HRS DOCUMENTATION RECORD--REVIEW COVER SHEET

Name of Site: Portland Harbor

Contact Persons:

Site Investigation: Roy F. Weston, Inc., Seattle

Documentation Record: Linda E. Foster, Ecology & Environment, Inc., Seattle
David Bennett, U.S. Environmental Protection Agency, Seattle

Pathways, Components, or Threats Not Evaluated

The groundwater migration pathway, groundwater-to-surface water component of the surface water migration pathway, soil exposure pathway, air pathway, and the drinking water threat of the overland/flood component of the surface water migration pathway were not included in the Hazard Ranking System (HRS) evaluation. These pathways/components were not included because a release to these media does not significantly affect the overall site score and because the human food chain and environmental threats of the overland/flood component of the surface water migration pathway produces an overall site score well above the minimum required for the site to qualify for inclusion on the National Priorities List. These pathways are of concern to the U.S. Environmental Protection Agency and may be evaluated during future investigations.

Site Summary

The Willamette River originates within Oregon in the Cascade Mountain Range and flows approximately 187 miles north to its confluence with the Columbia River. The Lower Reach of the Willamette River from River Mile (RM) 0 to approximately RM 26.5 is a wide, shallow, slow moving segment that is tidally influenced with tidal reversals occurring during low flow periods as far upstream as RM 15. The river segment between RM 3 and RM 10 is the primary depositional area of the Willamette River system. The Lower Reach has been extensively dredged to maintain a 40-foot deep navigation channel from RM 0 to RM 14. This segment of the Lower Reach contains a highly industrialized area known as Portland Harbor which contains a multitude of facilities and both private and municipal waste water outfalls. Up to 17 industrial operations have been identified as potential sources of contamination to Portland Harbor between RM 3.5 and RM 9.2, however, since not all sources of contamination to this river segment have been throughly investigated, the site is being evaluated as contaminated sediments with no identified source.

In July 1997, the United States Army Corps of Engineers (USACE) collected surface sediment samples between RM 3.8 and RM 8.9 from Portland Harbor as part of a pre-dredging sediment quality study. Analytical results document the presence of contaminated sediments in this river segment having elevated concentrations of arsenic, mercury, several pesticides, polychlorinated biphenyls (PCBs), and several semivolatile organic compounds (SVOCs).

In September and October 1997, consultants for the EPA conducted field work for a Site Inspection (SI) in the Lower Reach of the Willamette River within Portland Harbor. This sampling effort included the collection of bottom sediment and porewater samples from near shore areas between RM 3.5 and RM 9.2. Analytical results document the presence of contaminated sediments in this river segment having elevated concentrations of several inorganics (i.e., metals), several SVOCs, PCBs, dichloro-diphenyl-trichloroethene (DDT), and tributyltin (TBT).

HRS DOCUMENTATION RECORD

Name of Site: Portland Harbor
EPA Region 10 Date Prepared: May 15, 2000

CERCLIS No.: ORSFN1002155

Street Address of Site: Not Applicable (site consists of contaminated sediments with no identified source)

County and State: Multnomah County, Oregon

General Location in the State:

Topographic Map: Portland, Oregon-Washington and Linnton, Oregon Quadrangle, 7.5 minute series (1985) (Ref. 3). The site consists of contaminated sediments from River Mile 3.5 to River Mile 9.2 of the Willamette River in Oregon.

Beginning at Sample Point SD001 at Latitude: 45° 36' 55" North Longitude: 122° 47' 35" West
Ending at Sample Point SD150 at Latitude: 45° 33' 14" North Longitude: 122° 46' 23" West

Scores	
Ground Water Pathway	0.00
Surface Water Pathway	100.00
Soil Exposure Pathway	0.00
Air Pathway	0.00
HRS SITE SCORE	50.00

