CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD March 6, 2012

SUBJECT: INTERIM DETERMINATION ON THE SUITABILITY OF PROPOSED MAINTENANCE DREDGED MATERIAL FROM THE SEATTLE IRON & METALS CORPORATION DREDGING PROJECT IN SEATTLE, WASHINGTON (APPLICATION NO. NWS-2010-1114) EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR OPEN-WATER DISPOSAL AT A DMMP NON-DISPERSIVE OPEN-WATER DISPOSAL SITE AND ANTIDEGRADATION EVALUATION.

1. The following summary reflects the suitability determination memorandum on the characterization conducted at the Seattle Iron and Metals Corporation facility on the Duwamish Waterway. This summary reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) on the suitability of an estimated 28,000 cy of maintenance dredged material at the Seattle Iron and Metals Corporation North Dock evaluated for open-water unconfined disposal at the Elliott Bay non-dispersive open-water disposal site in Seattle, Washington.

Table 1. Project DMMP Tracking Details

JARPA APPLICATION NO.	NWS-2010-1114
SAP submitted:	May 18, 2011
SAP approved	June 27, 2011
Sampling dates: Vibracore sampler (4 – 10 ft cores & 4 – 6 ft cores)	June29, 2011 (4-surface DMMUs, 8 stations, 1-subsurface DMMU)
Final Characterization Report received by DMMP	February 3, 2012
Recency Determination: High Concern (2 years)	June 2013
DAIS reference number:	SI&MC-1-A-F-320

2. Background. This project is located in a High Concern area on the eastern side of the Lower Duwamish Waterway (LDW) Superfund Site between 2.3 and 2.5 miles from the southern end of Harbor Island in an industrial area of Seattle. The upland areas next to this portion of the waterway have been industrialized for decades. Historical and current operations in the vicinity of RM 2.3-2.5 East include food products manufacturing and distribution, metal products fabrication and recycling, cargo handling and storage, chemical repackaging and distribution, coffee roasting, heavy equipment storage, and truck, interior manufacturing. Seattle Iron & Metals is bordered by Seattle Boiler Works (downriver at RM 2.3) and S. Myrtle Street to the north, Trim Systems/CVG Commercial Vehicle Group, Pioneer Distribution and 7th Avenue S. to the east, Puget Sound Truck Lines (upriver at RM 2.6 to 2.8) and S. Othello Street to the south, and LDW to the west.

3. Site History. A summary of site history information extracted from SAIC, 2008, is provided at Attachment 1, and contains a summary of previously identified chemicals-of-concern for RM 2.3 to 2.8 East.

4. Sampling and Analysis Plan. The sampling and analysis plan (SAP) was submitted for DMMP agency review on May 18, 2011, and revised SAP was submitted for review on June 21, 2011, and was subsequently approved by the DMMP agencies on June 27, 2011.

5. Sampling. The sampling commenced on June 29, 2011 utilizing a Vibracore sampler for sampling. Table 2 and Figure 1 depicts the eight sampling stations, and Dredged Material Management Unit (DMMU) compositing strategy for the five DMMUs, which consisted of two composited samples from the upper 4-ft interval for each of

the four DMMUs (C1 – C4) and a subsurface composite (C5) made up of sediment from a core of the 4-8ft depth interval from each of the four DMMUs. The data characterization report was provided to the DMMP agencies for review and data quality assurance/control review on February 3, 2012. Some of the analytical data were missing or incomplete in the characterization report provided as described in paragraph 6 below. Therefore, a complete DMMP COC analysis inventory was not available at the time this suitability determination was completed. This **interim** suitability determination, therefore, reflects an assessment of the available data relative to DMMP guidelines and antidegradation compliance. The available data has undergone data validation, and therefore was acceptable for decision-making using best professional judgment.

Table 2. Summary of DMMU Sampling Stations at Seattle Iron & Metals, Corp. North Dock

DMMU ID	Vibracore Station ID#	Latitude	Longitude	Water Depth, feet	Approximate Mudline Elevation, feet MLLW	Approximate core depth, feet (with Z-sample annotated)	DMMU design dredge volume, cubic yards
C1	1-1	47.538447	122.327917	16.1	-13.1	10 (Z + 2)	4,000
	1-2	47.538404	122.328329	11.0	-12.5	6	
C2	2-1	47.538087	122.327445	20.1	-14.4	10 (Z + 2)	4,000
	2-2	47.538241	122.327779	12.1	-13.4	6	
C3	3-1	47.537738	122.326925	22.4	-12.4	10 (Z + 2)	4,000
	3-2	47.537421	122.326598	15.4	-13.7	6	
C4	4-1	47.537311	122.326304	21.3	-11.3	10 (Z + 2)	4,000
	4-2	47.536981	122.326163	15.7	-16.2	6	
C5	1-1, 2-1, 3-1, 4-1	NA	NA	NA	-13 to -17	Composite of 4-8 ft	12,000

NA = not applicable

6. Standard Chemicals of Concern Testing Summary. The Agencies' approved sampling and analysis plan was generally followed and quality assurance/quality control guidelines specified by PSEP and DMMP were generally complied with for the data provided, although as noted in Table 3, some of the analytical data were missing in the Characterization Report (1,3-Dichlorobenzene, Hexachloroethane, Lindane, Aroclors: 1016, 1221, 1232, 1242, 1262, and 1268). A summary of analyzed results for the standard list of CoC's is provided in Table 3, and demonstrates that PCBs exceeded the SL in all four DMMUs, with concentrations of total PCBs ranging from 186 ppb (C4) to 241 ppb (C2). Additionally SLs were exceeded for Benzoic Acid and Benzyl Alcohol in one or more DMMUs as depicted in Table 3. In DMMU-C1, Benzoic Acid exceeded the CSL and Benzyl Alcohol exceeded the SQS. Other than dioxins, the remaining analytes were below the Screening Levels in the four DMMUs. No toxicity testing was conducted to assess the DMMU's with SL exceedances.

7. Dioxin Testing Results Summary. Table 4 provides the results of dioxin/furan testing. The results for the four surface DMMUs, were as follows: DMMU-C1 = 19.9 pptr-TEQ, and DMMU-C2 = 14.2 pptr-TEQ, DMMU-C3 = 9.96 pptr-TEQ, and DMMU-C4 = 10.8 pptr-TEQ, whereas the subsurface DMMU-C5 = 10.0 pptr-TEQ (U = ½ detection limit).

8. 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):

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.

9. Dioxin Interpretation on Suitability for Unconfined-Open-Water Disposal. As summarized in paragraph 7 above, DMMU's C1, C2, and C4 were all quantitated above the 10 pptr-TEQ upper dioxin guideline limit, whereas DMMU C3 was quantitated close to the 10 pptr-TEQ upper limit at 9.96 pptr-TEQ. Moreover, the volume-weighted average for the five DMMUs (C1, C2, C3, C4, and C5) totaling 28,000 cy of characterized material is 12.1 pptr-TEQ, which is well above the 4-pptr-TEQ site management objective (Table 5). Therefore, on the basis of dioxin, all five DMMUs are unsuitable for open-water disposal at the Elliott Bay disposal site.

10. Antidegradation Evaluation of Z-samples underlying DMMU's.: Based on the PCB and dioxin guideline exceedances, the DMMP required the analysis of all four z-samples underlying the four surface DMMUs, and composited subsurface DMMU. The results of these z-sample analyses are summarized in Tables 3 and 4. For PCBs, the z-samples were all quantitated above the SQS guidelines for PCBs ranging from 13.4 to 55.5 ppm-TOC normalized, and all were more elevated than the overlying sediment. Moreover the Z sample at C1 was above the DMMP bioaccumulation trigger (38 ppm-TOC). The dioxin testing results showed concentrations ranging from 6.4 to 19.1 pptr-TEQ, where Z-sample concentrations in two of the DMMUs (C3 and C4) were more elevated than the overlying sediments. The CSL was exceeded in Z-sample at C2 for both Benzoic Acid and Benzyl Alcohol, whereas the SQS was exceeded for Benzyl Alcohol in Z-sample at C2.

11. The results of the z-sample analyses for dioxin and PCBs and for other analytes are summarized in Table 3, and congener specific dioxin summaries are found in Table 4. The z-sample results for dioxin in C1 (14 pptr-TEQ) was slightly lower than that seen in the dredge prism but still significantly elevated relative to the 4/10 pptr TEQ guideline, whereas the dioxin results for the Z-samples at C3 and C4 showed higher concentrations relative to the overlying material. Only for z-sample,C2-Z (6.36 pptr-TEQ) exhibited a dioxin concentration below 10 pptr-TEQ, although still above the DMMP 4 pptr-TEQ guideline.

12. Based on the PCBs and Dioxin testing results for all four DMMUs, the DMMP has concluded that the z-sample results for all four DMMUs are not in compliance with the antidegradation standard. At a minimum, the following actions will be required to remedy the exposed surface after maintenance dredging is completed although a final design would need to be coordinated with the EPA's CERCLA program:

    b. Dredge an additional one-foot of material beyond the required maintenance depth (-17 ft to -18 ft MLLW).
    c. Place a one-foot clean sand cover over the exposed surface.

13. Suitability for Unconfined-Open Water Disposal. Based on the testing results for the five DMMUs summarized in Table 3, all 28,000 cy of proposed dredged material is unsuitable for unconfined open-water disposal, and will have to be dredged and placed at an Ecology approved upland confined disposal site.

14. This memorandum documents the interim suitability determination for the characterized dredged material at the Seattle Iron and Metals Corporation dredging area for unconfined-open-water disposal at the Elliott Bay non-dispersive disposal site. It also documents the requirements to evaluate the exposed post-dredge surface to assess antidegradation compliance, and proposed remedy to address this concern. 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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Concur: The SDM is on file in the DMMO Project File

Date	David R. Kendall, Ph.D., 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

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DMMO file

Seattle Iron & Metals, Corp.

