CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD **May 16, 2001**

SUBJECT: DETERMINATION ON THE SUITABILITY OF PROPOSED FEDERAL OPERATION AND MAINTENANCE DREDGED MATERIAL FROM GRAYS HARBOR, WASHINGTON (*Public Notice CENWS OD-TS-NS-12*) EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR OPEN-WATER DISPOSAL AT THE SOUTH JETTY OR POINT CHEHALIS DISPERSIVE SITES, OR AT SOUTH BEACH OR HALF MOON BAY BENEFICIAL USE SITES.

1. **Introduction**. The following summary reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) on the suitability of material from Grays Harbor, Washington (Figure 1) for unconfined open-water disposal. The requirements for determining the suitability of this material are documented in *"Dredged Material Evaluation Procedures and Disposal Site Management Manual, Grays Harbor and Willapa Bay, Washington"* (GHDMEP, 1995). As outlined in the GHDMEP, full sediment characterization of dredged material from the federal navigation channel is required on a rotating, biennial basis for the reaches of concern in the inner portions of Grays Harbor. Per exclusionary criteria specified in Section 40 CFR 230.60 of the Clean Water Act, no contaminant testing is required for the outer reaches (Entrance, Bar, and South channels). This exclusion is based on distance from known sources of contamination, generally coarse grain sizes and the high energy environment of these areas.

For this project an estimated 1.86 million cubic yards (mcy) of maintenance material is proposed to be dredged annually from the upstream portions of the federal navigation channel. Approximately 1/3 of this material (620,000 cy) underwent GHDMEP sampling and testing as part of the 2000 effort. An additional 1/3 of the material will be tested in 2002, and the last 1/3 in 2004, to complete the current six-year round of testing. Disposal is anticipated to be at the Point Chehalis and South Jetty estuarine sites or at beneficial use sites nearshore or onshore of South Beach or Half Moon Bay.

Table 1. Regulatory Tracking Dates

Programmatic SAP & addendum received	July 7, 2000
SAP approved	July 14, 2000
Sampling dates	July 17-20, 2000
Data report submitted	December 12, 2000
Recency Determination: Low Concern (6 years)	July 2006

Table 2. Project Synopsis.

Time of proposed dredging	Annually, February through August, except during fish windows
Proposed disposal sites	Point Chehalis and South Jetty open water dispersive sites; Half Moon Bay and/or South Beach nearshore beneficial use sites, or HMB direct beach nourishment, as needed and approved.
Sediment ranking	low
Project last dredged	2000

2. **Background**. Dredging of the Grays Harbor navigation channel takes place annually to maintain the channel at the authorized depth. Characterization of this channel is not project specific, per the GHDMEP, but performed on a rotating basis. This approach characterizes the dredging volume over time rather than for a specific dredging event. The low rank of the area, and results from over a decade of sampling in the area continue to support this approach.

The year 2000 began the second six-year rotation of sampling and testing based on the GHDMEP. In order to plan holistically for the entire round of sampling, a programmatic sampling and analysis plan was prepared (Striplin 2000a). This PSAP looked at historic dredging volumes in various reaches of the navigation channel and devised a strategy for insuring that the sampling adequately represented those volumes. A SAP addendum was also prepared to address sampling issues specific to the 2000 sampling and testing event. If needed, addenda will also be prepared for subsequent sampling events during the six year testing rotation.