SURFACE WATER OVERLAND FLOW/FLOOD MIGRATION COMPONENT SCORESHEET

SURFACE WATER OVERLAND FLOW/FLOOD MIGRATION COMPONENT Factor Categories and Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	550
2. Potential to Release by Overland Flow		
2a. Containment	10	0
2b. Runoff	25	0
2c Distance to Surface Water	25	0
2d. Potential to Release by Overland Flow (lines 2a)	500	0
3. Potential to Release by Flood		
3a. Containment (Flood)	10	0
3b. Flood Frequency	50	0
3c. Potential to Release by Flood (lines 3a x 3b)	500	0
4. Potential to Release (lines 2d+3c)	500	0
5. Likelihood of Release	550	550
Waste Characteristics		
6. Toxicity/Persistence	*	10,000
7. Hazardous Waste Quantity	*	100
8. Waste Characteristics	100	320
Targets		
9. Nearest Intake	50	0
10, Population		
10a. Level I Concentrations	**	0
10b. Level II Concentrations	**	0
10c. Potential Contamination	**	0
10d Population (lines 10a+10b+10c)	**	0
11. Resources	5	0
12. Targets (lines 9+10d+11)	**	0
13. DRINKING WATER TARGETS SCORE	100	0

* Maximum value applies to waste characteristics category

** Maximum value not applicable

SURFACE WATER OVERLAND FLOW/FLOOD MIGRATION COMPONENT SCORESHEET

SURFACE WATER OVERLAND FLOW/FLOOD MIGRATION COMPONENT Factor Categories and Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
14. Likelihood of Release (same value as line 5)	550	550
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	5×10^8
16. Hazardous Waste Quantity	*	100
17. Waste Characteristics	1000	320
Targets		
18. Food Chain Individual	50	45
19. Population		
19a. Level I Concentrations	**	0
19b. Level II Concentrations	**	0.03
19c. Potential Human Food Chain Contamination	**	0
19d. Population (lines 19a+19b+19c)	**	0
20. Targets (lines 18+19d)	**	45.03
HUMAN FOOD CHAIN THREAT SCORE	100	96.06

* Maximum value applies to waste characteristics category

** Maximum value not applicable

SURFACE WATER OVERLAND FLOW/FLOOD MIGRATION COMPONENT SCORESHEET

SURFACE WATER OVERLAND FLOW/FLOOD MIGRATION COMPONENT Factor Categories and Factors ENVIRONMENTAL THREAT	Maximum Value	Assigned Value
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	*	5×10^8
24. Hazardous Waste Quantity	*	100
25. Waste Characteristics	1000	320
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0
26b. Level II Concentrations	**	175
26c. Potential Contamination	**	0
26d. Sensitive Environments (lines 26a+26b+26c)	**	175
27. Targets	**	175
28. ENVIRONMENTAL THREAT SCORE	60	60.00
29. WATERSHED SCORE	100	100.00
30. SURFACE WATER OVERLAND FLOW/FLOOD COMPONENT SCORE	100	100.00

* Maximum value applies to waste characteristics category

** Maximum value not applicable

WORKSHEET FOR COMPUTING HRS SITE SCORE

		S	S^2
1.	Ground Water Migration Pathway Score (S_{GW})	Not Evaluated	0
2a.	Surface Water Overland Flow/Flood Component (from HRS Table 4-1, line 30)	100.00	
2b.	Ground Water to Surface Water Migration Component (from HRS Table 4-25, line 28)	Not Evaluated	
2c.	Surface Water Migration Pathway Score (S_{SW}) Enter the larger of lines 2a and 2b as the pathway score	100.00	10,000.00
3	Soil Exposure Pathway Score (S_s)	Not Evaluated	0
4.	Air Migration Pathway Score (S_a) (from HRS Table 6-1, line 12)	Not Evaluated	0
5.	Total of $S_{GW}^2 + S_{SW}^2 + S_s^2 + S_A^2$		10,000.00
6.	**HRS Site Score.** Divide the value on line 5 by 4 and take the square root.	100.00	