Upland Yard

SOUTH MYRTLE STREET

S MYRTLE ST. OUTFALL

EXISTING BUILDING

S Myrtle St. Embayment

ABANDONED OUTFALL

S GARDEN ST. OUTFALL

North Wharf

South Wharf

PROPERTY LINE

DMMU-1

DMMU-2

DMMU-3

DMMU-4

EDGE OF MAINTAINED CHANNEL

CENTERLINE CHANNEL

FLOOD

EBB

DUWAMISH WATERWAY

APPROX. TOP OF BANK

LDW-SS527 Jan. 24, 05 Dioxin TEQ=3.3J

LDW-SC41 Feb. 20, 06

DR116 Aug. 18, 98

LDW-SS527 Dec. 17, 09 Dioxin TEQ=4.1J

LDW-SC42 Feb. 08, 06

DR118 Aug. 18, 98

DR117 Aug. 18, 98

1-1

1-2

2-1

2-2

3-1

3-2

4-1

4-2

EST182 Nov. 13, 97 PCBs=1.1xSQS

DR150 Aug. 19, 98

EST184 Oct. 22, 97

EST185 Oct. 20, 97

DR119 Aug. 18, 98 PCBs=1.2xSQS

LDW-SS87 Jan. 21, 05

DR151 Aug. 18, 98 PCBs=1.03xSQS

EST186 Oct. 20, 97

EST183 Oct. 20, 97

DR170 Aug. 13, 98

S14 Aug. 26, 99

CH0027 Oct. 14, 97

DR171 Aug. 19, 98

CH0020 Oct. 24, 97

DR231 Aug. 13, 98

EST178 Oct. 07, 97

LDW-SS333 Oct. 02, 06

DR172 Aug. 18, 98

EI1074 Nov. 03, 97

EST177 Oct. 22, 97

LDW-SS388 Jan. 25, 05 Hg=1.5xSQS; 1.1xSQS PCBs=3.9xSQS

LDW-SC43 Feb. 22, 06

LDW-SS334 Oct. 02, 06

WST340 Nov. 13, 97

WST339 Oct. 10, 97

DR159 Aug. 13, 98

DR189 Aug. 14, 98 HPAHs=1.2xSQS

WIT279 Oct. 17, 97

LDW-SS90 Mar. 14, 05

WST342 Oct. 23, 97

DR158 Aug. 20, 98

DR140 Sep. 01, 98

DR141 Aug. 20, 98 3 Ind. PAHs 1.1-1.5xSQS

LDW-SS526 Dec. 16, 09 Dioxin TEQ=1.1J PCBs=1.7xSQS

LDW-SS86 Mar. 10, 05

C5 Mar. 05, 99

C6 Mar. 05, 99

WRC-SS-B2 May 08, 04

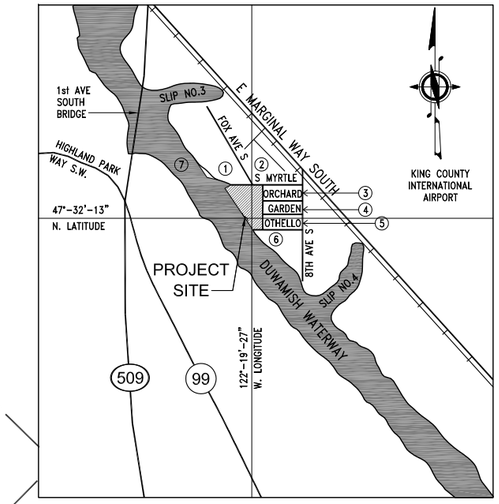
WRC-SS-B1 May 08, 04

WRC-SS-B5 May 08, 04 ZAs=1.2xSQS

WIT277 Nov. 12, 97

VICINITY MAP

NOT TO SCALE



DREDGE PLAN

SCALE: 1" = 100'

100 0 100 200

SCALE IN FEET 1" = 100'

LEGEND:

- 2-1 — CORE LOCATIONS (8 FOOT)
- 2-2 — CORE LOCATIONS (4 FOOT)
- XX / YY — EXISTING SEDIMENT SAMPLE
- XX / YY / ZZ — EXISTING SEDIMENT SAMPLE WITH SMS EXCEEDANCE AND DIOXIN DATA (in pptr TEQ)
- PROPOSED DREDGE AREA
- (#) — DREDGE SECTION
- EXISTING DOLPHIN

HARBOR CONSULTING ENGINEERS
ENGINEERS · PLANNERS · SURVEYORS
3006 FUHRMAN AVENUE EAST
SEATTLE WASHINGTON 98102
PHONE: (206) 709-2397

REVISED DESCRIPTION	DATE

SCALE: 1"=200'
CHK BY: X
DRW BY: JVL
REF: X

SEATTLE IRON & METALS CORP.
MAINTENANCE DREDGING

SEDIMENT SAMPLE LOCATION PLAN AND VICINITY MAP

JOB NO. 10012.00
DATE: 09/22/2011
SHEET: OF
DWG.# FIG 1

XX SET - NOT FOR CONSTRUCTION

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Table 3. Seattle Iron and Metals Corporation, Dredging and Dock Replacement Characterization, Seattle, Washington

