CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD **November 4, 2004**

SUBJECT: DETERMINATION ON THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE BLAIR INNER REACH CUTBACK AND TURNING BASIN EXPANSION IN THE BLAIR WATERWAY, COMMENCEMENT BAY, TACOMA, WASHINGTON (FILE # 200400818) EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR OPEN-WATER DISPOSAL AT THE COMMENCEMENT BAY OPEN WATER SITE.

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 approximately 2.6 million cubic yards (cy) of dredged material from the Port of Tacoma Blair Inner Reach Cutback and Turning Basin Expansion project, in the Blair Waterway in Tacoma, Washington. Disposal of suitable material is planned for the Commencement Bay non-dispersive DMMP disposal site, potentially in combination with approved upland sites, approved in-water contained sites, and/or approved beneficial use sites. Project depth of -51 ft. MLLW would be provided along with one foot of allowable overdepth (to –52 ft. MLLW) in the project area.

   This determination of suitability for open-water disposal is based on the acceptability of the sampling conducted in two events by Port of Tacoma contractors and subcontractors in February and April of 2004 (Table 1). All relevant test data from these sampling events is contained in a report submitted by GeoEngineers dated August 17, 2004. These data were considered sufficient and acceptable for decision-making by the DMMP agencies.

Table 1. Regulatory Tracking Dates

SAP received	January 19, 2004
SAP approved	January 30, 2004
Sampling dates	February 2-5 & April 27-29, 2004
Data report submitted	August 17, 2004
Recency Determination: Low/LM/M Concern (5-7 years)	February 2009 – 2011
DAIS Tracking number	POTBC-1-A-F-201

Table 2. Project Synopsis

Time of proposed dredging	16 July 2005 – 28 February 2006
Proposed disposal sites	Commencement Bay open water non-dispersive site; and or at permitted beneficial use site(s); and/or at approved upland locations
Sediment ranking	low; low-moderate; moderate; native
Predicted dredge volume	2.6 million cubic yards
Project last dredged	new work

2. **Background**. The Port of Tacoma's Blair Waterway was created incrementally over much of this century. As the waterway was extended, dredged material was used for fill in areas surrounding the waterway up through the 1970s. The waterway has also been dredged repeatedly in the last few years, beginning with the Sitcum Waterway Remediation Project completed in 1995. That project removed both contaminated and clean material from the waterway in a combined CERCLA cleanup and navigation deepening project. Since that time, Port of Tacoma development projects have led to further deepening of the Blair, expansion of the turning basin, and widening of some portions of the waterway.

   The project will modify portions of the Blair Inner Reach and Turning Basin within the head of the Waterway to provide infrastructure improvements. The Blair Inner Reach area will be cutback a maximum of approximately 230 feet to provide a 550-foot-wide channel and a 150-foot-wide berth on the east side of the Blair Inner Reach. The cutback will provide adequate width to enable ships to safely transit the Blair Inner Reach when vessels are on berth on both the east and west sides of the Waterway.

3. **Sampling**. Sampling took place on approximately 400,000 cy of the total proposed 2.6 million cy dredge prism. This is because only the top eight feet of native sediments were sampled, based on site history and previous sampling in the area. The remaining 2.2 million cy are deep native sediments that the DMMP determined, as part of its Tier 1 evaluation, were not necessary to test. Sampling took place during two separate events, the first from February 2 – 5, 2004, and the second from April 27 - 29, 2004. The separate sampling events were due to an inability to access the Weyerhaeuser portion of the site (DMMUs 1, 2, 3, 6, 7, 11, 12, 16 & 17) during the February time frame. All 17 DMMU were sampled with an upland drill rig that took fifteen borings (Attachment 2) according to the approved SAP. Samples from all borings 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. Chemical analyses were performed by Analytical Resources Incorporated (ARI) of Tukwila, Washington. Reanalysis of several COCs (2,4-Dimethylphenol, 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene and N-Nitrosodiphenylamine) from archived sediments occurred when reporting limits required by the DMMP were not met during the initial analyses. The laboratory was able to lower the reporting limit in every case during reanalysis.

