

SUBJECT: DETERMINATION ON THE ANTIDegradation EVALUATION OF EXPOSED SEDIMENTS AT PORT OF OLYMPIA BERTHS 1, 2 & 3 AND SWANTOWN BOATWORKS MAINTENANCE DREDGING PROJECT (NWS-2012-1098) RELATIVE TO DREDGED MATERIAL MANAGEMENT PROGRAM (DMMP) GUIDELINES EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT

1. The following summary reflects the suitability determination memorandum by the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) on the characterization conducted to assess antidegradation compliance of the exposed sediments underlying proposed maintenance dredged material at the Port of Olympia's Marine Terminal at Berths 1, 2, and part of 3, as well as the Swantown Boatworks Haulout sites that would be exposed following maintenance dredging at both locations.

Table 1. Project DMMP Tracking Details

JARPA APPLICATION NO.	NWS-2012-1098
SAP submitted:	November 5, 2012
SAP approved	November 20, 2012
Sampling dates: Vibracorer	February 25-27, 2013
Final Data characterization report submitted:	June 12, 2013
Recency Determination: High Concern (2 years)	February 2015
DAIS reference number:	OLYBS-2-A-336

2. **Background.** The Port of Olympia proposes to maintenance dredge up to 36,000 cubic yards (cy) of dredged material from the Port's Marine Terminal at Berths 1, 2, and part of 3. In addition, the Port proposes to dredge up to 3,000 cy of material from the Swantown Boatworks Haulout site. The purpose of the maintenance dredging at both locations is to provide navigation access to the marine terminal and Swantown Boatworks haulout site. All 39,000 cy of maintenance material will be disposed of at an Ecology approved upland site. The antidegradation test results reported here are being used to assess the post-construction remedies that may be required to reduce exposures from high dioxin sediments to be exposed following maintenance dredging. The overlying dredged material was not tested, and was presumed to contain elevated dioxin concentrations based on previous testing and monitoring in the vicinity of Berth's 2 and 3.
3. The sampling effort was accomplished in part to supplement the existing data and fill the data gaps identified in the Existing Information Summary and Data Gaps Memorandum (EISDGM)(Anchor OEA 2012).
4. **Sampling and Analysis Plan.** The initial sampling and analysis plan (SAP) was submitted to Ecology Toxics Cleanup Program (TCP) and to DMMP for review on November 5, 2012, and DMMP review comments were transmitted to Ecology TCP as part of consolidated review on November 20, 2012.
5. **Sampling.** The sampling took place between February 25 – 27, 2013, and vibracores were collected within both dredging subareas as depicted in **Table 2** and **Figures 1-4**. Samples were collected in accordance with the Ecology and DMMP approved SAP/QAPP, and Z-samples were collected at 2-foot intervals:

- a. For the **Marine Terminal berth area**, the Z-layer is:
 - i. Between -44 to -46 feet MLLW within the 1st 20 feet of the pier face (based on 2-foot allowable overdredge depth beyond the maintenance dredge elevation of -42 feet MLLW) at locations SC-04, SC-07, SC-10, SC-13, SC-15, and SC-18
 - ii. Between -40 to -42 feet MLLW within the area 90 to 110 feet from the pier face (based on a 2-foot allowable overdredge depth beyond the maintenance dredge elevation of -38 feet MLLW) at location SC-08
 - iii. Between -40 to -42 feet MLLW along the northern slope of the dredge area where dredging will expose sediment along a 3 horizontal:1 vertical (3H:1V) slope at location SC-20
 - b. For the **Swantown Boatworks area**, the Z-layer is located between -14 and -16 feet MLLW (based on a 2-foot allowable overdredge depth beyond the maintenance dredge elevation of -12 feet MLLW) at location SC-46
6. The data characterization report was submitted to Ecology and the DMMP agencies for review on April 10-, 2013, and it summarizes the analyses results for dioxin/furan Z-samples submitted for the nine core stations.

Table 2. Summary of the Z-Sample Core Stations at Berth1, 2 & 3 and Swantown Boatworks .

Subarea	Core Station ID:	Latitude (°N)	Longitude (°W)	Mudline Elevation (feet MLLW)	Penetration Depth (recovery = % recovery) (feet MLLW)	Z-samples
Berths 1, 2 & 3	POB1-SC-04	49.776539926	125.087457080	-34.2	14 (10.9 = 78%)	-44 to -46 ft MLLW
	POB1-SC-07	49.776829243	125.084845723	-32.0	14 (9.4 = 67%)	-44 to -45 ft MLLW
	POB1-SC-08	49.776679024	125.084960761	-36.6	9.2 (7.1 = 77%)	-40 to -42 ft MLLW
	POB1-SC-10	49.776795350	125.083779972	-37.8	10 (4.5 = 45%)	-44 to -46 ft MLLW
	POB1-SC-13	49.776811405	125.082658140	-36.9	12.5 (10.3 = 82%)	-44 to -46 ft MLLW
	POB1-SC-15	49.776803529	125.081933423	-37.3	14 (8.5 = 61%)	-44 to -48 ft MLLW
	POB1-SC-18	49.776787783	125.080278297	-36.3	11.9 (10.2 = 86%)	-44 to -46 ft MLLW
	POB1-SC-20	49.776782245	125.079648868	-34.3	13.5 (9.8 = 73%)	-40 to -42 ft MLLW
Swantown Boatworks	POB1-SC-46	49.783319909	125.086261181	-5.7	14 (12.6 = 90%)	-14 to -16 ft MLLW

Shaded stations exhibited poor core recoveries; therefore z-sample depths not clearly determined

7. **Dioxin Testing Summary.** The Agencies' approved sampling and analysis plan was followed and quality assurance/quality control guidelines specified by PSEP and DMMP were generally complied with. The DMMP agencies concluded, after reviewing the data validation report, that the data was acceptable for decision-making using best professional judgment. A summary of dioxin/furan analysis results is provided in **Table 3**.
8. **Dioxin Testing Results Summary.** **Table 3** and **Figure 5** depicts the Z-sample testing results for dioxin/furan at the eight core stations within the Marine Terminal dredging area, and the single Z-sample core station from the Swantown Boatworks site. The dioxin results observed at the Marine Terminal ranged as follows: samples ranged from low of **0.18 pptr-TEQ at SC-15-Z** to a high of **131 pptr-TEQ at SC-20-Z** (U = ½ detection limit).

