CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD November 14, 2007

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE PORT OF GRAYS HARBOR TERMINALS 1, 2 AND 4, ABERDEEN, GRAYS HARBOR COUNTY, FOR OPEN-WATER DISPOSAL AT THE SOUTH JETTY OR POINT CHEHALIS DISPERSIVE SITES, OR FOR BENEFICIAL USE.

1. Introduction. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Environmental Protection Agency, and Washington Departments of Ecology and Natural Resources) regarding the suitability of up to 114,000 cubic yards (cy) of dredged material from the Port of Grays Harbor Terminals 1, 2 and 4 for beneficial use or for disposal at one of the Grays Harbor dispersive open-water sites.

2. Background. The Port of Grays Harbor owns four terminals in the vicinity of Aberdeen, Washington, three of which are the subject of this suitability determination. Terminal 1 is a barge-loading facility, currently used for loading wood chips and vegetable oil products. Terminal 2 is a bulk-loading facility used for agricultural and vegetable oil products. Terminal 4 is the Port's main general cargo facility. See Figure 1 for a vicinity map.

   Terminal 2 requires annual maintenance dredging to -41 ft MLLW. Dredging is not currently required at Terminal 1, but characterization was performed in anticipation of future needs. Terminal 4 is equipped with an anti-siltation system to maintain a berthing depth of -41 ft MLLW, but characterization was performed in case additional sediment removal is required or the anti-siltation system experiences a mechanical breakdown.

   The Port of Grays Harbor terminals are located in an area where sediment can accumulate rapidly and is therefore considered to be relatively homogeneous. In areas subject to rapid shoaling, not all sediment to be dredged will be in place at the time of sampling. Therefore, the volume estimated for each terminal was based on historical dredging records and best professional judgment as required in the DMMP Users Manual (DMMP, 2007).

3. Project Summary. Table 1 includes project summary and tracking information.

Table 1. Project Summary

Project ranking – Terminal 1	Low
Project ranking – Terminal 2	Low-moderate
Project ranking – Terminal 4	Low-moderate
Characterized volume – Terminal 1	30,000 cubic yards
Characterized volume – Terminal 2	60,000 cubic yards
Characterized volume – Terminal 4	24,000 cubic yards
Maintenance depth – Terminal 1	-30 feet MLLW

Maintenance depth – Terminal 2	-36 to -41 feet MLLW
Maintenance depth – Terminal 4	-41 feet MLLW
Draft SAP received	August 3, 2007
Draft SAP returned for revisions	August 22, 2007
SAP addendum received	August 27, 2007
Revised SAP approved	August 27, 2007
Sampling date	September 7, 2007
Final data report received	November 13, 2007
DAIS Tracking number	POGHT-1-A-F-245
USACE Permit Application Number	NWS-2007-1789-SO
Recency Determination - Terminal 1 (low rank = 7 years)	September 2014
Recency Determination – Terminals 2 and 4 (low-moderate rank = 6 years)	September 2013

4. Project Ranking and Sampling Requirements. Terminal 1 is ranked "low" and Terminals 2 and 4 are ranked "low-moderate" (DMMP, 2007). In low- and low-moderate-ranked areas with homogeneous sediment, the number of field samples and dredged material management units (DMMUs) are calculated using the following guidelines:
    - Maximum volume of sediment represented by each field sample = 8,000 cubic yards
    - Maximum volume of sediment represented by each DMMU in a low-ranked area = 60,000 cubic yards.
    - Maximum volume of sediment represented by each DMMU in a low-moderate-ranked area = 40,000 cubic yards.

    The sampling and analysis requirements for the three terminals are shown in Table 2.

Table 2. Sampling and Analysis Requirements

Terminal	Field Samples	Laboratory Analyses
1	4	1
2	8	2
4	3	1

5. Sampling. Sampling took place on September 7, 2007 using a power grab sampler (in areas with homogeneous sediment, surface grab samples are deemed adequate to represent the sediment – DMMP, 2007). Sampling was accomplished without incident and according to the sampling and analysis plan (Integral, 2007a). See Figures 2, 3 and 4 for sampling locations.

6. Chemical Analysis. The approved sampling and analysis plan was followed and quality control guidelines specified by the PSEP and DMMP programs were met, with only minor quality control

deviations (Integral, 2007b). The data were considered sufficient and acceptable for regulatory decision-making under the DMMP program.

Sediment conventional results (Table 3) show that the proposed dredged material is predominantly silt. Total organic carbon ranged from 1.46 to 2.03 percent. The chemical results indicated that there were no exceedances of DMMP screening levels (Table 4). Consequently, bioassay testing was not required for this material. All four DMMUs met suitability guidelines, based on chemistry alone, for open-water disposal at either of the Grays Harbor dispersive sites.

In addition to routine DMMP chemicals of concern, analysis of dioxins/furans was required for this project. These chemicals are widespread in Grays Harbor due to the historical presence of bleach process pulp mills. Dioxins/furans had not been analyzed in Port of Grays Harbor sediments since the early to mid 1990s and the agencies required confirmation testing for this round of sediment characterization.

Results (Table 5) showed detected levels of dioxins/furans in all samples. Toxic Equivalence (TEQ) (with non-detects calculated as ½ reporting limit) ranged from 3.39 – 8.73 ng/kg dry wt., all below the 15 ng/kg TEQ suitability level set for Grays Harbor.

