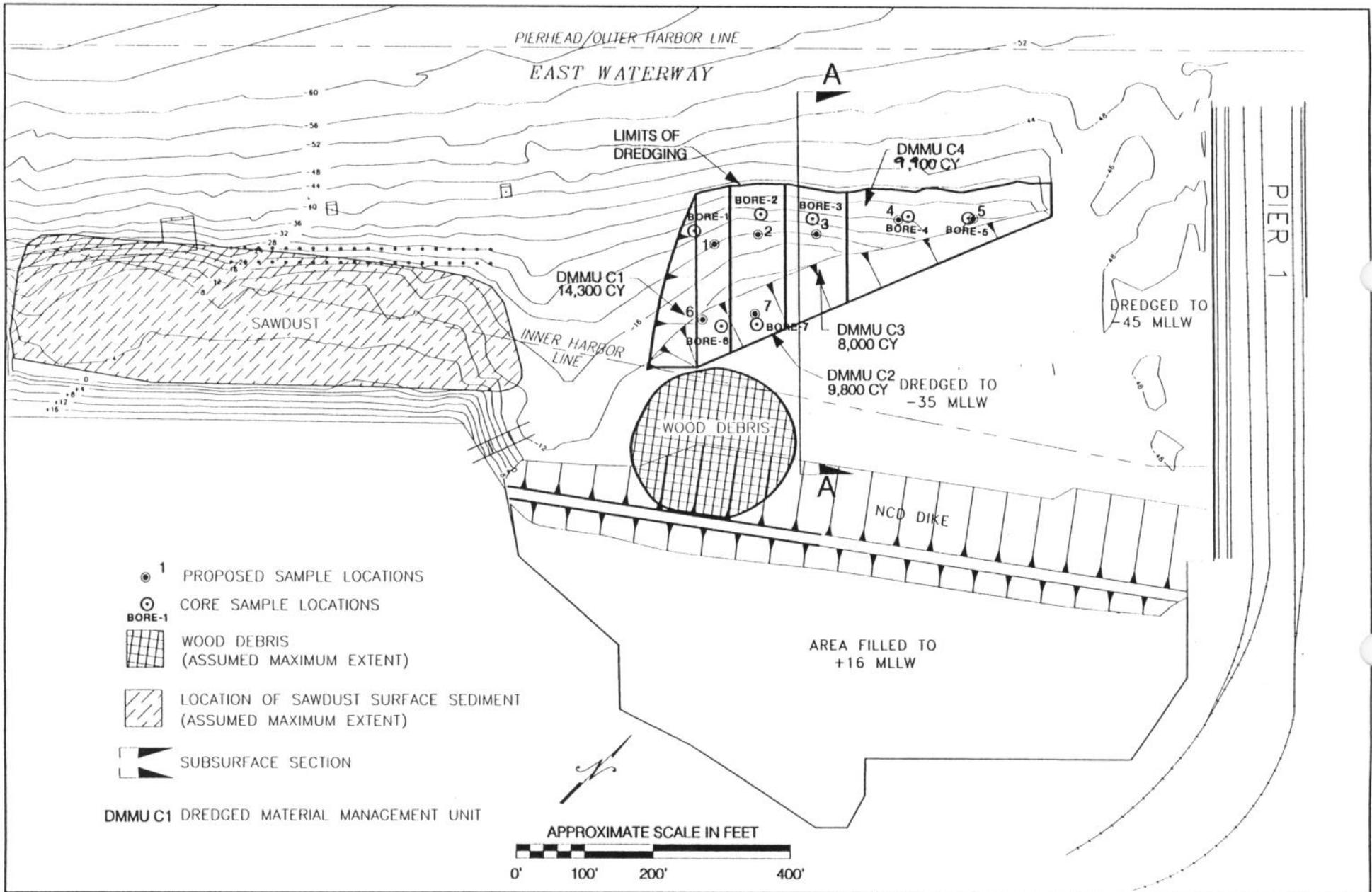


David R. Kendall, Ph.D.
Chief, DMMO

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Attachment 2

Attachment 3
Port of Everett NCD Berth Approach
97-2-00880
June 13, 1997

DMMU	Revised Volume (CY)	Sampling Station	Mudline Elevation (ft)	Native Contact Elevation (ft)
C1	14,300	1	-25.0	-33.9
C2	9,800	2	-26.5	-34.9
C3	8,000	3	-27.0	-32.2
C4	9,900	4	-27.9	-36.3
		5	-24.8	-34.6
Total:	42,000			