REFERENCES

Reference Number	Description of the Reference
1.	U.S. Environmental Protection Agency, December 14, 1990. Hazard Ranking System, Final Rule, 55 FR 51532, 135 pages.
2.	U.S. Environmental Protection Agency, June 1996. Superfund Chemical Data Matrix.
3.	U.S. Geological Survey, 7.5 minute series, Topographic Maps: Portland, Oregon-Washington Quadrangle 1990; Linnton, Oregon Quadrangle 1990.
4.	Roy F. Weston, May 1998, Portland Harbor Sediment Investigation Report, Multnomah County, Oregon, 674 pages.
5.	Roy F. Weston, September 16, 1997 to October 16, 1997, Portland Harbor Sediment Investigation, field sampling logbook, 14 pages.
6.	Roy F. Weston, September 16, 1997 to October 16, 1997, Portland Harbor Sediment Investigation, Data Quality Assurance packages, 1,642 pages.
7.	Roy F. Weston, September 16, 1997 to October 16, 1997, Portland Harbor Sediment Investigation, Chain-of-Custody forms, 86 pages.
8.	Roy F. Weston, July 1997, Willamette River Sampling and Analysis Plan, Site Inspections, Portland Harbor, Oregon, 57 pages.
9.	U.S. Geological Survey, 1977, A Synoptic Survey of Trace Metals in bottom Sediments of the Willamette River, Oregon, 30 pages.
10.	Tetra Tech, August 11, 1995, Willamette River Basin Water Quality Study, A Summary of Recent Scientific Reports on the Willamette River, 22 pages.
11.	National Oceanic and Atmospheric Administration, September 8, 1999, Findings of Fact, Preliminary Natural Resource Survey, Lower Willamette River, Portland, Oregon, 38 pages.
12.	Roy F. Weston, June 1997, Executive Summary of Historical Sediment Data, Site Investigation, Portland Harbor Area of the Willamette River, 158 pages.
13.	Oregon Department of Environmental Quality, Water Quality Division, July 1994, Willamette River Toxics Study, 1988/1991, 177 pages.
14.	Oregon Department of Fish and Wildlife, December 1998, 1997 Willamette River Spring Chinook Salmon Run, Fisheries, and Passage at Willamette Falls, pages 3, 6, 8, 15, and 26.
15.	National Oceanic and Atmospheric Administration, Internet web site www.nwr.noaa.gov, accessed on January 6, 2000, regarding Protected Resources, 6 pages.
16.	U.S. Army Corps of Engineers (USACE), January 1998, Columbia River Channel Deepening Sediment Quality Evaluation, Presented by the USACE at the Environmental Roundtable, Portland, Oregon, 54 pages.
17.	U.S. Army Corps of Engineers, July 1997, Analytical Data Packages, Willamette River 1997 Sampling Event as a part of the Columbia River Channel Deepening, 358 pages.
18.	Woodke, Mark, February 18, 2000, Sample Quantitation Limit/Detection Limit Calculations for samples collected as a part of the Roy F. Weston, May 1998, Portland Harbor Sediment Investigation Report, Multnomah County, Oregon, 76 pages.
19.	U.S. Environmental Protection Agency, November 1996, Using Qualified Data to Document an Observed Release and Observed Contamination, EPA 540-F-94-028, 18 pages.

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

Number of the source: 1

Name and description of the source: Other (Contaminated Sediments)

The source consists of contaminated sediments located between RM 3.5 and RM 9.2 in Portland Harbor on the Willamette River in Oregon (see Tables below). In September and October 1997, sediments in the Portland Harbor area on the River from RM 3.5 to RM 9.2 were investigated by Roy F. Weston under contract to the EPA (Ref. 4, p. 7). Analytical results document the presence of contaminated sediments in this river segment having elevated concentrations of several inorganics (i.e., metals), several SVOCs, DDT, PCBs, and TBT (see Tables below).

In July 1997 the USACE conducted sampling within this river segment as a part of a pre-dredging sediment quality study (Ref. 16, pp. 2 and 3). Analytical results document the presence of elevated concentrations of arsenic and mercury, several pesticides, and several SVOCs (see Tables below).

Location of the source, with reference to the site:

The contaminated sediment source extends from RM 3.5 to RM 9.2 in Portland Harbor (Ref. 3; Ref. 4, pp. 28-32).

Containment

The source is contaminated sediments, which by definition have no containment.

