CENWS-OD-TS-DM

MEMORANDUM FOR RECORD 2 November 2004

SUBJECT: **DETERMINATION OF THE SUITABILITY OF SEDIMENT PROPOSED TO BE DREDGED FROM THE PROPOSED BRIGHTWATER MARINE OUTFALL ALIGNMENT CORRIDOR PROJECT (2003-2-00198) FOR OPEN-WATER DISPOSAL AT A PSDDA 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 5,300 cubic yards of material excavated from the proposed marine outfall alignment corridor located near Point Wells, Puget Sound, for potential disposal at a PSDDA open-water disposal site.

2. The project was ranked Moderate for testing purposes. The sampling and analysis plan was submitted on April 19, 2004 and approved on May 12, 2004 by the DMMP agencies for an estimated total dredged material footprint volume of 5,300 cubic yards. A sediment quality characterization conducted during September/October 2003 along the proposed marine outfall alignment corridor was not coordinated or approved by the DMMP agencies. These data generally showed all chemicals of concern below the screening levels for the DMMP and SQS levels for the SMS, and are discussed in more detail below. A 4,800 gallon spill of heavy fuel oil occurred on December 30, 2003 at the Chevron Texaco bulk fuel terminal with releases into marine waters on the south side of Point Wells, which overlapped with the proposed marine outfall corridor. Therefore, the surface (0-10 cm) sediment quality was subject to confirmatory testing to confirm the sediment quality previously documented during the September/October 2003 sediment quality evaluation. The DMMP sampling design called for collecting confirmatory surface sediment samples at three uncomposited DMMU locations using a Van Veen Grab Sampler. Figure 1 shows the sample locations along the outfall alignment corridor. During field collections, heavily cobbled substrate was encountered at Station SB-1, and an alternate location was coordinated and approved by the DMMO/DMMP. The new location was located approximately 125 feet southwest of the prescribed location (see Figure 1). The uncomposited samples were collected for both chemisty and potential biological testing. A tiered testing approach was proposed, 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

Initial SAP submittal date:	April 19, 2004
SAP approval letter date:	May 12,2004
Sampling date(s):	June 14, 2004
Sediment data characterization report submittal date:	October 21, 2004
DAIS Tracking Number	BRWMO-1-A-F-202
Recency Determination Date: Moderate (5 years)	June 2009

4. The Sampling and Analysis Plan approved by the Agencies for testing for the three surface 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.

3. Table 2 provides an analysis summary of the results of the conventional parameters analyzed for the

three uncomposited DMMUs. Table 3 contains a complete inventory of chemical testing results for the three surface confirmatory DMMUs. There were no DMMP chemical screening level guideline exceedances. The subsurface sediment quality was documented from sampling conducted in September/October 2003. These data were previously evaluated by the DMMP during SAP review and the DMMP concluded that the subsurface sediment quality was good, and that there were no DMMP/PSDDA chemical of concern SL exceedances, nor were there any SMS SQS exceedances. The subsurface sediment quality is documented in Table 3 attached.

5. The results of the chemical analysis for the three uncomposited DMMUs, representing a total of 5,300 cy is suitable for unconfined open-water disposal at a PSDDA open-water disposal site.

6. This memorandum documents the suitability of sediment to be dredged from the King County Department of Natural Resources and Parks Brightwater Marine Outfall Alignment Corridor Project for disposal at a PSDDA non-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:

4 Nov 04
Date

David R. Kendall
David Kendall, Ph.D., Seattle District Corps of Engineers

4 Nov 2004
Date

John Malek
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Peter Leon, Washington Department of Natural Resources

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DMMO File

Figure 1
Brightwater Marine Outfall Alignment at Point Wells
2001, 2003, and 2004 Sediment Sampling Locations