7. Beneficial-Use Analysis. The proposed dredged material had no exceedances of the State of Washington numerical Sediment Quality Standards (see Table 6). However, based on agency best professional judgment regarding acceptable dioxin concentrations in beneficial use material, sediment from this project may be used for beneficial use only after comparison of dioxin concentrations in the source and receiving areas. Specifically, if the TEQ of sediment proposed for beneficial use is equal to or less than that in a representative sampling of the sediments from the receiving area(s), the dredged material will be acceptable for beneficial use at that approved location.

   To assess the suitability for upland beneficial use, the chemical results were compared to the Model Toxics Control Act (MTCA) guidelines (Ecology, 2005). Table 7 indicates that, while undetected, the reporting limit for arsenic exceeds the Method B guideline for carcinogens for all four DMMUs. Therefore, it is possible that the dredged material may be unsuitable for some types of upland use. Ecology, DNR and the local health department should be consulted if upland beneficial use is contemplated. Also, while there is no MTCA Method A guideline for total chromium, the total chromium value does exceed the guideline for chromium VI. Additional analysis may be required for upland beneficial use in order to determine the chromium VI content of the sediment.

8. Suitability Determination. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Port of Grays Harbor Terminals 1, 2 and 4 for open-water disposal or beneficial use. The approved sampling and analysis plan was followed and 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 conclude that **all 114,000 cubic yards are suitable** for open-water disposal at either the South Jetty or Point Chehalis dispersive site. If in-water beneficial use is to be considered, dioxin testing will be required of the receiving area.

This suitability determination does ***not*** constitute final agency approval of the expanded project. During the public comment period that follows a public notice, the resource agencies will provide input on the overall project. 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.

A pre-dredge conference call with DNR, Ecology and the Corps of Engineers will be required. A dredging quality control plan must be developed and submitted to the Enforcement Section of the Regulatory Branch of the Seattle District Corps of Engineers at least 7 days prior to the pre-dredge conference call. A DNR site use authorization must also be acquired.

9. References.

DMMP, 2007. *Dredged Material Evaluation and Disposal Procedures (Users Manual)*. Dredged Material Management Program, June 2007.

Ecology, 1995. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, December 1995.

Ecology, 2005. *Model Toxics Control Act – Chapter 70.105D RCW and Cleanup Regulation - Chapter 173-340 WAC*. Washington State Department of Ecology, October 2005.

Integral, 2007a. *Sampling and Analysis Plan, Sediment Characterization for Terminals 1, 2, and 4, Port of Grays Harbor, Grays Harbor, Washington.* Prepared by Integral Consulting Inc. for HDR Engineering. July 2007.

Integral, 2007b. *Sampling and Analysis Plan Addendum, Sediment Characterization for Terminals 1, 2, and 4, Port of Grays Harbor, Grays Harbor, Washington.* Prepared by Integral Consulting Inc. for HDR Engineering. August 2007.

Integral, 2007c. *Data Report, Sediment Characterization for Terminals 1, 2, and 4, Port of Grays Harbor, Grays Harbor, Washington.* Prepared by Integral Consulting Inc. for HDR Engineering. November 2007.

10. Agency Signatures.

Concur:

11/15/07 — David J. Fox
Date — David Fox, P.E. - Seattle District Corps of Engineers

11/15/07 —
Date — Erika Hoffman - Environmental Protection Agency

11/19/07 — Laura Inouye
Date — Laura Inouye, Ph.D. - Washington Department of Ecology

15-Nov-07 — Courtney Wasson
Date — Courtney Wasson - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Jim Green, Seattle District Regulatory
Susan Fitzgerald, Integral Consulting
Michael Johnson, Port of Grays Harbor

Table 3. Sediment Conventional Data.

		Terminal 1	Terminal 2		Terminal 4
Lab ID:		GH1	GH2A	GH2B	GH3
DAIS ID:		C1	C2	C3	C4
DMMU #:		DMMU 1	DMMU 2A	DMMU 2B	DMMU 3
GRAIN SIZE	% Gravel:	0.6	0.0	0.0	0.0
	% Sand:	22.1	16.2	25.1	13.7
	% Silt:	53.3	61.9	53.7	62.7
	% Clay:	23.9	21.9	21.4	23.6
	% Fines (clay+silt):	77.2	83.8	75.1	86.3
Total Solids (%):		45.0	43.6	42.9	38.4
Volatile Solids (%):		7.3	7.3	7.1	7.3
Total Organic Carbon (%):		1.84	1.64	1.46	2.03
Total Sulfides (mg/kg):		1420	182	1010	26
Total Ammonia (mg N/kg):		63	194	71	42

Table 4. Chemical results compared to DMMP regulatory guidelines.