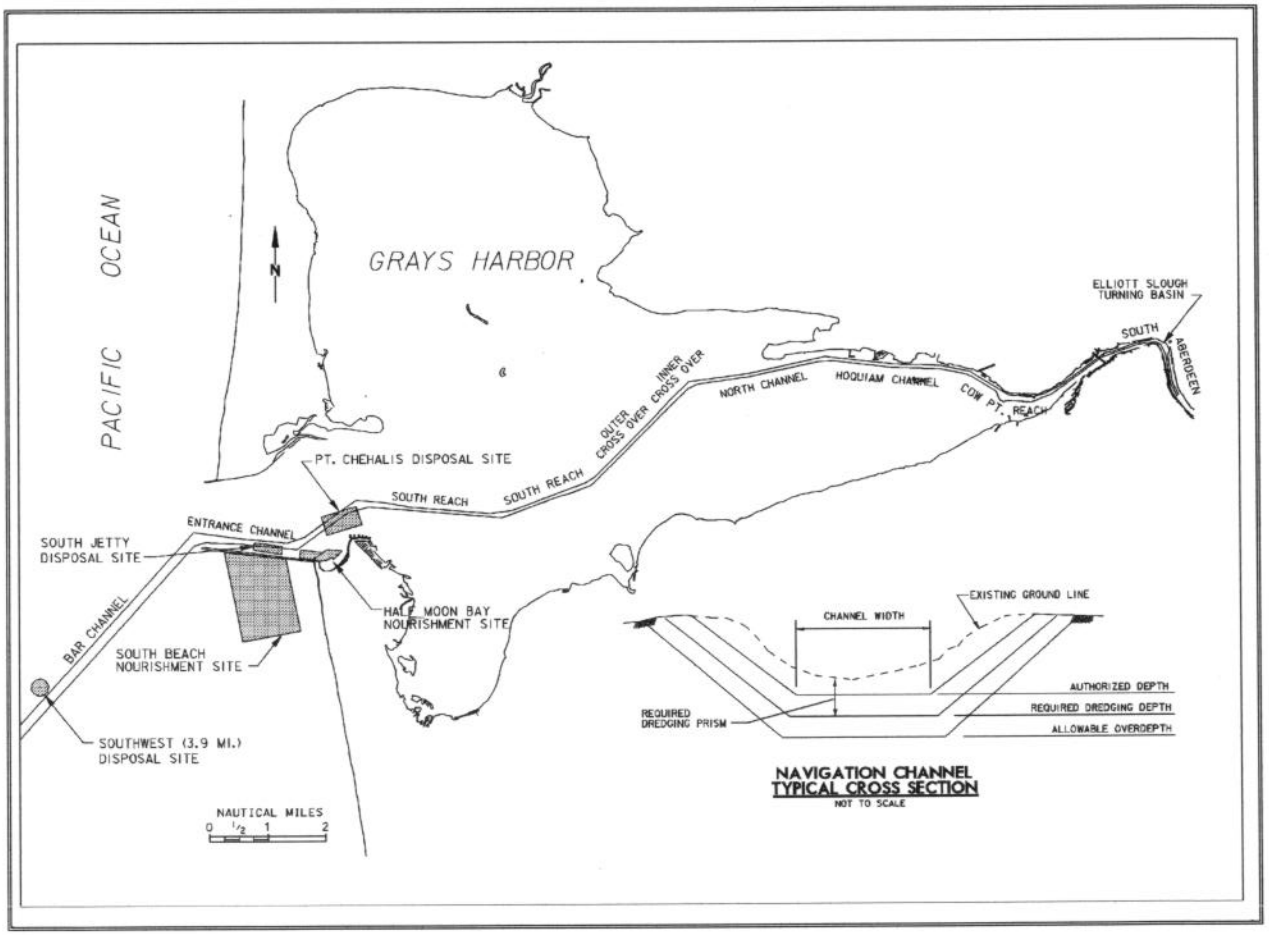

Figure 1. Grays Harbor navigation project. Samples in the 2000 characterization were from the Cow Point and South Aberdeen reaches, and the Elliott Slough Turning Basin.

3. **Sampling**. Sediment sampling took place from July 17 - 20, 2000. For the 2000 characterization, as in the past, the area was ranked "low," and the material available for dredging was considered homogenous. The approved programmatic and 2000 addendum sampling and analysis plans were followed, and quality assurance/quality control guidelines specified by the GHDMEP sampling and testing guidelines were generally complied with. The field sampling effort included collection of 82 sediment grab samples for compositing into 11 dredged material management unit (DMMU) samples. It also included collection of reference sediment in anticipation of performing confirmatory bioassays. Conventional parameters measured in these 11 DMMU samples are depicted in Table 3.

