

MEMORANDUM FOR RECORD

8 July 1998

SUBJECT: DETERMINATION ON THE SUITABILITY OF MAINTENANCE MATERIAL DREDGED FROM THE EAST ENTRANCE TO WESTHAVEN COVE (WESTPORT) MARINA (CENPS-OP-TS-NS-97) IN GRAYS HARBOR, WASHINGTON EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT (CWA) FOR OPEN-WATER DISPOSAL AT THE POINT CHEHALIS OPEN WATER DISPOSAL SITE.

1. The Corps proposes to maintenance dredge approximately 23,000 cy of material from the east entrance to Westhaven Cove (Westport) Marina to restore the authorized navigation depth to 16 feet (MLLW). The proposed dredged material would be disposed at the Point Chehalis dispersive open-water disposal site.
2. The project area was ranked moderate for this characterization by the DMMP agencies (Corps, EPA, Ecology, DNR). A sampling and analysis plan was submitted to the DMMP agencies for approval on 19 March 1998. The SAP was approved by the DMMP agencies on 1 April 1998.
3. Sampling to characterize the 23,000 cy of material was initiated on 29 April 1998. Sampling consisted of collecting six Vibracore samples, which were composited into two dredged material management units (C-1 and C-2, each comprised of three core subsamples). The location of the six surface core samples are depicted in Figure 1. The core samples sampled material from approximately 13 feet (MLLW) to the authorized depth of 16 feet (MLLW) including one foot of overdepth. The DMMP agency's approved SAP was followed. The data gathered were deemed sufficient and acceptable for decision making by the Agencies based on best professional judgment.
4. Relevant dates for regulatory tracking purposes are included in Table 1.

Table 1. Regulatory Tracking Dates

SAP Approval date:	April 1, 1998
Sampling date(s):	April 29, 1998
Data report submittal date:	July 7, 1998
Recency Determination Date: Moderate Concern (5 years)	April 2003

5. Table 2 summarizes the sediment conventional parameters for the two surface analyses conducted. Chemical analysis of the composited samples indicated that there were no detected or undetected exceedances of screening levels for all 56 chemicals of concern, including tributyltin. Analyses also included quantifying congeners of dioxin (2,3,7,8-TCDD), which are discussed below (see Table 3).

6. The two composited sediment samples were analyzed for dioxins by Maxim Technologies, Incorporated utilizing EPA method 8290. These data are summarized in Table 3. Results indicated that 2,3,7,8 TCDD (Tetrachloro-Dibenzo-p-Dioxin) was detected in both samples ranging from a low of 0.31 to a high of 0.67 ppt (parts per trillion). This congener is regarded by the EPA as the most toxic form of dioxin. A few other less toxic dioxin congeners were detected at low parts per trillion concentrations. In the following table, the toxicity equivalence in terms of 2,3,7,8-TCDD is shown for the nine most toxic congeners of furan and dioxin (undetected congeners were summed at ½ the detection limit).
7. One way to summarize potential toxicity for mammals is to calculate the toxicity equivalent concentrations (TEC) measured in tissue. Total TEC is calculated by multiplying the toxicity equivalent factor (TEF) by the congener specific concentration and summing the TEC's for all congeners. Total TEC comparisons are usually used for food ingestion, and have limited applicability to sediment because TEC **does not** consider the relative bioavailability of the congeners. Accordingly, TEC overstates toxicity to mammals when applied to sediments. TEC as a toxicity measure does not apply to fish, shellfish or birds. For comparison purposes only, the TEC's ranged from a low of 2.0 to a high of 6.3 ppt.
8. To facilitate a timely turn around on the testing, bioassays were initiated concurrently with the chemical analyses on these two DMMU's. Initial concurrent biological testing was performed on the two DMMU and consisted of the standard suite of bioassays: amphipod (*Rhepoxynius abronius*) bioassay, the 20-day *Neanthes* growth test, and the echinoderm larval (*Dendraster excentricus*) bioassay. The performance standards and interpretation guidelines specified for Grays Harbor and Willapa Harbor were used to evaluate the bioassay data collected (Table 4). Reference sediments were collected from approved Grays Harbor reference sites. Two different reference samples were collected from the GHS7 station to match the grain sizes of the two samples analyzed from the Westport Marina (see Tables 2 and 5). Both control sediments and reference sediments met the performance standards for all three bioassays conducted.
9. The results of the initial bioassays indicated that there was no toxicity observed in either of the two DMMUs analyzed for the amphipod and the *Neanthes* bioassays. The results for the initial testing round for the echinoderm larval bioassay were problematic however, and both DMMU showed anomalous responses indicating apparent toxicity. An examination of the larval echinoderm data ensued to ascertain whether a retest of one or both of the DMMU was justified. In reviewing the data DMMU C-2 had an apparently low interstitial salinity measurement (19.5 ppt) that may have contributed to an anomalous result, whereas interstitial salinity measured 25 ppt for C-1. The DMMP agencies subsequently authorized a retest of C-2 but not C-1.
10. The retest of C-2 for the Westport Marina clarified that the initial testing result may have been anomalous for the initial echinoderm larval test. The retest results indicated that the combined endpoint for C-2 was only 1.6 percent over the reference response, which is well below the 15% guideline for a single hit response, and was not statistically significant. The comparative summary results for both testing rounds are depicted in Table 4. The round 2 echinoderm results for C-2 compared favorably with the amphipod and *Neanthes* results, all depicting test responses similar or less than the reference response. In light of the round 2 results for C-2, the DMMP agencies agreed to set aside the round 1 results for the echinoderm larval bioassay for DMMU C-1 and DMMU C-2 using best professional