   Conventional results are presented in Table 3. Chemical analysis results (Table 4) demonstrated that most samples were predominately free of chemicals of concern, with very few detections of any COCs. One DMMU (#15, in the deepest 4 ft layer sampled) had several more detections, primarily of PAHs, than other DMMU, but none of the detected chemicals were even close to DMMP screening levels. Based on these results, no further analyses were required.

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. Most of the sediments tested had fairly low total organic carbon (TOC) content. Samples with TOC greater than 0.5% were carbon normalized (Table 5). Samples with lower TOC had their dry weight concentrations compared with dry weight Apparent Effects thresholds (Table 6).

The analyses showed that levels of all detected and most undetected contaminants were below the Sediment Quality Standards (SQS) set by Washington State. Several of the chlorinated hydrocarbons were not detected, but the reporting limit of the carbon-normalized values exceeded the SMS guidelines. Though the TOC content of these DMMU exceeded 0.5% TOC, there is no reason to believe that these chemicals are present at the levels that reporting limits indicate. These chemicals often show elevated non-detection limits when carbon normalized in low TOC sediments. The elevated non-detects persisted in the OC normalized sediments even after reanalysis of sediments that exceeded DMMP reporting limits. No sources of these chemicals have been identified in the project area and other data do not indicate their presence. Although the DMMP agencies agreed that there is no reason to believe that these non-detected chemicals are actually present at any level of concern, we recommend that material from DMMUs 1, 5, 6, 10, 11, 12, 13, 14, 15, 16, and 17 not be used for in-water beneficial uses. All other sediments in this project are suitable for beneficial uses under Washington State Sediment Management Standards.

6. **Suitability.** This memo documents the suitability of proposed dredged sediments within the Inner Reach Cutback and Turning Basin Expansion project area 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 **2,600,000 cubic yards are suitable** for open water disposal. Open water disposal may be at the Commencement Bay non-dispersive site or at an approved beneficial use site.

   A Dredging and Disposal plan for this project must be completed as part of the final project approval process. The Dredging and Disposal plan shall be provided to all DMMP agency representatives at least two weeks prior to the pre-dredge meeting.

   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. **Reference.**

GeoEngineers 2004. Revised Dredge material characterization for the Blair Waterway Inner Reach Cutback and Turning Basin Expansion, Port of Tacoma, Washington. Report to the Port of Tacoma, File No. 0454-054-10

Concur:

11/4/04
Date

Laurran Cole Warner, Seattle District Corps of Engineers

4 Nov 2004
Date

John Malek, Environmental Protection Agency

11/4/04
Date

Cinde Donoghue, Washington Department of Ecology

11/4/2004
Date

Peter Leon, Washington Department of Natural Resources

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Table 3. Sediment conventional results.

		Fill Layer - 0 to 4 ft.					Fill Layer - below 4 ft.		Top 4 feet of native layer					Second 4 feet of native layer				
	DMMU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Rank	LM	LM	L	L	LM	LM	Low	M	M	M	M	M	M	M	M	M	M
	Includes Borings	1, 2	3, 4	5, 6	7, 8, 9, 10	11, 12, 13, 14	1, 2, 3	4, 5, 6	7, 8, 9	10, 11, 12	13, 14, 15	1, 2, 3	4, 5, 6	7, 8, 9	10, 11, 12	13, 14, 15	1, 2, 3	4, 5, 6
	Volume (cubic yards)	16,138	15,334	15,334	40,699	38,995	24,207	11,415	24,550	24,018	23,172	23,976	22,830	24,550	21,956	24,814	23,976	22,830
Grain Size	% Gravel	30.9	22.8	19.7	10.7	12.2	0.6	1.6	0.8	0.4	0.1	1.2	1.1	2.0	0.1	-	-	1.1
Grain Size	% Sand	49.8	55.8	67.5	62.1	53.5	20.9	65.0	89.0	90.9	19.4	20.5	52.3	19.7	56.3	11.5	5.9	33.2
Grain Size	% Silt	13.4	16.7	9.3	22.7	29.4	61.9	27.8	8.8	6.7	65.3	65.7	35.0	52.5	34.5	60.4	70.9	51.8
Grain Size	% Clay	5.9	4.5	3.5	5.5	4.9	16.5	5.6	1.4	1.4	15.3	12.7	11.9	26.0	9.0	28.0	23.2	14.0
Grain Size	% Fines (clay+silt)	19.3	21.2	12.8	28.2	34.3	78.4	33.4	10.2	8.1	80.6	78.4	46.9	78.5	43.6	88.4	94.1	65.8
	Total Solids %	91.9	89.2	92.1	86.4	84.8	75.5	83.2	81.7	81.7	71.9	74.1	74.3	64.6	67	66.2	69.0	72.4
	Total Volatile Solids, %	1.86	1.1	0.95	1.4	1.8	2.37	2.28	1.1	1	2.6	2.71	2.48	5.4	3.1	3.8	3.3	3.21
	Total Organic Carbon, %	0.705	0.364	0.274	0.47	0.74	0.797	0.443	0.19	0.16	0.82	0.804	1	2	1	1.2	0.99	1.14
	Total Ammonia, mg/kg	3.19	0.24	1.26	6	6.3	29.6	6.12	4	9.3	30	34	22	77	27	60	39.4	53.7
	Total Sulfides, mg/kg	<1.1 U	2.3	2.3	130	<1.20 U	52 N	75	<1.10 U	49	50 N	310	47	25	25	140	500	33