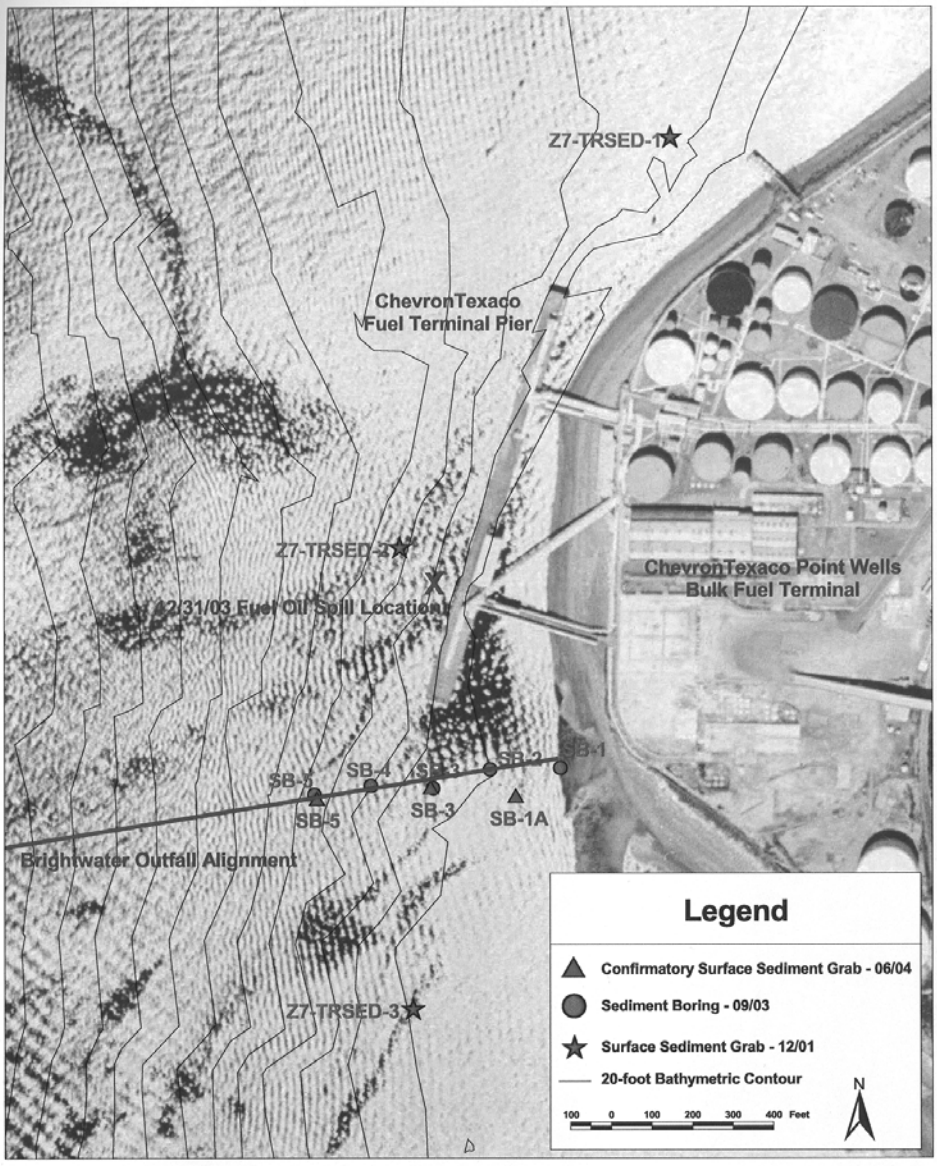

Table 2. Brightwater Marine Outfall Project DMMP Characterization Summary

		DMMP			SB-1A		SB-3		SB-5	
					dry wgt	VQ	dry wgt	VQ	dry wgt	VQ
CHEMICAL NAME	Units	SL	BT	ML	DMMU		DMMU		DMMU	
Antimony		150		200	**NA**		**NA**		**NA**	
Arsenic	mg/kg	57	0.5071	700	**NA**		**NA**		**NA**	
Cadmium	mg/kg	5	11.3	14	**NA**		**NA**		**NA**	
Chromium	mg/kg	(2)	267	(2)	**NA**		**NA**		**NA**	
Copper	mg/kg	390	1,027	1,300	**NA**		**NA**		**NA**	
Lead	mg/kg	450	975	1,200	**NA**		**NA**		**NA**	
Mercury	mg/kg	0.41	1.5	2.3	**NA**		**NA**		**NA**	
Nickel	mg/kg	140	370	370	**NA**		**NA**		**NA**	
Selenium	mg/kg	(2)	3	(2)	**NA**		**NA**		**NA**	
Silver	mg/kg	6.1	6.1	8.4	**NA**		**NA**		**NA**	
Zinc	mg/kg	410	2,783	3,800	**NA**		**NA**		**NA**	
Naphthalene	ug/kg	2,100		2,400	19	U	19	U	19	U
Acenaphthylene	ug/kg	560		1,300	21	U	20.0	U	20.0	U
Acenaphthene	ug/kg	500		2,000	9.6	U	10	U	10	U
Fluorene	ug/kg	540		3,600	18.0	U	18.0	U	18.0	U
Phenanthrene	ug/kg	1,500		21,000	5.5	U	**52.7**		5.4	U
Anthracene	ug/kg	960		13,000	5.5	U	**9.1**		5.4	U
2-Methylnapthalene	ug/kg	670		1,900	19.0	U	19	U	19	U
Total LPAH	ug/kg	5,200		29,000	21	U	**62.0**		20.0	U
Fluoranthene	ug/kg	1,700	4,600	30,000	11	U	**147**		**13**	
Pyrene	ug/kg	2,600	11,980	16,000	**5.9**		**122**		**13.0**	
Benzo(a)anthracene	ug/kg	1,300		5,100	**4.2**		**38**		**5.6**	
Chrysene	ug/kg	1,400		21,000	**5.9**		**51.1**		**8.3**	
Benzofluoranthenes (b+k)	ug/kg	3,200		9,900	**8.9**		**58.5**		**19.2**	
Benzo(a)pyrene	ug/kg	1,600		3,600	4.1	U	**29.8**		**9.11**	
Indeno(1,2,3-cd)pyrene	ug/kg	600		4,400	12	U	12	U	12	U
Dibenzo(a,h)anthracene	ug/kg	230		1,900	9.6	U	9.5	U	9.5	U
Benzo(g,h,I)perylene	ug/kg	670		3,200	11	U	**13**		11	U
Total HPAH	ug/kg	12,000		69,000	**25**		**460**		**68.0**	
1,3-Dichlorobenzene	ug/kg	170		350	0.36	U	0.35	U	0.35	U
1,4-Dichlorobenzene	ug/kg	110		120	0.18	U	0.18	U	0.18	U
1,2-Dichlorobenzene	ug/kg	35		110	0.36	U	0.35	U	0.35	U
1,2,4-Trichlorobenzene	ug/kg	31		64	0.36	U	0.35	U	0.35	U
Hexachlorobenzne (HCB)	ug/kg	22	168	230	0.90	U	0.90	U	0.89	U
Dimethylphthalate	ug/kg	1,400		15,000	15	U	15	U	15	U
Diethylphthalate	ug/kg	1,200		8,100	8.2	U	8.2	U	8.1	U
Di-n-butylphthalate	ug/kg	5,100		47,000	53	U	10	U	47	U
Butylbenzylphthalate	ug/kg	970		8,100	8.2	U	8.2	U	8.1	U
