CENWS-OD-TS-NR

MEMORANDUM FOR: RECORD July 9, 2015

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM TARGA SOUND TERMINAL, HYLEBOS WATERWAY, TACOMA, WASHINGTON, FOR OPEN-WATER DISPOSAL AT THE COMMENCEMENT BAY NON-DISPERSIVE DISPOSAL SITE.

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 a total 7,500 cubic yards (cy) of dredged material from the Targa Sound Terminal in the Hylebos Waterway of Tacoma, Washington for open-water disposal.

2. PROJECT SUMMARY. Targa Sound Terminal, LLC, operates a petroleum transfer terminal on the Hylebos Waterway, adjacent to the federal navigation channel and within the Commencement Bay/Nearshore Tideflats (CB/NT) Superfund Site (Figure 1). Targa proposes to dredge the marine terminal to restore the berth depth to -30 ft. MLLW, plus a 2-ft. allowable overdredge allowance, to -32 ft. MLLW. The sampling plan also included an additional one-foot overdredge, to -33 ft, MLLW in the event that a one-foot sand cover was needed to meet state of Washington anti-degradation standards. Total volume of dredged material considered in this characterization was approximately 7,500 cy.

Table 1. Targa Sound Terminal Project Tracking

Final SAP received	April 2, 2015
Final SAP approved	April 6, 2015
Sampling date	April 7, 2015
Data report received	June 25, 2015
DMMP Tracking number	TARGA-1-A-F-354
EIM Project number	TARGA15
USACE Permit Number	NWS-2015-337
Recency Expiration Date (High Rank--3 years)	April 2018

3. PROJECT RANKING AND SAMPLING REQUIREMENTS. Hylebos Waterway is ranked "high" for sampling purposes, per the DMMP User Manual (DMMP 2014). For a high-ranked project with heterogeneous sediment, the number of samples and analyses are calculated using the following guidelines:

   - Maximum volume of sediment represented by each field sample = 4,000 cubic yards.
   - Maximum volume of sediment represented by each analysis in the upper 4-feet of the dredging prism (surface sediment) = 4,000 cubic yards.
   - Maximum volume of sediment represented by each analysis in the subsurface portion of the dredging prism = 12,000 cubic yards.

   The sampling approach was based on the proposed dredge volume, dredge prism configuration, and typical cross sections and conditions within the project area (Figure 2). The dredge prism for the sampling design was based on the assumption that all proposed dredged material was considered to be "surface" material.

Table 2. Targa Sound Terminal Samples and DMMUs

DMMU	Station	Location (NAD83 WASPS)	
		X Coordinate	Y Coordinate
DMMU-1	C-1	1171205	714433
	C-2	1171491	714350
DMMU-2	C-3	1171676	714254
	C-4	1171782	714178

Notes:

- Coordinates are in NAD83 WA State Plane South, U.S. Feet.
- MLLW = mean lower low water
- NAD83 = North American Datum of 1983
- WASPS = Washington State Plane South

4. SAMPLING. Sampling took place on April 7, 2015, using a vibracore sampler. Four cores were obtained per the approved SAP. All cores met the required 75% core recovery, and were within an acceptable distance from the initial proposed location. Cores were transported to the analytical lab (Analytical Resources, Inc.) for appropriate storage and processed the following day. DMMP agency representatives were present during processing, in person and by phone, to assist in real-time decision-making regarding dredged material and Z-layer intervals. Because previous sampling in the area had identified a clean native layer below contaminated accumulated material, it was important to see if a native layer could be easily identified, and to adapt and refine the compositing plan and DMMUs based on real-time information. Native sediments were clearly identified between -31.0 and -31.5 ft MLLW in all cores. Based on this information, which was confirmed by the chemical analysis of Z-layer (see section 6) the extra foot of dredging originally planned in order to accommodate a sand cover was not needed (Table 3).