Chemical Name	DMMP Guidelines				SMS Guidelines			DMMU-C1			DMMU-C1-Z1			DMMU-C2			DMMU-C2-Z2			DMMU-C3			DMMU-C3-Z3		
	Vibracore ID: (Sampling elevation, ft. below mudline)							1-1 &1-2 (0-4 ft)		VQ	1-1 (8-10 ft)		VQ	2-1 & 2-2 (0-4 ft)		VQ	2-1 (8-10 ft)		VQ	3-1 & 3-2 (0-4 ft)		VQ	3-1 (8-10 ft)		VQ
								DMMP	SMS		DMMP	SMS		DMMP	SMS		DMMP	SMS		DMMP	SMS		DMMP	SMS	
Metals		SL	ML	BT		SQS	CSL	dry wgt	mg-oc-norm		dry wgt	mg-oc-norm		dry wgt	mg-oc-norm		dry wgt	mg-oc-norm		dry wgt	mg-oc-norm		dry wgt	mg-oc-norm	
Antimony	mg/kg dw	150	200	-		--	--	**9**		U	**--**	6	U	**--**	9	U	7		U	9		U	9		U
Arsenic	mg/kg dw	57	700	507.1	mg/kg	57	93	**17**			**9**			**16**			**12**			**16**			**19**		
Cadmium	mg/kg dw	5.1	14	11.3	mg/kg	5.1	6.7	**0.5**			**0.4**			**0.5**			**0.4**			**0.4**			**0.7**		
Chromium	mg/kg dw	260	-	260	mg/kg	260	270	**34.3**			**28.6**			**36.3**			**26.1**			**33.6**			**35**		
Copper	mg/kg dw	390	1300	1027	mg/kg	390	390	**67.6**			**30.5**			**59.5**			**39.9**			**56.3**			**66.4**		
Lead	mg/kg dw	450	1200	975	mg/kg	450	530	**50**			**21**			**29**			**27**			**26**			**46**		
Mercury	mg/kg dw	0.41	2.3	1.5	mg/kg	0.41	0.59	**0.16**		J	**0.1**		J	**0.14**		J	**0.09**		J	**0.15**		J	**0.26**		J
Selenium	mg/kg dw	-	-	3	mg/kg	--	--	0.9		U	0.6		U	0.9		U	0.7		U	0.9		U	0.9		U
Silver	mg/kg dw	6.1	8.4	6.1	mg/kg	6.1	6.1	0.5		U	0.3		U	0.6		U	0.4		U	0.6		U	0.5		U
Zinc	mg/kg dw	410	3800	2783	mg/kg	410	960	**129**			**61**			**113**			**74**			**104**			**132**		
Tributyltin (porewater - ion)	ug/L	0.15	--	0.15				**0.01**			**0.013**		J	0.005		U	**0.032**			**0.004**		J	**0.006**		
PAHs																									
Acenaphthene	µg/kg dw	500	2000	-	mg/kg-OC	16	57	**48**	**2.03**		**16**	**1.61**	J	**19**	**0.86**	J	**38**	**2.62**		**20**	**1.07**		**57**	**2.68**	
Acenaphthylene	µg/kg dw	560	1300	-	mg/kg-OC	66	66	19	0.80	U	18	1.82	U	20	0.90	U	19	1.31	U	19	1.02	U	**13**	**0.61**	J
Anthracene	µg/kg dw	960	13000	-	mg/kg-OC	220	1,200	**100**	**4.22**		**29**	**2.93**		**46**	**2.08**		**110**	**7.59**		**21**	**1.12**		**170**	**7.98**	
Benzo(a)anthracene	µg/kg dw	1300	5100	-	mg/kg-OC	110	270	**310**	**13.1**		**55**	**5.55**		**140**	**6.33**		**290**	**20.0**		**84**	**4.49**		**220**	**10.3**	
Total Benzofluoranthene	µg/kg dw	3200	9900	-	mg/kg/OC	230	450	**680**	**28.7**		**100**	**10.1**		**370**	**16.7**		**760**	**52.4**		**220**	**11.8**		**440**	**20.7**	
Benzo(g,h,i)perylene	µg/kg dw	670	3200	-	mg/kg-OC	31	78	**160**	**6.75**		**26**	**2.62**		**110**	**4.98**		**160**	**11.0**		**58**	**3.10**		**90**	**4.23**	
Benzo(a)pyrene	µg/kg dw	1600	3600	-	mg/kg-OC	99	210	**260**	**11.0**		**42**	**4.24**		**160**	**7.24**		**300**	**20.7**		**86**	**4.60**		**180**	**8.45**	
Chrysene	µg/kg dw	1400	21000	-	mg/kg-OC	110	460	**410**	**17.3**		**65**	**6.56**		**190**	**8.60**		**410**	**28.3**		**110**	**5.88**		**260**	**12.2**	
Dibenzo(a,h)anthracene	µg/kg dw	230	1900	-	mg/kg-OC	12	33	**48**	**2.03**		**8.6**	**0.87**		**33**	**1.49**		**61**	**4.21**		**17**	**0.91**		**38**	**1.78**	
Fluoranthene	µg/kg dw	1700	30000	4600	mg/kg-OC	160	1,200	**810**	**34.2**		**200**	**20.2**		**290**	**13.1**		**570**	**39.3**		**150**	**8.02**		**980**	**46.0**	
Fluorene	µg/kg dw	540	3600	-	mg/kg-OC	23	79	**57**	**2.41**		**20**	**2.02**		**17**	**0.77**	J	**37**	**2.55**		**16**	**0.86**	J	**95**	**4.46**	
Indeno(1,2,3-cd)pyrene	µg/kg dw	600	4400	-	mg/kg-OC	34	88	**140**	**5.91**		**24**	**2.42**		**97**	**4.39**		**160**	**11.0**		**52**	**2.78**		**91**	**4.27**	
2-Methylnaphthalene	µg/kg dw	670	1900	-	mg/kg-OC	38	64	**21**	**0.89**		**13**	**1.31**	J	**16**	**0.72**	J	**24**	**1.66**		**26**	**1.39**		**19**	**0.89**	J
Naphthalene	µg/kg dw	2100	2400	-	mg/kg-OC	99	170	**39**	**1.65**		**53**	**5.35**		**26**	**1.18**		**51**	**3.52**		**110**	**5.88**		**36**	**1.69**	
Phenanthrene	µg/kg dw	1500	21000	-	mg/kg-OC	100	480	**270**	**11.4**		**110**	**11.1**		**130**	**5.88**		**210**	**14.5**		**61**	**3.26**		**380**	**17.8**	
Pyrene	µg/kg dw	2600	16000	11980	mg/kg-OC	1,000	1,400	**1200**	**50.6**		**190**	**19.2**		**500**	**22.6**		**1600**	**110.3**		**230**	**12.3**		**920**	**43.2**	
Total HPAHs	µg/kg dw	12000	69000	-	mg/kg-OC	960	5,300	**4018**	**169.5**		**711**	**71.7**		**1890**	**85.5**		**4311**	**297.3**		**1007**	**53.9**		**3219**	**151.1**	
Total LPAHs	µg/kg dw	5200	29000	-	mg/kg-OC	370	780	**535**	**22.6**		**241**	**24.3**		**254**	**11.5**		**470**	**32.4**		**254**	**13.6**		**770**	**36.2**	
Phthalates																									
Butyl benzyl phthalate	µg/kg dw	63	970	-	mg/kg-OC	4.9	64	**24**	**1.01**		**5.3**	**0.53**		**22**	**1.00**		**31**	**2.14**		**30**	**1.60**		**22**	**1.03**	
Di-n-butyl phthalate	µg/kg dw	-	-	-	mg/kg-OC	220	1,700	**12**	**0.51**	J	18	1.82	U	20	0.90	U	**10**	**0.69**	J	**42**	**2.25**		20	0.94	U
Di-n-octyl phthalate	µg/kg dw	6200	6200	-	mg/kg-OC	58	4,500	**210**	**8.86**		**66**	**6.66**		**110**	**4.98**		**270**	**18.6**		**74**	**3.96**		**160**	**7.51**	
Diethyl phthalate	µg/kg dw	200	1200	-	mg/kg-OC	61	110	48	2.03	U	46	4.64	U	49	2.22	U	47	3.24	U	47	2.51	U	49	2.30	U
Dimethyl phthalate	µg/kg dw	71	1400	-	mg/kg-OC	53.0	53.0	**6.2**	**0.26**		4.6	0.46	U	**7.1**	**0.32**		4.7	0.32	U	**13**	**0.70**		**7.9**	**0.37**	
Bis(2-ethylhexyl) phthalate	µg/kg dw	1300	8300	-	mg/kg-OC	47	78	**210**	**8.86**		**66**	**6.66**		**110**	**4.98**		**270**	**18.6**		**74**	**3.96**		**160**	**7.51**	
Phenols																									
2,4-Dimethylphenol	µg/kg dw	29	210	-	ug/kg	29	29	**38**			37		U	39		U	**5.2**			38		U	39		U
2-Methylphenol	µg/kg dw	63	77	-	ug/kg	63	63	5.6		U	4.6		U	4.9		U	**4.9**			4.7		U	4.9		U
4-Methylphenol	µg/kg dw	670	3600	-	ug/kg	670	670	**24**		J	37		U	**18**		J	**22**		J	**14**		J	**17**		J
Pentachlorophenol	µg/kg dw	400	690	504	ug/kg	360	690	24		U	23		U	24		U	24		U	24		U	25		U
Phenol	µg/kg dw	420	1200		ug/kg	420	1,200	**79**			**11**		Jj	**40**			**76**			**26**			**32**		
Other SVOCs																									
Dibenzofuran	µg/kg dw	540	1700	-	mg/kg-OC	15	58	**44**	**1.86**		**12**	**1.21**	J	**24**	**1.09**		**37**	**2.55**		**14**	**0.75**	J	**40**	**1.88**	
Benzoic Acid	µg/kg dw	650	760	-	ug/kg	650	650	**880**			**--**			**510**			**780**			**210**		J	**290**		J
Benzyl Alcohol	µg/kg dw	57	870	-	ug/kg	57	73	**120**			18		U	**100**			**92**			**110**			**42**		
1,2-Dichlorobenzene	µg/kg dw	35	110	-	mg/kg-OC	2.3	2.3	19	0.80	U	18	1.82	U	20	0.90	U	19	1.31	U	19	1.02	U	20	0.94	U
1,3-Dichlorobenzene	µg/kg dw	170	-	-	mg/kg-OC	--	--	**--**			**--**			**--**			**--**			**--**			**--**		
1,4-Dichlorobenzene	µg/kg dw	110	120	-	mg/kg-OC	3.1	9.0	4.8	0.20	U	**7.3**	**0.74**		4.9	0.22	U	**5.2**	**0.36**		4.7	0.25	U	4.9	0.23	U
Hexachlorobenzene	µg/kg dw	22	230	168	mg/kg-OC	0.38	2.3	4.8	0.20	U	4.6	0.46	U	4.9	0.22	U	4.7	0.32	U	4.7	0.25	U	4.9	0.23	U
Hexachlorobutadiene	µg/kg dw	29	270	-	mg/kg-OC	3.9	6.2	1.2	0.05	U	0.9	0.09	U	1.2	0.05	U	0.97	0.07	U	1.2	0.06	U	1.2	0.06	U
Hexachloroethane	µg/kg dw	1400	14000	-	mg/kg-OC	--	--	**--**			**--**			**--**			**--**			**--**			**--**		
N-Nitrosodiphenylamine	µg/kg dw	28	130	-	mg/kg-OC	11	11	4.8	0.20	U	**5.7**	**0.58**		4.9	0.22	U	**5.6**	**0.39**		4.7	0.25	U	**5**	0.23	
1,2,4-Trichlorobenzene	µg/kg dw	31	64	-	mg/kg-OC	0.81	1.8	4.8	0.20	U	4.6	0.46	U	4.9	0.22	U	4.7	0.32	U	4.7	0.25	U	4.9	0.23	U
PCB Aroclors																									
Aroclor 1016	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U
Aroclor 1221	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U
Aroclor 1232	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U
Aroclor 1242	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U
Aroclor 1248	µg/kg dw	-	-	-		--	--	**68**			**220**		J	**74**			**65**			**69**			**120**		
Aroclor 1254	µg/kg dw	-	-	-		--	--	**87**			**210**		J	**99**			**81**			**89**			**160**		
Aroclor 1260	µg/kg dw	-	-	-		--	--	**57**			**120**		J	**68**			**48**			**61**			**120**		
Aroclor 1262	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U	**--**		U

Table 3. Seattle Iron and Metals Corporation, Dredging and Dock Replacement Characterization, Seattle, Washington