Bis(2-ethylhexyl)phthalate	ug/kg	8,300		9,100	**11**		**25.1**		9.1	U
Di-n-octylphthalate	ug/kg	6,200		11,000	11	U	11	U	11	U
Phenol	ug/kg	420		1,200	19	U	26	U	15	U
2-Methylphenol	ug/kg	63		77	22	U	22	U	22	U
4-Methylphenol	ug/kg	670		3,600	22	U	22	U	22	U
2,4-Dimethylphenol	ug/kg	29		210	9.6	U	9.5	U	9.5	U
Pentachlorophenol	ug/kg	400	504	690	9.2	U	9.1	U	9.1	U
Benzyl alcohol	ug/kg	57		870	8.2	U	8.2	U	8.1	U
Benzoic acid	ug/kg	650		760	**105**		**121**		**107**	
Dibenzofuran	ug/kg	540		1,700	19	U	19	U	19	U
Hexachloroethane	ug/kg	1,400		14,000	21	U	20	U	20	U
Hexachlorobutadiene	ug/kg	29		270	1	U	1	U	1	U
N-Nitrosodiphenylamine	ug/kg	28		130	27	U	27	U	27	U
Trichloroethene	ug/kg	160		1,600	6.8	U	6.8	U	6.8	U
Tetrachloroethene	ug/kg	57		210	6.8	U	6.8	U	6.8	U
Ethylbenzene	ug/kg	10		50	6.8	U	6.8	U	6.8	U
Total Zylene (sum of o-,m-,p-)	ug/kg	40		160	6.8	U	6.8	U	6.8	U
Total DDT (sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT)	ug/kg	6.9	50	69	**NA**		**NA**		**NA**	
Aldrin	ug/kg	10			**NA**		**NA**		**NA**	
Chlordane	ug/kg	10	37		**NA**		**NA**		**NA**	
Dieldrin	ug/kg	10			**NA**		**NA**		**NA**	
Heptachlor	ug/kg	10			**NA**		**NA**		**NA**	
Alpha-BHC	ug/kg	NA	10		**NA**		**NA**		**NA**	
Gamma-BHC (Lindane)	ug/kg	10			**NA**		**NA**		**NA**	

Table 2. Brightwater Marine Outfall Project DMMP Characterization Summary

Total PCBs	ug/kg	130	38***	3,100	NA		NA		NA	
Total Solids	%				73.0		73.4		73.8	
Total Volatile Solids	%				0.97		1.3		1.1	
Total Organic Carbon	%				0.10		0.23		0.18	
Total Ammonia	mg/kg				NA		NA		NA	
Total Sulfides	mg/kg				NA		NA		NA	
Gravel	%				0.70		0.3		0.8	
Sand	%				98.2		95		95	
Silt	%				0.7		1.3		0.7	
Clay	%				2.7		3		3	
Fines (percent silt + clay)	%				3.4		4.0		3.3	
Eohaustorius estuarius hits:					NA		NA		NA	
Mytilus galloprovincialis hits:					NA		NA		NA	
Neanthes arenaceodentata hits:					NA		NA		NA	
Bioassay Determination: (P/F)					NA		NA		NA	
BTs eyesceeded:					NO		NO		NO	
Bioaccumulation conducted:					NO		NO		NO	
Bioaccumulation Determination:										
ML Rule exceeded:					NO		NO		NO	
PSDDA Determination:					PASS		PASS		PASS	
DMMU Volume:	cy				1,767		1,767		1,766	
Rank					M		M		M	
Mean grab sampling depth	ft				10 cm		10 cm		10 cm	
Maximum sampling depth (mudline)					10 cm		10 cm		10 cm	
DMMU ID:					SB-1A		SB-3		SB-5	
							Total Volume:		5,300	