Table 3. Targa Sound Terminal Conceptual Dredging Plan and Sampling Scheme

DMMU	Station	Design Elevation (ft MLLW)		Dredged Material Surface Sample (A) Elevation Interval (ft MLLW)[1,2]		Native Sediment Interface (ft MLLW)	Z-layer Surface Sample Elevation Interval (ft MLLW)[1,2]	
		SAP	Final	SAP	Final		SAP	Final
1	C-1	-33	-32	-28 to -33	-28.3 to -32	-31.0	-33 to -35	-32 to -34
	C-2	-33	-32	-28 to -33	-28.3 to -32	-31.5	-33 to -35	-32 to -34
2	C-3	-33	-32	-29 to -33	-29.1 to -32	-31.1	-33 to -35	-32 to -34
	C-4	-33	-32	-27 to -33	-27.1 to -32	-31.0	-33 to -35	-32 to -34

Adapted from Anchor QEA 2015

[1] Sample intervals were corrected for length based on core recovery. Cores were assumed to have uniform compaction through the core.

[2] Surface Sample and Z-layer Sample intervals composited for analysis from each DMMU

5. CONVENTIONAL AND 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 (Anchor QEA 2015). The data were considered sufficient and acceptable for regulatory decision-making under the DMMP program.

Sediment conventional results (Table 4) confirmed different physical characteristics between proposed dredged material and underlying native material (Z-layer). Fractions of total fines were lower in both Z-layers, and TOC was higher in the proposed dredged material.

Table 4. Targa Sound Terminal Conventional Results

Sample ID	DMMU 1A	DMMU 1Z	DMMU 2A	DMMU 2Z
Conventional Parameters (mg/kg)				
Ammonia as nitrogen	8.19	2.47	6.87	2.24
Sulfide	2520 J	23.3 J	491 J	13.2 J
Conventional Parameters (%)				
Total organic carbon	2.06	0.454	1.46	0.531
Total solids	59.89	78.51	73.66	76.76
Total solids (preserved)	54.43	79.28	70.21	76.78
Total volatile solids	5.14	1.41	2.92	1.58
Grain Size (% retained by sieve size)				
Gravel (>2000 µm)	2.2	0.5	1.8	1.0
Total Sand (62.5 - 2000 µm)	48.9	83.1	69.4	77.8
Total Silt (3.9 - 62.5 µm)	31.4	12.9	19.5	16.2
Total Clay (0 - 3.9 µm)	17.6	3.7	9.2	5.1
Total Fines (<62.5 µm)	49.0	16.6	28.7	21.3

Adapted from Anchor QEA 2015

Chemical results indicated both detected and non-detected exceedances of DMMP standard chemicals of concern screening levels in the proposed dredged material (Table 5). In DMMU 1 there were exceedances of butylbenzyl phthalate, total PCBs and dioxin/furans. In DMMU 2 there were detected exceedances of total PCBs and dioxins/furans. Non-detected exceedances included DDT in DMMU 1, hexachlorobenzene in DMMU 2, and total chlordane in both DMMUs. Dioxin/furan toxicity equivalents (TEQ, with U = ½ estimated detection limit) for the dredge prism were 119.7 ng/kg dry wt. for DMMU 1, and 59.1 ng/kg dry wt. for DMMU 2, both well over the Puget Sound dioxin screening levels (Table 6).

Because all dredged material failed the Tier 2 chemical testing, further Tier 3 (biological and bioaccumulation) testing would need to be conducted—and passed—if material was to still be considered for open water disposal. Targa Sound Terminal chose not to pursue further testing and to dispose of all proposed dredged material at an upland location.

6. POST-DREDGE SEDIMENT QUALITY. The sediment to be exposed by dredging must either meet the State of Washington Sediment Quality Standards (SQS) or the State's Antidegradation standard (Ecology 2013) as outlined by DMMP guidance (DMMP 2008). For this project, Z-samples representing the material underlying both DMMUs had no detected or undetected exceedances of DMMP screening levels. Z-samples results were also compared with SMS standards (Table 7) and there were no detected or undetected exceedances of SQS standards. Dioxin TEQs were also below the DMMP Puget Sound screening level of 4 ng/kg dry wt. for both DMMUs. With this evidence, the DMMP agencies conclude that this project is in compliance with the State of Washington anti-degradation policy.

7. SUITABILITY DETERMINATION. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Targa Sound Terminal for open-water disposal at a DMMP non-dispersive disposal site. 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 concluded **that all proposed dredged material (approximately 7,500 cy) is not suitable** for open-water disposal at any DMMP disposal site. All dredged material must be removed from the water for disposal at an approved upland location. Project dredging must remove all material at least to the native interface, as determined by this characterization. The proposed dredge depth of -32 ft. MLLW fulfills this requirement.