Chemical Name	DMMP Guidelines				SMS Guidelines			DMMU-C1			DMMU-C1-Z1			DMMU-C2			DMMU-C2-Z2			DMMU-C3			DMMU-C3-Z3		
Aroclor 1268	µg/kg dw	-	-	-		--	--	--		U	--		U	--		U	--		U	--		U	--		U
Total PCBs	µg/kg dw	130	3100	-	mg/kg/OC	**12.0**	**65.0**	**212**	**8.95**		**550**	**55.5**	J	**241**	**10.9**		**194**	**13.4**		**219**	**11.7**		**400**	**18.8**	
Pesticides																									
Aldrin	µg/kg dw	9.5	-	-		--	--	1.2		U	0.9		U	1.2		U	0.97		U	1.2		U	1.2		U
gamma-BHC (Lindane)	µg/kg dw	-	-	-		--	--	--			--			--			--			--			--		
cis-Chlordane	µg/kg dw	-	-	-		--	--	--			--			**6.4**			--			--			--		
trans-nonachlor	µg/kg dw	-	-	-		--	--	--			--			**12**			--			--			--		
Total chlordane	µg/kg dw	2.8	-	-		--	--	2.4		U	12		Y	**22.8**			1.9		U	5.6		U	7.7		U
Dieldrin	µg/kg dw	1.9	-	-		--	--	2.4		U	10		U	2.4		U	1.9		U	2.5		U	2.4		U
Heptachlor	µg/kg dw	1.5	-	-		--	--	1.2		U	**3.3**			1.2		U	0.97		U	1.2		U	1.2		U
4,4'-DDD	µg/kg dw	16	-	-		--	--	2.4		U	1.8		U	2.4		U	1.9		U	2.5		U	**7.2**		NJ
4,4'-DDE	µg/kg dw	9	-	-		--	--	2.4		U	8.5		U	2.4		U	1.9		U	2.5		U	2.4		U
4,4'-DDT	µg/kg dw	12	-	-		--	--	2.4		U	8.3		U	5.6		U	8.2		U	**9.6**		PJ	7.3		YR
Total DDTs	µg/kg dw	-	69	50		--	--																		
Dioxin (TEQ: see Table 4 for detailed results)	**mg/kg**							**19.9**			**14**			**14.2**			**6.36**			**9.96**			**18.8**		
Sediment Conventionals																									
Total Solids	ng/kg						%	55.8			74.6			54.6			71.3			52.5			54.9		
Total Volatile Solids	%						%	7.59			2.26			7.09			4.08			7.35			7.02		
Total Organic Carbon	%						%	2.37			0.991			2.22			1.45			1.87			2.13		
Total Ammonia	mg/kg						mg/kg	67.2			44.3			43.8			70.8			45.4			118		
Total Sulfides	mg/kg						mg/kg	4240			780			2720			1440			2330			4220		
Gravel	%						%	1			12.9			0.1			27.4			1.4			0.6		
Sand	%						%	24.1			50.1			26			31.5			24.9			26		
Silt	%						%	58.8			27.3			60.3			30			59.9			59.4		
Clay	%						%	16.1			9.6			13.6			11.4			14			14		
Fines (percent silt + clay)	%						%	**74.9**			**37**			**73.9**			**41.1**			**73.8**			**73.4**		
Bioassay Determination: **(P/F)**								NA						NA						NA					
BTs exceeded: **Y/N**								N			**Y**			N			N			N			N		
Bioaccumulation conducted: **Y/N**											N														
Bioaccumulation Determination: **(P/F)**																									
ML Rule exceeded: **Y/N**								N			N			N			N			N			N		
PSDDA Determination: (Suitable/Unsuitable)								**Unsuitable**			**Failed (AD)**			**Unsuitable**			**Failed (AD)**			**Unsuitable**			**Failed (AD)**		
DMMU Volume: (cy)								4,000						4,000						4,000					
Rank (Low = L, Moderate = M, Low-Moderate =LM, High = H)								**H**						**H**						**H**					
Maximum Vibracore depth (ft) (includes 2 ft Z sar	ft						ft	10						10						10					
Mean core sampling depth (ft)	ft						ft	8						8						8					
DMMU ID:								**DMMU-C1**			**DMMU-C1-Z1**			**DMMU-C2**			**DMMU-C2-Z2**			**DMMU-C3**			**DMMU-C3-Z3**		

Legend:

Bold = detected results

J = Estimated value

P = The analyte was detected on both chromatographic columns but quantified values (RPD

NJ = The analyze is considered presumptively present due to poor instrument performance

R = Data regected due to significant exeedance of quality control criteria, analyte may/may not be present.

Y = The reporting limit is elevated due to interference. The result is not detected

NA = Not analyzed

SL / SQS exceedance

SL/BT exceedance

CSL exceedance

Unsuitable (open-water-disposal)

Failed Antidegradation (AD)

Table 3. Seattle Iron and Metals Corporation, Dredging and Dock Replacement Characterization, Seattle, Washington

Chemical Name	DMMP Guidelines				SMS Guidelines			DMMU-C4			DMMU-C4-Z4			DMMU-C5 (SUBSURFACE)		
	Vibracore ID: (Sampling elevation, ft. below mudline)							4-1 & 4-2 (0-4 ft)		VQ	4-1 (8-10 ft)		VQ	1-1, 2-1, 3-1, 4-1 (4-8 ft)		VQ
								DMMP	SMS		DMMP	SMS		DMMP	SMS	
Metals		**SL**	**ML**	**BT**		**SQS**	**CSL**	**dry wgt**	**mg-oc-norm**		**dry wgt**	**mg-oc-norm**		**dry wgt**	**mg-oc-norm**	
Antimony	mg/kg dw	150	200	-		--	--	8		U	9		U	8		U
Arsenic	mg/kg dw	57	700	507.1	mg/kg	57	93	**14**			**19**			**14**		
Cadmium	mg/kg dw	5.1	14	11.3	mg/kg	5.1	6.7	**0.3**			**0.8**			**0.4**		
Chromium	mg/kg dw	260	-	260	mg/kg	260	270	**30.9**			**34.8**			**31.2**		
Copper	mg/kg dw	390	1300	1027	mg/kg	390	390	**46.3**			**70.7**			**49.7**		
Lead	mg/kg dw	450	1200	975	mg/kg	450	530	**22**			**47**			**29**		
Mercury	mg/kg dw	0.41	2.3	1.5	mg/kg	0.41	0.59	**0.14**		J	**0.23**		J	**0.14**		J
Selenium	mg/kg dw	-	-	3	mg/kg	--	--	0.8			0.9		U	0.8		U
Silver	mg/kg dw	6.1	8.4	6.1	mg/kg	6.1	6.1	0.5		U	**0.6**			0.5		U
Zinc	mg/kg dw	410	3800	2783	mg/kg	410	960	**89**			**131**			**92**		
Tributyltin (porewater - ion)	ug/L	0.15	--	0.15				**0.005**			**0.010**			**0.007**		
PAHs																
Acenaphthene	µg/kg dw	500	2000	-	mg/kg-OC	16	57	**26**	**1.07**		**15**	**0.83**	J	**100**	**6.21**	
Acenaphthylene	µg/kg dw	560	1300	-	mg/kg-OC	66	66	19	0.78	U	20	1.10	U	**16**	**0.99**	J
Anthracene	µg/kg dw	960	13000	-	mg/kg-OC	220	1,200	**46**	**1.89**		**30**	**1.66**		**88**	**5.47**	
Benzo(a)anthracene	µg/kg dw	1300	5100	-	mg/kg-OC	110	270	**140**	**5.74**		**81**	**4.48**		**190**	**11.80**	
Total Benzofluoranthene	µg/kg dw	3200	9900	-	mg/kg/OC	230	450	**360**	**14.8**		**300**	**16.6**		**480**	**29.81**	
Benzo(g,h,i)perylene	µg/kg dw	670	3200	-	mg/kg-OC	31	78	**93**	**3.81**		**61**	**3.37**		**100**	**6.21**	
Benzo(a)pyrene	µg/kg dw	1600	3600	-	mg/kg-OC	99	210	**140**	**5.74**		**110**	**6.08**		**200**	**12.4**	
Chrysene	µg/kg dw	1400	21000	-	mg/kg-OC	110	460	**170**	**6.97**		**110**	**6.08**		**260**	**16.1**	
Dibenzo(a,h)anthracene	µg/kg dw	230	1900	-	mg/kg-OC	12	33	**28**	**1.15**		**20**	**1.10**		**34**	**2.11**	
Fluoranthene	µg/kg dw	1700	30000	4600	mg/kg-OC	160	1,200	**300**	**12.3**		**200**	**11.0**		**420**	**26.1**	
Fluorene	µg/kg dw	540	3600	-	mg/kg-OC	23	79	**35**	**1.43**		**16**	**0.88**	J	**85**	**5.28**	
Indeno(1,2,3-cd)pyrene	µg/kg dw	600	4400	-	mg/kg-OC	34	88	**84**	**3.44**		**60**	**3.31**		**98**	**6.09**	
2-Methylnaphthalene	µg/kg dw	670	1900	-	mg/kg-OC	38	64	**18**	**0.74**	J	**16**	**0.88**	J	**34**	**2.11**	
Naphthalene	µg/kg dw	2100	2400	-	mg/kg-OC	99	170	**44**	**1.80**		**18**	**0.99**	J	**100**	**6.21**	
Phenanthrene	µg/kg dw	1500	21000	-	mg/kg-OC	100	480	**150**	**6.15**		**82**	**4.53**		**280**	**17.4**	
Pyrene	µg/kg dw	2600	16000	11980	mg/kg-OC	1,000	1,400	**580**	**23.8**		**510**	**28.2**		**1100**	**68.3**	
Total HPAHs	µg/kg dw	12000	69000	-	mg/kg-OC	960	5,300	**1895**	**77.7**		**1452**	**80.2**		**2882**	**179.0**	
Total LPAHs	µg/kg dw	5200	29000	-	mg/kg-OC	370	780	**319**	**13.1**		**177**	**9.78**		**703**	**43.7**	
Phthalates																
Butyl benzyl phthalate	µg/kg dw	63	970	-	mg/kg-OC	4.9	64	**16**	**0.66**		**16**	**0.88**		**14**	**0.87**	
Di-n-butyl phthalate	µg/kg dw	-	-	-	mg/kg-OC	220	1,700	19	0.78	U	**11**	**0.61**	J	19	1.18	U
Di-n-octyl phthalate	µg/kg dw	6200	6200	-	mg/kg-OC	58	4,500	**120**	**4.92**		**170**	**9.39**		19	1.18	U
Diethyl phthalate	µg/kg dw	200	1200	-	mg/kg-OC	61	110	48	1.97	U	50	2.76	U	48	2.98	U
Dimethyl phthalate	µg/kg dw	71	1400	-	mg/kg-OC	53.0	53.0	4.8	0.20	U	5	0.28	U	4.8	0.30	U
Bis(2-ethylhexyl) phthalate	µg/kg dw	1300	8300	-	mg/kg-OC	47	78	**120**	**4.92**		**170**	**9.39**		**100**	**6.21**	
Phenols																
2,4-Dimethylphenol	µg/kg dw	29	210	-	ug/kg	29	29	39		U	40		U	4.8		U
2-Methylphenol	µg/kg dw	63	77	-	ug/kg	63	63	4.8		U	5		U	4.8		U
4-Methylphenol	µg/kg dw	670	3600	-	ug/kg	670	670	**16**		J	40		U	**12**		J
Pentachlorophenol	µg/kg dw	400	690	504	ug/kg	360	690	24		U	25		U	24		U
Phenol	µg/kg dw	420	1200		ug/kg	420	1,200	**38**			**47**			**48**		
Other SVOCs																
Dibenzofuran	µg/kg dw	540	1700	-	mg/kg-OC	15	58	**33**	**1.35**		**14**	**0.77**	J	**59**	**3.66**	
Benzoic Acid	µg/kg dw	650	760	-	ug/kg	650	650	**440**			**290**		J			
Benzyl Alcohol	µg/kg dw	57	870	-	ug/kg	57	73	**77**			**19**		J	**40**		
1,2-Dichlorobenzene	µg/kg dw	35	110	-	mg/kg-OC	2.3	2.3	19		U	20	1.10	U	4.8	0.30	U
1,3-Dichlorobenzene	µg/kg dw	170	-	-	mg/kg-OC	--	--	**--**			**--**			**--**		
1,4-Dichlorobenzene	µg/kg dw	110	120	-	mg/kg-OC	3.1	9.0	4.8	0.20	U	9.3	0.51	U	4.8	0.30	U
Hexachlorobenzene	µg/kg dw	22	230	168	mg/kg-OC	0.38	2.3	4.8	0.20	U	5	0.28	U	1.2	0.07	U
Hexachlorobutadiene	µg/kg dw	29	270	-	mg/kg-OC	3.9	6.2	1.2	0.05	U	1.2	0.07	U	1.2	0.07	U
Hexachloroethane	µg/kg dw	1400	14000	-	mg/kg-OC	--	--	**--**			**--**			**--**		
N-Nitrosodiphenylamine	µg/kg dw	28	130	-	mg/kg-OC	11	11	4.8	0.20	U	5	0.28	U	5.4	0.34	
1,2,4-Trichlorobenzene	µg/kg dw	31	64	-	mg/kg-OC	0.81	1.8	4.8	0.20	U	5	0.28	U	4.8	0.30	U
PCB Aroclors																
Aroclor 1016	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U
Aroclor 1221	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U
Aroclor 1232	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U
Aroclor 1242	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U
Aroclor 1248	µg/kg dw	-	-	-		--	--	**57**			**98**			**58**		
Aroclor 1254	µg/kg dw	-	-	-		--	--	**77**			**140**			**72**		
Aroclor 1260	µg/kg dw	-	-	-		--	--	**52**			**100**			**51**		
Aroclor 1262	µg/kg dw	-	-	-		--	--	**--**		U	**--**		U	**--**		U

