Lower Duwamish Waterway Group

Port of Seattle / City of Seattle / King County / The Boeing Company

Appendix N
Description of FS Baseline Dataset

Final Feasibility Study

Lower Duwamish Waterway
Seattle, Washington

FOR SUBMITTAL TO:

The U.S. Environmental Protection Agency
Region 10
Seattle, WA

The Washington State Department of Ecology
Northwest Regional Office
Bellevue, WA

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Part 1: FS Baseline Dataset Tables – Revised from RI Appendix E (Data Selection for the Baseline Surface Sediment Dataset and Data Quality Review Summaries)

Introduction

The baseline surface sediment data used in the feasibility study (FS) was based on a similar dataset used in the Lower Duwamish Waterway Remedial Investigation (LDW RI; Windward 2007), which is documented in Appendix E of the RI. The baseline dataset used in the FS was updated with data collected after the RI baseline dataset was finalized in 2006. This appendix contains tables that provide supplemental information about the baseline surface sediment dataset.

Surface sediment data that were collected within dredged area boundaries prior to dredging were excluded from the FS baseline surface sediment dataset because they are not representative of present conditions (Tables N-1 and N-2).

Dredging and capping occurred at the Duwamish/Diagonal early action area during the 2003/2004 dredging season. The predredging data within the removal area and the enhanced natural recovery area were used to characterize baseline conditions. Additional details on the inclusion or exclusion of surface sediment data from this area in the FS baseline dataset are provided in Table N-3 and Part 2 of this appendix.

The FS baseline dataset also includes data from resampled surface sediment locations. Newer data from resampled locations (Table N-4) replaced the older data from those locations (Table N-5).

The quality of the data in the sampling events included in the FS baseline dataset (and those that were excluded) was extensively reviewed, as summarized in Tables N-6 and N-7 and a series of data quality memoranda prepared by Windward Environmental (*Technical Memorandum: Summary of Chemistry Datasets to be used in the Phase 2 RI/FS – Addendum 3*, 2012; the other memoranda are cited in the sources for Table N-5).

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Table N-1 Dredging Events Outside of Navigation Channel (1990 to 2009)

Project/Site Name	Dredging Year	River Mile	Volume Dredged (cy)
Lone Star Northwest – Slip 2	1990	RM 1.70 – RM 1.76 east	1,600
Lone Star Northwest – Slip 2	1991	RM 1.70 – RM 1.76 east	1,100
Morton	1992	RM 2.86 – RM 2.97 west	7,980
South Park Marina	1993	RM 3.36 – RM 3.44 west	15,500
Lone Star Northwest – West Terminal	1993	RM 1.43 – RM 1.52 west	3,900
Terminal 115	1993	RM 1.78 – RM 1.95 west	3,000
Lone Star Northwest – Slip 2	1994	RM 1.70 – RM 1.76 east	3,000
Lone Star Northwest – Slip 2	1994	RM 1.70 – RM 1.76 east	2,000
Lone Star – Hardie/Kaiser	1996	RM 1.55 – RM 1.75 east	18,000
Crowley	1996	RM 2.8 – RM 2.85 east	13,000
Boyer	1998	RM 2.39 – RM 2.49 west	8,000
Hurlen	1998	RM 2.64 – RM 2.77 west	15,000
James Hardie Gypsum	1999	RM 1.56 – RM 1.75 east	10,000
Duwamish Yacht Club	1999	RM 4.03 – RM 4.15 west	24,000
Norfolk	1999	RM 4.85 – RM 4.95 east	5,190
Glacier Ready-mix Facility	2001	RM 1.7 east	4,900
Boeing Developmental Center south storm drain outfall	2003	RM 4.9 east	60
Duwamish/Diagonal	2003/2004	RM 0.4 – RM 0.6 east	68,250
Delta Marine	2004	RM 4.17 – RM 4.24 west	7,000
Lehigh Northwest	2004	RM 1.02 – RM 1.09 east	9,000
Terminal 103	2005	RM 0.46 – RM 0.56 west	1,350
Glacier NW	2005	RM 1.42 – RM 1.54 west	9,920
Delta Marine	2008	RM 4.17 – RM 4.24 west	11,905
Lafarge	2009	RM 1.07 – RM 1.08 west	1,000
Terminal 115	2009	RM 1.5 – RM 1.9 west	3,000

Notes:

cy = cubic yards; RM = river mile.

Table N-2 Navigation Channel Dredging Events Conducted by the USACE (1990 to 2010)

Dates	River Miles	Volume Dredged (cy)
2/28/90 – 3/30/90	RM 3.97 – RM 4.65	127,619
2/6/92 – 3/21/92	RM 3.34 – RM 4.65	177,076
3/7/94 – 3/28/94	RM 4.33 – RM 4.65	57,243
2/22/96 – 3/30/96	RM 4.02 – RM 4.48	90,057
2/5/97 – 3/31/97	RM 4.26 – RM 4.65	89,011
3/11/99 – 6/29/99	RM 3.43 – RM 4.65	165,116
1/14/02 – 2/9/02	RM 4.27 – RM 4.65	96,523
1/15/04 – 2/16/04	RM 4.33 – RM 4.65	75,770
12/11/07 – 1/10/08	RM 4.27 – RM 4.65	140,608
2/19/10 – 3/30/10	RM 4.18 – RM 4.65	60,371

Notes:

cy = cubic yards; RM = river mile; USACE = U.S. Army Corps of Engineers.

Table N-3 Duwamish/Diagonal Sampling Events

Event Name	Description	Date	Included in Baseline?
Duw/Diag-1	Phase 1 site assessment	Aug 1994	Yes
Duw/Diag-1.5	Phase 1.5 site assessment	Nov 1995	Yes
Duw/Diag-2	Phase 2 site assessment	May-Sep 1996	Yes
DuwDiag-October2003	Perimeter monitoring – predredge	Oct 2003	Yes
DuwDiagonal-March2004	Perimeter monitoring – post-dredge	Mar 2004	Yes (subset)[a]
DuwDiag-June2004	Baseline cap monitoring – year 0	Jun 2004	No
DuwDiag-Jan2005	Perimeter monitoring – 1 year post-dredge before thin-layer cap placement	Jan-Feb 2005	Yes (subset)[a,b]
LDWRI-SurfaceSediment	Phase 2 RI sampling conducted by LDWG	Jan-Feb 2005	No[c]
DuwDiag-Mar2005	Perimeter monitoring – 1 year post-dredge after thin-layer cap placement	Mar 2005	No
DuwDiag-April2005	Cap monitoring – year 1	Apr 2005	No
DuwDiagonal-August 2005	Cap monitoring – year 1	Aug 2005	No
DuwDiag-Mar2006	Cap monitoring – year 2	Mar 2006	Yes (subset)[a]
DuwDiagonal-April 2007	Cap, perimeter, and thin-layer placement area monitoring – year 3	Apr 2007	Yes (subset)[a]
DuwDiagonal-March2008	Cap, perimeter, and thin-layer placement area monitoring – year 4	Mar 2008	No
DuwDiagonal-April2009	Cap, perimeter, and thin-layer placement area monitoring – year 5	Apr 2009	Yes[d]

Notes:

a. If data were available from these sampling events for contaminants not included in the most recent dataset (i.e., April 2009), these data were included in the baseline dataset.

b. While only the most recent samples (i.e., April 2009) from annually monitored perimeter stations were included in the FS baseline dataset, five perimeter stations were sampled only one time (during the January-February 2005 event) and were not resampled in any other subsequent events. These results were therefore included in the baseline dataset because they are the most recent available data at these stations.

c. Samples from five locations within 200 ft of the dredging boundary (SS18, SS20, SS21, SS22, and SS25) were excluded from the FS baseline surface sediment dataset because these locations may be have been unduly influenced by the 2003/2004 dredging activity. The other samples collected by LDWG in Jan-Feb 2005 were included in the FS baseline surface sediment dataset.

d. Because the Duwamish/Diagonal data included in the FS baseline surface sediment dataset are intended to represent surface sediment conditions prior to the 2003 to 2004 remediation or outside the 2003-2004 remediation area for this event, only data from sampling locations on the perimeter of the remediation area were included in the FS baseline surface sediment dataset.

FS = feasibility study; LDWG = Lower Duwamish Waterway Group; RI = remedial investigation.

Table N-4 Newer Surface Sediment Samples that Superseded Older Surface Sediment Samples if the Sample Locations Were Less Than 10 ft Apart

Newer Sample				River Mile	Older Sample				Nominal Distance Between New and Old Coordinates (ft)
Sample	Event	Location	Sampling Date		Sample	Event	Location	Sampling Date	
LDW-SS1-010	LDWRI-SurfSedRound1	LDW-SS1	1/17/05	0.0	K-11[a]	Harbor Island RI	K-11	9/30/91	0.6
LDW-SS4-010	LDWRI-SurfSedRound1	LDW-SS4	1/17/05	0.0	K-07	Harbor Island RI	K-07	9/30/91	1.4
LDW-SS5-010	LDWRI-SurfSedRound1	LDW-SS5	1/17/05	0.0	SD-DR076-0000[a]	EPA SI	DR076	8/24/98	1.5
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-1[a]	Harbor Island RI	K-05	10/14/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-1-B[a]	Harbor Island RI	K-05	10/14/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-1-D1[a]	Harbor Island RI	K-05	9/27/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-1-D2	Harbor Island RI	K-05	10/14/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-2[a]	Harbor Island RI	K-05	10/14/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-2-D1[a]	Harbor Island RI	K-05	9/27/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-2-D2	Harbor Island RI	K-05	10/14/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-3[a]	Harbor Island RI	K-05	10/14/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-3-D1[a]	Harbor Island RI	K-05	9/27/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	K-05-3-D2	Harbor Island RI	K-05	10/14/91	10.4[b]
6324233	Ecology SPI	TRI-010	8/8/06	0.2	LDW-SS10-010[a]	LDWRI-SurfSedRound1	LDW-SS10	1/17/05	9.2
LDW-SS12-010	LDWRI-SurfSedRound1	LDW-SS12	1/17/05	0.2	SD-DR035-0000[a]	EPA SI	DR035	8/11/98	2.1
LDW-SS15-010	LDWRI-SurfSedRound1	LDW-SS15	1/17/05	0.3	SD-DR079-0000[a]	EPA SI	DR079	8/24/98	1.7
6324235	Ecology SPI	TRI-016	8/8/06	0.3	LDW-SS16-010[a]	LDWRI-SurfSedRound2	LDW-SS16	3/8/05	5.0
LDW-SS17-010	LDWRI-SurfSedRound1	LDW-SS17	1/24/05	0.3	L7279-11[a]	Duw/Diag-1.5	DUD042	11/11/95	3.3
L7279-3	Duw/Diag-1.5	DUD032	11/9/95	0.4	L4288-27[a]	Duw/Diag-1	DUD032	8/12/94	0.0
L12059-1	KC WQA	DD-1	9/24/97	0.4	L4288-30[a]	Duw/Diag-1	DUD001	8/17/94	4.5
L12666-1	KC WQA	DD-1	9/24/97	0.4	L4288-30[a]	Duw/Diag-1	DUD001	8/17/94	4.5
L12666-2	KC WQA	DD-2	9/24/97	0.4	L4288-5[a]	Duw/Diag-1	DUD006	8/10/94	4.2
L12666-3	KC WQA	DD-2	9/24/97	0.4	L4288-5[a]	Duw/Diag-1	DUD006	8/10/94	4.2

Table N-4 Newer Surface Sediment Samples that Superseded Older Surface Sediment Samples if the Sample Locations Were Less Than 10 ft Apart (continued)

Newer Sample				River Mile	Older Sample				Nominal Distance Between New and Old Coordinates (ft)
Sample	Event	Location	Sampling Date		Sample	Event	Location	Sampling Date	
L12059-3	KC WQA	DD-3	9/24/97	0.5	L4288-21[a]	Duw/Diag-1	DUD022	8/10/94	4.3
L12666-4	KC WQA	DD-3	9/24/97	0.5	L4288-21[a]	Duw/Diag-1	DUD022	8/10/94	4.3
L12666-5	KC WQA	DD-4	9/24/97	0.5	L4288-28[a]	Duw/Diag-1	DUD034	8/12/94	4.5
L12666-6	KC WQA	DD-4	9/24/97	0.5	L4288-28[a]	Duw/Diag-1	DUD034	8/12/94	4.5
L12059-5	KC WQA	DD-5	9/24/97	0.5	L7279-8[a]	Duw/Diag-1.5	DUD039	11/9/95	4.2
L12666-7	KC WQA	DD-5	9/24/97	0.5	L7279-8[a]	Duw/Diag-1.5	DUD039	11/9/95	4.2
L29990-4	DuwDiagOct2003	DUD_4C	10/23/03	0.6	L7279-4[a]	Duw/Diag-1.5	DUD036	11/11/95	6.0
L29990-5	DuwDiagOct2003	DUD_4C	10/23/03	0.6	L7279-4[a]	Duw/Diag-1.5	DUD036	11/11/95	6.0
LDW-SS200-010	LDWRI-SurfSedRound1	LDW-SS27	1/18/05	0.8	EST21-03[a]	NOAA SiteChar	EST219	9/17/97	4.5
LDW-SS27-010	LDWRI-SurfSedRound1	LDW-SS27	1/18/05	0.8	EST21-03[a]	NOAA SiteChar	EST219	9/17/97	4.5
LDW-SSB2b-010	LDWRI-SurfSedRound2	LDW-SSB2b	3/11/05	0.8	SD-DR085-0000[a]	EPA SI	DR085	8/31/98	5.6
SD-DR048-0000	EPA SI	DR048	8/12/98	0.9	WST20-02[a]	NOAA SiteChar	WST367	9/19/97	6.3
LDW-SS32-010	LDWRI-SurfSedRound1	LDW-SS32	1/18/05	0.9	SD-DR019-0000[a]	EPA SI	DR019	8/17/98	0.6
LDW-SS31-010	LDWRI-SurfSedRound1	LDW-SS31	1/21/05	0.9	SD-DR020-0000[a]	EPA SI	DR020	8/17/98	1.0
LDW-SS319-010	LDWRI-SurfaceSedimentRound3	LDW-SS319	10/4/06	0.9	SD-DR021-0000[a]	EPA SI	DR021	8/17/98	6.7
LDW-SS37-010	LDWRI-SurfSedRound1	LDW-SS37	1/18/05	1.0	SD-DR087-0000[a]	EPA SI	DR087	8/12/98	2.5
LDW-SS40-010	LDWRI-SurfSedRound1	LDW-SS40	1/18/05	1.1	SD-DR088-0000[a]	EPA SI	DR088	8/31/98	1.1
LDW-SS44-010	LDWRI-SurfSedRound1	LDW-SS44	1/21/05	1.2	SD-DR053-0000-CC[a]	EPA SI	DR053	8/31/98	1.6
6324258	Ecology SPI	B4B	8/11/06	1.3	LDW-B4b-S[a]	LDWRI-Benthic	B4b	8/28/04	4.2
6324258	Ecology SPI	B4B	8/11/06	1.3	SD-DR028-0000[a]	EPA SI	DR028	8/17/98	3.2
6324239	Ecology SPI	TRI-045	8/9/06	1.3	LDW-SS45-010[a]	LDWRI-SurfSedRound2	LDW-SS45	3/10/05	6.7
LDW-SS48-010	LDWRI-SurfSedRound1	LDW-SS48	1/18/05	1.3	SS-2[a]	Duwamish Shipyard	SS-2	8/17/93	1.5
LDW-SS202-010	LDWRI-SurfSedRound1	LDW-SS50	1/24/05	1.3	SD-DR030-0000[a]	EPA SI	DR030	8/17/98	1.9

Table N-4 Newer Surface Sediment Samples that Superseded Older Surface Sediment Samples if the Sample Locations Were Less Than 10 ft Apart (continued)

Newer Sample				River Mile	Older Sample				Nominal Distance Between New and Old Coordinates (ft)
Sample	Event	Location	Sampling Date		Sample	Event	Location	Sampling Date	
LDW-SS50-010	LDWRI-SurfSedRound1	LDW-SS50	1/24/05	1.3	SD-DR030-0000[a]	EPA SI	DR030	8/17/98	1.9
6324243	Ecology SPI	TRI-051	8/9/06	1.3	SD-DR160-0000[a]	EPA SI	DR160	8/12/98	5.0
6324243	Ecology SPI	TRI-051	8/9/06	1.3	LDW-SS51-010[a]	LDWRI-SurfSedRound1	LDW-SS51	1/18/05	6.3
LDW-SS49-010	LDWRI-SurfSedRound1	LDW-SS49	1/26/05	1.4	SS-6[a]	Duwamish Shipyard	SS-3	8/17/93	8.0
LDW-SS49-010	LDWRI-SurfSedRound1	LDW-SS49	1/26/05	1.4	SS-3[a]	Duwamish Shipyard	SS-3	8/17/93	8.0
LDW-SS55-010	LDWRI-SurfSedRound1	LDW-SS55	1/24/05	1.4	SS-4[a]	Duwamish Shipyard	SS-4	8/17/93	3.0
LDW-SS57-010	LDWRI-SurfSedRound1	LDW-SS57	1/24/05	1.4	SD-DR123-0000[a]	EPA SI	DR123	9/14/98	6.7
LDW-SS52-010	LDWRI-SurfSedRound1	LDW-SS52	1/25/05	1.4	SD-DR065-0000[a]	EPA SI	DR065	8/17/98	1.2
LDW-SS63-010	LDWRI-SurfSedRound1	LDW-SS63	1/21/05	1.7	SD-DR097-0000[a]	EPA SI	DR097	8/20/98	9.7
LDW-SS70-010	LDWRI-SurfSedRound1	LDW-SS70	1/21/05	1.8	SD-DR131-0000-CC[a]	EPA SI	DR131	8/13/98	1.3
LDW-SS75-010	LDWRI-SurfSedRound1	LDW-SS75	1/21/05	1.9	SD0056	Boeing SiteChar	R7	10/15/97	5.7
LDW-SS76-010	LDWRI-SurfSedRound1	LDW-SS76	1/20/05	2.0	SD-DR106-0000[a]	EPA SI	DR106	8/19/98	2.3
LDW-SS79-010	LDWRI-SurfSedRound1	LDW-SS79	1/24/05	2.0	CH07-01[a]	NOAA SiteChar	CH0023	10/16/97	1.7
LDW-SS81-010	LDWRI-SurfSedRound2	LDW-SS81	3/8/05	2.1	SD-DR113-0000-CC[a]	EPA SI	DR113	8/19/98	1.1
6324256	Ecology SPI	DR-111	8/11/06	2.1	SD-DR111-0000-CC[a]	EPA SI	DR111	8/19/98	5.0
LDW-B5a-S2	LDWRI-Benthic	B5a-2	9/24/04	2.2	WIT11-01[a]	NOAA SiteChar	WIT280	10/3/97	9.8
SD-DR141-0000-CC	EPA SI	DR141	8/20/98	2.3	WST14-01[a]	NOAA SiteChar	WST342	10/23/97	3.9
LDW-SS88-010	LDWRI-SurfSedRound1	LDW-SS88	1/25/05	2.5	EIT09-01[a]	NOAA SiteChar	EIT074	11/3/97	7.2
LDW-SS92-010	LDWRI-SurfSedRound1	LDW-SS92	1/25/05	2.7	EST13-05[a]	NOAA SiteChar	EST180	10/6/97	2.4
LDW-SS94-010	LDWRI-SurfSedRound1	LDW-SS94	1/21/05	2.7	SD-DR175-0000[a]	EPA SI	DR175	8/20/98	0.7
6324248	Ecology SPI	TRI-096	8/10/06	2.8	LDW-SS96-010[a]	LDWRI-SurfSedRound1	LDW-SS96	1/21/05	6.7