Attachment 4
Port of Everett NCD Berth Approach (97-00880)
PSDDA Evaluation Summary
June 13, 1997

				DMMU:	C1		C2		C3		C4		CR23	
				Rank:	M		M		M		M		NA	
Chemical Name	Units	SL	BT	ML	Conc.	VQ	Conc.	VQ	Conc.	VQ	Conc.	VQ	Conc.	VQ
Cadmium	MG/KG	0.96		9.6	2.1		2.4		2.4		2.3			
Lead	MG/KG	66		660	109	J	107	J	112	J	115	J		
2-Methylnaphthalene	UG/KG	67		670			98							
Anthracene	UG/KG	130		1300	660		1200							
Fluorene	UG/KG	64		640	130		200							
Phenanthrene	UG/KG	320		3200			470							
Total LPAH	UG/KG	610		6100	1322		2079							
Indeno(1,2,3-c,d)pyrene	UG/KG	69		5200							100			
Total HPAH	UG/KG	1800		51000							2002			
Hexachlorobutadiene	UG/KG	29	212	290	39									
Dibenzofuran	UG/KG	54		540	58		70							
4-Methylphenol	UG/KG	120		1200	210		350		340		140			
1,2,4-Trichlorobenzene	UG/KG	13		64			15	UJ						
Total DDD,DDE and DDT	UG/KG	6.9	50	69							18.6			
Organic carbon, total	%				8.3	J	14		9.6	J	10		NT	
Total solids	%				33.9		28.5		31.2		35.5		NT	
Total volatile solids	%				42		38		33		32		NT	
Ammonia, total	MG/KG				34		36		52		71		NT	
Total Sulfides	MG/KG				1200	J	1500	J	1200	J	1300	J	NT	
Fines, percent (silt+clay)	%				39		46		51		49		40	
Mytilus trossulus hits:					X		X		X		XX			
Eohaustorius estuaris hits:														
Neanthes arenaceodentata hits:														
Bioassay Pass/Fail:					P		P		P		F		NA	
BTs exceeded:					none		none		none		none		NA	
ML rule exceeded:					no		no		no		no		NA	
PSDDA determination:					P		P		P		F		NA	
DMMU volume (cubic yards):					14,300		9,800		8,000		9,900		NA	

SL = screening level

NT = not tested

U = undetected

X = hit under 2-hit rule

BT = bioaccumulation trigger

NA = not applicable

J = estimate

XX = hit under 1-hit rule

ML = maximum level

M = moderate

VQ = validated qualifier

P = pass

F = fail

Attachment 5
Solid Phase Bioassay Results
Port of Everett NCD Berth Approach
97-2-00880
June 13, 1997

Dredged Material Management Units	Amphipod Mortality (%) (<i>Ampelisca abdita</i>)	Sediment Larval Combined Mortality and Abnormality ¹ (%) (<i>Mytilus trossulus</i>)	<i>Neanthes</i> growth (mg/ind-day) purged ²	<i>Neanthes</i> growth (mg/ind-day) non-purged ³	DMMU Suitability (non-dispersive)
Negative Control	3	0.0	0.42 mortality = 0%	0.73 mortality = 0%	NA
Carr-23 Reference	16	0.15	0.58 mortality = 0%	0.72 mortality = 0%	NA
C1	18	0.44 = X	0.61 mortality = 0%	0.67 mortality = 4%	suitable
C2	20	0.41 = X	0.61 mortality = 0%	0.70 mortality = 0%	suitable
C3	10	0.30 = X	0.60 mortality = 4%	0.75 mortality = 0%	suitable
C4	12	0.67 = XX	0.47 mortality = 4%	0.69 mortality = 0%	unsuitable
Ref. Toxicant:	CdCl ₂	sodium dodecyl sulphate	CdCl ₂	CdCl ₂	
LC50/EC50:	0.68 mg/L	5.0 mg/L	8.4 mg/L	12.7 mg/L	
DAIS Mean ± SD	0.49 ± 0.42 (n = 9)	none available	12.5 ± 5.4 (n = 30)	12.5 ± 5.4 (n = 30)	