Table 3. Seattle Iron and Metals Corporation, Dredging and Dock Replacement Characterization, Seattle, Washington

Chemical Name	DMMP Guidelines				SMS Guidelines			DMMU-C4			DMMU-C4-Z4			DMMU-C5 (SUBSURFACE)		
Aroclor 1268	µg/kg dw	-	-	-		--	--	--		U	--		U	--		U
Total PCBs	µg/kg dw	130	3100	-	mg/kg/OC	**12.0**	**65.0**	**186**	**7.6**		**338**	**18.7**		**181**	**11.2**	
Pesticides																
Aldrin	µg/kg dw	9.5	-	-		--	--	1.2		U	1.2		U	1.2		U
gamma-BHC (Lindane)	µg/kg dw	-	-	-		--	--	--			--					
cis-Chlordane	µg/kg dw	-	-	-		--	--	--			--					
trans-nonachlor	µg/kg dw	-	-	-		--	--	--			--					
Total chlordane	µg/kg dw	2.8	-	-		--	--	2.4		U	2.4		U	2.4		U
Dieldrin	µg/kg dw	1.9	-	-		--	--	2.4		U	2.4		U	2.4		U
Heptachlor	µg/kg dw	1.5	-	-		--	--	1.2		U	1.2		U	1.2		U
4,4'-DDD	µg/kg dw	16	-	-		--	--	2.4		U	**7.9**		NJ	2.4		U
4,4'-DDE	µg/kg dw	9	-	-		--	--	2.4		U	2.4		U	2.4		U
4,4'-DDT	µg/kg dw	12	-	-		--	--	8		Y	6.8		YR	8.3		Y
Total DDTs	µg/kg dw	-	69	50		--	--							8.3		
Dioxin (TEQ: see Table 4 for detailed results)	**mg/kg**							**10.8**			**19.1**			**10**		
Sediment Conventionals																
Total Solids	ng/kg						%	61			56.5			58.7		
Total Volatile Solids	%						%	5.44			7.26			5.5		
Total Organic Carbon	%						%	2.44			1.81			1.61		
Total Ammonia	mg/kg						mg/kg	46			98			72		
Total Sulfides	mg/kg						mg/kg	2090			4540			3080		
Gravel	%						%	1.2			2.9			1.7		
Sand	%						%	36.5			23.7			35.1		
Silt	%						%	50.1			60.7			46.1		
Clay	%						%	12.1			12.7			17.1		
Fines (percent silt + clay)	%						%	**62.3**			**73.3**			**63.1**		
Bioassay Determination: **(P/F)**								NA								
BTs exceeded: **Y/N**								N			N					
Bioaccumulation conducted: **Y/N**																
Bioaccumulation Determination: **(P/F)**																
ML Rule exceeded: **Y/N**								N			N					
PSDDA Determination: (Suitable/Unsuitable)								**Unsuitable**			**Failed (AD)**			**Unsuitable**	**Failed (AD)**	
DMMU Volume: (cy)								4,000						12,000		
Rank (Low = L, Moderate = M, Low-Moderate =LM, High = H)								**H**						**H**		
Maximum Vibracore depth (ft) (includes 2 ft Z sar	ft						ft	10						10		
Mean core sampling depth (ft)	ft						ft	8						10		
DMMU ID:								**DMMU-C4**			**DMMU-C4-Z4**			**DMMU-C5**		

Legend:

Bold = detected results

J = Estimated value

P = The analyte was detected on both chromatographic columns but quantified values (RPD

NJ = The analyze is considered presumptively present due to poor instrument performance

R = Data regected due to significant exeedance of quality control criteria, analyte may/may not be present.

Y = The reporting limit is elevated due to interference. The result is not detected

NA = Not analyzed

SL / SQS exceedance

SL/BT exceedance

CSL exceedance

Unsuitable (open-water-disposal)

Failed Antidegradation (AD)

Table 4. Seattle Iron Metals, Corporation Dioxin Testing Results Summary

Analyte	WHO (05) TEF	DMMU-C1			DMMU-C1-Z			DMMU-C2			DMMU-C2-Z		
		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	0.841	JEMPC	0.4205	0.91	JEMPC	0.455	**0.641**	J	**0.641**	0.448	JEMPC	0.224
1,2,3,7,8-PeCDD	1	**3.08**		**3.08**	**2.11**		**2.11**	**2.09**		**2.09**	**1.42**		**1.42**
1,2,3,4,7,8-HxCDD	0.1	**4.54**		**0.454**	**2.2**		**0.22**	**2.45**		**0.245**	**1.24**	**J**	**0.124**
1,2,3,6,7,8-HxCDD	0.1	**20.2**		**2.02**	**14.9**		**1.49**	**13.2**		**1.32**	**6.45**		**0.645**
1,2,3,7,8,9-HxCDD	0.1	**9.75**		**0.975**	**8.11**		**0.811**	**6.96**		**0.696**	**4.03**		**0.403**
1,2,3,4,6,7,8-HpCDD	0.01	**771**		**7.71**	**507**		**5.07**	**507**		**5.07**	**173**		**1.73**
OCDD	0.0003	**5970**		**1.791**	**4870**		**1.461**	**4610**		**1.383**	**1450**		**0.435**
2,3,7,8-TCDF	0.1	**1.81**		**0.181**	1.1	EMPC	0.055	**1.8**		**0.18**	**0.922**		**0.0922**
1,2,3,7,8-PeCDF	0.03	**2.09**		**0.0627**	**0.89**	**JB**	**0.0267**	**1.54**	**J**	**0.0462**	**0.921**	**BJ**	**0.02763**
2,3,4,7,8-PeCDF	0.3	**2.55**		**0.765**	**1.88**		**0.564**	**2.07**		**0.621**	**1.02**		**0.306**
1,2,3,4,7,8-HxCDF	0.1	**8.09**		**0.809**	**6.09**		**0.609**	**6.35**		**0.635**	**3.16**		**0.316**
1,2,3,6,7,8-HxCDF	0.1	**3.17**		**0.317**	**1.98**		**0.198**	**2.63**		**0.263**	**1.29**	**J**	**0.129**
2,3,4,6,7,8-HxCDF	0.1	**4.23**		**0.423**	**2.69**		**0.269**	**3.27**		**0.327**	**1.63**	**J**	**0.163**
1,2,3,7,8,9-HxCDF	0.1	**2.35**		**0.235**	**1.34**	**J**	**0.134**	1.54		**0.154**	**0.73**	**J**	**0.073**
1,2,3,4,6,7,8-HpCDF	0.01	**53.4**		**0.534**	**43.1**		**0.431**	**48.8**		**0.488**	**23**		**0.23**
1,2,3,4,7,8,9-HpCDF	0.01	**5.24**		**0.0524**	**3.6**		**0.036**	**4.3**		**0.043**	**2.1**		**0.021**
OCDF	0.0003	**156**		**0.0468**	**117**		**0.0351**	**150**		**0.045**	**76.9**		**0.02307**
Total TEQ (u = 1/2):				**19.9**			**14.0**			**14.2**			**6.4**
Total TEQ (u=0):				**19.5**			**13.5**			**14.2**			**6.1**
TOC (%)				**2.4**			**2.3**			**2.2**			**1.5**

