CENWS-OD-TS-NR

MEMORANDUM FOR: RECORD **April 21, 2015**

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE PORT OF SEATTLE T-5 BERTH DEEPENING, SEATTLE, WASHINGTON, FOR OPEN-WATER DISPOSAL AT THE ELLIOTT 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 51,000 cubic yards (cy) of dredged material from the Port of Seattle Terminal 5 for disposal at the Elliott Bay non-dispersive open-water site.

2. **PROJECT SUMMARY**. The Port of Seattle T-5 is a container cargo facility off the Seattle Harbor West Waterway, at the mouth of the Duwamish River (**Figure 1**). The Port is planning upgrades to T5, including deepening the berth for deeper-draft vessels. The present surface elevation is between -48 ft and -52 ft MLLW. This sediment characterization was designed to provide information for either of two potential design depths for the T5 berth upgrades; the option chosen will depend on potential future tenant requirements. The two different dredging depth options are:

   - **Option A:** Design elevation of –53 MLLW (plus 1 ft. advanced maintenance and up to 2 ft. overdredge to a final depth of –56 MLLW) for a total volume of approximately 31,000 cy.
   - **Option B:** Design elevation of –55 MLLW (plus 1 ft. advanced maintenance and up to 2 ft. overdredge to a final depth of –58 MLLW) for a total volume of approximately 51,000 cy.

Table 1. Port of Seattle T-5 Project Tracking

SAP received	November 24, 2014
SAP approved	December 12, 2014
Sampling dates	December 15-16, 2014
Data report received	March 24, 2015
DMMP Tracking number	POST5-1-A-F-364
EIM Project number	POST514
USACE Permit Number	NWS-2015- 0269-WRD
Recency Expiration Date (High Rank--3 years)	December 2017

3. **PROJECT RANKING AND SAMPLING REQUIREMENTS**. As an urban, industrialized area, T-5 is ranked as “high” concern for potential contamination (DMMP 2014). In the Dredged Material Management Program, “surface” material (i.e. the top 4 feet of a dredge prism) is usually treated differently from “subsurface” material (deeper than 4 feet) for the purpose of calculating the number of dredged material management units (DMMUs) and samples needed. But for this project, previous characterizations have indicated potential contamination at depth,

so all material was sampled and characterized as surface sediment, with a maximum volume of 4,000 cy per DMMU. And though high-ranked projects only require a sample density of one sample per 4,000 cy, in this case two cores were necessary to obtain the amount of sediment required for analyses. The DMMP requested that the two core samples be placed in different parts of each DMMU and composited, for better representation of the DMMU as a whole.

Z-sample depth also varies with the two different design options, so some samples needed to be characterized such that they provide information either as a dredge prism DMMU, or as a Z-sample. The sampling scheme and locations are as shown in **Table 2** and **Figures 2a and 2b**.

Table 2. Port of Seattle Sampling requirements and DMMUs

DMMU Section	DMMU Designation Option A: -53' Elevation	DMMU Designation Option B: -55' Elevation	Depth Interval Beneath Mudline (uncorrected)*	Volume(cy)
S-1	A	A	0 - 2'	1251
	B	B	2' - 5'	2593
	C	C	5' - 8'	2068
	ZA	D	8' - 10'	2254
	---	ZB	10' - 12'	---
S-2	A	A	0 - 2'	856
	B	B	2' - 5'	1510
	C	C	5' - 8'	1652
	ZA	D	8' - 10'	1948
	---	ZB	10' - 12'	---
S-3	A	A	0 - 2'	531
	B	B	2' - 5'	1066
	C	C	5' - 8'	1199
	ZA	D	8' - 10'	1434
	---	ZB	10' - 12'	---
S-4	A	A	0 - 2'	1555
	B	B	2' - 4'	2292
	ZA	C	4' - 6'	2994
	---	ZB	6' - 8'	---
S-5	A	A	0 - 2'	1665
	B	B	2' - 4'	2233
	ZA	C	4' - 6'	2634
	---	ZB	6' - 8'	---
S-6	A	A	0 - 2'	1661
	B	B	2' - 4'	1835
	ZA	C	4' - 6'	2196
	---	ZB	6' - 8'	---
S-7	A	A	0 - 2'	1277
	B	B	2' - 4'	1986
	ZA	C	4' - 6'	2949
	---	ZB	6' - 8'	---
S-8	A	A	0 - 2'	1149
	B	B	2' - 4'	1908
	ZA	C	4' - 6'	1827
	---	ZB	6' - 8'	---

*depth intervals were corrected in the field to insure that sample elevations were consistent within each DMMU

4. **SAMPLING**. Sampling took place on December 15-16, 2014, using a vibracore sampler. Sixteen cores were obtained per the approved SAP, with two cores taken from each section of the dredge prism. Material from the appropriate section of each of the two cores was composited for each DMMU. Minor deviations from the approved SAP included field core measurement errors that did not substantively affect the resulting samples (**Table 3**).

5. **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 (HartCrowser 2015). The data were considered sufficient and acceptable for regulatory decision-making under the DMMP program.

   Sediment conventional results (**Table 4**) show that the grain sizes represented in the proposed dredged material varied substantially throughout the dredge prism. Sand content ranged from 15% to 82%; at least some of the samples with higher sand fractions were likely due to post-dredge sand cover placements in 2011 and 2014. Total fine fractions (silt + clay) ranged from 18% to 85%. Total organic carbon was generally low, ranging from 0.15% to 0.7%.

   Chemical results indicated that there were no detected exceedances of DMMP standard chemicals of concern screening levels (**Tables 5-8**). Some semivolatile analytes were analyzed with selected ion monitoring (SIM) of Method 8270D to insure that DMMP reporting limit criteria were met. There were also nondetected exceedances of DMMP SLs due to elevated laboratory reporting limits for some pesticides (4,4'-DDT, dieldrin, trans-chlordane and trans-nonachlor) in sample S4-A, reportedly caused by matrix interferences (HartCrowser 2015). These analytes were also undetected at the laboratory detection limit, which is below the DMMP SLs, so no further action was warranted.

   TBT. Bulk TBT analysis was used for all samples, and detected and undetected results were compared with the DMMP bioaccumulation trigger of 73 µg/kg. All detected TBT results were below this threshold, with the highest reported concentration of 48 µg/kg in the surface DMMU of S2. The only surface DMMU without reported levels of bulk TBT was S1, on the southern end of the proposed dredge prism.

   Dioxins. Dioxins/furans were detected in all samples, mostly at very low levels (**Tables 9-16**). In each of the eight sampled sections, the surface DMMU Toxicity equivalents (TEQ, with U = ½ estimated detection limit) showed higher concentrations than did the subsurface DMMUs. Two surface DMMUs (S2-A and S4-A) showed dioxin concentrations between 4 and 10 pptr TEQ, which are accepted at non-dispersive sites if the volume-weighted average of the entire project is below the 4 pptr non-dispersive disposal site management objective. Volume-weighted averages for this project were calculated on both potential project options (**Table 17**): for Option A, VWA = 1.07 TEQ; for Option 2, VWA = 0.73. This analysis shows that all material for either option passes DMMP non-dispersive dioxin/furan guidelines.

7. **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, no sediment exposed by dredging—as represented by the Z-samples for both potential project designs—exceeds any DMMP SLs. Therefore, the sediment to be exposed by dredging is not considered to be degraded relative to the currently exposed sediment surface, and the DMMP agencies concluded that this project is in compliance with the State of Washington anti-degradation policy.

8. SUITABILITY DETERMINATION. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Port of Seattle Terminal 5 deepening project, for open-water disposal at the Elliott Bay non-dispersive disposal site. The approved sampling and analysis plan was generally 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 51,000 cy of proposed dredged material--for either Option A or Option B--is suitable for open-water disposal at the Elliott Bay non-dispersive disposal site.**

In-water beneficial use was not evaluated for this material, due to the fact that all dredged material was considered as part of the volume-weighted average for dioxin placement at the Elliott Bay disposal site. **As part of this suitability determination, all material suitable for open water disposal must be placed at the Elliott Bay site.** If changes in volume or proposed disposal locations for any of the material are considered, the DMMP must reevaluate this suitability based on updated project specifics.

This suitability determination does *not* constitute final agency approval of this 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 with DNR, Ecology 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. A DNR site use authorization must also be acquired.

9. REFERENCES

HartCrowser 2015. Dredged Material Characterization: Port of Seattle T-5 Berth Deepening. Report prepared for the Port of Seattle, March 24, 2015, #19094-01.

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 in the Dredged Material Management Office

9. <u>Agency Signatures</u>.

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Concur:

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

_____ _____
Date Erika Hoffman - Environmental Protection Agency

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

_____ _____
Date Celia Barton - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Olivia Romano, Seattle District Regulatory
Roger McGinnis, HartCrowser
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Table 3. Port of Seattle T5 Deepening - Proposed and Actual sampling locations (adapted from HartCrowser 2015)

	Proposed		Actual		Difference	Measured Mudline Elevation	Penetration	Recovery
Station	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**(ft)**	**(ft MLLW)**	**Depth (ft)**	**(%)**
S1-01	47 34.4634	-122 21.6698	47 34.4626	-122 21.6703	5	48.0	14	98
S1-02	47 34.4720	-122 21.6780	47 34.4726	-122 21.6777	4	48.0	14	96
S2-01	47 34.4948	-122 21.6768	47 34.4940	-122 21.6772	5	48.0	14	90
S2-02	47 34.5171	-122 21.6751	47 34.5173	-122 21.6745	3	47.5	14	88
S3-01	47 34.5360	-122 21.6782	47 34.5355	-122 21.6788	4	48.0	14	81
S3-02	47 34.5557	-122 21.6782	47 34.5557	-122 21.6780	1	47.0	14	84
S4-01	47 34.5948	-122 21.6781	47 34.5954	-122 21.6777	4	53.0	14	88
S4-02	47 34.6239	-122 21.6771	47 34.6244	-122 21.6778	4	52.0	14	84
S5-01	47 34.6648	-122 21.6778	47 34.6648	-122 21.6778	4	52.0	13	90
S5-02	47 34.6929	-122 21.6787	47 34.6939	-122 21.6781	7	52.0	14	86
S6-01	47 34.7561	-122 21.6791	47 34.7563	-122 21.6791	2	52.0	14	92
S6-02	47 34.7797	-122 21.6791	47 34.7801	-122 21.6797	3	52.0	14	95
S7-01	47 34.8238	-122 21.6773	47 34.8241	-122 21.6772	2	52.5	14	98
S7-02	47 34.8663	-122 21.6792	47 34.8658	-122 21.6794	3	52.0	14	89
S8-01	47 34.8923	-122 21.6806	47 34.8924	-122 21.6803	1	52.0	14	95
S8-02	47 34.9000	-122 21.6659	47 34.8998	-122 21.6654	3	53.0	14	98

Table 4. Port of Seattle T5 Deepening Conventional Results

SAMPLE ID	S1-A		S1-B		S1-C		S1-D/ZA		S1-ZB		S2-A		S2-B		S2-C		S2-D/ZA		S2-ZB		S3-A	
Depth Interval (ft)	0 to 2		2 to 5		5 to 8		8 to 10		10 to 12		0 to 2		2 to 5		5 to 8		8 to 10		10 to 12		0 to 2	
Preserved Total Solids	68.49		70.74		73.88		71.5		70.01		77.53		82.05		75.1		74.67		71.11		89	
Total Organic Carbon	0.371	J	0.359		0.318		0.28		0.199		0.697		0.185		0.267		0.465		0.301		0.415	
Total Solids	76.32		75.96		73.63		76.12		74.78		68.22		79.3		77.53		72.64		75.27		82.59	
Total Volatile Solids	1.75		2		2.1		1.77		1.75		4.43		1.38		1.7		2.23		2.12		2.05	
Ammonia	1.46		18.2		33		29.6		48.5		6.96		4.97		17.8		37.8		38.6		3.58	
Sulfide	20.7		244		445		478		32		148	J	1.13	U	17.5		117		104		1.11	U
Particle/Grain Size, Clay	9		11.6		12.9		13.9		18.5		18		6.7		8.6		16.7		12.8		9.1	
Particle/Grain Size, Gravel	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	1		0.1		0.1	U	0.1		0.1	U	0.5	
Particle/Grain Size, Sand	58.1		22.7		41.6		29.4		14.6		41.6		74.3		45.7		27.2		30.6		75.7	
Particle/Grain Size, Silt	32.6		65.7		45.5		56.3		66.9		39.3		19		45.7		56		56.6		14.6	
Total Fines (Silt + Clay)	41.6		77.3		58.4		70.2		85.4		57.3		25.7		54.3		72.7		69.4		23.7	

