CENWS-OD-TS-DM

MEMORANDUM FOR RECORD 12 May 2004

SUBJECT: **DETERMINATION OF THE SUITABILITY OF SEDIMENT PROPOSED TO BE MAINTENANCE DREDGED FROM THE ANCHOR COVE MARINA PROJECT (2004-00104) FOR OPEN-WATER DISPOSAL AT THE ROSARIO STRAIT OPEN-WATER DISPOSAL SITE, AS EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT.**

1. The following summary reflects the consensus determination of the agencies that comprise the regional Dredged Material Management Program (DMMP) for the State of Washington. The agencies include the Corps of Engineers, Department of Ecology, Department of Natural Resources, and the Environmental Protection Agency. The agencies are charged with determining the suitability of proposed dredged material for in-water disposal and have evaluated the proposed maintenance dredging of 22,440 cubic yards from the Anchor Cove Marina Project located on Guemes Channel in Anacortes, Washington.

2. The project was ranked moderate for testing purposes. The sampling and analysis plan was approved on February 26, 2004 by the DMMP agencies for an estimated total dredged material footprint volume of 22,440 cubic yards. The sampling design called for analyzing 22,440 cy of the proposed maintenance material down to –13 feet MLLW. Sampling of the proposed maintenance dredging footprint (see figures 1 and 2) was conducted on March 11-12, 2004, and consisted of collecting samples at six locations using a **gravity corer**. The six core station samples (see figure 2) were composited into 2 dredged material management units (DMMUs) as follows: DMMU-C1 (S-1, S-2, S-3), DMMU-C2 (S-4, S-5, S-6). Samples were collected for both chemisty and potential biological testing. A tiered testing approach was used, and all samples for potential biological testing were archived at 4°C pending completion of the chemical analyses.

3. Relevant dates for regulatory tracking purposes are included in Table 1.

Table 1. Regulatory Tracking Information and Dates

SAP submittal date:	February 3, 2004
SAP Approval letter date:	February 26, 2004
Sampling date(s):	March 11-12, 2004
Sediment data characterization report submittal date:	April 28, 2004
DAIS Tracking Number	ANCVM-1-A-F-197
Recency Determination Date: Moderate (5 years)	March 2009

4. The Sampling and Analysis Plan approved by the agencies for testing for the two DMMUs was followed, and quality assurance/quality control guidelines specified by the PSDDA Users Manual were generally complied with. The data gathered were deemed sufficient and acceptable for decision-making by the DMMP agencies based on best professional judgment and current program guidelines.

5. Table 2 provides an analysis summary of the results of the conventional parameters analyzed for the two composited DMMUs. Chemical analysis of the two DMMUs indicated that there were no detected or detection limit exceedances of screening level for all chemicals of concern. Table 3 provides a complete dry weight chemical analysis inventory for the two DMMUs analyzed. There were no bioaccumulation trigger (BT) or maximum level (ML) exceedances of COCs analyzed. Because there were no SL guideline exceedances, biological testing was not required.

6. The results of the chemical analysis for the two composited DMMUs representing a total of 22,440 cy of potential dredged material is determined to be suitable for unconfined open-water disposal at the **dispersive Rosario Strait** disposal site.

7. This memorandum documents the suitability of sediment to be dredged from the Anchor Cove Marina maintenance dredging project for disposal at the Rosario Strait 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 alternatives analysis is done under Section 404(b)(1) of the Clean Water Act.

Concur:

5/13/2004
Date — David Kendall, Ph.D., Seattle District Corps of Engineers

5/13/2004
Date — Justine Barton, Environmental Protection Agency

5/13/04
Date — Tom Gries/Loree Randall, Washington Department of Ecology

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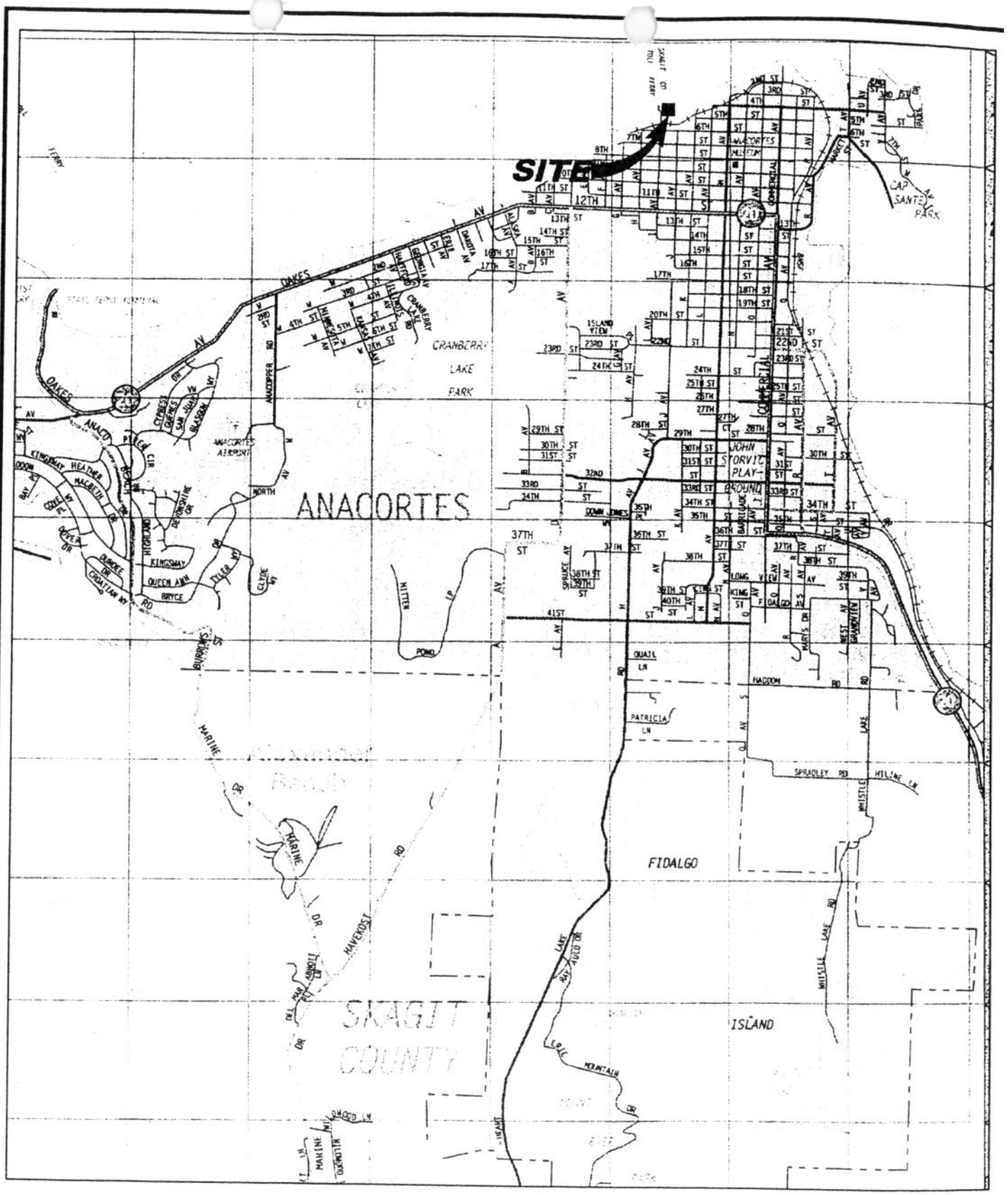

N.T.S.