This suitability determination does ***not*** constitute final agency approval of this project. During the public comment period that follows a public notice, 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 with DNR, Ecology, EPA and the Corps of Engineers will be required prior to the beginning of dredging. A dredging quality control plan must be developed and submitted to the DMMP at least 7 days prior to the pre-dredge conference call.

8. REFERENCES

Anchor 2015. Data Report: Targa Sound Terminal - Hylebos Waterway Navigational Maintenance Sediment Characterization. Prepared by Anchor QEA, LLC on behalf of Targa Resources. June 2015.

DMMP 2008. *DMMP Clarification Paper: Quality of Post-Dredge Sediment Surfaces (Updated).* Prepared by David Fox (USACE), Erika Hoffman (EPA) and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

DMMP 2014. *Dredged Material Evaluation and Disposal Procedures (User Manual)*. Dredged Material Management Program, updated December 2014.

Ecology 2013. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, February 2013.

PSDDA 1988. *Evaluation Procedures Technical Appendix – Phase I – Central Puget Sound*. U.S. Army Corps of Engineers Seattle District, U.S. Environmental Protection Agency Region 10, Washington State Department of Ecology, Washington State of Natural Resources. June 1988.

Signed copy on file at the Dredged Material Management Office, Seattle District Corps of Engineers

AGENCY SIGNATURES

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Concur:

_____ _____
Date Lauran Cole Warner - Seattle District Corps of Engineers

_____ _____
Date Justine Barton - Environmental Protection Agency

_____ _____
Date Laura Inouye, Ph.D. - Washington Department of Ecology

_____ _____
Date Celia Barton - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Tom Bloxton, Seattle District Regulatory
Joy Dunay, Anchor QEA
Rudy Salazar, Targa Resources
Puyallup Tribe

Table 5. Targa Sound Terminal Chemical Results compared to DMMP Guidelines

CHEMICAL	DMMP Marine Guidelines			DMMU-1 A		DMMU-1 Z		DMMU-2 A		DMMU-2 Z	
	SL	BT	ML	0-2.8 ft		2.8-4.3 ft		0-2.8 ft		2.8-4.7 ft	
METALS (mg/kg dry wt)											
Antimony	150	---	200	5.9	J	0.65	J	4.33	J	0.57	J
Arsenic	57	507.1	700	53		8		38		5.44	J
Cadmium	5.1	11.3	14	0.6		0.17	J	0.4		0.19	J
Chromium	260	260	---	26		13.5		20.4		15.1	
Copper	390	1,027	1,300	131		13.8		72.7		15.2	
Lead	450	975	1,200	65		1.54	J	41		2.52	J
Mercury	0.41	1.5	2.3	0.22		0.016	J	0.09		0.02	J
Selenium	---	3	---	0.38	J	0.6	U	0.18	J	0.6	U
Silver	6.1	6.1	8.4	0.17	J	0.4	U	0.4	U	0.4	U
Zinc	410	2,783	3,800	157	J	23		112	J	25	J
ORGANOMETALLIC COMPOUNDS											
Tributyltin ion (bulk; ug/kg)		73	---	36		3.1	U	7.6	U	3.4	U
PAHs (µg/kg dry wt)											
Naphthalene	2,100	---	2,400	250		8.4	J	120		25	
Acenaphthylene	560	---	1,300	44		19	U	36		5.9	J
Acenaphthene	500	---	2,000	49		19	U	38		20	U
Fluorene	540	---	3,600	56		19	U	30		20	U
Phenanthrene	1,500	---	21,000	310		11	J	130		25	
Anthracene	960	---	13,000	120		19	U	63		6.9	J
2-Methylnaphthalene(1)	670	---	1,900	70		19	U	42		8.8	J
Total LPAH	5,200	---	29,000	829		19.4	J	417		62.8	J
Fluoranthene	1,700	4,600	30,000	390		15	J	210		26	
Pyrene	2,600	11,980	16,000	640		24		430		38	
Benz(a)anthracene	1,300	---	5,100	120		5.6	J	72		7.9	J
Chrysene	1,400	---	21,000	300		13	J	170		19	J
Benzofluoranthenes (b, j ,k)	3,200	---	9,900	590		18	J	340		28	J
Benzo(a)pyrene	1,600	---	3,600	160		8.4	J	110		6.9	J
Indeno(1,2,3-c,d)pyrene	600	---	4,400	77		19	U	54		20	UJ
Dibenz(a,h)anthracene	230	---	1,900	32		4.7	U	20		4.9	UJ
Benzo(g,h,i)perylene	670	---	3,200	60		19	U	41		7.9	J
Total HPAH	12,000	---	69,000	2,369		84	J	1,447		134	J
CHLORINATED HYDROCARBONS (µg/kg dry wt)											
1,4-Dichlorobenzene	110	---	120	8.6		4.7	U	4.3	J	4.9	U
1,2-Dichlorobenzene	35	---	110	3.3	J	4.7	U	4.8	U	4.9	U
1,2,4-Trichlorobenzene	31	---	64	8.5		1.41	U [1]	3.6	J	1.51	U [1]
Hexachlorobenzene (HCB)	22	168	230	19	UJ	0.95	U	24	UJ	0.94	U
PHTHALATES (µg/kg dry wt)											
Dimethyl phthalate	71	---	1,400	4.9	U	4.7	U	4.8	U	4.9	UJ
Diethyl phthalate	200	---	1,200	50		27		24		28	
Di-n-butyl phthalate	1,400	---	5,100	20	U	19	U	19	U	20	U
Butyl benzyl phthalate	63	---	970	82		19	U	23		20	UJ
Bis(2-ethylhexyl) phthalate	1,300	---	8,300	92		47	U	52		49	U
Di-n-octyl phthalate	6,200	---	6,200	20	U	19	U	19	U	20	U
PHENOLS (µg/kg dry wt)											
Phenol	420	---	1,200	110		19	U	36		8.8	J
2-Methylphenol	63	---	77	12		4.7	U	4.8	U	4.9	U
4-Methylphenol	670	---	3,600	63		4.7	U	29		7.2	
2,4-Dimethylphenol	29	---	210	12	J	23	UJ	24	UJ	25	UJ
Pentachlorophenol	400	504	690	22	J	19	U	17	J	20	U
MISC. EXTRACTABLES (µg/kg dry wt)											
Benzyl alcohol	57	---	870	37	J	19	UJ	19	UJ	20	UJ
Benzoic acid	650	---	760	350	J	190	U	160	J	200	U
Dibenzofuran	540	---	1,700	74		19	U	42		20	U
Hexachlorobutadiene	11	---	270	4.6	UJ	0.95	U	2.4	UJ	0.94	U