Table 4. Chemistry results compared to DMMP criteria. Only detected analytes are reported.																				
Chemical	DMMP Criteria			DMMU																
	SL	BT	ML	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Conventionals																				
Total Organic Carbon (%)	--	--	--	0.705	0.364	0.274	0.47	0.74	0.797	0.443	0.19	0.16	0.82	0.804	1	2	1	1.2	0.99	1.14
Metals																				
Antimony	150	150	200																	
Arsenic	57	507	700				6									8		10		
Cadmium	5.1	--	14																	
Chromium	--	--	--	22.7	19.9	17.4	16.8	20.5	16.5	13.9	12.7	13.4	19.1	18.7	16.6	21.9	15.6	24.5	19.9	18.4
Copper	390	--	1300	22.5	16.2	15.6	15.7	15.8	26.6	15.3	11.9	11.5	28.3	27	22.5	40.3	20.8	42.3	35.9	27.9
Lead	450	--	1200	5 N	3	3	4	3	4	10			4	5	5	6	3	11	5	6
Mercury	0.41	1.5	2.3	<0.05U														0.09		
Nickel	140	370	--	22	16	15	13	15	13	11	9	9	12	13	11	17	11	20	17	14
Silver	6.1	6.1	8.4	< 0.3 U																
Zinc	410	--	3,800	38.1	24.9	25	26	24.3	26.9	25.6	21.6	21.8	29.6	31.8	28.3	38.2	25.7	45.2	39.8	35.9
Organics																				
LPAH																				
Total LPAH	5,200	--	29,000															178 J		
Acenaphthylene	560	--	2,000																	
Acenaphthene	500	--	1,900																	
Anthracene	960	--	13,000															61		
Fluorene	540	--	3,600															11 J		
Naphthalene	2,100	--	2,400															15 J		
Phenanthrene	1,500	--	21,000					10 J										91		
2-Methylnaphthalene	670	--	1,900															9.8 J		
HPAH																				
Total HPAH	12,000	--	69,000	62				23 J		57	116		28 J		381	379	21 J	3,472		54
Benzo(a)anthracene	1,300	--	5,100												31	25		160		
Benzo(a)pyrene	1,600	3,600	3,600													18 J		240		

Table 4. Chemistry results compared to DMMP criteria. Only detected analytes are reported.

Chemical	DMMP Criteria			DMMU																
	SL	BT	ML	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Total Benzofluoranthenes	3,200	--	9,900										11 J		47	68		930		
Benzo(ghi)perylene	670	--	3,200															130		
Chrysene	1,400	--	21,000	62				12 J			27		17 J		73	88	11 J	510		
Dibenzo(a,H)anthracene	230	--	190															42		
Fluoranthene	1,700	4,600	30,000					11 J		29	47				120	88	10 J	510		27
Indeno(1,2,3-cd)pyrene	600	--	4,400															110		
Pyrene	2,600	--	16,000							28	42				110	92		840 N		27
Miscellaneous Extractables																				
Dibenzofuran	540	--	1700																	
Hexachlorobutadiene	29	212	270																	
N-Nitrosodiphenylamine	28	130	130																	
Benzoic Acid	650	--	760																	
Benzyl Alcohol	57	--	870																	
Hexachloroethane	1,400	10,220	14,000																	
Chlorinated Hydrocarbons																				
Hexachlorobenzene	22	168	230																	
1,2-Dichlorobenzene	35	37	110																	
1,3-Dichlorobenzene	170		--																	
1,4-Dichlorobenzene	110	120	120																	
1,2,4-Trichlorobenzene	31	--	64																	
Phthalates																				
Bis(2-ethylhexyl)phthalate	9,300	13,870	--	80	180	180	120	140 B	23	170	52	120 B	98 B	26	100	60	74 B	86 B	22	48
Butyl benzyl phthalate	970	--	--																	
Diethyl phthalate	1200	--	--									9.9 J								
Dimethyl phthalate	1400	1,400	--																	
Di-n-butyl phthalate	5,100	10,220	--																	

