

17 April 2004

MEMORANDUM FOR RECORD

SUBJECT: DETERMINATION OF THE SUITABILITY OF DREDGED MATERIAL TESTED UNDER DMMP EVALUATION PROCEDURES FOR LEHIGH NORTHWEST INC. (CADMAN SITE) DREDGING PROJECT (DAIS # LEHIG-1-B-F-196) WITH PROPOSED DISPOSAL AT THE ELLIOTT BAY OPEN WATER DISPOSAL SITE.

1. Lehigh Northwest Inc. proposes to maintenance dredge 9000 cubic yards of material from its facility located on the Duwamish Waterway, Seattle Washington. The following summary reflects the DMMP agencies (Corps of Engineers, Department of Ecology, Department of Natural Resources and the Environmental Protection Agency) consensus decision on the acceptability of the sampling plan and all relevant test data to make a determination of suitability for the disposal of the material at a PSDDA open-water disposal site.
2. The ranking for this area is "high" based on the guidance found in the PSDDA User's Manual (2000) and the PSDDA Management Plan Report, Phase II, Page A-11 (1989).
3. A sampling and analysis plan was completed for this project and approved by the DMMP agencies on 10 August 2003. Sampling for this project was performed on 29 August 2004.

<i>SAP Submittal date</i>	<i>10 July 2003</i>
SAP approval date	10 August 2003
Sampling date	29 August 2003
Data Report submittal date	2 February 2004
Recency determination date	29 August 2005
4. Samples were taken from four locations and composited for two surface analyses and one subsurface analysis (DMMU S1, DMMU S2, and DMMU SS3). The sampling and compositing plan is presented in Table 1. Due to the coarse nature of the materials, some sample locations were adjusted, and no sample was obtained from sample location A-2.
5. DMMU S2 exceeded the DMMP 2003 screening level for total PCBs. In addition, the reporting limit for total DDT was exceeded for DMMU S2. All detection limits were below screening levels. The matrix spike recoveries for antimony were low, and below the laboratory recovery limits. A review of SEDQUAL data shows that antimony has not been found above the SL at any site in the Lower Duwamish Waterway. Based on this information, the data was determined to be sufficient for decision-making.

6. Bioassays were conducted on DMMU S2, including the amphipod 10-day acute toxicity test, using *Eohaustorius estuarius*, the sediment larval test, using *Mytilus galloprovincialis*, and the *Neanthes* 20-day growth test. Tests were conducted according to PSEP (1995), as modified by the DMMP program.
7. Reference sediment for use in the bioassays was collected from Carr Inlet. Amphipod organisms were collected from Lower Yaquina Bay, Oregon by Northwest Aquatic Sciences. Control sediment for the amphipod bioassay was obtained from Yaquina Bay Oregon. *Mytilus galloprovincialis* organisms were obtained from Carlsbad Aquafarms, Carlsbad, California. *Neanthes* organisms were obtained from Dr. Don Reish, Long Beach California.
8. Bioassay results are listed in Table 2. There was a one-hit failure in the sediment larval test, and no hits on either the amphipod or *Neanthes* test.
9. In summary, the DMMP-approved sampling and analysis plan was followed, and quality assurance, quality control guidelines specified by the DMMP were generally followed. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program. Based on the results of the chemical and biological testing, the consensus determination of the DMMP agencies is that the 3000 cubic yards from DMMU S2 is not suitable for open-water disposal. The 6000 cubic yards of material from DMMUs S1 and SS3 from the Lehigh Northwest dredging project are suitable for open-water disposal at either a dispersive or nondispersive site.
10. This memorandum documents the suitability of proposed dredged sediments for disposal at a PSDDA open water disposal site. It 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 and public input, and after an alternatives analysis is done under section 404 (b) 1 of the Clean Water Act.

**Lehigh Northwest, Inc
Duwamish Waterway**

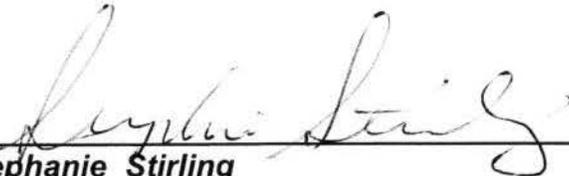
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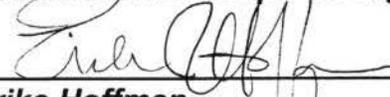
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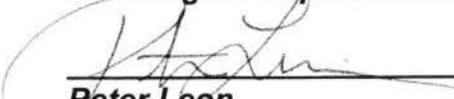
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**Stephanie Stirling
Seattle District Corps of Engineers**


**Erika Hoffman
Environmental Protection Agency, Region 10**


**Tom Gries
Washington Department of Ecology**


**Peter Leon
WA Department of Natural Resources**

Copies Furnished:

EPA/Erika Hoffman
DOE/Tom Gries
DNR/Peter Leon
CENWS/OD-RG

Table 1. Sampling and Compositing Plan

DMMU	Sample Station	Sample Interval
DMMU S1 (3,000 cy)	A-1	0 to 4.4 ft
	A-2	No sample
DMMU S2 (3,000 cy)	A-5	0 to 4 ft
	A-6	0 to 4 ft
DMMU1-2B (3,000 cy)	A-3*	0 to 2 ft
	A--5	4 ft to 5.8 ft
	A-6	4 ft to 7.1 ft

* Sample A-3 was taken from the surface, but at a deeper elevation than the surrounding sediment. Elevation at mudline for this sample was -19.1 feet. Elevation at mudline for sample A-1 was -11.7

Impact Corer

Table 3 Conventional and Contaminant Chemistry Results for Composite Samples Collected in the Proposed Lehigh Northwest (Cadman) Wharf Dredge Prism

Table 3 (continued)

Parameters	PSDDA Criteria			DMMU Sample ID	Surface Upriver			Surface Downriver			Subsurface		
	SL	BT	ML		S-1			S-2			SS-3		
					C-1	Q1	Q2	C-2	Q1	Q2	C-3S	Q1	Q2
	Value			Value			Value			Value			
Conventionals													
Percent gravel	—	—	—		45.1			47.2			25.7		
Percent sand	—	—	—		30.4			29.8			38.1		
Percent silt	—	—	—		20			16.5			26.1		
Percent clay	—	—	—		4.5			6.5			10.1		
Percent fines	—	—	—		24.5			23.0			36.2		
Total solids (%)	—	—	—		77.7			76.2			75.3		
Total volatile solids (%)	25	—	—		4			3.3			3.4		
N-ammonia (mg-N/kg)	—	—	—		15	J		17	J		27	J	
Total Sulfides (mg/kg)	—	—	—		2000			1500			1500		
Total organic carbon (%)	—	—	—		1.8			1.9			1.3		
Metals													
	ppm	ppm	ppm										
Antimony	150	—	200		6 U	R		6 U	R		7 U	R	
Arsenic	57	507.1	700		16			12			7 U		
Cadmium	5.1	11.3	14		0.5			0.7			0.5		
Chromium	—	267	—		31.4			37.9			26.2		
Copper	390	1027	1300		74			69.3			44		
Lead	450	975	1200		57	J		34			17		
Mercury	0.41	1.5	2.3		0.17			0.25			0.23		
Nickel	140	370	370		26			23			21		
Selenium	—	3	—		0.3 U			0.3 U			0.3 U		
Silver	6.1	6.1	8.4		1.3			1.2			0.7		
Zinc	410	2783	3800		125			98.3			64.3		
Organics													
	ppb	ppb	ppb										
Total LPAH	5200	—	29000		270			370			222		
2-Methylnaphthalene	670	—	1900		39 U			20 U			19 U		
Acenaphthene	500	—	2000		39 U			20 U			19 U		
Acenaphthylene	560	—	1300		39 U			20 U			19 U		
Anthracene	960	—	13000		100			120			72		
Fluorene	540	—	3600		39 U			20			19 U		
Naphthalene	2100	—	2400		39 U			20 U			19 U		
Phenanthrene	1500	—	21000		170			230	J		150		
Total HPAH	12000	—	69000		4245			3497			2659		
Benzo(a)anthracene	1300	—	5100		310			260			210		
Benzo(a)pyrene	1600	—	3600		290			260			290		
Benzo(g,h,i)perylene	670	—	3200		60			120			140		
Total Benzofluoranthenes	3200	—	9900		1090			580			540		
Chrysene	1400	—	21000		460			400			280		
Dibenzo(a,h)anthracene	230	—	1900		39 U			27			29		
Fluoranthene	1700	4600	30000		760			740	J		330		
Indeno(1,2,3-c,d)pyrene	600	—	4400		75			130			150		
Pyrene	2600	11980	16000		1200			980			690		

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Table 3 (continued)

