

## MEMORANDUM FOR RECORD

**SUBJECT: DETERMINATION ON THE SUITABILITY OF PROPOSED DREDGED MATERIAL TESTED FOR THE CITY OF ANACORTES, SKYLINE MARINA, ANACORTES, WASHINGTON PROJECT (NWS-2009-695) EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR EITHER OPEN-WATER DISPOSAL AT THE ROSARIO STRAIT DISPERSIVE DISPOSAL SITE, OR AN APPROPRIATE BENEFICIAL USE SITE IN FIDALGO BAY.**

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 dredging of the City of Anacortes\ and Skyline Marina (e.g., #17, #18, #19, #22, #23, #24 = Skyline Marina Holdings), located in Flounder Bay, Anacortes, 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 the proposed 105,700 cy of proposed dredged material from the public and private access channels maintained by the City of Anacortes within the finger waterways and private marinas collectively called the Skyline Marina, located in Anacortes, for either open-water disposal at the Rosario Strait dispersive disposal site, or placement at an appropriate beneficial use site in Fidalgo Bay.
2. **Table 1** documents the regulatory tracking information and dates for the DMMP testing conducted.

**Table 1. Regulatory Tracking Information and Dates**

Initial SAP submittal date:	February 9, 2009
Revised SAP submittal date:	April 6, 2009
2 <sup>nd</sup> Revised SAP submittal date:	April 27, 2009
SAP approval letter dates:	Initial Revision 2 <sup>nd</sup> Revision
	March 4, 2009 April 20, 2009 June 2, 2009 (email response approving changes)
Sampling date(s):	April 13-15, 2009
Characterization Report submittal:	June 12, 2009
Dioxin Data Validation Report Submittal:	August 12, 2009
Volume Tested (# DMMUs), Sampling Method:	105,700 cy; (12 DMMUs); Vibracorer
DAIS Tracking Number:	SKYLM-1-A-F-274
<b>Recency Determination Date:</b>	
<b>Moderate = 5 years</b>	April 2014 ( <b>Moderate</b> )

### Background:

3. The marina was last dredged in the 1970s but no records are available. No historic sediment testing data are known except the Phase I samples collected in January 2008. The results of these analyses did not highlight any significant sediment quality concerns. During this screening level characterization effort, all chemicals of concern were quantitated below DMMP screening levels, and dioxin/furan concentrations were quantitated between 1.38 to 6.39 pptr-TEQ ( $u = \frac{1}{2}$  detection limit) at five locations (see **Figure 2**).

4. The project was ranked **Moderate** for DMMP characterization. The initial SAP and two revised SAPs were prepared and submitted to DMMP for review and approval (See **Table 1**).