Table 4. Chemistry results compared to DMMP criteria. Only detected analytes are reported.																				
Chemical	DMMP Criteria			DMMU																
	SL	BT	ML	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Di-n-octyl phthalate	6,200	--	--																	
PCBs																				
Total PCBs	130	38	3,100	16 J											15 J			82		
Pesticides																				
Total DDT	6.9	50	69																	
Aldrin	10	37	--																	
Dieldrin	10	37	--																	
alpha-Chlordane	10	37	--																	
gamma-Chlordane	10	37	--																	
Heptachlor	10	37	--																	
gamma-BHC (Lindane)	10	--	--																	
Volatile Organics																				
Trichloroethene	160	1,168	1,600																	
Tetrachloroethene	57	102	210																	
Ethylbenzene	10	27	50																	
Xylene	40	--	160																	
Phenols																				
Pentachlorophenol	400	504	690																	
Phenol	420	876	1,200																	
2 Methylphenol	63	--	77																	
4 Methylphenol	670	--	3,600																	
2,4-Dimethylphenol	29	--	210																	

Notes:

Total LPAH = The sum of acenaphthylene, acenaphthene, anthracene, fluorene, naphthalene, and phenanthrene.

Total HPAH = The sum of benzo(a)anthracene, benzo(a)pyrene, total benzofluoanthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3,-c,d)pyrene, and pyrene.

J = The result is an estimated concentration that is less than Method Reporting Limit but greater than or equal to the Method Detection Limit.

B = Analyte was found in the associated method blank at a level that is significant relative to the sample result.