Table 3. Sediment conventional results.

						bioassays						bioassays	REFERENCE	
		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	NAS #6501	GHS7 b
Volume (cubic yards)		60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	47,000	60,000	33,000	na	na
GRAIN SIZE	% Gravel	0.9	2.5	1.4	1.0	1.9	1.6	0.9	0.4	16.1	3.7	6.5	0	1.2
	% Sand	22.6	8.2	20.5	21.1	24.6	23.3	47.6	54.6	79.4	69.1	80.9	100	21.1
	% Silt	62.1	65.8	63.4	61.6	59.4	61.4	40.5	33.6	2.8	21.9	8.9	0	52.1
	% Clay	14.2	23.3	14.7	16.3	14.3	13.6	11.0	11.4	1.7	5.3	3.7	0	25.6
	% Fines (clay+silt)	76.3	89.1	78.1	77.9	73.7	75.0	51.5	45.0	4.5	27.2	12.6	0	77.7
Total Solids, %		44.1	36.6	41.0	43.5	44.2	44.3	51.1	54.1	74.9	58.1	72.1	82.7	45.0
Volatile Solids, %		7.2	8.9	8.0	7.6	7.6	7.5	5.9	5.6	2.6	4.8	3.1	0.49	7.7
Total Organic Carbon, %		2.0	2.5	3.6	2.1	2.2	2.3	2.0	2.0	0.8	3.2	1.7	0.047	2.2
Total Sulfides, mg/kg		8.7	<2.6	16.0	160	12.0	150	8.8	<2	<1.7	<1.3	<1.4	<2	na
Total Ammonia, mg N* kg^{-1}		57	88	76	65	61	63	38	28	3.3	26	12	<0.24	38

4. **Chemical Analysis**. The Agencies' approved sampling and analysis plan was followed, and quality assurance/quality control guidelines specified by PSEP and the DMMP program were generally complied with, except as noted below. Chemical analysis results (Table 4) demonstrated that all dredged material management units characterized showed no detected chemical exceedances of DMMP screening levels.

In one DMMU (C10), the semi-volatiles analyzed with EPA method 8270 could not be concentrated enough to achieve the lowest detection limits. For four of these chemicals (2,4 dimethlyphenol, hexachlorabutadiene, n-nitrosodiphenylamine and hexachlorobenzene) the detection limit of 39 ppb exceeded the DMMP SL. From the final data report (Striplin 2000b): "These compounds were undetected in all other samples at detection limits below the SL values. Undetected concentrations of hexachlorobutadiene at 30 ppb exceeded the DMMP value of 20 ppb in two samples in 1992. Hexachlorobutadiene and the three other chemicals listed above have not been detected in recent Corps characterizations, and the exceedances appear to be entirely due to the elevated detection limit for semi-volatile organic compounds in sample C10 that resulted from a greater final extract volume." The agencies agreed with this conclusion and did not require biological testing specifically for C10, as is usually done when detection limits exceed the SL. Confirmatory biological testing of two DMMU (C5 and C11) was considered sufficient for biological testing and decision making for this project.

The GHDMEP suggests analysis of special "chemicals of concern" for the Grays Harbor area. These analyses are in addition to the suite of chemical analyses routinely required for DMMP testing. Guaiacols and resin acids were considered special COCs for this characterization. No guaiacols were detected in any sample. Low levels of three out of four resin acids were detected in some samples, but the levels detected were much lower than levels generally associated with environmental or human health effects.

5. **Comparison to SMS Guidelines**. All results of the chemical analyses were organic carbon normalized, if necessary, and compared to Washington State Sediment Management Standards. All detected chemicals were well below Sediment Quality Standards (SQS). In addition, the non-detected levels of two of the four chemicals (hexachlorobutadiene and N-nitrosodiphenylamine) that exceeded DMMP SLs in C10 did NOT exceed state SQS guidelines when TOC normalized. However, non-detected levels of hexachlorobenzene and 2,4-dimethylphenol exceeded SQS as well as DMMP guidelines.

Table 4. Results of chemical analysis.