Containment Value: 10

Hazardous Substances

Portland Harbor Sediment Investigation (Weston, 1997) (Ref. 4):

Consultants for the EPA conducted Portland Harbor SI field work in September and October 1997. Sampling activities included the collection of approximately 150 surface (0 to 10 centimeter) sediment samples, 37 subsurface (1.8 to 4.55 feet) sediment samples, and 28 sediment porewater samples from Portland Harbor between RM 3.5 and RM 9.2 at near shore locations [Ref. 4, pp. 14, 28 through 32 (Figures 3-1 through 3-5); Ref. 5, pp. 1 through 14]. Only the surface sediment samples will be used in the documentation record to document observed releases that define the area of the contaminated sediment source, although it is expected that subsurface sediment samples and porewater samples also may document additional observed releases. All surface sediment samples were collected from 6 to 17 centimeters with a decontaminated stainless-steel van Veen grab sampler (Ref. 4, pp. 16 and 18; Ref. 8 pp. 24 and 25). On average, between 1 and 4 grabs were required at each station to retrieve sufficient sediment volume for the required analytical suite (Ref. 4, p. 16). Samples were homogenized in stainless steel bowls or stainless steel soup pots and then placed in pre-cleaned sample jars (Ref. 4, p. 16; Ref. 8, pp. 16 and 17). All sample containers were stored on ice in coolers maintained under chain-of-custody prior to and during shipment (Ref. 4, pp. 16 and 18; Ref. 8, pp. 23 and 24; Ref. 7).

Surface sediment samples were analyzed for a variety of analytical suites in varying combinations dependent on the suspected contaminants at each individual location. All samples were analyzed for total inorganics (EPA Method series 6000/7000), SVOCs (EPA Method 8270), total organic carbon (TOC) (EPA Method 9060), and grain size (ASTM D-442-63) (Ref. 4, p. 16; Ref. 8, pp.16, 43, 44, and 45). Selected samples also were analyzed for pesticides (EPA Method 8081), PCBs (EPA Method 8081), chlorinated herbicides (EPA Method 8081), organotins (Puget Sound Estuary Program protocols), and dioxins/furans (Ref. 8, pp.16, 43, 44, 45).

Designated background samples were not collected (Ref. 4, p. 19). Background samples were selected for determining observed release concentrations by considering both contaminant variances expected as a function of grain size (i.e., some contaminants have affinities for small particles and will tend to be more concentrated in samples with a high percentage of fines) and contaminant variances expected as a function of distance to shoreline manufacturing facilities and outfalls (i.e., contaminant concentrations are expected to be higher near manufacturing facilities and outfalls, and the types of contaminants present are expected to be a reflection of the contaminants associated with these facilities and outfalls). In selecting background concentrations, first all sediment samples were divided into four grain size classifications based on the percent of fines present (0 – 24.99%, 25 – 49.99%, 50 – 74.99%, and 75 to 100%), then the lowest results per analyte in each classification were selected as the background concentration. Fines contain particle sizes that are smaller than sands. Fines are generally clays and silts. As a result of this method for selecting background concentrations, the background sample location varies by both grain size and by analyte. This method for selecting background samples is appropriate since it addresses both concentration variances reflective of sample particular size and of the patchwork distribution of analytes expected throughout the 6 mile length of contaminated river sediments. Also, as a result of this method for selecting background concentrations, seemingly downstream locations may at times be the selected background location. Again, this selection method still is appropriate since the area of contaminated sediments (RM 3.5 to RM 9.2) is known to be effected by tidal reversals which reverse the flow of water throughout this segment (Ref. 4, p. 2-1; Ref. 9, p. F4). In addition to this selection method, an average background concentration was used for all of the metals in an attempt to account for the natural range of concentrations in the sediments. Therefore, each grain size classification contains several background samples except for the 75%-100% fines classification. For the 75%-100% classification, only one sample was considered to be an appropriate background and the average background concentration method was not used. To calculate the average background concentration, all of the selected background concentrations were added and then the sum was divided by the number of background samples used for that analyte and grain size classification. All of the average background concentrations are bolded in the applicable tables.

Selected analytes meeting observed release criteria are presented in the following tables (Table 1 through Table 17) (Ref. 1, Section 2.3). Not all analytes meeting observed release criteria are presented. Blank cells in these tables are for those analytes that were not detected above their respective detection limits or were not detected at concentrations meeting observed release criteria. All sample quantitation limits (SQLs) in the tables were calculated by EPA's contractor. Examples of SQL calculations and all supporting documents are provided as Reference 18. The following data qualifiers apply to the these tables:

AC - Adjusted concentration as per EPA Guidance Document "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19).

D - Diluted sample (Ref. 18).

J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met (Ref. 6).

U - The compound was analyzed for, but was not detected (Ref. 6).