At the Swantown Boatworks haulout site the dioxin concentrations in the Z-sample were quantitated at **0.43 pptr-TEQ** (U = ½ detection limit).

9. **Dioxin Interim Interpretative Framework.** The DMMP implemented new interim guidelines for interpreting dioxin data implemented on December 6, 2010, and are summarized below for non-dispersive disposal sites ([http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/New Interim Guidelines for Dioxins.pdf](http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/New_Interim_Guidelines_for_Dioxins.pdf)):
 - a. Nondispersive Screening Levels. DMMUs with dioxin concentrations below 10 pptr TEQ will be allowed for open-water disposal as long as the volume-weighted average concentration of dioxins in material from the entire dredging project does not exceed the Disposal Site Management Objective of 4 pptr TEQ.
10. **Dioxin Z-sample Interpretation relative to Antidegradation and DMMP site management.** As summarized in paragraph 8 above, seven of eight Z-samples from the Marine Terminal maintenance dredging subarea had dioxin concentrations above **10 pptr-TEQ**, and all but one sample had dioxin above the 4 pptr-TEQ DMMP background-based site management guideline (**Figure 1 and Table 3**). Based on these dioxin testing results the DMMP agencies determined that the exposed surface at the Marine Terminal at Berth's 1, 2, and 3 would be degraded relative to DMMP dioxin guidelines and, therefore **not in compliance with the Washington State antidegradation standard.**,

Dioxin in the Z-sample from the Swantown Boatworks site was below the DMMP background-based site management guideline, and therefore meets the antidegradation compliance standard.

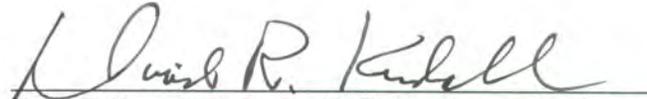
11. **Antidegradation Evaluation.** Due to elevated dioxin concentrations observed in seven of eight z-sample results within the Marine Terminal berthing area (1, 2, and 3), the DMMP determined that the exposed surface after maintenance dredging will not meet the Washington State compliance standard for antidegradation. To insure the compliance with the antidegradation standard the following actions will be required to remedy the exposed surface after maintenance dredging is completed:
 - a. One additional foot of dredge depth will be required to provide room for the clean sand and still achieve the maintenance dredge elevations required for the Port's operational needs. The required dredge elevations at the Marine Terminal areas would therefore be adjusted to -39 and -43 feet MLLW, instead of the originally proposed -38 and -42 feet MLLW elevations.
 - b. The Port will place a minimum 6-inch (nominal 9-12 inches) clean sand cover over the non-keyway component of the Marine Terminal dredge area immediately following the first dredging event.
 - c. Before the end of the second dredging season (2014/15 construction window), the Port must place a minimum 6-inch (nominal 9-12 inches) clean sand cover over the keyway area to address anti-degradation concerns, regardless of whether or not dredging occurs in the second season
 - d. Details on the timing of bathymetric surveys, cover placement, and additional dredging in the keyway area will be determined in consultation with the DMMP agencies and specified in the 401 Certification and COE Permit.
12. This memorandum documents the DMMP's antidegradation compliance evaluation of the exposed surface at the Port of Olympia's Marine Terminal and Swantown Boatworks based on -z-sample results. This memo also outlines actions required to address antidegradation at the Marine Terminal. However, this suitability determination does not constitute final agency approval of the project. A dredging plan for this project must be completed as part of the final project approval process. 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.

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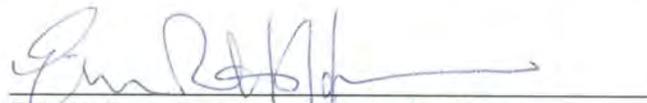
7/10/13