Table N-4 Newer Surface Sediment Samples that Superseded Older Surface Sediment Samples if the Sample Locations Were Less Than 10 ft Apart (continued)

Newer Sample				River Mile	Older Sample				Nominal Distance Between New and Old Coordinates (ft)
Sample	Event	Location	Sampling Date		Sample	Event	Location	Sampling Date	
6324249	Ecology SPI	DR-181	8/10/06	2.9	SD-DR181-0000[a]	EPA SI	DR181	9/1/98	2.2
LDW-SS102-010	LDWRI-SurfSedRound1	LDW-SS102	1/24/05	3.0	SD-DR198-0000[a]	EPA SI	DR198	8/20/98	2.8
LDW-SS104-010	LDWRI-SurfSedRound1	LDW-SS104	1/25/05	3.1	SD-DR202-0000[a]	EPA SI	DR202	8/27/98	1.5
T117-SE10-SG	T117BoundaryDefinition	T117-SE-10-G	12/8/03	3.5	WST09-02[a]	NOAA SiteChar	WST323	10/21/97	1.2
T117-107-SG	T117 Sed Boundary	T117-SE107-G	8/29/08	3.6	T117-SE19-SG	T117BoundaryDefinition	T117-SE-19-G	12/5/03	1.7
SD-309-0000	JorgensenAugust2004	SD-309-S	8/16/04	3.6	EST11-03[a]	NOAA SiteChar	EST152	9/24/97	3.5
SD-320-0000	JorgensenAugust2004	SD-320-S	8/16/04	3.6	SD2B-DUW92-0000[a]	Plant 2 RFI-2b	SD-DUW92	4/2/96	4.8
SD-334-0000	JorgensenAugust2004	SD-334-S	8/26/04	3.6	EST11-04[a]	NOAA SiteChar	EST154	9/24/97	9.1
SD-343-0000	JorgensenAugust2004	SD-343-S	8/27/04	3.6	SD2B-DUW90-0000[a]	Plant 2 RFI-2b	SD-DUW90	4/4/96	6.1
SWY17	Plant2-TransformPhase1	SD-SWY17	9/9/03	3.6	SD-SWY07-0000[a]	Plant 2 RFI-1	SD-SWY07	6/13/95	7.0
LDW-SS110-010	LDWRI-SurfSedRound1	LDW-SS110	1/25/05	3.6	SD-323-0000	Jorgensen August 2004	SD-323-S	8/17/04	3.4
LDW-SS111-010	LDWRI-SurfSedRound1	LDW-SS111	1/19/05	3.6	SD-DR186-0000[a]	EPA SI	DR186	8/27/98	1.0
T117-113-SG	T117 Sed Boundary	T117-SE113-G	8/29/08	3.7	SD0019[a]	Boeing SiteChar	R19	10/11/97	5.7
T117-114-SG	T117 Sed Boundary	T117-SE114-G	8/29/08	3.7	SD0018[a]	Boeing SiteChar	R18	10/11/97	1.9
T117-117-SG	T117 Sed Boundary	T117-SE117-G	8/29/08	3.7	T117-SE46-SG[a]	T117BoundaryDefinition	T117-SE-46-G	12/9/03	5.1
LDW-SS113b-010	LDWRI-SurfSedRound1	LDW-SS113b	1/20/05	3.7	SD0009	Boeing SiteChar	R21	10/9/97	1.4
LDW-SS115-010	LDWRI-SurfSedRound1	LDW-SS115	1/25/05	3.7	SD-DR187-0000[a]	EPA SI	DR187	8/27/98	3.0
LDW-SS117-010	LDWRI-SurfSedRound1	LDW-SS117	1/20/05	3.8	SD0013	Boeing SiteChar	R24	10/10/97	1.2
LDW-SS119-010	LDWRI-SurfSedRound1	LDW-SS119	1/19/05	3.8	SD0021	Boeing SiteChar	R30	10/11/97	2.3
LDW-SS121-010	LDWRI-SurfSedRound1	LDW-SS121	1/25/05	3.9	EIT06-02[a]	NOAA SiteChar	EIT061	9/29/97	4.0
AN019-SS-061024	8801 E Marginal (formerly KenworthPACCAR)	AN-019	10/24/06	3.9	EST09-04[a]	NOAA SiteChar	EST144	9/25/97	9.2

Table N-4 Newer Surface Sediment Samples that Superseded Older Surface Sediment Samples if the Sample Locations Were Less Than 10 ft Apart (continued)

Newer Sample				River Mile	Older Sample				Nominal Distance Between New and Old Coordinates (ft)
Sample	Event	Location	Sampling Date		Sample	Event	Location	Sampling Date	
AN019-SS-061024	8801 E Marginal (formerly KenworthPACCAR)	AN-019	10/24/06	3.9	LDW-SS123-010[a]	LDWRI-SurfSedRound1	LDW-SS123	1/24/05	8.2
AN019-SS-061024	8801 E Marginal (formerly KenworthPACCAR)	AN-019	10/24/06	3.9	LDW-SS203-010[a]	LDWRI-SurfSedRound1	LDW-SS123	1/24/05	8.2
LDW-SS125-010	LDWRI-SurfSedRound1	LDW-SS125	1/20/05	4.0	SD-DR238-0000[a]	EPA SI	DR238	8/27/98	1.1
LDW-B8b-S	LDWRI-Benthic	B8b	8/19/04	4.1	EST07-07[a]	NOAA SiteChar	EST135	11/12/97	2.7
LDW-SS126-010	LDWRI-SurfSedRound1	LDW-SS126	1/20/05	4.1	RPL-A11-05-02[a]	Rhône-Poulenc RFI-2	A11-05	8/18/94	2.1
LDW-SS126-010	LDWRI-SurfSedRound1	LDW-SS126	1/20/05	4.1	RPL-A11-10-02[a]	Rhône-Poulenc RFI-2	A11-05	8/18/94	2.1
Upper SB-01	RhônePoulenc2004	SB-1	8/25/04	4.2	SD-DR242-0000-CC[a]	EPA SI	DR242	8/24/98	9.5
Upper SB-15	RhônePoulenc2004	SB-1	8/25/04	4.2	SD-DR242-0000-CC[a]	EPA SI	DR242	8/24/98	9.5
LDW-SS127-010	LDWRI-SurfSedRound1	LDW-SS127	1/20/05	4.2	SD0032	Boeing SiteChar	R40	10/13/97	1.0
LDW-SS129-010	LDWRI-SurfSedRound1	LDW-SS129	1/20/05	4.2	SD0033	Boeing SiteChar	R42	10/13/97	8.4
LDW-SS130-010	LDWRI-SurfSedRound1	LDW-SS130	1/20/05	4.2	SD0070	Boeing SiteChar	R45	10/16/97	0.5
Upper SH-04	RhônePoulenc2004	SH-04	8/24/04	4.3	06-intsed-2[a]	Rhône-Poulenc RFI-3	06-intsed-2	7/1/96	8.6
Upper SH-02	RhônePoulenc2004	SH-02	8/25/04	4.3	07-intsed-1[a]	Rhône-Poulenc RFI-3	07-intsed-1	7/1/96	9.7
LDW-B10b-S	LDWRI-Benthic	B10b	8/19/04	4.3	SD-DR286-0000-CC[a]	EPA SI	DR286	8/26/98	3.2
LDW-SS148-010	LDWRI-SurfSedRound2	LDW-SS148	3/9/05	4.7	SD-DR271-0000[a]	EPA SI	DR271	9/15/98	2.0
L20703-2	Norfolk-monit4	NFK501	4/24/01	4.9	L15421-1[a]	Norfolk-monit1	NFK501	4/23/99	8.7
L23995-6	Norfolk-monit5	NFK503	4/30/02	4.9	L16628-6[a]	Norfolk-monit2a	NFK503	10/8/99	4.2
L23995-6	Norfolk-monit5	NFK503	4/30/02	4.9	L17647-6[a]	Norfolk-monit3	NFK503	4/6/00	3.3
L23995-6	Norfolk-monit5	NFK503	4/30/02	4.9	L20703-6	Norfolk-monit4	NFK503	4/24/01	4.0
288131	Ecology-Norfolk	2	7/9/02	4.9	L4321-2[a]	Norfolk-cleanup1	NFK002	8/18/94	8.5

Table N-4 Newer Surface Sediment Samples that Superseded Older Surface Sediment Samples if the Sample Locations Were Less Than 10 ft Apart (continued)

Newer Sample				River Mile	Older Sample				Nominal Distance Between New and Old Coordinates (ft)
Sample	Event	Location	Sampling Date		Sample	Event	Location	Sampling Date	
288132	Ecology-Norfolk	3	7/9/02	4.9	L4321-2[a]	Norfolk-cleanup1	NFK002	8/18/94	9.5
288133	Ecology-Norfolk	4	7/9/02	4.9	L4321-2[a]	Norfolk-cleanup1	NFK002	8/18/94	8.7
288134	Ecology-Norfolk	5	7/9/02	4.9	SD0079[a]	Boeing SiteChar	R87	10/18/97	5.3
288134	Ecology-Norfolk	5	7/9/02	4.9	L17311-1	Norfolk-monit2b	NFK506	2/10/00	6.3
288136	Ecology-Norfolk	7	7/9/02	4.9	SD0079[a]	Boeing SiteChar	R87	10/18/97	6.4
288136	Ecology-Norfolk	7	7/9/02	4.9	L17311-1	Norfolk-monit2b	NFK506	2/10/00	6.3
288148	Ecology-Norfolk	7	7/9/02	4.9	SD0079[a]	Boeing SiteChar	R87	10/18/97	6.4
288148	Ecology-Norfolk	7	7/9/02	4.9	L17311-1	Norfolk-monit2b	NFK506	2/10/00	5.4
LDW-SS341-010	LDWRI-SurfaceSedimentRound3	LDW-SS341	10/3/06	4.9	288139	Ecology-Norfolk	10	7/9/02	8.9
LDW-SS341-010	LDWRI-SurfaceSedimentRound3	LDW-SS341	10/3/06	4.9	L17315-3	Norfolk-monit2b	NFK503	2/8/00	7.6
LDW-SS341-010	LDWRI-SurfaceSedimentRound3	LDW-SS341	10/3/06	4.9	L28052-6[a]	Norfolk-monit6	NFK503	4/23/03	4.3
LDW-SS341-010	LDWRI-SurfaceSedimentRound3	LDW-SS341	10/3/06	4.9	L31635-6[a]	Norfolk-monit7	NFK503	4/5/04	1.8
NFK502VV12	LDW Upstream Sed	NFK502	4/30/08	4.9	L16628-4[a]	Norfolk-monit2a	NFK502	10/8/99	4.5
NFK502VV12	LDW Upstream Sed	NFK502	4/30/08	4.9	L17647-4[a]	Norfolk-monit3	NFK502	4/6/00	6.4
NFK502VV12	LDW Upstream Sed	NFK502	4/30/08	4.9	L20703-4[a]	Norfolk-monit4	NFK502	4/24/01	3.6
NFK502VV12	LDW Upstream Sed	NFK502	4/30/08	4.9	L23995-4[a]	Norfolk-monit5	NFK502	4/30/02	3.2
NFK502VV12	LDW Upstream Sed	NFK502	4/30/08	4.9	L28052-4[a]	Norfolk-monit6	NFK502	4/23/03	4.2
NFK502VV12	LDW Upstream Sed	NFK502	4/30/08	4.9	L31635-4[a]	Norfolk-monit7	NFK502	4/5/04	3.0
NFK502VV12	LDW Upstream Sed	NFK502	4/30/08	4.9	LDW-SS342-010[a]	LDWRI-SurfaceSedimentRound3	LDW-SS342	10/3/06	2.8
NFK-501VV16	LDW Upstream Sed	NFK501	5/1/08	4.9	288146	Ecology-Norfolk	17	7/9/02	8.4
NFK-501VV16	LDW Upstream Sed	NFK501	5/1/08	4.9	L17315-1	Norfolk-monit2b	NFK501	2/8/00	10.8[b]
NFK-501VV16	LDW Upstream Sed	NFK501	5/1/08	4.9	L23995-2[a]	Norfolk-monit5	NFK501	4/30/02	8.4
NFK-501VV16	LDW Upstream Sed	NFK501	5/1/08	4.9	L28052-2[a]	Norfolk-monit6	NFK501	4/23/03	4.2
NFK-501VV16	LDW Upstream Sed	NFK501	5/1/08	4.9	L31635-2[a]	Norfolk-monit7	NFK501	4/5/04	6.2

Table N-4 Newer Surface Sediment Samples that Superseded Older Surface Sediment Samples if the Sample Locations Were Less Than 10 ft Apart (continued)

Newer Sample				River Mile	Older Sample				Nominal Distance Between New and Old Coordinates (ft)
Sample	Event	Location	Sampling Date		Sample	Event	Location	Sampling Date	
NFK-501VV16	LDW Upstream Sed	NFK501	5/1/08	4.9	LDW-SS343-010[a]	LDWRI-SurfaceSedimentRound3	LDW-SS343	10/3/06	7.4
NFK-501VV16	LDW Upstream Sed	NFK501	5/1/08	4.9	288142	Ecology-Norfolk	13	7/9/02	6.2
LDW-SS344-010	LDWRI-SurfaceSedimentRound3	LDW-SS344	10/3/06	4.9	L15421-4[a]	Norfolk-monit1	NFK504	4/23/99	1.1
LDW-SS344-010	LDWRI-SurfaceSedimentRound3	LDW-SS344	10/3/06	4.9	L17647-8[a]	Norfolk-monit3	NFK504	4/6/00	6.6
LDW-SS344-010	LDWRI-SurfaceSedimentRound3	LDW-SS344	10/3/06	4.9	L20703-8[a]	Norfolk-monit4	NFK504	4/24/01	6.8
LDW-SS344-010	LDWRI-SurfaceSedimentRound3	LDW-SS344	10/3/06	4.9	L23995-8[a]	Norfolk-monit5	NFK504	4/30/02	8.9
LDW-SS344-010	LDWRI-SurfaceSedimentRound3	LDW-SS344	10/3/06	4.9	L28052-8[a]	Norfolk-monit6	NFK504	4/23/03	7.2
LDW-SS344-010	LDWRI-SurfaceSedimentRound3	LDW-SS344	10/3/06	4.9	L31635-8[a]	Norfolk-monit7	NFK504	4/5/04	3.0

Notes:

1. Sampling location coordinates are Washington State Plane North, U.S. survey ft, North American Vertical Datum 1983 (NAD83).
2. The FS surface sediment baseline dataset consists of 1,718 samples, including the 99 newer samples that superseded the 125 older samples shown in this table.

a. Newer results have replaced older results in the FS baseline dataset (see Table N-5), but for chemicals not analyzed in the newer samples, older results have been preserved in the FS baseline dataset. In most cases, only a small number of chemical results from the older samples are used.

b. Nominal distance between oldest and newest location is slightly greater than the 10-ft threshold. Results from an older sample were originally superseded in the RI by a sample that has been subsequently superseded by a third (newer) sample shown in this table. The distances between this intermediate-date sample and the newest and oldest samples were both less than 10 ft.

Ecology = Washington State Department of Ecology; EPA = U.S. Environmental Protection Agency; FS = feasibility study; ft = feet; KC = King County; LDW = Lower Duwamish Waterway; NOAA = National Oceanic and Atmospheric Administration; RCRA = Resource Conservation and Recovery Act; RFI = RCRA facility investigation; RI = remedial investigation; SI = site investigation; SPI = sediment profile imaging; WQA = water quality assessment.