JOB NO.: 4-91M-14889-0 | DWG DATE: 04-15-2004 | SCALE: N.T.S. | DESIGN BY: EMM | FILE NAME: LOCATION.DWG

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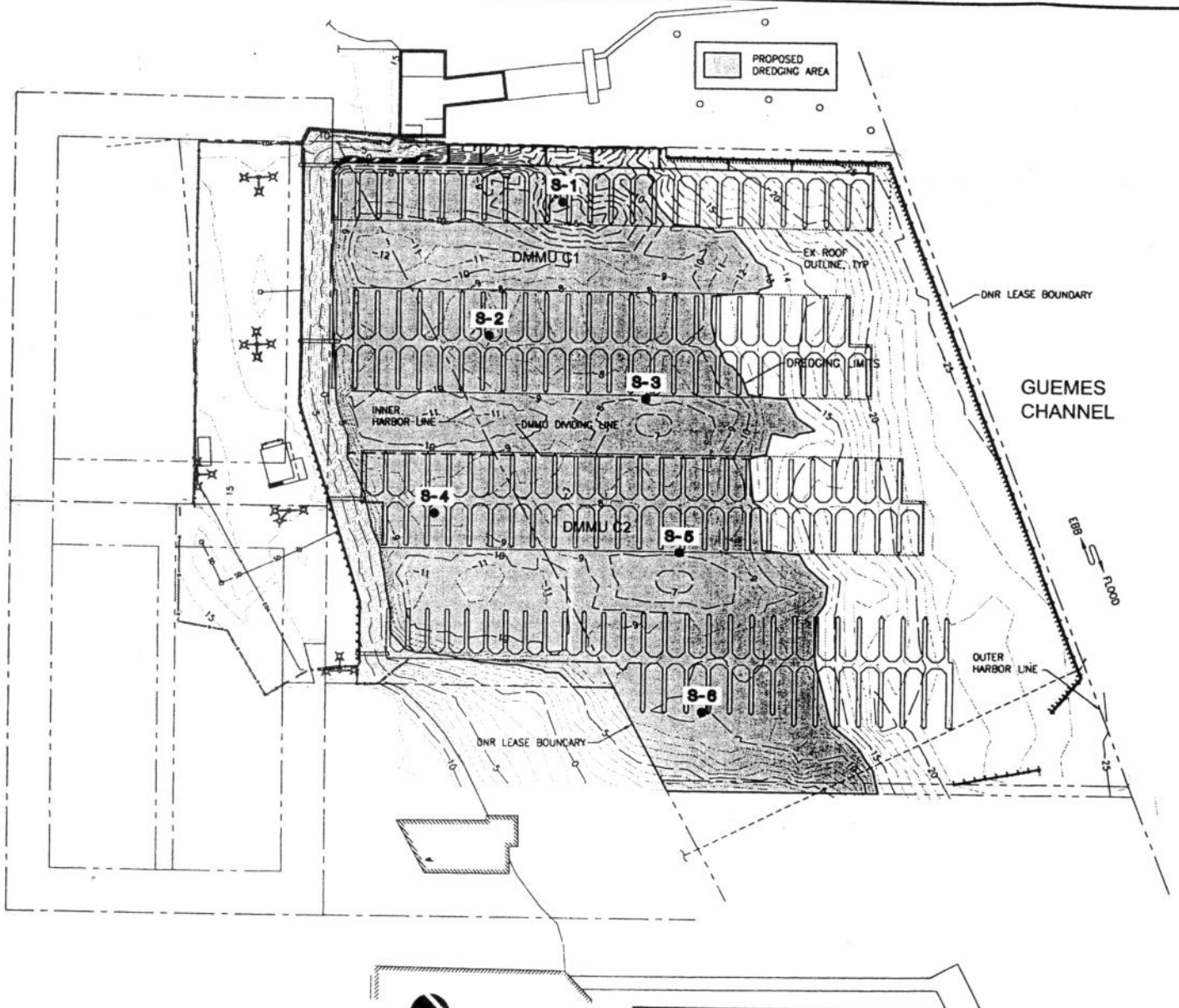
LOCATION MAP

ANCHOR COVE MARINA
SEDIMENT SAMPLING

ANACORTES, WASHINGTON

FIGURE

1



LEGEND

S-6 ● SEDIMENT SAMPLING

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DMMU'S AND SAMPLING LOCATIONS