Date


David R. Kendall, Ph.D., Seattle District Corps of Engineers

7/10/13

Date


Erika Hoffman, Environmental Protection Agency

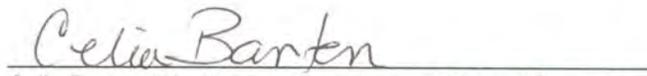
07/10/2013

Date


Laura Inouye, Ph.D., Washington Department of Ecology

7/10/13

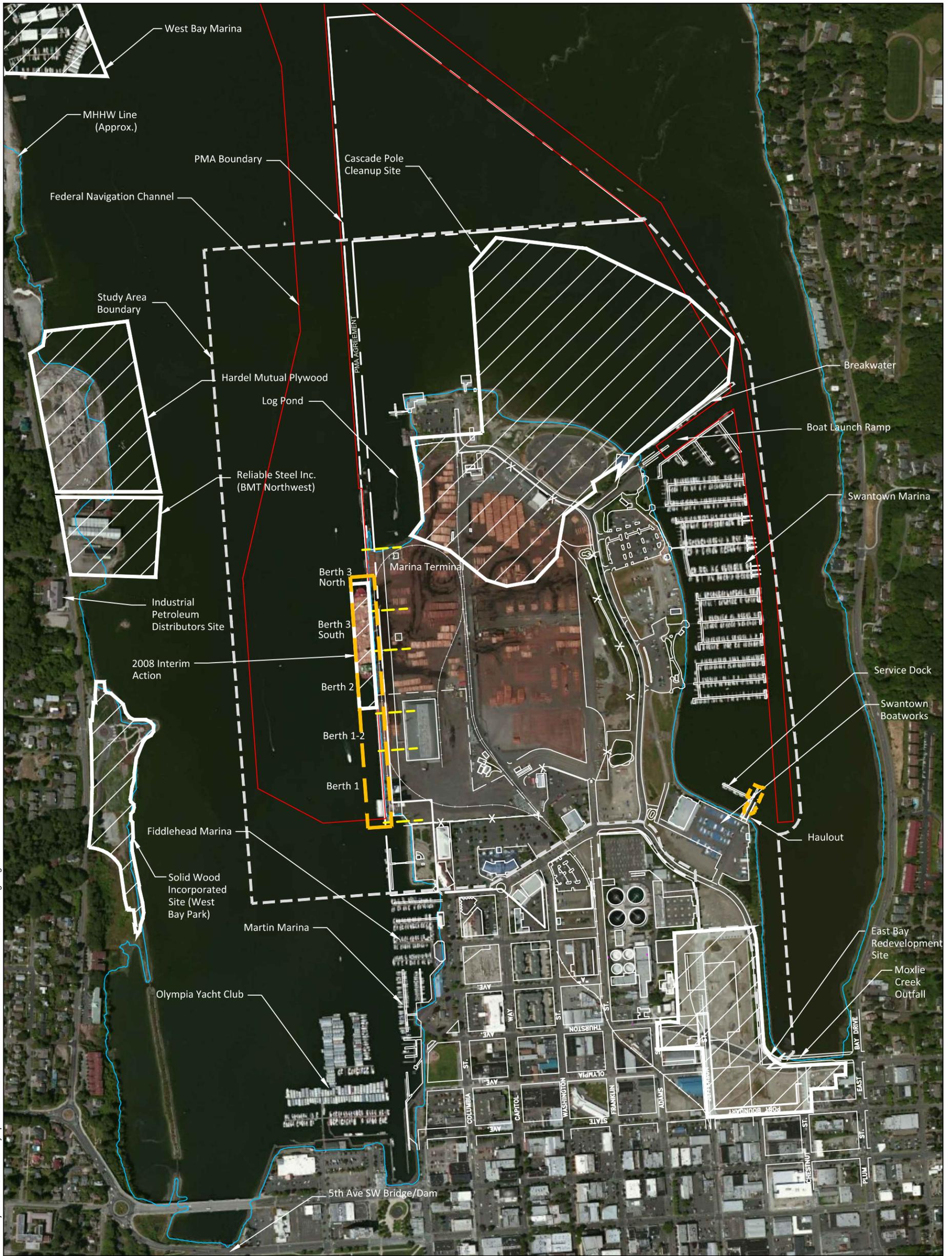
Date


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DMMO file

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SOURCE: Aerial image from ESRI data. Basemap from Port of Olympia, dated June 2008.
HORIZONTAL DATUM: Washington State Plane South, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

-  Cleanup Site
-  Proposed 2013/2014 Dredge Area

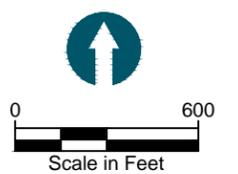


Figure 1
 Site Overview
 Dredge Maintenance Sampling Results Summary
 Port of Olympia Budd Inlet Sediment Site