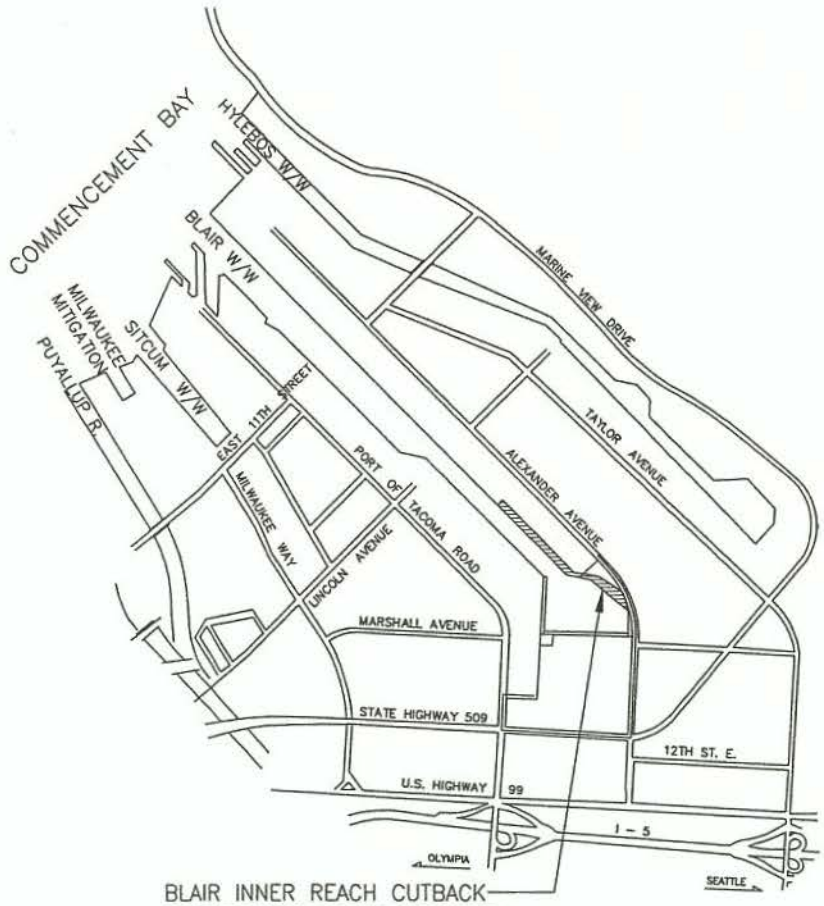
Table 5. Blair Cutback SMS comparisons for OC normalized criteria													
	SMS Criteria		DMMU	DMMU	DMMU	DMMU	DMMU	DMMU	DMMU	DMMU	DMMU	DMMU	DMMU
Chemical	SQS	CL	1	5	6	10	11	12	13	14	15	16	17
Conventionals													
Total Organic Carbon (%)	--	--	0.705	0.74	0.797	0.82	0.804	1	2	1	1.2	0.99	1.14
Metals (mg/kg dry wt)													
Arsenic	57	700							8		10		
Cadmium	5.1	14											
Chromium	260	270	22.7	20.5	16.5	19.1	18.7	16.6	21.9	15.6	24.5	19.9	18.4
Copper	390	1300	22.5	15.8	26.6	28.3	27	22.5	40.3	20.8	42.3	35.9	27.9
Lead	450	1200	5 N	3	4	4	5	5	6	3	11	5	6
Mercury	0.41	2.3									0.09		
Silver	6.1	8.4											
Zinc	410	3,800	38.1	24.3	26.9	29.6	31.8	28.3	38.2	25.7	45.2	39.8	35.9
Organics													
Total LPAH (mg/kg OC)	**370**	**780**		**1.4 J**							**14.8 J**		
Acenaphthylene	66	66											
Acenaphthene	16	57											
Anthracene	220	1,200									5		
Fluorene	23	79									0.92 J		
Naphthalene	99	170									1.25 J		
Phenanthrene	100	480		1.4 J							8		
2-Methylnaphthalene	38	64									0.82 J		
Total HPAH (mg/kg OC)	**960**	**5,300**	**8.8**	**3 J**		**3.4 J**		**38.1**	**18.9**	**2.1 J**	**219**		**5**
Benzo(a)anthracene	110	270						3.1	1.3		13		
Benzo(a)pyrene	99	210							0.9 J		20		
Total Benzofluoranthenes	110	460				1.3 J		4.7	3.4		78		
Benzo(ghi)perylene	12	33									11		
Chrysene	160	1,200	8.8	1.6 J		2.1 J		7.3	4.4	1.1 J	43		
Dibenzo(a,h)anthracene	34	88									4		
Fluoranthene	1,000	1,400		1.4 J				12	4.4	1.0 J	43		2.35
Chlorinated Hydrocarbons													

Table 5. Blair Cutback SMS comparisons for OC normalized criteria													
Chemical	SMS Criteria		DMMU 1	DMMU 5	DMMU 6	DMMU 10	DMMU 11	DMMU 12	DMMU 13	DMMU 14	DMMU 15	DMMU 16	DMMU 17
	SQS	CL											
Dibenzofuran (mg/kg OC)	15	1700											
Hexachlorobutadiene (mg/kg OC)	3.9	270											
N-Nitrosodiphenylamine (mg/kg OC)	11	130											
Benzoic Acid (ug/kg dry wt)	650	760											
Benzyl Alcohol (ug/kg dry wt)	57	870											
Miscellaneous Extractables													
Hexachloroethane (ug/kg dry wt)	1,400	14,000											
Hexachlorobenzene	0.38	2.3											
1,2-Dichlorobenzene	2.3	2.3		*< 2.7 U*	*< 2.5 U*	*< 2.4 U*	*< 2.5 U*						
1,4-Dichlorobenzene	3.1	9	*< 5.5 U*	*< 2.7 U*	*< 2.5 U*								
1,2,4-Trichlorobenzene	0.81	1.8	*< 2.7 U*	*< 2.7 U*	*< 2.5 U*	*< 2.4 U*	*< 2.5 U*	*< 2.3 U*	*< 1 U*	*< 2 U*	*< 1.7 U*	*< 2 U*	*< 1.8 U*
Phthalates (mg/kg OC)													
Bis(2-ethylhexyl)phthalate	47	--	11.3	18.92 B	2.9	12 B	3.2	10	3	7.4 B	7.2 B	2	4.2
Butyl benzyl phthalate	4.9	--	*< 5.5 U*										
Diethyl phthalate	61	--											
Dimethyl phthalate	53	--											
Di-n-butyl phthalate	220	--											
Di-n-octyl phthalate	58	--											
PCBs (mg/kg OC)													
Total PCBs	12	65	2.3 J					1.5 J			6.8		
Phenols (ug/kg dry wt)													
Pentachlorophenol	360	690											
Phenol	420	1,000											
2 Methylphenol	63	63											
4 Methylphenol	670	670											
2,4-Dimethylphenol	29	29											