Table 5. Targa Sound Terminal Chemical Results compared to DMMP Guidelines

CHEMICAL	DMMP Marine Guidelines			DMMU-1 A		DMMU-1 Z		DMMU-2 A		DMMU-2 Z	
	SL	BT	ML	0-2.8 ft		2.8-4.3 ft		0-2.8 ft		2.8-4.7 ft	
N-Nitrosodiphenylamine	28	---	130	20	U	19	U	19	U	20	U
PESTICIDES & PCBs (µg/kg dry wt)											
4,4'-DDD	16	---	---	0.99	UJ	0.95	UJ	0.99	U	0.94	U
4,4'-DDE	9	---	---	0.99	UJ	0.95	UJ	0.99	UJ	0.94	U
4,4'-DDT	12	---	---	13	UJ	0.95	UJ	4.8	U	0.94	U
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	---	50	69	13	UJ	0.95	UJ	4.8	UJ	0.94	U
Aldrin	10	---	---	0.5	UJ	0.48	UJ	0.5	UJ	0.47	U
Total Chlordane (sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, oxychlordane)	2.8	37	---	46	UJ	0.95	UJ	20	UJ	0.94	U
Dieldrin	2	---	1,700	0.99	UJ	0.95	UJ	0.99	UJ	0.94	U
Heptachlor	2	---	270	0.5	UJ	0.48	UJ	0.5	UJ	0.47	U
Total PCBs Aroclors (Sum of: 1016, 1221, 1242, 1248, 1254, 1260, 1268)	130	38 (2)	3,100	262	J	9.1	J	151	J	18.2	J

(1) 2-Methylnaphthalene is not included in the summation for total LPAH.
(2) This value is normalized to total organic carbon, and is expressed in mg/kg carbon.
Detected concentration is greater than DMMP SL
Non-detected concentration is above one or more identified screening levels
Bold text indicates detected result
U = Compound not detected above reporting limit
U [1] = Method detection limit was used, rather than reporting limit
J = Estimated value
UJ = Compound analyzed, but not detected above estimated detection limit
DMMP = Dredged Material Management Program
SL = DMMP Screening Level 2014
BT = DMMP Bioaccumulation Trigger 2014
ML = DMMP Maximum Level 2014