Chemical Parameter	DMMP PROGRAM SL (1998)	BT (1998)	ML (1998)	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
Metals:	**mg/kg dry weight**													
Antimony	150	150	200	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9 U	6 U	8 U	7 U
Arsenic	57	507.1	700	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9 U	6 U	8 U	7 U
Cadmium	5.1	--	14	0.4 U	0.4 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4	0.4 U	0.3	0.3	0.3 U
Chromium	--	--	--	39	41	40	37	36	37	35	35	36.5	38.7	33.4
Copper	390	--	1,300	54.8	60.4	57.5	56.3	54.4	53.2	49.9	50.2	45	49.5	50.1
Lead	450	--	1,200	10	12	12	10	10	9	9	9	6	9	8
Mercury	0.41	1.5	2.3	0.08 U	0.08 U	0.1 U	0.09 U	0.1 U	0.1 U	0.09 U	0.09 U	0.05 U	0.07 U	0.06 U
Nickel	140	370	370	26	29	29	27	26	27	28	29	35	33	34
Silver	6.1	6.1	8.4	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	0.6 U	0.4 U	0.5 U	0.4 U
Zinc	410	--	3,800	78	83	80	77	75	77	76	74	66.2	74.0	71.2
Nonionizable Organic Compounds:	**ug/kg dry weight**													
Aromatic Hydrocarbons														
Total LPAH	5,200	--	29,000	36	43	43	33	61	51	33	24	0	48	201
Naphthalene	2,100	--	2,400	19U	13MJ	12J	20U	12J	13J	19U	19U	19U	39U	14U
Acenaphthylene	560	--	1,300	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19J
Acenaphthene	500	--	2,000	19U	19U	11J	20U	19J	13J	19U	19U	19U	39U	48
Fluorene	540	--	3,600	19U	19U	20U	20U	14J	11J	19U	19U	19U	39U	33
Phenanthrene	1,500	--	21,000	36	43	43	33	61	51	33	24	19U	48	120
Anthracene	960	--	13,000	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	11J
2-Methylnaphthalene	670	--	1,900	19U	19U	10J	20U	13J	20U	19U	19U	19U	39U	19U
Total HPAH	12,000	--	69,000	69	110	70	67	90	90	68	55	-	205	196
Fluoranthene	1,700	4,600	30,000	36	45	36	36	52	49	38	32	19U	130	100
Pyrene	2,600	--	16,000	33	45	34	31	38	41	30	23	19U	75	73
Benzo[a]anthracene	1,300	--	5,100	10J	16MJ	9.6J	9.6J	14J	15J	12J	9.4MJ	19U	24J	23
Chrysene	1,400	--	21,000	13J	20	13J	16J	17J	16J	12J	12J	19U	25J	17J
Total benzofluoranthenes	3,200	--	9,900	10J	18MJ	11MJ	12MJ	13MJ	12MJ	19U	19U	19U	38MJ	21J
Benzo[a]pyrene	1,600	3,600	3,600	19U	19U	9.5MJ	12MJ	10MJ	12MJ	19U	19U	19U	39U	19U
Indeno[1,2,3-c,d]pyrene	600	--	4,400	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Dibenzo[a,h]anthracene	230	--	1,900	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Benzo[g,h,i]perylene	670	--	3,200	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Chlorinated Benzenes	**ug/kg dry weight**													
1,2-Dichlorobenzene	35	37	110	1.9 U	2.2U	2.0U	1.9 U	2.0U	1.4 U	1.9 U	1.2U	1.1U	1.0U	1.0U
1,3-Dichlorobenzene	170	1,241	--	1.9 U	2.2U	2.0U	1.9 U	2.0U	1.4 U	1.9 U	1.2U	1.1U	1.0U	1.0U
1,4-Dichlorobenzene	110	120	120	1.9 U	2.2U	2.0U	1.9 U	2.0U	1.4 U	1.9 U	1.2U	1.1U	1.0U	1.0U
1,2,4-Trichlorobenzene	31	--	64	9.4U	11U	10U	9.3U	9.8U	7.1 U	9.7U	6.1U	5.3U	5.0U	5.2U
Hexachlorobenzene	22	168	230	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Phthalate Esters	**ug/kg dry weight**													
Dimethyl phthalate	1,400	1,400	--	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Diethyl phthalate	1,200	--	--	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Di-n-butyl phthalate	5,100	10,220	--	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Butyl benzyl phthalate	970	--	--	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Bis[2-ethylhexyl]phthalate	8,300	13,870	--	24	31	28	22	23	21	17J	17J	19U	39U	19U
Di-n-octyl phthalate	6,200	--	--	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U

Table 4, cont.