Legend:

SL = Screening Level exceedance

P = Pass (Suitable for UCOWD)

VQ = Validation Qualifier

UCOWD = Unconfined open-water disposal

U = Undetected at the method detection limit

J = Estimate

Table 3
Sediment Chemistry Results Compared to PSDDA Criteria
Point Wells Subtidal Sediment Borings
Brightwater Marine Outfall Alignment

Boring	SB-1 (-0.2 ft MLLW)			SB-2 (-20.8 ft MLLW)			SB-3 (-28.4 ft MLLW)		SB-4 (-67.5 ft MLLW)		SB-5 (-105.6 ft MLLW)		PSDDA Chemical Criteria[1]		
Sampling Interval	0 - 2 ft	8 - 15 ft	32.5 - 38.5 ft	0 - 1.5 ft	5 - 14 ft	25 - 31.5 ft	0 - 1.5 ft	9 - 16 ft	0 - 1.5 ft	5 - 13 ft	0 - 1.5 ft	7.75 - 14 ft	SL	BT	ML
Conventionals															
Solids (%)	84.9	88.1	80.1	78.9	67.2	83.9	85.9	88.4	79.5	80.5	84.7	85.7	--	--	--
Total Organic Carbon (mg/Kg DW)	1,450	740	N/A	3,360	8,510	N/A	1,330	1,390	2,210	1,840	1,350	1,410	--	--	--
Total Organic Carbon (%)	0.15	0.07	N/A	0.34	0.85	N/A	0.13	0.14	0.22	0.18	0.14	0.14	--	--	--
Clay (%)	1.3	N/A	N/A	2.0	N/A	N/A	1.8	N/A	3.3	N/A	3.1	N/A	--	--	--
Silt (%)	5.1	N/A	N/A	7.4	N/A	N/A	3.8	N/A	7.8	N/A	6.6	N/A	--	--	--
Sand (%)	61.7	N/A	N/A	88.0	N/A	N/A	68.6	N/A	88.8	N/A	83.7	N/A	--	--	--
Gravel (%)	32.2	N/A	N/A	2.6	N/A	N/A	25.7	N/A	0.1	N/A	6.5	N/A	--	--	--
Ammonia (mg/Kg DW)	5.09	2.94	5.58	4.17	7.60	2.41	0.983	0.268	1.05	1.06	0.523	0.908	--	--	--
Total Sulfides (mg/Kg DW)	<MDL (1.2)	<MDL (1.1)	N/A	<MDL (1.3)	N/A	N/A	<MDL (1.2)	N/A	<MDL (1.3)	N/A	<MDL (1.2)	N/A	--	--	--
Metals (mg/Kg DW)															
Antimony	<MDL (1.6)	<MDL (1.7)	<MDL (1.9)	<MDL (1.9)	N/A	<MDL (1.8)	<MDL (1.7)	<MDL (1.7)	<MDL (1.9)	<MDL (1.9)	<MDL (1.8)	<MDL (1.8)	150	150	200
Arsenic	<MDL (2.8)	3.1	3.5	<MDL (3.3)	N/A	<MDL (3.0)	<MDL (2.9)	<MDL (2.8)	<MDL (3.1)	<MDL (3.2)	<MDL (3.0)	<MDL (2.9)	57	507.1	700
Cadmium	0.18	0.19	0.6	<MDL (0.19)	N/A	<MDL (0.18)	<MDL (0.17)	<MDL (0.17)	<MDL (0.19)	<MDL (0.19)	<MDL (0.18)	<MDL (0.18)	5.1	--	14
Chromium	15.9	16.1	23.6	20.4	N/A	42.1	12.8	20.1	15.8	21.2	18.9	13.5	--	--	--
Copper	11.1	22.6	25.8	12.0	N/A	14.5	9.23	11.3	6.93	7.19	6.36	12.4	390	--	1,300
Lead	4.4	1.8	2.4	13.4	N/A	1.9	3.6	<MDL (1.7)	4.7	1.9	2.7	<MDL (1.8)	450	--	1,200
Mercury	<MDL (0.024)	<MDL (0.022)	<MDL (0.026)	<MDL (0.025)	N/A	<MDL (0.024)	<MDL (0.024)	<MDL (0.023)	0.029	<MDL (0.024)	<MDL (0.024)	<MDL (0.023)	0.41	1.5	2.3
Nickel	17.9	21.6	34.1	24.5	N/A	31.8	13.9	23.1	16.1	19.4	21.0	18.9	140	370	370
Silver	0.42	0.47	0.69	0.43	N/A	0.44	0.37	0.49	0.42	0.45	0.43	0.46	6.1	6.1	8.4
Zinc	23.4	28.3	30.1	30.9	N/A	24.6	21.1	23.4	21.3	20.7	30.0	22.5	410	--	3,800
Organics (µg/Kg DW)															
LPAHs															
Acenaphthene	<MDL (8.2)	<MDL (7.9)	<MDL(8.7)	<MDL (8.9)	<MDL (21)	<MDL (8.3)	<MDL (8.1)	<MDL (7.9)	<MDL (8.8)	<MDL(8.7)	<MDL (8.3)	<MDL (8.2)	500	--	2,000
Acenaphthylene	<MDL (18)	<MDL (17)	<MDL (19)	<MDL (19)	<MDL (45)	<MDL (18)	<MDL (17)	<MDL (17)	<MDL (19)	<MDL (19)	<MDL (18)	<MDL (18)	560	--	1,300
Anthracene	<MDL (4.7)	<MDL (4.5)	<MDL (5.0)	5.2	25.1	<MDL (4.8)	<MDL (4.7)	<MDL (4.5)	<MDL (5.0)	<MDL (5.0)	<MDL (4.7)	<MDL (4.7)	960	--	13,000
Fluorene	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (39)	<MDL (15)	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (15)	<MDL (15)	540	--	3,600
2-Methylnaphthalene	<MDL (16)	<MDL (16)	<MDL (17)	<MDL (18)	<MDL (42)	<MDL (17)	<MDL (16)	<MDL (16)	<MDL (18)	<MDL (17)	<MDL (17)	<MDL (16)	670	--	1,900
Naphthalene	<MDL (16)	<MDL (16)	<MDL (17)	<MDL (18)	<MDL (42)	<MDL (17)	<MDL (16)	<MDL (16)	<MDL (18)	<MDL (17)	<MDL (17)	<MDL (16)	2,100	--	2,400