				Terminal 1		Terminal 2				Terminal 4	
			Lab ID:	GH1		GH2A		GH2B		GH3	
			DAIS ID:	C1		C2		C3		C4	
CHEMICAL	SL	BT	ML	DMMU 1		DMMU 2A		DMMU 2B		DMMU 3	
METALS (mg/kg dry)				conc	QL	conc	QL	conc	QL	conc	QL
Antimony	150	---	200	10	UJ	10	UJ	10	UJ	10	UJ
Arsenic	57	507	700	10	U	10	U	10	U	10	U
Cadmium	5.1	11.3	14	0.4	U	0.4	U	0.5	U	0.5	U
Chromium	---	267	---	40		37		38		33	
Copper	390	1,027	1,300	54.1		58		53.8		46.3	
Lead	450	975	1,200	7		6		6		5	
Mercury	0.41	1.5	2.3	0.09	U	0.09	U	0.1	U	0.1	U
Nickel	140	370	370	26		27		27		22	
Selenium	---	3.0	---	0.4	U	0.4	U	0.5	U	0.5	U
Silver	6.1	6.1	8.4	0.6	U	0.6	U	0.7	U	0.8	U
Zinc	410	2,783	3,800	80		80		80		71	
LPAH (ug/kg dry)											
2-Methylnaphthalene	670	---	1,900	61	U	61	U	61	U	62	U
Acenaphthene	500	---	2,000	61	U	61	U	61	U	62	U
Acenaphthylene	560	---	1,300	61	U	61	U	61	U	62	U
Anthracene	960	---	13,000	61	U	61	U	61	U	62	U
Fluorene	540	---	3,600	61	U	61	U	61	U	62	U
Naphthalene	2,100	---	2,400	61	U	61	U	61	U	62	U
Phenanthrene	1,500	---	21,000	61	U	61	U	61	U	62	U
Total LPAH	5,200	---	29,000	61	U	61	U	61	U	62	U
HPAH (ug/kg dry)											
Benzo(a)anthracene	1,300	---	5,100	77		61	U	61	U	62	U
Benzo(a)pyrene	1,600	---	3,600	61	U	61	U	61	U	62	U
Benzo(g,h,i)perylene	670	---	3,200	61	U	61	U	61	U	62	U
Benzofluoranthenes	3,200	---	9,900	70		61	U	61	U	62	U
Chrysene	1,400	---	21,000	99		61	U	61	U	62	U
Dibenzo(a,h)anthracene	230	---	1,900	61	U	61	U	61	U	62	U
Fluoranthene	1,700	4,600	30,000	250		61	U	61	U	62	U
Indeno(1,2,3-c,d)pyrene	600	---	4,400	61	U	61	U	61	U	62	U
Pyrene	2,600	11,980	16,000	180		61	U	61	U	62	U
Total HPAH	12,000	---	69,000	676		61	U	61	U	62	U
CHLORINATED HYDROCARBONS (ug/kg dry)											
1,2,4-Trichlorobenzene	31	---	64	6.1	U	6.1	U	6.1	U	6.2	U
1,2-Dichlorobenzene	35	---	110	6.1	U	6.1	U	6.1	U	6.2	U
1,3-Dichlorobenzene	170	---	---	6.1	U	6.1	U	6.1	U	6.2	U
1,4-Dichlorobenzene	110	---	120	6.1	U	6.1	U	6.1	U	6.2	U
Hexachlorobenzene	22	168	230	0.98	U	1	U	0.99	U	0.99	U

CHEMICAL	SL	BT	ML	DMMU 1		DMMU 2A		DMMU 2B		DMMU 3	
PHTHALATES (ug/kg dry)											
Bis(2-ethylhexyl)phthalate	1,300	---	8,300	61	U	61	U	61	U	62	U
Butyl benzyl phthalate	63	---	970	6.1	U	6.1	U	6.1	U	6.2	U
Di-n-butyl phthalate	1,400	---	5,100	61	U	61	U	61	U	62	U
Di-n-octyl phthalate	6,200	---	6,200	61	U	61	U	61	U	62	U
Diethyl phthalate	200	---	1,200	61	U	61	U	61	U	62	U
Dimethyl phthalate	71	---	1,400	6.1	U	6.1	U	6.1	U	6.2	U
PHENOLS (ug/kg dry)											
2 Methylphenol	63	---	77	6.1	U	6.1	U	6.1	U	6.2	U
2,4-Dimethylphenol	29	---	210	6.1	U	6.1	U	6.1	U	6.2	U
4 Methylphenol	670	---	3,600	61	U	61	U	61	U	62	U
Pentachlorophenol	400	504	690	31	U	30	U	31	U	31	U
Phenol	420	---	1,200	61	U	61	U	61	U	62	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)											
Benzoic acid	650	---	760	610	U	610	U	610	U	620	U
Benzyl alcohol	57	---	870	31	U	30	U	31	U	31	U
Dibenzofuran	540	---	1,700	61	U	61	U	61	U	62	U
Hexachlorobutadiene	29	---	270	0.98	U	1	U	0.99	U	0.99	U
Hexachloroethane	1,400	---	14,000	61	U	61	U	61	U	62	U
N-Nitrosodiphenylamine	28	---	130	6.1	U	6.1	U	6.1	U	6.2	U
PESTICIDES AND PCBs (ug/kg dry)											
Aldrin	10	---	---	0.98	U	1	U	0.99	U	0.99	U
Chlordane	10	37	---	2	U	2	U	2	U	2	U
Dieldrin	10	---	---	2	U	2	U	2	U	2	U
Heptachlor	10	---	---	0.98	U	1	U	0.99	U	0.99	U
Lindane	10	---	---	0.98	U	1	U	0.99	U	0.99	U
Total DDT	6.9	50	69	2	U	2	U	2	U	2	U
Total PCBs	130	---	3,100	19	U	20	U	50	U	20	U
Total PCBs (mg/kg OC)	---	38	---	1	U	1.2	U	3.4	U	1	U

J = estimated concentration
U = undetected
QL = laboratory qualifier
OC = organic carbon
SL = screening level
BT = bioaccumulation trigger
ML = maximum level

Table 5. Dioxin/Furan data.