UJ - The compound was analyzed for, but was not detected. The associated quantitation limit is an estimate because quality control criteria were not met (Ref. 6).

Table 1
2-Methylnaphthalene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	2-Methylnaphthalene	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384098 (Background)	WR-SD-SD012-0000	19.50	19 U	19 U	133
97384060	WR-SD-SD001-0000	9.25	100	20 U	11
97384947	WR-SD-SD077-0000	12.99	430	19 U	320
97384901	WR-SD-SD056-0000	18.40	240	19 U	185
97384062	WR-SD-SD003-0000	22.71	92	19 U	14
25-49.99% Fines					
97384964 (Background)	WR-SD-SD094-0000	41.50	19 U	19 U	350
97384944	WR-SD-SD072-0000	25.01	130	20 U	309
97384109	WR-SD-SD053-0000	27.50	67	20 U	182
97384945	WR-SD-SD075-0000	29.70	180	19 U	314
97384108	WR-SD-SD051-0000	30.20	530	19 U	179
97384925	WR-SD-SD060-0000	32.46	66	19 U	236
97384063	WR-SD-SD005-0000	33.13	74	19 U	20
97384941	WR-SD-SD070-0000-CC	34.10	530	19 U	297
97384940	WR-SD-SD069-0000	41.00	210	20 U	290
97384937	WR-SD-SD065-0000	44.23	11000 D	1,900 U	272
97384906	WR-SD-SD041-0000	46.24	410	19 U	200
97384939	WR-SD-SD068-0000	47.47	2700 D	980 U	284
97384064	WR-SD-SD011-0000	48.61	140	20 U	23
50-74.99% Fines					
97384954 (Background)	WR-SD-SD086-0000	54.30	19 U	19 U	332
97384938	WR-SD-SD067-0000	50.64	7600	200 U	278
97384926	WR-SD-SD066-0000	53.46	180	20 U	239
97384935	WR-SD-SD064-0000	53.66	44000 D	3,900 U	266
97384934	WR-SD-SD063-0000	56.94	680	19 U	260
97384933	WR-SD-SD062-0000	62.56	18000 D	2,000 U	254
97384068	WR-SD-SD018-0000	64.42	420	19 U	32
97384080	WR-SD-SD033-0000	65.41	99	19 U	76
97384081	WR-SD-SD032-0000	71.15	490	98 U	82

Table 2
4-Methylphenol
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	4-Methylphenol	SQL	Reference (Page Number from Ref. 6)
0-24.99 % Fines					
97394712 (Background)	WR-SD-SD092-0000-CC	7.18	19 U	19 U	444
97394727	WR-SD-SD136-0000	7.88	380	19 U	483
97384947	WR-SD-SD077-0000	12.99	68	19 U	320
97394760	WR-SD-SD150-0000	16.78	260	23 U	593
97394752	WR-SD-SD118-0000	16.99	88	20 U	575
97384901	WR-SD-SD056-0000	18.40	530	19 U	185
97394702	WR-SD-SD081-0000	22.01	200	20 U	420
97394759	WR-SD-SD145-0000	23.09	350	24 U	590
97384105	WR-SD-SD042-0000	24.85	680	20 U	173
25-49.99% Fines					
97384101 (Background)	WR-SD-SD034-0000	42.04	19 U	19 U	142
97384944	WR-SD-SD072-0000	25.01	250	20 U	309
97384109	WR-SD-SD053-0000	27.50	350	20 U	182
97384961	WR-SD-SD096-0000	28.49	280	20 U	344
97384968	WR-SD-SD102-0000	29.33	210	19 U	411
97384945	WR-SD-SD075-0000	29.70	97	19 U	314
97384108	WR-SD-SD051-0000	30.20	1000	19 U	179
97394755	WR-SD-SD132-0000	30.83	550	20 U	581
97384925	WR-SD-SD060-0000	32.46	230	20 U	236
97394715	WR-SD-SD100-0000	32.78	250	19 U	453
97394707	WR-SD-SD087-0000	34.31	260	20 U	432
97394700	WR-SD-SD080-0000	34.71	500	19 U	417
97394705	WR-SD-SD084-0000	35.99	330	20 U	426
97394710	WR-SD-SD090-0000	36.70	190	20 U	438
97384927	WR-SD-SD071-0000	37.06	290	20 U	242
97394770	WR-SD-SD143-0000	37.17	290	19 U	491
97384958	WR-SD-SD089-0000	38.46	300	19 U	338
97394731	WR-SD-SD148-0000	39.30	690	20 U	518
97384919	WR-SD-SD057-0000	39.76	280	19 U	224
97394764	WR-SD-SD135-0000	40.26	340	20 U	605
97394763	WR-SD-SD131-0000	40.94	360	20 U	602
97384940	WR-SD-SD069-0000	41.00	64	20 U	290
97394758	WR-SD-SD138-0000	41.28	420	19 U	587
97394716	WR-SD-SD106-0000	41.49	260	20 U	456
97384964	WR-SD-SD094-0000	41.50	390	19 U	350
97384970	WR-SD-SD101-0000	41.95	360	19 U	414
97384916	WR-SD-SD052-0000	42.15	600	20 U	218
97384905	WR-SD-SD039-0000	42.16	620	20 U	197
97394749	WR-SD-SD115-0000	42.44	630	20 U	563
97384960	WR-SD-SD091-0000	43.18	320	19 U	341
97384908	WR-SD-SD044-0000	43.62	490	20 U	209