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
Boeing SiteChar	R18	195175	1275682	10/11/97	SD0018[a]		10	superseded by T117-SE114-G, 2 ft away
Boeing SiteChar	R19	195178	1275727	10/11/97	SD0019[a]		10	superseded by T117-SE113-G, 6 ft away
Boeing SiteChar	R21	194955	1275772	10/9/97	SD0009		10	superseded by LDW-SS113b, 1 ft away
Boeing SiteChar	R24	194553	1275818	10/10/97	SD0013		10	superseded by LDW-SS117, 1 ft away
Boeing SiteChar	R30	194391	1276226	10/11/97	SD0021		10	superseded by LDW-SS119, 2 ft away
Boeing SiteChar	R40	193044	1277453	10/13/97	SD0032		10	superseded by LDW-SS127, 1 ft away
Boeing SiteChar	R42	192917	1277567	10/13/97	SD0033		10	superseded by LDW-SS129, 8 ft away
Boeing SiteChar	R45	192810	1277407	10/16/97	SD0070		10	superseded by LDW-SS130, less than 1 ft away
Boeing SiteChar	R7	201578	1269271	10/15/97	SD0056		10	superseded by LDW-SS75, 6 ft away
Boeing SiteChar	R86	190215	1278519	10/19/97	SD0091		10	sample falls inside 1999 Norfolk dredge area
Boeing SiteChar	R87	190257	1278543	10/18/97	SD0079[a]		10	superseded by Ecology-Norfolk 5 and 7
Duw/Diag-1	DUD001	209120	1267153	8/17/94	L4288-30[a]		10	superseded by KC WQA loc. DD-1
Duw/Diag-1	DUD006	209059	1267092	8/10/94	L4288-5[a]		10	superseded by KC WQA loc. DD-2
Duw/Diag-1	DUD022	208929	1267040	8/10/94	L4288-21[a]		10	superseded by KC WQA loc. DD-3
Duw/Diag-1	DUD032	208978	1266889	8/12/94	L4288-27[a]		10	superseded by 1995 location DUD032, samp L7279-3
Duw/Diag-1	DUD034	208785	1266933	8/12/94	L4288-28[a]		10	superseded by KC WQA loc. DD-4
Duw/Diag-1.5	DUD036	208245	1267118	11/11/95	L7279-4[a]		10	superseded by DUD_4C
Duw/Diag-1.5	DUD039	208606	1266844	11/9/95	L7279-8[a]		10	superseded by KC WQA loc. DD-5
Duw/Diag-1.5	DUD042	209785	1266880	11/11/95	L7279-11[a]		10	superseded by LDW-SS17, 3 ft away
Duwamish Shipyard	SS-2	204599	1268050	8/17/93	SS-2[a]		7.5	superseded by LDW-SS48
Duwamish Shipyard	SS-3	204476	1268107	8/17/93	SS-3[a]		7.5	superseded by LDW-SS49
Duwamish Shipyard	SS-3	204476	1268107	8/17/93	SS-6[a]	duplicate	7.5	superseded by LDW-SS49
Duwamish Shipyard	SS-4	204181	1268184	8/17/93	SS-4[a]		7.5	superseded by LDW-SS55
Duwamish Shipyard	SS-5	203667	1268323	8/17/93	SS-5		7.5	inside 2005 Glacier NW dredge area
DuwDiagApril2005	DUD_1A	209089	1267047	4/27/05	L35394-1		8	on top of dredged area cap
DuwDiagApril2005	DUD_1B	208484	1267060	4/27/05	L35394-7		10	on top of dredged area cap
DuwDiagApril2005	DUD_2A	208902	1267139	4/27/05	L35394-2		5	on top of dredged area cap
DuwDiagApril2005	DUD_3A	208973	1266951	4/27/05	L35394-3		6	on top of dredged area cap
DuwDiagApril2005	DUD_4A	209354	1266888	4/27/05	L35394-4		10	on top of dredged area cap
DuwDiagApril2005	DUD_5A	209410	1266805	4/27/05	L35394-5		8	on top of dredged area cap
DuwDiagApril2005	DUD_5A	209410	1266805	4/27/05	L35394-6		7	on top of dredged area cap
DuwDiagJan2005	DUD_1C	208754	1267168	2/1/05	L34524-1		6	only most recent data (April 2009) included
DuwDiagJan2005	DUD_2C	208651	1267175	1/31/05	L34524-2		9	only most recent data (April 2009) included

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
DuwDiagJan2005	DUD_3C	208144	1267146	1/31/05	L34524-3		10	within thin-layer placement area
DuwDiagJan2005	DUD_4C	208239	1267116	1/31/05	L34524-4		7	within thin-layer placement area
DuwDiagJan2005	DUD_4C	208239	1267116	1/31/05	L34524-5	replicate	7	within thin-layer placement area
DuwDiagJan2005	DUD_5C	208263	1267025	1/31/05	L34524-6		10	within thin-layer placement area
DuwDiagJan2005	DUD_6C	208501	1266950	1/31/05	L34524-7		9	within thin-layer placement area
DuwDiagJan2005	DUD_7C	208486	1266902	1/31/05	L34524-8		9	within thin-layer placement area
DuwDiagJan2005	DUD_8C	208920	1266864	2/1/05	L34524-10	replicate	7	only most recent data (April 2009) included
DuwDiagJan2005	DUD_8C	208920	1266864	2/1/05	L34524-9		6	only most recent data (April 2009) included
DuwDiagJan2005	DUD_9C	209157	1266784	1/31/05	L34524-11		7	only most recent data (April 2009) included
DuwDiagJan2005	DUD_10C	209517	1266663	2/1/05	L34524-12		8	only most recent data (April 2009) included
DuwDiagJan2005	DUD_11C	209535	1266844	2/1/05	L34524-13		7	only most recent data (April 2009) included
DuwDiagJan2005	DUD_12C	209630	1266813	2/2/05	L34524-14		9	only most recent data (April 2009) included
DuwDiagJan2005	DUD_13C	207853	1267236	2/2/05	L34524-15		10	approximately 120 ft from thin-layer placement area and possibly influenced by thin-layer placement
DuwDiagJan2005	DUD_14C	208000	1267196	2/2/05	L34524-16		10	within thin-layer placement area
DuwDiagJan2005	DUD_15C	207970	1267059	2/2/05	L34524-17		10	within thin-layer placement area
DuwDiagJune2004	DUD_1A	209089	1267047	6/1/04	L32085-1		6	on top of dredged area cap
DuwDiagJune2004	DUD_1B	208484	1267060	6/1/04	L32085-7		6	on top of dredged area cap
DuwDiagJune2004	DUD_2A	208902	1267139	6/1/04	L32085-2		5	on top of dredged area cap
DuwDiagJune2004	DUD_2B	208621	1267079	6/1/04	L32085-8		5	on top of dredged area cap
DuwDiagJune2004	DUD_3B	208716	1267049	6/1/04	L32085-9		6	on top of dredged area cap
DuwDiagJune2004	DUD_4A	209354	1266888	6/1/04	L32085-4		10	on top of dredged area cap
DuwDiagJune2004	DUD_5A	209410	1266805	6/1/04	L32085-5		10	on top of dredged area cap
DuwDiagJune2004	DUD_5A	209410	1266805	6/1/04	L32085-6		10	on top of dredged area cap
DuwDiagMarch2005	DUD_3C	208144	1267146	3/16/05	L34971-3		10	within thin-layer placement area
DuwDiagMarch2005	DUD_4C	208239	1267116	3/16/05	L34971-4		9	within thin-layer placement area
DuwDiagMarch2005	DUD_4C	208239	1267116	3/16/05	L34971-5		9	within thin-layer placement area
DuwDiagMarch2005	DUD_5C	208263	1267025	3/24/05	L34971-6		10	within thin-layer placement area
DuwDiagMarch2005	DUD_6C	208501	1266950	3/24/05	L34971-7		10	within thin-layer placement area
DuwDiagMarch2005	DUD_7C	208486	1266902	3/24/05	L34971-8		10	within thin-layer placement area
DuwDiagMarch2005	DUD_14C	208000	1267196	3/16/05	L34971-16		10	within thin-layer placement area
DuwDiagMarch2005	DUD_15C	207970	1267059	3/16/05	L34971-17		10	within thin-layer placement area
DuwDiagonal-March2004	DUD_1C	208754	1267168	3/29/04	L31520-1		10	only most recent data (April 2009) included
DuwDiagonal-March2004	DUD_2C	208651	1267175	3/29/04	L31520-2		10	only most recent data (April 2009) included

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
DuwDiagonal-March2004	DUD_3C	208144	1267146	3/29/04	L31520-3		10	within thin-layer placement area
DuwDiagonal-March2004	DUD_4C	208239	1267116	3/29/04	L31520-4		10	within thin-layer placement area
DuwDiagonal-March2004	DUD_4C	208239	1267116	3/29/04	L31520-5	replicate	10	within thin-layer placement area
DuwDiagonal-March2004	DUD_5C	208263	1267025	3/29/04	L31520-6		10	within thin-layer placement area
DuwDiagonal-March2004	DUD_6C	208501	1266950	3/30/04	L31520-15	replicate	10	within thin-layer placement area
DuwDiagonal-March2004	DUD_6C	208501	1266950	3/30/04	L31520-7		10	within thin-layer placement area
DuwDiagonal-March2004	DUD_7C	208486	1266902	3/30/04	L31520-8		10	within thin-layer placement area
DuwDiagonal-March2004	DUD_8C	208920	1266864	3/30/04	L31520-10	replicate	10	only most recent data (April 2009) included
DuwDiagonal-March2004	DUD_8C	208920	1266864	3/30/04	L31520-9		10	only most recent data (April 2009) included
DuwDiagonal-March2004	DUD_9C	209157	1266784	3/30/04	L31520-11		10	only most recent data (April 2009) included
DuwDiagonal-March2004	DUD_10C	209517	1266663	3/30/04	L31520-12		10	only most recent data (April 2009) included
DuwDiagonal-March2004	DUD_11C	209535	1266844	3/30/04	L31520-13		10	only most recent data (April 2009) included
DuwDiagonal-March2004	DUD_12C	209630	1266813	3/30/04	L31520-14		10	only most recent data (April 2009) included
DuwDiagonal August 2005	DUD_2B	208621	1267079	8/17/05	L36565-3		3	on top of dredged area cap
DuwDiagonal August 2005	DUD_30C	208888	1267269	8/17/05	L36565-1		3	bank-soil station likely influenced by cap
DuwDiagonal August 2005	DUD_31C	209000	1267237	8/17/05	L36565-2		3	bank-soil station likely influenced by cap
DuwDiagMarch2006	DUD_1A	209089	1267047	3/7/06	L38325-1		8	on top of dredged area cap
DuwDiagMarch2006	DUD_1B	208484	1267060	3/7/06	L38325-7		7	on top of dredged area cap
DuwDiagMarch2006	DUD_1C	208754	1267168	3/8/06	L38326-1		10	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_2A	208902	1267139	3/7/06	L38325-2		9	on top of dredged area cap
DuwDiagMarch2006	DUD_2B	208621	1267079	3/7/06	L38325-8		4	on top of dredged area cap
DuwDiagMarch2006	DUD_2C	208651	1267175	3/8/06	L38326-2		7	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_3A	208973	1266951	3/7/06	L38325-3		7	on top of dredged area cap
DuwDiagMarch2006	DUD_3B	208716	1267049	3/7/06	L38325-9		5	on top of dredged area cap
DuwDiagMarch2006	DUD_3C	208144	1267146	3/10/06	L38327-1		10	within thin-layer placement area
DuwDiagMarch2006	DUD_4A	209354	1266888	3/7/06	L38325-4		9	on top of dredged area cap
DuwDiagMarch2006	DUD_4C	208239	1267116	3/10/06	L38327-2		10	within thin-layer placement area
DuwDiagMarch2006	DUD_4C	208239	1267116	3/10/06	L38327-3	replicate	10	within thin-layer placement area
DuwDiagMarch2006	DUD_5A	209410	1266805	3/7/06	L38325-5		6	on top of dredged area cap
DuwDiagMarch2006	DUD_5A	209410	1266805	3/7/06	L38325-6	replicate	6	on top of dredged area cap
DuwDiagMarch2006	DUD_5C	208263	1267025	3/10/06	L38327-4		10	within thin-layer placement area
DuwDiagMarch2006	DUD_6C	208501	1266950	3/10/06	L38327-5		10	within thin-layer placement area
DuwDiagMarch2006	DUD_7C	208486	1266902	3/10/06	L38327-6		10	within thin-layer placement area

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
DuwDiagMarch2006	DUD_8C	208920	1266864	3/8/06	L38326-9		5	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_8C	208920	1266864	3/8/06	L38326-10	replicate	5	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_9C	209157	1266784	3/8/06	L38326-11		5	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_10C	209517	1266663	3/8/06	L38326-12		6	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_11C	209535	1266844	3/9/06	L38326-13		6	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_12C	209630	1266813	3/9/06	L38326-14		8	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_13C	207853	1267236	3/9/06	L38326-15		10	approximately 120 ft from thin-layer placement area and possibly influenced by thin-layer placement
DuwDiagMarch2006	DUD_14C	208000	1267196	3/10/06	L38327-7		10	only most recent data (April 2009) included
DuwDiagMarch2006	DUD_15C	207970	1267059	3/10/06	L38327-8		10	only most recent data (April 2009) included
DuwDiagonal April 2007	DUD_1A	209089	1267047	4/3/07	L42276-1		6	on top of dredged area cap
DuwDiagonal April 2007	DUD_1B	208484	1267060	4/3/07	L42276-7		10	on top of dredged area cap
DuwDiagonal April 2007	DUD_1C	208754	1267168	4/2/07	L42275-1[a]		10	only most recent data (April 2009) included
DuwDiagonal April 2007	DUD_2A	208902	1267139	4/3/07	L42276-2		10	on top of dredged area cap
DuwDiagonal April 2007	DUD_2B	208621	1267079	4/3/07	L42276-8		7	on top of dredged area cap
DuwDiagonal April 2007	DUD_2C	208651	1267175	4/2/07	L42275-2[a]		10	only most recent data (April 2009) included
DuwDiagonal April 2007	DUD_3A	208973	1266951	4/3/07	L42276-3		9	on top of dredged area cap
DuwDiagonal April 2007	DUD_3B	208716	1267049	4/3/07	L42276-9		10	on top of dredged area cap
DuwDiagonal April 2007	DUD_3C	208144	1267146	4/3/07	L42274-1		10	within thin-layer placement area
DuwDiagonal April 2007	DUD_4A	209354	1266888	4/3/07	L42276-4		7	on top of dredged area cap
DuwDiagonal April 2007	DUD_4C	208239	1267116	4/3/07	L42274-2		10	within thin-layer placement area
DuwDiagonal April 2007	DUD_4C	208239	1267116	4/3/07	L42274-3		10	within thin-layer placement area
DuwDiagonal April 2007	DUD_5A	209410	1266805	4/3/07	L42276-5		4	on top of dredged area cap
DuwDiagonal April 2007	DUD_5A	209410	1266805	4/3/07	L42276-6	replicate	4	on top of dredged area cap
DuwDiagonal April 2007	DUD_5C	208263	1267025	4/3/07	L42274-3		7	within thin-layer placement area
DuwDiagonal April 2007	DUD_6C	208501	1266950	4/3/07	L42274-4		6	within thin-layer placement area
DuwDiagonal April 2007	DUD_7C	208486	1266902	4/4/07	L42274-5		9	within thin-layer placement area
DuwDiagonal April 2007	DUD_8C	208920	1266864	4/2/07	L42275-3[a]		5	only most recent data (April 2009) included
DuwDiagonal April 2007	DUD_8C	208920	1266864	4/2/07	L42275-4[a]	replicate	5	only most recent data (April 2009) included
DuwDiagonal April 2007	DUD_9C	209157	1266784	4/2/07	L42275-5[a]		5	only most recent data (April 2009) included
DuwDiagonal April 2007	DUD_10C	209517	1266663	4/2/07	L42275-6[a]		8	only most recent data (April 2009) included
DuwDiagonal April 2007	DUD_11C	209535	1266844	4/2/07	L42275-7[a]		8	only most recent data (April 2009) included
DuwDiagonal April 2007	DUD_12C	209630	1266813	4/2/07	L42275-8[a]		6	only most recent data (April 2009) included

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
DuwDiagonal April 2007	DUD_13C	207853	1267236	4/4/07	L42275-9		10	approximately 120 ft from thin-layer placement area and possibly influenced by thin-layer placement
DuwDiagonal April 2007	DUD_14C	208000	1267196	4/4/07	L42274-7		10	within thin-layer placement area
DuwDiagonal April 2007	DUD_15C	207970	1267059	4/4/07	L42274-8		9	within thin-layer placement area
DuwDiagonalMarch2008	DUD_1A	209093	1267050	3/24/08	L45304-1		5	on top of dredged area cap
DuwDiagonalMarch2008	DUD_1B	208488	1267058	3/24/08	L45304-7		9	on top of dredged area cap
DuwDiagonalMarch2008	DUD_1C	208757	1267167	3/24/08	L45302-1		5	only most recent data (April 2009) included
DuwDiagonalMarch2008	DUD_2A	208905	1267140	3/24/08	L45304-2		7	on top of dredged area cap
DuwDiagonalMarch2008	DUD_2B	208625	1267076	3/24/08	L45304-8		7	on top of dredged area cap
DuwDiagonalMarch2008	DUD_2C	208653	1267168	3/24/08	L45302-2		5	only most recent data (April 2009) included
DuwDiagonalMarch2008	DUD_3A	208973	1266952	3/24/08	L45304-3		9	on top of dredged area cap
DuwDiagonalMarch2008	DUD_3B	208717	1267049	3/24/08	L45304-9		6	on top of dredged area cap
DuwDiagonalMarch2008	DUD_3C	208145	1267145	3/25/08	L45303-1		10	within thin-layer placement area
DuwDiagonalMarch2008	DUD_4A	209357	1266886	3/24/08	L45304-4		7	on top of dredged area cap
DuwDiagonalMarch2008	DUD_4C	208237	1267115	3/25/08	L45303-2		9	within thin-layer placement area
DuwDiagonalMarch2008	DUD_4C	208237	1267115	3/25/08	L45303-3	replicate	9	within thin-layer placement area
DuwDiagonalMarch2008	DUD_5A	209409	1266798	3/24/08	L45304-5		9	on top of dredged area cap
DuwDiagonalMarch2008	DUD_5A	209409	1266798	3/24/08	L45304-6	replicate	9	on top of dredged area cap
DuwDiagonalMarch2008	DUD_5C	208265	1267024	3/25/08	L45303-4		8	within thin-layer placement area
DuwDiagonalMarch2008	DUD_6C	208505	1266948	3/25/08	L45303-5		8	within thin-layer placement area
DuwDiagonalMarch2008	DUD_7C	208486	1266900	3/25/08	L45303-6		9	within thin-layer placement area
DuwDiagonalMarch2008	DUD_8C	208917	1266866	3/24/08	L45302-3		6	only most recent data (April 2009) included
DuwDiagonalMarch2008	DUD_8C	208917	1266866	3/24/08	L45302-4	replicate	6	only most recent data (April 2009) included
DuwDiagonalMarch2008	DUD_9C	209159	1266785	3/24/08	L45302-5		6	only most recent data (April 2009) included
DuwDiagonalMarch2008	DUD_10C	209515	1266662	3/24/08	L45302-6		7	only most recent data (April 2009) included
DuwDiagonalMarch2008	DUD_11C	209538	1266843	3/25/08	L45302-7		7	only most recent data (April 2009) included
DuwDiagonalMarch2008	DUD_12C	209630	1266812	3/25/08	L45302-8		8	only most recent data (April 2009) included
DuwDiagonalMarch2008	DUD_13C	207860	1267238	3/25/08	L45302-9		10	approximately 120 ft from thin-layer placement area and possibly influenced by thin-layer placement
DuwDiagonalMarch2008	DUD_14C	208001	1267195	3/25/08	L45303-7		9	within thin-layer placement area
DuwDiagonalMarch2008	DUD_15C	207969	1267057	3/25/08	L45303-8		9	within thin-layer placement area
DuwDiagonalApril2009	DUD_1A	209093	1267050	4/28/09	L47890-1		6	on top of dredged area cap
DuwDiagonalApril2009	DUD_1B	208488	1267058	4/27/09	L47890-7		8	on top of dredged area cap
DuwDiagonalApril2009	DUD_2A	208905	1267140	4/28/09	L47890-2		7	on top of dredged area cap