		Terminal 1				Terminal 2								Terminal 4			
	Lab ID:	GH1				GH2A				GH2B				GH3			
	DAIS ID:	C1				C2				C3				C4			
CHEMICAL	TEF	DMMU 1				DMMU 2A				DMMU 2B				DMMU 3			
DIOXINS (ng/kg dry)		conc	QL	TEQ (U=½ DL)	TEQ (U=0)	conc	QL	TEQ (U=½ DL)	TEQ (U=0)	conc	QL	TEQ (U=½ DL)	TEQ (U=0)	conc	QL	TEQ (U=½ DL)	TEQ (U=0)
2,3,7,8-TCDD	1	3.4		3.4	3.4	1.2		1.2	1.2	0.97	EM	0.97	0.97	2.4		2.4	2.4
1,2,3,7,8-PeCDD	1	2.5	J	2.5	2.5	1.4	J	1.4	1.4	1.6	EM	1.6	1.6	2.9	J	2.9	2.9
1,2,3,4,7,8-HxCDD	0.1	3	U	0.15	0	0.45	U	0.0225	0	0.45	EM	0.045	0.045	1.4	J	0.14	0.14
1,2,3,6,7,8-HxCDD	0.1	3.5	J	0.35	0.35	1	J	0.1	0.1	1.2	J	0.12	0.12	2.8	J	0.28	0.28
1,2,3,7,8,9-HxCDD	0.1	7.2		0.72	0.72	2.4	EM	0.24	0.24	3.3	J	0.33	0.33	7.2		0.72	0.72
1,2,3,4,6,7,8-HpCDD	0.01	58		0.58	0.58	14		0.14	0.14	19		0.19	0.19	42		0.42	0.42
OCDD	0.0003	320		0.096	0.096	96		0.0288	0.0288	150		0.045	0.045	300		0.09	0.09
FURANS (ng/kg dry)																	
2,3,7,8-TCDF	0.1	1.8	EM	0.18	0.18	0.62	J	0.062	0.062	0.67	J	0.067	0.067	1.2		0.12	0.12
1,2,3,7,8-PeCDF	0.03	1.8	U	0.027	0	0.17	U	0.00255	0	0.24	U	0.0036	0	0.37	U	0.00555	0
2,3,4,7,8-PeCDF	0.3	1.3	U	0.195	0	0.18	EM	0.054	0.054	0.37	EM	0.111	0.111	0.67	J	0.201	0.201
1,2,3,4,7,8-HxCDF	0.1	1.6	U	0.08	0	0.39	J	0.039	0.039	0.57	J	0.057	0.057	0.67	J	0.067	0.067
1,2,3,6,7,8-HxCDF	0.1	1.7	U	0.085	0	0.24	EM	0.024	0.024	0.31	U	0.0155	0	0.49	J	0.049	0.049
1,2,3,7,8,9-HxCDF	0.1	2.1	U	0.105	0	0.12	U	0.006	0	0.21	U	0.0105	0	0.16	J	0.016	0.016
2,3,4,6,7,8-HxCDF	0.1	1.8	U	0.09	0	0.24	J	0.024	0.024	0.25	U	0.0125	0	0.85	J	0.085	0.085
1,2,3,4,6,7,8-HpCDF	0.01	14	EM	0.14	0.14	4.5	J	0.045	0.045	7.7		0.077	0.077	19		0.19	0.19
1,2,3,4,7,8,9-HpCDF	0.01	5.1	U	0.0255	0	0.32	U	0.0016	0	0.42	EM	0.0042	0.0042	0.84	J	0.0084	0.0084
OCDF	0.0003	22	EM	0.0066	0.0066	13		0.0039	0.0039	12		0.0036	0.0036	27		0.0081	0.0081
TOTAL TEQ:				8.73	7.97			3.39	3.36			3.66	3.62			7.70	7.69

J = estimated concentration
U = undetected
EM = estimated maximum possible concentration
QL = laboratory qualifier
TEF = toxic equivalency factor (WHO 2005 mammalian)
TEQ = toxic equivalency

Table 6. Chemical results compared to SMS regulatory guidelines.