SAMPLE ID	S3-B		S3-C		S3-D/ZA		S3-ZB		S4-A		S4-B		S4-C/ZA		S4-ZB		S5-A		S5-B		S5-C/ZA		S5-ZB	
Depth Interval (ft)	2 to 5		5 to 8		8 to 10		10 to 12		0 to 2		2 to 4		4 to 6		6 to 8		0 to 2		2 to 4		4 to 6		6 to 8	
Preserved Total Solids	81.74		76.2		76.58		75.41		74.86		73.03		74.78		73.71		85.58		76.92		76.92		74.77	
Total Organic Carbon	0.152		0.378		0.539		0.253		0.424		0.177		0.293		0.155		0.237		0.204		0.181		0.192	
Total Solids	84.03		79.3		77		75.87		72		77.43		75.12		77.51		83.84		75.96		78.44		76.62	
Total Volatile Solids	1.25		1.65		3.29		1.65		2.42		1.75		2.37		1.42		1.51		1.41		1.41		1.82	
Ammonia	6.44		8.79		14.7		19.4		4.62		6.13		27.6		38		5.35		26.5		34.4		40.3	
Sulfide	1.22	U	3.6		15.6		5.86		75.6		33.7		7.14		72.5		3.18		21.1		59.5		39.8	
Particle/Grain Size, Clay	4.8		3		4.8		6.5		5.1		5.4		3.6		3		5.1		3.5		7.3		9.1	
Particle/Grain Size, Gravel	0.2		0.1	U	0.2		0.1	U	1.7		2.4		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Particle/Grain Size, Sand	80.4		68		75.8		57.9		70.4		63.6		62.9		84.8		75.1		44.4		72		30.5	
Particle/Grain Size, Silt	14.7		29.1		19.3		35.5		22.7		28.9		33.3		12.2		19.7		52.3		20.5		60.3	
Total Fines (Silt + Clay)	19.5		32.1		24.1		42.0		27.8		34.3		36.9		15.2		24.8		55.8		27.8		69.4	

SAMPLE ID	S6-A		S6-B		S6-C/ZA		S6-ZB		S7-A		S7-B		S7-C/ZA		S7-ZB		S8-A		S8-B		S8-C/ZA		S8-ZB	
Depth Interval (ft)	0 to 2		2 to 4		4 to 6		6 to 8		0 to 2		2 to 4		4 to 6		6 to 8		0 to 2		2 to 4		4 to 6		6 to 8	
Preserved Total Solids (%)	75.2		72.52		75.52		75.93		82.61		74.08		75.68		75.79		81.33		72.11		72.75		73.4	
Total Organic Carbon (%)	0.176		0.264		0.19		0.224		0.201		0.219		0.204		0.15		0.291		0.395		0.161		0.238	
Total Solids (%)	76.2		73.63		77.26		76.44		82.35		78.75		82.19		76.89		77.16		75.6		75.06		74.93	
Total Volatile Solids (%)	1.57		1.67		2.36		1.98		1.27		1.47		1.42		1.62		1.78		1.98		2.16		1.95	
Ammonia	15.1		38.4		33		32.4		7.3		22.1		29.9		42.9		21.1		40.3		63.6		64.7	
Sulfide	96.6		43.6		14.7		36.1		6.87		17		9.02		9.58		33.8		34.7		122		172	
Particle/Grain Size, Clay	4		5.2		4.5		4		0.2		4.3		6.4		4.8		7.8		11.6		14.5		12.7	
Particle/Grain Size, Gravel	0.1	U	0.1	U	0.1		0.1		0.2		0.1	U	0.1	U	0.1	U	0.1		0.1	U	0.1	U	0.1	U
Particle/Grain Size, Sand	80.3		66.6		81.6		69.7		16.2		77.2		70.9		70.1		57.4		30.1		36		38.1	
Particle/Grain Size, Silt	15.8		28.1		13.9		26.3		83.3		18.3		22.5		24.9		34.5		58.5		49.4		49	
Total Fines (Silt + Clay)	19.8		33.3		18.4		30.3		83.5		22.6		28.9		29.7		42.3		70.1		63.9		61.7	

Table 5. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S1 and S2)

CHEMICAL OF CONCERN			SAMPLE ID	S1-A		S1-B		S1-C		S1-D/ZA		S1-ZB		S2-A		S2-B		S2-C		S2-D/ZA		S2-ZB	
	Depth Interval in Feet			0 to2		2 to 5		5 to 8		8 to 10		10 to 12		0 to2		2 to 5		5 to 8		8 to 10		10 to 12	
	DMMP Guidelines																						
	SL	BT	ML																				
Metals (mg/kg dry wt.)																							
Antimony	150		200	6	UJ	7	UJ	7	UJ	6	UJ	6	UJ	7	UJ	6	UJ	6	UJ	7	UJ	7	UJ
Arsenic	57	507.1	700	**2.5**		**2.3**		**2.6**		**2.3**		**2.5**		**7.2**		**1.9**		**2.3**		**2.7**		**2.5**	
Cadmium	5.1	11.3	14	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	**0.3**		0.1	U	0.1	U	0.1	U	0.1	U
Chromium	260	260		**13.1**		**13.7**		**14.4**		**13.1**		**12.7**		**20.2**		**9**		**12**		**14**		**13**	
Copper	390	1027	1300	**16.3**		**16.9**		**20.5**		**18.3**		**20.3**		**55.7**		**11**		**16**		**20**		**20**	
Lead	450	975	1200	**3**		3	U	3	U	3	U	2	U	**54**	**J**	2	U	2	U	3	U	3	U
Mercury	0.41	1.5	2.3	0.03	U	**0.03**		0.03	U	0.03	U	0.03	U	**0.21**		0	U	0	U	**0.03**		0	U
Selenium		3		0.6	U	0.6	U	0.6	U	0.7	U	0.6	U	0.7	U	0.6	U	0.6	U	0.7	U	0.6	U
Silver	6.1	6.1	8.4	0.4	U	0.4	U	0.4	U	0.4	U	0.3	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Zinc	410	2783	3800	**28**	**J**	**28**	**J**	**32**	**J**	**28**	**J**	**28**	**J**	**88**		**22**		**25**		**29**		**29**	
Tributyltin Ion (ug/kg)		73		3.6	UJ	3.6	UJ	3.6	UJ	3.7	UJ	3.8	UJ	**48**	**J**	3.4	UJ	3.6	UJ	3.7	UJ	3.7	UJ
LPAHs (ug/kg dry wt.)																							
Naphthalene	2100		2400	**260**		**17**	**T**	19	U	19	U	**90**		**160**		19	U	20	U	19	U	19	U
Acenaphthene	500		2000	**33**		**17**	**T**	**6.6**	**T**	19	U	20	U	**77**		19	U	20	U	19	U	19	U
Acenaphthylene	560		1300	**11**	**T**	**5.6**	**T**	**4.7**	**T**	19	U	20	U	**39**		19	U	20	U	19	U	19	U
Fluorene	540		3600	**32**		**16**	**T**	19	U	19	U	**5.8**	**JT**	**68**	**J**	19	UJ	20	UJ	19	UJ	19	UJ
Phenanthrene	1500		21000	**52**		**50**		19	U	19	U	20	U	**290**		19	U	**14**	**T**	19	U	**91**	
Anthracene	960		13000	**16**	**JT**	**14**	**JT**	19	UJ	19	UJ	20	UJ	**110**	**J**	19	UJ	20	UJ	19	UJ	**12**	**JT**
2-Methylnaphthalene	670		1900	**47**		19	U	19	U	19	U	**12**	**T**	**44**		19	U	20	U	19	U	19	U
Total LPAHs	5200		29000	**404**	**J**	**119.6**	**J**	**11.3**	**J**	19	U	**95.8**	**J**	**744**	**J**	19	U	**14**	**J**	19	U	**103**	**J**
HPAHs (ug/kg dry wt.)																							
Fluoranthene	1700	4600	30000	**40**		**49**		19	U	19	U	**9.7**	**T**	**410**		19	U	**8**	**T**	19	U	**150**	
Pyrene	2600	11980	16000	**81**		**45**		**9.4**	**T**	19	U	**13**	**T**	**620**		**12**	**T**	**10**	**T**	19	U	**100**	
Benzo(a)anthracene	1300		5100	**14**	**T**	**12**	**T**	19	U	19	U	20	U	**200**		19	U	20	U	19	U	**29**	
Chrysene	1400		21000	**30**		**19**		**9.4**	**T**	19	U	20	U	**340**		19	U	20	U	19	U	**48**	
Total Benzofluoranthenes	3200		9900	**52**		**22**	**T**	**13**	**T**	**11**	**T**	**15**	**T**	**630**		**12**	**T**	40	U	39	U	**48**	
Benzo(a)pyrene	1600		3600	**24**	**J**	**12**	**JT**	19	UJ	19	UJ	20	UJ	**250**	**J**	19	UJ	20	UJ	19	UJ	**15**	**JT**
Indeno(1,2,3-cd)pyrene	600		4400	**25**		**10**	**T**	19	U	19	U	20	U	**150**		19	U	20	U	19	U	19	U
Dibenz(a,h)anthracene (SIM)	230		1900	**11**		**6.9**		**5.7**		**4.9**		**3.4**	**T**	**58**	**J**	**2.8**	**JT**	5	UJ	4.8	UJ	**3.2**	**JT**
Benzo(g,h,i)perylene	670		3200	**21**		**28**		19	U	19	U	20	U	**120**		19	U	20	U	19	U	19	U
Total HPAHs	12000		69000	**298**	**J**	**197**	**J**	**31.8**	**J**	**11**	**J**	**37.7**	**J**	**2779**	**J**	**24**	**J**	**18**	**J**	39	U	**390**	**J**
Phenols (ug/kg dry wt.)																							
Phenol	420		1200	**14**	**T**	**16**	**T**	**12**	**T**	19	U	20	U	**51**		19	U	20	U	**12**	**T**	19	U
2-Methylphenol (SIM)	63		77	**2.6**	**T**	**3.3**	**T**	**3.1**	**T**	4.8	U	4.9	U	19	U	19	U	20	U	19	U	19	U
4-Methylphenol	670		3600	20	U	19	U	19	U	19	U	20	U	**23**		19	U	20	U	19	U	19	U
2,4-Dimethylphenol (SIM)	29		210	**10**	**JT**	**11**	**JT**	**11**	**JT**	24	UJ	24	UJ	96	UJ	94	UJ	100	UJ	97	UJ	96	UJ
Pentachlorophenol (SIM)	400	504	690	20	U	**10**	**T**	19	U	19	U	20	U	**15**	**T**	19	U	20	U	19	U	19	U
Chlorinated Hydrocarbons (ug/kg wt.)																							
1,2-Dichlorobenzene (SIM)	35		110	**3.8**	**JT**	**3.6**	**JT**	**3.3**	**JT**	4.8	UJ	4.9	UJ	**3.1**	**T**	4.7	U	5	U	4.8	U	4.8	U
1,4-Dichlorobenzene (SIM)	110		120	**4.6**	**JT**	**3.4**	**JT**	**3.2**	**JT**	4.8	UJ	4.9	UJ	**7.8**	**J**	4.7	UJ	5	UJ	4.8	UJ	4.8	UJ
1,2,4-Trichlorobenzene (SIM)	31		64	**2.6**	**T**	**4.9**		**4.4**	**T**	4.8	U	4.9	U	**2.4**	**JT**	4.7	UJ	5	UJ	4.8	UJ	4.8	UJ
Hexachlorobenzene (SIM)	22	168	230	**2.8**	**T**	**4.7**		**3.4**	**T**	4.8	U	4.9	U	**4.8**	**JT**	4.7	U	**2.8**	**T**	4.8	U	4.8	U

Table 5. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S1 and S2)

CHEMICAL OF CONCERN	SAMPLE ID			S1-A		S1-B		S1-C		S1-D/ZA		S1-ZB		S2-A		S2-B		S2-C		S2-D/ZA		S2-ZB	
	Depth Interval in Feet			0 to2		2 to 5		5 to 8		8 to 10		10 to 12		0 to2		2 to 5		5 to 8		8 to 10		10 to 12	
	DMMP Guidelines																						
	SL	BT	ML																				
Phthalates (ug/kg dry wt.)																							
bis(2-Ethylhexyl)phthalate	1300		8300	**44**	**T**	47	U	47	U	48	U	49	U	**170**		47	U	**51**		48	U	48	U
Butylbenzylphthalate (SIM)	63		970	**14**		**8.7**		**8.1**		**5.8**		**4.6**	**T**	19	U	19	U	20	U	19	U	19	U
Diethylphthalate	200		1200	**24**	**17**	**T**	19	U	**46**	**24**				**23**		19	U	20	U	19	U	19	U
Dimethylphthalate (SIM)	71		1400	**2.5**	**T**	**4**	**T**	**3.6**	**T**	4.8	U	4.9	U	19	U	19	U	20	U	19	U	19	U
Di-n-Butylphthalate	1400		5100	20	U	19	U	19	U	19	U	20	U	19	U	19	U	20	U	19	U	**12**	**T**
Di-n-Octyl phthalate	6200		6200	**9.9**	**T**	19	U	19	U	19	U	20	U	19	U	19	U	20	U	19	U	19	U
Misc. extractables (ug/kg dry wt.)																							
Benzyl Alcohol (SIM)	57		870	20	U	19	U	19	U	19	U	20	U	**37**		19	U	20	U	19	U	19	U
Benzoic Acid	650		760	200	U	190	U	190	U	190	U	200	U	**210**		190	U	200	U	190	U	190	U
Dibenzofuran	540		1700	**32**		**13**	**T**	19	U	19	U	20	U	**73**		19	U	20	U	19	U	19	U
Hexachlorobutadiene (SIM)	11		270	**9.2**	**J**	**6.4**	**J**	**5.9**	**J**	**4**	**JT**	**3.3**	**JT**	**3.7**	**JT**	4.7	UJ	5	UJ	4.8	UJ	4.8	UJ
N-Nitrosodiphenylamine (SIM)	28		130	**9.5**		**5.2**		**4.3**	**T**	**3**	**T**	4.9	U	4.8	U	4.7	U	5	U	4.8	U	4.8	U
Pesticide/PCBs (ug/kg)																							
Total PCB Aroclors	130		3100	3.9	U	4	U	3.9	U	3.9	U	3.9	U	**97**		3.9	U	3.9	U	3.9	U	4	U
4,4'-DDD	16			0.95	UJ	0.96	UJ	0.97	UJ	0.98	UJ	0.95	UJ	0.95	UJ	1	UJ	1	UJ	0.9	UJ	1	UJ
4,4'-DDE	9			0.95	UJ	0.96	UJ	0.97	UJ	0.98	UJ	0.95	UJ	0.95	UJ	1	UJ	1	UJ	0.9	UJ	1	UJ
4,4'-DDT	12			0.95	UJ	0.96	U	0.97	U	0.98	U	0.95	U	3.3	U	1	U	1	U	0.9	U	1	U
Total DDD, DDE, DDT		50	69	0.95	UJ	0.96	UJ	0.97	UJ	0.98	UJ	0.95	UJ	0.95	UJ	1	UJ	1	UJ	0.9	UJ	1	UJ
Aldrin	9.5			0.48	U	0.48	U	1.1	U	1	U	0.47	U	0.81	U	0.5	U	0.5	U	0.5	U	0.5	U
Total Chlordanes	2.8	37		0.95	UJ	0.96	UJ	0.97	UJ	0.98	UJ	0.95	UJ	0.95	U	1	U	1	U	0.9	U	1	U
Dieldrin	1.9		1700	0.95	UJ	0.96	UJ	0.97	UJ	0.98	UJ	0.95	UJ	0.95	UJ	1	UJ	1	UJ	0.9	UJ	1	UJ
Heptachlor	1.5		270	0.48	UJ	0.48	UJ	0.48	UJ	0.49	UJ	0.47	UJ	0.48	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ

Table 6. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S3 and S4)

CHEMICAL OF CONCERN	SAMPLE ID			S3-A		S3-B		S3-C		S3-D/ZA		S3-ZB		S4-A		S4-B		S4-C/ZA		S4-ZB	
	Depth Interval in Feet			0 to 2		2 to 5		5 to 8		8 to 10		10 to 12		0 to2		2 to 4		4 to 6		6 to 8	
	DMMP Guidelines																				
	SL	BT	ML																		
Metals (mg/kg dry wt.)																					
Antimony	150		200	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ
Arsenic	57	507.1	700	**4.4**		**1.9**		**1.9**		**1.9**		**2.2**		**4.4**		**2.6**		**2.6**		**1.9**	
Cadmium	5.1	11.3	14	**0.1**		0.1	U	0.1	U	0.1	U	0.1	U	**0.2**		0.1	U	0.1	U	0.1	U
Chromium	260	260		**15.2**		**8.4**		**10**		**9.6**		**11**		**16.5**		**12**		**12**		**9.8**	
Copper	390	1027	1300	**33.1**		**11**		**13**		**11**		**13**		**42.4**		**20**		**21**		**12**	
Lead	450	975	1200	**17**		2	U	2	U	2	U	3	U	**20**		**6**		3	U	2	U
Mercury	0.41	1.5	2.3	**0.07**		0	U	0	U	0	U	0	U	**0.14**	**J**	**0**	**J**	**0**	**J**	0	U
Selenium		3		0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.7	U	0.6	U
Silver	6.1	6.1	8.4	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Zinc	410	2783	3800	**55**		**24**		**27**		**23**		**24**		**57**		**33**		**30**		**22**	
Tributyltin Ion (ug/kg)		73		**43**	**J**	**3.2**	**JT**	3.5	UJ	3.5	UJ	3.6	UJ	**43**	**J**	**5**	**J**	3.2	UJ	3.2	UJ

Table 6. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S3 and S4)

CHEMICAL OF CONCERN	SAMPLE ID			S3-A		S3-B		S3-C		S3-D/ZA		S3-ZB		S4-A		S4-B		S4-C/ZA		S4-ZB	
	Depth Interval in Feet			0 to 2		2 to 5		5 to 8		8 to 10		10 to 12		0 to2		2 to 4		4 to 6		6 to 8	
	DMMP Guidelines																				
	SL	BT	ML																		
LPAHs (ug/kg dry wt.)																					
Naphthalene	2100		2400	**56**		**14**	T	20	U	20	U	20	U	**82**		**76**		**17**	T	20	U
Acenaphthene	500		2000	**22**		20	U	20	U	20	U	20	U	**34**		**28**		18	U	20	U
Acenaphthylene	560		1300	**15**	T	20	U	20	U	20	U	20	U	**29**		19	U	18	U	20	U
Fluorene	540		3600	**25**	J	20	UJ	20	UJ	20	UJ	20	UJ	**48**		**27**		18	U	20	U
Phenanthrene	1500		21000	**87**		**19**	T	20	U	20	U	20	U	**200**		**53**		**12**	T	20	U
Anthracene	960		13000	**47**	J	20	UJ	20	UJ	20	UJ	20	UJ	**120**		**18**	T	18	U	20	U
2-Methylnaphthalene	670		1900	**18**	T	20	U	20	U	20	U	20	U	**34**		**23**		18	U	20	U
Total LPAHs	5200		29000	**252**	J	**33**		20	U	20	U	20	U	**513**		**202**	J	**29**	J	20	U
HPAHs (ug/kg dry wt.)																					
Fluoranthene	1700	4600	30000	**140**		**17**	T	20	U	20	U	20	U	**230**		**57**		**11**	T	20	U
Pyrene	2600	11980	16000	**250**		**53**		20	U	20	U	20	U	**390**		**160**		**16**	T	20	U
Benzo(a)anthracene	1300		5100	**92**		20	U	20	U	20	U	20	U	**120**		**18**	T	18	U	20	U
Chrysene	1400		21000	**220**		20	U	20	U	20	U	20	U	**260**		**28**		**11**	T	20	U
Total Benzofluoranthenes	3200		9900	**300**		**27**	T	39	U	39	U	39	U	**380**		**79**		**15**	T	40	U
Benzo(a)pyrene	1600		3600	**120**	J	20	UJ	20	UJ	20	UJ	20	UJ	**160**		**36**		18	U	20	U
Indeno(1,2,3-cd)pyrene	600		4400	**70**		20	U	20	U	20	U	20	U	**110**		**23**		18	U	20	U
Dibenz(a,h)anthracene (SIM)	230		1900	**25**	J	5	UJ	4.9	UJ	4.9	UJ	4.9	UJ	**34**		**9.8**		**2.9**	T	5	U
Benzo(g,h,i)perylene	670		3200	**58**		20	U	20	U	20	U	20	U	**84**		**25**		18	U	20	U
Total HPAHs	12000		69000	**1274**	J	**97**	J	39	U	39	U	39	U	**1770**		**426**	J	**53**	J	40	U
Phenols (ug/kg dry wt.)																					
Phenol	420		1200	18	U	20	U	20	U	20	U	20	U	**24**	J	**16**	JT	**11**	JT	20	UJ
2-Methylphenol (SIM)	63		77	4.6	U	5	U	4.9	U	4.9	U	4.9	U	5.1	U	4.7	U	4.6	U	5	U
4-Methylphenol	670		3600	18	U	20	U	20	U	20	U	20	U	**21**		19	U	18	U	20	U
2,4-Dimethylphenol (SIM)	29		210	4.6	U	5	U	4.9	U	4.9	U	4.9	U	**14**	T	**11**	T	23	U	25	U
Pentachlorophenol (SIM)	400	504	690	18	U	20	U	20	U	20	U	20	U	16	JT	19	UJ	18	UJ	20	UJ
Chlorinated Hydrocarbons (ug/kg wt.)																					
1,2-Dichlorobenzene (SIM)	35		110	4.6	U	5	U	4.9	U	4.9	U	4.9	U	4.8	U	4.7	U	4.6	U	5	U
1,4-Dichlorobenzene (SIM)	110		120	4.6	UJ	5	UJ	4.9	UJ	4.9	UJ	4.9	UJ	**6.1**		**3.1**	T	4.6	U	5	U
1,2,4-Trichlorobenzene (SIM)	31		64	4.6	UJ	5	UJ	4.9	UJ	4.9	UJ	4.9	UJ	4.8	U	4.7	U	4.6	U	5	U
Hexachlorobenzene (SIM)	22	168	230	4.6	U	5	U	4.9	U	4.9	U	4.9	U	4.8	U	4.7	U	4.6	U	5	U
Phthalates (ug/kg dry wt.)																					
bis(2-Ethylhexyl)phthalate	1300		8300	**110**		50	U	49	U	49	U	49	U	110	U	47	U	46	U	50	U
Butylbenzylphthalate (SIM)	63		970	**8.1**		5	U	4.9	U	4.9	U	4.9	U	**13**		**10**		**7.6**		**5.6**	
Diethylphthalate	200		1200	18	U	20	U	20	U	20	U	20	U	19	UJ	19	UJ	18	UJ	20	UJ
Dimethylphthalate (SIM)	71		1400	4.6	UJ	5	UJ	4.9	UJ	4.9	UJ	4.9	UJ	4.8	U	4.7	U	4.6	U	5	U
Di-n-Butylphthalate	1400		5100	**7.4**	T	20	U	20	U	20	U	20	U	19	U	19	U	18	U	20	U
Di-n-Octyl phthalate	6200		6200	18	U	20	U	20	U	20	U	20	U	19	U	19	U	18	U	20	U
Misc. extractables (ug/kg dry wt.)																					
Benzyl Alcohol (SIM)	57		870	18	U	20	U	20	U	20	U	20	U	19	U	19	U	18	U	20	U
Benzoic Acid	650		760	180	U	200	U	200	U	200	U	200	U	**110**	T	190	U	180	U	200	U

Table 6. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S3 and S4)

CHEMICAL OF CONCERN	SAMPLE ID			S3-A		S3-B		S3-C		S3-D/ZA		S3-ZB		S4-A		S4-B		S4-C/ZA		S4-ZB	
	Depth Interval in Feet			0 to 2		2 to 5		5 to 8		8 to 10		10 to 12		0 to2		2 to 4		4 to 6		6 to 8	
	DMMP Guidelines																				
	SL	BT	ML																		
Dibenzofuran	540		1700	**21**		20	U	20	U	20	U	20	U	**36**		**26**		18	U	20	U
Hexachlorobutadiene (SIM)	11		270	4.6	UJ	5	UJ	4.9	UJ	4.9	UJ	4.9	UJ	**10**	**J**	**9.3**	**J**	7.3	J	**4.8**	**JT**
N-Nitrosodiphenylamine (SIM)	28		130	4.6	U	5	U	4.9	U	4.9	U	4.9	U	4.8	U	**3.7**	**T**	**2.8**	**T**	**2.9**	**T**
Pesticide/PCBs (ug/kg)																					
Total PCB Aroclors	130		3100	**72**		**5.6**		4	U	4	U	3.9	U	**108**		**45**		3.7	U	3.6	U
4,4'-DDD	16			0.94	UJ	1	UJ	1	UJ	1	UJ	0.9	UJ	0.99	UJ	1	UJ	1	UJ	1	UJ
4,4'-DDE	9			0.94	UJ	1	UJ	1	UJ	1	UJ	0.9	UJ	3.3	U	1	U	1	U	1	U
4,4'-DDT	12			2.4	U	1	U	1	U	1	U	0.9	U	*31*	*U*	2.4	U	1	U	1	U
Total DDD, DDE, DDT		50	69	2.4	U	1	U	1	U	1	U	0.9	U	0.99	UJ	1	UJ	1	UJ	1	UJ
Aldrin	9.5			0.47	U	0.5	U	0.5	U	0.5	U	0.5	U	1.5	U	0.5	U	0.5	U	0.5	U
Total Chlordanes	2.8	37		0.94	U	1	U	1	U	1	U	0.9	U	*6.9*	*U*	1	U	1	U	1	U
Dieldrin	1.9		1700	0.94	UJ	1	UJ	1	UJ	1	UJ	0.9	UJ	*9.7*	*U*	1	U	1	U	1	U
Heptachlor	1.5		270	0.47	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.49	UJ	0.5	UJ	0.5	UJ	0.5	UJ

Table 7. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S5 and S6)

CHEMICAL OF CONCERN	SAMPLE ID			S5-A		S5-B		S5-C/ZA		S5-ZB		S6-A		S6-B		S6-C/ZA		S6-ZB	
	Depth Interval in Feet			0 to 2		2 to 4		4 to 6		6 to 8		0 to 2		2 to 4		4 to 6		6 to 8	
	DMMP Guidelines																		
	SL	BT	ML																
Metals (mg/kg dry wt.)																			
Antimony	150		200	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ	7	UJ	6	UJ	6	UJ
Arsenic	57	507.1	700	**2.9**		**1.8**		**1.9**		**2.4**		**2.7**		**2.6**		**3.7**		**5**	
Cadmium	5.1	11.3	14	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Chromium	260	260		**12.2**		**9.9**		**10.6**		**12.3**		**11.1**		**10**		**9.8**		**9.9**	
Copper	390	1027	1300	**25.1**		**15.6**		**14.6**		**18.1**		**17**		**15**		**15**		**15**	
Lead	450	975	1200	**9**		2	U	2	U	2	U	**4**		3	U	2	U	3	U
Mercury	0.41	1.5	2.3	**0.06**	**J**	0	U	0	U	**0**	**J**	**0.06**	**J**	**0.2**	**J**	**0**	**J**	0	U
Selenium		3		0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.7	U	0.6	U	0.6	U
Silver	6.1	6.1	8.4	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Zinc	410	2783	3800	**39**		**23**		**23**		**25**		**29**		**24**		**24**		**24**	
Tributyltin Ion (ug/kg)		73		**13**	**J**	3.3	UJ	3.1	UJ	3.3	UJ	**40**	**J**	3.2	UJ	3.4	UJ	3.4	UJ
LPAHs (ug/kg dry wt.)																			
Naphthalene	2100		2400	**22**		19	U	19	U	20	U	**160**		19	U	18	U	20	U
Acenaphthene	500		2000	**14**	**T**	19	U	19	U	20	U	**66**		19	U	18	U	20	U
Acenaphthylene	560		1300	19	U	19	U	19	U	20	U	**22**		19	U	18	U	20	U
Fluorene	540		3600	**17**	**T**	19	U	19	U	20	U	**60**		19	U	18	U	20	U
Phenanthrene	1500		21000	**57**		**33**		19	U	20	U	**170**		19	U	18	U	20	U
Anthracene	960		13000	**18**	**J**	19	U	19	U	20	U	**60**		19	U	18	U	20	U
2-Methylnaphthalene	670		1900	19	U	19	U	19	U	20	U	**46**		19	U	18	U	20	U
Total LPAHs	5200		29000	**128**	**J**	**33**		19	U	20	U	**538**		19	U	18	U	20	U
HPAHs (ug/kg dry wt.)																			
Fluoranthene	1700	4600	30000	**97**		**36**		19	U	20	U	**340**		**10**	**T**	18	U	20	U

