

MEMORANDUM FOR RECORD

SUBJECT: DETERMINATION ON THE SUITABILITY OF MATERIAL TESTED FOR THE CAP SANTE BOAT HAVEN M, N, AND O-DOCK MAINTENANCE DREDGING PROJECT, ANACORTES, WASHINGTON EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR OPEN-WATER DISPOSAL.

1. The following summary reflects the consensus suitability determination of the Agencies that comprise the regional Dredged Material Management Program (DMMP) for the State of Washington on testing conducted for the evaluation of sediments within the Port of Anacortes Cap Sante Boat Haven – M, N, and O-Dock Maintenance Dredging Project, which is located at the northern part of the marina in Anacortes, Washington, (**Figure 1, Vicinity map**). This characterization evaluates approximately 12,000 cy of maintenance material within the marina, for unconfined open-water disposal at either the Rosario Strait Dispersive site, or the Port Gardner non-dispersive site.
2. **Table 1** documents the regulatory tracking information and dates for the DMMP testing conducted.

Table 1. Regulatory Tracking Information and Dates

SAP submittal date	September 6, 2011
SAP approval date:	September 16, 2011
Sampling date:	February 28, 2012
Initial Characterization Report submittal: Revised Characterization Report submittal:	May 8, 2012 June 7, 2012
Volume Tested (# DMMUs), Sampling Method:	12,000 cy (3 sampling Stations composited for 1 DMMU with Vibracore Sampler)
DAIS Tracking Number:	CSMNO-1-A-F-324
Recency Determination Date: Area Rank Moderate¹ = 5 years	February 2017 (Moderate):

Background:

3. Maintenance dredging at this location has become necessary as the near shore sections of the floating docks now frequently ground on the sediment surface during low tides, posing a potential public safety issue and damage to dock structures, and maintenance dredging will restore sufficient freeboard in the vicinity of the M, N, and O-Dock floats to minimize grounding at low tide.

¹ Area Ranking beyond 2017 will be **High** (see paragraph 13 for explanation)

Table 2. Cap Sante Boat Haven M, N, and O-Dock Characterization/Sampling Summary.

DMMU ID	Vibracore Station ID	Coordinates		Mudline Elevation (feet, MLLW)	Core Depth (ft)	DMMU Volume, CY
		Latitude	Longitude			
C1	1-1	N 48° 30'56.2951"	W 122° 36'24.0922"	-6.57	7	12,000
	1-2	N 48° 30'56.3186"	W 122° 36'22.3652"	-5.2	7	
	1-3	N 48° 30'55.9661"	W 122° 36'18.6952"	-2.23	10	

4. The project was ranked **Moderate** for the DMMP characterization. The SAP was submitted to the DMMP agencies for review/approval on September 6, 2011, and approved by the DMMP agencies on September 16, 2011 with minor revisions (See **Table 1**).

Sampling:

5. **Figure 2** depicts the proposed dredging subarea at M, N, O-Dock, and **Figure 3** and **Table 2** depicts the three Vibracore stations sampled and station keeping data. Three core stations were sampled and composited for a single DMMU (C1). The samples were collected on February 28, 2012 (**Table 2**), and submitted to the testing laboratory for analysis. The initial Data Characterization Report was submitted to the DMMP agencies for review on May 8, 2012, and a revised Characterization Report was subsequently submitted on June 7, 2012. The DMMP agencies concluded, after reviewing the data validation report, that the data was acceptable for decision-making using best professional judgment.

Chemical Testing Results:

6. The conventional and DMMP chemical analyses results are summarized in **Table 3**, and the comparative SMS evaluation summary is provided in **Table 3**. Dioxin/furans were quantitated above the DMMP screening level (SL) and bioaccumulation trigger (BT) at 42.7 pptr-TEQ, and are discussed further below. TBT porewater concentrations were quantitated at **0.25 µg/L**, which exceeds both the screening level (SL) and bioaccumulation trigger (BT). There were no other chemicals exceeding DMMP marine screening level and bioaccumulation guidelines. No chemicals exceeded the maximum levels. The applicant elected not to perform necessary bioaccumulation testing to assess dioxin and TBT BT exceedances, and therefore, without this testing, all the proposed dredged material is unsuitable for unconfined-open-water disposal.
7. Evaluation of these data in DMMU C1 relative to SMS guidelines (see **Table 3**), indicate that there were no Sediment Quality Standard (SQS) exceedances (other than TBT and dioxin) within the Cap Sante Marina M, N, O-Dock, and all chemicals were below SMS dry weight values or carbon-normalized values for SQS.
8. **Dioxin Testing Results Summary.** **Table 4** provides the congener specific dioxin/furan testing results for the single DMMU, DMU-C1, which was quantitated at **42.7 pptr-TEQ** (U = ½ detection limit).