			Terminal 1		Terminal 2				Terminal 4	
		Lab ID:	GH1		GH2A		GH2B		GH3	
		DAIS ID:	C1		C2		C3		C4	
CHEMICAL	SQS	CSL	DMMU 1		DMMU 2A		DMMU 2B		DMMU 3	
METALS (mg/kg dry)			conc	QL	conc	QL	conc	QL	conc	QL
Arsenic	57	93	10	U	10	U	10	U	10	U
Cadmium	5.1	6.7	0.4	U	0.4	U	0.5	U	0.5	U
Chromium	260	270	40		37		38		33	
Copper	390	390	54.1		58		53.8		46.3	
Lead	450	530	7		6		6		5	
Mercury	0.41	0.59	0.09	U	0.09	U	0.1	U	0.1	U
Silver	6.1	6.1	0.6	U	0.6	U	0.7	U	0.8	U
Zinc	410	960	80		80		80		71	
LPAH (mg/kg OC)										
2-Methylnaphthalene	38	64	3.3	U	3.7	U	4.2	U	3.1	U
Acenaphthene	16	57	3.3	U	3.7	U	4.2	U	3.1	U
Acenaphthylene	66	66	3.3	U	3.7	U	4.2	U	3.1	U
Anthracene	220	1200	3.3	U	3.7	U	4.2	U	3.1	U
Fluorene	23	79	3.3	U	3.7	U	4.2	U	3.1	U
Naphthalene	99	170	3.3	U	3.7	U	4.2	U	3.1	U
Phenanthrene	100	480	3.3	U	3.7	U	4.2	U	3.1	U
Total LPAH	370	780	3.3	U	3.7	U	4.2	U	3.1	U
HPAH (mg/kg OC)										
Benzo(a)anthracene	110	270	4.2		3.7	U	4.2	U	3.1	U
Benzo(a)pyrene	99	210	3.3	U	3.7	U	4.2	U	3.1	U
Benzo(g,h,i)perylene	34	88	3.3	U	3.7	U	4.2	U	3.1	U
Benzofluoranthenes	230	450	3.8		3.7	U	4.2	U	3.1	U
Chrysene	110	460	5.4		3.7	U	4.2	U	3.1	U
Dibenzo(a,h)anthracene	12	33	3.3	U	3.7	U	4.2	U	3.1	U
Fluoranthene	160	1200	13.6		3.7	U	4.2	U	3.1	U
Indeno(1,2,3-c,d)pyrene	34	88	3.3	U	3.7	U	4.2	U	3.1	U
Pyrene	1000	1400	9.8		3.7	U	4.2	U	3.1	U
Total HPAH	960	5300	36.7		3.7	U	4.2	U	3.1	U
CHLORINATED HYDROCARBONS (mg/kg OC)										
1,2,4-Trichlorobenzene	0.81	1.8	0.33	U	0.37	U	0.42	U	0.31	U
1,2-Dichlorobenzene	2.3	2.3	0.3	U	0.4	U	0.4	U	0.3	U
1,4-Dichlorobenzene	3.1	9	0.3	U	0.4	U	0.4	U	0.3	U
Hexachlorobenzene	0.38	2.3	0.05	U	0.06	U	0.07	U	0.05	U
PHTHALATES (mg/kg OC)										
Bis(2-ethylhexyl)phthalate	47	78	3.3	U	3.7	U	4.2	U	3.1	U
Butyl benzyl phthalate	4.9	64	0.3	U	0.4	U	0.4	U	0.3	U
Di-n-butyl phthalate	220	1700	3.3	U	3.7	U	4.2	U	3.1	U
Di-n-octyl phthalate	58	4500	3.3	U	3.7	U	4.2	U	3.1	U
Diethyl phthalate	61	110	3.3	U	3.7	U	4.2	U	3.1	U
Dimethyl phthalate	53	53	0.3	U	0.4	U	0.4	U	0.3	U

CHEMICAL	SQS	CSL	DMMU 1		DMMU 2A		DMMU 2B		DMMU 3	
PHENOLS (ug/kg dry)										
2 Methylphenol	63	63	6.1	U	6.1	U	6.1	U	6.2	U
2,4-Dimethylphenol	29	29	6.1	U	6.1	U	6.1	U	6.2	U
4 Methylphenol	670	670	61	U	61	U	61	U	62	U
Pentachlorophenol	360	690	31	U	30	U	31	U	31	U
Phenol	420	1200	61	U	61	U	61	U	62	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)										
Benzoic acid	650	650	610	U	610	U	610	U	620	U
Benzyl alcohol	57	73	31	U	30	U	31	U	31	U
MISCELLANEOUS EXTRACTABLES (mg/kg OC)										
Dibenzofuran	15	58	3.3	U	3.7	U	4.2	U	3.1	U
Hexachlorobutadiene	3.9	6.2	0.1	U	0.1	U	0.1	U	0.05	U
N-Nitrosodiphenylamine	11	11	0.3	U	0.4	U	0.4	U	0.3	U
PCBs (mg/kg OC)										
Total PCBs (mg/kg carbon)	12	65	1.0	U	1.2	U	3.4	U	1.0	U

U = undetected
QL = laboratory qualifier
OC = organic carbon
SMS = Sediment Management Standards
SQS = sediment quality standard
CSL = cleanup screening level

Table 7. Chemical results compared to MTCA regulatory guidelines.