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
DuwDiagonalApril2009	DUD_2B	208625	1267076	4/27/09	L47890-8		5	on top of dredged area cap
DuwDiagonalApril2009	DUD_3A	208973	1266952	4/28/09	L47890-3		10	on top of dredged area cap
DuwDiagonalApril2009	DUD_3B	208717	1267049	4/27/09	L47890-9		5	on top of dredged area cap
DuwDiagonalApril2009	DUD_3C	208145	1267145	4/28/09	L47893-1		10	within thin-layer placement area
DuwDiagonalApril2009	DUD_4A	209357	1266886	4/28/09	L47890-4		7	on top of dredged area cap
DuwDiagonalApril2009	DUD_4C	208237	1267115	4/28/09	L47893-2		10	within thin-layer placement area
DuwDiagonalApril2009	DUD_4C	208237	1267115	4/28/09	L47893-3	replicate	10	within thin-layer placement area
DuwDiagonalApril2009	DUD_5A	209409	1266798	4/28/09	L47890-5		9	on top of dredged area cap
DuwDiagonalApril2009	DUD_5A	209409	1266798	4/28/09	L47890-6	replicate	9	on top of dredged area cap
DuwDiagonalApril2009	DUD_5C	208265	1267024	4/28/09	L47893-4		10	within thin-layer placement area
DuwDiagonalApril2009	DUD_6C	208505	1266948	4/28/09	L47893-5		10	within thin-layer placement area
DuwDiagonalApril2009	DUD_7C	208486	1266900	4/28/09	L47893-6		10	within thin-layer placement area
DuwDiagonalApril2009	DUD_13C	207860	1267238	4/29/09	L47888-9		10	approximately 120 ft from thin-layer placement area and possibly influenced by thin-layer placement
DuwDiagonalApril2009	DUD_14C	208001	1267195	4/28/09	L47893-7		8	within thin-layer placement area
DuwDiagonalApril2009	DUD_15C	207969	1267057	4/28/09	L47893-8		8	within thin-layer placement area
Ecology-Norfolk	10	190201	1278537	7/9/02	288139		10	superseded by LDW-SS341, 9 ft away
Ecology-Norfolk	13	190172	1278577	7/9/02	288142		10	superseded by NFK501, 6 ft away
Ecology-Norfolk	17	190168	1278591	7/9/02	288146		10	superseded by LDW-SS343, 1 ft away
EPA SI	DR019	206530	1268204	8/17/98	SD-DR019-0000[a]		10	superseded by LDW-SS32, less than 1 ft away
EPA SI	DR020	206549	1268450	8/17/98	SD-DR020-0000[a]		10	superseded by LDW-SS31, 1 ft away
EPA SI	DR021	206718	1267822	8/17/98	SD-DR021-0000[a]		10	superseded by LDW-SS319, 7 ft away
EPA SI	DR022	206228	1267936	8/17/98	SD-DR022-0000-CC		10	sample falls within 2004 Lehigh NW dredge area
EPA SI	DR028	204607	1268471	8/17/98	SD-DR028-0000[a]		10	superseded by LDWB4b, 2 ft away
EPA SI	DR030	204436	1268521	8/17/98	SD-DR030-0000[a]		10	superseded by LDW-SS50, 2 ft away
EPA SI	DR031	211452	1265523	8/11/98	SD-DR031-0000		10	north of RM 0, therefore outside of study area
EPA SI	DR035	210194	1266104	8/11/98	SD-DR035-0000[a]		10	superseded by LDW-SS12, 2 ft away
EPA SI	DR053	204908	1267941	8/31/98	SD-DR053-0000-CC[a]		10	superseded by LDW-SS44, 2 ft away
EPA SI	DR065	204315	1268452	8/17/98	SD-DR065-0000[a]		10	superseded by LDW-SS52, 1 ft away
EPA SI	DR076	211210	1265996	8/24/98	SD-DR076-0000[a]		10	superseded by LDW-SS5, 2 ft away
EPA SI	DR079	209860	1266467	8/24/98	SD-DR079-0000[a]		10	superseded by LDW-SS15, 2 ft away
EPA SI	DR085	207054	1267392	8/31/98	SD-DR085-0000[a]		10	superseded by LDW-SSB2b, 6 ft away
EPA SI	DR087	206171	1267735	8/12/98	SD-DR087-0000[a]		10	superseded by LDW-SS37, 3 ft away
EPA SI	DR088	205507	1267960	8/31/98	SD-DR088-0000[a]		10	superseded by LDW-SS40, 1 ft away

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
EPA SI	DR093	203278	1268849	8/17/98	SD-DR093-0000		10	sample inside 1999 James Hardie dredge area
EPA SI	DR096	203090	1269369	9/2/98	SD-DR096-0000		10	sample inside 1999 Glacier Ready Mix dredge area
EPA SI	DR097	203284	1269528	8/20/98	SD-DR097-0000[a]		10	superseded by LDW-SS63, 10 ft away
EPA SI	DR106	201545	1270217	8/19/98	SD-DR106-0000[a]		10	superseded by LDW-SS76, 1 ft away
EPA SI	DR111	201460	1269985	8/19/98	SD-DR111-0000-CC[a]		10	superseded by DR-111, 5 ft away
EPA SI	DR113	200851	1270429	8/19/98	SD-DR113-0000-CC[a]		10	superseded by LDW-SS81, 1 ft away
EPA SI	DR123	203890	1267968	9/14/98	SD-DR123-0000[a]		10	superseded by LDW-SS57, 7 ft away
EPA SI	DR125	204137	1268161	8/31/98	SD-DR125-0000		10	sample inside Glacier NW 2005 dredge area
EPA SI	DR131	201998	1268809	8/13/98	SD-DR131-0000-CC[a]		10	superseded by LDW-SS70, 1 ft away
EPA SI	DR142	199659	1271055	8/20/98	SD-DR142-0000		10	sample inside 1998 Hurlen-Boyer dredge area
EPA SI	DR143	199472	1271243	8/31/98	SD-DR143-0000		10	sample inside 1998 Hurlen-Boyer dredge area
EPA SI	DR145	203146	1268825	8/17/98	SD-DR145-0000		10	inside 1999 James Hardie dredge area
EPA SI	DR160	204365	1268236	8/12/98	SD-DR160-0000[a]		10	superseded by LDW-SS51, 2 ft away
EPA SI	DR163	203131	1268774	8/27/98	SD-DR163-0000		10	inside 1999 James Hardie dredge area
EPA SI	DR175	198641	1272581	8/20/98	SD-DR175-0000[a]		10	superseded by LDW-SS94, 1 ft away
EPA SI	DR181	198868	1273272	9/1/98	SD-DR-181-0000[a]		10	superseded by DR-181, 2 ft away
EPA SI	DR186	195288	1275958	8/27/98	SD-DR186-0000[a]		10	superseded by LDW-SS111, 1 ft away
EPA SI	DR187	194730	1276134	8/27/98	SD-DR187-0000[a]		10	superseded by LDW-SS115, 3 ft away
EPA SI	DR191	198744	1271964	8/13/98	SD-DR191-0000		10	sample falls within 1998 Hurlen-Boyer dredge area
EPA SI	DR192	198507	1272251	8/13/98	SD-DR192-0000		10	sample falls within 1998 Hurlen-Boyer dredge area
EPA SI	DR198	197314	1273506	8/20/98	SD-DR198-0000[a]		10	superseded by LDW-SS102, 3 ft away
EPA SI	DR202	197040	1273815	8/27/98	SD-DR202-0000[a]		10	superseded by LDW-SS104, 2 ft away
EPA SI	DR228	196122	1275015	9/1/98	SD-DR228-0000		10	sample inside 1999 USACE dredge area
EPA SI	DR229	195739	1275490	8/27/98	SD-DR229-0000		10	sample inside 1999 USACE dredge area
EPA SI	DR230	194778	1275907	8/25/98	SD-DR230-0000		10	sample inside 1999 USACE dredge area
EPA SI	DR234	196363	1274835	8/19/98	SD-DR234-0000		10	sample inside 1999 USACE dredge area
EPA SI	DR235	195030	1275851	8/26/98	SD-DR235-0000		10	sample inside 1999 USACE dredge area
EPA SI	DR238	193348	1276577	8/27/98	SD-DR238-0000[a]		10	superseded by LDW-SS125, 1 ft away
EPA SI	DR242	192929	1277477	8/24/98	SD-DR242-0000-CC[a]		10	superseded by RhônePoulenc2004 loc. SB-1
EPA SI	DR255	190300	1278369	9/15/98	SD-DR255-0000		10	Inside 1999 Norfolk dredge area
EPA SI	DR256	190118	1278608	9/15/98	SD-DR256-0000		10	Inside 1999 Norfolk dredge area
EPA SI	DR260	193122	1276042	9/2/98	SD-DR260-0000		10	Inside Duwamish YC 1999 dredge area
EPA SI	DR261	192860	1276181	8/25/98	SD-DR261-0000		10	Inside Duwamish YC 1999 dredge area

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
EPA SI	DR271	189995	1277573	9/15/98	SD-DR271-0000[a]		10	superseded by LDW-SS148, 2 ft away
EPA SI	DR282	194054	1276089	8/25/98	SD-DR282-0000		10	sample inside 1999 USACE dredge area
EPA SI	DR283	193104	1276196	8/25/98	SD-DR283-0000		10	Inside Duwamish YC 1999 dredge area
EPA SI	DR286	191854	1276508	8/26/98	SD-DR286-0000-CC[a]		10	superseded by LDW-B10b, 3 ft away
EPA SI	DR288	193668	1276259	8/25/98	SD-DR288-0000		10	sample inside 1999 USACE dredge area
Harbor Island RI	K-05	210286	1266258	9/27/91	K-05-1-D1[a]		2	superseded by TRI-10, 10 ft away
Harbor Island RI	K-05	210286	1266258	9/27/91	K-05-2-D1[a]	field duplicate	2	superseded by TRI-10, 10 ft away
Harbor Island RI	K-05	210286	1266258	9/27/91	K-05-3-D1[a]	field duplicate	2	superseded by TRI-10, 10 ft away
Harbor Island RI	K-05	210286	1266258	10/14/91	K-05-1[a]		2	superseded by TRI-10, 10 ft away
Harbor Island RI	K-05	210286	1266258	10/14/91	K-05-1-B[a]		2	superseded by TRI-10, 10 ft away
Harbor Island RI	K-05	210286	1266258	10/14/91	K-05-2[a]		2	superseded by TRI-10, 10 ft away
Harbor Island RI	K-05	210286	1266258	10/14/91	K-05-3[a]		2	superseded by TRI-10, 10 ft away
Harbor Island RI	K-07	211229	1266883	9/30/91	K-07		2	superseded by LDW-SS4,1 ft away
Harbor Island RI	K-08	211686	1267033	9/30/91	K-08		2	north of RM 0, therefore outside of study area
Harbor Island RI	K-11	211372	1266032	9/30/91	K-11[a]		2	superseded by LDW-SS1, less than 1 ft away
Harbor Island RI	K-12	211610	1265764	9/30/91	K-12		2	north of RM 0, therefore outside of study area
Harbor Island RI	K-13	211863	1265485	9/30/91	K-13		2	north of RM 0, therefore outside of study area
JorgensenAugust2004	SD-323-S	195348	1275946	8/17/04	SD-323-0000		10	superseded by LDW-SS10, 3 ft away
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-1		10	Coordinates uncertain and do not meet project DQOs
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-2		10	Coordinates uncertain and do not meet project DQOs
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-3		10	Coordinates uncertain and do not meet project DQOs
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-4		10	Coordinates uncertain and do not meet project DQOs
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-5		10	Coordinates uncertain and do not meet project DQOs
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-6		10	Coordinates uncertain and do not meet project DQOs
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-7		10	Coordinates uncertain and do not meet project DQOs

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-8		10	Coordinates uncertain and do not meet project DQOs
KC WQA	Kellogg Island - Amphipods	207202	1266150	7/14/98	L13812-9		10	Coordinates uncertain and do not meet project DQOs
KC WQA	West Marginal Way - Amphipods	207348	1266548	7/23/98	L13898-1		10	Coordinates uncertain and do not meet project DQOs
KC WQA	West Marginal Way - Amphipods	207348	1266548	7/23/98	L13898-2		10	Coordinates uncertain and do not meet project DQOs
KC WQA	West Marginal Way - Amphipods	207348	1266548	7/23/98	L13898-3		10	Coordinates uncertain and do not meet project DQOs
LDWRI-Benthic	B4b	204605	1268471	8/28/04	LDW-B4b-S[a]		10	superseded by B4B, 4 ft away
LDWRI-SurfaceSedimentRound1	LDW-SS10	210287	1266257	1/17/05	LDW-SS10-010[a]		10	superseded by TRI-010, 9 ft away
LDWRI-SurfaceSedimentRound1	LDW-SS18	209531	1266844	2/1/05	LDW-SS18-010		10	Collected within 200 ft of Duwamish/Diagonal dredging, thereby reflecting post-remediation conditions in this area
LDWRI-SurfaceSedimentRound1	LDW-SS20	209158	1266779	2/2/05	LDW-SS20-010		10	Collected within 200 ft of Duwamish/Diagonal dredging, thereby reflecting post
LDWRI-SurfaceSedimentRound1	LDW-SS22	208754	1267170	1/17/05	LDW-SS22-010		10	Collected within 200 ft of Duwamish/Diagonal dredging, thereby reflecting post
LDWRI-SurfaceSedimentRound1	LDW-SS51	204366	1268234	1/18/05	LDW-SS51-010[a]		10	superseded by TRI-051, 6 ft away
LDWRI-SurfaceSedimentRound1	LDW-SS96	198348	1272753	1/21/05	LDW-SS96-010[a]		10	superseded by TRI-096, 7 ft away
LDWRI-SurfaceSedimentRound1	LDW-SS123	193932	1276329	1/24/05	LDW-SS123-010[a]		10	superseded by AN-019, 8 ft away
LDWRI-SurfaceSedimentRound1	LDW-SS123	193932	1276329	1/24/05	LDW-SS203-010[a]	field duplicate	10	superseded by AN-019, 8 ft away
LDWRI-SurfaceSedimentRound2	LDW-SS16	209832	1266290	3/8/05	LDW-SS16-010[a]		10	superseded by TRI-016, 5 ft away
LDWRI-SurfaceSedimentRound2	LDW-SS21	209139	1266686	3/8/05	LDW-SS21-010		10	Collected within 200 ft of Duwamish/Diagonal dredging, thereby reflecting post
LDWRI-SurfaceSedimentRound2	LDW-SS25	208202	1267285	3/10/05	LDW-SS25-010		10	Collected within 200 ft of Duwamish/Diagonal dredging, thereby reflecting post
LDWRI-SurfaceSedimentRound2	LDW-SS-45	204843	1268062	3/10/05	LDW-SS45-010[a]		10	superseded by TRI-045, 7 ft away
LDWRI-SurfaceSedimentRound2	LDW- SS-151	189733	1279105	3/15/05	LDW-SS151-010[a]		10	superseded by DR-02, 8 ft away
NOAA SiteChar	CH0005	194120	1276106	10/9/97	CH02-01		10	sample inside 1999 USACE dredge area
NOAA SiteChar	CH0009	195697	1275667	10/15/97	CH03-01		10	sample inside 1999 USACE dredge area
NOAA SiteChar	CH0010	195402	1275830	10/15/97	CH03-02		10	sample inside 1999 USACE dredge area
NOAA SiteChar	CH0011	195146	1275866	10/15/97	CH03-03		10	sample inside 1999 USACE dredge area
NOAA SiteChar	CH0012	194742	1275998	10/15/97	CH03-04		10	sample inside 1999 USACE dredge area
NOAA SiteChar	CH0017	196259	1274916	11/13/97	CH04-04		10	sample inside 1999 USACE dredge area