¹normalized to negative control (the negative control non-normalized combined mortality and abnormality was 0.30)

²initial weight = 0.59 mg/individual

³initial weight = 0.75 mg/individual

X = hit under the two-hit rule; XX = hit under the single-hit rule; DAIS = Dredged Analysis Information System



May 22, 1997

Mr. David Fox, P.E.
Dredged Material Management Office
Seattle District, US Army Corps of Engineers
PO Box 3755
Seattle, Washington 98124-2255

**Port of Everett NCD Berth Approach PSDDA Sediment Characterization Report
and
Request for Suitability Decision for Additional Dredging**

Dear Dave:

Enclosed is the sampling and analysis report for the Port of Everett's (Port) Nearshore Confined Disposal (NCD) Berth Approach Puget Sound Dredged Disposal Analysis (PSDDA) Sediment Characterization. This report summarizes the field sampling activities and the results of the chemical and biological analyses conducted on the sediment composite samples collected for the full characterization.

It should be noted that there is a significant change in the estimated volumes of the Dredged Material Management Units (DMMUs) characterized for this project. The DMMU volumes presented in the Sampling and Analysis Plan (SAP) and the new estimated DMMU volumes are presented below.

DMMU	Volume in SAP (cy)	New estimated volume (cy)
1	13,700	14,300
2	13,400	9,800
3	11,900	8,000
4	13,100	0,400 9,900 <i>EF</i>
Total	52,100	40,500 42,000 <i>EF</i>

} from phone conversation with Cliff Whitman June 2, 1997

There are primarily two reasons for the change in the estimated volume of the DMMUs. First, the DMMU volumes presented in the SAP were based on 1994 bathymetry data; the new

Mr. David Fox, P.E.
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estimated volumes are based on 1997 bathymetry data. Second, the original volume estimates did not take into account some of the design slopes; vertical cuts were assumed. This caused the original volume estimates to be greater than actually proposed for dredging and provided a volume contingency safety factor. Current volume estimates do not have contingency safety factors included.

As we have discussed, the Port now requires additional navigation depth for access to the NCD Berth (Figure 1); therefore, the area shown on Figure 1 needs to be dredged to -40+2 ft MLLW. This area, including the Barge Berth Approach area, has been characterized to -35+2 ft MLLW during two previous characterizations: the Barge Berth PSDDA Full Characterization conducted in 1994 and the enclosed NCD Berth Approach PSDDA Sediment Characterization. The area covered by the two previous characterizations is shown on Figure 1.

The discussion presented below regarding the suitability of sediments characterized in the NCD Berth Approach Characterization is based on our interpretation of the results of the testing and the likely suitability decisions to be made by the PSDDA agencies for the project. Figure 1 depicts the plan view of the two characterized areas and presents the location of two typical sections. There are nine area/soil units that will be dredged for this project (Table 1).

Unit 1 (Table 1) is DMMU 4 of the NCD Berth Approach Characterization from the existing mudline to the native contact (elevation varies) and is composed of approximately 6,000 cy of wood/silt (Section A-A). This material failed PSDDA biological testing and is not suitable for PSDDA open-water disposal; it will be placed in the NCD fill.

Unit 2 is DMMU 4 of the NCD Berth Approach Characterization from the native contact (elevation varies) to -35+2 ft (the bottom of the characterized area) and is composed of approximately 3,900 cy of native material. Based on the 1992 Partial Characterization conducted within the project area, the PSDDA agencies have determined that all native material is suitable for open-water disposal; no additional testing of native material is required.

Unit 3 is DMMUs 1, 2, and 3 of the NCD Berth Approach Characterization (Section B-B) from the existing mudline to -35+2 ft and is composed of approximately 32,100 cy of wood/silt and native material. Based on the NCD Berth Approach Characterization, this material is considered suitable for open-water disposal.

Mr. David Fox, P.E.
May 22, 1997
page 3

Unit 4 is DMMUs 1, 2, and 3 of the NCD Berth Approach Characterization (Section B-B) from -35+2 ft to the native contact (elevation varies) and is composed of approximately 1,000 cy of wood/silt material. This wood/silt material has not been characterized; however, it lies directly below material (DMMUs 1, 2, and 3) that is suitable for open-water disposal. Therefore, this material is considered suitable for open-water disposal.