			Terminal 1		Terminal 2				Terminal 4	
		Lab ID:	GH1		GH2A		GH2B		GH3	
		DAIS ID:	C1		C2		C3		C4	
CHEMICAL	Method A[1]	Method B[2]	DMMU 1		DMMU 2A		DMMU 2B		DMMU 3	
METALS (mg/kg dry)			conc	QL	conc	QL	conc	QL	conc	QL
Arsenic, inorganic	20	0.67	10	U	10	U	10	U	10	U
Cadmium	2	---	0.4	U	0.4	U	0.5	U	0.5	U
Chromium (total)	---	---	40		37		38		33	
Chromium VI	19	---	---		---		---		---	
Copper	---	---	54.1		58		53.8		46.3	
Lead	250	---	7		6		6		5	
Mercury	2	---	0.09	U	0.09	U	0.1	U	0.1	U
Silver	---	---	0.6	U	0.6	U	0.7	U	0.8	U
Zinc	---	---	80		80		80		71	
LPAH (ug/kg dry)										
Acenaphthene	---	---	61	U	61	U	61	U	62	U
Anthracene	---	---	61	U	61	U	61	U	62	U
Fluorene	---	---	61	U	61	U	61	U	62	U
Naphthalene	5,000	---	61	U	61	U	61	U	62	U
HPAH (ug/kg dry)										
Benzo(a)anthracene	---	140	77		61	U	61	U	62	U
Benzo(a)pyrene	100	140	61	U	61	U	61	U	62	U
Benzo(b,k)fluoranthenes	---	---	70		61	U	61	U	62	U
Benzo(b)fluoranthene	---	140	61	U	61	U	61	U	62	U
Benzo(k)fluoranthenes	---	140	70		61	U	61	U	62	U
Chrysene	---	140	99		61	U	61	U	62	U
Dibenzo(a,h)anthracene	---	140	61	U	61	U	61	U	62	U
Fluoranthene	---	---	250		61	U	61	U	62	U
Indeno(1,2,3-c,d)pyrene	---	140	61	U	61	U	61	U	62	U
Pyrene	---	---	180		61	U	61	U	62	U
CHLORINATED HYDROCARBONS (ug/kg dry)										
1,2,4-Trichlorobenzene	---	---	6.1	U	6.1	U	6.1	U	6.2	U
1,2-Dichlorobenzene	---	---	6.1	U	6.1	U	6.1	U	6.2	U
1,4-Dichlorobenzene	---	42,000	6.1	U	6.1	U	6.1	U	6.2	U
Hexachlorobenzene	---	630	0.98	U	1	U	0.99	U	0.99	U
PHTHALATES (ug/kg dry)										
Bis(2-ethylhexyl)phthalate	---	71,000	61	U	61	U	61	U	62	U
Butyl benzyl phthalate	---	---	6.1	U	6.1	U	6.1	U	6.2	U
Di-n-butyl phthalate	---	---	61	U	61	U	61	U	62	U
Di-n-octyl phthalate	---	---	61	U	61	U	61	U	62	U
Diethyl phthalate	---	---	61	U	61	U	61	U	62	U
Dimethyl phthalate	---	---	6.1	U	6.1	U	6.1	U	6.2	U

CHEMICAL	Method A[1]	Method B[2]	DMMU 1		DMMU 2A		DMMU 2B		DMMU 3	
PHENOLS (ug/kg dry)										
2,4-Dimethylphenol	---	---	6.1	U	6.1	U	6.1	U	6.2	U
Pentachlorophenol	---	8,300	31	U	30	U	31	U	31	U
Phenol	---	---	61	U	61	U	61	U	62	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)										
Benzoic acid	---	---	610	U	610	U	610	U	620	U
Benzyl alcohol	---	---	31	U	30	U	31	U	31	U
Dibenzofuran	---	---	61	U	61	U	61	U	62	U
Hexachlorobutadiene	---	13,000	0.98	U	1	U	0.99	U	0.99	U
N-Nitrosodiphenylamine	---	200,000	6.1	U	6.1	U	6.1	U	6.2	U
PESTICIDES AND PCBs (ug/kg dry)										
Aldrin	---	59	0.98	U	1	U	0.99	U	0.99	U
Chlordane	---	2,900	2	U	2	U	2	U	2	U
Dieldrin	---	63	2	U	2	U	2	U	2	U
Heptachlor	---	220	0.98	U	1	U	0.99	U	0.99	U
Heptachlor epoxide	---	110	---		---		---		---	
Lindane	10	770	0.98	U	1	U	0.99	U	0.99	U
Total DDT	---	---	2	U	2	U	2	U	2	U
DDT	3,000	2,900	2	U	2	U	2	U	2	U
DDE	---	2,900	2	U	2	U	2	U	2	U
Total PCBs	1,000	500	19	U	20	U	50	U	20	U

[1]Soil, Method A, Unrestricted Land Use, Table Value

[2]Soil, Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use

Y = estimated concentration

U = undetected

QL = laboratory qualifier

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Figure 1
Grays Harbor, WA
Site Vicinity Map