Table 6. Targa Sound Terminal Dioxin/Furan results and TEQ calculations

	TEF	ng/kg								ND=1/2 RL TEQ				ND=0 TEQ			
Analyte	WHO 2005	DMMU 1-A		DMMU 1-Z		DMMU 2-A		DMMU 2-Z		1 - A	1 - Z	2 - A	2 - Z	1 - A	1 - Z	2 - A	2 - Z
2,3,7,8-TCDF	0.1	145		1.03	J	65		5.41		14.500	0.103	6.500	0.541	14.500	0.103	6.500	0.541
2,3,7,8-TCDD	1	1.43		0.15	U	0.667		0.175	U	1.430	0.075	0.667	0.088	1.430	0	0.667	0
1,2,3,7,8-PeCDF	0.03	186		1.39	J	92.5		5.96		5.580	0.042	2.775	0.179	5.580	0.042	2.775	0.179
2,3,4,7,8-PeCDF	0.3	82.3		0.467	U	37.3		2.25		24.690	0.070	11.190	0.675	24.690	0	11.190	0.675
1,2,3,7,8-PeCDD	1	6.79		0.054	U	2.67		0.177	J	6.790	0.027	2.670	0.177	6.790	0	2.670	0.177
1,2,3,4,7,8-HxCDF	0.1	309		2.1		180		10.4		30.900	0.210	18.000	1.040	30.900	0.210	18.000	1.040
1,2,3,6,7,8-HxCDF	0.1	79.7		0.58	U	50.9		2.87		7.970	0.029	5.090	0.287	7.970	0	5.090	0.287
2,3,4,6,7,8-HxCDF	0.1	32.7		0.255	U	16.7		0.544	J	3.270	0.013	1.670	0.054	3.270	0	1.670	0.054
1,2,3,7,8,9-HxCDF	0.1	43.7		0.457	U	24.4		1.83	J	4.370	0.023	2.440	0.183	4.370	0	2.440	0.183
1,2,3,4,7,8-HxCDD	0.1	7.5		0.056	U	2.26		0.183	J	0.750	0.003	0.226	0.018	0.750	0	0.226	0.018
1,2,3,6,7,8-HxCDD	0.1	55.9		0.201	J	20.4		0.886	J	5.590	0.020	2.040	0.089	5.590	0.020	2.040	0.089
1,2,3,7,8,9-HxCDD	0.1	16.8		0.128	J	6.99		0.458	U	1.680	0.013	0.699	0.023	1.680	0.013	0.699	0
1,2,3,4,6,7,8-HpCDF	0.01	251		1.67		131		8.3		2.510	0.017	1.310	0.083	2.510	0.017	1.310	0.083
1,2,3,4,7,8,9-HpCDF	0.01	78.2		0.676	J	45.9		3.62		0.782	0.007	0.459	0.036	0.782	0.007	0.459	0.036
1,2,3,4,6,7,8-HpCDD	0.01	710		2.57	U	266		12.7		7.100	0.013	2.660	0.127	7.100	0	2.660	0.127
OCDF	0.0003	720		4.39		337		25.6		0.216	0.001	0.101	0.008	0.216	0.001	0.101	0.008
OCDD	0.0003	5,350	J	17		2,050		94.6		1.605	0.005	0.615	0.028	1.605	0.005	0.615	0.028
Totals										119.7	0.67	59.1	3.6	119.7	0.417	59.1	3.53

Bold = Analyte detected
U = Analyte not detected
J = Estimated value
Detected concentration is greater than DMMP SL of 4 pptr TEQ