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	SL	BT	ML		S-1			S-2			SS-3		
	Value	Q1	Q2		C-1			C-2			C-3S		
Chlorinated Organics	ppb	ppb	ppb										
1,2,4-Trichlorobenzene	31	—	64		5.8 U			20 U			19 U		
1,2-Dichlorobenzene	35	—	110		1.2 U			20 U			19 U		
1,3-Dichlorobenzene	170	—	—		39 U			20 U			19 U		
1,4-Dichlorobenzene	110	—	120		39 U			20 U			19 U		
Hexachlorobenzene (HCB)	22	168	230		<0.96 U			20 U			19 U		
Phthalates													
Bis(2-ethylhexyl)phthalate	8300	—	—		530			140			120		
Diethyl phthalate	1200	—	—		39 U			20 U			19 U		
Dimethyl phthalate	1400	—	—		39 U			20 U			19 U		
Di-n-butyl phthalate	5100	—	—		39 U			20 U			19 U		
Di-n-octyl phthalate	6200	—	—		39 U			20 U			19 U		
Butyl benzyl phthalate	970	—	—		39 U			20 U			19 U		
Phenols													
2,4-Dimethylphenol	29	—	210		19 UJ			20 U			19 U		
2-Methylphenol	63	—	77		39 U			20 U			19 U		
4-Methylphenol	670	—	3600		39 U			20 U			19 U		
Pentachlorophenol	400	504	690		190 U			98 U			96 U		
Phenol	420	—	1200		300			86			60		
Misc. Extractables													
Benzoic acid	650	—	760		390 U			200 U			190 U		
Benzyl alcohol	57	—	870		39 U			20 U			19 U		
Dibenzofuran	540	—	1700		39 U			20 U			19 U		
Hexachlorobutadiene	29	—	270		<0.96 U			20 U			19 U		
Hexachloroethane	1400	—	14000		39 U			20 U			19 U		
Volatile organics													
Trichloroethene	160	—	1,600		1.2 U			1.1 U			1.1 U		
Tetrachloroethene	57	—	210		1.2 U			1.1 U			1.1 U		
Ethylbenzene	10	—	50		1.2 U			1.1 U			1.1 U		
Total Xylene (sum of o-, m-, p-)	40	—	160		1.2 U			1.1 U			1.1 U		

Table 3 Conventional and Contaminant Chemistry Results for Composite Samples Collected in the Proposed Lehigh Northwest (Cadman) Wharf Dredge Prism

Table 3 (continued)

Parameters	PSDDA Criteria			DMMU Sample ID	Surface Upriver			Surface Downriver			Subsurface	
	SL	BT	ML		S-1 C-1		S-2 C-2		SS-3 C-3S		Q1	Q2
	Value	Value	Value		Value	Q1	Q2	Value	Q1	Q2	Value	Q1
Pesticides and PCBs	ppb	ppb	ppb									
Total DDT	6.9	50	69		< 1.9 U			13 Y			< 1.9 U	
p,p'-DDE	—	—	—		< 1.9 U			< 6.6 Y			< 1.9 U	
p,p'-DDD	—	—	—		< 1.9 U			< 3 Y			< 1.9 U	
p,p'-DDT	—	—	—		< 1.9 U			< 13 Y			< 1.9 U	
Alpha-BHC	—	10*	—		< 0.96 U			< 0.98 U			< 0.97 U	
Gamma-BHC (Lindane)	10	—	—		< 0.96 U			< 0.98 U			< 0.97 U	
Aldrin	10	37	—		< 0.96 U			< 0.98 U			< 1.9 U	
Chlordane	10	37	—		< 0.96 U			< 0.98 U			< 0.97 U	
Dieldrin	10	—	—		< 1.9 U			< 2.0 U			< 1.9 U	
Heptachlor	10	—	—		< 0.96 U			< 0.98 U			< 0.97 U	
Total PCBs	130	38*	3100		58			159			79	

Q1: Lab assigned Qualifier

Q2: Data Validation assigned Qualifier

U: Undetected at the detection limit shown.

J: Estimated concentration when the value is less than the calculated reporting limit.

Y: Indicates raised reporting limits due to interference. Compound still not detected at or above raised limit.

R: The sample result is rejected. The presence or absence of the analyte cannot be verified and data are not usable.

*: Carbon-normalized concentration

Table 3. Solid Phase Bioassay Results Summary

Dredged Material Management Units (DMMU)	Amphipod Mortality, % (Eohaustorius)	Sediment Larval Test ¹ (<i>Mytilus galloprovincialis</i>)		20-day <i>Neanthes</i> growth, mg-ind-day (% reference), mortality %	DMMU Suitability	
		Mort+Abnor %	Abnormality %		ND	D
Control	0	4.8	3.4	initial wgt=0.6 mg-individual 1.00 (\pm 0.04 SD) mortality = 0%	NA	
Carr Inlet	0	32.6	3.8	0.85 (\pm 0.13 SD) mortality = 0%	NA	
DMMU S2	15	72.5	32.9	1.27(127%) mortality = 0%	Fail	Fail
Positive Control (LC50/EC50) TEST	CdCl ₂ (mg/L) 0.70	CdCl ₂ (mg/L) 11.4	--	CuCl ₂ (mg/L) 7.37		
DAIS (Mean \pm SD)	(0.49 \pm 0.42 DAIS)	(10.1 \pm 6.5 DAIS for <i>Mytilus</i>)		(12.5 \pm 5.4 DAIS)		

Legend: ND = Nondispersive site suitability; D = Dispersive site suitability.
NA = not applicable; SD = Standard Deviation