ANCHOR COVE MARINA
SEDIMENT SAMPLING

ANACORTES, WASHINGTON

FIGURE

2

Table 2. DMMP testing summary for the Anchor Cove Marina

CHEMICAL NAME	DMMU	C1 (surface)		C2 (surface)	
	Rank	M		M	
	Units	Conc.	VQ	Conc	VQ
Total Solids	%	55.0		60.6	
Total Volatile Solids	%	4.4		3.0	
Total Organic Carbon	%	**1.3**		**1.6**	
Total Ammonia	mg/kg	85.0		38.0	
Total Sulfides	mg/kg	1,500		1,100	
Gravel (percent)	%	0.6		12.4	
Sand (percent)	%	41.2		48.9	
Silt (percent)	%	39.2		25.2	
Clay (percent)	%	18.9		13.5	
Fines (percent silt + clay)	%	58.1		38.7	
Eohaustorius estuarius hits:		NA		NA	
Mytilus galloprovincialis hits:		NA		NA	
Neanthes arenaceodentata hits:		NA		NA	
Bioassay Pass/Fail:		**NA**		**NA**	
BTs exceeded:		no		no	
Bioaccumulation conducted:		no		no	
Bioaccumulation Pass/Fail:					
ML Rule exceeded:		no		no	
PSDDA Determination:		**Pass**		**Pass**	
DMMU Volume:	cy	11,240		11,200	
Mean Core Sampling depth		5.6 ft		4.6 ft	
Maximum sampling depth relative to mudline		7.5 ft		8.2 ft	
DMMU ID:		C1		C2	

Legend:

NA = Not Analyzed (bioassays)

UCOWD = unconfined open-water disposal

P = Pass (Suitable for UCOWD)

22,440 cy: Suitable

TABLE 3. CHEMICAL PARAMETERS FOR DMMU SA.. ..ES COMPARED TO PSSDA NUMERICAL CRITERIA
ANCHOR COVE MARINA
Anacortes, Washington
Sample type: Sediment
Date Collected: 11 and 12th March 2004
Equipment: Gravity/Push Corer

Chemical Parameter	Aanalysis Method	Group	Units	Puget Sound Dredged Disposal Analysis Program SL	ML	DMMUC1	Qual	DMMUC2	Qual
MISCELLANEOUS									
Total Solids	EPA 160.3, SM 2540 B	Miscellaneous	percent			55.0		60.6	
Preserved Total Solids	EPA 160.3, SM 2540 B	Miscellaneous	percent			56.5		50.4	
Total Volatile Solids	EPA 160.3, SM 2540 B	Miscellaneous	percent			4.4		3.0	
Total Organic Carbon	Plumb, 1981	Miscellaneous	percent			1.3		1.6	
N-Amonia	EPA 350.1, 4500 NH3 H	Miscellaneous	mg-N/kg			85		38	
Sulfide	EPA 376.2, SM4500S2-D	Miscellaneous	mg/kg			1,500		1,100	
METALS				**(mg/kg dry weight, ppm)**					
Tributyl Tin (as Chloride)	Selected Ion Monitoring GC/MS	Metals (porewater)	ug/kg	0.15	--	0.025	U	0.025	U
Tributyl Tin (ion)	Selected Ion Monitoring GC/MS	Metals (porewater)	ug/kg	0.15	--	0.022	U	0.022	U
Antimony	6010B	Metals	mg/kg-dry	150	200	9	U	8	U
Arsenic	6010B	Metals	mg/kg-dry	57	700	9	U	8	U
Cadmium	6010B	Metals	mg/kg-dry	5.1	14	0.4		0.4	
Chromium	6010B	Metals	mg/kg-dry	--	--	30.6		32.7	
Copper	6010B	Metals	mg/kg-dry	390	1300	29.4		25.1	
Lead	6010B	Metals	mg/kg-dry	450	1200	12		12	
Mercury	7471AA	Metals	mg/kg-dry	0.41	2.3	0.09	U	0.08	U
Nickel	6010B	Metals	mg/kg-dry	140	370	28		28	
Silver	6010B	Metals	mg/kg-dry	6.1	8.4	0.5	U	0.5	U
Zinc	6010B	Metals	mg/kg-dry	410	3,800	72		64.5	
IONIZABLE ORGANIC COMPOUNDS				**(ug/kg dry weight, ppb)**					
Phenol	8270-GC/MS	Ionizable Organic Compounds	ug/kg	420	1,200	100		19	U
Benzyl alcohol	8270-GC/MS	Ionizable Organic Compounds	ug/kg	57	870	20	U	19	U
2-Methylphenol	8270-GC/MS	Ionizable Organic Compounds	ug/kg	63	77	20	U	19	U
4-Methylphenol	8270-GC/MS	Ionizable Organic Compounds	ug/kg	670	3,600	23		19	U
2,4-Dimethylphenol	8270-GC/MS	Ionizable Organic Compounds	ug/kg	29	210	20	U	19	U
Benzoic acid	8270-GC/MS	Ionizable Organic Compounds	ug/kg	650	760	200	U	190	U
Pentachlorophenol	8270-GC/MS	Ionizable Organic Compounds	ug/kg	400	690	99	U	97	U
NONIONIZABLE ORGANIC COMPOUNDS				**(ug/kg dry weight, ppb)**					
Chlorinated Benzenes									
1,3-Dichlorbenzene	8270-GC/MS	Chlorinated Benzenes	ug/kg	170	--	20	U	19	U
1,4-Dichlorobenzene	8270-GC/MS	Chlorinated Benzenes	ug/kg	110	120	20	U	19	U
1,2,-Dichlorobenzene	8270-GC/MS	Chlorinated Benzenes	ug/kg	35	110	20	U	19	U
1,2,4-Trichlorobenzene	8270-GC/MS	Chlorinated Benzenes	ug/kg	31	64	20	U	19	U
Hexachlorobenzene	8270-GC/MS	Chlorinated Benzenes	ug/kg	22	230	20	U	19	U