Legend:
J = Estimated value
EMPC = EMPC qualified data treated as undetected

Table 4. Seattle Iron Metals, Corporation Dioxin Testing Results Summary

Analyte	WHO (05) TEF	DMMU-C3			DMMU-C3-Z			DMMU-C4			DMMU-C4-Z			DMMU-C5		
		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	0.462	JEMPC	0.231	**1.06**		**1.06**	0.509	JEMPC	0.2545	1.04	JEMPC	0.5200	0.566	JEMPC	0.283
1,2,3,7,8-PeCDD	1	**1.98**		**1.98**	**3.44**		**3.44**	**2.15**		**2.15**	**4.04**		**4.0400**	**1.82**		**1.82**
1,2,3,4,7,8-HxCDD	0.1	**2.32**		**0.232**	3.9		**0.39**	**2.5**		**0.25**	**4.3**		**0.4300**	**1.82**	**J**	**0.182**
1,2,3,6,7,8-HxCDD	0.1	**9.62**		**0.962**	**18.1**		**1.81**	**10.6**		**1.06**	**20.2**		**2.0200**	**8.69**		**0.869**
1,2,3,7,8,9-HxCDD	0.1	**5.53**		**0.553**	**10.3**		**1.03**	**6.2**		**0.62**	**12.2**		**1.2200**	**4.91**		**0.491**
1,2,3,4,6,7,8-HpCDD	0.01	**258**		**2.58**	**505**		**5.05**	**290**		**2.9**	**515**		**5.1500**	**313**		**3.13**
OCDD	0.0003	**2280**		**0.684**	**4700**		**1.41**	**2540**		**0.762**	**4340**		**1.3020**	**3070**		**0.921**
2,3,7,8-TCDF	0.1	**1.62**		**0.162**	**2.45**		**0.245**	**1.81**		**0.181**	**2.44**		**0.2440**	**1.44**		**0.144**
1,2,3,7,8-PeCDF	0.03	**1.62**	**J**	**0.0486**	**2.07**		**0.0621**	**1.65**	**J**	**0.0495**	**1.95**		**0.0585**	**1.49**	**J**	**0.0447**
2,3,4,7,8-PeCDF	0.3	**1.96**		**0.588**	**3.15**		**0.945**	**2.13**		**0.639**	**3.28**		**0.9840**	**1.76**		**0.528**
1,2,3,4,7,8-HxCDF	0.1	**6.69**		**0.669**	**10.2**		**1.02**	**6.6**		**0.66**	**9.91**		**0.9910**	**5.35**		**0.535**
1,2,3,6,7,8-HxCDF	0.1	**2.48**		**0.248**	**3.72**		**0.372**	**2.69**		**0.269**	**4.32**		**0.4320**	**2.14**		**0.214**
2,3,4,6,7,8-HxCDF	0.1	**3.03**		**0.303**	**5.36**		**0.536**	**3.17**		**0.317**	**5.56**		**0.5560**	**2.65**		**0.265**
1,2,3,7,8,9-HxCDF	0.1	**1.48**		**0.148**	**2.39**		**0.239**	**1.48**	**J**	**0.148**	**2.41**		**0.2410**	**1.2**	**J**	**0.12**
1,2,3,4,6,7,8-HpCDF	0.01	**47.9**		**0.479**	**98.8**		**0.988**	**42.1**		**0.421**	**73.5**		**0.7350**	**38**		**0.38**
1,2,3,4,7,8,9-HpCDF	0.01	**4.18**		**0.0418**	**7.06**		**0.0706**	**3.84**		**0.0384**	**6.93**		**0.0693**	**3.1**		**0.031**
OCDF	0.0003	**184**		**0.0552**	**300**		**0.09**	**116**		**0.0348**	**211**		**0.0633**	**198**		**0.0594**
Total TEQ (u = 1/2):				**10.0**			**18.8**			**10.8**			**19.1**			**10.0**
Total TEQ (u=0):				**9.7**			**18.8**			**10.5**			**18.5**			**9.7**
TOC (%)				**1.9**			**2.1**			**2.4**			**1.8**			**1.6**

Legend:
J = Estimated value
EMPC = EMPC qualified data treate

Table 5. Selective Volume Weighted Average (VWA) Dioxin Concentrations for Seattle Iron & Metals Corp.

DMMU ID:	Volume (CY)	TCDD/F TEQ	ng/kg-dw	Product (Vol x TEQ)	ng x cy/kg x	Prod./total	Proportional contribution/Suitable DMMU
C1 (sur)	4,000	19.9	ng/kg-dw	79,600	ng x cy/kg	23.5%	% of Total DMMU
C2 (sur)	4,000	14.2	ng/kg-dw	56,800	ng x cy/kg	16.7%	% of Total DMMU
C3 (sur)	4,000	9.96	ng/kg-dw	39,840	ng x cy/kg	11.7%	% of Total DMMU
C4 (sur)	4,000	10.8	ng/kg-dw	43,200	ng x cy/kg	12.7%	% of Total DMMU
C5 (sub)	12,000	10.0	ng/kg-dw	120,000	ng x cy/kg	35.4%	% of Total DMMU
Totals (Volume):	28,000	12.97	ng/kg-dw	339,440	ng x cy/kg	12.12	ng/kg-dw/Project (VWA)

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1.4 Site History

The following site history information is extracted from SAIC, 2008. Prior to purchase by the Shalmar Group, the two parcels that make up this property were owned by the Othello Street Warehouse Corporation. No information regarding operations at the property during its ownership by the Othello Street Warehouse Corporation was available for SAIC to review. All Alaskan Seafoods, Inc. formerly occupied a portion of parcel 0076 with an address at 501 S. Myrtle Street in Seattle. The facility was adjacent to Seattle Boiler Works and Seattle Iron & Metals. The business operated under EPA ID No. WA0000229062 (inactive). The Ecology Facility/Site ID is 6368989, and the NAICS Codes is 114112 (Shellfish Fishing).

In February 1988, Northland Services, Inc. filed a first Notification of Dangerous Waste Activities form with Ecology. The form indicates that Northland was operating as a transporter of dangerous waste at the 601 S. Myrtle Street parcel and Manson Construction and Engineering is listed as the property owner from 1982 to 1988. In October 1994, Northland filed a revised Notification of Dangerous Waste Activities form with Ecology. The form indicates that Northland is the property owner and was operating as a transporter of dangerous waste via highway and waterway transportation under EPA Site ID WAD981773005. According to SAIC's review of Ecology's ISIS database, there are two USTs on the property which may have been installed during Manson's occupancy. One UST is used for heating fuel and the other has been closed in place. The UST Site ID is 10855 (SAIC, 2008).
According to SAIC's review of the 1945 report Sources of Pollution in the Duwamish-Green River Drainage Area, Continental Can Co. was located on this parcel. Maust Trucking is mentioned as a previous operator at the current Seattle Iron & Metals facility in the City of

Seattle's Analysis and Decision Document for Seattle Iron & Metals' construction and land use permit.

Ecology Facility/Site ID 9872313 is also assigned to this parcel under the name "Whitehead Company" at 600 S. Myrtle Street. Two leaded gasoline USTs with capacities up to 1,100 gallons were removed from the property (UST Site ID 9634) (SAIC, 2008).

According to SAIC's review of City of Seattle records, prior to 1998 Othello Street Warehouse Corporation conducted an Independent Remedial Action Plan (IRAP) to determine the nature and extent of contamination and environmental cleanup at the 606 S. Myrtle Street property (Ecology Facility/Site ID 12153465). Six monitoring wells were installed on the property. Residual concentrations of petroleum hydrocarbons and copper in soil and groundwater were in exceedance of the Model Toxics Control Act (MTCA) residential cleanup levels for soil and groundwater. The IRAP is documented in Hart Crowser's Voluntary Cleanup Program (VCP) report (VCP ID NW0093) dated March 23, 1998. The property was capped and a restrictive covenant constraining site uses was placed on the property as follows: industrial use only, the groundwater cannot be used without prior approval from Ecology, and no release or removal of soil that may result in an exposure pathway is allowed. Following cleanup activities, Ecology issued a "No Further Action" letter for the property.

In 1998, The Port of Seattle arranged to demolish the existing 28,400-sq. ft. warehouse and grade approximately 16,000 cubic yards of soil to allow Seattle Iron & Metals to use the facility. The cap placed by Othello Street Warehouse Corporation under the VCP program was cracked at the time Seattle Iron & Metals began its occupancy. Seattle Iron & Metals installed a new cap consisting of a 10-inch thick layer of concrete supported by 110 stone pile columns (installed by U.S. SeaCon, Inc.) over the 9.5-acre property. Significant contaminated soil was removed prior to installing the new concrete cap.

1.5 Previously Identified Chemicals of Concern for RM 2.3 to 2.8 East

During the RI/FS process for the whole LDW site although forty-one chemicals were identified as risk drivers for benthic invertebrates, Total PCBs, arsenic, cPAHs, and dioxins/furans were identified as risk drivers for human health in the LDW FS (AECOM, 2010).

COCs were identified for the east side of this reach of the LDW by SAIC (2008) based on the results of sediment sampling conducted between 1991 and 2007. Chemicals that exceeded the SQS in at least one surface or subsurface sediment sample offshore of RM 2.3-2.8 East are considered COCs. Although no sediment quality standards have been promulgated for dioxins and furans, they were also identified as COCs in this reach due to the likelihood of their presence, particularly within the S. Myrtle Street Embayment. In addition, the presence of organo-tin compounds at various locations, particularly offshore of Seattle Boiler Works, Seattle Iron & Metals, and Puget Sound Truck Lines, resulted in their inclusion as COCs.
The following chemicals were identified as COCs at RM 2.3-2.8 East by SAIC (2008) with regard to potential sediment recontamination:

- Mercury
- PCBs
- PAHs
- Dioxins/furans
- Organo-tin compounds (TBT).