Unit 5 is located below DMMUs 1, 2, and 3 of the NCD Berth Approach Characterization from the native contact (elevation varies) to -40+2 ft (Section B-B) and is composed of approximately 7,700 cy of native material. This material is suitable for open-water disposal.

Unit 6 is located below DMMU 4 of the NCD Berth Approach Characterization from -35+2 ft to the native contact (elevation varies; Section A-A) and is composed of approximately 1,000 cy of wood/silt material that has not been characterized. This unit is directly below wood/silt material that failed open-water disposal criteria (Unit 1); therefore, this material is not considered suitable for open-water disposal and will be disposed of in the NCD fill.

Unit 7 is located below DMMU 4 of the NCD Berth Approach Characterization from the native contact or -35+2 ft to -40+2 ft and is composed of approximately 5,500 cy of native material (Section A-A). This material is suitable for open-water disposal.

Unit 8 is located below the area characterized during the Barge Berth Characterization conducted in 1994 (see Figure 1) from -35+2 to -40+2 ft (Sections A-A and B-B) and is composed of approximately 26,000 cy of native material. This material is suitable for open-water disposal.

Unit 9 is outside the footprint of either of the two previous characterizations (Figure 1 and Sections A-A and B-B). This material has not been characterized. The unit is composed of approximately 3,200 cy of material that is assumed to be wood/silt. Since the suitability of this material for open-water disposal is not known, it will be considered unsuitable and disposed of in the NCD fill.

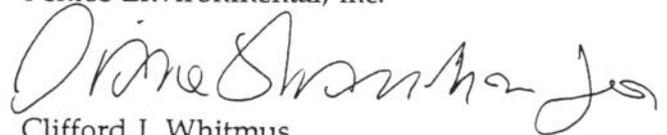
The sediment represented in the units described above can be combined into three material type/suitability groups for suitability determination (Table 2). Combining Units 1, 6, and 9, there is approximately 10,200 cy of unsuitable wood/silt material. There is approximately 33,100 cy of wood/silt/native material from Units 3 and 4, which is suitable for open-water

Mr. David Fox, P.E.
May 22, 1997
page 4

disposal, and there is approximately 43,100 cy of native material from Units 2, 5, 7, and 8, which is suitable for open-water disposal.

The Port is in the process of submitting a single US Army Corps of Engineers 404 permit application for dredging the area characterized in the NCD Berth Approach Characterization (to -35+2 ft) and dredging from -35 to -40+2 ft throughout the entire project area. On behalf of the Port, I request that the PSDDA agencies issue a single suitability determination for all the above-described dredging. If you have any questions, please call me at (425) 775-4682. Thank you for your consideration.

Sincerely,
Pentec Environmental, Inc.