TABLE 3 (Continued)

Chemical Parameter	Method	Group	UNITS	Puget Sound Dredged Disposal Analysis Program SL	ML	DMMUC1	Qual	DMMUC2	Qual
CHLORINATED PESTICIDES									
gamma-BHC (Lindane)	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg	10	--	0.97	U	0.97	U
Heptachlor	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg	10	--	0.97	U	0.97	U
Aldrin	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg	10	--	0.97	U	0.97	U
Dieldrin	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg	10	--	1.9	U	1.9	U
4,4' - DDE	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg			1.9	U	1.9	U
4,4' - DDD	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg			1.9	U	1.9	U
4,4' - DDT	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg	6.9	69	1.9	U	1.9	U
gamma Chlordane	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg	10	--	0.97	U	1.5	Y
alpha Chlordane	Pesticides/PCBs by GC/ECD	Chlorinated Pesticides	ug/kg	10	--	0.97	U	0.97	U
MISCELLANEOUS									
Hexachloroethane	8270-GC/MS	Miscellaneous	ug/kg	1,400	14,000	20	U	19	U
Hexachlorobutadiene	8270-GC/MS	Miscellaneous	ug/kg	29	270	20	U	19	U
Dibenzofuran	8270-GC/MS	Miscellaneous	ug/kg	540	1700	20	U	30	
N-nitrosodiphenylamine	8270-GC/MS	Miscellaneous	ug/kg	28	130	20	U	19	U
PCBs									
Aroclor 1016	Pesticides/PCBs by GC/ECD	PCB	ug/kg			19	U	19	U
Aroclor 1242	Pesticides/PCBs by GC/ECD	PCB	ug/kg			19	U	19	U
Aroclor 1248	Pesticides/PCBs by GC/ECD	PCB	ug/kg			19	U	19	U
Aroclor 1254	Pesticides/PCBs by GC/ECD	PCB	ug/kg			19	U	19	U
Aroclor 1260	Pesticides/PCBs by GC/ECD	PCB	ug/kg			19	U	19	U
Aroclor 1221	Pesticides/PCBs by GC/ECD	PCB	ug/kg			19	U	19	U
Aroclor 1232	Pesticides/PCBs by GC/ECD	PCB	ug/kg			19	U	19	U
Total PCBs		PCB	ug/kg	130	3100	19*	U	19*	U
Phthalate Esters									
Dimethyl phthalate	8270-GC/MS	Phthalate Esters	ug/kg	1400	--	20	U	19	U
Diethyl phthalate	8270-GC/MS	Phthalate Esters	ug/kg	1200	--	20	U	19	U
Di-n-butyl phthalate	8270-GC/MS	Phthalate Esters	ug/kg	5,100	--	20	U	19	U
Butyl benzyl phthalate	8270-GC/MS	Phthalate Esters	ug/kg	970	--	20	U	19	U
Bis[2-ethylhexyl]phthalate	8270-GC/MS	Phthalate Esters	ug/kg	8,300	--	24		31	
Di-n-octyl phthalate	8270-GC/MS	Phthalate Esters	ug/kg	6,200	--	20	U	19	U
Aromatic Hydrocarbons									
Fluoranthene	8270-GC/MS	HPAH	ug/kg	1,700	30,000	200		1,300	
Pyrene	8270-GC/MS	HPAH	ug/kg	2,600	16,000	280		820	
Benzo[a]anthracene	8270-GC/MS	HPAH	ug/kg	1,300	5,100	88		220	
Chrysene	8270-GC/MS	HPAH	ug/kg	1,400	21,000	150		350	
Benzo(b)fluoranthene	8270-GC/MS	HPAH	ug/kg	3,200	9,900	110		260	
Benzo(k)fluoranthene	8270-GC/MS	HPAH	ug/kg	3,200	9,900	110		240	
Total Benzofluoranthene			ug/kg	3,200	9,900	220		500	
Benzo[a]pyrene	8270-GC/MS	HPAH	ug/kg	1,600	3,600	93		200	
Indeno[1,2,3-cd]pyrene	8270-GC/MS	HPAH	ug/kg	600	4,400	50		92	
Dibenz[a,h]anthracene	8270-GC/MS	HPAH	ug/kg	230	1,900	20	U	23	
Benzo[ghi]perylene	8270-GC/MS	HPAH	ug/kg	670	3,200	49		82	
Total HPAH			ug/kg	12,000	69,000	1,150		3,587	