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
NOAA SiteChar	CH0023	201244	1269902	10/16/97	CH07-01[a]		10	superseded by LDW-SS79, 2 ft away
NOAA SiteChar	EIT061	194079	1276332	9/29/97	EIT06-02[a]		10	superseded by LDW-SS121, 4 ft away
NOAA SiteChar	EIT074	199309	1271869	11/3/97	EIT09-01[a]		10	superseded by LDW-SS88, 7 ft away
NOAA SiteChar	EST135	192760	1276632	11/12/97	EST07-07[a]		10	superseded by LDW-B8b, 3 ft away
NOAA SiteChar	EST144	193933	1276329	9/25/97	EST09-04[a]		10	superseded by AN-019, 9 ft away
NOAA SiteChar	EST152	195584	1275858	9/24/97	EST11-03[a]		10	superseded by Jorgenson 2004 location SD-309-S
NOAA SiteChar	EST154	195474	1275881	9/24/97	EST11-04[a]		10	superseded by Jorgenson 2004 location SD-334-S
NOAA SiteChar	EST180	198751	1272435	10/6/97	EST13-05[a]		10	superseded by LDW-SS92, 2 ft away
NOAA SiteChar	EST202	205988	1267994	9/17/97	EST19-01		10	sample inside Lehigh NW 2004 dredge area
NOAA SiteChar	EST219	207310	1267542	9/17/97	EST21-03[a]		10	superseded by LDW-SS27, 5 ft away
NOAA SiteChar	WIT280	200290	1270188	10/3/97	WIT11-01[a]		10	superseded by LDW-B5a, 10 ft away
NOAA SiteChar	WST313	192989	1276092	10/20/97	WST06-01		10	sample inside 1999 Duwamish YC dredge area
NOAA SiteChar	WST316	193828	1276100	10/1/97	WST07-02		10	sample inside 1999 USACE dredge area
NOAA SiteChar	WST317	193461	1276205	10/15/97	WST07-03		10	sample inside 1999 USACE dredge area
NOAA SiteChar	WST318	195552	1275619	10/2/97	WST08-01		10	sample inside 1999 USACE dredge area
NOAA SiteChar	WST319	195294	1275737	10/2/97	WST08-02		10	sample inside 1999 USACE dredge area
NOAA SiteChar	WST320	195074	1275811	10/2/97	WST08-03		10	sample inside 1999 USACE dredge area
NOAA SiteChar	WST321	194891	1275832	10/2/97	WST08-04		10	sample inside 1999 USACE dredge area
NOAA SiteChar	WST323	195779	1275215	10/21/97	WST09-02[a]		10	superseded by T117-SE-10-G
NOAA SiteChar	WST341	198722	1272031	10/21/97	WST13-03		10	inside Hurlen-Boyer 1998 dredge area
NOAA SiteChar	WST342	199913	1270839	10/23/97	WST14-01[a]		10	superseded by EPA SI location DR141
NOAA SiteChar	WST344	199541	1271195	10/10/97	WST14-02		10	inside Hurlen-Boyer 1998 dredge area
NOAA SiteChar	WST367	206409	1266994	9/19/97	WST20-02[a]		10	superseded by EPA SI location DR048
Norfolk-cleanup1	NFK001	190277	1278459	8/18/94	L4321-1		10	inside 1999 Norfolk dredge area
Norfolk-cleanup1	NFK002	190237	1278506	8/18/94	L4321-2[a]		10	superseded by Ecology - Norfolk locations 2,3 and 4
Norfolk-cleanup1	NFK004	190165	1278594	8/18/94	L4321-4		10	inside 1999 Norfolk dredge area
Norfolk-cleanup1	NFK007	190249	1278415	8/22/94	L4321-7		10	inside 1999 Norfolk dredge area
Norfolk-cleanup1	NFK008	190203	1278497	8/17/94	L4321-8		10	inside 1999 Norfolk dredge area
Norfolk-cleanup1	NFK009	190154	1278564	8/17/94	L4321-9		10	inside 1999 Norfolk dredge area
Norfolk-cleanup1	NFK009	190154	1278564	8/31/94	L4321-25		15	inside 1999 Norfolk dredge area
Norfolk-cleanup1	NFK012	190158	1278480	8/18/94	L4321-13		10	inside 1999 Norfolk dredge area
Norfolk-cleanup1	NFK013	190089	1278542	8/19/94	L4321-14		10	inside 1999 Norfolk dredge area
Norfolk-cleanup1	NFK014	190015	1278609	8/19/94	L4321-16	field duplicate	10	inside 1999 Norfolk dredge area

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
Norfolk-cleanup2	NFK201	190294	1278424	8/23/95	L6725-1		10	inside 1999 Norfolk dredge area
Norfolk-cleanup2	NFK202	190219	1278524	8/23/95	L6725-2		10	inside 1999 Norfolk dredge area
Norfolk-cleanup2	NFK203	190129	1278619	8/23/95	L6725-3		10	inside 1999 Norfolk dredge area
Norfolk-cleanup2	NFK205	190234	1278457	8/28/95	L6725-5		10	inside 1999 Norfolk dredge area
Norfolk-cleanup3	NFK201	190294	1278424	12/5/95	L7462-16		10	inside 1999 Norfolk dredge area
Norfolk-cleanup3	NFK312	190314	1278384	12/5/95	L7462-12		10	inside 1999 Norfolk dredge area
Norfolk-cleanup3	NFK314	190257	1278407	12/6/95	L7462-14		10	inside 1999 Norfolk dredge area
Norfolk-cleanup3	NFK315	190186	1278524	12/5/95	L7462-15		10	inside 1999 Norfolk dredge area
Norfolk-monit1	NFK501	190150	1278591	4/23/99	L15421-1[a]		10	superseded by April-01 sample from this location
Norfolk-monit1	NFK504	190083	1278626	4/23/99	L15421-4[a]		10	superseded by LDW-SS344, 1 ft away
Norfolk-monit2a	NFK501	190160	1278569	10/8/99	L16628-1		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit2a	NFK502	190164	1278512	10/8/99	L16628-3		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit2a	NFK502	190164	1278512	10/8/99	L16628-4[a]		10	superseded by NFK502, 5 ft away
Norfolk-monit2a	NFK503	190181	1278543	10/8/99	L16628-5[a]		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit2a	NFK503	190181	1278543	10/8/99	L16628-6		10	superseded by April-02 sample from this location
Norfolk-monit2a	NFK504	190086	1278619	10/8/99	L16628-7		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit2b	NFK501	190166	1278593	2/8/00	L17315-1		2	superseded by NFK501, 11 ft away[b]
Norfolk-monit2b	NFK503	190197	1278548	2/8/00	L17315-3		2	superseded by LDW-SS341, 2 ft away
Norfolk-monit2b	NFK506	190257	1278543	2/10/00	L17311-1		10	superseded by Ecology, Norfolk locations 5 and 7
Norfolk-monit3	NFK501	190142	1278573	4/6/00	L17647-1		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit3	NFK502	190165	1278511	4/6/00	L17647-3		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit3	NFK502	190165	1278511	4/6/00	L17647-4[a]		10	superseded by LDW-SS342, 9 ft away
Norfolk-monit3	NFK503	190179	1278543	4/6/00	L17647-5		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit3	NFK503	190179	1278543	4/6/00	L17647-6[a]		10	superseded by April-02 sample from this location
Norfolk-monit3	NFK504	190076	1278628	4/6/00	L17647-7		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit3	NFK504	190076	1278628	4/6/00	L17647-8[a]		10	superseded by LDW-SS344, 7 ft away
Norfolk-monit4	NFK501	190153	1278583	4/24/01	L20703-1		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit4	NFK502	190156	1278512	4/24/01	L20703-3		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit4	NFK502	190156	1278512	4/24/01	L20703-4[a]		10	superseded by NFK502, 4 ft away
Norfolk-monit4	NFK503	190177	1278549	4/24/01	L20703-5		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit4	NFK503	190177	1278549	4/24/01	L20703-6		10	superseded by April-02 sample from this location
Norfolk-monit4	NFK504	190075	1278625	4/24/01	L20703-7		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit4	NFK504	190075	1278625	4/24/01	L20703-8[a]		10	superseded by LDW-SS344, 7 ft away

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
Norfolk-monit5	NFK501	190165	1278589	4/30/02	L23995-1		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit5	NFK501	190165	1278589	4/30/02	L23995-2[a]		10	superseded by LDW-SS343, 4 ft away
Norfolk-monit5	NFK502	190156	1278513	4/30/02	L23995-3		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit5	NFK502	190156	1278513	4/30/02	L23995-4[a]		10	superseded by LDW-SS342, 3 ft away
Norfolk-monit5	NFK503	190177	1278545	4/30/02	L23995-5		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit5	NFK504	190074	1278622	4/30/02	L23995-7		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit5	NFK504	190074	1278622	4/30/02	L23995-8[a]		10	superseded by LDW-SS344, 9 ft away
Norfolk-monit6	NFK501	190167	1278586	4/23/03	L28052-1		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit6	NFK501	190167	1278586	4/23/03	L28052-2[a]		10	superseded by NFK501, 4 ft away
Norfolk-monit6	NFK502	190156	1278511	4/23/03	L28052-3		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit6	NFK502	190156	1278511	4/23/03	L28052-4[a]		10	superseded by NFK502, 4 ft away
Norfolk-monit6	NFK503	190197	1278543	4/23/03	L28052-5		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit6	NFK503	190197	1278543	4/23/03	L28052-6[a]		10	superseded by LDW-SS341, 4 ft away
Norfolk-monit6	NFK504	190076	1278622	4/23/03	L28052-7		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit6	NFK504	190076	1278622	4/23/03	L28052-8[a]		10	superseded by LDW-SS344, 7 ft away
Norfolk-monit7	NFK501	190169	1278589	4/5/04	L31635-1		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit7	NFK501	190169	1278589	4/5/04	L31635-2[a]		10	superseded by LDW-SS343, 1 ft away
Norfolk-monit7	NFK502	190156	1278515	4/5/04	L31635-3		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit7	NFK502	190156	1278515	4/5/04	L31635-4[a]		10	superseded by LDW-SS342, 2 ft away
Norfolk-monit7	NFK503	190194	1278543	4/5/04	L31635-5		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit7	NFK503	190194	1278543	4/5/04	L31635-6[a]		10	superseded by LDW-SS341, 2 ft away
Norfolk-monit7	NFK504	190079	1278627	4/5/04	L31635-7		2	only 0-2 cm depth, 10 cm depth preferred
Norfolk-monit7	NFK504	190079	1278627	4/5/04	L31635-8[a]		10	superseded by LDW-SS344, 3 ft away
Plant 2 RFI-1	SD-SWY07	195628	1275855	6/13/95	SD-SWY07-0000[a]		9	superseded by Plant2-Transformer Phase1 loc. SD-SWY17
Plant 2 RFI-2b	SD-DUW83	195679	1275624	4/3/96	SD2B-DUW83-0000		9	sample inside 1999 USACE dredge area
Plant 2 RFI-2b	SD-DUW90	195533	1275877	4/4/96	SD2B-DUW90-0000[a]		9	superseded by Jorgenson August 2004 loc SD-343-S
Plant 2 RFI-2b	SD-DUW92	195387	1275932	4/2/96	SD2B-DUW92-0000[a]		9	superseded by Jorgenson August 2004 loc SD-320-S
PSAMP/NOAA98	203	208455	1266636	6/22/98	203		2	not acceptable for all phase 2 uses, insufficient QA/QC available
PSAMP/NOAA98	204	208272	1267209	6/22/98	204		2	not acceptable for all phase 2 uses, insufficient QA/QC available
PSAMP/NOAA98	205	202467	1269112	6/23/98	205		2	not acceptable for all phase 2 uses, insufficient QA/QC available
Rhône-Poulenc RFI-1	A11-01	192748	1276772	3/3/94	RPL-A11-01-01		15	not acceptable for all phase 2 uses, insufficient QA/QC available
Rhône-Poulenc RFI-1	A11-02	192817	1276678	3/3/94	RPL-A11-02-01		15	not acceptable for all phase 2 uses, insufficient QA/QC available
Rhône-Poulenc RFI-1	A11-03	192906	1276719	3/3/94	RPL-A11-03-01		15	not acceptable for all phase 2 uses, insufficient QA/QC available

Table N-5 LDW Surface Sediment Samples Collected Since 1990 Excluded from the FS Baseline Dataset (continued)

Event Name	Location Name	Northing[a]	Easting[a]	Sampling Date	Sample ID	Field QC	Lower Depth (cm)	Rationale for Exclusion
Rhône-Poulenc RFI-1	A11-03	192906	1276719	3/3/94	RPL-A11-08-01	duplicate	15	not acceptable for all phase 2 uses, insufficient QA/QC available
Rhône-Poulenc RFI-1	A11-04	193038	1276583	3/3/94	RPL-A11-04-01		15	not acceptable for all phase 2 uses, insufficient QA/QC available
Rhône-Poulenc RFI-1	A11-05	193145	1276637	3/3/94	RPL-A11-05-01		15	not acceptable for all phase 2 uses, insufficient QA/QC available
Rhône-Poulenc RFI-1	A11-06	193383	1276536	3/3/94	RPL-A11-06-01		15	not acceptable for all phase 2 uses, insufficient QA/QC available
Rhône-Poulenc RFI-1	A11-07	193521	1276514	3/3/94	RPL-A11-07-01		15	not acceptable for all phase 2 uses, insufficient QA/QC available
Rhône-Poulenc RFI-2	A11-05	193145	1276637	8/18/94	RPL-A11-05-02[a]		2	superseded by LDW-SS126, 2 ft away
Rhône-Poulenc RFI-2	A11-05	193145	1276637	8/18/94	RPL-A11-10-02[a]	field duplicate	2	superseded by LDW-SS126, 2 ft away
Rhône-Poulenc RFI-3	06-intsed-2	193293	1276681	7/1/96	06-intsed-2[a]		10	superseded by RhônePoulenc2004 loc. SH-04
Rhône-Poulenc RFI-3	07-intsed-1	193466	1276645	7/1/96	07-intsed-1[a]		10	superseded by RhônePoulenc2004 loc. SH-02
T117BoundaryDefinition	T117-SE-19-G	195677	1275494	12/5/03	T117-SE19-SG		10	superseded by T117-SE107-G, 2 ft away
T117BoundaryDefinition	T117-SE-46-G	195148	1275660	12/9/03	T117-SE46-SG[a]		10	superseded by T117-SE117-G, 5 ft away

Notes:

1. Sampling location coordinates are Washington State Plane North, U.S. survey ft, NAD83.
2. Although these data were excluded from the FS baseline dataset and were not used for mapping the extent of contamination, some of these data were used for time trend analyses (see Section 2.2.3 for details).

a. Newer results have replaced older results in the FS baseline dataset, but for chemicals not analyzed in the newer samples, older results have been preserved in the FS baseline dataset. In most cases, only a small number of chemical results from the older sample are used.

b. Nominal distance between oldest and newest location is slightly greater than the 10-ft threshold. Results from older sample were originally superseded in the RI by sample that has been subsequently superseded by a third (newer) sample shown in this table. The distances between this intermediate-date sample and the newest and oldest samples were both less than 10 ft.

cm = centimeter; DQO = data quality objective; Ecology = Washington State Department of Ecology; EPA = U.S. Environmental Protection Agency; FS = feasibility study; ID = identification; KC = King County; LDW = Lower Duwamish Waterway; NOAA = National Oceanic and Atmospheric Administration; QA = quality assurance; QC = quality control; RI = remedial investigation; RFI = RCRA facility investigation; SI = site investigation; RCRA = Resource Conservation and Recovery Act; USACE = U.S. Army Corps of Engineers; WQA = water quality assessment; YC = yacht club.

