CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD **June 27, 2002**

SUBJECT: DETERMINATION ON THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE SWINOMISH FEDERAL NAVIGATION CHANNEL (PN # CENWS-OD-TS-NS-15) FOR DISPOSAL AT THE ROSARIO STRAIT DMMP DISPOSAL SITE, OR FOR LOCAL BENEFICIAL USE.

1. **Introduction**. The following summary reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) on the suitability of up to 120,000 cubic yards (cy) of dredged material from the Swinomish Channel (Figure 1 – Vicinity Map) for open water disposal. Suitable material will be disposed at the Rosario Strait open-water dispersive disposal site or at an approved beneficial use site. Because of the sandy and relatively clean nature of the Swinomish sediments, this material is usually in demand for capping projects and other beneficial uses.

Table 1. Regulatory Tracking Dates

SAP received	March 13, 2002
SAP approved	April 10, 2002
Sampling dates	April 23-24, 2002
Data report submitted	June 10, 2002
Recency Determination (low rank)	April 2007-2009
DAIS Tracking number	SWINR-1-A-F-175

Table 2. Project Synopsis

Time of proposed dredging	2002 – 2008 (approximately every other year)
Proposed disposal sites	Rosario Strait DMMP dispersive site; approved beneficial use site(s)
Sediment ranking	low rank
Project last dredged	2000

2. **Project Summary.** This project is ranked "low" by the DMMP program based on the lack of significant contaminant sources and past characterization data. The Swinomish Channel is dredged frequently due to rapid and routine shoaling, and thus these sediments are considered homogenous and suitable for sampling by a grab sampler (PSDDA Users Manual, 2000). DMMP requires low-ranked homogenous sediments to be characterized by one grab sample for each 8,000 cy and one analysis for each 60,000 of dredged material. Thus, for this project, 8 grab samples were taken in each DMMU (a total of 16 samples) and composited for two analyses.

3. **Sampling.** Sampling for this project took place on April 23-24, 2002. Two DMMU (noted as C1 and C2) were sampled with a double vanVeen grab sampler that took samples according to the approved SAP (Figure 2). Samples from all grabs taken in a given DMMU were composited for analysis.

4. **Chemical Analysis**. The Agencies' approved sampling and analysis plan was followed, and quality assurance/quality control guidelines specified by PSEP and the DMMP program were generally complied with. These data were considered sufficient and acceptable for decision-making by the Agencies based on best professional judgment.

   Conventional results (Table 3) and chemical results (Table 4) show that there were no detected or non-detected exceedances of DMMP screening levels, and thus no bioassays were necessary for decision-making. These results demonstrate that all proposed dredged material from the Swinomish Federal Navigation Channel is suitable for open-water disposal at any DMMP dispersive or non-dispersive disposal site.

Table 3. Conventional results for Swinomish Channel characterization, 2002.

PSDDA Determination:		**Pass**		**Pass**	
DMMU Volume (cy):		60,000		60,000	
DMMU ID:		C1		C2	
Rank:		Low		Low	
ANALYTE	**Units**	**Conc.**	**VQ**	**Conc**	**VQ**
Conventionals					
Total Solids	%	75.1		76.1	
Total Volatile Solids	%	1.9		0.85	
Total Organic Carbon	%	0.94	J	0.19	J
Total Ammonia	mg/kg	3.4		0.26	
Total Sulfides	mg/kg	1.8		1.5	
Grain Size					
Gravel	%	1.2		2.5	
Sand & Gravel	%	81.1		84.3	
Silt	%	14.2		0.5	
Clay	%	3.5		0.8	
Fines (percent silt + clay)	%	17.7		1.3	

Table 4. Chemical analysis results for 2002 Swinomish Channel O&M.