Phenanthrene	<MDL (4.7)	<MDL (4.5)	<MDL (5.0)	21.4	61.9	<MDL (4.8)	5.8	<MDL (4.5)	13.6	6.8	<MDL (4.7)	<MDL (4.7)	1,500	--	21,000
Total LPAHs	<MDL (4.7-18)	<MDL (4.5-17)	<MDL (5.0-19)	27	87	<MDL (4.8-18)	6	<MDL (4.5-17)	14	7	<MDL (4.7-18)	<MDL (4.7-18)	5,200	--	29,000
HPAHs															
Benzo(a)anthracene	4.75	<MDL (2.3)	<MDL (2.5)	21.0	81.0	<MDL (2.4)	6.05	<MDL (2.3)	10.2	7.49	<MDL (2.4)	<MDL (2.3)	1,300	--	5,100
Benzo(a)pyrene	5.2	<MDL (3.4)	<MDL (3.7)	26.7	126	<MDL (3.6)	9.19	<MDL (3.4)	12.7	19.1	<MDL (3.5)	<MDL (3.5)	1,600	3,600	3,600
Benzofluoranthenes (b+k)	11.0	<MDL (3.4)	<MDL (3.7)	60.9	215	<MDL (3.6)	19.9	<MDL (3.4)	22.9	40.7	3.5	<MDL (3.5)	3,200	--	9,900
Benzo(g,h,i)perylene	<MDL (9.4)	<MDL (9.1)	<MDL (10)	20.8	67.4	<MDL (9.5)	<MDL (9.3)	<MDL (9.0)	<MDL (10)	<MDL (9.9)	<MDL (9.4)	<MDL (9.3)	670	--	3,200
Chrysene	11.9	<MDL (4.5)	<MDL (5.0)	25.7	85.4	<MDL (4.8)	8.3	<MDL (4.5)	10.3	14.4	<MDL (4.7)	<MDL (4.7)	1,400	--	21,000
Dibenzo(a,h)anthracene	<MDL (8.2)	<MDL (7.9)	<MDL(8.7)	<MDL (8.9)	<MDL (21)	<MDL (8.3)	<MDL (8.1)	<MDL (7.9)	<MDL (8.8)	<MDL(8.7)	<MDL (8.3)	<MDL (8.2)	230	--	1,900
Fluoranthene	<MDL (9.4)	<MDL (9.1)	<MDL (10)	47.7	118	<MDL (9.5)	13	<MDL (9.0)	20.1	<MDL (9.9)	<MDL (9.4)	<MDL (9.3)	1,700	4,600	30,000
Indeno(1,2,3-c,d)pyrene	<MDL (11)	<MDL (10)	<MDL (11)	22	60.6	<MDL (11)	<MDL (10)	<MDL (10)	<MDL (11)	<MDL (11)	<MDL (11)	<MDL (11)	600	--	4,400
Pyrene	6.2	<MDL (4.5)	<MDL (5.0)	63.9	208	<MDL (4.8)	14.2	<MDL (4.5)	25.8	13.9	6.1	<MDL (4.7)	2,600	--	16,000
Total HPAHs	39	<MDL (2.3-10)	<MDL (2.5-11)	289	961	<MDL (2.4-11)	71	<MDL (2.3-10)	102	96	10	<MDL (2.3-11)	12,000	--	69,000
Phthalates															
Benzyl Butyl Phthalate	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (40)	<MDL (15)	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (15)	<MDL (15)	970	--	--
Bis(2-ethylhexyl) Phthalate[2]	<MDL (40)	<MDL (40)	<MDL (40)	<MDL (40)	<MDL (42)	<MDL (40)	43.7	<MDL (40)	<MDL (40)	<MDL (40)	<MDL (40)	<MDL (40)	8,300	13,870	--
Diethyl Phthalate	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (40)	<MDL (15)	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (15)	<MDL (15)	1,200	--	--
Dimethyl Phthalate	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (40)	<MDL (15)	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (15)	<MDL (15)	1,400	1,400	--
Di-N-butyl Phthalate	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (40)	<MDL (15)	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (15)	<MDL (15)	5,100	10,220	--
Di-N-octyl Phthalate	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (40)	<MDL (15)	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (15)	<MDL (15)	6,200	--	--
Chlorobenzenes															
1,2-Dichlorobenzene	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (4.0)	<MDL (1.5)	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.5)	<MDL (1.5)	35	37	110
1,3-Dichlorobenzene	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (4.0)	<MDL (1.5)	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.5)	<MDL (1.5)	170	1241	--
1,4-Dichlorobenzene	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (4.0)	<MDL (1.5)	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.5)	<MDL (1.5)	110	120	120
1,2,4-Trichlorobenzene	<MDL (0.31)	<MDL (0.30)	<MDL (0.32)	<MDL (0.33)	<MDL (0.79)	<MDL (0.31)	<MDL (0.30)	<MDL (0.29)	<MDL (0.33)	<MDL (0.32)	<MDL (0.31)	<MDL (0.30)	31	--	64
Hexachlorobenzene	<MDL (0.78)	<MDL (0.75)	<MDL (0.82)	<MDL (0.84)	<MDL (1.9)	<MDL (0.79)	<MDL (0.77)	<MDL (0.75)	<MDL (0.83)	<MDL (0.82)	<MDL (0.78)	<MDL (0.77)	22	168	230