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Sediment Chemistry							
Duwamish/Diagonal Apr 2009 (surface sediment)	Duw Diagonal April 2009	2009	RM 0.3 – 0.7 east and navigation channel	PCBs (as Aroclors), metals, SVOCs, pesticides, dioxins/furans, conventionals	23 surface sediment samples (0-10 cm) and 3 field replicates from 23 locations collected using multiple casts of a 0.1-m^2 van Veen grab sampler; 3 composites and 1 field replicate were analyzed for dioxins/furans	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2003a, 2010) King County (2005a) included in Anchor (2007a), Appendix A
Boeing Developmental Center 2009 (surface sediment)	Boeing DC 2009	2009	RM 4.9 – 5.0 east	PCBs (as Aroclors), TOC, total solids	3 surface sediment samples (0-5 cm) and one field duplicate collected using disposable plastic spoons	data validation consistent with EPA guidelines	Project Performance Corporation (2004) CALIBRE (2009a)
Boeing Plant 2-2009 (subsurface sediment)	Boeing P2 2009 DSOA	2009	RM 2.9 – 3.7 east and navigation channel	TOC, total solids, PCB Aroclors, VOCs	226 subsurface sediment samples and 23 field duplicates from 33 locations collected using the MudMole™ impact corer with the exception of one sample, which was collected using freeze coring methods. Samples were collected at 1-ft intervals down to a depth of 12 to 13 ft below mudline	data validation consistent with EPA guidelines; validation qualifiers added to database	AMEC Geomatrix (2010)
Turning basin maintenance dredging – 2009 (subsurface sediment)	LDW Turning Basin 09	2009	RM 4.1-4.3 navigation channel	PCBs (as Aroclors), pesticides, SVOCs, VOCs, metals, conventionals	11 subsurface sediment samples (up to 13 ft in depth) from 13 locations collected using a vibracorer	data review consistent with EPA guidelines; validation qualifiers added to database	SAIC (2008a, b, 2009a, b)
Terminal 115 (surface and subsurface sediment)	T115 Intertidal 2009 (surface) T115 (subsurface)	2009 (surf.) 2008 (subsurf.)	RM 1.7 – 1.9 west	PCBs (as Aroclors), SVOCs, pesticides, dioxin/furans, conventionals	5 surface sediment samples (0-10 cm) and 1 field duplicate from 5 locations 11 subsurface sediment samples (2 samples from 0 to 3 ft, 9 1-ft z-layer samples down to 6 ft) from 4 locations using a vibracorer	data validation consistent with EPA guidelines; validation qualifiers added to database	Anchor (2007b, 2008) Anchor QEA (2009a, c)
Boeing Developmental Center 2008 (surface sediment)	Boeing DC 2008	2009	RM 4.9 – 5.0 east	PCBs (as Aroclors), TOC, total solids	3 surface sediment samples (0-5 cm) and one field duplicate collected using disposable plastic spoons	data validation consistent with EPA guidelines	Project Performance Corporation (2004) CALIBRE (2009b)
Ecology upstream sampling (surface sediment)	LDW Upstream Sed	2008	RM 4.9 – 7.4	PCBs (as Aroclors), SVOCs, metals, conventionals	86 surface sediment samples (1-10 cm) and 2 field duplicates collected using a van Veen sampler or by manual methods	data review consistent with EPA guidelines; validation qualifiers added to database	Ecology (2008) Ecology and Environment (2009)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Turning basin maintenance dredging – 2008 (surface and subsurface sediment)	LDW Turning Basin 08	2008	RM 4.1-4.7 navigation channel	PCBs (as Aroclors), dioxins/ furans, pesticides, SVOCs, VOCs, metals, conventionals	32 subsurface sediment samples (up to 6 ft in depth) from 32 locations collected using a vibracorer and modified Young van Veen grab sampler	data review consistent with EPA guidelines; validation qualifiers added to database	SAIC (2008a, b, 2009a, b)
Terminal 117 boundary delineation (surface sediment)	T117 Sed Boundary	2008	RM 3.4 – 3.7 west and navigation channel	PCBs (as Aroclors), SVOCs, pesticides, metals, conventionals	17 surface sediment samples (0-10 cm) and 1 field duplicate collected using an Eckman grab sampler or by hand using a stainless steel spoon; 1 sample composited from 3 grabs (2-3 cm) because of insufficient penetration	data validation consistent with EPA guidelines; validation qualifiers added to database	Windward et al. (2003) Windward (2008) Windward and Integral (2009)
Duwamish/Diagonal Mar 2008 (surface sediment)	DuwDiagonal March 2008	2008	RM 0.3 – 0.8 east and navigation channel	PCBs (as Aroclors), metals, SVOCs, pesticides, conventionals	23 surface sediment samples (0 to10 cm) and 3 field replicates from 23 locations collected using multiple casts of a 0.1-m^2 van Veen grab sampler	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2003a, 2010) King County (2005a) included in Anchor (2007a), Appendix A
Slip 4 investigation of PCB sources (subsurface sediment)	Slip 4-Landau 2008	2008	Slip 4 (RM 2.8 – 2.9 east)	PCBs (as Aroclors)	13 subsurface sediment samples (up to 24 in. depth) from 4 locations collected by hand using divers	data validation consistent with EPA guidelines; no validation qualifiers needed	Landau (2008)
Boeing Plant 2-2008 (subsurface sediment)	Boeing P2 2008 DSOA	2008	RM 3.1 – 3.7east	PCBs (as Aroclors), TOC, total solids	37 subsurface sediment samples and 2 field duplicates collected at 1-ft intervals from 3 to 15 ft below mudline from 10 locations using a MudMole™ sampler	data validation consistent with EPA guidelines; validation qualifiers added to database	Geomatrix (2007) AMEC Geomatrix (2009b)
Boeing Plant 2-under building (subsurface sediment)	Boeing P2 Under Bldg	2008	RM 3.3 – 3.6 east	PCBs (as Aroclors), metals, SVOCs, conventionals	61 samples and 6 field duplicates from 18 locations were collected using a hollow-stem auger drill rig with a split-spoon sampler. Samples were collected at 1- to 1.5-ft intervals down to depths of 5 to 9 ft below mudline	data validation consistent with EPA guidelines; validation qualifiers added to database	Geomatrix and Floyd|Snider (2008) AMEC Geomatrix (2009a)
Industrial Container Services (surface sediment)	Industrial Container Services	2007	RM 2.1 – 2.3 west	PCBs (as Aroclors), pesticides, SVOCs, TPH, metals, conventionals	5 surface sediment samples (0 to 10 cm) and 1 field duplicate collected by hand using stainless steel scoops	data validation consistent with EPA guidelines; validation qualifiers added to database	SAIC (2007, 2009c)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
8801 E. Marginal (surface and subsurface sediment)	8801 E Marginal (formerly Kenworth PACCAR)	2008, 2006	RM 3.8 – 4.1 east	PCBs (as Aroclors), SVOCs, pesticides, metals, conventionals	29 surface sediment samples (0 to 10 cm) and 3 field duplicates collected using a van Veen sampler except where soft sediment or low tide events necessitated the use of an Eckman sampler or manual sample collection using a stainless steel trowel. 24 subsurface sediment samples and 1 field duplicate from 4 locations collected using a vibracorer. Samples were collected at 1-ft intervals to a depth of 6 ft below mudline	data validation consistent with EPA guidelines; validation qualifiers added to database	Anchor (2006) Anchor QEA (2009b)
Boeing Plant 2-DSOA west boundary (surface and subsurface sediment)	Plant 2-DSOA West Boundary and Nav Channel	2007	RM 3.1 – 3.6 navigation channel	PCBs (as Aroclors), TOC, total solids	11 surface sediment samples (0-10 cm) and 1 field duplicate collected using 0.1-m^2 modified van Veen grab sampler. 48 subsurface sediment samples (1-9 ft) and 1 field duplicate from 12 locations were collected using a MudMole™ sampler	data validation consistent with EPA guidelines; validation qualifiers added to database	Geomatrix (2007, 2008)
Boeing Developmental Center 2007 (surface sediment)	Boeing Developmental Center-2007	2007	RM 4.9 – 5.0 east	PCBs (as Aroclors), TOC, total solids	3 surface sediment samples (0-5 cm) and one field duplicate collected using disposable plastic spoons	data validation consistent with EPA guidelines	Project Performance Corporation (2004) CALIBRE (2008)
Duwamish/Diagonal Apr 2007 (surface sediment)	DuwDiagonal April 2007	2007	RM 0.3 – 0.8 east and navigation channel	PCBs (as Aroclors), SVOCs, pesticides, metals, conventionals	23 surface sediment samples (0-10 cm) and 3 field replicates from 23 locations collected using multiple casts of a 0.1-m^2 van Veen grab sampler	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2003a, 2005a) included in Anchor (2007a), Appendix A King County and Anchor (2008)
Slip 4 boundary definition (surface and subsurface sediment)	Slip 4 EAA 2008	2006	Slip 4 (RM 2.8 – 2.9 east)	PCBs (as Aroclors), SVOCs, TPH, pesticides, metals, geotechnical parameters, conventionals	4 surface sediment samples (0-10 cm) and 1 field replicate collected by hand, using stainless steel spoons. 26 subsurface sediment samples including one composite representing the total lengths of 3 cores were collected from 11 locations using either split spoon (max core tube length of 18 or 24 in.) or Shelby tube (max 30 in.) samplers	data validation consistent with EPA guidelines; validation qualifiers added to database	Integral (2006, 2007)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Ecology SPI (surface sediment)	Ecology SPI	2006	RM 0.0 – 2.9 east, west, and navigation channel (including Slip 4)	PCBs (as Aroclors), SVOCs, metals, organotins, conventionals	30 surface sediment samples (0-10 cm) and 1 field duplicate collected using a 0.1-m^2 double van Veen grab sampler	data validation consistent with EPA guidelines; validation qualifiers added to database	Germano & Associates (2006) Ecology (2007)
Duwamish Diagonal March 2006 cap monitoring – year 2, perimeter sediment characterization, and ENR cap sediment characterization – year 1	DuwDiag March 2006	2006	RM 0.4-0.6 east	Grain size, TOC, metals, SVOCs, PCB Aroclors, organochlorine pesticides	23 samples and 3 field duplicate samples; 8 grab samples collected with 6" coring device; 18 samples composited using equal aliquots of 3-10 grab samples collected using a van Veen grab sampler (0-10 cm)	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers will be added to database	King County (2006a, b, 2007)
Duwamish/Diagonal Aug 2005 (surface sediment)	DuwDiagonal August 2005	2005	RM 0.5 – 0.6 east	PCBs (as Aroclors), metals, SVOCs, pesticides, conventionals	1 surface sediment sample (0-10 cm) collected using multiple casts of a 0.1-m^2 modified, stainless steel van Veen grab sampler; 2 bank samples were collected by hand on the same day	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2003a, 2005a) included in Anchor (2007a), Appendix A
Boeing Developmental Center 2005 Annual Sampling of South Storm Drain System – Year 2	Boeing Developmental Center-2005	2005	RM 4.9 east	PCB Aroclors, TOC, total solids	3 surface (0-2 cm) sediment grab samples (1 field duplicate sample) collected using disposable plastic spoons	QC consistent with EPA guidelines; no validation qualifiers needed	CALIBRE (2006)
Duwamish Diagonal Jan-Feb 2005 post-dredge perimeter - before thin-layer cap placement	DuwDiag Jan 2005	2005	RM 0.4-0.6 east	Grain size, TOC, metals, SVOCs, PCB Aroclors, organochlorine pesticides	22 grab surface (0-10 cm) sediment samples (2 field replicates) using van Veen grab sampler	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2005f)
Duwamish Diagonal Mar 2005 post-dredge perimeter - after thin-layer cap placement	DuwDiag March 2005	2005	RM 0.4-0.6 east	Grain size, TOC, metals, SVOCs, PCB Aroclors, organochlorine pesticides	8 surface sediment samples (1 replicate) using a diver-actuated coring device from the top 10 cm of sediment	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2005e)
Duwamish Diagonal April 2005 baseline cap monitoring - year 1	DuwDiag April 2005	2005	RM 0.4-0.6 east	TOC, grain size, metals, SVOCs, PCB Aroclors, organochlorine pesticides	7 surface sediment grab samples (1 replicate) using van Veen grab samplers from the top 10 cm of sediment	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2005d)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Boeing Developmental Center 2004 Annual Sampling of South Storm Drain System – year 1	Boeing Developmental Center-2004	2004	RM 4.9 east	PCB Aroclors, TOC, total solids	3 surface (0-2 cm) sediment grab samples (1 field duplicate sample) collected using disposable plastic spoons	QC consistent with EPA guidelines; no validation qualifiers needed	CALIBRE (2005)
Triad approach (immunoassay as a real-time measure) to characterize PCB in a Washington riverine sediment site	Jorgensen August 2004	2004	RM 3.5-3.7 east	TOC, SVOCs, grain size, mercury, lead	18 surface sediment samples (2 duplicate samples) using the van Veen sampler (<10 cm) and 50 subsurface sediment samples from 17 locations collected by vibracorer (1-6 ft, samples generally at 1-ft intervals)	data validation consistent with EPA guidelines; validation qualifiers for all fixed laboratory analyses added to database; field screening data may be used for informational purposes only	Herrera (2005) EPA (2005a, 2004)
Upriver (Area 1) sediment characterization	Jorgensen April 2004	2004	RM 3.6-3.7 east	metals, PCB Aroclors, TOC, grain size	75 subsurface sediment samples from 22 sediment cores (2 duplicate cores) from 20 locations using the MudMole (6.8 to 10.6-ft cores; samples generally at 1-ft intervals)	data validation consistent with EPA guidelines; validation qualifiers added to database	MCS (2004c)
Rhône-Poulenc surface/subsurface sediment	RhônePoulenc 2004	2004	RM 4.0-4.3 east	VOCs, metals, pesticides, PCB Aroclors	50 sediment samples (8 duplicate samples) from 21 locations using a clam gun; cores were divided into upper (0-10 cm) and lower (> 10 cm) samples	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	EPA (2005b)
Duwamish Diagonal June 2004 baseline cap monitoring - year 0 (post-cap placement)	DuwDiagJune 2004	2004	RM 0.4-0.6 east	TOC, grain size, metals, PCB Aroclors, SVOCs	8 surface sediment grab samples from the top 10 cm of sediment using the van Veen grab sampler	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2005g)
Boeing Plant 2 DSOA additional vertical characterization - Phase 2	DSOAvertchar2	2004	RM 2.9-3.2 east	PCB Aroclors, TOC	28 subsurface samples from 15 sediment cores (2 duplicate samples) from 15 locations using the MudMole (3.7 to 10.6-ft cores; samples generally at 1-ft intervals)	data validation consistent with EPA guidelines; validation qualifiers added to database	MCS (2004a)
Boeing Plant 2 DSOA additional vertical characterization - Phase 3	DSOAvertchar3	2004	RM 3.0-3.4 east	PCB Aroclors, TOC	5 sediment cores from 4 new locations and one reoccupied location using the MudMole (5.4 to 9.9-ft cores; samples generally at 1-ft intervals)	data validation consistent with EPA guidelines; all data, as reported are acceptable for use	MCS (2004b)
Boyer Towing dock replacement	Boyer Towing	2004	RM 2.4 west	metals, SVOCs, PCB Aroclors, conventionals	4 surface (0-10 cm) and 4 subsurface (30-60 cm) sediment samples collected with push core	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	WR Consulting (2004)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
PSDDA characterization at the Lehigh Northwest Duwamish Waterway Facility	Lehigh NW	2004	RM 1.1 east	metals, SVOCs, PCB Aroclors, organochlorine pesticides, conventionals	3 sediment core samples (2 from 0-120 cm, 1 from 120-150 cm) collected with impact corer	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	MCS (2004d)
Slip 4 early action area site characterization	Slip4-EarlyAction	2004	Slip 4 (RM 2.8-2.9 east)	PCB Aroclors, mercury	29 grab samples (van Veen) from 0-10 cm; 58 core samples (vibracorer) taken from 11 locations; 4-6 samples taken at each location to a depth of 360 cm	data validation and data quality review consistent with EPA guidelines; data collected under existing LDW RI AOC, so no data quality review is needed in this memorandum	Integral (2004)
Additional vertical characterization, Duwamish Sediment Other Area	DSOAvert char2	2004	RM 2.8-3.7 east	PCB Aroclors	28 core samples (vibracorer) taken from 15 locations; 1-3 samples from each location from 60-144 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	MCS (2004a)
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 5, April 2004	Norfolk-monit7	2004	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2005c)
Duwamish/Diagonal pre- and post-cleanup monitoring data	DuwDiag-Dredge Monitoring	2003-2004	RM 0.4-0.6 east	metals, PCB Aroclors, organochlorine pesticides, SVOCs	24 composite samples from 10 grab samples (van Veen) from 0-10 cm at 12 locations, sampled both before dredging and after dredging	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County et al. (2005)
Terminal 117 early action area site characterization	T117 Boundary Definition	2003-2004	RM 3.6-3.7 west	PCB Aroclors; metals, SVOCs on selected samples	46 grab samples (power grab or by hand from intertidal) from 0-10 cm; 101 core samples (vibracorer) from 18 locations, 3-6 samples collected at each core location to a depth of 300 cm [c]	data validation and data quality review consistent with EPA guidelines; data collected under existing LDW RI AOC, so no data quality review is needed in this memorandum	Windward et al. (2004a, b)
Final preliminary site investigation report for the South Park Bridge project	South Park Bridge	2003	RM 3.3-3.4	metals, TBT, VOCs, SVOCs, organochlorine pesticides, PCB Aroclors, TOC	11 subsurface sediment samples from 2 locations (rotary drill unit) from depths up to 100 ft (samples collected at 2.5 ft intervals in top 10 ft, and at several deeper 2.5 ft intervals to 100 ft)	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers as reported are acceptable for use	Wilbur Consulting (2004)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 4, April 2003	Norfolk-monit6	2003	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2003b)
Sediment characterization results for the Duwamish River navigational channel turning basin	Turning Basin	2003	RM 4.2-4.7	metals, PCB Aroclors, organochlorine pesticides, SVOCs	5 core samples (vibracorer) taken down to depths of 144 to 390 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	Anchor (2003)
Boeing Plant 2 transformer investigation – Phase 1	Plant 2-Transformer Phase1	2003	RM 3.6 east	PCB Aroclors	5 surface grab samples (by hand) taken from 0-5 cm; 46 core samples (vibracorer) taken from 13 locations; 3-5 samples at each location from 0-240 cm [b]	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	Floyd Snider McCarthy (2004)
PSDDA dredged sediment characterization for Glacier NW	Glacier NW	2002	RM 1.5 west	metals, PCB Aroclors, organochlorine pesticides, SVOCs	4 composite sediment samples from eleven cores collected by vibracorer from 0-172 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	PIE (2002)
Norfolk combined sewer overflow (Duwamish River) sediment cap recontamination. Phase I investigation	Ecology-Norfolk	2002	RM 4.9-5.0 east	PCB Aroclors	20 grab samples (van Veen) from 0-10 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	Ecology (2003)
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 3, April 2002	Norfolk-monit5	2002	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2002)
Data report, DSOA vertical characterization and outfall 12 data collection. Duwamish sediment other area, Boeing Plant 2	DSOAvert char	2001	RM 2.8-3.7 east	PCB Aroclors	125 core samples (vibracorer) from 37 locations; 2-6 samples at each location, most locations starting at 60 cm down to depths of 150-280 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	Pentec (2001)
Norfolk CSO five-year monitoring program, Year Two, April 2001	Norfolk-monit4	2001	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	validation qualifiers added to database	King County (2001b)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Norfolk CSO five-year monitoring program – Twelve-month post construction	Norfolk-monit3	2000	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	validation qualifiers added to database	King County (2000c)
Norfolk CSO five-year monitoring program – Supplemental nearshore sampling	Norfolk-monit2b	2000	RM 4.9-5.0 east	PCB Aroclors	Composites of 3 grab samples (van Veen) at each of 3 locations; 3 samples from 0-2 cm; 3 samples from 0-10 cm	validation qualifiers added to database	King County (2000b)
Outfall and nearshore sediment sampling report, Duwamish Facility	James Hardie	2000	RM 1.5 east	metals, PCB Aroclors, SVOCs	9 grab samples (van Veen or by hand in intertidal) from 0-10 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	Weston (2000)
PSDDA sediment characterization of Duwamish River navigation channel: FY2000 operations and maintenance dredging data report	PSDDA99	1999	RM 1.9-3.4	metals, PCB Aroclors, organochlorine pesticides, SVOCs	20 composite core samples (vibracorer) taken from 18 locations; three borings made at each location; 18 samples from 0 to 120 cm; 2 samples from 120 to 240 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	SEA (2000a, b)
Norfolk CSO five-year monitoring program – Six-month post construction	Norfolk-monit2a	1999	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	validation qualifiers added to database	King County (2000d)
Norfolk CSO five-year monitoring program – Post backfill	Norfolk-monit1	1999	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-10 cm	validation qualifiers added to database	King County (1999b)
PSDDA sediment characterization of Duwamish River navigation channel: FY99 operations and maintenance dredging data report	PSDDA98	1998	RM 3.5-4.6	metals, PCB Aroclors, organochlorine pesticides, SVOCs	10 core samples (vibracorer) taken from 12 locations; 7 samples taken from 0 to 60-90 cm, each from single location; 3 samples taken from 2 or 3 locations (0-60 cm, 0-120 cm, and 120-360 cm)	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	SEA (1998)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
EPA Site Inspection: Lower Duwamish River	EPA SI	1998	entire LDW study area	metals, organochlorine pesticides, PCB Aroclors & selected congeners, dioxins & furans, TBT, SVOCs, VOCs	300 grab samples from 0-10 cm (van Veen); 33 core samples (vibracorer) from 0-60 and 60-120 cm from 17 locations	data collected by EPA for Superfund program; acceptable for all uses	Weston (1999)
King County combined sewer overflow water quality assessment for the Duwamish River and Elliott Bay	KC WQA	1997	Duwamish/Diagonal (RM 0.5-0.6 east); Kellogg Island (RM 0.7 west); Brandon CSO (RM 1.1 east); 8th Ave CSO (RM 2.8 west); South Park (RM 3.3 east); Hamm Creek (RM 4.4 west)	metals, PCB Aroclors, SVOCs, TBT	0-10 cm grab samples (van Veen) from 14 locations; single samples from 5 Duwamish/Diagonal locations and 4 Kellogg Island locations; weekly samples from Kellogg Island (9 samples), Brandon (13 samples), 8th Ave (9 samples), South Park (4 samples), Hamm Creek (4 samples)	validation qualifiers added to database	King County (1999a)
Duwamish Waterway Phase 1 site characterization	Boeing SiteChar	1997	RM 1.8-2.0 west; Slip 4 (RM 2.8-2.9 east); RM 3.6-4.0; RM 4.2-5.0 east	metals, PCB Aroclors, SVOCs	88[b] grab samples (van Veen) from 0-10 cm	accepted by EPA for all uses	Exponent (1998)
Duwamish Waterway sediment characterization study	NOAA SiteChar	1997	entire LDW study area	total PCBs, selected PCB congeners, total PCTs	328 grab samples (van Veen) from 0-10 cm	validation qualifiers added to database; congener data not appropriate for use in Phase 2 risk assessments	NOAA (1997, 1998)
1996 USACE Duwamish O&M	USACE 1996	1996	RM 4.2-4.6 navigation channel	metals, organochlorine pesticides, PCB Aroclors, SVOCs, VOCs,	4 core samples (vibracorer) collected to a depth of 120 cm	validation qualifiers added to database	SEA (1996)
Seaboard Lumber site, Phase 2 site investigation	Seaboard-Ph2	1996	RM 0.4-0.7 west	metals, PCB Aroclors, SVOCs	20 grab samples (van Veen) from 0-10 cm	accepted by EPA for all uses	Herrera (1997)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 2b	Plant 2 RFI-2b	1996	RM 2.8-3.7 east	metals, PCB Aroclors, SVOCs	39 grab samples (van Veen) from 0-10 cm; 44 core samples (vibracorer) from 15 locations – 2 to 4 samples per core, up to 480 cm below mudline	validation qualifiers J+/J- changed to JH/JL; accepted by EPA for all uses	Weston (1998)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Duwamish/Diagonal cleanup Study – Phase 2	Duw/Diag-2	1996	RM 0.4-0.6 east	metals, PCB Aroclors, SVOCs, TPH	36 grab samples (van Veen) from 0-10 cm; 53 core samples (vibracorer) from 15 locations – 1 to 6 samples per core, up to 270 cm below mudline	validation qualifiers added to database	King County (2000a)
Duwamish/Diagonal cleanup Study – Phase 1.5	Duw/Diag-1.5	1995	RM 0.4-0.6 east	metals, PCB Aroclors, SVOCs, TBT	12 grab samples (van Veen) from 0-10 cm	validation qualifiers added to database	King County (2000a)
Norfolk CSO sediment cleanup study – Phase 3	Norfolk-cleanup3	1995	RM 4.9-5.0 east	PCB Aroclors	16 grab samples (van Veen) from 0-10 cm	validation qualifiers added to database	King County (1996)
Norfolk CSO sediment cleanup study – Phase 2	Norfolk-cleanup2	1995	RM 4.9-5.0 east	metals, organochlorine pesticides, PCB Aroclors and selected congeners, SVOCs, VOCs, TPH	12 grab samples (van Veen) from 0-10 cm; 27 core samples (vibracorer) from 3 locations at 30 or 60 cm intervals up to 180 cm below mudline	validation qualifiers added to database	King County (1996)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 2a	Plant 2 RFI-2a	1995	RM 2.8-3.7 east	metals, PCB Aroclors SVOCs	54 grab samples (van Veen) from 0-10 cm	validation qualifiers J+/J- changed to JH/JL; accepted by EPA for all uses	Weston (1998)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 1	Plant 2 RFI-1	1995	RM 2.8-3.7 east	metals, PCB Aroclors, TPH, SVOCs, VOCs	65 grab samples (van Veen) from 0-10 cm; 22 core samples (vibracorer) from 12 locations at 15-45 cm intervals down to 135 cm below mudline	validation qualifiers J+/J- changed to JH/JL; accepted by EPA for all uses	Weston (1998)
Duwamish/Diagonal cleanup Study – Phase 1	Duw/Diag-1	1994	RM 0.4-0.6 east	metals, organochlorine pesticides, PCB Aroclors, SVOCs, TBT	38 grab samples (van Veen) from 0-10 cm; 2 grab samples (van Veen) from 0-15 cm; 12 core samples (vibracorer) from 2 locations at 15-30 cm intervals down to 150 cm below mudline	validation qualifiers added to database	King County (2001a)
Norfolk CSO sediment cleanup study – Phase 1	Norfolk-cleanup1	1994	RM 2.8-3.7 east	metals, organochlorine pesticides, SVOCs, PCB Aroclors, VOCs	21 grab samples (van Veen) from 0-10 cm; 3 core samples from 1 location – 15-30, 30-45, and 45-60 cm	validation qualifiers added to database	King County (1996)
Rhône-Poulenc RCRA Facility Investigation for the Marginal Way facility – Round 2	Rhône-RFI-2	1994	Slip 6 (RM 4.2 east)	metals, SVOCs, PCB Aroclors 1254 and 1260, organochlorine pesticides	7 grab samples (van Veen) from 0-2 cm	accepted by EPA for all uses	Rhône-Poulenc (1995)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Results of sampling and analysis, sediment monitoring plan, Duwamish Shipyard, Inc.	Duwamish Shipyard	1993	RM 1.4-1.5 west	metals, SVOCs, TBT	5 grab samples (van Veen) from 0-10 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	Hart Crowser (1993)
Harbor Island Remedial Investigation	Harbor Island RI	1991	RM 0.0-0.4	metals, organochlorine pesticides, PCB Aroclors, SVOCs, VOCs, TPH, TBT	34 grab samples (van Veen) from 0-10 cm	data collected by EPA for Superfund program; acceptable for all uses	Weston (1993)
1991 USACE Duwamish O&M	USACE 1991	1991	RM 2.9-3.6 navigation channel	metals, SVOCs, PCB Aroclors, organochlorine pesticides	20 composite samples (vibracorer), each made from single core samples, including 19 samples from 0 to 90-150 cm, and 1 sample from 120 to 420 cm	validation qualifiers added to database	SAIC (1991)
1990 USACE Duwamish O&M	USACE 1990	1990	RM 3.4-4.5 navigation channel	metals, SVOCs, PCB Aroclors, organochlorine pesticides	8 composite samples (vibracorer), each made from single core samples collected from 0 to 150-210 cm	validation qualifiers added to database	PTI (1990)
Tissue Chemistry							
King County tissue 2006	KC 2006 fish tissue	2006	RM 0.2 –1.0, 1.6 – 2.4, 2.9– 3.7, and 4.2– 5.2	PCBs (as Aroclors), phthalates, total solids, lipids	6 English sole whole-body tissue composite samples, 9 English sole individual whole-body tissue, and 6 shiner surfperch whole-body tissue composites and one field replicate collected using a high-rise otter trawl	QC consistent with previous ARI analytical tissue analyses and LDC data validation; validation qualifiers added to database	Anchor and King County (2006, 2007)
East Waterway, Harbor Island Superfund site: Technical memorandum: Tissue chemistry results for juvenile chinook salmon collected from Kellogg Island and East Waterway	EW-Salmon	2002	Kellogg Island (RM 0.8-0.9 west)	PCB Aroclors, mercury	12 composite samples of whole-body juvenile chinook salmon (6 from LDW, 6 from East Waterway) collected by beach seine; each sample consisted of 6-7 fish	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	Windward (2002)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
NMFS Duwamish injury assessment project	NOAA-salmon2	2000	Kellogg Island (RM 0.8-0.9 west), Slip 4 (RM 2.8 east)	PCB congeners, organochlorine pesticides (salmon); PCB Aroclors (shiner perch)	29 samples of whole-body juvenile chinook salmon collected by beach seine (9 were composites of 3-10 fish, 20 were individual fish); 6 composite samples of chinook salmon stomach contents; 2 composite samples of whole-body shiner perch	neither EPA nor LDWG plan to conduct a review of the salmon portion of this dataset because LDWG's 2003 juvenile chinook salmon sampling results make the effort required for such a review unwarranted, as documented by Windward (2005); therefore, these data were not used in the final RI. The shiner perch portion of the dataset has been previously approved for all uses by EPA (2003)	NMFS (2002)
Waterway Sediment Operable Unit Harbor Island Superfund Site	WSOU	1998	RM 0.4-0.9 (crab), RM 2.0-4.4 (English sole), RM 0.0-0.2 (striped perch)	Hg, TBT, PCB Aroclors	3 English sole skinless fillet composite samples (5 fish/composite caught by trawl); 3 red rock crab edible meat composite samples (5 crab/composite caught by crab trap); 1 Dungeness crab edible meat sample (1 individual caught by crab trap); 3 striped perch skinless fillet samples (5 fish/composite for 2 samples, 1 individual fish for 1 sample; caught by diver)	collected under EPA oversight for a previously conducted Superfund risk assessment; previously approved for all uses by EPA (2003)	ESG (1999)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
King County Combined Sewer Overflow Water Quality Assessment for the Duwamish River and Elliott Bay	KC WQA	1996- 1997	RM 0.5-0.9	metals, TBT, SVOCs, PCB Aroclors	3 English sole skinless fillet composite samples (20 fish/composite caught by trawl); 3 English sole whole-body composite samples[d] (20 fish/ composite caught by trawl); 2 Dungeness crab edible meat composite samples (3 crabs/sample caught by crab trap); 1 Dungeness crab hepatopancreas composite sample (3 crabs caught by crab trap); 4 amphipod composite samples (caught by benthic sledge); 3 shiner surfperch whole-body composite samples (10 fish/sample caught by trawl); 22 mussels edible meat composite samples (20 mussels/ sample collected by hand) [e]	add validation qualifiers; English sole whole-body composite samples not acceptable for all uses because they don't truly represent whole bodies	King County (1999a)
Puget Sound Ambient Monitoring Program – annual sampling	PSAMP-fish	1992	RM 0.4-1.3	organochlorine pesticides, SVOCs, PCB Aroclors, As, Cu, Pb, Hg	3 English sole skinless fillet (10-20 fish/ sample collected by trawl)	acceptable for all uses	West et al. (2001)
		1995	RM 0.4-1.3	organochlorine pesticides, PCB Aroclors, As, Cu, Pb, Hg	3 English sole skinless fillet composite samples (10-20 fish/sample collected by trawl)	acceptable for all uses	
		1997	RM 0.4-1.3	Hg, organochlorine pesticides	3 English sole skinless fillet composite samples (10-20 fish/sample collected by trawl)	acceptable for all uses	
Elliott Bay/Duwamish River Fish Tissue Investigation	EVS 95	1995	RM 1.1-1.4	PCB Aroclors, Hg, MeHg, TBT	3 English sole skinless fillet composite samples (6 fish/sample collected by trawl)	collected under EPA oversight for a previously conducted Superfund risk assessment; previously approved for all uses by EPA (2003)	Battelle (1996); EVS (unpublished); Frontier Geosciences (1996)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Contaminant exposure and associated biochemical effects in outmigrant juvenile chinook salmon from urban and non-urban estuaries of Puget Sound	NOAA-salmon	1989- 1990	RM 0.7	organochlorine pesticides, PCB Aroclors, PAHs	14 composite samples of whole-body juvenile chinook salmon collected by beach seine (2-10 fish/sample); 6 composite samples of stomach contents (10 fish/sample) [f]	neither EPA nor LDWG plan to conduct a review of this dataset because LDWG's 2003 juvenile chinook salmon sampling results make the effort required for such a review unwarranted; therefore, these data were not used in final RI	Varanasi et al. (1993)
Other Chemistry							
King County surface water quality sampling – 2001 to 2008 (surface water)	KC Arsenic SW KC 2007 SW KC_Fall2007 KC 2008 SW	2001 – 2008	RM 0, 3.3, 6.3, and 12.4	PCB congeners, dioxin/furans, PAHs, metals, conventionals	All surface water samples 2001 – 13 samples collected on 13 dates and analyzed for arsenic and TSS 2002 – 71 samples collected on 35 dates and analyzed for arsenic and TSS 2003 – 58 samples collected on 34 dates and analyzed for arsenic and TSS 2004 – 13 samples collected on 13 dates and analyzed for arsenic and TSS 2005 – 2 samples collected on 2 dates and analyzed for arsenic and TSS 2006 – 15 samples collected on 14 dates and analyzed for arsenic and TSS 2007 – 12 samples collected on 5 dates from upstream of the LDW and analyzed for PCB congeners and conventionals; 2 samples collected on 2 dates and analyzed for metals 2008 – 4 samples collected on 2 dates and analyzed for PCB congeners; 28 samples collected on 10 dates and analyzed for PAHs and conventionals	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (2005b) LDC (2007a, b, 2008a, b, c, d, e, f)
Duwamish River/Elliott Bay/Green River Water Column PCB Congener Survey	KC 2005 Water Sampling	2005	RM 0 and 3.3	PCB congeners, conventional parameters	28 water samples collected over 4 months at 4 locations; 2 locations in the Duwamish River were sampled at both surface and bottom depths of the water column; all samples analyzed for PCB congeners and conventional field parameters	QC consistent with previous King County events approved for all uses; validation qualifiers added to database; Windward evaluated field and laboratory replicate samples for method blank contamination	Mickelson and Williston (2006)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Rhône-Poulenc porewater	RhônePoulenc 2004	2004	RM 4.0-4.3 east	VOCs, metals, pesticides, PCB Aroclors	16 porewater samples for chemistry parameters (1 duplicate sample, and 1 additional sample analyzed only for field parameters) collected using a piezometer or a seepage meter	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database	EPA (2005b)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 1	Plant 2 RFI-1	1995	RM 2.8 – 3.7 east	metals, PCB Aroclors, TPH, SVOCs, VOCs	22 seep water	comprehensive data quality review not warranted because EPA has previously approved these data for all uses in the RCRA program	Weston (1998)
Rhône-Poulenc RCRA Facility Investigation for the Marginal Way facility – Round 3	RhônePoulenc-RFI-3	1995	Slip 6 (RM 4.2 east)	VOCs	7 seep water	comprehensive data quality review not warranted because EPA has previously approved these data for all uses in the RCRA program	Rhône-Poulenc (1996)
Supplemental remedial investigation and feasibility study. Great Western International	Great Western Apr-94	1994	RM 2.2 east	VOCs	6 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Hart Crowser (1994a)
	Great Western Jul-94	1994		VOCs	9 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Hart Crowser (1994b)
	Great Western Nov-94	1994		VOCs	7 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Hart Crowser (1996)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Supplemental remedial investigation and feasibility study. Great Western International (cont.)	Great Western May-95	1995	RM 2.2 east	VOCs	7 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Hart Crowser (1996)
	Great Western-1995 Annual	1995		VOCs	7 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Hart Crowser (1996)
	Great Western-1996 Annual	1996		VOCs	5 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Hart Crowser (1997)
	Great Western-1997 Annual	1997		VOCs	4 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Terra Vac, Floyd & Snider (2000)
	Great Western-1998 Annual	1998		VOCs	9 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Terra Vac, Floyd & Snider (2000)
	Great Western-Embayment Study	1998		VOCs	10 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Terra Vac, Floyd & Snider (2000)
	Great Western-1999 Annual	1999		VOCs, SVOCs	5 seep water	comprehensive data quality review not warranted because Ecology has previously approved these data for all uses in the MTCA program	Terra Vac, Floyd & Snider (2000)