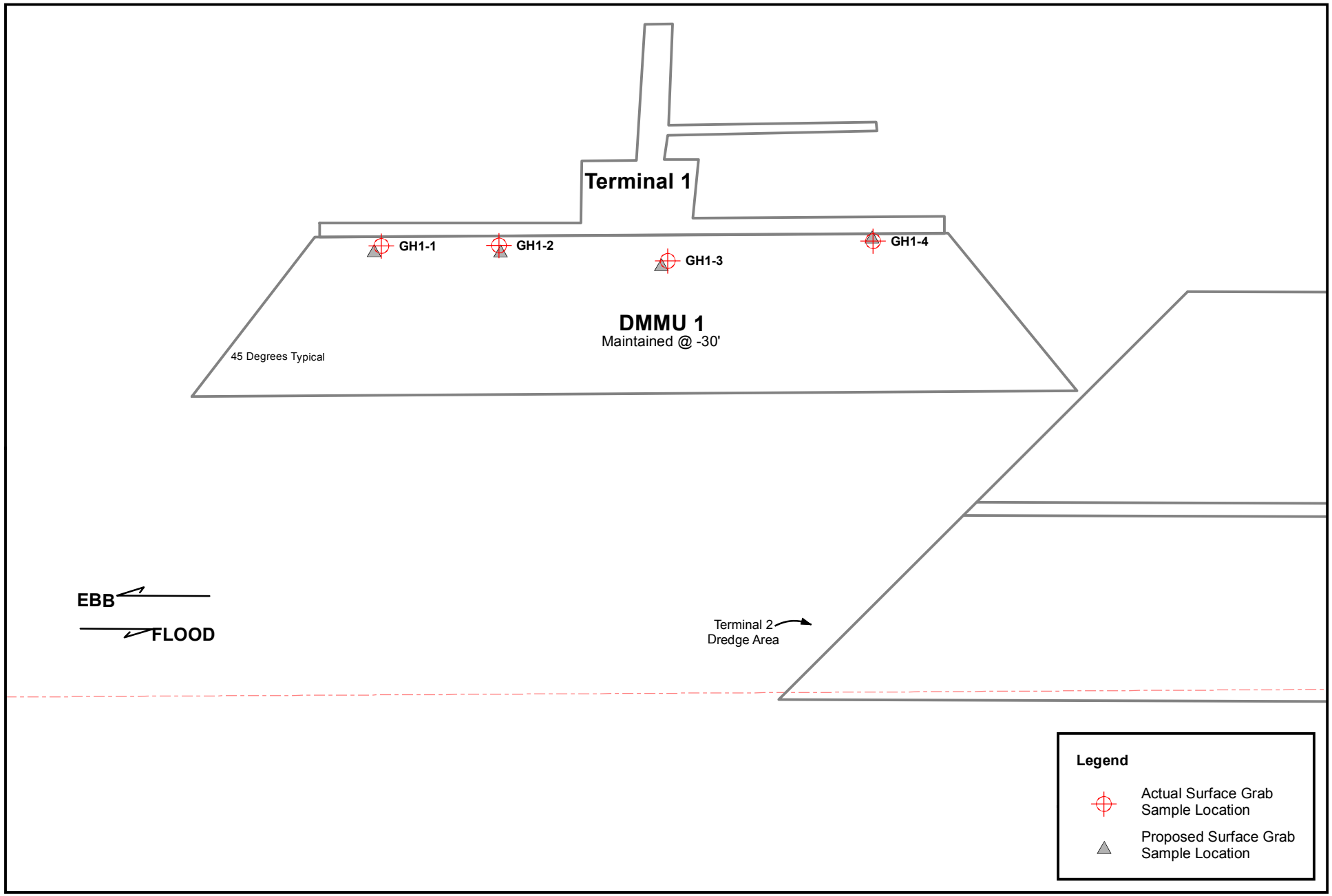

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Figure 2
Grays Harbor, WA
Terminal 1 (DMMU 1) Sample Locations