Notes: Analytes with elevated non-detects are shaded and italicized

Table 6. Blair Cutback SMS comparisons for dry wt. criteria								
	SMS Criteria							
Chemical	SQS	CL	DMMU 2	DMMU 3	DMMU 4	DMMU 7	DMMU 8	DMMU 9
Conventionals								
Total Organic Carbon (%)	--	--	0.364	0.274	0.47	0.443	0.19	0.16
Metals (mg/kg dry wt)								
Arsenic	57	93			6			
Cadmium	5.1	6.7						
Chromium	260	270	19.9	17.4	16.8	13.9	12.7	13.4
Copper	390	390	16.2	15.6	15.7	15.3	11.9	11.5
Lead	450	530	3	3	4	10		
Mercury	0.41	0.59						
Silver	6.1	6.1						
Zinc	410	960	24.9	25	26	25.6	21.6	21.8
Organics								
Total LPAH (ug/kg dry wt)	**5,200**	--						
Acenaphthylene	560	--						
Acenaphthene	500	--						
Anthracene	960	--						
Fluorene	540	--						
Naphthalene	2,100	--						
Phenanthrene	1,500	--						
2-Methylnaphthalene	670	--						
Total HPAH (ug/kg dry wt)	**12,000**	--				**57**	**116**	
Benzo(a)anthracene	1,300	--						
Benzo(a)pyrene	1,600	--						
Total Benzofluoranthenes	3,200	--						
Benzo(ghi)perylene	670	--						
Chrysene	1,400	--					27	
Dibenzo(a,h)anthracene	230	--						
Fluoranthene	1,700	--				29	47	
Indeno(1,2,3-cd)pyrene	600	--						
Pyrene	2,600	--				28	42	

Table 6. Blair Cutback SMS comparisons for dry wt. criteria								
	SMS Criteria							
Chemical	SQS	CL	DMMU 2	DMMU 3	DMMU 4	DMMU 7	DMMU 8	DMMU 9
Miscellaneous Extractables (ug/kg dry wt)								
Dibenzofuran	540	--						
Hexachlorobutadiene	11	--						
N-Nitrosodiphenylamine	28	--						
Benzoic Acid	650	--						
Benzyl Alcohol	57	--						
Hexachloroethane	1,400	--						
Chlorinated Hydrocarbons (ug/kg dry wt)								
Hexachlorobenzene	22	--						
1,2-Dichlorobenzene	35	--						
1,3-Dichlorobenzene	--	--						
1,4-Dichlorobenzene	110	--						
1,2,4-Trichlorobenzene	31	--						
Phthalates (ug/kg dry wt)								
Bis(2-ethylhexyl)phthalate	1,300	--	180	180	120	170	52	120 B
Butyl benzyl phthalate	63	--						
Diethyl phthalate	48	--						9.9 J
Dimethyl phthalate	71	--						
Di-n-butyl phthalate	1,400	--						
Di-n-octyl phthalate	420	--						
PCBs (ug/kg dry wt)								
Total PCBs	130	--						
Phenols (ug/kg dry wt)								
Pentachlorophenol	140	690						
Phenol	420	1,200						
2 Methylphenol	63	63						
4 Methylphenol	670	670						
2,4-Dimethylphenol	29	29						



BLAIR INNER REACH CUTBACK AND TURNING BASIN EXPANSION (IRC/TBE)

NO SCALE

Reference: Drawing provided by Port of Tacoma.