judgment (BPJ). Therefore, both C-1 and C-2 are considered suitable for unconfined open-water disposal under the dispersive site guidelines for Grays Harbor.

11. The agencies concluded that both DMMU tested passed PSDDA dispersive site guidelines for open-water disposal. The estimated 23,000 cy of material is suitable for placement at the Point Chehalis open-water dispersive disposal site.
12. This memorandum documents the suitability of proposed dredged sediments from the Westport Marina for disposal at the Point Chehalis dispersive open-water disposal site. However, this suitability determination does not constitute final agency approval of the project. A dredging plan for this project must be completed as part of the final project approval process. A final decision will be made after full consideration of agency input, and after an alternative analysis is done under Section 404(b)(1) of the Clean Water Act.

Concur:

Date

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Table 2. Sediment conventional results for the east entrance to Westhaven Cove (Westport) Marina.

Parameter	DMMU C-1	DMMU C-2
Grain Size:		
% Gravel	7.9	3.2
% Sand	62.0	47.9
% Silt	21.9	34.1
% Clay	8.3	14.8
% Fines (clay+silt)	30.2	48.9
Total Solids, %	71.0	61.4
Volatile Solids, %	3.6	5.3
Total Organic Carbon, %	1.4	1.4
Total Sulfides, mg/kg	17.0	650
Total Ammonia, mg/kg	7.2	18

11,350 cy

11,350 cy

Table 3. Native congeners of Dioxin quantitated from the Westport Marina Entrance Channel sediments.

NATIVE CONGENERS ¹ (pptr)	TEF ²	C1 (TEC)	C2 (TEC)
2,3,7,8-TCDD	1	0.31 (0.31)	0.67 (0.67)
1,2,3,7,8-PeCDD	0.5	1.5u (0.20)	1.3 (0.65)
1,2, ,7,8-HxCDD	0.1	3.1 (0.31)	9.4 (0.94)
1,2,3,4,7,8-HpCDD	0.01	67 (0.67)	256 (2.56)
OCDD	0.001	160 (0.16)	600 (0.60)
2,3,7,8-TCDF	0.1	1.0 (0.1)	2.1 (0.21)
1,2,3,7,8-PeCDF	0.05	0.26 (0.01)	0.17 (0.01)
2,3,4,7,8-PeCDF	0.5	0.21 (0.11)	0.49 (0.25)
1,2,3,7,8-HxCDF	0.1	1.30 (0.13)	3.07 (0.31)
1,2,3,7,8-HpCDF	0.01	3.55 (0.04)	10.08 (0.10)
OCDF	0.001	4.5 (0.005)	15 (0.015)
TOTALS:		2.045	6.315

¹ TCDD = Tetrachlorodibenzodioxin TCDF = Tetrachlorodibenzofuran
 PeCDD = Pentachlorodibenzodioxin PeCDF = Pentachlorodibenzofuran
 HxCDD = Hexachlorodibenzodioxin HxCDF = Hexachlorodibenzofuran
 HpCDD = Heptachlorodibenzodioxin HpCDF = Heptachlorodibenzofuran
 OCDD = Octachlorodibenzodioxin OCDF = Octachlorodibenzofuran