	DMMP COMPARISONS							SMS COMPARISONS					
	SL	BT	ML	C1		C2		SQS	CSL	C1		C2	
Metals	mg/kg dry weight							mg/kg dry weight					
Antimony	150	150	200	7	U	6	U	-	-	7	U	6	U
Arsenic	57	507.1	700	7	U	6	U	57	93	7	U	6	U
Cadmium	5.1	-	14	0.3	U	0.2	U	5.1	6.7	0.3	U	0.2	U
Chromium	-	-	-	29.5		20.3		260	270	29.5		20.3	
Copper	390	-	1,300	14.1		6.8		390	390	14.1		6.8	
Lead	450	-	1,200	3	U	2	U	450	530	3	U	2	U
Mercury	0.41	1.5	2.3	0.14		0.06	U	0.41	0.59	0.14		0.06	U
Nickel	140	370	370	30		17		-	-	30		17	
Silver	6.1	6.1	8.4	0.4	U	0.4	U	6.1	6.1	0.4	U	0.4	U
Zinc	410	-	3,800	36.6		28.8		410	960	36.6		28.8	
LPAHs	µg/kg dry weight							mg/kg, TOC					
Naphthalene	2,100	-	2,400	20	U	20	U	99	170	2.13	U,J	10.53	U,J
Acenaphthene	500	-	2,000	20	U	20	U	16	57	2.13	U,J	10.53	U,J
Acenaphthylene	560	-	1,300	20	U	20	U	66	66	2.13	U,J	10.53	U,J
Anthracene	960	-	13,000	20	U	20	U	220	1200	2.13	U,J	10.53	U,J
Fluorene	540	-	3,600	20	U	20	U	23	79	2.13	U,J	10.53	U,J
Phenanthrene	1,500	-	21,000	20	U	20	U	100	480	2.13	U,J	10.53	U,J
2-Methylnaphthalene	670	-	1,900	20	U	20	U	38	64	2.13	U,J	10.53	U,J
Total LPAHs	5,200	-	29,000	20	U	20	U	370	780	2.13	U,J	10.53	U,J
HPAHs	µg/kg dry weight							mg/kg, TOC					
Fluoranthene	1,700	4,600	30,000	20	U	20	U	160	1,200	2.13	U,J	10.53	U,J
Pyrene	2,600	-	16,000	20	U	20	U	1,000	1,400	2.13	U,J	10.53	U,J
Benzo(a)anthracene	1,300	-	5,100	20	U	20	U	110	270	2.13	U,J	10.53	U,J
Chrysene	1,400	-	21,000	20	U	20	U	110	460	2.13	U,J	10.53	U,J
Benzo(a)pyrene	1,600	3,600	3,600	20	U	20	U	99	210	2.13	U,J	10.53	U,J
Benzo(b+k)fluoranthenes	3,200	-	9,900	20	U	20	U	230	450	2.13	U,J	10.53	U,J
Indeno(1,2,3-c,d)pyrene	600	-	4,400	20	U	20	U	34	88	2.13	U,J	10.53	U,J
Dibenzo(a,h)anthracene	230	-	1,900	20	U	20	U	12	33	2.13	U,J	10.53	U,J
Benzo(g,h,I)perylene	670	-	3,200	20	U	20	U	31	78	2.13	U,J	10.53	U,J
Total HPAHs	12,000	-	69,000	20	U	20	U	960	5,300	2.13	U,J	10.53	U,J
Chlorinated Hydrocarbons	µg/kg dry weight							mg/kg, TOC					
1,2-Dichlorobenzene	35	-	110	1.7	U	1.3	U	2.3	2.3	0.18	U,J	0.68	U,J
1,3-Dichlorobenzene	170	1,241	-	1.7	U	1.3	U	-	-	0.18	U,J	0.68	U,J
1,4-Dichlorobenzene	110	120	120	1.7	U	1.3	U	3.1	9	0.18	U,J	0.68	U,J
1,2,4-Trichlorobenzene	31	-	64	8.7	U	6.7	U	0.81	1.8	0.93	U,J	3.53	U,J
Hexaclorobenzene (HCB)	22	168	230	20	U	20	U	0.38	2.3	2.13	U,J	10.53	U,J

Table 4, cont.