## **Sampling:**

5. **Figure 1** depicts the site vicinity and **Figure 2** depicts the previously collected 2008 sampling stations, and **Figure 3** depicts the 2009 sampling effort DMMU boundaries and sampling stations (proposed and actual) locations within each of the designated 12 DMMU boundaries. Generally, two vibracore sampling stations were collected within 7 of the 12 DMMUs<sup>1</sup> (DMMUs: 1, 2, 3, 4, 6, 10, 13), 3 were collected within DMMU-7, and the remaining 4 DMMUs had one station within the DMMU (DMMUs: 8, 9, 11, 12). Sampling was initiated on April 13 and completed on April 15, 2009. The Data Characterization Report was submitted to the DMMP agencies for review on June 12, 2009. At the DMMP agencies request, full data validation on the Round 2 dioxin testing results was required, and the Validation report was submitted to the DMMP agencies on August 12, 2009. 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 2**, and, the comparative SMS evaluation summary are provided in **Table 3**. It demonstrates that for chemicals of concern including dioxin/furan, no chemicals exceeded DMMP screening level guidelines, or bioaccumulation triggers. Evaluation of these data relative SMS guidelines, indicate that there were no Sediment Quality Standard (SQS) exceedances within any of the twelve DMMUs.
7. **Table 4** provides a summary of the validated dioxin/furan congener specific testing results for the twelve DMMUs, with TEQ (Toxicity Equivalence) concentrations ranging from a low of 0.22 pptr (DMMU-10) to a high of 2.29 pptr (DMMU-13) for the Round 2 dioxin testing results. The initial Round 1 analysis results were not in concordance with the other chemicals-of-concern testing results after QA/QC review by independent contractor (Raleigh Farlow). The testing lab (PACE Analytical) re-extracted and reanalyzed subsamples from each DMMU in a second testing round and performed a conformational third testing round. The testing results for the 2<sup>nd</sup> and 3<sup>rd</sup> testing rounds were evaluated by the DMMP agencies prior to data validation of the second round of dioxin/furan testing results, and the DMMP agencies concluded that the first round of test data should be discarded and were not useable for decision-making.
8. The DMMP agencies are currently using an interim process for interpreting dioxin data ([http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=DMMO&pagename=Dioxin\\_Guidelines](http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=DMMO&pagename=Dioxin_Guidelines)) pending the development of a programmatic regulatory framework, expected in late 2009. All twelve DMMUs were quantitated below the Samish Reference Bay Interim Dioxin/Furan Guideline of **2.44- pptr-TEQ**, which is applicable for Rosario Strait Dispersive Site disposal.
9. Based on these chemical testing results, the DMMP agencies concluded that analyses of archived Z-samples underlying each DMMU would not be required.

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<sup>1</sup> DMMU-5 was reserved, and this DMMU was not analyzed during this characterization effort.

## **Suitability Determination:**

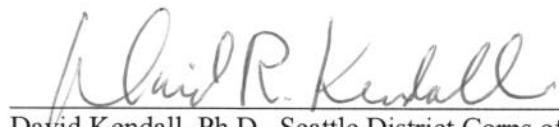
10. The results of these analyses in summary (all DMMP COC and dioxins/furans) indicate that all 105,700 cy of proposed dredged material are suitable for unconfined-open-water disposal at the Rosario Strait dispersive site based on these testing results using best-professional-judgment (BPJ).
11. The results of these analyses compared to SMS guidelines, indicate that all 105,700 cy of proposed dredged material are suitable for an appropriate Beneficial Use project in Fidalgo Bay.
12. This memorandum documents the suitability of material proposed for dredging from the Skyline Marina Dredging Project in Anacortes, Washington, for either open-water disposal at the Rosario Strait dispersive disposal site, or at an appropriate beneficial use site in Fidalgo Bay. 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.

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Concur:

19 Aug 09

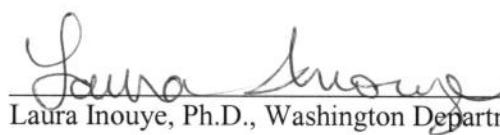
Date



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

Aug 19, 2009

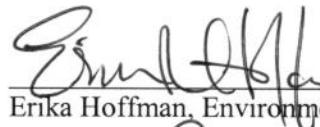
Date



Laura Inouye, Ph.D., Washington Department of Ecology

8/19/09

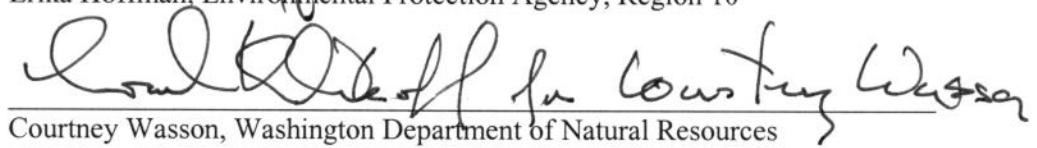
Date



Erika Hoffman, Environmental Protection Agency, Region 10

08/19/09

Date



Courtney Wasson, Washington Department of Natural Resources

Erin Legge, Corps Regulatory Project Manager

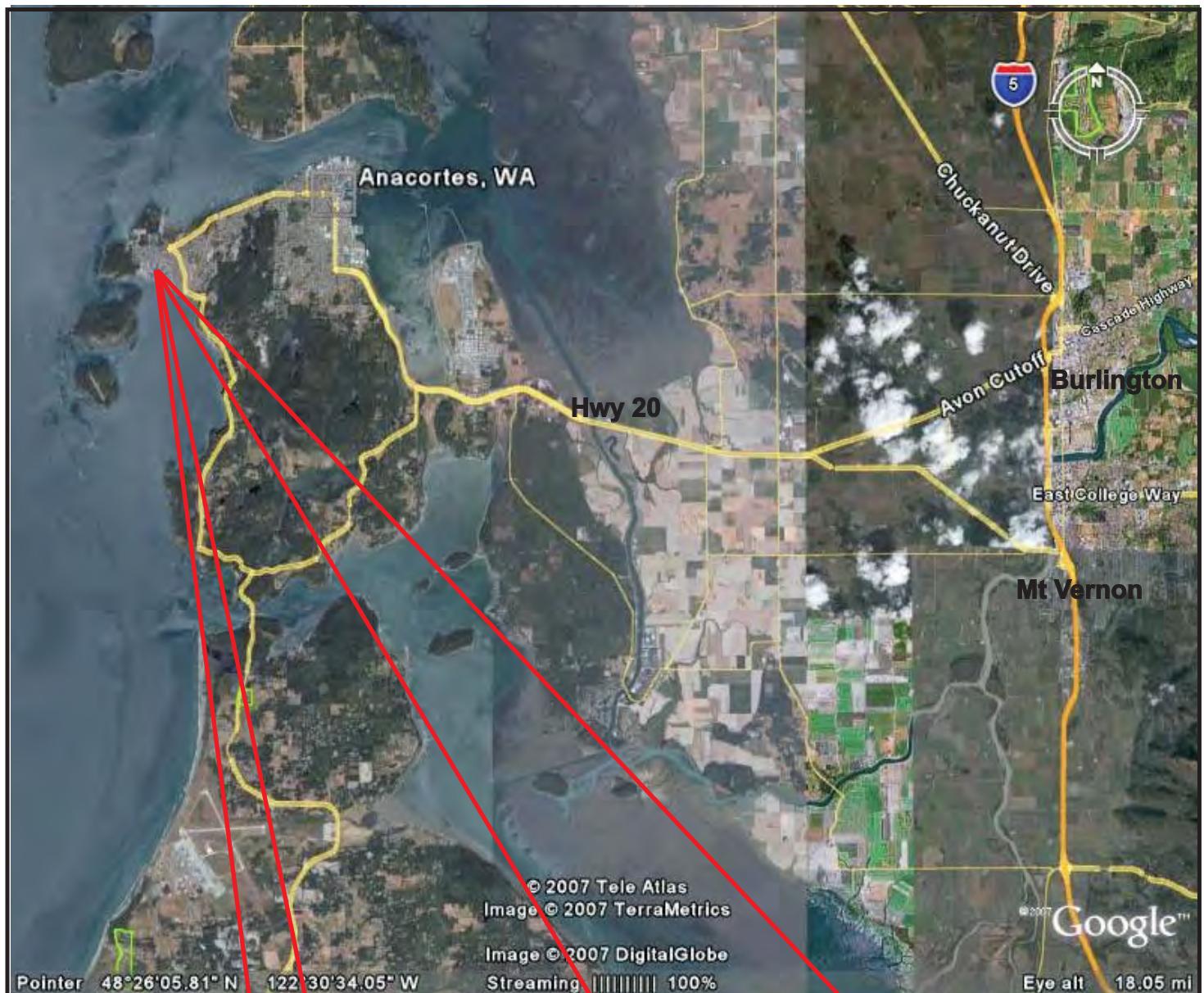
Nancy Case O'Bourke, PE., Dalton, Olmsted & Fuglevand, Inc.