Table N-6 Chemistry Datasets Acceptable for All Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
King County combined sewer overflow water quality assessment for the Duwamish River and Elliott Bay [g]	KC WQA	1996-1997	Duwamish/ Diagonal CSO (RM 0.5 east), Brandon CSO (RM 1.1 east), SW Michigan CSO (RM 2.0 east), Norfolk CSO (RM 4.9 east) [h]	metals, SVOCs, conventionals, PCB Aroclors	1,249 surface water samples collected using Niskin and van Dorn samplers. Samples were collected from multiple depths (near-surface and near-bottom) and up to 3 locations horizontally across the waterway. Samples were collected weekly and also during storm events [h]	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database	King County (1999a)

Notes:

a. All events listed on this table are: 1) considered acceptable for all uses in Phase 2, even if not specifically mentioned, 2) acceptable for some uses, but not others, as noted, or 3) undergoing additional review by EPA; acceptability determination is still pending.

b. Sample total does not include three reference samples that were collected upstream of the study area.

c. Does not include soil, groundwater, and seep data collected concurrently during this investigation.

d. Samples are of remnant tissues following the subsampling of fillet tissue. In addition, livers were removed from some fish in the composite samples.

e. Sample counts do not include data from cooked crab and English sole samples or data from caged mussel deployments. These data were not used in the final RI.

f. Six composite samples of juvenile chinook salmon livers were also analyzed, but these data were not used in the Final RI.

g. Only water chemistry data. Sediment and tissue chemistry data from this sampling event were previously reviewed in Windward (2005b).

h. Samples collected outside the LDW study area were also included in this sampling event.

AOC = administrative order on consent; As = arsenic; CSO = combined sewer overflow; Cu = copper; DC = developmental center; ENR = enhanced natural remediation; EPA = U.S. Environmental Protection Agency; EW = East Waterway; FS = feasibility study; FY = fiscal year; Hg = mercury; LDC = Laboratory Data Consulting; MeHg = methylmercury; MTCA = Model Toxics Control Act; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; PAH = polycyclic aromatic hydrocarbon; Pb = lead; PCB = polychlorinated biphenyl; PCT = polychlorinated terphenyl; PSAMP = Puget Sound Ambient Monitoring Program; PSDDA = Puget Sound Dredged Disposal Analysis Program; QC = quality control; RCRA = Resource Conservation and Recovery Act; RM = river mile; SVOC = semivolatile organic compound; TBT = tributyltin; TOC = total organic carbon; TPH = total petroleum hydrocarbons; TSS = total suspended solids; USACE = U.S. Army Corps of Engineers; VOC = volatile organic compound; WSOU = Waterway Sediment Operable Unit.