Table 7. Targa Sound Terminal Chemical Results compared to SMS Guidelines

CHEMICAL	SMS Marine Guidelines		SMS Comparison							
			DMMU-1 A		DMMU-1 Z		DMMU-2 A		DMMU-2 Z	
	SCO	CSL	0-2.8 ft		2.8-4.3 ft		0-2.8 ft		2.8-4.7 ft	
Total organic carbon (%)			2.06		0.454		1.46		0.531	
METALS (mg/kg dry wt)										
Arsenic	57	93	53		8		38		5.44	J
Cadmium	5.1	6.7	0.6		0.17	J	0.4		0.19	J
Chromium	260	270	26		13.5		20.4		15.1	
Copper	390	390	131		13.8		72.7		15.2	
Lead	450	530	65		1.54	J	41		2.52	J
Mercury	0.41	0.59	0.22		0.016	J	0.09		0.019	J
Silver	6.1	6.1	0.17	J	0.4	U	0.4	U	0.4	U
Zinc	410	960	157	J	23		112	J	25	J
PAHs (mg/kg OC)										
Naphthalene	99	170	12.14		1.85	J	8.22		4.71	
Acenaphthylene	66	66	2.14		4.19	U	2.47		1.11	J
Acenaphthene	16	57	2.38		4.19	U	2.60		3.77	U
Fluorene	23	79	2.72		4.19	U	2.06		3.77	U
Phenanthrene	100	480	15.05		2.42	J	8.90		4.71	
Anthracene	220	1,200	5.83		4.19	U	4.32		1.30	J
2-Methylnaphthalene[(2)]	38	64	3.40		4.19	U	2.88		1.66	J
Total LPAH	370	780	40.20		4.27	J	28.60		11.80	J
Fluoranthene	160	1,200	18.93		3.30	J	14.38		4.90	
Pyrene	1,000	1,400	31.07		5.29		29.45		7.16	
Benz(a)anthracene	110	270	5.83		1.23	J	4.93		1.49	J
Chrysene	110	460	14.56		2.86	J	11.64		3.58	J
Benzofluoranthenes (b, j ,k)	230	450	28.64		3.97	J	23.29		5.27	J
Benzo(a)pyrene	99	210	7.77		1.85	J	7.53		1.30	J
Indeno(1,2,3-c,d)pyrene	34	88	3.74		4.19	U	3.70		3.77	UJ
Dibenz(a,h)anthracene	12	33	1.55		1.04	U	1.37		0.92	UJ
Benzo(g,h,i)perylene	31	78	2.91		4.19	U	2.81		1.49	J
Total HPAH	960	5,300	115		19	J	99		25	J
Chlorinated Hydrocarbons (mg/kg OC)										
1,4-Dichlorobenzene	3.1	9	0.4126		0.3084	U [1]	0.247	J	0.2825	U [1]
1,2-Dichlorobenzene	2.3	2.3	0.1602	J	1.0352	U	0.329	U	0.9228	U
1,2,4-Trichlorobenzene	0.81	1.8	0.4175		1.0352	U	0.295	J	0.9228	U
Hexachlorobenzene (HCB)	0.38	2.3	0.922	UJ	0.2093	U	1.644	UJ	0.177	U
PHTHALATES (mg/kg OC)										
Dimethyl phthalate	53	53	0.24	U	1.04	U	0.33	U	0.92	UJ
Diethyl phthalate	61	110	2.43		5.95		1.64		5.27	
Di-n-butyl phthalate	220	1,700	0.97	U	4.19	U	1.30	U	3.77	U
Butyl benzyl phthalate	4.9	64	3.98		4.19	U	1.58		3.77	UJ
Bis(2-ethylhexyl) phthalate	47	78	4.47		10.35	U	3.56		9.23	U
Di-n-octyl phthalate	58	4,500	0.97	U	4.19	U	1.30	U	3.77	U
PHENOLS (µg/kg dry wt)										
Phenol	420	1,200	19	U	36		8.8	J	19	U
2-Methylphenol	63	63	4.7	U	4.8	U	4.9	U	4.7	U
4-Methylphenol	670	670	4.7	U	29		7.2		4.7	U
2,4-Dimethylphenol	29	29	23	UJ	24	UJ	25	UJ	23	UJ
Pentachlorophenol	360	690	19	U	17	J	20	U	19	U
MISC. EXTRACTABLES										
Benzyl alcohol (mg/kg dry wt)	57	73	37	J	19	UJ	19	UJ	20	UJ
Benzoic acid (mg/kg dry wt)	650	650	350	J	190	U	160	J	200	U
Dibenzofuran (mg/kg OC)	15	58	3.59		4.19	U	2.88		3.77	U
Hexachlorobutadiene (mg/kg OC)	3.9	6.2	0.22	UJ	0.21	U	0.16	UJ	0.18	U
N-Nitrosodiphenylamine (mg/kg OC)	11	11	0.97	U	4.19	U	1.30	U	3.77	U
PCBs (mg/kg OC)										
Total PCBs Aroclors	12	65	12.7	J	2	J	10.3	J	3.43	J

Table 7 notes:

(1) 2-Methylnaphthalene is not included in the summation for total LPAH.