Table 2
4-Methylphenol
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	4-Methylphenol	SQL	Reference (Page Number from Ref. 6)
97384937	WR-SD-SD065-0000	44.23	300	96 U	272
97384907	WR-SD-SD043-0000	44.83	480	19 U	206
97384106	WR-SD-SD049-0000	44.98	460	19 U	176
97384103	WR-SD-SD036-0000	45.91	450	19 U	167
97384906	WR-SD-SD041-0000	46.24	380	20 U	200
97384903	WR-SD-SD037-0000	46.25	480	19 U	191
97394747	WR-SD-SD113-0000	46.43	1100	20 U	560
97394742	WR-SD-SD105-0000	46.48	590	19 U	545
97394704	WR-SD-SD083-0000	46.66	330	19 U	423
97394762	WR-SD-SD123-0000	46.98	270	19 U	599
97384104	WR-SD-SD040-0000	47.25	640	19 U	170
97384939	WR-SD-SD068-0000	47.47	160	20 U	284
97384924	WR-SD-SD061-0000	47.77	190	19 U	233
97394711	WR-SD-SD093-0000	47.82	580	19 U	441
97394775	WR-SD-SD147-0000	47.87	990	19 U	500
97394724	WR-SD-SD121-0000	47.91	460	20 U	474
97394745	WR-SD-SD110-0000	47.93	700	19 U	554
97384921	WR-SD-SD059-0000	48.05	300	20 U	227
97384963	WR-SD-SD095-0000	48.29	280	20 U	347
97394744	WR-SD-SD109-0000	49.25	580	20 U	551
97394756	WR-SD-SD020-0000	49.25	370	19 U	584
97394753	WR-SD-SD133-0000	49.76	510	19 U	578
50-74.99% Fines					
97384080 (Background)	WR-SD-SD033-0000	65.41	19 U	19 U	76
97384929	WR-SD-SD076-0000	50.49	490	20 U	248
97384938	WR-SD-SD067-0000	50.64	250	200 U	278
97394719	WR-SD-SD111-0000	50.88	480	20 U	462
97384966	WR-SD-SD098-0000	50.96	380	19 U	356
97394725	WR-SD-SD129-0000	51.24	1100	19 U	477
97384956	WR-SD-SD082-0000	51.88	300	19 U	335
97394738	WR-SD-SD127-0000	52.57	570	19 U	536
97384926	WR-SD-SD066-0000	53.46	130	19 U	239
97394722	WR-SD-SD119-0000	53.74	500	19 U	468
97384954	WR-SD-SD086-0000	54.30	420	19 U	332
97384930	WR-SD-SD074-0000	54.32	560	20 U	251
97394771	WR-SD-SD144-0000	55.73	1200	19 U	494
97394720	WR-SD-SD116-0000	55.99	490	20 U	465
97384934	WR-SD-SD063-0000	56.94	200	19 U	260
97384928	WR-SD-SD073-0000	57.39	320	20 U	245
97394718	WR-SD-SD108-0000	57.45	480	20 U	459
97394739	WR-SD-SD130-0000	57.76	630	19 U	539
97384965	WR-SD-SD099-0000	58.02	420	19 U	353
97394746	WR-SD-SD112-0000	58.19	640	19 U	557