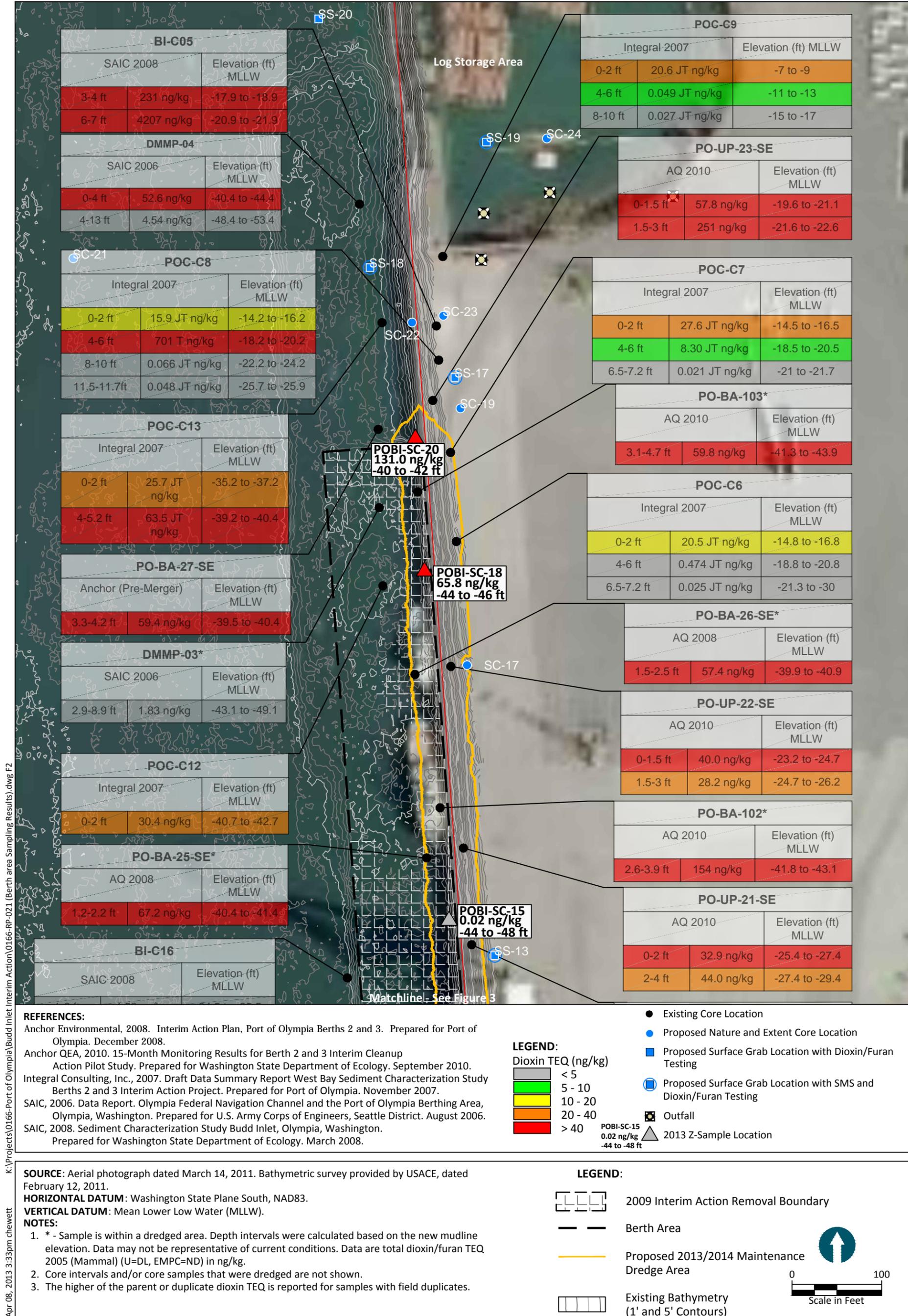
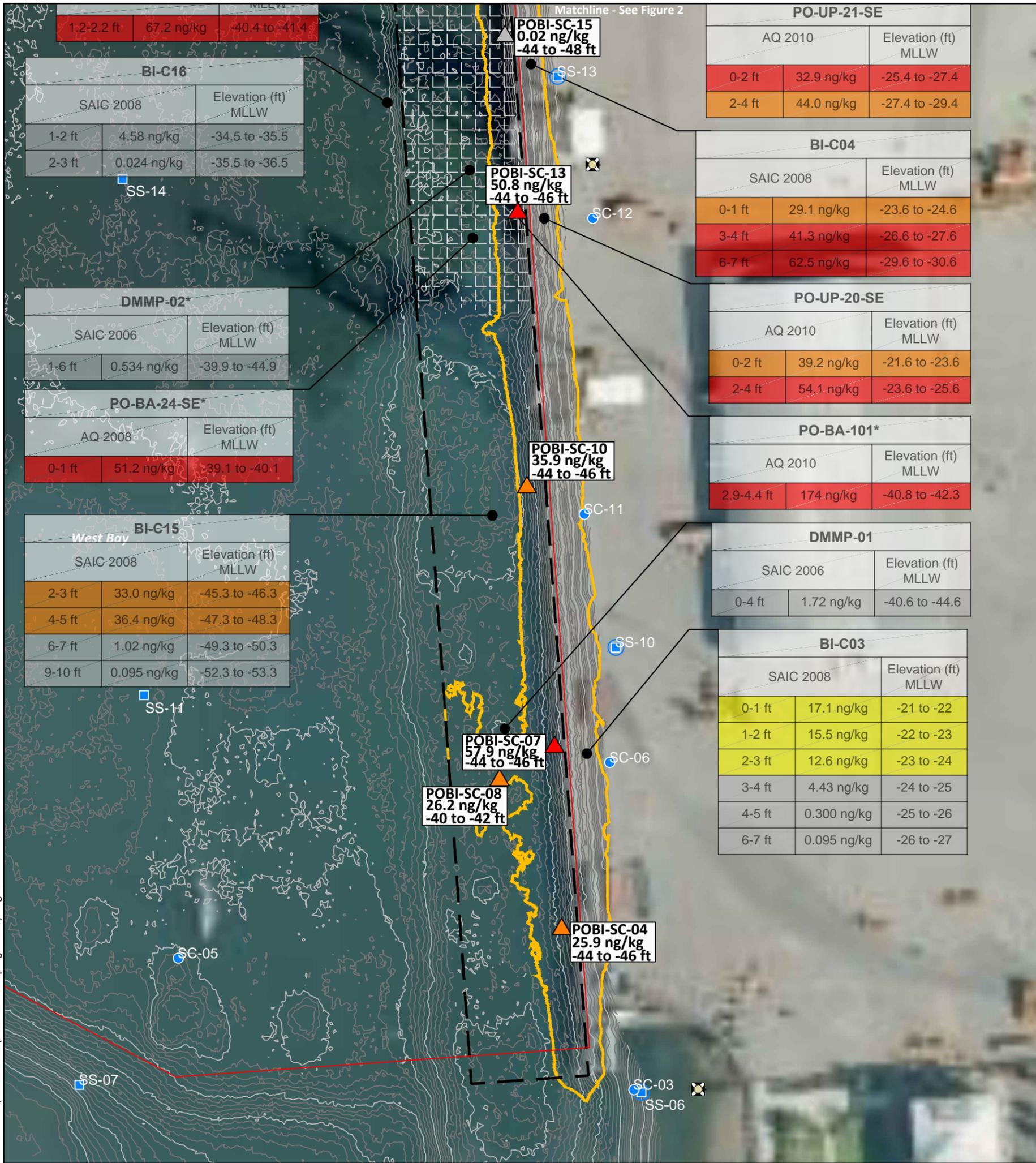


Figure 2
 2013 Z-Sample and Existing Core Results – Berth Area North
 Dredge Maintenance Sampling Results Summary
 Port of Olympia Budd Inlet Sediment Site

Note: All TCDD TEQ's expressed as U = 0, not in U = 1/2 DL



REFERENCES:
 Anchor Environmental, 2008. Interim Action Plan, Port of Olympia Berths 2 and 3. Prepared for Port of Olympia. December 2008.
 Anchor QEA, 2010. 15-Month Monitoring Results for Berth 2 and 3 Interim Cleanup Action Pilot Study. Prepared for Washington State Department of Ecology. September 2010.
 Integral Consulting, Inc., 2007. Draft Data Summary Report West Bay Sediment Characterization Study Berths 2 and 3 Interim Action Project. Prepared for Port of Olympia. November 2007.
 SAIC, 2006. Data Report. Olympia Federal Navigation Channel and the Port of Olympia Berthing Area, Olympia, Washington. Prepared for U.S. Army Corps of Engineers, Seattle District. August 2006.
 SAIC, 2008. Sediment Characterization Study Budd Inlet, Olympia, Washington. Prepared for Washington State Department of Ecology. March 2008.