Chemical Parameter	DMMP PROGRAM SL (1998)	BT (1998)	ML (1998)	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
Miscellaneous	ug/kg dry weight													
Dibenzofuran	540	--	1,700	19U	19U	20U	20U	12J	20U	19U	19U	19U	39U	32
Hexachlorobutadiene	29	212	270	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
N-nitrosodiphenylamine	28	130	130	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Pesticides/PCBs	ug/kg dry weight													
p,p'-DDE	--	--	--	1.9 U	1.9 U	1.9 U	2.0 U	2.0 U	2.0 U	1.5 U	1.9 U	1.8U	1.8U	1.9 U
p,p'-DDD	--	--	--	1.9 U	1.9 U	1.9 U	2.0 U	2.0 U	2.0 U	1.5 U	1.9 U	1.8U	1.8U	1.9 U
p,p'-DDT	--	--	--	1.9 U	1.9 U	1.9 U	2.0 U	2.0 U	2.0 U	1.5 U	1.9 U	1.8U	1.8U	1.9 U
Total DDT	6.9	50.0	69.0	1.9 U	1.9 U	1.9 U	2.0 U	2.0 U	2.0 U	1.5 U	1.9 U	1.8U	1.8U	1.9 U
Aldrin	10	37	--	0.93U	0.93U	0.94U	0.99 U	1.0 U	0.99 U	0.76U	0.96U	0.90U	0.92U	0.96U
alpha-Chlordane	10	37	--	0.93U	0.93U	0.94U	0.99 U	1.0 U	0.99 U	0.76U	0.96U	0.90U	0.92U	0.96U
Dieldrin	10	37	--	1.9 U	1.9 U	1.9 U	2.0 U	2.0 U	2.0 U	1.5 U	1.9 U	1.8U	1.8U	1.9U
Heptachlor	10	37	--	0.93U	0.93U	0.94U	0.99 U	1.0 U	0.99 U	0.76U	0.96U	0.90U	0.92U	0.96U
gamma-BHC (Lindane)	10	37	--	0.93U	0.93U	0.94U	0.99 U	1.0 U	0.99 U	0.76U	0.96U	0.90U	0.92U	0.96U
PCBs														
PCBs (dry wgt - ug/kg)	130	--	3,100	37	37	38	40	40	40	30	38	36	37	38
PCBs (TOC norm.- mg/kg)	--	38	--	1.9	1.5	1.1	1.9	1.8	1.7	1.5	1.9	4.5	1.2	2.2
Volatile Organic Compounds:	ug/kg dry weight													
Trichloroethene	160	1,168	1,600	1.9 U	2.2U	2.0U	1.9 U	2.0U	1.4 U	1.9 U	1.2U	1.1U	1.0U	1.0U
Tetrachloroethene	57	102	210	1.9 U	2.2U	2.0U	1.9 U	2.0U	1.4 U	1.9 U	1.2U	1.1U	0.6J	1.0U
Ethylbenzene	10	27	50	1.9 U	2.2U	2.0U	1.9 U	2.0U	1.4 U	1.9 U	1.2U	1.1U	1.0U	1.0U
Total Xylene	40	--	160	1.9 U	2.2U	2.0U	1.9 U	2.0U	1.4 U	1.9 U	1.2U	1.1U	2.0U	2.0U
Ionizable Organic Compounds:	ug/kg dry weight													
Phenol	420	876	1,200	19U	13J	20U	20U	20U	20U	19U	19U	19U	39U	19U
2-Methylphenol	63	--	77	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
4-Methylphenol	670	--	3,600	19U	16J	13J	12MJ	20U	12MJ	19U	19U	19U	39U	19U
2,4-Dimethylphenol	29	--	210	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Pentachlorophenol	400	504	690	97U	97U	99U	99U	100U	99U	96U	96U	97U	190U	96U
Benzyl alcohol	57	--	870	19U	19U	20U	20U	20U	20U	19U	19U	19U	39U	19U
Benzoic acid	650	--	760	18J	36MJ	24J	25MJ	21MJ	25MJ	190U	190U	190U	390U	10J
Resin Acids	ug/kg dry weight													
Abietic acid				1400	700	500M	470M	990	700	440	430U	430U	870U	430U
Dehydroabietic acid				620	630	360	330	540	410	280	260	43U	1100	280
Isopimaric acid				220	140	98	98	150	160	100	59	43U	110	54
Pimaric acid				44U	61Y	44U	52Y	59Y	50Y	43U	43U	43U	87U	43U
Guaiacols	ug/kg dry weight													
Guaiacol				39U	39U	39U	40U	40U	40U	38U	39U	39U	78U	38U
Tetrachloroguaiacol				150U	150U	150U	150U	150U	150U	140U	140U	140U	290U	140U
3,4,5-Trichloroguaiacol				150U	150U	150U	150U	150U	150U	140U	140U	140U	290U	140U
4,5,6-Trichloroguaiacol				97U	97U	99U	99U	100U	99U	96U	96U	97U	190U	96U