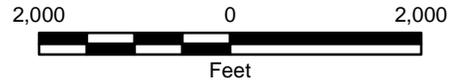
9. **Dioxin Interim Interpretative Framework.** The DMMP implemented new interim guidelines for interpreting dioxin data implemented on December 6, 2010, and are summarized below for both dispersive and non-dispersive disposal sites:
 - a. **Dispersive Screening Levels.** DMMUs with dioxin concentrations below 4 pptr TEQ will be allowed for open-water disposal at dispersive sites.
 - b. **Nondispersive Screening Levels.** DMMUs with dioxin concentrations below 10 pptr TEQ will be allowed for open-water disposal as long as the volume-weighted average concentration of dioxins in material from the entire dredging project does not exceed the Disposal Site Management Objective of 4 pptr TEQ.
10. **Dioxin Interpretation on Suitability for Unconfined-Open-Water Disposal.** As summarized in paragraph 6 above, DMMU-C1 was quantitated above the **4 pptr-TEQ** SL, the upper dioxin guideline limit for dispersive disposal, and non-dispersive site disposal (after volume weighted averaging), and above the DMMP BT of **10 pptr-TEQ**.
11. **Antidegradation.** A single Z-sample (C1-Z) was analyzed to assess antidegradation, and all SMS chemicals (including TBT and dioxin/furans) were below SQS (**Table 3**). TBT was quantitated at **0.006 ppb**, and dioxin was quantitated at **1.57 pptr-TEQ**, well below SLs and overlying sediment concentrations. Heptachlor was undetected at the reporting limit of 1.9 ppb, which exceeds the DMMP SL (1.5 ppb). Because this was only a detection limit exceedance, and the dioxin and TBT concentrations in the exposed surface were well below the DMMP SLs, the DMMP agencies used best-professional-judgment (BPJ) to conclude that the exposed surface would not exceed antidegradation based on these testing results.

Suitability Determination:

12. Therefore, the DMMP agencies conclude based on these testing results that the 12,000 cy of maintenance dredged material for the single DMMU (C1) is unsuitable for unconfined open-water disposal at either dispersive or non-dispersive DMMP disposal sites based on these testing results using best professional judgment (BPJ).
13. Based on these testing results, future DMMP characterizations will require testing this project at a **High Rank** based on dioxin and TBT testing results.
14. This memorandum documents the suitability of material proposed for dredging from the Cap Sante Boat Haven M, N, O-Dock Dredging Project, Anacortes, Washington, for open-water disposal. 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.

Map Revised: 01 August 2011 tbannister

Office: SEA Path: P:\51514701\0\GIS\VicinityMap.mxd



Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Cap Sante Boat Haven
Anacortes, Washington



Figure 1

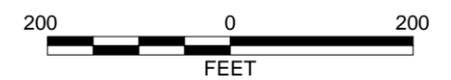
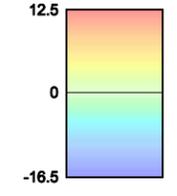
P:\15147010\02\CAD\15147010-02 SEDIMENT CHARACTERIZATION REPORT FIG 2.DWG\TAB.F2 MODIFIED BY THICHAUD ON APR 04, 2012 - 17:10



Legend:

— DMMU Boundary

**DEPTH LEGEND
(IN FEET, MLLW)**



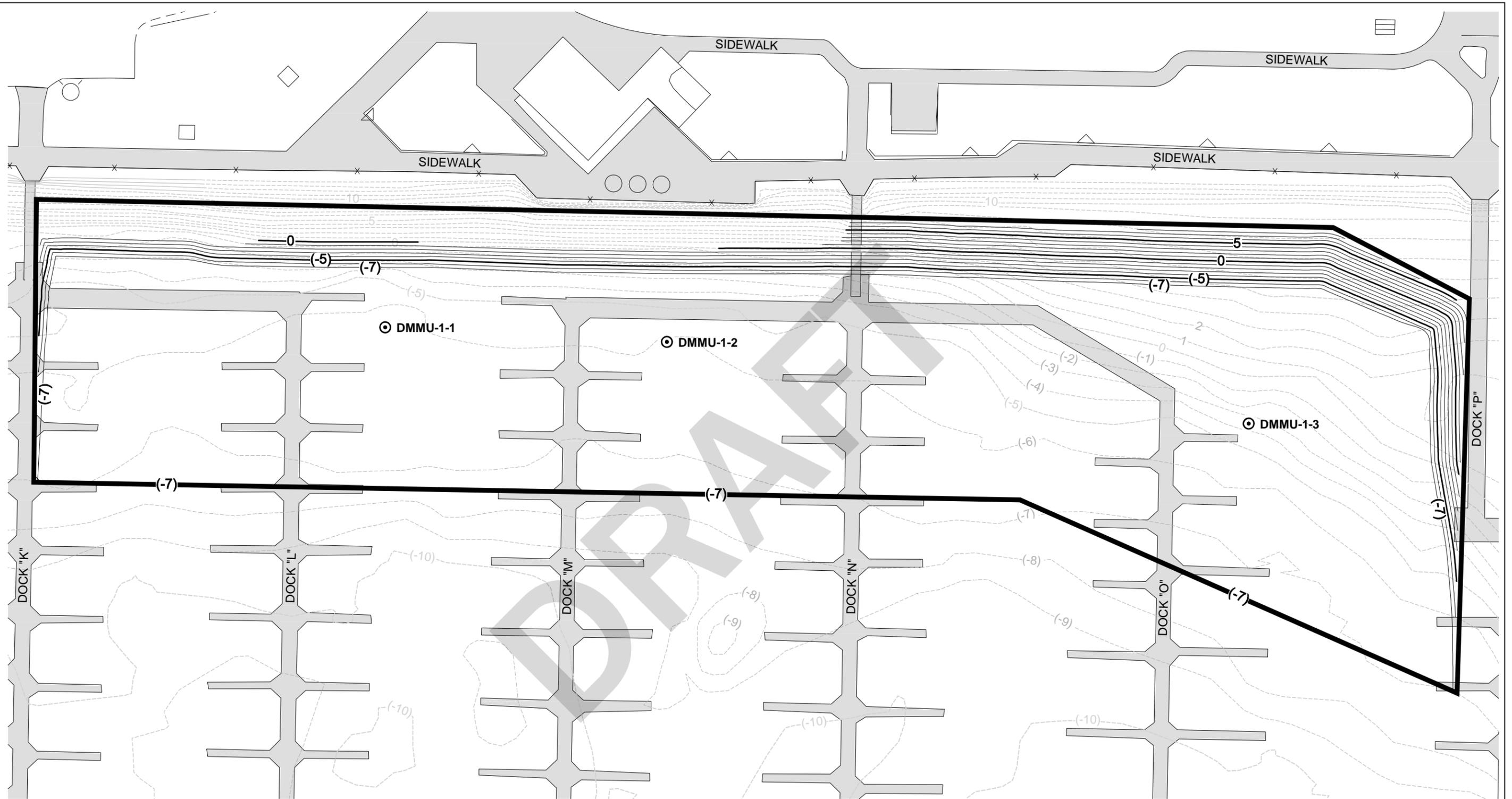
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Reference: Drawing base from David Evans and Associates, entitled Cap Sante Boat Haven, Multibeam Bathymetric Survey, Composite Hill Shade Imagery, Sheet 2 of 2, dated 3/29/06, project number POAN03.

Site Plan	
M, N and O-Dock Maintenance Dredging Project Anacortes, Washington	
GEOENGINEERS	Figure 2

P:\15\1470\02\CAD\151470\02 SEDIMENT CHARACTERIZATION REPORT FIG 3.DWG\TAB:PLAN MODIFIED BY THICHAUD ON APR 04, 2012 - 17:11

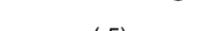
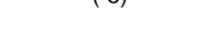


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Reference: Contours based on "Vicinity Map & Sheet Index" of Port of Anacortes Docks P/Q Small Craft Launch - In Water by Marine Structures Engineering dated August 2009.