LEGEND:
 ● Existing Core Location
 ● Proposed Nature and Extent Core Location
 ■ Proposed Surface Grab Location with Dioxin/Furan Testing
 ■ Proposed Surface Grab Location with SMS and Dioxin/Furan Testing
 ⊠ Outfall
 ▲ 2013 Z-Sample Location

LEGEND:
 Dioxin TEQ (ng/kg)
 < 5
 5 - 10
 10 - 20
 20 - 40
 > 40

POBI-SC-15
 0.02 ng/kg
 -44 to -48 ft

SOURCE: Aerial photograph dated March 14, 2011. Bathymetric survey provided by USACE, dated February 12, 2011.
HORIZONTAL DATUM: Washington State Plane South, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).
NOTES:
 1. * - Sample is within a dredged area. Depth intervals were calculated based on the new mudline elevation. Data may not be representative of current conditions. Data are total dioxin/furan TEQ 2005 (Mammal) (U=DL, EMPC=ND) in ng/kg.
 2. Core intervals and/or core samples that were dredged are not shown.
 3. The higher of the parent or duplicate Dioxin TEQ is reported for samples with field duplicates.

LEGEND:
 [Dashed Box] 2009 Interim Action Removal Boundary
 [Dashed Line] Berth Area
 [Yellow Line] Proposed 2013/2014 Maintenance Dredge Area
 [Contour Lines] Existing Bathymetry (1' and 5' Contours)

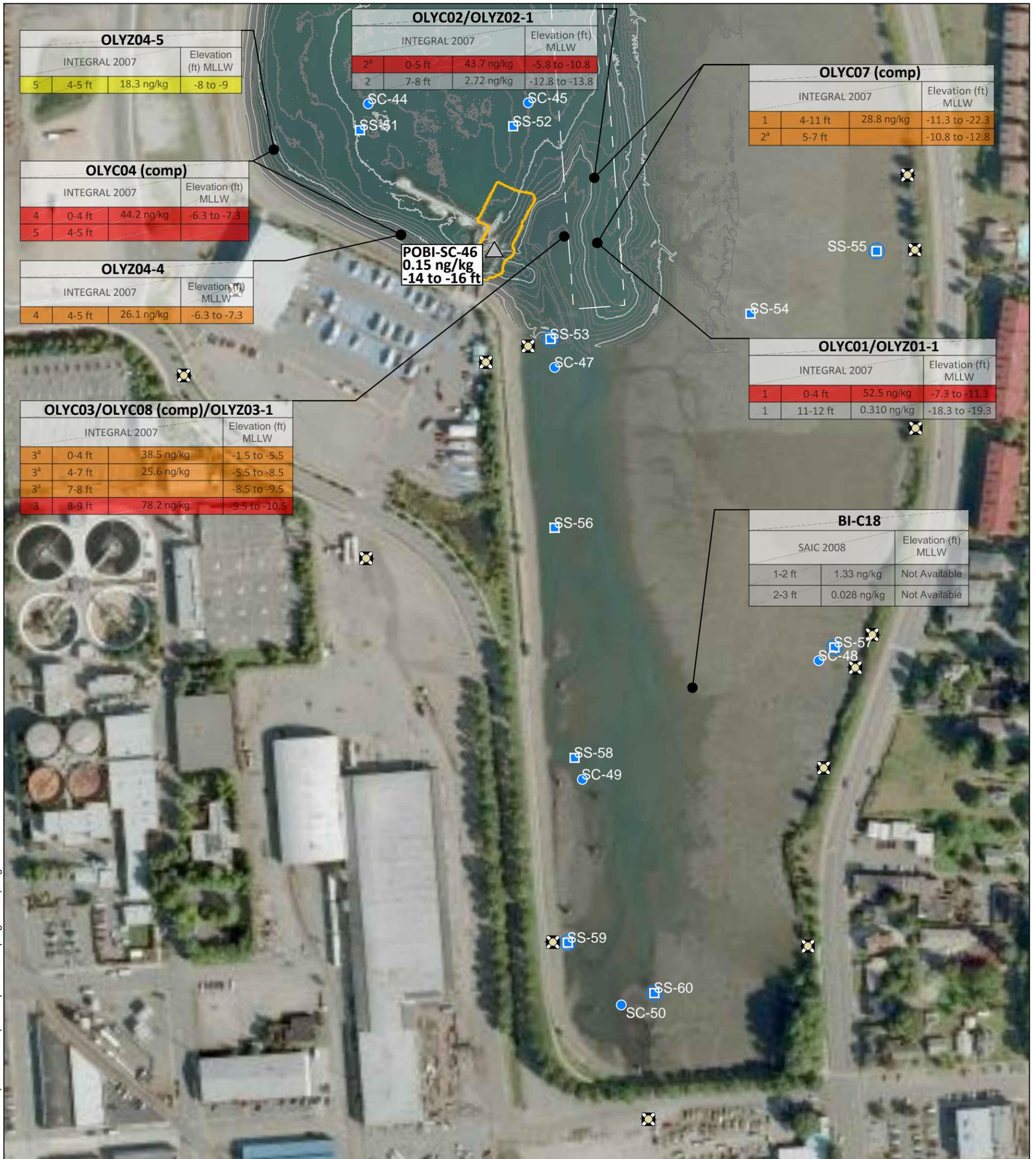
Scale in Feet
 0 100

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Figure 3
 2013 Z-Sample and Existing Core Results – Berth Area South Dredge Maintenance Sampling Results Summary Port of Olympia Budd Inlet Sediment Site