Laura Inouye, Ph.D., Ecology

Erika Hoffman, EPA

Courtney Wasson, DNR

DMMO File



**Seattle**

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Figure 1  
Vicinity Map  
Skyline Marina Sediment Sampling



Notes:

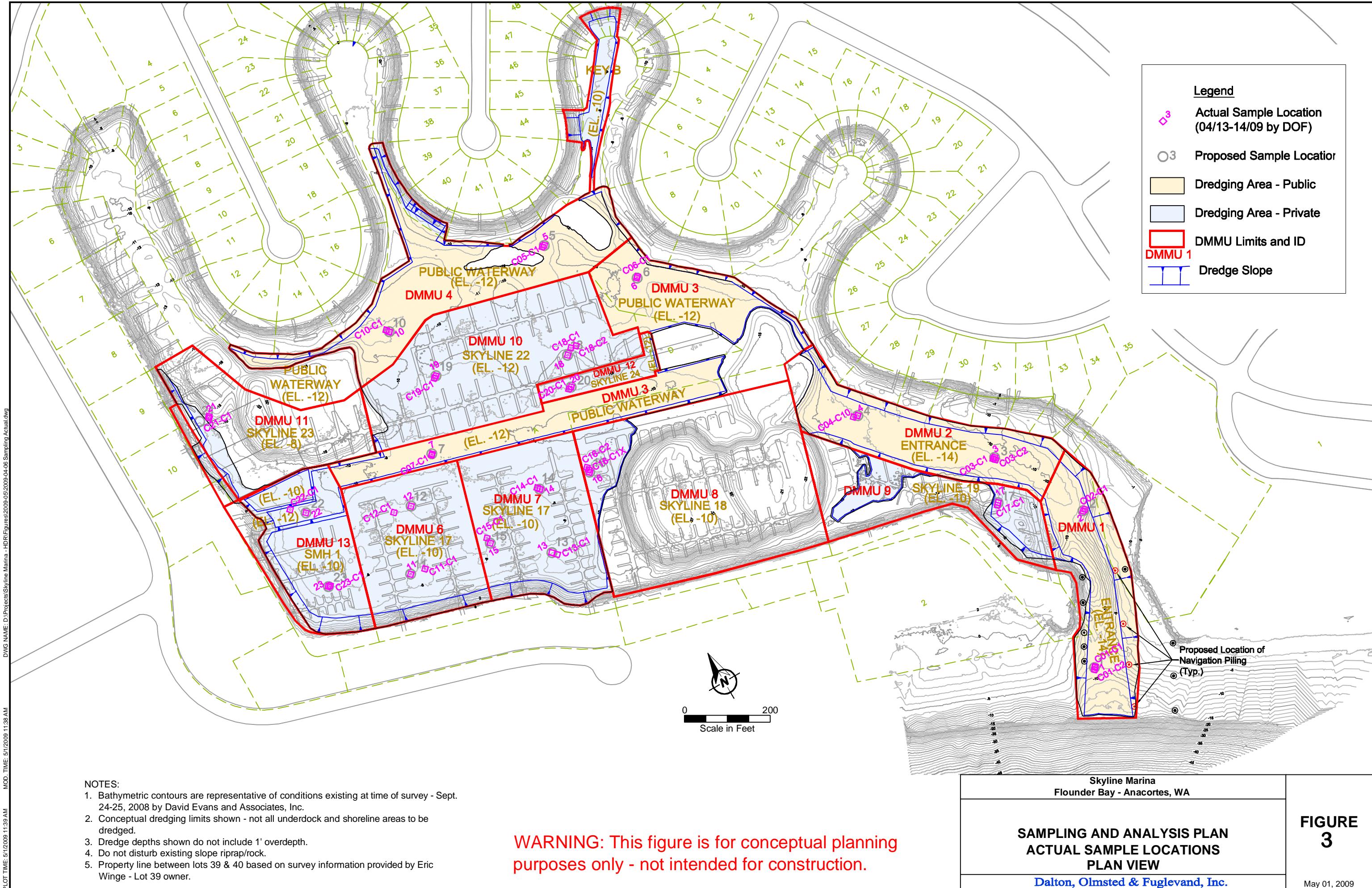
1. Depths and associated model are based on soundings collected 8/30/06, 9/24/06, 4/30/07 and 9/08/07. All depths have been adjusted to simulate zero tide (MLLW)
2. All data provided to DOF by the City of Anacortes (COA).
3. Dredge footprint provided by the City of Anacortes (COA).