Legend

-  DMMU Boundary
-  DMMU-1-1 Sample Location
-  Proposed Contour (-5)
-  Existing Contour (-10)



Dredge Material Management Unit (DMMU-1) and Sample Locations	
M, N and O-Dock Maintenance Dredging Project Anacortes, Washington	
GEOENGINEERS 	Figure 3

Table 3. Cap Sante Boat Haven, M, N, O-Dock DMMP Maintenance Characterization Summary

CHEMICAL NAME	Units	Sample ID:						DMMU-1			DMMU-1Z		
		DMMU ID:						C1			C1Z		
		DMMP (Marine-DW)			SMS (marine-DW & OC)			mg/kg-DW	mg/kg-OC	VQ	mg/kg-DW	mg/kg-OC	VQ
	SL	BT	ML	Units	SQS	CSL	DMMP	SMS		DMMP	SMS		
Antimony		150		200			9.0		U	6.0		U	
Arsenic	mg/kg	57	507.1	700	mg/kg	57	93	6.0		U	6.0	U	
Cadmium	mg/kg	5.1	11.3	14	mg/kg	5.1	6.7	1.30			0.60		
Chromium	mg/kg	260	260	(2)	mg/kg	260	270	32.8			35.4		
Copper	mg/kg	390	1,027	1,300	mg/kg	390	390	56.1			30.3		
Lead	mg/kg	450	975	1,200	mg/kg	450	530	13.0			4.0		
Mercury	mg/kg	0.41	1.5	2.3	mg/kg	0.41	0.59	0.11			0.040		
Selenium	mg/kg	(2)	3	(2)	mg/kg	--	--	0.90		U	0.70	U	
Silver	mg/kg	6.1	6.1	8.4	mg/kg	6.1	6.1	0.50		U	0.40	U	
Zinc	mg/kg	410	2,783	3,800	mg/kg	410	960	91.0			53		
Tributyltin (porewater)	µg/L	0.15	0.15					0.25			0.006	U	
Tributyltin (bulk/sediment)	µg/kg	73.2	73.2										
ORGANIC CHEMICALS													
Total LPAH	µg/kg	5,200		29,000	mg/kg-OC	370	780	1,837.0	77.8		273.7	55.6	
Naphthalene	µg/kg	2,100		2,400	mg/kg-OC	99	170	380.0	16.1		99.0	20.1	
Acenaphthylene	µg/kg	560		2,000	mg/kg-OC	66	66	120.0	5.08		16.0	3.25	
Acenaphthene	µg/kg	500		2,000	mg/kg-OC	16	57	92.0	3.90		9.7	1.97	
Fluorene	µg/kg	540		3,600	mg/kg-OC	23	79	130.0	5.51		16.0	3.25	
Phenanthrene	µg/kg	1,500		2,100	mg/kg-OC	100	480	810.0	34.3		95.0	19.3	
Anthracene	µg/kg	560		13,000	mg/kg-OC	220	1,200	230.0	9.75		24.0	4.88	
2-Methylnaphthalene	µg/kg	670		1,900	mg/kg-OC	38	64	75.0	3.18		14.0	2.85	
Total HPAH	µg/kg	12,000		69,000	mg/kg-OC	960	5,300	5,502.0	233.1		528.0	107.3	
Fluoranthene	µg/kg	1,700	4,600	30,000	mg/kg-OC	160	1,200	1,400.0	59.3		130.0	26.4	