Table 7. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S5 and S6)

CHEMICAL OF CONCERN	SAMPLE ID			S5-A		S5-B		S5-C/ZA		S5-ZB		S6-A		S6-B		S6-C/ZA		S6-ZB	
	Depth Interval in Feet			0 to 2		2 to 4		4 to 6		6 to 8		0 to 2		2 to 4		4 to 6		6 to 8	
	DMMP Guidelines																		
	SL	BT	ML																
Pyrene	2600	11980	16000	**210**		**28**		19	U	20	U	**530**		**15**	**T**	18	U	20	U
Benzo(a)anthracene	1300		5100	**34**		19	U	19	U	20	U	**94**		19	U	18	U	20	U
Chrysene	1400		21000	**60**		**12**	**T**	19	U	20	U	**120**		19	U	18	U	20	U
Total Benzofluoranthenes	3200		9900	**120**		**17**	**T**	38	U	40	U	**280**		37	U	37	U	40	U
Benzo(a)pyrene	1600		3600	**58**		19	U	19	U	20	U	**140**		19	U	18	U	20	U
Indeno(1,2,3-cd)pyrene	600		4400	**29**		19	U	19	U	20	U	**86**		19	U	18	U	20	U
Dibenz(a,h)anthracene (SIM)	230		1900	**14**		4.8	U	4.8	U	5	U	**27**		4.7	U	4.6	U	5	U
Benzo(g,h,i)perylene	670		3200	**25**		19	U	19	U	20	U	**76**		**10**	**T**	18	U	20	U
Total HPAHs	12000		69000	**646**	**J**	**93**	**J**	38	U	40	U	**1698**		**35**	**J**	37	U	40	U
Phenols (ug/kg dry wt.)																			
Phenol	420		1200	**9.4**	**JT**	19	UJ	19	UJ	20	UJ	**17**	**JT**	**10**	**JB**	**15**	**JB**	20	UJ
2-Methylphenol (SIM)	63		77	4.7	U	4.8	U	4.8	U	5	U	6.1	U	4.7	U	4.6	U	5	U
4-Methylphenol	670		3600	19	U	19	U	19	U	20	U	**14**	**T**	19	U	18	U	20	U
2,4-Dimethylphenol (SIM)	29		210	24	U	24	U	24	U	25	U	23	U	23	U	23	U	25	U
Pentachlorophenol (SIM)	400	504	690	19	UJ	19	UJ	19	UJ	20	UJ	19	UJ	19	UJ	18	UJ	20	UJ
Chlorinated Hydrocarbons (ug/kg wt.)																			
1,2-Dichlorobenzene (SIM)	35		110	4.7	U	4.8	U	4.8	U	5	U	**2.8**	**T**	4.7	U	4.6	U	5	U
1,4-Dichlorobenzene (SIM)	110		120	4.7	U	4.8	U	4.8	U	5	U	4.6	U	4.7	U	4.6	U	5	U
1,2,4-Trichlorobenzene (SIM)	31		64	4.7	U	4.8	U	4.8	U	5	U	4.6	U	4.7	U	4.6	U	5	U
Hexachlorobenzene (SIM)	22	168	230	4.7	U	4.8	U	4.8	U	5	U	4.6	U	4.7	U	4.6	U	5	U
Phthalates (ug/kg dry wt.)																			
bis(2-Ethylhexyl)phthalate	1300		8300	47	U	48	U	48	U	50	U	46	U	47	U	46	U	50	U
Butylbenzylphthalate (SIM)	63		970	**18**		4.8	U	**2.8**	**T**	**4.6**	**T**	**5.8**	**4**	**T**	**3**	**T**	5	U	
Diethylphthalate	200		1200	19	UJ	19	UJ	19	UJ	20	UJ	19	UJ	19	UJ	18	UJ	20	UJ
Dimethylphthalate (SIM)	71		1400	4.7	U	4.8	U	4.8	U	5	U	4.6	U	4.7	U	4.6	U	5	U
Di-n-Butylphthalate	1400		5100	19	U	19	U	19	U	20	U	19	U	19	U	18	U	20	U
Di-n-Octyl phthalate	6200		6200	19	U	19	U	19	U	20	U	19	U	19	U	18	U	20	U
Misc. extractables (ug/kg dry wt.)																			
Benzyl Alcohol (SIM)	57		870	19	U	19	U	19	U	20	U	19	U	19	U	18	U	20	U
Benzoic Acid	650		760	190	U	190	U	190	U	200	U	190	U	190	U	180	U	200	U
Dibenzofuran	540		1700	**13**	**T**	19	U	19	U	20	U	**60**		19	U	18	U	20	U
Hexachlorobutadiene (SIM)	11		270	**3.5**	**JT**	4.8	UJ	**2.5**	**JT**	**3.7**	**JT**	**3**	**JT**	**3.1**	**JT**	**1.8**	**JT**	5	UJ
N-Nitrosodiphenylamine (SIM)	28		130	4.7	U	4.8	U	4.8	U	5	U	**2.3**	**T**	4.7	U	4.6	U	5	U
Pesticide/PCBs (ug/kg)																			
Total PCB Aroclors	130		3100	**40.4**		3.7	U	3.7	U	3.6	U	**30.6**		3.8	U	3.7	U	3.8	U
4,4'-DDD	16			0.96	UJ	1	UJ	1	UJ	1	UJ	0.96	UJ	1	UJ	1	UJ	1	UJ
4,4'-DDE	9			0.96	U	1	U	1	U	1	U	0.96	U	1	U	1	U	1	U
4,4'-DDT	12			1.8	U	1	U	1	UJ	1	U	2.4	U	1	U	1	U	1	U
Total DDD, DDE, DDT		50	69	0.96	UJ	1	UJ	1	UJ	1	UJ	2.4	U	1	U	1	U	1	U
Aldrin	9.5			0.48	U	0.5	U	0.5	U	0.5	U	0.48	U	0.5	U	0.5	U	0.5	U
Total Chlordanes	2.8	37		0.96	U	1	U	1	U	1	U	0.96	U	1	U	1	U	1	U
Dieldrin	1.9		1700	0.96	U	1	U	1	U	1	U	0.96	U	1	U	1	U	1	U
Heptachlor	1.5		270	0.48	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.48	UJ	0.5	UJ	0.5	UJ	0.5	UJ

Table 8. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S7 and S8)

CHEMICAL OF CONCERN	SAMPLE ID			S7-A		S7-B		S7-C/ZA		S7-ZB		S8-A		S8-B		S8-C/ZA		S8-ZB	
	Depth interval in feet			0 to 2		2 to 4		4 to 6		6 to 8		0 to 2		2 to 4		4 to 6		6 to 8	
	DMMP GUIDELINES																		
	SL	BT	ML																
Metals (mg/kg dry wt.)																			
Antimony	150		200	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ	6	UJ
Arsenic	57	507.1	700	**2.7**		**2.8**		**2.3**		**2.5**		**2.7**		**3.4**		**3.1**		**2.7**	
Cadmium	5.1	11.3	14	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Chromium	260	260		**12.2**		**10**		**9.8**		**10**		**11.8**		**12**		**12**		**11**	
Copper	390	1027	1300	**17.3**		**17**		**13**		**13**		**19.1**		**20**		**21**		**18**	
Lead	450	975	1200	**2**		2	U	2	U	3	U	2	U	3	U	3	U	2	U
Mercury	0.41	1.5	2.3	0.03	J	0	U	0	U	0	U	**0.04**	**J**	**0.1**	**J**	**0**	**J**	0	U
Selenium		3		0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.7	U	0.6	U	0.6	U
Silver	6.1	6.1	8.4	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Zinc	410	2783	3800	**28**		**25**		**23**		**23**		**30**		**29**		**30**		**27**	
Tributyltin Ion (ug/kg)		73		**4.7**	**J**	3.4	UJ	3.2	UJ	3.2	UJ	**3.1**	**JT**	3.4	UJ	3.4	UJ	3.3	UJ
LPAHs (ug/kg dry wt.)																			
Naphthalene	2100		2400	**11**	**T**	**11**	**T**	**31**		20	U	**20**		19	U	**80**		19	U
Acenaphthene	500		2000	19	U	**32**		**27**		20	U	20	U	19	U	19	U	19	U
Acenaphthylene	560		1300	19	U	20	U	19	U	20	U	20	U	19	U	19	U	19	U
Fluorene	540		3600	19	U	**46**		**17**	**T**	20	U	20	U	19	U	19	U	19	U
Phenanthrene	1500		21000	**13**	**T**	**330**		**93**		20	U	**22**		**10**	**T**	**17**	**T**	**13**	**T**
Anthracene	960		13000	19	U	**83**		**21**		20	U	20	U	19	U	19	U	19	U
2-Methylnaphthalene	670		1900	19	U	20	U	**11**	**T**	20	U	20	U	19	UJ	**16**	**T**	19	U
Total LPAHs	5200		29000	**24**	**J**	**502**	**J**	**189**	**J**	20	U	**42**		**10**	**J**	**97**	**J**	**13**	**J**
HPAHs (ug/kg dry wt.)																			
Fluoranthene	1700	4600	30000	**19**		**250**		**82**		20	U	**20**		19	U	19	U	**15**	**T**
Pyrene	2600	11980	16000	**27**		**190**		**100**		20	U	**32**		19	U	19	U	**12**	**T**
Benzo(a)anthracene	1300		5100	19	U	**55**		**18**	**T**	20	U	20	U	19	U	19	U	19	U
Chrysene	1400		21000	**10**	**T**	**63**		**24**		20	U	**11**	**J**	19	U	19	U	19	U
Total Benzofluoranthenes	3200		9900	**24**	**T**	**37**	**T**	**29**	**T**	40	U	**19**	**T**	38	U	38	U	37	U
Benzo(a)pyrene	1600		3600	19	U	**17**	**T**	19	U	20	U	20	U	19	U	19	U	19	U
Indeno(1,2,3-cd)pyrene	600		4400	19	U	20	U	19	U	20	U	20	U	19	U	19	U	19	U
Dibenz(a,h)anthracene (SIM)	230		1900	**3**	**T**	**3**	**T**	4.7	U	5	U	4.9	U	**3.2**	**T**	4.7	U	**2.5**	**T**
Benzo(g,h,i)perylene	670		3200	19	U	20	U	19	U	20	U	20	U	19	U	19	U	19	U
Total HPAHs	12000		69000	**80**	**J**	**612**	**J**	**253**	**J**	40	U	**82**	**J**	38	U	38	U	**27**	**J**
Phenols (ug/kg dry wt.)																			
Phenol	420		1200	19	U	20	U	19	U	20	U	**13**	**T**	**10**	**T**	**15**	**T**	**12**	**T**
2-Methylphenol (SIM)	63		77	4.7	U	4.9	U	4.7	U	5	U	4.9	U	**4.8**	**T**	4.7	U	4.7	U
4-Methylphenol	670		3600	19	U	20	U	19	U	20	U	20	U	19	U	19	U	19	U
2,4-Dimethylphenol (SIM)	29		210	23	U	24	U	24	U	25	U	24	U	24	U	24	U	23	U
Pentachlorophenol (SIM)	400	504	690	19	UJ	20	UJ	19	UJ	20	UJ	20	UJ	19	UJ	19	UJ	19	UJ
Chlorinated Hydrocarbons (ug/kg wt.)																			
1,2-Dichlorobenzene (SIM)	35		110	4.7	U	4.9	U	4.7	U	5	U	4.9	U	**2.7**	**T**	4.7	U	4.7	U
1,4-Dichlorobenzene (SIM)	110		120	4.7	U	4.9	U	4.7	U	5	U	4.9	U	**2.8**	**T**	4.7	U	4.7	U
1,2,4-Trichlorobenzene (SIM)	31		64	4.7	U	4.9	U	4.7	U	5	U	4.9	U	**2.8**	**T**	4.7	U	4.7	U

Table 8. Port of Seattle T5 Deepening: Chemical Results Compared to DMMP Guidelines (S7 and S8)