Skyline Marina  
Flounder Bay - Anacortes, WA

**Proposed Sediment Sampling Areas**

**Figure 2** 12/07/07

Dalton, Olmsted & Fuglevand, Inc.







**Table 3. SMS Evaluation Summary for Beneficial Use (Skyline Marina Dredging Project).**

Chemical	Sediment Management Standards (SQS)	DMMU Composite Sample Test Results											
		1	2	3	4	6	7	8	9	10	11	12	13
METALS (mg/kg dry weight)													
Arsenic	57	7U	8U	8U	7U	7U	7U	8U	7U	6U	6U	7U	
Cadmium	5.1	0.3	0.3U	0.7	0.3U	0.3	0.3	0.4	0.5	0.3	0.2U	0.3U	0.6
Chromium	260	27.3	8.4	34.6	33	27.5	24.8	26.3	27.5	25.3	22.3	24.7	31.5
Copper	390	14	3.6	19	13.3	17.7	12.7	15.1	12.2	110.5	13.8	12.1	33.4
Lead	450	4	3U	5	3U	3	3U	3	3U	3U	2U	3U	7
Mercury	0.41	0.03	0.03	0.04U	0.02U	0.03U	0.03	0.02U	0.04	0.03U	0.02U	0.02U	0.03
Silver	6.1	0.4U	0.5U	0.5U	0.4U	0.4U	0.4U	0.4U	0.5U	0.4U	0.4U	0.4U	0.4U
Zinc	410	52	13	60	43	46	37	47	42	36	43	32	54
ORGANOMETALLIC COMPOUNDS													
ORGANICS (mg/kg organic carbon)													
PAHs													
Total LPAH	370	8.31J	1.79U	1.14U	2.74U	1.70U	2.29U	0.97J	4.20J	2.75U	2.43U	2.38U	0.93J
Naphthalene	99	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
Acenaphthylene	66	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
Acenaphthene	16	2.22J	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
Fluorene	23	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
Phenanthrene	100	2.46	1.79U	1.14U	2.74U	1.70U	2.29U	0.97J	2.63	2.75U	2.43U	2.38U	0.93J
Anthracene	220	3.63	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	1.58J	2.75U	2.43U	2.38U	1.18U
2-Methylnaphthalene	38	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
Total HPAH	960	40.98	2.14J	5.2J	11.11J	14.38J	12.91J	13.13J	51.12J	2.06J	13.26J	17.74J	14.60J
Fluoranthene	160	6.79	1.79U	0.86J	1.92J	3.39	3.66	2.01	5.91	2.75U	3.04	5.12	2.86
Pyrene	1000	7.26	1.07J	1.71	3.16	4.02	3.43	2.43	15.77	2.06J	3.89	4.88	3.79
Benzo(a)anthracene	110	4.22	1.79U	1.14U	2.74U	0.89J	2.29U	1.32J	4.47	2.75U	2.43U	2.38U	0.99J
Chrysene	110	11.48	1.07J	1.26	1.51J	2.41	2.29	2.50	6.70	2.75U	2.43	3.21	1.68
Total Benzofluoranthenes	230	8.31	1.79U	1.37J	4.53J	3.66	3.54J	4.10	10.25	2.75U	3.89J	4.52	2.86
Benzo(a)pyrene	99	2.93	1.79U	1.14U	2.74U	1.70U	2.29U	0.76J	4.47	2.75U	2.43U	2.38U	0.99J
Indeno(1,2,3-c,d)pyrene	34	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	1.71J	2.75U	2.43U	2.38U	0.62J
Dibenz(a,h)anthracene	12	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
Benzo(g,h,i)perylene	31	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	1.84J	2.75U	2.43U	2.38U	0.81J
CHLORINATED HYDROCARBONS (mg/kg organic carbon)													
1,4-Dichlorobenzene	3.1	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
1,2-Dichlorobenzene	2.3	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
1,2,4-Trichlorobenzene	0.81	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U
Hexachlorobenzene (HCB)	0.38	2.34U	1.79U	1.14U	2.74U	1.70U	2.29U	1.39U	2.63U	2.75U	2.43U	2.38U	1.18U