TACO\0\0454054\10\CAD\IRC-TBE\045405410_IRC-TBE_FIG-1.dwg 06/11/04 VRE:SLF:SCY

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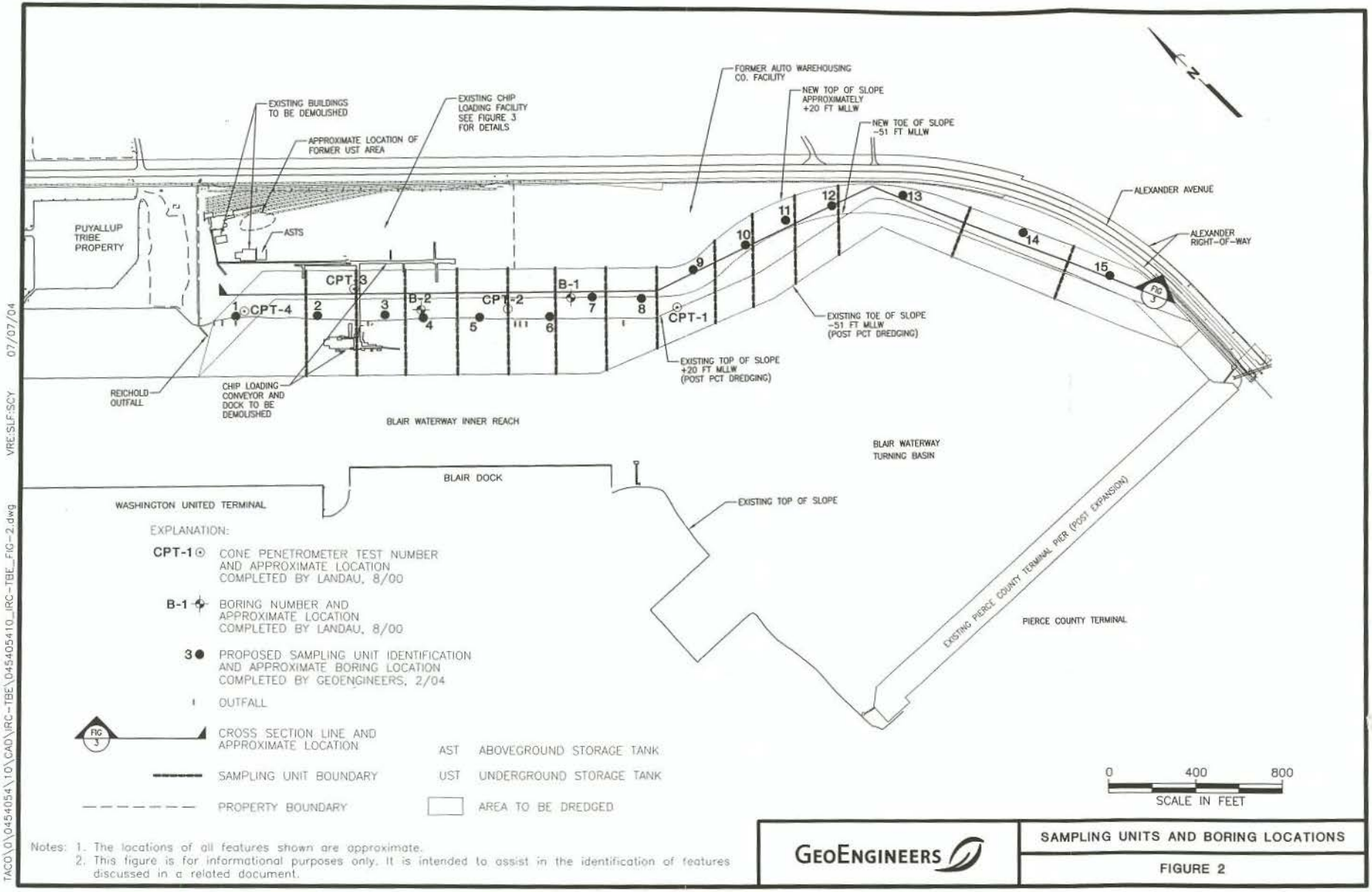
VICINITY MAP

FIGURE 1



Notes: 1. The locations of all features shown are approximate.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document.