Table 3
Sediment Chemistry Results Compared to PSDDA Criteria
Point Wells Subtidal Sediment Borings
Brightwater Marine Outfall Alignment

Boring	SB-1 (-0.2 ft MLLW)			SB-2 (-20.8 ft MLLW)			SB-3 (-28.4 ft MLLW)		SB-4 (-67.5 ft MLLW)		SB-5 (-105.6 ft MLLW)		PSDDA Chemical Criteria[1]		
Sampling Interval	**0 - 2 ft**	**8 - 15 ft**	**32.5 - 38.5 ft**	**0 - 1.5 ft**	**5 - 14 ft**	**25 - 31.5 ft**	**0 - 1.5 ft**	**9 - 16 ft**	**0 - 1.5 ft**	**5 - 13 ft**	**0 - 1.5 ft**	**7.75 - 14 ft**	**SL**	**BT**	**ML**
Organics (µg/Kg DW)															
Miscellaneous Semivolatiles															
Benzoic Acid	<MDL (32)	<MDL (31)	<MDL (34)	48	<MDL (79)	<MDL (32)	<MDL (31)	<MDL (31)	<MDL (34)	<MDL (34)	<MDL (32)	<MDL (32)	650	--	760
Benzyl Alcohol	<MDL (7.1)	<MDL (6.8)	<MDL (7.5)	<MDL (7.6)	<MDL (18)	<MDL (7.2)	<MDL (7.0)	<MDL (6.8)	<MDL (7.5)	<MDL (7.5)	<MDL (7.1)	<MDL (7.0)	57	--	870
Dibenzofuran	<MDL (16)	<MDL (16)	<MDL (17)	<MDL (18)	<MDL (42)	<MDL (17)	<MDL (16)	<MDL (16)	<MDL (18)	<MDL (17)	<MDL (17)	<MDL (16)	540	--	1,700
Hexachlorobutadiene	<MDL (0.88)	<MDL (0.85)	<MDL (0.94)	<MDL (0.95)	<MDL (2.2)	<MDL (0.89)	<MDL (0.87)	<MDL (0.85)	<MDL (0.94)	<MDL (0.93)	<MDL (0.89)	<MDL (0.88)	29	212	270
Hexachloroethane	<MDL (18)	<MDL (17)	<MDL (19)	<MDL (19)	<MDL (45)	<MDL (18)	<MDL (17)	<MDL (17)	<MDL (19)	<MDL (19)	<MDL (18)	<MDL (18)	1,400	10,220	14,000
N-Nitrosodiphenylamine	<MDL (24)	<MDL (23)	<MDL (25)	<MDL (25)	<MDL (60)	<MDL (24)	<MDL (23)	<MDL (23)	<MDL (25)	<MDL (25)	<MDL (24)	<MDL (23)	28	130	130
PCBs															
Aroclor 1016	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.9)	<MDL (1.5)	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.5)	<MDL (1.5)	--	--	--
Aroclor 1221	<MDL (2.9)	<MDL (2.8)	<MDL (3.1)	<MDL (3.2)	<MDL (3.7)	<MDL (3.0)	<MDL (2.9)	<MDL (2.8)	<MDL (3.1)	<MDL (3.1)	<MDL (3.0)	<MDL (2.9)	--	--	--
Aroclor 1232	<MDL (2.9)	<MDL (2.8)	<MDL (3.1)	<MDL (3.2)	<MDL (3.7)	<MDL (3.0)	<MDL (2.9)	<MDL (2.8)	<MDL (3.1)	<MDL (3.1)	<MDL (3.0)	<MDL (2.9)	--	--	--
Aroclor 1242	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.9)	<MDL (1.5)	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.5)	<MDL (1.5)	--	--	--
Aroclor 1248	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.9)	<MDL (1.5)	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.5)	<MDL (1.5)	--	--	--
Aroclor 1254	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.9)	<MDL (1.5)	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	<MDL (1.5)	<MDL (1.5)	--	--	--
Aroclor 1260	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	<MDL (1.6)	5.97	<MDL (1.5)	<MDL (1.5)	<MDL (1.5)	<MDL (1.6)	5.99	<MDL (1.5)	<MDL (1.5)	--	--	--
Total PCBs	<MDL (1.5-2.9)	<MDL (1.5-2.8)	<MDL (1.6-3.1)	<MDL (1.6-3.2)	5.97	<MDL (1.5-3.0)	<MDL (1.5-2.9)	<MDL (1.5-2.8)	<MDL (1.6-3.1)	5.99	<MDL (1.5-3.0)	<MDL (1.5-2.9)	130	38[3]	3,100