Clifford J. Whitmus
Senior Fisheries Biologist/Principal

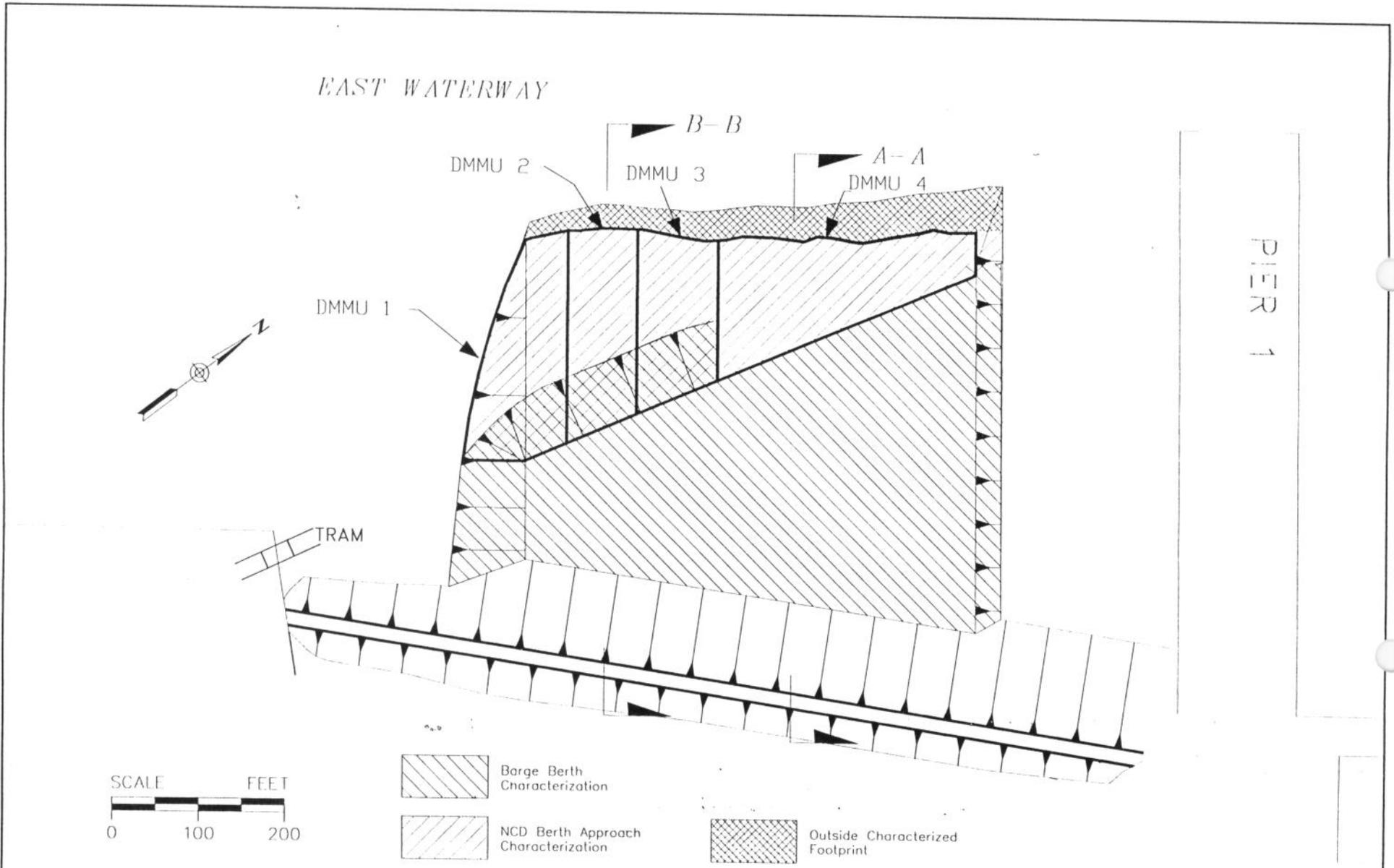
CJW/ds
Enclosure

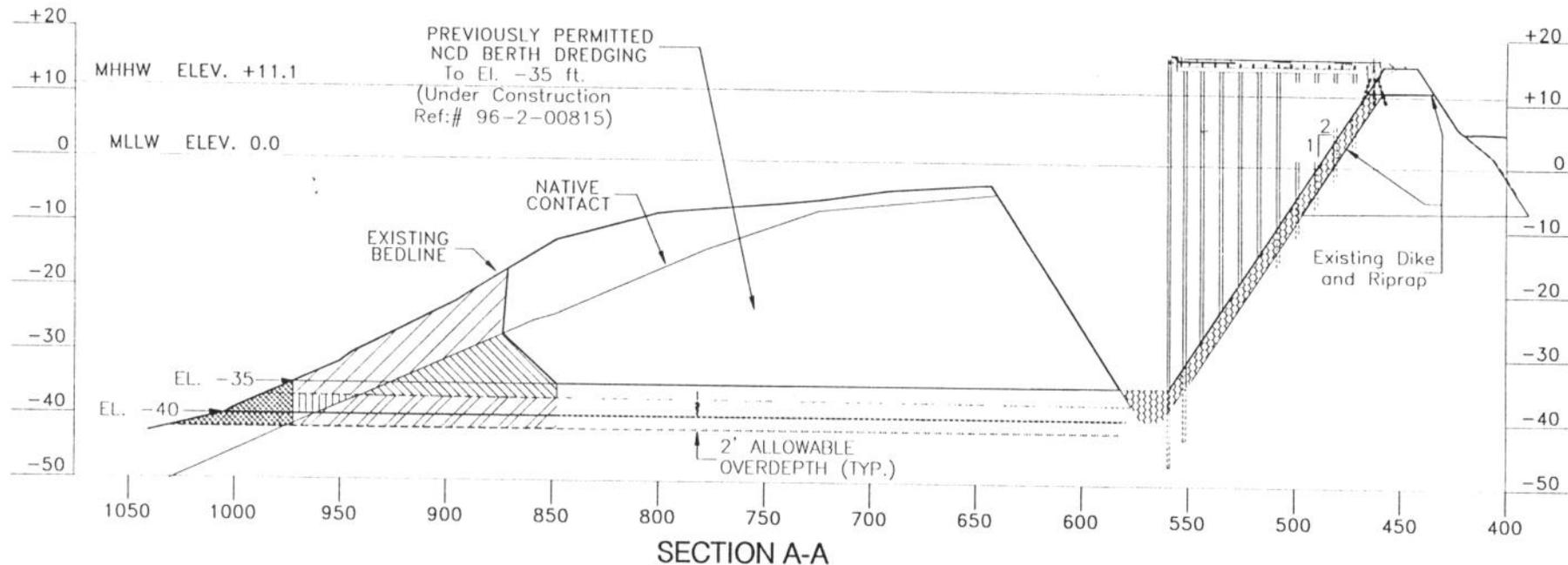
cc: Ms. Justine Barton, United States Environmental Protection Agency
Ms. Vernice Santee, Washington State Department of Ecology
Mr. Ted Benson, Washington Department of Natural Resources
Mr. Dennis Gregoire, Port of Everett