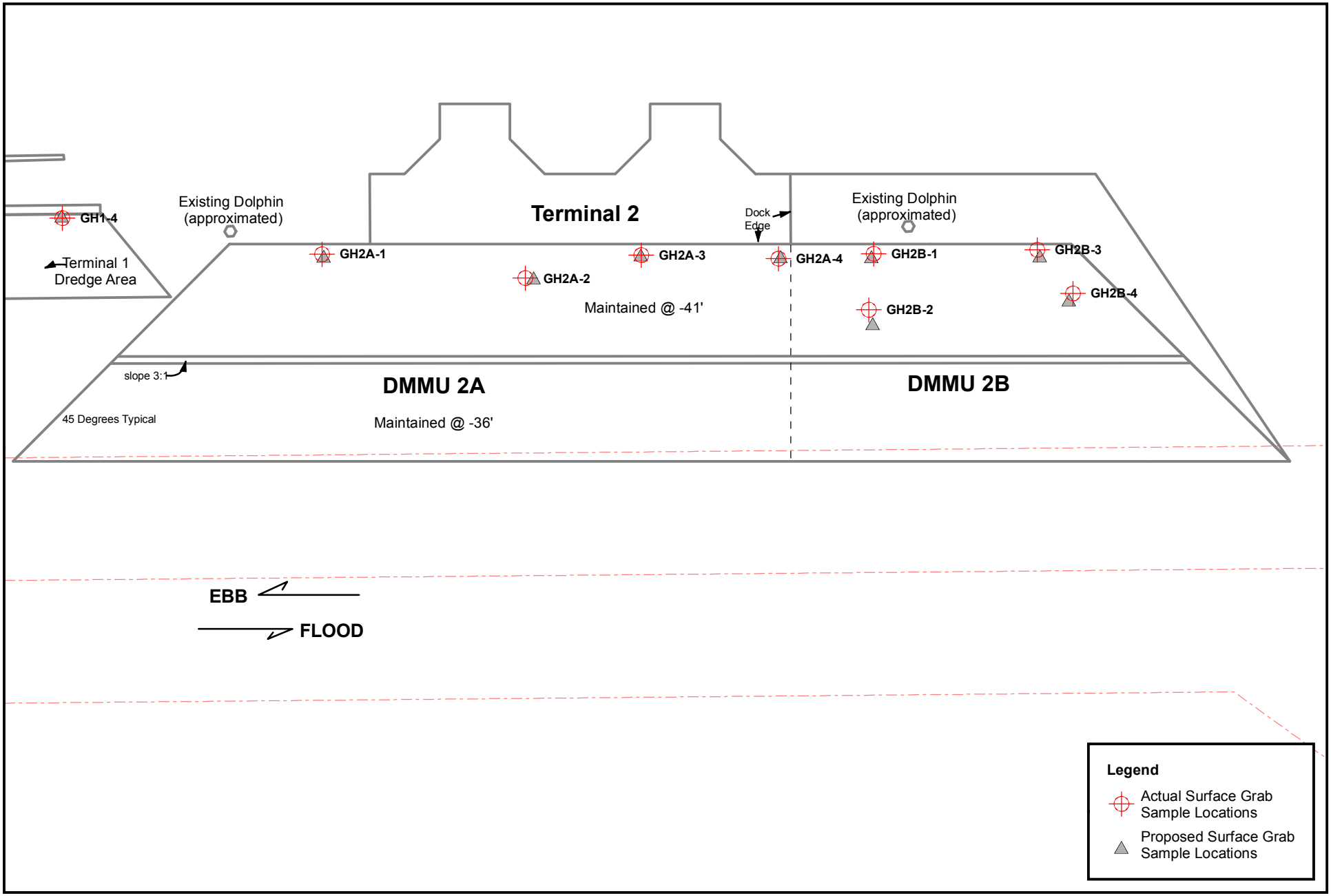

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Figure 3
Grays Harbor, WA
Terminal 2 (DMMU 2A & 2B) Sample Locations

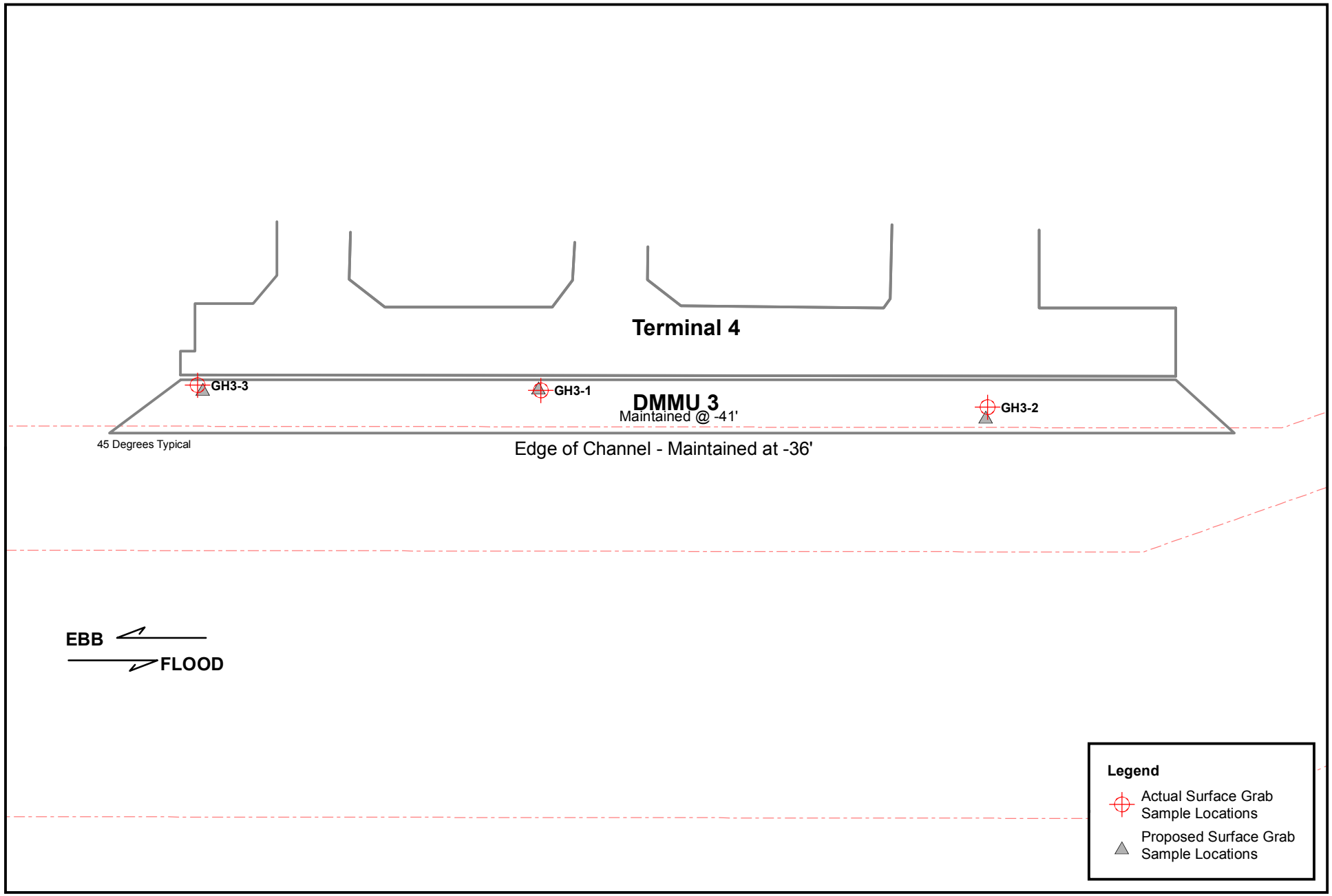

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Figure 4
Grays Harbor, WA
Terminal 4 (DMMU 3) Sample Locations