CHEMICAL OF CONCERN	SAMPLE ID			S7-A		S7-B		S7-C/ZA		S7-ZB		S8-A		S8-B		S8-C/ZA		S8-ZB	
	Depth interval in feet			0 to 2		2 to 4		4 to 6		6 to 8		0 to 2		2 to 4		4 to 6		6 to 8	
	DMMP GUIDELINES																		
	SL	BT	ML																
Hexachlorobenzene (SIM)	22	168	230	4.7	U	4.9	U	4.7	U	5	U	4.9	U	**3.7**	**T**	4.7	U	4.7	U
Phthalates (ug/kg dry wt.)																			
bis(2-Ethylhexyl)phthalate	1300		8300	47	U	49	U	47	U	50	U	49	U	48	U	47	U	47	U
Butylbenzylphthalate (SIM)	63		970	4.7	U	4.9	U	4.7	U	5	U	4.9	U	**2.9**	**T**	**2.8**	**T**	**2.8**	**T**
Diethylphthalate	200		1200	19	UJ	20	UJ	19	UJ	33	J	20	UJ	19	UJ	19	UJ	19	UJ
Dimethylphthalate (SIM)	71		1400	4.7	U	4.9	U	4.7	U	5	U	4.9	U	**1.4**	**T**	4.7	U	4.7	U
Di-n-Butylphthalate	1400		5100	19	U	20	U	19	U	20	U	20	U	19	U	19	U	19	U
Di-n-Octyl phthalate	6200		6200	19	U	20	U	19	U	20	U	20	U	19	U	19	U	19	U
Misc. extractables (ug/kg dry wt.)																			
Benzyl Alcohol (SIM)	57		870	19	U	20	U	19	U	20	U	20	U	19	U	19	U	19	U
Benzoic Acid	650		760	190	U	200	U	190	U	200	U	200	U	190	U	**66**	**T**	190	U
Dibenzofuran	540		1700	19	U	**23**		**16**	**T**	20	U	20	U	19	U	19	U	19	U
Hexachlorobutadiene (SIM)	11		270	4.7	UJ	4.9	UJ	4.7	UJ	5	UJ	4.9	UJ	**3.2**	**JT**	**2.2**	**JT**	4.7	UJ
N-Nitrosodiphenylamine (SIM)	28		130	4.7	U	4.9	U	4.7	U	5	U	4.9	U	4.8	U	4.7	U	4.7	U
Pesticide/PCBs (ug/kg)																			
Total PCB Aroclors	130		3100	**7**	**JP**	**9.1**	**J**	3.7	U	3.7	U	**6.1**	**J**	3.8	U	3.8	U	3.8	U
4,4'-DDD	16			0.95	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ
4,4'-DDE	9			0.95	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
4,4'-DDT	12			0.95	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Total DDD, DDE, DDT		50	69	0.95	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aldrin	9.5			0.47	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Total Chlordanes	2.8	37		0.95	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dieldrin	1.9		1700	0.95	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Heptachlor	1.5		270	0.47	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ

Notes on Tables 5 to 8:

- **Bold** - Analyte detected
- *Italic* - Laboratory reporting limit greater than SL due to analytical interference; Laboratory detection limit below SL
- U - Analyte not detected
- J - Estimated value
- T - Concentration between the MDL and PQL
- P - Greater than 40 percent difference between the primary and secondary GC columns
- K - Analyte identification criteria not met
- Total PCB Aroclors = Sum of 1016, 1221, 1242, 1248, 1254, 1260, 1268
- Total chlordane = sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, oxychlordane
- Total LPAHs = sum of naphthalene, acenaphthene, acenaphthylene, fluorene, phenanthrene, anthracene
- Total HPAHs = fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene
- SIM: The analytes noted with (SIM) were analyzed using both Method 8270D and 8270D with selected ion monitoring (SIM) to lower reporting limits. The SIM results are the ones reported.

Table 9. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S1

T5-S1	TEF	ng/kg										ND=1/2 RL TEQ					ND=0 TEQ				
	WHO 2005	S1-A		S1-B		S1-C		S1-D/ZA		S1-ZB		S1-A	S1-B	S1-C	S1-D/ZA	S1-ZB	S1-A	S1-B	S1-C	S1-D/ZA	S1-ZB
2,3,7,8-TCDD	1	0.165	UK	0.057	U	0.0865	U	0.0596	U	0.0518	U	0.083	0.029	0.043	0.030	0.026	0	0	0	0	0
1,2,3,7,8-PeCDD	1	0.219	UK	0.0747	UK	**0.0669**	**T**	0.117	UK	0.134	UK	0.110	0.037	0.067	0.059	0.067	0	0	0.067	0	0
1,2,3,4,7,8-HxCDD	0.1	0.207	UK	0.108	U	0.0649	U	0.125	U	0.0877	UK	0.010	0.005	0.003	0.006	0.004	0	0	0	0	0
1,2,3,6,7,8-HxCDD	0.1	**0.568**	**T**	0.112	U	0.108	UK	0.143	UK	0.126	UK	0.057	0.006	0.005	0.007	0.006	0.057	0	0	0	0
1,2,3,7,8,9-HxCDD	0.1	0.444	UK	0.226	UK	**0.224**	**T**	0.369	UK	0.247	UK	0.022	0.011	0.022	0.018	0.012	0	0	0.022	0	0
1,2,3,4,6,7,8-HpCDD	0.01	**13.9**		**2.54**		2.37	U	2.86	U	2.46	U	0.139	0.025	0.012	0.014	0.012	0.139	0.025	0	0	0
OCDD	0.0003	**123**		26.8	U	19.4	U	28.6	U	20.8	U	0.037	0.004	0.003	0.004	0.003	0.037	0	0	0	0
2,3,7,8-TCDF	0.1	0.139	UK	0.0491	U	0.057	U	0.0675	U	0.0439	U	0.007	0.002	0.003	0.003	0.002	0	0	0	0	0
1,2,3,7,8-PeCDF	0.03	0.191	UK	0.1	U	0.0885	UK	0.115	UK	0.0837	UK	0.003	0.002	0.001	0.002	0.001	0	0	0	0	0
2,3,4,7,8-PeCDF	0.3	0.0737	U	0.055	UK	0.0708	U	0.0794	U	0.0459	U	0.011	0.008	0.011	0.012	0.007	0	0	0	0	0
1,2,3,4,7,8-HxCDF	0.1	**0.333**	**T**	0.053	UK	0.0826	UK	0.103	UK	**0.0877**	**T**	0.033	0.003	0.004	0.005	0.009	0.033	0	0	0	0.009
1,2,3,6,7,8-HxCDF	0.1	**0.191**	**T**	**0.0786**	**T**	0.0728	UK	0.115	UK	0.0718	UK	0.019	0.008	0.004	0.006	0.004	0.019	0.008	0	0	0
1,2,3,7,8,9-HxCDF	0.1	0.185	UK	**0.0963**	**T**	0.061	UK	0.0894	UK	0.0857	UK	0.009	0.010	0.003	0.004	0.004	0	0.010	0	0	0
2,3,4,6,7,8-HxCDF	0.1	**0.273**	**T**	0.0491	UK	0.057	UK	**0.113**	**T**	0.0479	U	0.027	0.002	0.003	0.011	0.002	0.027	0	0	0.011	0
1,2,3,4,6,7,8-HpCDF	0.01	2.69	UK	0.373	UK	0.258	UK	0.381	UK	0.201	UK	0.013	0.002	0.001	0.002	0.001	0	0	0	0	0
1,2,3,4,7,8,9-HpCDF	0.01	**0.173**	**T**	0.0845	UK	0.0767	U	0.0834	UK	0.0479	U	0.002	0.000	0.000	0.000	0.000	0.002	0	0	0	0
OCDF	0.0003	**8.58**		0.998	U	0.604	U	1.39	U	0.63	UK	0.003	0.000	0.000	0.000	0.000	0.003	0	0	0	0
Totals												**0.585**	**0.155**	**0.186**	**0.185**	**0.162**	**0.317**	**0.043**	**0.089**	**0.011**	**0.009**

Table 10. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S2

T5-S2	TEF	ng/kg										ND=1/2 RL TEQ					ND=0 TEQ				
	2005	S2-A		S2-B		S2-C		S2-D/ZA		S2-ZB		S2-A	S2-B	S2-C	S2-D/ZA	S2-ZB	S2-A	S2-B	S2-C	S2-D/ZA	S2-ZB
2,3,7,8-TCDD	1	0.408	UK	0.139	UK	0.119	UK	0.0577	U	0.0534	U	0.204	0.070	0.060	0.029	0.027	0.000	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDD	1	**1.23**		**0.0935**	**T**	0.0626	UK	0.0577	UK	0.311	UK	1.230	0.094	0.031	0.029	0.156	1.230	0.094	0.000	0.000	0.000
1,2,3,4,7,8-HxCDD	0.1	**1.72**		0.23	UK	0.0685	UK	0.0537	U	**0.682**	**T**	0.172	0.012	0.003	0.003	0.068	0.172	0.000	0.000	0.000	0.068
1,2,3,6,7,8-HxCDD	0.1	**6.6**		0.242	UK	0.112	UK	0.0755	UK	**0.548**	**T**	0.660	0.012	0.006	0.004	0.055	0.660	0.000	0.000	0.000	0.055
1,2,3,7,8,9-HxCDD	0.1	**2.88**		**0.341**	**T**	0.184	UK	0.209	UK	**0.714**	**T**	0.288	0.034	0.009	0.010	0.071	0.288	0.034	0.000	0.000	0.071
1,2,3,4,6,7,8-HpCDD	0.01	**225**		5.65	U	2.15	U	2.13	U	**5.32**		2.250	0.028	0.011	0.011	0.053	2.250	0.000	0.000	0.000	0.053
OCDD	0.0003	**2100**		45.9	U	20.3	U	21.8	U	30.3	U	0.630	0.007	0.003	0.003	0.005	0.630	0.000	0.000	0.000	0.000
2,3,7,8-TCDF	0.1	**1.06**		0.0496	U	0.045	U	0.0716	U	0.0554	U	0.106	0.002	0.002	0.004	0.003	0.106	0.000	0.000	0.000	0.000

Table 10. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S2

T5-S2	TEF	ng/kg										ND=1/2 RL TEQ					ND=0 TEQ				
	2005	S2-A		S2-B		S2-C		S2-D/ZA		S2-ZB		S2-A	S2-B	S2-C	S2-D/ZA	S2-ZB	S2-A	S2-B	S2-C	S2-D/ZA	S2-ZB
1,2,3,7,8-PeCDF	0.03	**0.889**	**JT**	0.0992	UK	0.0587	U	0.0497	U	0.115	UK	0.027	0.001	0.001	0.001	0.002	0.027	0.000	0.000	0.000	0.000
2,3,4,7,8-PeCDF	0.3	**1.41**		0.0417	U	0.0607	U	0.0497	U	0.0633	U	0.423	0.006	0.009	0.007	0.009	0.423	0.000	0.000	0.000	0.000
1,2,3,4,7,8-HxCDF	0.1	**3.9**		0.113	UK	0.0841	UK	**0.132**	**T**	**0.0924**	**T**	0.390	0.006	0.004	0.013	0.009	0.390	0.000	0.000	0.013	0.009
1,2,3,6,7,8-HxCDF	0.1	**1.56**		**0.101**	**T**	0.0489	UK	0.177	UK	0.121	UK	0.156	0.010	0.002	0.009	0.006	0.156	0.010	0.000	0.000	0.000
1,2,3,7,8,9-HxCDF	0.1	**1.05**		0.0714	UK	0.102	UK	0.0835	UK	0.0752	UK	0.105	0.004	0.005	0.004	0.004	0.105	0.000	0.000	0.000	0.000
2,3,4,6,7,8-HxCDF	0.1	**1.19**		0.115	UK	0.0391	U	0.0577	UK	**0.0969**	**T**	0.119	0.006	0.002	0.003	0.010	0.119	0.000	0.000	0.000	0.010
1,2,3,4,6,7,8-HpCDF	0.01	**38.1**		**0.462**	**T**	0.249	UK	**0.454**	**T**	0.287	UK	0.381	0.005	0.001	0.005	0.001	0.381	0.005	0.000	0.005	0.000
1,2,3,4,7,8,9-HpCDF	0.01	**2.87**		0.121	UK	0.0489	UK	**0.0932**	**T**	0.0396	U	0.029	0.001	0.000	0.001	0.000	0.029	0.000	0.000	0.001	0.000
OCDF	0.0003	**146**		1.8	U	0.714	UK	1.16	UK	0.914	UK	0.044	0.000	0.000	0.000	0.000	0.044	0.000	0.000	0.000	0.000
Totals												**7.213**	**0.297**	**0.150**	**0.135**	**0.479**	**7.009**	**0.142**	**0.000**	**0.019**	**0.267**