Pyrene	µg/kg	2,600	11,980	16,000	mg/kg-OC	1,000	1,400	1,400.0	59.3		130.0	26.4	
Benzo(a)anthracene	µg/kg	1,300		5,100	mg/kg-OC	110	270	450.0	19.1		42.0	8.54	
Chrysene	µg/kg	1,400		21,000	mg/kg-OC	110	460	650.0	27.5		48.0	9.76	
Total Benzo(b+k)fluoranthenes	µg/kg	3,200		9,900	mg/kg-OC	230	450	770.0	32.6		68.0	13.8	
Benzo(a)pyrene	µg/kg	1,600		3,600	mg/kg-OC	99	210	410.0	17.4		44.0	8.94	
Indeno(1,2,3-cd)pyrene	µg/kg	600		4,400	mg/kg-OC	34	88	180.0	7.63		21.0	4.27	
Dibenzo(a,h)anthracene	µg/kg	230		1,900	mg/kg-OC	12	33	52.0	2.20		19.0	3.86	
Benzo(g,h,i)perylene	µg/kg	670		3,200	mg/kg-OC	31	78	190.0	8.05		26.0	5.28	
1,4-Dichlorobenzene	µg/kg	110		120	mg/kg-OC	3.1	9.0	19.0	0.81	U	19.0	3.86	
1,2-Dichlorobenzene	µg/kg	35		110	mg/kg-OC	2.3	2.3	19.0	0.81	U	19.0	3.86	
1,2,4-Trichlorobenzene	µg/kg	31		64	mg/kg-OC	0.81	1.8	19.0	0.81	U	19.0	3.86	
Hexachlorobenzene (HCB)	µg/kg	22	168	230	mg/kg-OC	0.38	2.3	19.0	0.81	U	19.0	3.86	
Dimethylphthalate	µg/kg	71		1,400	mg/kg-OC	53.0	53.0	12.0	0.51	J	19.0	3.86	
Diethylphthalate	µg/kg	200		1,200	mg/kg-OC	61	110	48.0	2.03	U	37.0	7.52	
Di-n-butylphthalate	µg/kg	1,400		5,100	mg/kg-OC	220	1,700	19.0	0.81	U	19.0	3.86	
Butylbenzylphthalate	µg/kg	63		970	mg/kg-OC	4.9	64	19.0	0.81	U	19.0	3.86	
Bis(2-ethylhexyl)phthalate	µg/kg	1,300		8,300	mg/kg-OC	47	78	90.0	3.81		28.0	5.69	
Di-n-octylphthalate	µg/kg	6,200		6,200	mg/kg-OC	58	4,500	19.0	0.81	U	19.0	3.86	
Phenol	µg/kg	420		1,200	µg/kg	420	1,200	170.0			31.0		
2-Methylphenol	µg/kg	63		77	ug/kg	63	63	19.0		U	19.0	U	
4-Methylphenol	µg/kg	670		3,600	ug/kg	670	670	330.0			24.0	J	
2,4-Dimethylphenol	µg/kg	29		210	ug/kg	29	29	19.0		UJ	19.0	UJ	
Pentachlorophenol	µg/kg	400		690	ug/kg	360	690	190.0		U	190.0	U	
Benzyl alcohol	µg/kg	57		87	ug/kg	57	73	14.0		J	19.0	U	
Benzoic acid	µg/kg	650		760	µg/kg	650	650	320.0		J	390.0	U	
Dibenzofuran	µg/kg	540		1,700	mg/kg-OC	15	58	93.0	3.94		12.0	2.44	