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OLYZ04-5			
INTEGRAL 2007			Elevation (ft) MLLW
5	4-5 ft	18.3 ng/kg	-8 to -9

OLYC02/OLYZ02-1			
INTEGRAL 2007			Elevation (ft) MLLW
2 ^a	0-5 ft	43.7 ng/kg	-5.8 to -10.8
2	7-8 ft	2.72 ng/kg	-12.8 to -13.8

OLYC07 (comp)			
INTEGRAL 2007			Elevation (ft) MLLW
1	4-11 ft	28.8 ng/kg	-11.3 to -22.3
2 ^a	5-7 ft		-10.8 to -12.8

OLYC04 (comp)			
INTEGRAL 2007			Elevation (ft) MLLW
4	0-4 ft	44.2 ng/kg	-6.3 to -7.3
5	4-5 ft		

POBI-SC-46
0.15 ng/kg
-14 to -16 ft

OLYZ04-4			
INTEGRAL 2007			Elevation (ft) MLLW
4	4-5 ft	26.1 ng/kg	-6.3 to -7.3

OLYC01/OLYZ01-1			
INTEGRAL 2007			Elevation (ft) MLLW
1	0-4 ft	52.5 ng/kg	-7.3 to -11.3
1	11-12 ft	0.310 ng/kg	-18.3 to -19.3

OLYC03/OLYC08 (comp)/OLYZ03-1			
INTEGRAL 2007			Elevation (ft) MLLW
3 ^a	0-4 ft	38.5 ng/kg	-1.5 to -5.5
3 ^a	4-7 ft	25.6 ng/kg	-5.5 to -8.5
3 ^a	7-8 ft		-8.5 to -9.5
3	8-9 ft	78.2 ng/kg	-9.5 to -10.5

BI-C18			Elevation (ft) MLLW
SAIC 2008			
1-2 ft	1.33 ng/kg		Not Available
2-3 ft	0.028 ng/kg		Not Available

REFERENCES:
Integral Consulting, Inc., 2007. Draft PSDDA Sediment Characterization Report. East Bay Dredging Project, Olympia, WA. Prepared for Port of Olympia. February 2007
SAIC, 2008. Sediment Characterization Study Budd Inlet, Olympia, Washington. Prepared for Washington State Department of Ecology. March 2008.

LEGEND:

Dioxin TEQ (ng/kg)

- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

● Existing Core Location
● Proposed Nature and Extent Core Location
■ Proposed Surface Grab Location with Dioxin/Furan Testing
■ Proposed Surface Grab Location with SMS and Dioxin/Furan Testing
⊗ Outfall
▲ 2013 Z-Sample Location

POBI-SC-46
0.15 ng/kg
-14 to -16 ft

SOURCE: Aerial photograph dated March 14, 2011. Bathymetric survey dated July, 2010.
HORIZONTAL DATUM: Washington State Plane South, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).
NOTES:
1. Data are total dioxin/furan TEQ 2005 (Mammal) (U=DL, EMPC=ND) in ng/kg.
2. The higher of the parent or duplicate dioxin TEQ is reported for samples with field duplicates.

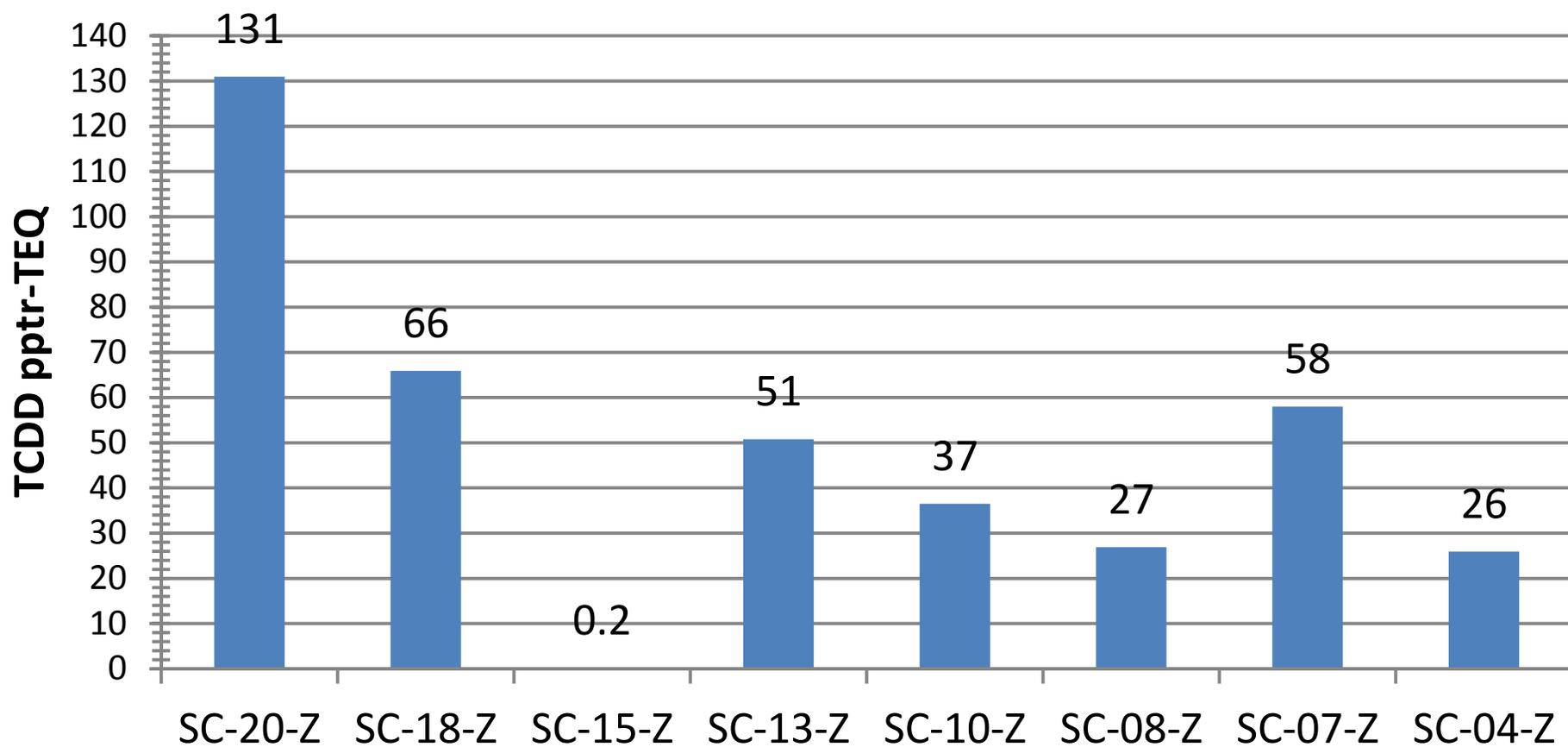
LEGEND:

- Proposed 2013/2014 Maintenance Dredge Area
- Federal Navigation Channel
- Existing Bathymetry (1' and 5' Contours)

0 120
 Scale in Feet

Figure 4
2013 Z-Sample and Existing Core Results – East Bay South Dredge Maintenance Sampling Results Summary
Port of Olympia Budd Inlet Sediment Site

Figure 5. Z-sample Dioxin analyses at Port of Olympia's Marine Terminal, Berth's 1, 2, and 3



TCDD: U = 1/2 DL

Table 3. Dioxin/furan Z-Sample Testing Summary for Port of Olympia Berths 1, 2 and 3 and Swantown Boatworks Maintenance Dredging Assessment.

		Marine Terminal: Berth's 1, 2 & 3 Maintenance Dredging Area														
Analyte	WHO (05) TEF	SC-04-Z			SC-07-Z			SC-07-Z (dup)			SC-08-Z			SC-10-Z		
		-44 to -46 ft MLLW			-44 to -45 ft MLLW			-44 to -45 ft MLLW			-40 to -42 ft MLLW			-44 to -46 ft MLLW		
		ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ
2,3,7,8-TCDD	1	0.949		0.949	1.61	EMPC	0.805	1.72	EMPC	0.860	0.864	EMPC	0.432	1.06	EMPC	0.53
1,2,3,7,8-PeCDD	1	3.52		3.52	9.21		9.21	9.04		9.04	4.69		4.69	4.89		4.89
1,2,3,4,7,8-HxCDD	0.1	4.95		0.495	12.3		1.23	13.3		1.33	5.78		0.578	6.7		0.67
1,2,3,6,7,8-HxCDD	0.1	32		3.2	74.5		7.45	73.8		7.38	38.2		3.82	41.1		4.11
1,2,3,7,8,9-HxCDD	0.1	10.5		1.05	26.2		2.62	25.7		2.57	14.2		1.42	14.7		1.47
1,2,3,4,6,7,8-HpCDD	0.01	769		7.69	1720		17.2	1710		17.1	778		7.78	896		8.96
OCDD	0	5020	J	1.506	11300	J	3.39	11100	J	3.33	5680	J	1.704	6430	J	1.929
2,3,7,8-TCDF	0.1	2.17		0.217	4.46		0.446	4.27		0.427	2.97		0.297	2.98		0.298
1,2,3,7,8-PeCDF	0.03	2.85		0.0855	6.88		0.2064	6.15		0.1845	2.94		0.0882	4.63		0.1389
2,3,4,7,8-PeCDF	0.3	3.29		0.987	8.05		2.415	7.62		2.286	3.15		0.945	5.09		1.527
1,2,3,4,7,8-HxCDF	0.1	16.8		1.68	41.5		4.15	40.4		4.04	15.1		1.51	36.6		3.66
1,2,3,6,7,8-HxCDF	0.1	6.42		0.642	14.8		1.48	14.2		1.42	6.7		0.67	11.3		1.13
2,3,4,6,7,8-HxCDF	0.1	10.2		1.02	11.3	EMPC	0.565	24.3		2.43	5.02	EMPC	0.251	18.5		1.85
1,2,3,7,8,9-HxCDF	0.1	3.88		0.388	9.57		0.957	9.37		0.937	3.12		0.312	6.78		0.678
1,2,3,4,6,7,8-HpCDF	0.01	223		2.23	483		4.83	477		4.77	218		2.18	418		4.18
1,2,3,4,7,8,9-HpCDF	0.01	9.84		0.0984	21.7		0.217	21.4		0.214	8.95		0.0895	19.2		0.192
OCDF	0	372		0.1116	865		0.2595	894		0.2682	337		0.1011	808		0.2424
Total TEQ (u = 1/2):		25.9			57.4			58.6			26.9			36.5		
Total TEQ (u=0):		25.9			56.1			57.7			26.2			35.9		
TOC (%)		3.0			3.6			4.0			3.3			3.4		

Legend:

EMPC = estimated maximum potential concentration (treated as undetected)

J = Estimated concentration, reported at reporting limit

U = Analyte not detected at or above the reported concentration

Table 3. Dioxin/furan Z-Sample Testing Summary for Port of Olympia Berths 1, 2 and 3 and Swantown Boatworks Mainatenance Dredging Assessment.