Detected concentration is greater than SCO (Sediment Cleanup Objective)

Non-detected concentration is above SCO

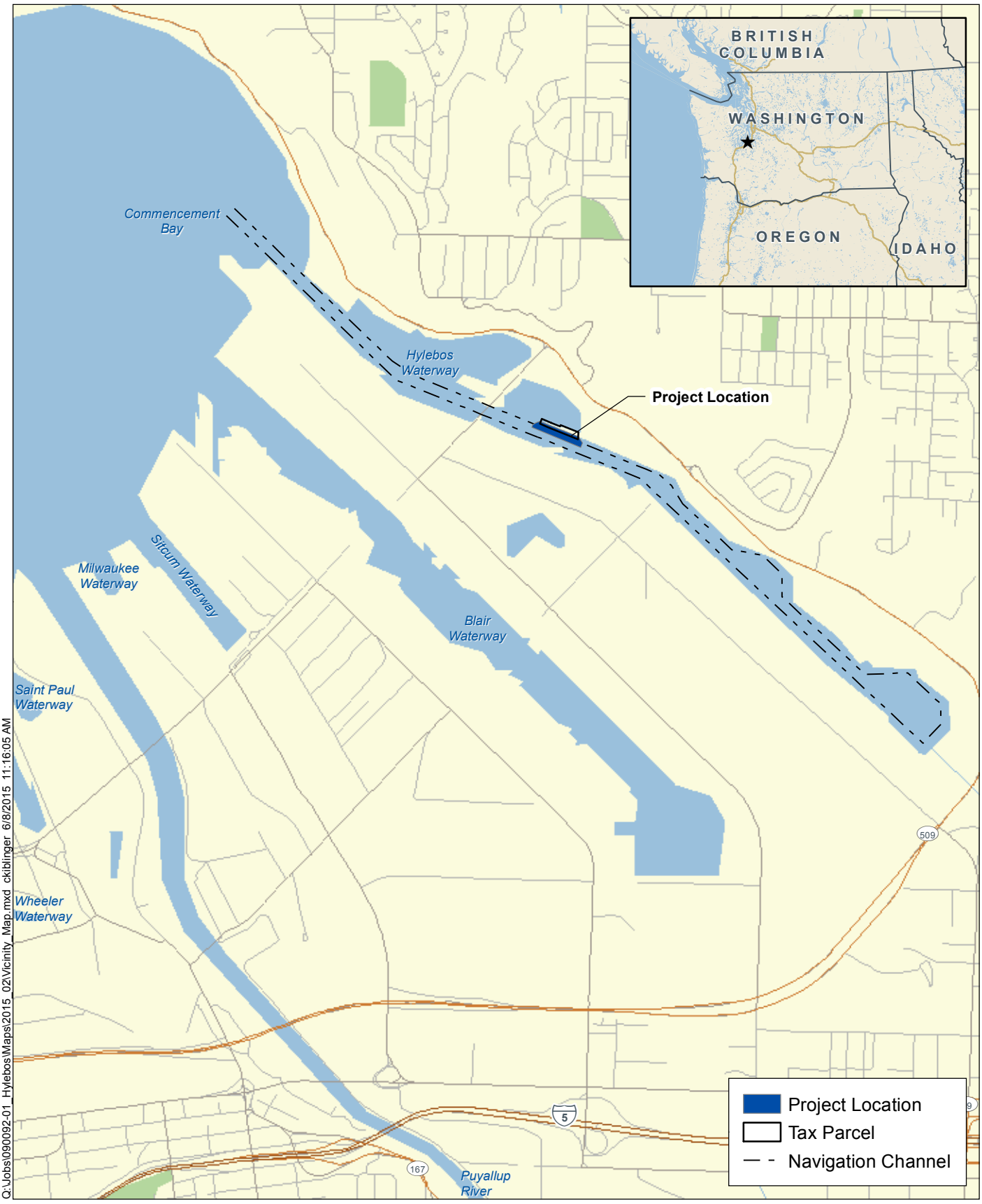
Bold text indicates detected result

U = Compound not detected above reporting limit

U [1] = Method detection limit was used, rather than reporting limit

J = Estimated value

UJ = Compound analyzed, but not detected above estimated detection limit