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Table N-7 Chemistry Datasets Not Acceptable for all Uses in the FS, Including Data Quality Review Summaries

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Action/ Conclusions	Reference
Sediment Chemistry							
Delta Marine dredged material characterization (subsurface sediment)	Delta Marine	2007	RM 4.2 west	PCBs (as Aroclors), SVOCs, VOCs, dioxin/furans, metals, conventionals	7 cores were collected using a vibracore sampler and homogenized to represent 3 DMMUs. One Z sample was also analyzed	not reviewed by Windward; sediment characterized has been dredged	AMEC (2007a,b) USACE et al. (2008)
Dredge material characterization Duwamish Yacht Club	Duwam Yacht Club	1999	RM 4.1 west	metals, organochlorine pesticides, PCB Aroclors, SVOCs, VOCs, TBT	6 core samples (vibracorer), each made from 2 separate cores collected to 50-65 cm	not reviewed by Windward; sediment characterized has been dredged	Hart Crowser (1999)
Sediment sampling and analysis James Hardie Gypsum Inc. – Round 1	Hardie Gypsum-1	1999	RM 1.6-1.7 east	metals, organochlorine pesticides, PCB Aroclors, SVOCs, VOCs	5 core samples (vibracorer) made from single cores down to 120 cm	not reviewed by Windward; sediment characterized has been dredged	Spearman (1999)
Sediment sampling and analysis James Hardie Gypsum Inc. – Round 2	Hardie Gypsum-2	1999	RM 1.6-1.7 east	metals, organochlorine pesticides, PCB Aroclors, SVOCs, VOCs	9 core samples (vibracorer) made from single cores down to 90 cm	not reviewed by Windward; sediment characterized has been dredged	Spearman (1999)
Dredge material characterization Hurlen Construction Company & Boyer Alaska Barge Lines berthing areas	Hurlen-Boyer	1998	RM 2.4-2.7 west	metals, organochlorine pesticides, PCB Aroclors, SVOCs, TBT, TPH	6 core samples (vibracorer), 2 from Boyer, 4 from Hurlen, each made from 2 separate cores collected to 60-120 cm	not reviewed by Windward; sediment characterized has been dredged	Hart Crowser (1998)
Sediment quality in Puget Sound. Year 2 – Central Puget Sound	PSAMP/ NOAA98	1998	RM 0.5, 0.6, 1.8	metals, PCB Aroclors, organochlorine pesticides, SVOCs, TBT	3 grab samples (van Veen) collected from 0-2 cm	Windward did not conduct a review of this dataset because the QA/QC information was not readily available. The effort that would have been required to obtain this QA/QC information was not justified for the purposes of the RI and risk assessments	NOAA and Ecology (2000)
RCRA facility investigation (RFI) report for the Marginal Way facility. Round 3 data and sewer sediment technical memorandum	RhônePoulenc RFI3	1996	RM 4.2 east	metals, phenols (4 samples)	16 grab samples collected by hand from 0-10 cm	data validation consistent with EPA guidelines, but laboratory Form 1s not present in data report; Phase 2 RI DQOs not met, so not acceptable for all uses	Rhône-Poulenc (1996)
Proposed dredging of Slip No. 4, Duwamish River, Seattle, WA	Slip4-Crowley	1996	RM 2.8 east	metals, organochlorine pesticides, PCB Aroclors, SVOCs, VOCs, TBT	4 core samples (vibracorer) composited from sediment at 9 locations collected to a depth of 70-130 cm	not reviewed by Windward; sediment characterized has been dredged	PTI (1996)
Lone Star Northwest and James Hardie Gypsum – Kaiser dock upgrade	Lone Star-Hardie Gypsum	1995	RM 1.6 east	metals, organochlorine pesticides, PCB Aroclors, SVOCs, VOCs	5 core samples (vibracorer); 4 collected to a depth of 120-150 cm, 1 at 120-360 cm	not reviewed by Windward; sediment characterized has been dredged	Hartman (1995)

Table N-7 Chemistry Datasets Not Acceptable for all Uses in the FS, Including Data Quality Review Summaries (continued)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Action/ Conclusions	Reference
Rhône-Poulenc RCRA Facility Investigation for the Marginal Way facility – Round 1	RhônePoulenc RFI-1	1994	RM 4.2 east	metals, SVOCs, PCB Aroclors, organochlorine pesticides	7 grab samples (van Veen) collected from 0-15 cm	data validation consistent with EPA guidelines, but laboratory Form 1s not present in data report; Phase 2 RI DQOs not met, so not acceptable for all uses	Rhône-Poulenc (1995)
Lone Star Northwest – West Terminal US ACOE – Seattle	Lone Star 92	1992	RM 1.5 east	metals, organochlorine pesticides, PCB Aroclors, SVOCs, VOCs	1 core sample (vibracorer), made from 2 separate cores collected to 120 cm	not reviewed by Windward; sediment characterized has been dredged	Hartman (1992)
Sediment sampling and analysis, South Park Marina, Duwamish Waterway, Seattle, Washington	South Park Marina	1991	RM 3.5 west	metals, SVOCs, PCB Aroclors, organochlorine pesticides	2 core samples (vibracorer), each made from 2 separate cores collected to 120 cm	data not reviewed because of age of data; sediment characterized has been dredged	Spearman (1991)
Tissue Chemistry							
Preliminary exposure assessment of dioxin-like chlorobiphenyls in great blue herons of the lower Duwamish River	Heron USFWS	1998	heron colony west of RM 0.5 west	PCB congeners	6 samples taken from 5 great blue heron eggs collected by hand from nest (5 egg samples, 1 egg yolk sample)	no formal data validation conducted, laboratory Form 1s not present in data report; EPA determined QA/QC data were not readily available	Krausmann (2002)
Puget Sound Ambient Monitoring Program – annual sampling	PSAMP- fish	1992	RM 0.7	SVOCs, organochlorine pesticides, PCB Aroclors, As, Cu, Pb, Hg	6 coho salmon and 6 chinook salmon composite fillet samples (5 fish/composite caught by gill net)	Adult salmon; data were summarized in the Phase 1 RI, but were not used in the risk assessments because almost all the chemicals in these fish are associated with exposure outside the LDW	West et al. (2001)
		1993 – 1996	RM 0.7	organochlorine pesticides, PCB Aroclors, As, Cu, Pb, Hg	1993: 5 coho salmon and 6 chinook salmon composite fillet samples (5 fish/composite caught by gill net); 1994: 5 coho salmon composite fillet samples and 6 chinook salmon filet samples (5 composite, 1 individual) (5 fish/composite caught by gill net); 1995: 7 coho salmon (6 composite, 1 individual) and 15 chinook salmon filet samples (13 composite, 2 individual) (5 fish/composite caught by gill net); 1996: 19 coho salmon (5 composite, 14 individual) and 49 chinook salmon fillet samples (all individual) (5 fish/composite caught by gill net)		
		1998	RM 0.7	Hg, organochlorine pesticides	13 coho salmon composite fillet samples (5 fish/composite caught by gill net)		

Notes:

Ag = silver; Cu = copper; DMMU = Dredged Material Management Unit; DQO = data quality objective; EPA = U.S. Environmental Protection Agency; FS = feasibility study; Hg = mercury; NOAA = National Oceanic and Atmospheric Administration; O&M = operations and maintenance; Pb = lead; PCB = polychlorinated biphenyl; PSAMP = Puget Sound Ambient Monitoring Program; QA/QC = quality assurance/quality control; RCRA = Resource Conservation and Recovery Act; RI = remedial investigation; RM = river mile; SVOC = semivolatile organic compound; TBT = tributyltin; TPH = total petroleum hydrocarbons; VOC = volatile organic compound.

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Part 2: Memorandum on Use of Duwamish/Diagonal Early Action Area Surface Sediment Data

MEMORANDUM

To:	EPA, Ecology	**Date:**	May 27, 2010[1]
From:	Lower Duwamish Waterway Group	**Project:**	Lower Duwamish Waterway FS
Re:	**Use of Duwamish/Diagonal Early Action Area Surface Sediment Data in Final Feasibility Study**		

The RI baseline dataset contained surface sediment data collected between 1991 and 2006. The RI baseline dataset was "locked down" following receipt of the Round 3 surface sediment data collected in 2006. Since establishment of the Remedial Investigation (RI) baseline dataset that was used to conduct the characterizations and analyses in the RI and in the Draft FS, additional data have been collected in the Lower Duwamish Waterway (LDW). Therefore, a new feasibility study (FS) "baseline dataset" has been established for the Final FS. The purpose of the FS baseline dataset is to: 1) establish conditions within the LDW prior to any proposed remedies,[2] and 2) use these baseline conditions in the comparative analysis of remedial alternatives in the Final FS. This memo discusses the use of data collected by King County in and around the Duwamish/Diagonal Early Action Area (EAA) in the Final FS. The FS baseline dataset adheres to the same general data rules as those for the RI baseline dataset (Windward 2003; LDWG 2010).

Duwamish/Diagonal Post-Action Data

In November 2003, King County dredged a 7-acre area of the Duwamish/Diagonal EAA (Figure 1). Next, an armored sand cap was placed over the dredged area in February and March 2004. Based on post-construction monitoring data collected in 2004, a 6-inch layer of sand (enhanced natural recovery [ENR]) was placed over an adjacent 4-acre area (Figure 1) during the following construction window in February 2005.

Following completion of these actions, cap, ENR, and perimeter monitoring stations were sampled annually for five years (2005 through 2009). These monitoring data were not used in the RI baseline dataset because the dataset was "locked down" in 2006 and because only preremedy data from the cap, ENR, and perimeter monitoring stations

[1] Revised to reflect that the work was done for the Final FS. No new analysis was performed.

[2] Including baseline conditions prior to the now-completed Duwamish/Diagonal EAA and Boeing Developmental Center south storm drain actions.

were used (per the definition of "baseline" for the RI). Both the RI and the Draft FS presented the 2005–2007 data from these monitoring locations in a time trends analysis.[3]

Use of Duwamish/Diagonal Data in the Draft Final FS

Under the general "10-foot" rule for reoccupied stations, the most recently available data were used for the FS baseline dataset, which had a "lock down" date of April 2010. The Duwamish/Diagonal data are an exception to this rule. The Duwamish/Diagonal data collected from the cap, ENR, and perimeter monitoring stations were used in the Final FS as listed below and as described in Tables 1 and 2:

- Only the dredge/cap footprint was used to define the boundary of the EAA. Because thin-layer placement within the ENR area was in response to dredge residuals rather than a final remedy, it was considered like the rest of the LDW for inclusion within the Areas of Potential Concern for development and evaluation of remedial alternatives (i.e., rather than part of the EAA footprint for Alternative 1).
- The preremedy data from the cap[4] and ENR monitoring stations were used in the FS baseline dataset. The exception is that the 2009 dioxin/furan composite sample[5] from the ENR area (referred to as Composite C) was used in the FS baseline dataset because of the limited dataset and because there were no dioxin/furan data there prior to thin-layer placement. The 2009 dioxin/furan composite data from the cap area (Composites A and B) were not used in the FS baseline dataset because they reflect remediated, post-EAA conditions.
- The most recent data from the 2005-2009 perimeter monitoring events, conducted since completion of the EAA actions, was included in the FS baseline dataset. Following the data rules, the most recent data (2009) were presented (data from the four previous years were trumped because the same nominal locations were sampled each year). Any data that were trumped (e.g., preremedy or post-remedy monitoring data) were retained for use in the Final FS for time trend analyses, similar to any other area of the LDW with data collected in multiple years.
- Data from the 2005-2009 monitoring of the ENR area were used to inform the assignment of remedial technologies for the remedial alternatives. They were

[3] The 2005 to 2007 monitoring data were evaluated in the Draft FS; the 2008 and 2009 results were not yet available.

[4] The monitoring data from the dredge/cap footprint are described as cap monitoring data.

[5] Three composite samples were made from the 2009 cap and ENR samples collected by King County: one each from Cap Area A, Cap Area B, and the ENR Area. These three composite samples were analyzed for dioxins/furans.

also used, along with the preremedy data collected in the ENR area, to demonstrate the efficacy of this technology (ENR) in the LDW.

- Preremedy data and data from the 2005-2009 post-remedy monitoring of the cap were used to demonstrate the efficacy of this technology (capping) in the LDW.

The time trends data (preremedy and 2005-2009 post-remedy monitoring data) were valuable for providing site-specific information about the performance of three technologies in the LDW: cap, ENR, and monitored natural recovery (MNR).

The FS baseline data were used in a strictly objective sense to evaluate remedial action level exceedances and to set the footprint for active remediation (dredging, capping, ENR) in areas outside the EAAs for each remedial alternative. Figure 1 displays the locations of the surface sediment data discussed in this memo that were included in the FS baseline dataset and were used for other FS analyses.

Table 1. Comparison of Duwamish/Diagonal Data and Use of Data Types

Monitoring Data	Document/ Dataset and How Used		
	Draft FS: RI Baseline	Final FS: FS Baseline	Final FS: Time Trends and Technology Assignments
Cap	Preremedy	Pre-remedy	All data up through 2009 for time trends; Most recent data in ENR and perimeter areas for technology assignments (2009)
ENR		Preremedy plus 2009 dioxin/furan composite "C" sample	
Perimeter		Most recent (up through 2009)	

Note: See Figure 1 for locations of the monitoring stations.

Table 2. Use of Duwamish/Diagonal Data in the Draft Final FS

FS Section	Pre-Remedy Data			Post-Remedy Data		
	Dredge/Cap	ENR	Perimeter	Cap	ENR	Perimeter
Section 2 – nature/extent mapping; re-interpolation (FS baseline dataset)	X	X	X	—	—	Most recent (up through 2009)[c]
Section 6 – establish the area of potential concern (AOPC)	—[a]	X[b]	X	—	—	
Section 7 – time trends and evaluation of dredging/capping, ENR, and MNR technologies	Compare preremedy to post-remedy conditions			Compare 2005 through 2009 trends		
Section 8 – assign technologies and develop remedial alternatives	—	—	—	—	X (2009)	X (2009)

Notes:
X Data used for purpose indicated.
— Data not used for purpose indicated.
[a] The dredge/cap footprint, as an EAA, is included in the Alternative 1 footprint as a completed action.
[b] Includes 2009 dioxin/furan composite sample C from the ENR area.
[c] Perimeter monitoring data follow 10-ft trumping rule established in RI. During each year of the monitoring, the samples were collected nominally from the same locations, so only the most recent data are used in the FS baseline dataset.

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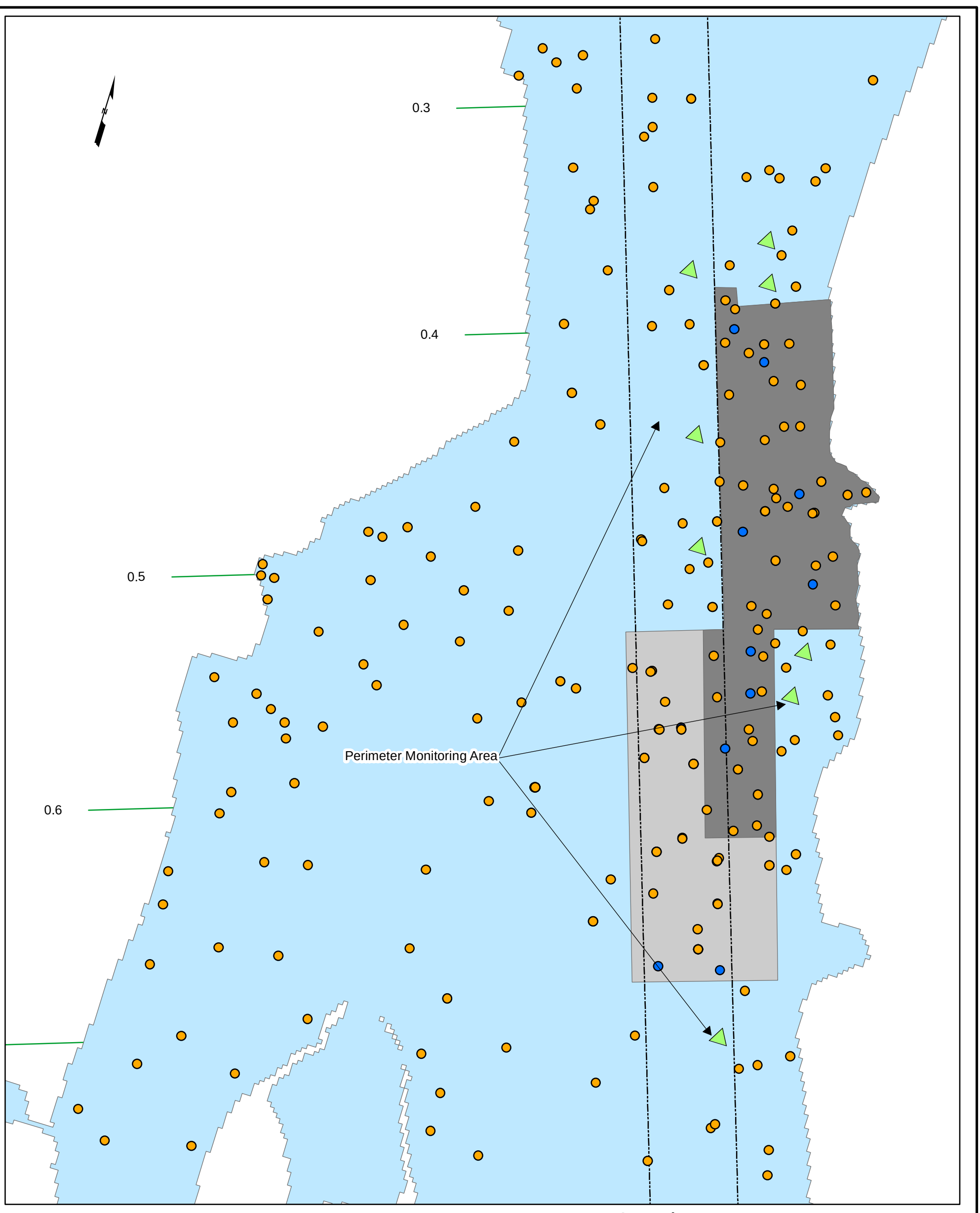

Notes:
1. Five years of post remedy data (2005-2009) for the cap, ENR area, and perimeter monitoring stations will be considered for the time trend analysis and technology assignments.
2. FS Baseline data from database provided by Windward on April 2, 2010, with the exception of the baseline ENR area data, which is from the RI baseline dataset.

Legend

Duwamish/Diagonal Cap, ENR, Perimeter, and Vicinity Sampling Locations

- Post-remedy Monitoring Location (2005-2009)
- FS Baseline Location
- Perimeter Monitoring Station (2009 in FS baseline; 2005-2009 for time trends/technology assignment).
- Duwamish/Diagonal Dredge and Capping Area
- Duwamish/Diagonal ENR Area
- Study Area
- Navigation Channel
- River Mile Marker

Feet
0 125 250 500

AECOM

Lower Duwamish Waterway Group
Port of Seattle / City of Seattle / King County / The Boeing Company

Lower Duwamish Waterway
Final Feasibility Study
60150270-14.33

Duwamish/Diagonal Cap, ENR, Perimeter, and Vicinity Sampling Locations

DATE: 10/31/12	DWRN:mvi/SEA	Revision: 1		**FIGURE 1**

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