= detection limit above DMMP SL
= undetected at given level
= lab estimate at given level

6. Biological Testing.

6.1. ***Sample Selection***. As reported above, no COCs were detected above DMMP screening levels. However, detection levels of four COCs exceeded the SLs in composite C10, though the analytical laboratory did everything possible to bring down detection limits. According to DMMP guidelines, exceedance of SLs solely by detection limits can trigger biological testing. In Grays Harbor, safety-net bioassay testing on at least two DMMU composites is required by the GHDMEP. Tiered testing due to SL exceedances (detected or non-detected) can be included in the two samples chosen for safety-net bioassays.

For several reasons, C10 was NOT one of the DMMUs chosen for safety-net bioassays. The selection process considers grain size (fine-grained sediments are preferred); sediment chemical results, and the proximity of the collected samples to known or potential contaminant sources. For this characterization, there were three general groups of grain sizes found in the composite samples:

- Fine grained: C1 through C6 all had over 70% fines (representing 58% of all characterized sediments)
- Intermediate grained: C7 and C8, with around 50% fines (representing 19% of all characterized sediments)
- Coarse grained: C9, C10 and C11 ranged from 5% to 27% fines (representing 23% of all characterized sediments)

Most of the sediments in the Cow Point area are very fine-grained, and they represent the bulk of material deposited annually from upstream sources and dredged in a given year. Because the fine-grained DMMUs all showed similar chemical results, C5, with 74% fine-grained material, was randomly chosen to represent this group of sediments. The remainder of the sediments included two intermediate grain-sized and three coarser-grained DMMU. The intermediate- and coarser-grained sediments were all from the area upstream of the Cow Pt. turning basin, in the Aberdeen and South Aberdeen Reaches. The coarser upstream sediments are less frequently dredged and are generally closer than the downstream sediments to known or potential contaminant sources, including the Weyerhauser pulp mill in Cosmopolis. It was field observations of the area and sediments sampled in C11 that led to its choice for safety-net biological sampling. In addition to the timber-related activities and paper mill, boat maintenance activities were observed in the area of DMMU 11. The sediments collected for C11 exhibited a marked oily sheen and odors. Though chemical analysis of the coarse grained sediments showed no detected levels of COCs above the SL, C11 was chosen over C10 for safety-net testing because it was considered a higher risk for potential toxicity based on field observations.

6.2. ***Bioassay Testing***. The standard suite of three bioassay tests (amphipod toxicity, larval mortality/abnormality, and *Neanthes* growth) was performed on sediments chosen for safety-net testing. Though there was some quality control issues, detailed below, data from all tests were accepted by the agencies and both sediments passed DMMP guidelines for open water disposal.