Phenols															
Phenol	58.7	<MDL (10)	<MDL (11)	16	<MDL (27)	<MDL (11)	<MDL (10)	<MDL (10)	<MDL (11)	<MDL (11)	<MDL (11)	<MDL (11)	420	876	1,200
2-Methylphenol	<MDL (22)	<MDL (22)	<MDL (24)	<MDL (24)	<MDL (57)	<MDL (23)	<MDL (22)	<MDL (21)	<MDL (24)	<MDL (24)	<MDL (22)	<MDL (22)	63	--	77
4-Methylphenol	<MDL (19)	<MDL (18)	<MDL (20)	<MDL (20)	<MDL (48)	<MDL (19)	<MDL (19)	<MDL (18)	<MDL (20)	<MDL (20)	<MDL (19)	<MDL (19)	670	--	3,600
2,4-Dimethylphenol	<MDL (8.2)	<MDL (7.9)	<MDL (8.7)	<MDL (8.9)	<MDL (21)	<MDL (8.3)	<MDL (8.1)	<MDL (7.9)	<MDL (8.8)	<MDL (8.7)	<MDL (8.3)	<MDL (8.2)	29	--	210
Pentachlorophenol	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (40)	<MDL (15)	<MDL (15)	<MDL (15)	<MDL (16)	<MDL (16)	<MDL (15)	<MDL (15)	400	504	690
Pesticides															
4,4'-DDD	<MDL (1.2)	<MDL (1.1)	<MDL (1.2)	<MDL (1.3)	N/A	<MDL (1.2)	<MDL (1.2)	<MDL (1.1)	<MDL (1.3)	<MDL (1.2)	<MDL (1.2)	<MDL (1.2)	--	--	--
4,4'-DDE	<MDL (1.2)	<MDL (1.1)	<MDL (1.2)	<MDL (1.3)	N/A	<MDL (1.2)	<MDL (1.2)	<MDL (1.1)	<MDL (1.3)	<MDL (1.2)	<MDL (1.2)	<MDL (1.2)	--	--	--
4,4'-DDT	<MDL (1.2)	<MDL (1.1)	<MDL (1.2)	<MDL (1.3)	N/A	<MDL (1.2)	<MDL (1.2)	<MDL (1.1)	<MDL (1.3)	<MDL (1.2)	<MDL (1.2)	<MDL (1.2)	--	--	--
Total DDT	<MDL (1.2)	<MDL (1.1)	<MDL (1.2)	<MDL (1.3)	N/A	<MDL (1.2)	<MDL (1.2)	<MDL (1.1)	<MDL (1.3)	<MDL (1.2)	<MDL (1.2)	<MDL (1.2)	6.9	50	69
Aldrin	<MDL (1.2)	<MDL (1.1)	<MDL (1.2)	<MDL (1.3)	N/A	<MDL (1.2)	<MDL (1.2)	<MDL (1.1)	<MDL (1.3)	<MDL (1.2)	<MDL (1.2)	<MDL (1.2)	10	37	--
Chlordane	<MDL (0.59)	<MDL (0.57)	<MDL (0.62)	<MDL (0.63)	N/A	<MDL (0.60)	<MDL (0.58)	<MDL (0.57)	<MDL(0.63)	<MDL (0.62)	<MDL (0.59)	<MDL (0.58)	10	37	--
Dieldrin	<MDL (1.2)	<MDL (1.1)	<MDL (1.2)	<MDL (1.3)	N/A	<MDL (1.2)	<MDL (1.2)	<MDL (1.1)	<MDL (1.3)	<MDL (1.2)	<MDL (1.2)	<MDL (1.2)	10	37	--
Gamma-BHC (Lindane)	<MDL (0.59)	<MDL (0.57)	<MDL (0.62)	<MDL (0.63)	N/A	<MDL (0.60)	<MDL (0.58)	<MDL (0.57)	<MDL(0.63)	<MDL (0.62)	<MDL (0.59)	<MDL (0.58)	10	--	--
Heptachlor	<MDL (0.59)	<MDL (0.57)	<MDL (0.62)	<MDL (0.63)	N/A	<MDL (0.60)	<MDL (0.58)	<MDL (0.57)	<MDL(0.63)	<MDL (0.62)	<MDL (0.59)	<MDL (0.58)	10	37	--
Volatile Organics															
Ethylbenzene	<MDL (5.9)	<MDL (5.7)	<MDL (6.2)	<MDL (6.3)	N/A	<MDL (6.0)	<MDL (5.8)	<MDL (5.7)	<MDL (6.3)	<MDL (6.2)	<MDL (5.9)	<MDL (5.8)	10	27	50
Trichloroethene (TCE)	<MDL (5.9)	<MDL (5.7)	<MDL (6.2)	<MDL (6.3)	N/A	<MDL (6.0)	<MDL (5.8)	<MDL (5.7)	<MDL (6.3)	<MDL (6.2)	<MDL (5.9)	<MDL (5.8)	160	1,168	1,600
Tetrachloroethene (PCE)	<MDL (5.9)	<MDL (5.7)	<MDL (6.2)	<MDL (6.3)	N/A	<MDL (6.0)	<MDL (5.8)	<MDL (5.7)	<MDL (6.3)	<MDL (6.2)	<MDL (5.9)	<MDL (5.8)	57	102	210
Total Xylenes	<MDL (5.9)	<MDL (5.7)	<MDL (6.2)	<MDL (6.3)	N/A	<MDL (6.0)	<MDL (5.8)	<MDL (5.7)	<MDL (6.3)	<MDL (6.2)	<MDL (5.9)	<MDL (5.8)	40	--	160