**Table 3. SMS Evaluation Summary for Beneficial Use (Skyline Marina Dredging Project).**

Table 4. Summary of Dioxin/Furan Data from the Skyline Marina DMMP Characterization

DMMU ID:	WHO (05)	DMMU-1				DMMU-2				DMMU-3				DMMU-4				DMMU-6				DMMU-7				
		TEF	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ									
Dioxin Furans (ng/kg)																										
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1	0.095	U	0.0475	0.093	U	0.0465	0.098	U	0.049	0.088	U	0.044	0.16	U	0.08	0.13	U	0.065							
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	1	0.13	J	0.13	0.074	Ji	0.074	0.18	Ji	0.18	0.26	J	0.26	0.25	Ji	0.25	0.42	Ji	0.42							
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	0.16	U	0.008	0.12	Ji	0.012	0.45	J	0.045	0.39	J	0.039	0.46	J	0.046	0.75	J	0.075							
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	0.66	J	0.066	0.48	J	0.048	1.1	J	0.11	1.8	J	0.18	1.5	J	0.15	2.1	J	0.21							
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	0.23	Ji	0.023	0.38	J	0.038	0.78	J	0.078	0.92	Ji	0.092	0.97	J	0.097	1.6	J	0.16							
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.01	6.3		0.063	8.5		0.085	18		0.18	35		0.35	29		0.29	49		0.49							
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	0.0003	44		0.0132	64		0.0192	130		0.039	280		0.084	220		0.066	340		0.102							
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.1	0.38	J	0.038	0.2	Ji	0.02	0.42	J	0.042	0.21	Ji	0.021	0.24	J	0.024	0.34	J	0.034							
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.03	0.085	J	0.00255	0.075	J	0.00225	0.18	Ji	0.0054	0.081	Ji	0.00243	0.12	Ji	0.0036	0.17	J	0.0051							
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.3	0.14	J	0.042	0.078	Ji	0.0234	0.25	Ji	0.075	0.16	J	0.048	0.19	Ji	0.057	0.25	Ji	0.075							
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.088	Ji	0.0088	0.1	J	0.01	0.23	J	0.023	0.18	Ji	0.018	0.18	Ji	0.018	0.32	J	0.032							
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.099	J	0.0099	0.094	J	0.0094	0.31	Jd	0.031	0.32	J	0.032	0.26	J	0.026	0.37	Jd	0.037							
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.1	0.067	Ji	0.0067	0.13	Ji	0.013	0.3	J	0.03	0.25	Ji	0.025	0.3	J	0.03	0.32	J	0.032							
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.052	U	0.0026	0.028	U	0.0014	0.06	U	0.003	0.04	U	0.002	0.05	U	0.0025	0.12	Ji	0.012							
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HxCDF)	0.01	0.84	J	0.0084	0.94	J	0.0094	2.4	J	0.024	3	J	0.03	2.7	J	0.027	4.3	J	0.043							
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HxCDF)	0.01	0.058	U	0.00029	0.085	Ji	0.00085	0.23	J	0.0023	0.18	Ji	0.0018	0.2	J	0.002	0.22	Ji	0.0022							
1,2,3,4,5,6,7,8-Octachlorodibenzofuran (OCDF)	0.0003	1.9	J	0.00057	2.7	J	0.00081	6.2	J	0.00186	8.3	J	0.00249	8.3	J	0.00249	11		0.0033							
Total TEQ (u = 1/2)(Mammal):				0.47			0.41				0.92			1.23			1.17			1.80						
Total TEQ (u=0)(Mammal):				0.41			0.37				0.87			1.19			1.089			1.73						
Total Organic Carbon (TOC), %:				0.85			1.12				1.74			0.73			1.12			0.88						