Table 2 Combined material type/suitability groups for PSDDA suitability determination.

Material type	Units	Volume (cy)	PSDDA suitability determination	Disposition
Wood/silt	1, 6, and 9	10,200	Unsuitable for open-water disposal	NCD Fill
Wood/silt/native	3 and 4	33,100	Suitable for open-water disposal	PSDDA open-water, NCD cap, or upland
Native	2, 5, 7, and 8	43,100	Suitable for open-water disposal	PSDDA open-water, NCD cap, or upland

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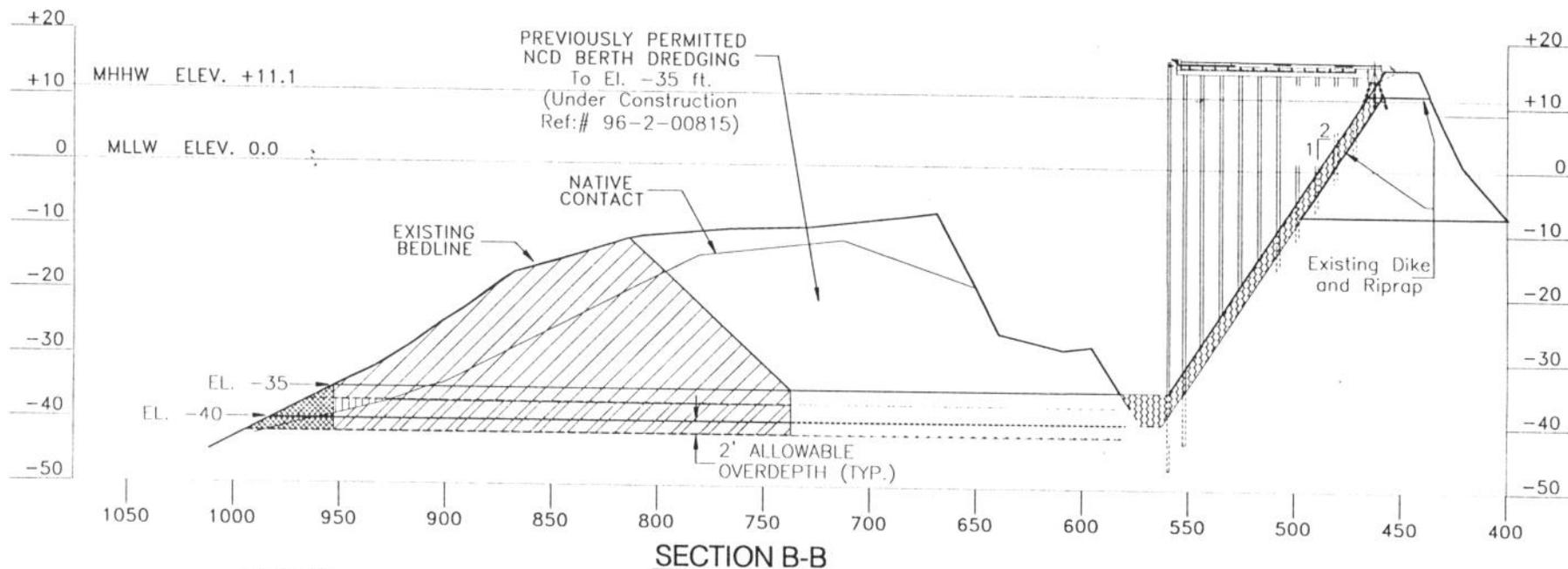
SECTION A-A