Table 11. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S3

T5-S3	TEF	ng/kg										ND=1/2 RL TEQ					ND=0 TEQ				
	WHO 2005	S3-A		S3-B		S3-C		S3-D/ZA		S3-ZB		S3-A	S3-B	S3-C	S3-D/ZA	S3-ZB	S3-A	S3-B	S3-C	S3-D/ZA	S3-ZB
2,3,7,8-TCDD	1	0.191	UK	0.163	UK	0.0358	U	0.0609	U	0.0492	U	0.096	0.082	0.018	0.030	0.025	0.000	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDD	1	0.595	UK	**0.116**	**T**	**0.0845**	**T**	0.134	UK	0.154	UK	0.595	0.116	0.085	0.067	0.077	0.000	0.116	0.085	0.000	0.000
1,2,3,4,7,8-HxCDD	0.1	**0.813**	**BJ**	**0.141**	**T**	**0.152**	**T**	0.0982	UK	**0.227**	**T**	0.081	0.014	0.015	0.005	0.023	0.081	0.014	0.015	0.000	0.023
1,2,3,6,7,8-HxCDD	0.1	**3.9**		**0.361**	**T**	0.179	UK	0.147	UK	0.224	UK	0.390	0.036	0.009	0.007	0.011	0.390	0.036	0.000	0.000	0.000
1,2,3,7,8,9-HxCDD	0.1	**1.76**		**0.371**	**T**	0.304	UK	0.291	UK	**0.299**	**T**	0.176	0.037	0.015	0.015	0.030	0.176	0.037	0.000	0.000	0.030
1,2,3,4,6,7,8-HpCDD	0.01	**121**		**10.1**		3.88	U	3.03	U	4.99	U	1.210	0.101	0.019	0.015	0.025	1.210	0.101	0.000	0.000	0.000
OCDD	0.0003	**1080**		**87.9**		26.5	U	24.2	U	34.2	U	0.324	0.026	0.004	0.004	0.005	0.324	0.026	0.000	0.000	0.000
2,3,7,8-TCDF	0.1	0.528	UK	**0.0746**	**T**	0.0398	U	0.0766	U	0.0492	U	0.026	0.007	0.002	0.004	0.002	0.000	0.007	0.000	0.000	0.000
1,2,3,7,8-PeCDF	0.03	0.434	U	0.0615	U	0.105	UK	0.118	UK	0.0709	U	0.007	0.001	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000
2,3,4,7,8-PeCDF	0.3	**0.691**	**T**	0.125	UK	0.0497	UK	**0.0741**	**T**	0.0709	U	0.207	0.019	0.007	0.022	0.011	0.207	0.000	0.000	0.022	0.000
1,2,3,4,7,8-HxCDF	0.1	**2.16**		**0.351**	**T**	0.0656	UK	0.124	UK	**0.0728**	**T**	0.216	0.035	0.003	0.006	0.007	0.216	0.035	0.000	0.000	0.007
1,2,3,6,7,8-HxCDF	0.1	**0.775**	**T**	**0.245**	**T**	**0.0972**	**T**	**0.0617**	**T**	0.0728	UK	0.078	0.025	0.010	0.006	0.004	0.078	0.025	0.010	0.006	0.000
1,2,3,7,8,9-HxCDF	0.1	**0.544**	**T**	0.171	UK	0.0815	UK	0.143	UK	0.0689	U	0.054	0.009	0.004	0.007	0.003	0.054	0.000	0.000	0.000	0.000
2,3,4,6,7,8-HxCDF	0.1	**1.21**		0.115	UK	0.0497	U	0.0432	U	0.0531	U	0.121	0.006	0.002	0.002	0.003	0.121	0.000	0.000	0.000	0.000
1,2,3,4,6,7,8-HpCDF	0.01	**24.7**		**2.23**		0.211	UK	**0.406**	**T**	0.236	UK	0.247	0.022	0.001	0.004	0.001	0.247	0.022	0.000	0.004	0.000
1,2,3,4,7,8,9-HpCDF	0.01	**1.78**		0.232	UK	0.0716	UK	0.0904	UK	0.061	UK	0.018	0.001	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000
OCDF	0.0003	**107**		**6.76**		0.553	U	0.982	U	0.465	UK	0.032	0.002	0.000	0.000	0.000	0.032	0.002	0.000	0.000	0.000
Totals												**3.878**	**0.539**	**0.197**	**0.197**	**0.228**	**3.154**	**0.422**	**0.109**	**0.032**	**0.060**

Table 12. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S4

T5-S4	TEF	ng/kg								ND=1/2 RL TEQ				ND=0 TEQ			
	WHO 2005	S4-A		S4-B		S4-C/ZA		S4-ZB		S4-A	S4-B	S4-C/ZA	S4-ZB	S4-A	S4-B	S4-C/ZA	S4-ZB
2,3,7,8-TCDD	1	0.311	UK	0.18	UK	0.0398	U	0.095	U	0.156	0.090	0.020	0.048	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDD	1	**0.999**		**0.293**	**T**	**0.103**	**T**	0.107	UK	0.999	0.293	0.103	0.054	0.999	0.293	0.103	0.000
1,2,3,4,7,8-HxCDD	0.1	**1.17**		**0.332**	**T**	0.107	UK	0.188	UK	0.117	0.033	0.005	0.009	0.117	0.033	0.000	0.000
1,2,3,6,7,8-HxCDD	0.1	**5.02**		**1.29**		0.189	UK	0.331	UK	0.502	0.129	0.009	0.017	0.502	0.129	0.000	0.000
1,2,3,7,8,9-HxCDD	0.1	**2.15**		**0.857**	**T**	**0.231**	**T**	0.513	UK	0.215	0.086	0.023	0.026	0.215	0.086	0.023	0.000
1,2,3,4,6,7,8-HpCDD	0.01	**147**		**36.5**		**3.82**		**3.96**		1.470	0.365	0.038	0.040	1.470	0.365	0.038	0.040
OCDD	0.0003	**1300**		**314**		27.7	U	**45.1**		0.390	0.094	0.004	0.014	0.390	0.094	0.000	0.014
2,3,7,8-TCDF	0.1	**0.672**	**T**	0.18	UK	0.0417	U	0.111	U	0.067	0.009	0.002	0.006	0.067	0.000	0.000	0.000
1,2,3,7,8-PeCDF	0.03	**0.615**	**T**	**0.231**	**T**	0.0437	U	0.0891	U	0.018	0.007	0.001	0.001	0.018	0.007	0.000	0.000
2,3,4,7,8-PeCDF	0.3	**0.932**	**T**	**0.326**	**T**	0.0457	U	0.109	U	0.280	0.098	0.007	0.016	0.280	0.098	0.000	0.000
1,2,3,4,7,8-HxCDF	0.1	**2.81**		**1.83**		0.0298	U	0.095	U	0.281	0.183	0.001	0.005	0.281	0.183	0.000	0.000
1,2,3,6,7,8-HxCDF	0.1	**1.12**		**0.56**	**T**	0.0219	UK	0.095	UK	0.112	0.056	0.001	0.005	0.112	0.056	0.000	0.000
1,2,3,7,8,9-HxCDF	0.1	**0.713**	**T**	**0.479**	**T**	**0.0656**	**T**	0.343	UK	0.071	0.048	0.007	0.017	0.071	0.048	0.007	0.000
2,3,4,6,7,8-HxCDF	0.1	1.23	UK	0.376	UK	0.0298	U	0.212	UK	0.062	0.019	0.001	0.011	0.000	0.000	0.000	0.000
1,2,3,4,6,7,8-HpCDF	0.01	**26.4**	**J**	**15.4**	**J**	**0.111**	**JT**	**0.838**	**JT**	0.264	0.154	0.001	0.008	0.264	0.154	0.001	0.008
1,2,3,4,7,8,9-HpCDF	0.01	**2.33**		**1.26**		0.0517	U	0.123	U	0.023	0.013	0.000	0.001	0.023	0.013	0.000	0.000
OCDF	0.0003	**98.3**		**42**		0.318	UK	3.16	UK	0.029	0.013	0.000	0.000	0.029	0.013	0.000	0.000
Totals										**5.056**	**1.689**	**0.225**	**0.276**	**4.839**	**1.571**	**0.172**	**0.062**

Table 13. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S5

T5-S5	TEF	ng/kg								ND=1/2 RL TEQ				ND=0 TEQ			
	WHO 2005	S5-A		S5-B		S5-C/ZA		S5-ZB		S5-A	S5-B	S5-C/ZA	S5-ZB	S5-A	S5-B	S5-C/ZA	S5-ZB
2,3,7,8-TCDD	1	0.242	UK	0.0537	U	0.0478	U	0.0457	U	0.121	0.027	0.024	0.023	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDD	1	**0.413**	**T**	0.0596	U	0.0716	UK	0.0477	U	0.413	0.030	0.036	0.024	0.413	0.000	0.000	0.000
1,2,3,4,7,8-HxCDD	0.1	0.542	UK	**0.165**	**T**	0.103	UK	0.0636	U	0.027	0.017	0.005	0.003	0.000	0.017	0.000	0.000
1,2,3,6,7,8-HxCDD	0.1	**2.18**		0.0775	U	**0.161**	**T**	**0.115**	**T**	0.218	0.004	0.016	0.012	0.218	0.000	0.016	0.012
1,2,3,7,8,9-HxCDD	0.1	**1.1**		0.332	UK	**0.225**	**T**	0.187	UK	0.110	0.017	0.023	0.009	0.110	0.000	0.023	0.000
1,2,3,4,6,7,8-HpCDD	0.01	**76**		**4.33**		**2.9**		**1.75**		0.760	0.043	0.029	0.018	0.760	0.043	0.029	0.018
OCDD	0.0003	**679**		34.2	U	27.6	U	15.3	U	0.204	0.005	0.004	0.002	0.204	0.000	0.000	0.000
2,3,7,8-TCDF	0.1	**0.322**	**T**	0.0477	U	0.0418	U	0.0398	U	0.032	0.002	0.002	0.002	0.032	0.000	0.000	0.000
1,2,3,7,8-PeCDF	0.03	0.27	UK	**0.0775**	**T**	0.0498	U	0.0437	U	0.004	0.002	0.001	0.001	0.000	0.002	0.000	0.000
2,3,4,7,8-PeCDF	0.3	**0.489**	**T**	0.0616	UK	0.0517	U	0.0497	U	0.147	0.009	0.008	0.007	0.147	0.000	0.000	0.000

Table 13. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S5

T5-S5	TEF	ng/kg								ND=1/2 RL TEQ				ND=0 TEQ			
	WHO 2005	S5-A		S5-B		S5-C/ZA		S5-ZB		S5-A	S5-B	S5-C/ZA	S5-ZB	S5-A	S5-B	S5-C/ZA	S5-ZB
1,2,3,4,7,8-HxCDF	0.1	**1.27**		0.117	UK	**0.0856**	T	**0.0537**	T	0.127	0.006	0.009	0.005	0.127	0.000	0.009	0.005
1,2,3,6,7,8-HxCDF	0.1	**0.556**	T	0.0636	UK	0.0458	UK	**0.0636**	T	0.056	0.003	0.002	0.006	0.056	0.000	0.000	0.006
1,2,3,7,8,9-HxCDF	0.1	0.419	UK	0.143	UK	**0.0637**	T	**0.0915**	T	0.021	0.007	0.006	0.009	0.000	0.000	0.006	0.009
2,3,4,6,7,8-HxCDF	0.1	0.761	UK	0.0517	UK	**0.0617**	T	0.0358	U	0.038	0.003	0.006	0.002	0.000	0.000	0.006	0.000
1,2,3,4,6,7,8-HpCDF	0.01	**15.4**		**0.412**	JT	**0.356**	JT	**0.249**	JT	0.154	0.004	0.004	0.002	0.154	0.004	0.004	0.002
1,2,3,4,7,8,9-HpCDF	0.01	**1.23**	J	0.0934	UK	0.0716	UK	0.0616	U	0.012	0.000	0.000	0.000	0.012	0.000	0.000	0.000
OCDF	0.0003	**44.3**		**1.44**	T	**1.22**	T	**0.704**	T	0.013	0.000	0.000	0.000	0.013	0.000	0.000	0.000
Totals										**2.457**	**0.180**	**0.175**	**0.126**	**2.246**	**0.067**	**0.093**	**0.053**

Table 14. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S6

T5-S6	TEF	ng/kg								ND=1/2 RL TEQ				ND=0 TEQ			
	WHO 2005	S6-A		S6-B		S6-C/ZA		S6-ZB		S6-A	S6-B	S6-C/ZA	S6-ZB	S6-A	S6-B	S6-C/ZA	S6-ZB
2,3,7,8-TCDD	1	0.198	UK	0.0395	U	0.0658	U	0.0415	U	0.099	0.020	0.033	0.021	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDD	1	0.265	UK	0.0494	U	0.0638	U	0.0811	UK	0.133	0.025	0.032	0.041	0.000	0.000	0.000	0.000
1,2,3,4,7,8-HxCDD	0.1	0.362	UK	0.0652	U	0.0818	UK	0.0475	U	0.018	0.003	0.004	0.002	0.000	0.000	0.000	0.000
1,2,3,6,7,8-HxCDD	0.1	**1.47**		0.123	UK	0.0698	U	**0.0831**	T	0.147	0.006	0.003	0.008	0.147	0.000	0.000	0.008
1,2,3,7,8,9-HxCDD	0.1	0.829	UK	0.194	UK	0.0698	UK	0.227	UK	0.041	0.010	0.003	0.011	0.000	0.000	0.000	0.000
1,2,3,4,6,7,8-HpCDD	0.01	**40.7**		**2.94**		**1.74**		**2.49**		0.407	0.029	0.017	0.025	0.407	0.029	0.017	0.025
OCDD	0.0003	**378**		21.2	U	14.4	U	29.6	UK	0.113	0.003	0.002	0.004	0.113	0.000	0.000	0.000
2,3,7,8-TCDF	0.1	0.208	UK	0.0375	U	0.0638	U	0.0317	U	0.010	0.002	0.003	0.002	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDF	0.03	0.212	UK	0.0296	UK	0.0399	U	0.0732	UK	0.003	0.000	0.001	0.001	0.000	0.000	0.000	0.000
2,3,4,7,8-PeCDF	0.3	**0.297**	T	0.0474	U	0.0439	U	0.0435	U	0.089	0.007	0.007	0.007	0.089	0.000	0.000	0.000
1,2,3,4,7,8-HxCDF	0.1	**0.991**		0.0336	U	0.0419	U	**0.0851**	T	0.099	0.002	0.002	0.009	0.099	0.000	0.000	0.009
1,2,3,6,7,8-HxCDF	0.1	0.336	UK	0.0316	U	0.0399	U	0.0772	UK	0.017	0.002	0.002	0.004	0.000	0.000	0.000	0.000
1,2,3,7,8,9-HxCDF	0.1	**0.382**	T	0.0455	U	0.0479	UK	0.138	UK	0.038	0.002	0.002	0.007	0.038	0.000	0.000	0.000
2,3,4,6,7,8-HxCDF	0.1	**0.502**	T	0.0336	U	0.0419	U	**0.0514**	T	0.050	0.002	0.002	0.005	0.050	0.000	0.000	0.005
1,2,3,4,6,7,8-HpCDF	0.01	**7.57**	J	0.126	UK	0.106	UK	**0.384**	JT	0.076	0.001	0.001	0.004	0.076	0.000	0.000	0.004
1,2,3,4,7,8,9-HpCDF	0.01	**0.841**	T	0.0771	U	0.0518	U	0.121	UK	0.008	0.000	0.000	0.001	0.008	0.000	0.000	0.000
OCDF	0.0003	**26.8**		**0.401**	T	**0.375**	T	**1.89**	T	0.008	0.000	0.000	0.001	0.008	0.000	0.000	0.001
Totals										**1.358**	**0.114**	**0.115**	**0.151**	**1.036**	**0.030**	**0.018**	**0.051**