² Toxicity Equivalent Factor (TEF's summed for each congener expressed in parenthesis)

Table 4(a). SOLID PHASE BIOASSAY PERFORMANCE STANDARDS

PARAMETER	AMPHIPOD BIOASSAY	SEDIMENT LARVAL BIOASSAY	<i>NEANTHES</i> 20-DAY GROWTH TEST
Negative control performance	Mortality $\leq 10\%$	CMA ¹ $\leq 30\%$	Mortality $\leq 10\%$ Growth rate ³ ≥ 0.38
Reference sediment performance	Reference mortality minus control mortality $\leq 20\%$	NCMA ² $\leq 35\%$	Mean individual growth rate ³ $\geq 80\%$ of control

¹ Combined mortality and abnormality.

² Normalized combined mortality and abnormality (see text).

³ Expressed as mg/individual-day (dry weight); ≥ 0.72 as a performance target.

Table 4(b). SOLID PHASE BIOASSAY INTERPRETIVE GUIDELINES FOR SINGLE-HIT FAILURES ¹

INTERPRETIVE COMPARISON	AMPHIPOD BIOASSAY	SEDIMENT LARVAL BIOASSAY	<i>NEANTHES</i> 20-DAY GROWTH TEST
Test response comparison to negative control	Test sediment mortality minus control mortality $> 20\%$	Test sediment NCMA $> 20\%$	Mean test sediment individual growth rate $< 80\%$ of mean control individual growth rate
Test response comparison to reference sediment	Test sediment mortality minus reference mortality $> 10\%$	Test sediment NCMA minus reference NCMA $> 15\%$	Mean test sediment individual growth rate $< 70\%$ of reference
Statistical comparison to reference sediment	Statistical significance ($p < 0.05$)	Statistical significance ($p < 0.10$)	Statistical significance ($p < 0.05$)

¹ Test sediment responses which are less than the interpretative criteria shown in Table 10-2 for a "single-hit" failure, but exhibit a response greater than 20% over the control, and are significantly different from the reference sediment are interpreted as a "two-hit" response, requiring another "hit" (single or double) to judge a DMMU unsuitable for unconfined open-water disposal.

Table 5. Bioassay Testing Summary for Westport Marina DMMU.

Station	Amphipod (Rhepoxynius abronius) % mortality	Neanthes Growth (Ind. Growth rate) mg/ind/day	Echinoderm Larval (Dendraster sp.) (NCMA) ³ % Initial	Echinoderm Larval (Dendraster sp.) (NCMA) % Retest	DMMP (suitable/unsuitable)
Control	1.0 ± 2.2	0.46 ± 0.12	0.0 ± 10.1	0.0 ± 26.5	
Reference (GHS7-10) (13 % fines)	4.0 ± 5.5	0.43 ± 0.07	5.1 ± 10.0	29.8 ± 19.6	
Reference (GHS7-65) (44.2 % fines)	9.0 ± 4.2	0.49 ± 0.10	-0.5 ± 5.6	27.3 ± 33.4	
DMMU C1 (30.2 % fines)	8.0 ± 5.7	0.49 ± 0.06	28.6 ± 8.8 ^(SH)	Not Retested	Suitable (BPJ)
DMMU C2 (48.9 % fines)	8.0 ± 8.4	0.47 ± 0.13	48.7 ± 9.7 ^{(SH)⁴}	28.9 ± 17.7	Suitable (BPJ)
Reference Toxicant:	0.92 mg/L Cd (96 hr LC50)	7.18 mg/L Cd (96 hr LC50)	7.78 mg/L Cd (EC50)	4.96 ⁵ mg/L Cd (EC50)	
Lab control limits:	0.0 - 2.84 mg/L	1.9 - 15.0 mg/L	5.1 - 12.6 mg/L	5.1 - 12.6 mg/L	

Shaded reference indicates appropriate reference for interpretation

SH = Single Hit (test sediment NCMA > 15% absolute over reference sediment NCMA, and statistically significant, p < 0.1)

³ NCMA = normalized combined mortality and abnormality

⁴ Retesting Authorized by DMMP due to low interstitial salinity (19.5 ppt), which may have contributed to low larval survival.

⁵ Retest Reference Toxicant Test at lower end of Laboratory Control Limit. Lab expects an exceedance of Control Limits 5 percent of time. They judged the test as being a valid test based on these results.