TABLE 3 (Continued)

Chemical Parameter	Method	Group	UNITS	Puget Sound Dredged Disposal Analysis Program SL	ML	DMMUC1	Qual	DMMUC2	Qual
Naphthalene	8270-GC/MS	LPAH	ug/kg	2,100	2,400	20	U	19	U
2-Methylnaphthalene	8270-GC/MS	LPAH	ug/kg	670	1,900	20	U	19	U
Acenaphthylene	8270-GC/MS	LPAH	ug/kg	560	1,300	20	U	34	
Acenaphthene	8270-GC/MS	LPAH	ug/kg	500	2,000	20	U	31	
Fluorene	8270-GC/MS	LPAH	ug/kg	540	3,600	20	U	48	
Phenanthrene	8270-GC/MS	LPAH	ug/kg	1,500	21,000	100		370	
Anthracene	8270-GC/MS	LPAH	ug/kg	960	13,000	33		100	
Total LPAH			ug/kg	5,200	2,900	233		621	
VOLATILE ORGANIC COMPOUNDS									
Ethylbenzene	Purge & Trap GC/MS	Volatile Organic Compounds	ug/kg	10	50	1.3	U	1.6	
Tetrachloroethene	Purge & Trap GC/MS	Volatile Organic Compounds	ug/kg	57	210	1.3	U	1.6	U
Total Xylene	Purge & Trap GC/MS	Volatile Organic Compounds	ug/kg	40	160	2.6	U	3.1	U
Trichloroethene	Purge & Trap GC/MS	Volatile Organic Compounds	ug/kg	160	1,600	1.3	U	1.6	U

NOTES:

-- - no numerical criterion of this type for this chemical
AET - apparent effects threshold
CSL - cleanup screening level
HPAH - high molecular weight polycyclic aromatic hydrocarbon
LPAH - low molecular weight polycyclic aromatic hydrocarbon
MCUL - minimum cleanup level
U - undetected
* As per PSDDA guidance the highest recored value is reported.
ML - maximum level
PCB - polychlorinated biphenyl
SIZmax - Sediment Impact Zone maximum allowable contamination level (WAC 173-204-420)
SL - screening level
SMS - Sediment Management Standards (WAC 173-204)
SQS - Sediment Quality Standards (WAC 173-204-320)
J - estimated

Both the SMS and PSDDA numerical criteria are based on Puget Sound apparent effects threshold (AET) values (Barrick et al. 1988). Conceptually, the SMS and PSDDA numerical criteria each provide two regulatory levels for the evaluation of sediment contaminant concentrations. The SQS under the SMS and the SL under the PSDDA program represent concentrations below which adverse biological effects are considered to be unlikely. The SIZmax, CSL, and MCUL under the SMS and the ML under the PSDDA program represent concentrations above which adverse biological effects are considered to be significant. The derivation of these numerical criteria from the AET values is somewhat different because of the different regulatory uses of these criteria in the two applications. In addition, the fact that the concentrations of nonionizable organic compounds are expressed on a TOC-normalized basis under the SMS but on a dry-weight basis under the PSDDA program means that direct comparison of these two sets of numerical criteria is not possible.