	DMMP COMPARISONS							SMS COMPARISONS					
	SL	BT	ML	C1		C2		SQS	CSL	C1		C2	
Phthalates	µg/kg dry weight							mg/kg, TOC					
Bis(2-ethylhexyl)phthalate	8,300	13,870	-	30		73		47	78	3.19	J	38.42	J
Butylbenzylphthalate	970	-	-	20	U	20	U	4.9	64	2.13	U,J	10.53	U,J
Diethylphthalate	1,200	-	-	20	U	20	U	61	110	2.13	U,J	10.53	U,J
Dimethylphthalate	1,400	1,400	-	20	U	20	U	53	53	2.13	U,J	10.53	U,J
Di-n-buylphthalate	5,100	10,220	-	20	U	20	U	220	1,700	2.13	U,J	10.53	U,J
Di-n-octylphthalate	6,200	-	-	20	U	20	U	58	4,500	2.13	U,J	10.53	U,J
Phenols	µg/kg dry weight							µg/kg dry weight					
2-Methylphenol	63	-	77	20	U	20	U	63	63	20	U	20	U
4-Methylphenol	670	-	3,600	20	U	20	U	670	670	20	U	20	U
2,4-Dimethylphenol	29	-	210	20	U	20	U	29	29	20	U	20	U
Pentachlorophenol	400	504	690	98	U	98	U	360	690	98	U	98	U
Phenol	420	876	1,200	20	U	20	U	420	1,200	20	U	20	U
Miscellaneous Extractables	µg/kg dry weight							mg/kg, TOC					
Benzyl alcohol	57	-	870	20	U	20	U	57	73	20	U	20	U
Benzoic acid	650	-	760	200	U	200	U	650	650	200	U	200	U
Dibenzofuran	540	-	1,700	20	U	20	U	15	58	2.13	U,J	10.53	U,J
Hexachlorobutadiene	29	212	270	20	U	20	U	3.9	6.2	2.13	U,J	10.53	U,J
N-Nitrosodiphenylamine	28	130	130	20	U	20	U	11	11	2.13	U,J	10.53	U,J
Volatiles	µg/kg dry weight							µg/kg dry weight					
Ethylbenzene	10	27	50	1.7	U	1.3	U	-	-	1.7	U	1.3	U
Tetrachloroethene	57	102	210	1.7	U	1.3	U	-	-	1.7	U	1.3	U
Trichloroethene	160	1,168	1,600	1.7	U	1.3	U	-	-	1.7	U	1.3	U
Xylene (sum of o,m,p)	40		160	1.7	U	1.3	U	-	-	1.7	U	1.3	U
Pesticides and PCBs	µg/kg dry weight							mg/kg, TOC					
Total DDT	6.9	50	69	1.9	U	1.9	U	-	-	0.2	U	1.00	U
Aldrin	10	37	-	0.97	U	0.97	U	-	-	0.10	U	0.51	U
alpha-Chlordane	10	37	-	0.97	U	0.97	U	-	-	0.10	U	0.51	U
Dieldrin	10	37	-	1.9	U	1.9	U	-	-	0.20	U	1.00	U
Heptachlor	10	37	-	0.97	U	0.97	U	-	-	0.10	U	0.51	U
Lindane	10	37	-	0.97	U	0.97	U	-	-	0.10	U	0.51	U
Total PCBs	130		3,100	39	U	39	U	12	65	4.15	U,J	20.53	U,J
Total PCBs (TOC- normalized)	-	38	-	4.15	U,J	20.53	U,J	(see above)					

Notes:
- dry wt. comparisons are not more robust in sediments with low TOC values (see text)

5. Comparison to SMS Guidelines. All results of the chemical analyses were organic carbon normalized, if necessary, and compared to Washington State Sediment Management Standards. There were no detected exceedances of SMS Sediment Quality Standards. However, non-detected levels of two chemicals (hexachlorobenzene and 1,2,4-trichlorobenzene) exceeded SQS guidelines for both C1 and C2 (Table 5).

C1. Though TOC-normalized values exceeded SMS guidelines for C1, the TOC values for this DMMU were below 0.5%, the level below which TOC normalized dry weight values are never used to compare to SMS guidelines. In this case, the dry weight value is compared to the dry weight-normalized LAET (lowest apparent effects threshold). Levels of these two chemicals fall below the LAET for C1.

C2. A reason-to-believe analysis was conducted on C2 to determine whether non-detected levels of hexachlorobenzene and 1,2,4-trichlorobenzene were of concern for beneficial use projects. This review suggested that high detection limits should not be an indication that these chemicals are present at the non-detected levels. These chemicals, generally generated by industry, have no apparent sources in the Swinomish waterway. In addition, the relatively low TOC for C2 suggests that dry weight comparisons are still probably the most appropriate in this case, as the theory that supports TOC normalization doesn't hold up well empirically at lower TOC values (Russ McMillan, personal communication.) Non-detected dry weight values of both chemicals fall below listed LAETs for C2. For these reasons, DMMP agency representatives do not believe that the non-detected levels of these two chemicals should preclude use of these sediments for any beneficial use.

Table 5. Standards comparison for 1-2-4-trichlorobenzene and hexachlorobenzene.

	SMS		Non-detected levels				SMS	Non-detected levels			
	(mg/kg, TOC)						(µg/k dry wt.)				
	SQS	CSL	C1		C2		LAET	C1		C2	
1,2,4-Trichlorobenzene	0.81	1.8	0.93	U	3.53	U	31	8.7	U	6.7	U
Hexachlorobenzene	0.38	2.3	2.13	U	10.53	U	22	20	U	20	U
TOC (%)			0.19	J	0.94	J		0.19	J	0.94	J

6. Suitability. This memo documents the suitability of proposed dredged sediments for the federal maintenance dredging in the Swinomish Channel for open water disposal. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program. Based on the results of the previously described testing, the DMMP agencies concluded that **all 120,000 cubic yards are suitable** for open water disposal at any DMMP dispersive or non-dispersive site, or for beneficial use sites.

This suitability determination does not constitute final agency approval of the project. A final decision on project approval 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.

7. References.

McMillan, Russ. Washington State Dept. of Ecology, Toxics Cleanup office. Personal communication (via telephone) on 27 June 2002.