Table 3. Cap Sante Boat Haven, M, N, O-Dock DMMP Maintenance Characterization Summary

CHEMICAL NAME	Units	Sample ID:						DMMU-1			DMMU-1Z		
		DMMU ID:						C1			C1Z		
		DMMP (Marine-DW)			SMS (marine-DW & OC)			mg/kg-DW	mg/kg-OC	VQ	mg/kg-DW	mg/kg-OC	VQ
	SL	BT	ML	Units	SQS	CSL	DMMP	SMS		DMMP	SMS		
Hexachlorobutadiene	µg/kg	29		270	mg/kg-OC	3.9	6.2	9.6	0.41	UJ	9.7	1.97	UJ
N-Nitrosodiphenylamine	µg/kg	28		130	mg/kg-OC	11	11	19.0	0.81	U	19.0	3.86	U
p,p-DDD	µg/kg	16						0.96		U	1.1		Y
p,p-DDE	µg/kg	9						0.96		U	0.92		U
p,p-DDT	µg/kg	12						4.30		Y	0.92		U
Total DDT (sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT)	µg/kg		50	69		--	--	4.30		Y	1.1		Y
Aldrin	µg/kg	9.5				--	--	0.48		U	0.73		Y
Chlordane (sum of cis, trans, cis-nonachlor, trans-nonachlor, oxy)	µg/kg	2.8				--	--	1.80		Y	0.92		Y
Dieldrin	µg/kg	1.9	37			--	--	0.96		U	0.92		U
Heptachlor	µg/kg	1.5				--	--	1.3		Y	1.9		Y
Total PCBs	µg/kg	130		3,100	mg/kg/OC	12.0	65.0	19	0.8	UJ	19	3.9	UJ
Total PCBs (TOC-normalized)	µg/kg		38***					0.8			3.9		
Dioxin (TEQ: see Table 4 for detailed results)	ng/kg	4	10					42.7			1.57		
Total Solids	%							48.3			73.0		
Total Volatile Solids	%												
Total Organic Carbon	%							2.36			0.49		
Total Ammonia	mg/kg							44.9			15.5		
Total Sulfides	mg/kg							385			16.7		
Gravel	%							1.6			17.9		
Sand	%							27.7			26.9		
Silt	%												
Clay	%												
Fines (percent silt + clay)	%							70.6			55.1		
Bioassay Determination: (P/F)	%							NA			NA		
BTs exceeded:								Yes			No		
Bioaccumulation conducted:								No			No		
Bioaccumulation Determination: (P/F)													
ML Rule exceeded:								No			No		
PSDDA Determination:								Fail UCOWD			Pass AD		
DMMU Volume:								12,000					
Rank (Low = L, Moderate = M, Low-Moderate =LM, High = H)								M			M		
Mean core sampling depth (ft)	ft							8.0			8.0		
Maximum sampling depth (mudline) (with Z-sample)	ft							10.0			10.0		
DMMU ID:								DMMU-C1			DMMU-C1Z		

Pass AD = Pass Antidegradation (BPJ)

Fail = exceeds DMMP suitability guidelines

SL/BT = exceeds DMMP SL/BT

SL = exceeds DMMP Screening Level

VQ = Validation Qualifier

UCOWD = Unconfined open-water disposal

AD = antidegradation

NA = Not applicable

U = undetected at the reporting limit (method detection limit)

Y = Analyte is not detected at or above the reported concentration, due to chromatographic interference

J = Estimated Concentration, at the reporting limit

Table 4. Dioxin/furan Testing Summary for Cap Sante Marina, M,N,O Dock Project

Analyte	WHO (05) TEF	C1 (CSM)			C1Z (CSM)		
		ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ
2,3,7,8-TCDD	1	1.19	EMPC	0.595	0.187	JEMPC	0.0935
1,2,3,7,8-PeCDD	1	11.6		11.6	0.638	JEMPC	0.319
1,2,3,4,7,8-HxCDD	0.1	17.4		1.74	0.712	JEMPC	0.0356
1,2,3,6,7,8-HxCDD	0.1	62		6.2	2.33		0.233
1,2,3,7,8,9-HxCDD	0.1	39.7		3.97	1.71	J	0.171
1,2,3,4,6,7,8-HpCDD	0.01	1220		12.2	37.8		0.378
OCDD	0.0003	7130		2.139	219		0.0657
2,3,7,8-TCDF	0.1	3.19		0.319	0.402	J	0.0402
1,2,3,7,8-PeCDF	0.03	2.41		0.0723	0.235	J	0.00705
2,3,4,7,8-PeCDF	0.3	2.86		0.858	0.32	J	0.096
1,2,3,4,7,8-HxCDF	0.1	5.61		0.561	0.324	JEMPC	0.0162
1,2,3,6,7,8-HxCDF	0.1	4.99		0.499	0.179	JEMPC	0.00895
2,3,4,6,7,8-HxCDF	0.1	6.86		0.686	0.4	J	0.04
1,2,3,7,8,9-HxCDF	0.1	2.29		0.229	0.0636	JEMPC	0.00318
1,2,3,4,6,7,8-HpCDF	0.01	90.4		0.904	5.57		0.0557
1,2,3,4,7,8,9-HpCDF	0.01	4.01		0.0401	0.0702	U	0.000351
OCDF	0.0003	191		0.0573	8.27		0.002481
Total TEQ (u = 1/2):				42.7			1.57
Total TEQ (u=0):				42.1			1.09
TOC (%)				2.4			0.49

Legend:

EMPC qualified data treated as undetected

J = Estimated concentration, reported at reporting limit

U = Analyte not detected at or above the reported concentration