1.6 Previous Sediment Sampling and Analysis

Previously developed documents for the vicinity of the site were reviewed to aide in development of sample locations, and analytes. The LDWRI presents the results of many years of investigations from 1990 to 2001 (approximately 1,200 surface sediment samples and 230 subsurface sediment samples), and since 2003, approximately 900 additional samples to characterize chemical contamination (Windward, 2010). Significant conclusions of the LDWRI indicate that based on surface sediment data, the LDW can be characterized as having localized areas with relatively high chemical concentrations (hot spots) separated by relatively large areas with lower chemical concentrations. Many of the highest concentrations of key chemicals are in areas that were identified as candidates for early action (Windward, 2010).

In the LDW overall, PCBs, various metals, PAHs, and phthalates were frequently detected in surface sediments. Samples from a smaller number of locations in the LDW were analyzed for dioxins and furans; at least one dioxin or furan congener was detected in each sample. Many other organic chemicals, such as volatile organic compounds (VOCs), other semivolatile organic compounds, and pesticides, were less frequently or rarely detected (Windward, 2010).

The majority of the high arsenic and total PCB concentrations in surface sediment were located within fairly well-defined areas. The locations of the highest arsenic and total PCB concentrations were generally not in the same areas, indicating that sources likely differ for these two chemicals. Areas with the highest cPAH concentrations were located in many of the same areas identified for arsenic and total PCBs, but were also more dispersed. There are several areas with high dioxin and furan TEQs in surface sediments (Windward, 2010). Two of the areas with the highest concentrations are within the same river mile as the site including: the Slip 4 early action area (EAA), upriver East between RM 2.8 and 2.9 where 13 total PCB samples exceeded 1,300 µg/kg dw and 5 cPAH samples exceeded 1,500 µg TEQ/kg dw; and two of the highest concentrations of total PCBs (2,900,000 and 230,000 µg/kg dw were collected in 2007 at RM 2.2 immediately downriver East (Trotsky Inlet). The sample with the fourth highest dioxin/furan concentration (412 ng TEQ/kg dw) was also collected in the Trotsky inlet.

Although there are a number of Sediment Management Standard (SMS) Sediment Quality Standard (SQS) criteria exceedances for surface sediment samples in the reach of the LDW (between RM 2.2 and RM 2.8 [Slip 4]), the site is located in a section of the LDW where chemical concentrations have been found to be relatively low. In addition, the SQS exceedances in this reach, which are mostly PCBs, are mostly of a relatively low magnitude of exceedance. Other constituents detected in this reach include TBT and dioxins. The following section describes the existing surface sediment exceedances for this reach.

1.6.1 Existing Vicinity Surface Sediment Data Summary (RM 2.3 to 2.6)

Over 65 sample locations already exist within the vicinity of the site. Of those, 27 are within or in close proximity to the proposed dredge area (12 locations are actually within or along the immediate perimeter of the dredge area). Sampling dates range from 1997 to 2009. Existing vicinity data were reviewed for all data points reported between river mile (RM) 2.3 and 2.6 in the Lower Duwamish Waterway Group Feasibility Study database (LDWG FS, AECOM, 2010). Note that in the LDWG FS, no dioxin or tributyltin (TBT) SQS and CSL criteria were established, so they are compared separately with DMMP guidance levels below.

COC SQS and SL Exceedances

There were 10 data points in this stretch of the river that had one or more COC chemical exceedances (PAHs, PCBs, and mercury) of the SQS criteria (with an exceedance factor greater than 1.5 times the criteria (see Table 1) Slightly more locations, 14 exceeded the DMMP Screening Level (SL) criteria. There were 12 marginal exceedances (only 4 for the SL) between 1 and 1.5 times the criteria including mercury, zinc, PAHs and PCBs. Only 2 data points for total PCBs (one upriver east at RM 2.6 at station LDW-SS88 and one on the west side at RM 2.3 at station DR157) had concentrations that were 5-fold or more times the criteria. All exceedances included in the FS database were based on the SQS (or SQS equivalent, Lowest Apparent Effect Threshold, LAET). The distributions of the significant exceedances were as follows and are shown by river mile below in Table 1:

- RM 2.3 to 2.5 each had 2 SQS and 2-4 SL exceedances and
- RM 2.6 had 4 SQS/SL exceedances.

Of the 27 locations that are within or in close proximity to the proposed dredge area, there were only four PCB SQS exceedances (three marginal SQS exceedances (one downriver at EST182) and one significant exceedance upriver at LDW-SS88). The upriver LDW-SS88 location also marginally exceeds the SQS for mercury.

Table 1 Existing Data - COC SQS and SL Exceedances

Location	Date	Chemical	Value	Qualifier	Unit	X	Y	RM	SQS Criteria	SQS Unit	SQS EF	SQS	SL	SL EF
DR157	31-Aug-98	Mercury	1.6		mg/kg dw	1270346	200349	2.3	SQS	mg/kg dw	3.9	0.41	0.41	3.9
LDW-SS85	07-Mar-05	Total PCBs	630		ug/kg dw	1270595	200140	2.3	SQS	mg/kg OC	2.8	12	130	4.8
DR138	31-Aug-98	Total PCBs	187		ug/kg dw	1270354	200326	2.3	LAET	ug/kg dw	1.4	130	130	1.4
DR157	31-Aug-98	Total PCBs	4700		ug/kg dw	1270346	200349	2.3	LAET	ug/kg dw	36	130	130	36.2
LDW-SS526	16-Dec-09	Total PCBs	360		ug/kg dw	1270659	200018	2.3	SQS	mg/kg OC	1.7	12	130	2.8
DR141	20-Aug-98	Acenaphthene	420	J	ug/kg dw	1270837	199909	2.4	SQS	mg/kg OC	1.2	16	500	0.8
DR141	20-Aug-98	Fluorene	570	J	ug/kg dw	1270837	199909	2.4	SQS	mg/kg OC	1.1	23	540	1.1
DR141	20-Aug-98	Phenanthrene	2900	J	ug/kg dw	1270837	199909	2.4	SQS	mg/kg OC	1.3	100	1500	1.9
EST182	13-Nov-97	Total PCBs	250		ug/kg dw	1270940	200239	2.4	SQS	mg/kg OC	1.2	12	130	1.9
DR189	14-Sep-98	Chrysene	1600		ug/kg dw	1271415	199261	2.5	SQS	mg/kg OC	1.1	110	1400	1.1
DR189	14-Sep-98	Fluoranthene	6900		ug/kg dw	1271415	199261	2.5	SQS	mg/kg OC	3.1	160	1700	4.1
DR189	14-Sep-98	Phenanthrene	2500		ug/kg dw	1271415	199261	2.5	SQS	mg/kg OC	1.8	100	1500	1.7
DR189	14-Sep-98	Total HPAHs	16200		ug/kg dw	1271415	199261	2.5	SQS	mg/kg OC	1.2	960	12000	1.4
DR119	18-Aug-98	Total PCBs	390	J	ug/kg dw	1271501	199672	2.5	SQS	mg/kg OC	1.2	12	130	3.0
DR151	18-Aug-98	Total PCBs	325	J	ug/kg dw	1271542	199556	2.5	SQS	mg/kg OC	1	12	130	2.5
WRC-SS-B3	08-May-04	Zinc	479		mg/kg dw	1271056	199592	2.5	SQS	mg/kg dw	1.2	410	410	1.2
DR221	13-Aug-98	Fluoranthene	4200		ug/kg dw	1271882	198941	2.6	SQS	mg/kg OC	1.7	160	1700	2.5
LDW-SS88	25-Jan-05	Mercury	0.62		mg/kg dw	1271865	199304	2.6	SQS	mg/kg dw	1.5	0.41	0.41	1.5
LDW-SS88	25-Jan-05	Total PCBs	660		ug/kg dw	1271865	199304	2.6	SQS	mg/kg OC	3.2	12	130	5.1
LDW-SS89	19-Jan-05	Total PCBs	1800		ug/kg dw	1272011	199091	2.6	SQS	mg/kg OC	15	12	130	13.8
EST176	22-Oct-97	Total PCBs	120		ug/kg dw	1271928	199162	2.6	SQS	mg/kg OC	1.1	12	130	0.9
EIT075	03-Nov-97	Total PCBs	120		ug/kg dw	1272039	199123	2.6	SQS	mg/kg OC	1.8	12	130	0.9

COC CSL and ML Exceedances

There were three data points at two locations (upriver LDW-SS88 and downrinver west DR157) in this stretch of the river that had one or more chemical exceedances (PCBs and mercury) of the SMS Cleanup Screening Level (CSL) criteria (with exceedance factors ranging from 2.7 to 4.7 times the criteria (see Table 2). There was also one marginal exceedance of 1.1 times the criteria for mercury at the upriver LDW-SS88 location. The downriver west DR157 location was the only exceedance in this reach of the DMMP Maximum Level (ML) (1.5 times the ML for PCBs).