The performance standards and interpretation guidelines specified in the GHDMEP were used to evaluate the bioassay data collected (Table 5). Reference sediments were collected from an approved Grays Harbor reference site at Station GHS7 (77.7% fines), to pair with the fine-grained composite C5 (73.7% fines). No reference sediment was available at the approved sites to match the coarse-grained composite (C11, 12.6% fines), so these sediments were compared with control sediments collected from Yaquina Bay, OR.

Control and reference sediments were within DMMP performance criteria for the amphipod (*Eohaustorius estuaries)*10-day acute mortality test and the larval echinoderm (*Dendraster excentricus)* bioassay. But the *Neanthes* bioassay failed to pass performance standards for the control and for one of the reference sediment samples (GHS7b). DMMP guidelines specify 90% survival in the control samples for test acceptability, though this was exceeded in the test by 2 percentage points. For the reference sediment performance standards, GHS7b did not meet this standard when compared with the negative control. However, the "coarse" control sediment was from the same source as the negative control. When compared to this growth rate, GHS7b passed performance criteria with 83% of the control growth rate. All other performance criteria were met by the *Neanthes* bioassay. Test sediments all showed 100% survivorship for this test.

Table 5. Bioassay results summary.

STATION	% fines	Amphipod (Eohaustorius) Mortality (%)		Sediment Larval (*Dendraster*) NCMA (%)		20-day Neanthes Growth				DMMP
						Survival (%)	Growth (mg/ind/day) 0.5 mg initial wt.		Growth % of reference	
		mean	sd	mean	sd		mean	sd		
Control	0	0.0	0.0	0.0	6.3	88*	1.32	0.23	146% of GHS7b; 122% of ref. Control	
Yaquina Bay Reference	0	0.0	0.0	8.2	13.0	100	1.08	0.26	na	
Reference GHS7 b	77.7	3.0	4.5	-0.3	12.5	100	0.90	0.10	na	
C5	73.7	1.0	2.2	-2.9	5.9	100	0.85	0.12	94.0%	Pass
C11	12.6	4.0	5.5	5.7	11.2	100	0.96	0.20	88.9%	Pass
Reference toxicant		Cadmium chloride 96 hr. LC50, 2.55 mg/L Cd		Cadmium chloride EC50, 9.69 mg/L Cd		Cadmium chloride 96 hr. LC50, 8.25 mg/L Cd				
Lab Control limits		0.20 -5.25 mg/L Cd		5.76-12.6 mg/L Cd		4.28-10.9 mg/L Cd				

*Though the control on the *Neanthes* growth test exhibited less than the required 90% survival, the results of these tests were accepted by the agencies (see Section 5.2 for more details).

Table 6. Bioassay performance summary.

Bioassay	Test Sediment	Negative Control Performance Standard	Reference Sediment Performance Standard
Amphipod	C5 (fine)	0% < **10%**	3% < **20%**
	C11 (coarse)		0% < **20%**
Larval	C5 (fine)	85% > **70%**	100% > **65%**
	C11 (coarse)		92% > **65%**
Neanthes growth	C5 (fine)	12% > **10%**	0% < **20%** BUT 68% < **80%**
	C11 (coarse)		0% < **20%** and 82% > **80%**

7. **Suitability**. This memo documents the suitability of all proposed dredged sediments in the Grays Harbor navigation channel for open water disposal. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the GHDMEP program. Based on the results of the chemical and biological testing and the discussions above, the DMMP agencies concluded that the total dredging volume of 1.86 million cubic yards is suitable for open water disposal. Open water disposal may be at the South Jetty or Point Chehalis estuarine disposal site, or at an approved beneficial use (nearshore or onshore) site. However, this suitability determination does not constitute final agency approval of the project.

8. **References**.

Striplin Environmental Associates, Inc. 2000a. Programmatic Sampling and Analysis Plan: Sediment characterization for Grays Harbor Maintenance Dredging, FY 2000 - 2006. Prepared for the Seattle District, US Army Corps of Engineers, 7 July 2000.

Striplin Environmental Associates, Inc. 2000b. Data Report: Sediment characterization for Grays Harbor Maintenance Dredging, FY 2000. Prepared for the Seattle District, US Army Corps of Engineers, December 2000.

Concur:

5/29/01
Date

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5-17-01
Date

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Date

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