LEGEND

- 1997 EXISTING SURFACE
-  Unit 1 – NCD Berth Approach DMMU 4 (above native contact)
-  Unit 2 – NCD Berth Approach DMMU 4 (below native contact)
-  Unit 6 – Area Below NCD Berth Characterized, DMMU 4 (above native contact)
-  Unit 7 – Area Below NCD Berth Characterized, DMMU 4 (below native contact)
- Unit 8 – Area Below Barge Berth Characterization Conducted in 1994
-  Unit 9 – Area Outside of Characterized Footprint

NOTE:

ELEVATIONS SHOWN ARE IN FEET AND ARE BASED ON MEAN LOWER LOW WATER DATUM (MLLW)
 HORIZONTAL & VERTICAL SCALE IN FEET



LEGEND

- 1997 EXISTING SURFACE
-  Unit 3 – NCD Berth Approach DMMU's 1, 2, and 3
-  Unit 4 – Area Below NCD Berth Characterized, DMMU's 1, 2, and 3 (above native contact)
-  Unit 5 – Area Below NCD Berth Characterized, DMMU 1, 2, and 3 (below native contact)
-  Unit 8 – Area Below Barge Berth Characterization Conducted in 1994
-  Unit 9 – Area Outside of Characterized Footprint

NOTE:

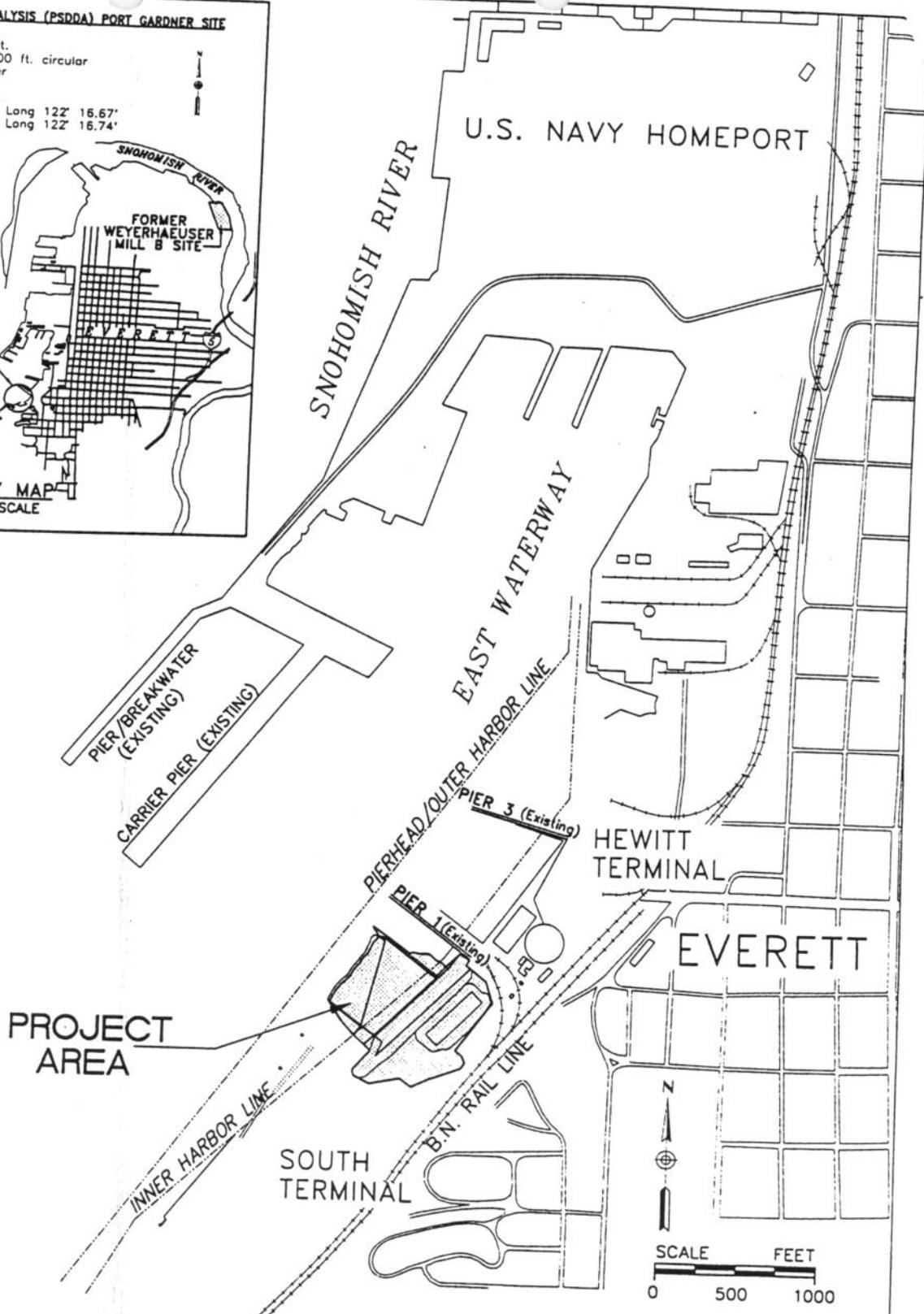
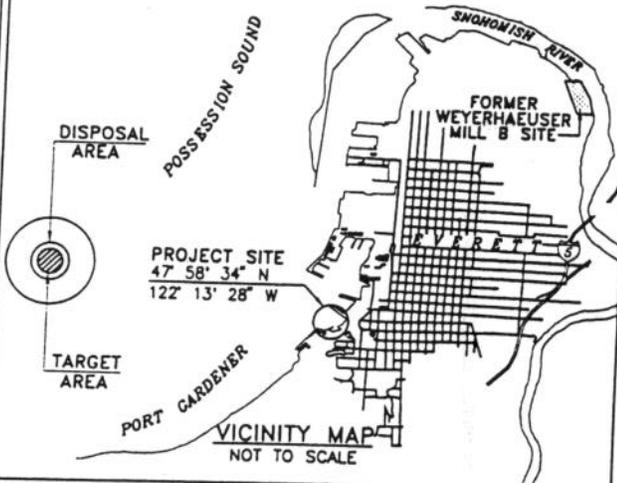
ELEVATIONS SHOWN ARE IN FEET AND ARE BASED ON MEAN LOWER LOW WATER DATUM (MLLW)

HORIZONTAL & VERTICAL SCALE IN FEET

SECTION B-B

PUGET SOUND DREDGE DISPOSAL ANALYSIS (PSDDA) PORT GARDNER SITE

TYPE: Nondispersive
 AREA: 318 Acres DEPTH: 420 ft.
 SITE DIMENSIONS: 4200 ft. by 4200 ft. circular
 DISPOSAL ZONE: 1800 ft. Diameter
 TARGET AREA: 1200 ft. Diameter
 BARGE POSITIONING METHOD: GPS
 NAD 27 LOCATION: Lat 47° 58.86' Long 122° 16.67'
 NAD 83 LOCATION: Lat 47° 58.85' Long 122° 16.74'



PURPOSE: Modernize & Upgrade Existing Port Facilities & Construct New Berth Facility

- DATUM:** MLLW = 0.0' N.O.S.
ADJACENT PROPERTY OWNERS:
1. City of Everett (South)
 2. Scott Paper Co. (North)
 3. Burlington Northern RR (East)
 4. State DNR (West)

LOCATION AND VICINITY MAP

REF: 97-2-00880

STAGE 1 MARINE TERMINAL IMPROVEMENTS

IN: Port Gardner AT: Everett
 COUNTY OF: Snohomish STATE: WA
 APPLICATION BY: Port of Everett
 SHEET: 1 of 4 DATE: 05/22/97

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