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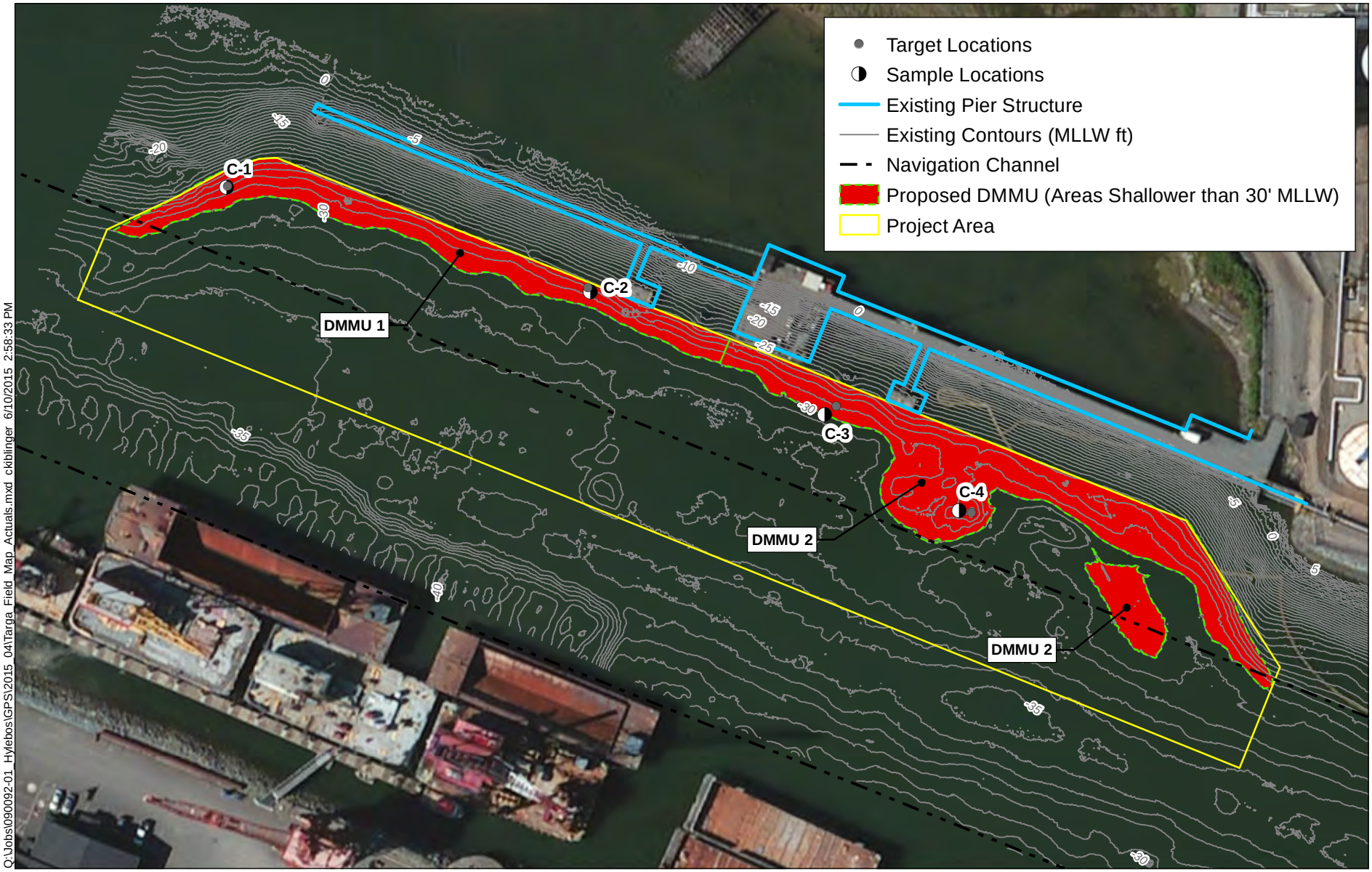
Feet
0 1,250 2,500

Figure 1
Vicinity Map
Targa Sound Terminal Sediment Characterization
Targa Resources



ANCHOR QEA

Feet
0 100 200

Figure 2
Target and Actual Sample Locations
Targa Sound Terminal Sediment Characterization
Targa Resources