Notes

PSDDA - Puget Sound Dredged Disposal Analysis (Program).
ft MLLW - Depth of seafloor at location of sediment boring, referenced to mean lower low water.
ft - Depth of sediment sampling interval referenced to the sediment surface.
% - Percent.
mg/Kg DW - Milligrams per kilogram normalized to dry weight, based on percent solids analysis.
µg/Kg DW - Micrograms per kilogram normalized to dry weight, based on percent solids analysis.
LPAHs - Low molecular weight polynuclear aromatic hydrocarbons.
HPAHs - High molecular weight polynuclear aromatic hydrocarbons.
PCBs - Polychlorinated biphenyls.
<MDL (#) - Result is less than the analytical *method detection limit* (number in parentheses is the numeric MDL).
N/A - Not analyzed due to lack of sample material.
Shaded Cell - Method detection limit exceeds PSDDA Screening Level (SL) criterion (sample was analyzed at a 2.5:1 dilution).
[1] - PSDDA chemical criteria from Table 5-1, *Dredged Material Evaluation and Disposal Procedures, February 2000*. SL - Screening Level, BT - Bioaccumulation Trigger, ML - Maximum Level.
[2] - Bis(2-ethylhexyl) phthalate was detected in both quality control laboratory method blanks. The method detection limit for this compound was raised to 5X the method blank concentrations.
[3] - Bioaccumulation Trigger (BT) numeric criterion for PCBs is normalized to organic carbon and presented in units of mg/Kg OC (milligrams per kilogram of organic carbon).