Analyte	WHO TEF	Marine Terminal: Berth's 1, 2, and 3 Maintenance Dredging Area												Swantown Boatworks		
		SC-13-Z			SC-15-Z			SC-18-Z			SC-20-Z			SC-46-Z		
		-44 to -46 ft MLLW			-44 to -48 ft MLLW			-44 to -46 ft MLLW			-40 to -42 ft MLLW			-14 to -16 ft MLLW		
		ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ
2,3,7,8-TCDD	1	0.939		0.939	0.109	U	0.0545	0.737		0.737	1.67		1.67	0.14	JEMPC	0.07
1,2,3,7,8-PeCDD	1	6.07		6.07	0.0835	U	0.04175	4.28		4.28	10.6		10.6	0.164	U	0.082
1,2,3,4,7,8-HxCDD	0.1	9.3		0.93	0.143	U	0.00715	7.72		0.772	14.1		1.41	0.199	U	0.00995
1,2,3,6,7,8-HxCDD	0.1	49.1		4.91	0.143	U	0.00715	68.7		6.87	140		14	0.341	JEMPC	0.01705
1,2,3,7,8,9-HxCDD	0.1	16.5		1.65	0.151	U	0.00755	16.5		1.65	36.5		3.65	0.656	JEMPC	0.0328
1,2,3,4,6,7,8-HpCDD	0.01	1170		11.7	1.77		0.0177	1760		17.6	3370		33.7	9.5		0.095
OCDD	0	8580	J	2.574	11.2		0.00336	12500	J	3.75	25200	J	7.56	82.7		0.02481
2,3,7,8-TCDF	0.1	3.37		0.337	0.0775	U	0.003875	2.69	EMPC	0.1345	7.55		0.755	0.132	U	0.0066
1,2,3,7,8-PeCDF	0.03	5.4	J	0.162	0.0895	U	0.0013425	4.9	J	0.147	14		0.42	0.13	U	0.00195
2,3,4,7,8-PeCDF	0.3	9.6		2.88	0.0795	U	0.011925	10.2		3.06	28.8		8.64	0.124	U	0.0186
1,2,3,4,7,8-HxCDF	0.1	62.2		6.22	0.0795	U	0.003975	83.3		8.33	201		20.1	0.359	JEMPC	0.01795
1,2,3,6,7,8-HxCDF	0.1	15.4		1.54	0.0755	U	0.003775	19.2		1.92	40.3		4.03	0.142	U	0.0071
2,3,4,6,7,8-HxCDF	0.1	25.7		2.57	0.0875	U	0.004375	35.8		3.58	67.6		6.76	0.167	U	0.00835
1,2,3,7,8,9-HxCDF	0.1	9.99		0.999	0.0875	U	0.004375	13.2		1.32	36.2		3.62	0.175	U	0.00875
1,2,3,4,6,7,8-HpCDF	0.01	657		6.57	0.372	JEMPC	0.00186	1030		10.3	1270		12.7	3.28		0.0328
1,2,3,4,7,8,9-HpCDF	0.01	32		0.32	0.151	U	0.000755	52.3		0.523	98.5		0.985	0.116	JEMPC	0.00058
OCDF	0	1520		0.456	0.875	J	0.0002625	3200		0.96	2960		0.888	6.48		0.001944
Total TEQ (u = 1/2):				50.8			0.18			65.9			131			0.44
Total TEQ (u=0):				50.8			0.02			65.8			131			0.15
TOC (%)				3.6			0.3			3.0			6.5			0.17

Table 3. Dioxin/furan Z-Sample Testing Summary for Port of Olympia Berths 1, 2 and 3 and Swantown Boatworks Maintenance Dredging Assessment.

		Puget Sound SRM (030513)					
Analyte	WHO	SRM (030513)			SRM Acceptance Limits		
	TEF	ng/kg-dw	LQ	TEQ	ng/kg-dw (AVG)	TEQ	In/Out (Low/High)
	2,3,7,8-TCDD	1	1.02		1.02	1.05	1.05
1,2,3,7,8-PeCDD	1	1.18		1.18	1.08	1.08	ln (.542/1.63)
1,2,3,4,7,8-HxCDD	0.1	1.43		0.143	1.59	0.159	ln (0.797/2.39)
1,2,3,6,7,8-HxCDD	0.1	3.79		0.379	3.88	0.388	ln (1.94/5.82)
1,2,3,7,8,9-HxCDD	0.1	2.47		0.247	3.04	0.304	ln (1.52/4.55)
1,2,3,4,6,7,8-HpCDD	0.01	102		1.02	90.6	0.906	ln (45.3/136)
OCDD	0	907		0.2721	811	0.2433	ln (406/1217)
2,3,7,8-TCDF	0.1	0.839		0.0839	1.11	0.111	ln (0.557/1.67)
1,2,3,7,8-PeCDF	0.03	0.939	J	0.02817	1.23	0.0369	ln (0.613/1.84)
2,3,4,7,8-PeCDF	0.3	0.725	J	0.2175	1.07	0.321	ln (0.533/1.60)
1,2,3,4,7,8-HxCDF	0.1	3.09		0.309	3.02	0.302	ln (1.51/4.53)
1,2,3,6,7,8-HxCDF	0.1	0.883	JEMPC	0.04415	1.09	0.109	ln (.545/1.64)
2,3,4,6,7,8-HxCDF	0.1	2.09		0.209	1.83	0.183	ln (.917/2.75)
1,2,3,7,8,9-HxCDF	0.1	0.496	J	0.0496	0.511	0.0511	ln (.255/0.77)
1,2,3,4,6,7,8-HpCDF	0.01	20		0.2	18.7	0.187	ln (9.36/28.1)
1,2,3,4,7,8,9-HpCDF	0.01	1.71		0.0171	1.63	0.0163	ln (.815/2.44)
OCDF	0	61.4		0.01842	58.4	0.01752	ln (29.2/87.6)
Total TEQ (u = 1/2):				5.438		5.465	
Total TEQ (u=0):				5.394		5.465	
TOC (%)							