Legend:

U = Nondetected at the associated value

J = Associated value is considered an estimate due to concentration less than verifiable linear concentration range

Ji = Associated value is considered an estimate due to chemical interference (EMPC)

Jd = Associated value is considered an estimate due to possible dipheylether interference

Table 4. Summary of Dioxin/Furan Data from the Skyline Marina DMMP Characterization

DMMU ID:	WHO (05)	DMMU-8			DMMU-9			DMMU-10			DMMU-11			DMMU-12			DMMU-13			
		TEF	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ
Dioxin Furans (ng/kg)																				
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1	0.01	U	0.005	0.14	U	0.07	0.1	U	0.05	0.098	U	0.049	0.13	U	0.065	0.14	U	0.07	
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	1	0.3	Ji	0.3	0.14	U	0.07	0.085	U	0.0425	0.11	J	0.11	0.31	J	0.31	0.54	J	0.54	
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	0.5	J	0.05	0.29	Ji	0.029	0.11	U	0.0055	0.15	Ji	0.015	0.57	J	0.057	0.76	J	0.076	
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	2	J	0.2	1.3	J	0.13	0.22	Ji	0.022	0.76	J	0.076	2.3	J	0.23	2.3	J	0.23	
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	1	J	0.1	0.63	J	0.063	0.14	U	0.007	0.26	Ji	0.026	1.4	J	0.14	1.5	J	0.15	
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.01	40			0.4	20		0.2	4.9		0.049	18		0.18	43		0.43	52		0.52
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	0.0003	290			0.087	150		0.045	36		0.0108	130		0.039	310		0.093	410		0.123
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.1	0.38	J	0.038	0.26	J	0.026	0.069	U	0.00345	0.13	J	0.013	0.32	J	0.032	0.55	J	0.055	
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.03	0.25	U	0.00375	0.19	U	0.00285	0.059	U	0.000885	0.052	U	0.00078	0.11	J	0.0033	0.48	J	0.0144	
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.3	0.35	J	0.105	0.18	J	0.054	0.044	U	0.0066	0.076	Ji	0.0228	0.22	J	0.066	0.54	J	0.162	
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.32	J	0.032	0.28	J	0.028	0.06	U	0.003	0.13	J	0.013	0.25	J	0.025	0.6	J	0.06	
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.29	J	0.029	0.34	J	0.034	0.047	U	0.00235	0.22	Ji	0.022	0.38	Jd	0.038	0.87	Jd	0.087	
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.1	0.34	J	0.034	0.31	J	0.031	0.063	U	0.00315	0.13	J	0.013	0.3	J	0.03	0.71	J	0.071	
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.16	J	0.008	0.25	J	0.025	0.061	U	0.00305	0.036	U	0.0018	0.17	Ji	0.017	0.16	J	0.016	
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpcCDF)	0.01	3.3	J	0.033	3	J	0.03	0.41	J	0.0041	5.6		0.056	4.1	J	0.041	9.9		0.099	
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpcCDF)	0.01	0.44	J	0.0044	0.28	Ji	0.0028	0.041	U	0.000205	0.24	J	0.0024	0.23	J	0.0023	0.49	J	0.0049	
1,2,3,4,5,6,7,8-Octachlorodibenzofuran (OCDF)	0.0003	8.1	J	0.00243	5.1	J	0.00153	1.1	J	0.00033	34		0.0102	10		0.003	34		0.0102	
Total TEQ (u = 1/2)(Mammal):					1.43			0.84			0.21			0.65			1.58			2.29
Total TEQ (u=0)(Mammal):					1.42			0.70			0.09			0.60			1.52			2.22
Total Organic Carbon (TOC), %:					1.44			0.76			0.73			0.82			0.8			1.61