Table 2 Existing Data - COC CSL and ML Exceedances

Location	Date	Chemical	Value	Unit	X	Y	RM	CSL Criteria	CSL Unit	CSL EF	CSL	ML	ML EF
DR157	31-Aug-98	Mercury	1.6	mg/kg dw	1270346	200349	2.3	CSL	mg/kg dw	2.7	0.59	2.3	0.7
DR157	31-Aug-98	Total PCBs	4700	ug/kg dw	1270346	200349	2.3	2LAET	ug/kg dw	4.7	1000	3100	1.5
LDW-SS88	25-Jan-05	Mercury	0.62	mg/kg dw	1271865	199304	2.6	CSL	mg/kg dw	1.1	0.59	2.3	0.3
LDW-SS89	19-Jan-05	Total PCBs	1800	ug/kg dw	1272011	199091	2.6	CSL	mg/kg OC	2.8	65	3100	0.6

Dioxin data

The Interim Nondispersive Screening Levels (INSLs) are used for dioxin because there are no final SMS/DMMP dioxin criteria. DMMP INSLs are as follows: DMMUs with dioxin concentrations below 10 pptr TEQ (total toxic equivalency) will be allowed in 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 (DMMP, 2010). There were 6 total dioxin TEQ data results (collected between 1998 and 2009, all are J flagged as estimated concentrations) in this reach as follows (Table 3):

- Two exceedances of 10 pptr TEQ: 17J pptr TEQ at RM 2.3 (west downriver, LDW-SS526); and 33.3J pptr TEQ at RM 2.4 (Myrtle Bay outfall, east downriver, LDW-SS83)
- One exceedance of 4 pptr TEQ: 6.9J pptr TEQ at RM 2.3 (east downriver, DR115); and one marginal exceedance at 4.1J pptr TEQ at RM 2.4 (LDW-SS27, within proposed dredge area)
- Two non-exceedance results: 1.69J pptr TEQ at RM 2.3 (west downriver, LDW-SS525) and 3.9J pptr TEQ at RM 2.6 (west upriver, DR221)

Table 3 Existing Dioxin Data

Name	Date	Chemical	Value	Qualifier	Unit	Detected	X	Y	RM
DR115	14-Sep-98	Dioxin/furan TEQ - mammal (half DL)	6.9	J	ng/kg dw	Yes	1270794	200489	2.3
LDW-SS525	16-Dec-09	Dioxin/furan TEQ - mammal (half DL)	1.69	J	ng/kg dw	Yes	1270444	200303	2.3
LDW-SS526	16-Dec-09	Dioxin/furan TEQ - mammal (half DL)	17	J	ng/kg dw	Yes	1270659	200018	2.3
LDW-SS83	24-Jan-05	Dioxin/furan TEQ - mammal (half DL)	33.3	J	ng/kg dw	Yes	1271225	200361	2.4
LDW-SS527	17-Dec-09	Dioxin/furan TEQ - mammal (half DL)	4.1	J	ng/kg dw	Yes	1271351	199943	2.4
DR221	13-Aug-98	Dioxin/furan TEQ - mammal (half DL)	3.9	J	ng/kg dw	Yes	1271882	198941	2.6

TBT data

The DMMP (USACE, 1996 and 2007) SL for sediments of 0.15 µg/L for interstitial water corresponds to 30 µg Sn/kg and 73 µg/kg, TBT bulk. There were 9 TBT (tributyltin as ion, µg/kg DW) data points in this stretch of the river. Five of the 9 locations had detected values of TBT as follows (Table 4):

- All five detects were below the screening level (SL) of 73 µg/kg (ranging in concentration from 31 to 48 µg/kg TBT (two of the detects were downriver, DR115 and

in Myrtle Bay, LDW-SC41; one was mid-channel west of the site, DR171; one was near the perimeter of the proposed dredge area, DR151; and one was upriver west to mid-channel, DR221.

Table 4 Existing TBT Data

Location	Date	Chemical	Value	Qualifier	Unit	Detected	X	Y	RM
DR115	14-Sep-98	Tributyltin as ion	31	J	ug/kg dw	Yes	1270794	200489	2.3
DR116	18-Aug-98	Tributyltin as ion	48		ug/kg dw	Yes	1271194	200280	2.4
DR140	01-Sep-98	Tributyltin as ion	1	UJ	ug/kg dw	No	1270776	199947	2.4
WRC-SS-B1	08-May-04	Tributyltin as ion	5.2	U	ug/kg dw	No	1271107	199533	2.5
WRC-SS-B2	08-May-04	Tributyltin as ion	5.3	U	ug/kg dw	No	1271101	199571	2.5
WRC-SS-B3	08-May-04	Tributyltin as ion	5.1	U	ug/kg dw	No	1271056	199592	2.5
DR151	18-Aug-98	Tributyltin as ion	47		ug/kg dw	Yes	1271542	199556	2.5
DR171	19-Aug-98	Tributyltin as ion	37		ug/kg dw	Yes	1271310	199597	2.5
DR221	13-Aug-98	Tributyltin as ion	31		ug/kg dw	Yes	1271882	198941	2.6

Of note, is the trend in TBT data. In this reach of the river including RM 2.7 and 2.8, there are 21 datapoints for TBT (10 from 1998 and 11 from 2004-2006). Although the maximum concentrations are comparable between the two sample collection timeframes (48 µg/kg TBT and 45 µg/kg TBT, respectively), the mean concentrations reflect a downward concentration trend from 31 µg/kg TBT in 1998 to 10 µg/kg TBT in the more recent dataset. The more recent mean TBT concentration for the reach of 10 µg/kg is approximately seven-fold lower than the SL of 73 µg/kg TBT.

Non-COC data

Other chemical constituents that were not identified as COCs for this reach exceeded the SQS and CSL between RM 2.3 and 2.6. These include only five detects, all on the west side of the LDW (note that many of the exceedances were not detected, but the detection limit exceeded the screening level):

- RM 2.3: One SQS/SL and a marginal CSL exceedance for bis(2-ehtylhexyl)phthalate (downriver west, DR-157), well below the ML; and three SQS/SL exceedances for butylbenzyl phthalate (downriver west, DR-157), well below the ML; total chlordane (west, LDW-SS85), also exceeds the biological trigger (BT); and total DDT (downriver west, B5a-1), just below the ML
- RM 2.5: one SQS/SL exceedance for hexachlorobenzene (west,DR-189) that is significantly below the ML

1.6.2 Existing Vicinity Subsurface Sediment Data Summary (RM 2.3 to 2.6)

The distribution of chemicals within subsurface sediment has also been characterized as part of the RI/FS process. Chemicals frequently detected in subsurface sediment were similar to those detected in surface sediment. In many areas, the highest chemical concentrations were buried under surface sediment with lower concentrations. Sampling results have generally shown subsurface elevated concentrations to extend deeper in the under pier and shipway areas than in the open water areas. Source control efforts have resulted in the concentrations of chemicals in current releases generally being lower than those in historical releases (Windward, 2010).

Because subsurface data is not evaluated for SMS compliance, subsurface data form the RI/FS database is compared for a representative core by RM to the DMMP screening levels below. This provides information on what constituents are expected to be encountered in the site subsurface as well as providing an indication of how subsurface conditions compare to the DMMP screening levels.

At all three representative core locations, metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), PAHs, and other SVOCs (including phthalates, phenols, pentachlorophenol, chlorinated hydrocarbons, and miscellaneous extractables) were all below the DMMP SLs.

River Mile 2.4 (LDW-SC41 – adjacent downstream of subject site in Myrtle Bay)
Elevated subsurface chemicals include:

- dioxin/furans (ranging between 12.5J-14J pptr TEQ) above the INSL at depths of 1-4 feet
- TBT was apparently not analyzed in this core
- PCBs exceed the SL (but are well below the ML) for total PCBs from two depth intervals (4-6 feet and 6-8 feet)

River Mile 2.5 (LDW-SC42 – immediately offshore of site within the proposed dredge area)
Detected subsurface chemicals include:

- dioxin/furans were apparently not analyzed in this core
- TBT was below the DMMP SL
- PCBs were not detected to depths of 4-feet in this core

River Mile 2.6 (LDW-SC43 – adjacent upstream of subject site)
Detected subsurface chemicals include:

- dioxin/furans were apparently not analyzed in this core
- TBT was apparently not analyzed in this core
- PCBs were not detected to depths of 4-feet in this core

Other subsurface sampling data exist in this reach of LDW, however, there were no other SL exceedances for any other locations in this reach with the exception of two locations that both

exceed the SL (but are well below the ML) for total PCBs at depths of 0-4 feet (PSDDA99 S15 and Hurlen-Boyer C6).

1.6.3 Existing Vicinity Source Control Activities (RM 2.3 to 2.8)

Source control in the LDW started in 2003 and is an on-going, iterative process. Ecology is the lead for the Source Control Work Group and is responsible for investigating potential ongoing sources and evaluating whether they have been controlled sufficiently. Potential ongoing sources include stormwater runoff, CSOs, industrial wastewater discharges, among others. The focus of Ecology's source control strategy for the LDW is to identify and manage sources of chemicals to waterway sediments in coordination with sediment cleanups and to prevent post-remediation recontamination. Ecology and the SCWG have identified 23 nearly contiguous areas within the LDW to prioritize source investigations which includes 7 EAAs (two of which are discussed above as near the site).

Recently, Ecology has begun to direct source control sampling at various outfall locations in the vicinity of the site. Final data will be summarized by SAIC at a future date.

1.7 Sediment Characterization Report Organization

The remainder of the report is divided into the following sections:

- Section 2 describes all aspects of the sediment sampling program;
- Section 3 summarizes the sediment physical, conventional and chemical characterization; and
- Section 4 summarizes the findings as compared to DMMP and SMS criteria.

These sections are followed by a list of references cited in the report and supported by tables and a figure that follow the references. Tables 1 through 4 present historical vicinity data for the site. Table 5 presents observations from sediment sampling activities. Tables 6 through 11 present physical, conventional and chemical data summaries along with relevant regulatory screening criteria. Figure 1 presents a vicinity map and the sediment sample locations. In addition, two appendices present supporting information on:

- Appendix A - Sediment Sampling Core Photos, Core Logs and Field Forms;
- Appendix B - Data Quality Review, Chain of Custody Forms and Complete Laboratory Data and Results Screening Tables.