Puget Sound Dredged Disposal Analysis (PSDDA). 2000. Dredged material evaluation and disposal procedures – a users manual for the PSDDA program. Prepared by the US Army Corps of Engineers, Seattle District; US EPA, Region 10; Washington State Department of Ecology; and Washington State Department of Natural Resources.

Striplin Environmental Associates 2002. PSDDA Sediment characterization for Swinomish Channel maintenance dredging FY02-FY08. Data report to Seattle District Corps of Engineers, June 7, 2002.

Concur:

7/10/02
Date

Lauran Cole Warner, Seattle District Corps of Engineers

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Date

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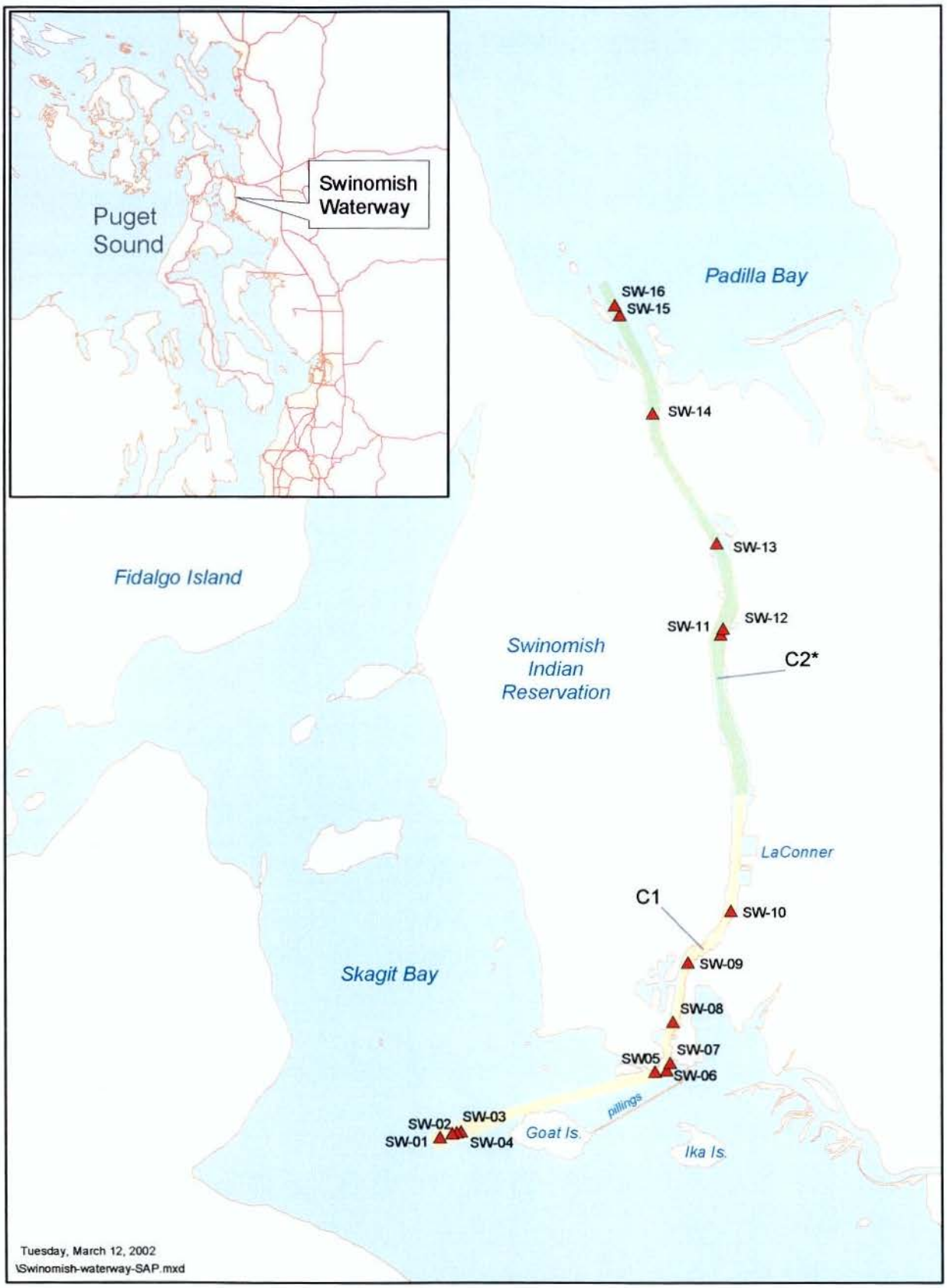

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* Two additional stations will be sampled in DMMU C2 based on current bathymetry at the time of sampling. See text for additional information.

Station Location Map for the Sediment Characterization of the Swinomish Channel, Washington.

Figure 1

Key!