Table 15. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S7

T5-S7	TEF	ng/kg								ND=1/2 RL TEQ				ND=0 TEQ			
	WHO 2005	S7-A		S7-B		S7-C/ZA		S7-ZB		S7-A	S7-B	S7-C/ZA	S7-ZB	S7-A	S7-B	S7-C/ZA	S7-ZB
2,3,7,8-TCDD	1	0.145	UK	0.163	UK	0.0438	U	0.0497	U	0.073	0.082	0.022	0.025	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDD	1	0.0635	U	0.0615	UK	0.0598	U	0.0557	U	0.032	0.031	0.030	0.028	0.000	0.000	0.000	0.000
1,2,3,4,7,8-HxCDD	0.1	**0.183**	**T**	0.157	UK	0.0677	U	0.0934	UK	0.018	0.008	0.003	0.005	0.018	0.000	0.000	0.000
1,2,3,6,7,8-HxCDD	0.1	**0.365**	**T**	0.339	UK	0.0717	U	0.149	UK	0.037	0.017	0.004	0.007	0.037	0.000	0.000	0.000
1,2,3,7,8,9-HxCDD	0.1	**0.315**	**T**	**0.301**	**T**	**0.233**	**T**	0.0696	U	0.032	0.030	0.023	0.003	0.032	0.030	0.023	0.000
1,2,3,4,6,7,8-HpCDD	0.01	**11.6**		**11.1**		**2.07**		**2.16**		0.116	0.111	0.021	0.022	0.116	0.111	0.021	0.022
OCDD	0.0003	**99**		**90.4**		22.4	UK	19.7	U	0.030	0.027	0.003	0.003	0.030	0.027	0.000	0.000
2,3,7,8-TCDF	0.1	0.0556	U	0.0734	UK	0.0418	U	0.0417	U	0.003	0.004	0.002	0.002	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDF	0.03	0.0456	U	0.0595	U	0.0618	U	0.0358	UK	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
2,3,4,7,8-PeCDF	0.3	0.0516	U	**0.12**	**T**	0.0657	U	0.0557	U	0.008	0.036	0.010	0.008	0.000	0.036	0.000	0.000
1,2,3,4,7,8-HxCDF	0.1	**0.208**	**T**	**0.235**	**T**	0.0857	UK	0.0417	U	0.021	0.024	0.004	0.002	0.021	0.024	0.000	0.000
1,2,3,6,7,8-HxCDF	0.1	**0.109**	**T**	**0.108**	**T**	**0.0482**	**T**	0.0398	U	0.011	0.011	0.005	0.002	0.011	0.011	0.005	0.000
1,2,3,7,8,9-HxCDF	0.1	**0.141**	**T**	**0.122**	**T**	0.0996	UK	0.0875	UK	0.014	0.012	0.005	0.004	0.014	0.012	0.000	0.000
2,3,4,6,7,8-HxCDF	0.1	0.0853	UK	0.113	UK	0.0896	UK	0.0437	U	0.004	0.006	0.004	0.002	0.000	0.000	0.000	0.000
1,2,3,4,6,7,8-HpCDF	0.01	**2.09**	**J**	**1.9**	**J**	0.345	UK	**0.143**	**JT**	0.021	0.019	0.002	0.001	0.021	0.019	0.000	0.001
1,2,3,4,7,8,9-HpCDF	0.01	0.155	UK	0.198	UK	0.0717	UK	0.0378	UK	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
OCDF	0.0003	**5.92**		**5.02**		1.03	UK	0.417	UK	0.002	0.002	0.000	0.000	0.002	0.002	0.000	0.000
Totals										**0.421**	**0.419**	**0.140**	**0.116**	**0.300**	**0.271**	**0.049**	**0.023**

Table 16. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S8

T5-S8	TEF	ng/kg								ND=1/2 RL TEQ				ND=0 TEQ			
	WHO 2005	S8-A		S8-B		S8-C/ZA		S8-ZB		S8-A	S8-B	S8-C/ZA	S8-ZB	S8-A	S8-B	S8-C/ZA	S8-ZB
2,3,7,8-TCDD	1	0.205	UK	0.147	UK	0.121	UK	0.0411	U	0.103	0.074	0.061	0.021	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDD	1	0.0816	UK	0.11	UK	**0.0615**	**T**	**0.0578**	**T**	0.041	0.055	0.062	0.058	0.000	0.000	0.062	0.058
1,2,3,4,7,8-HxCDD	0.1	0.107	UK	0.138	UK	0.107	UK	0.106	UK	0.005	0.007	0.005	0.005	0.000	0.000	0.000	0.000
1,2,3,6,7,8-HxCDD	0.1	**0.347**	**T**	0.204	UK	0.13	UK	0.135	UK	0.035	0.010	0.007	0.007	0.035	0.000	0.000	0.000
1,2,3,7,8,9-HxCDD	0.1	0.277	UK	**0.41**	**T**	0.3	UK	**0.264**	**T**	0.014	0.041	0.015	0.026	0.000	0.041	0.000	0.026
1,2,3,4,6,7,8-HpCDD	0.01	**9.7**		**4.05**		**2.29**		**2.0**		0.097	0.041	0.023	0.020	0.097	0.041	0.023	0.020
OCDD	0.0003	**80.6**		**43.3**		35	U	24.3	U	0.024	0.013	0.005	0.004	0.024	0.013	0.000	0.000
2,3,7,8-TCDF	0.1	0.0438	U	0.0413	U	0.0389	U	0.0411	U	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000
1,2,3,7,8-PeCDF	0.03	0.103	UK	0.126	UK	0.105	UK	0.0686	UK	0.002	0.002	0.002	0.001	0.000	0.000	0.000	0.000
2,3,4,7,8-PeCDF	0.3	**0.0631**	**T**	0.0864	UK	0.0526	U	0.047	U	0.019	0.013	0.008	0.007	0.019	0.000	0.000	0.000
1,2,3,4,7,8-HxCDF	0.1	0.0796	UK	**0.102**	**T**	**0.164**	**T**	0.049	UK	0.004	0.010	0.016	0.002	0.000	0.010	0.016	0.000

Table 16. Port of Seattle T5 Deepening: Dioxin/Furan TEQs for S8

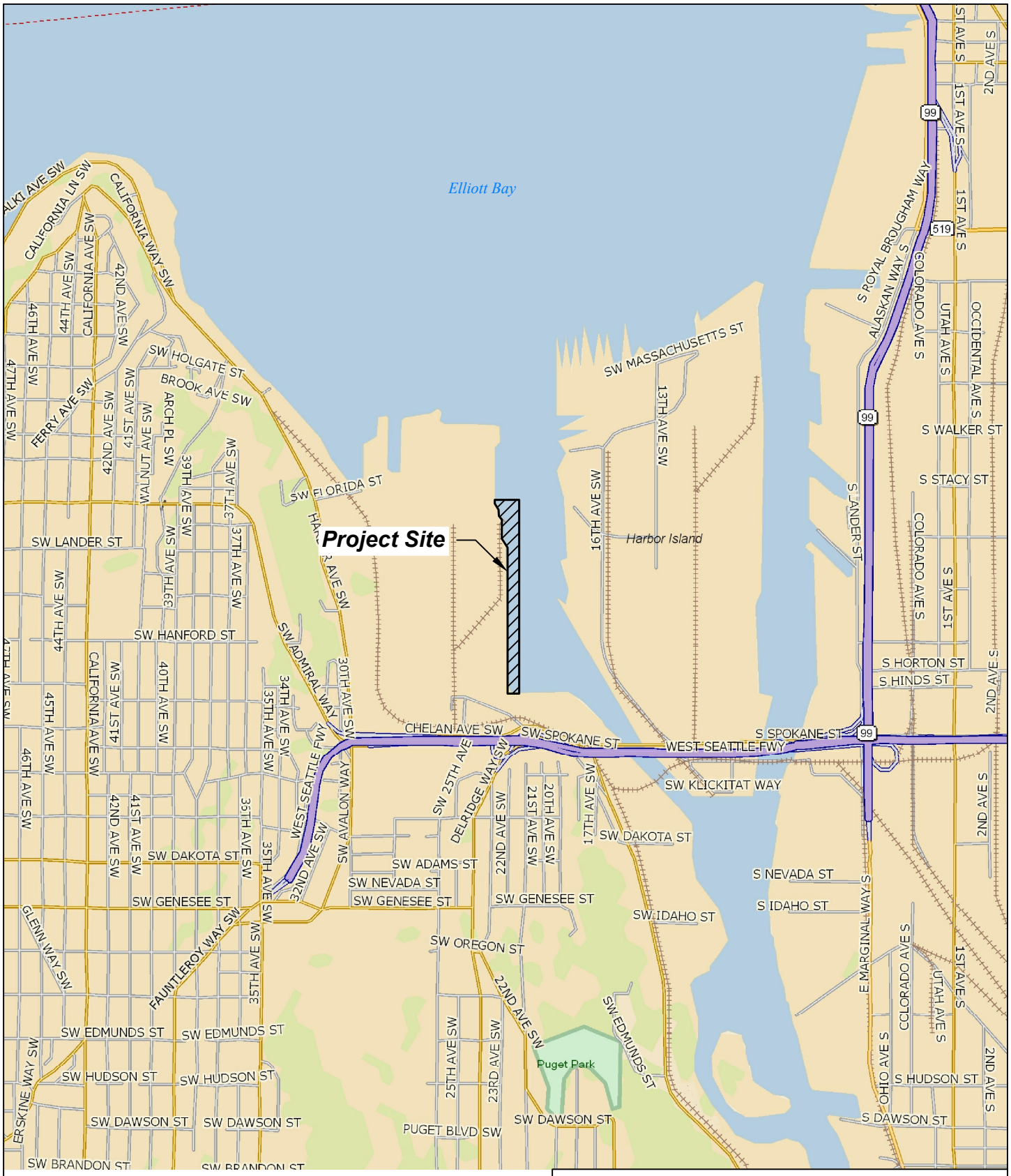
T5-S8	TEF	ng/kg								ND=1/2 RL TEQ				ND=0 TEQ			
	WHO 2005	S8-A		S8-B		S8-C/ZA		S8-ZB		S8-A	S8-B	S8-C/ZA	S8-ZB	S8-A	S8-B	S8-C/ZA	S8-ZB
1,2,3,6,7,8-HxCDF	0.1	**0.125**	T	**0.133**	T	0.0876	UK	**0.0484**	T	0.013	0.013	0.004	0.005	0.013	0.013	0.000	0.005
1,2,3,7,8,9-HxCDF	0.1	0.0975	UK	**0.229**	T	0.185	UK	**0.0748**	T	0.005	0.023	0.009	0.007	0.000	0.023	0.000	0.007
2,3,4,6,7,8-HxCDF	0.1	0.149	UK	**0.117**	T	**0.102**	T	0.0705	UK	0.007	0.012	0.010	0.004	0.000	0.012	0.010	0.000
1,2,3,4,6,7,8-HpCDF	0.01	**1.73**	J	**0.817**	JT	0.682	UK	0.384	UK	0.017	0.008	0.003	0.002	0.017	0.008	0.000	0.000
1,2,3,4,7,8,9-HpCDF	0.01	0.155	UK	**0.205**	T	**0.128**	T	0.0548	U	0.001	0.002	0.001	0.000	0.000	0.002	0.001	0.000
OCDF	0.0003	**5.01**		**3.52**		**3.29**		**1.59**	T	0.002	0.001	0.000	0.000	0.002	0.001	0.000	0.000
Totals										**0.389**	**0.326**	**0.234**	**0.172**	**0.206**	**0.164**	**0.113**	**0.117**

Notes for Tables 9-16:

- **Bold** - Analyte detected
- *Italic* - Laboratory reporting limit greater than SL due to analytical interference; Laboratory detection limit below SL
- U - Analyte not detected
- J - Estimated value
- T - Concentration between the MDL and PQL
- K - Analyte identification criteria not met
- EMPC values were assigned a "UK" qualifier

Table 17. Dioxin/Furan Volume-weighted average calculations

DMMU	VOLUME (cy)	TCDD/F TEQ (ND=1/2 RL) ng/kg dry wt.	PRODUCT (VOL x TEQ)	PRODUCT/TOTAL (ng/kg/VOLUME)
S1-A	1,251	0.585	732	
S1-B	2,593	0.155	401	
S1-C	2,068	0.186	385	
S1-D/ZA	2,254	0.185	417	
S2-A	856	7.213	6,174	
S2-B	1,510	0.297	448	
S2-C	1,652	0.150	248	
S2-D/ZA	1,948	0.135	263	
S3-A	531	3.878	2,059	
S3-B	1,066	0.539	574	
S3-C	1,199	0.197	236	
S3-D/ZA	1,434	0.197	283	
S4-A	1,555	5.056	7,863	
S4-B	2,292	1.689	3,871	
S4-C/ZA	2,994	0.225	673	
S5-A	1,665	2.457	4,091	
S5-B	2,233	0.180	401	
S5-C/ZA	2,634	0.175	461	
S6-A	1,661	1.358	2,255	
S6-B	1,835	0.114	209	
S6-C/ZA	2,196	0.115	253	
S7-A	1,277	0.421	538	
S7-B	1,986	0.419	833	
S7-C/ZA	2,949	0.140	412	
S8-A	1,149	0.389	447	
S8-B	1,908	0.326	623	
S8-C/ZA	1,827	0.234	427	
Totals - Option A Design elev. -53 MLLW w/overdepth -56 MLLW	**30,287**		**32,389**	**1.07 TEQ**
Totals - Option B Design elev. -55 MLLW w/overdepth -58 MLLW	**48,523**		**35,578**	**0.73 TEQ**



Source: Base map prepared from DeLorme Topo 7.0, 2007.