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SAMPLING UNITS AND BORING LOCATIONS

FIGURE 2

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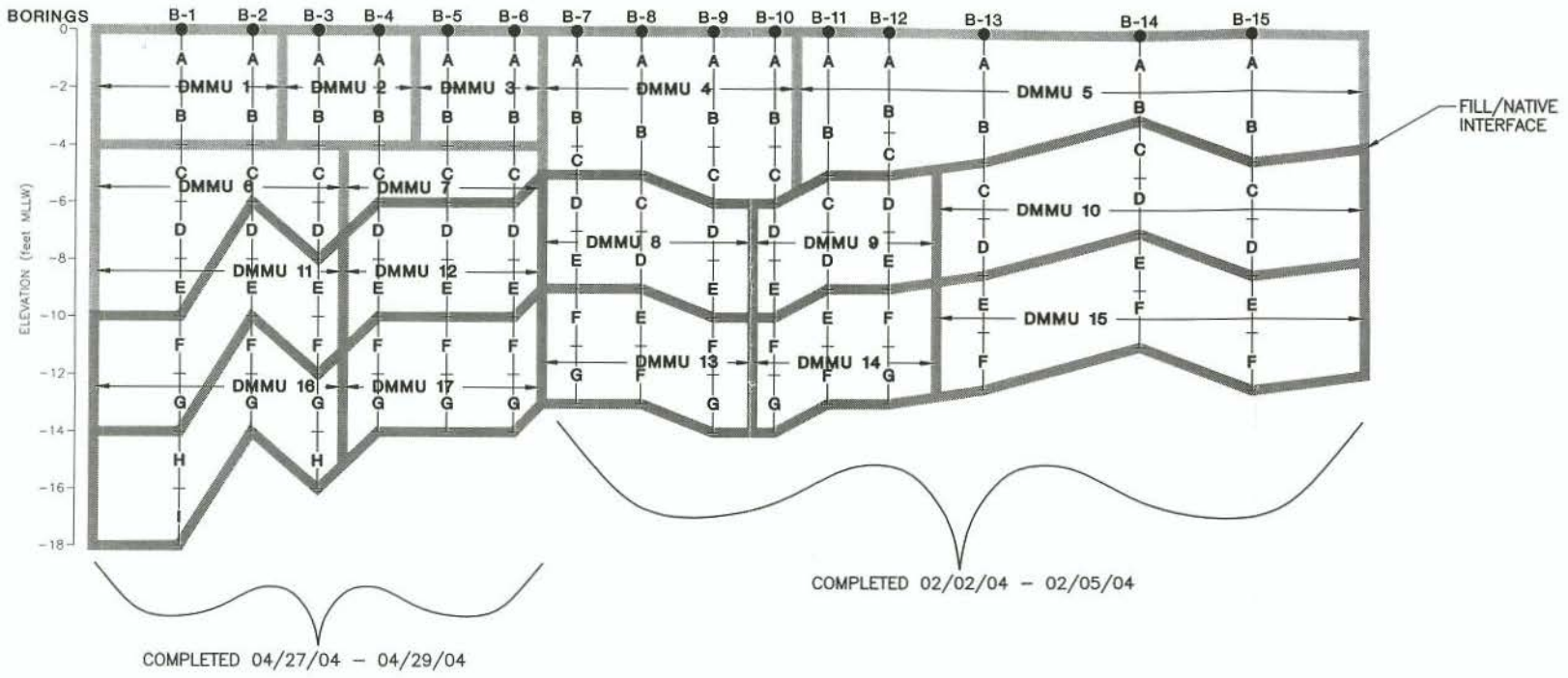

EXPLANATION:

DMMU	DREDGE MATERIAL MANAGEMENT UNIT
A	SUBUNIT SAMPLE/ARCHIVE IDENTIFICATION
B-1	BORING IDENTIFICATION

HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1"=4'

Reference: Drawing created from sketch provided by GeoEngineers' personnel.

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SAMPLING & COMPOSITING SCHEME

FIGURE 3

TACO\0\0454054\10\CAD\IRC-TBE\045405410_IRC-TBE_FIG-3.dwg VRE:SLF:SCY 07/07/04