N

0 2000 4000

Scale in Feet

Terminal 5 Berth Deepening
Seattle, Washington

Vicinity Map

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Figure

1

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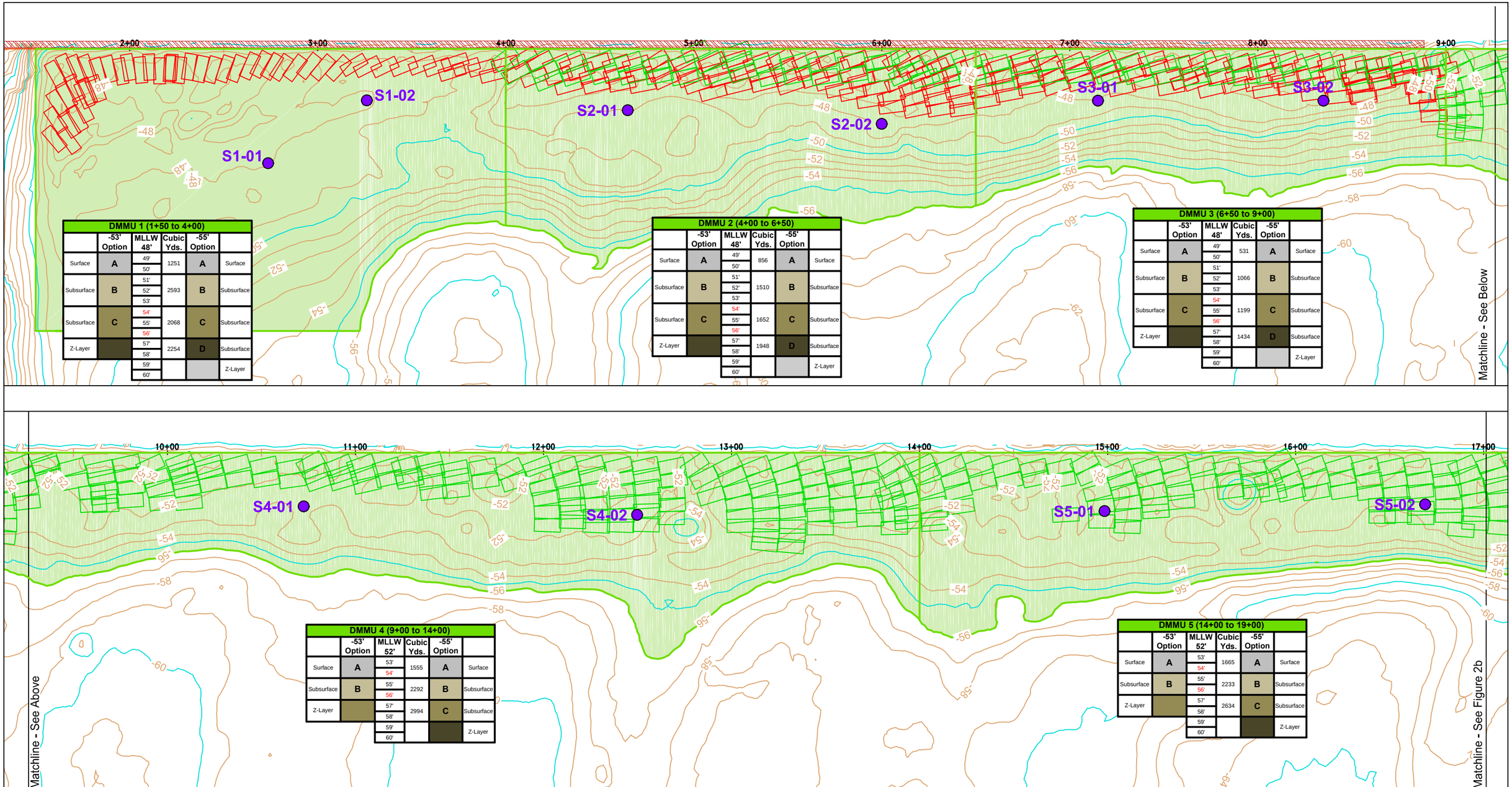

DMMU 1 (1+50 to 4+00)

	-53' Option	MLLW 48'	Cubic Yds.	-55' Option	
Surface	A	49'	1251	A	Surface
		50'			
Subsurface	B	51'	2593	B	Subsurface
		52'			
		53'			
Subsurface	C	54'	2068	C	Subsurface
		55'			
		56'			
Z-Layer		57'	2254	D	Subsurface
		58'			
		59'			Z-Layer
		60'			

DMMU 2 (4+00 to 6+50)

	-53' Option	MLLW 48'	Cubic Yds.	-55' Option	
Surface	A	49'	856	A	Surface
		50'			
Subsurface	B	51'	1510	B	Subsurface
		52'			
		53'			
Subsurface	C	54'	1652	C	Subsurface
		55'			
		56'			
Z-Layer		57'	1948	D	Subsurface
		58'			
		59'			Z-Layer
		60'			

DMMU 3 (6+50 to 9+00)

	-53' Option	MLLW 48'	Cubic Yds.	-55' Option	
Surface	A	49'	531	A	Surface
		50'			
Subsurface	B	51'	1066	B	Subsurface
		52'			
		53'			
Subsurface	C	54'	1199	C	Subsurface
		55'			
		56'			
Z-Layer		57'	1434	D	Subsurface
		58'			
		59'			Z-Layer
		60'			

DMMU 4 (9+00 to 14+00)

	-53' Option	MLLW 52'	Cubic Yds.	-55' Option	
Surface	A	53'	1555	A	Surface
		54'			
Subsurface	B	55'	2292	B	Subsurface
		56'			
Z-Layer		57'	2994	C	Subsurface
		58'			
		59'			Z-Layer
		60'			

DMMU 5 (14+00 to 19+00)

	-53' Option	MLLW 52'	Cubic Yds.	-55' Option	
Surface	A	53'	1665	A	Surface
		54'			
Subsurface	B	55'	2233	B	Subsurface
		56'			
Z-Layer		57'	2634	C	Subsurface
		58'			
		59'			Z-Layer
		60'			

Source: NW Hydro Survey February 2, 2014.

LEGEND

- DMMUs
- Core Sample
- 2011Sand Cover Placement Marks
- 2014 Sand Cover Placement Marks
- Area of Existing Sheet Pile Wall

N

0 50 100
Scale in Feet

Terminal 5 Berth Deepening
Port of Seattle

DMMUs and Core Locations

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Figure
2a

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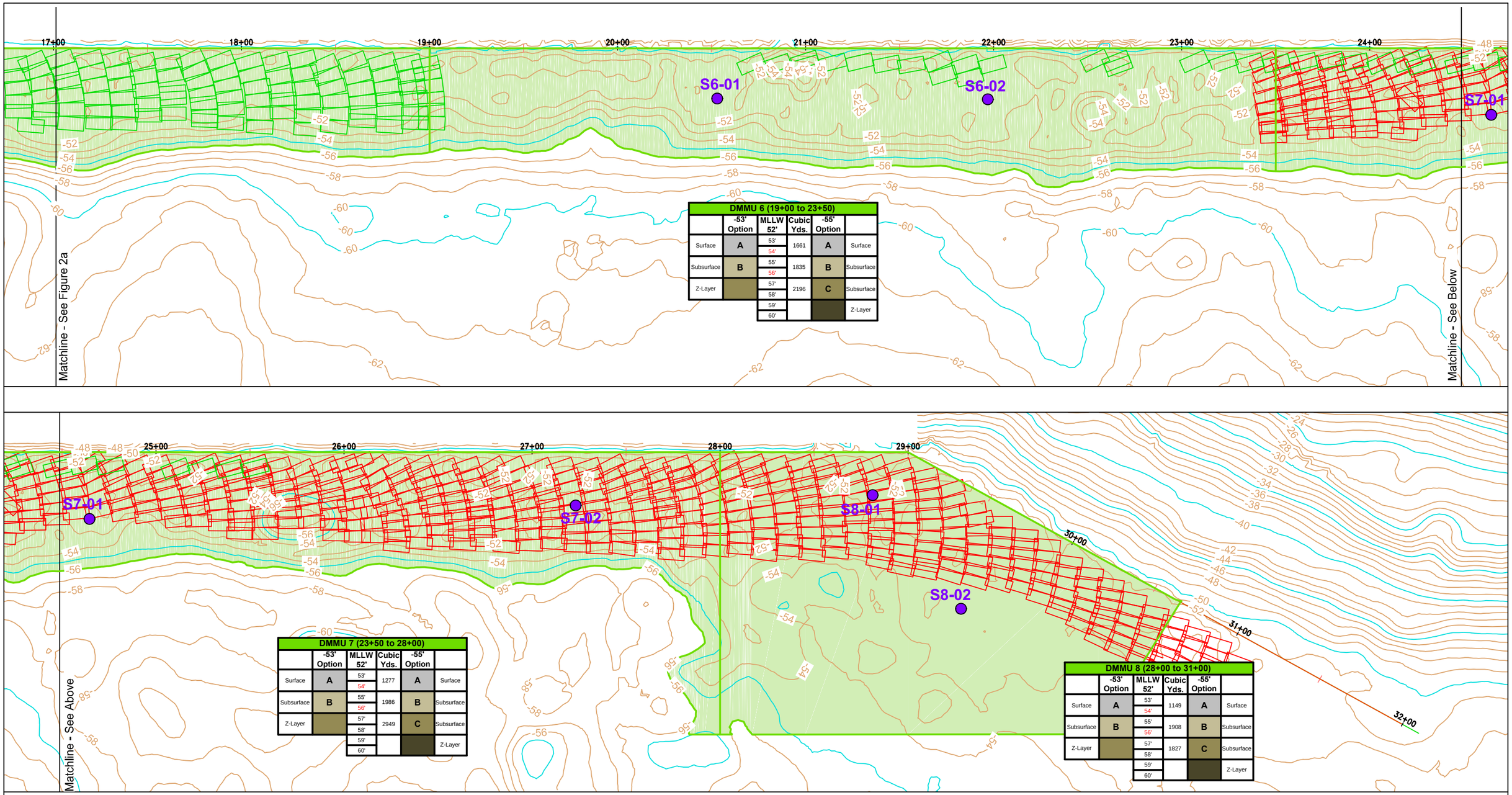

DMMU 6 (19+00 to 23+50)					
	-53' Option	MLLW 52'	Cubic Yds.	-55' Option	
Surface	A	53'	1661	A	Surface
		54'			
Subsurface	B	55'	1835	B	Subsurface
		56'			
Z-Layer		57'	2196	C	Subsurface
		58'			
		59'			Z-Layer
		60'			

DMMU 7 (23+50 to 28+00)					
	-53' Option	MLLW 52'	Cubic Yds.	-55' Option	
Surface	A	53'	1277	A	Surface
		54'			
Subsurface	B	55'	1986	B	Subsurface
		56'			
Z-Layer		57'	2949	C	Subsurface
		58'			
		59'			Z-Layer
		60'			

DMMU 8 (28+00 to 31+00)					
	-53' Option	MLLW 52'	Cubic Yds.	-55' Option	
Surface	A	53'	1149	A	Surface
		54'			
Subsurface	B	55'	1908	B	Subsurface
		56'			
Z-Layer		57'	1827	C	Subsurface
		58'			
		59'			Z-Layer
		60'			

Source: NW Hydro Survey February 2, 2014.

LEGEND

- DMMUs
- Core Sample
- 2011Sand Cover Placement Marks
- 2014 Sand Cover Placement Marks

N

0 50 100

Scale in Feet

Terminal 5 Berth Deepening
Port of Seattle

DMMUs and Core Locations

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Figure **2b**

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