Table 2
4-Methylphenol
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	4-Methylphenol	SQL	Reference (Page Number from Ref. 6)
97384967	WR-SD-SD103-0000	58.31	680	20 U	359
97394732	WR-SD-SD124-0000	58.71	610	20 U	521
97394772	WR-SD-SD146-0000	58.86	750	19 U	497
97394767	WR-SD-SD140-0000	59.27	730	20 U	614
97394743	WR-SD-SD107-0000	60.51	770	19 U	548
97394768	WR-SD-SD142-0000	62.72	950	19 U	617
97394776	WR-SD-SD149-0000	62.88	800	20 U	503
97384904	WR-SD-SD038-0000	63.46	560	19 U	194
97394736	WR-SD-SD125-0000	63.48	870	19 U	533
97394723	WR-SD-SD122-0000	64.53	690	19 U	471
97394761	WR-SD-SD120-0000	67.13	880	20 U	596
97394741	WR-SD-SD104-0000	67.83	1300	19 U	542
97394733	WR-SD-SD126-0000	68.56	170	20 U	524
97394734	WR-SD-SD128-0000	69.29	540	20 U	527
75-100% Fines					
97384084 (Background)	WR-SD-SD027-0000	80.43	19 U	19 U	94
97394729	WR-SD-SD141-0000-CC	82.39	1000	20 U	512
97394726	WR-SD-SD134-0000	85.44	780	20 U	480
97394728	WR-SD-SD139-0000	89.69	1400	19 U	488

Table 3
Acenaphthene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Acenaphthene	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384098 (Background)	WR-SD-SD012-0000	19.50	19 U	19 U	133
97384060	WR-SD-SD001-0000	9.25	90	20 U	11
97384947	WR-SD-SD077-0000	12.99	2400 D	95 U	320
97384901	WR-SD-SD056-0000	18.40	340	19 U	185
97384062	WR-SD-SD003-0000	22.71	110	19 U	14
25-49.99% Fines					
97394715 (Background)	WR-SD-SD100-0000	32.78	19 U	19 U	453
97384944	WR-SD-SD072-0000	25.01	1500	20 U	309
97384109	WR-SD-SD053-0000	27.50	85	20 U	182
97384945	WR-SD-SD075-0000	29.70	3800 D	190 U	314
97384108	WR-SD-SD051-0000	30.20	760	19 U	179
97384925	WR-SD-SD060-0000	32.46	60	20 U	236
97384912	WR-SD-SD050-0000	32.83	70	20 U	371
97384063	WR-SD-SD005-0000	33.13	150	19 U	20
97384941	WR-SD-SD070-0000-CC	34.10	11000 D	940 U	297
97394710	WR-SD-SD090-0000	36.70	170	20 U	438
97384909	WR-SD-SD045-0000	37.02	61	19 U	362
97384096	WR-SD-SD009-0000	39.50	74	19 U	127
97384919	WR-SD-SD057-0000	39.76	110	19 U	224
97384940	WR-SD-SD069-0000	41.00	5600 D	980 U	290
97384101	WR-SD-SD034-0000	42.04	110	19 U	142
97384916	WR-SD-SD052-0000	42.15	66	20 U	218
97384905	WR-SD-SD039-0000	42.16	120	20 U	197
97384095	WR-SD-SD008-0000	43.79	97	19 U	121
97384937	WR-SD-SD065-0000	44.23	15000 D	1,900	272
97384106	WR-SD-SD049-0000	44.98	80	19 U	176
50-74.99% Fines					
97394741 (Background)	WR-SD-SD104-0000	67.83	19 U	19 U	542
97384103	WR-SD-SD036-0000	45.91	81	19 U	167
97384906	WR-SD-SD041-0000	46.24	5000 D	390 U	200
97384074	WR-SD-SD030-0000	46.80	170	19 U	64
97384939	WR-SD-SD068-0000	47.47	15000 D	980 U	284
97384924	WR-SD-SD061-0000	47.77	63	19 U	233
97384921	WR-SD-SD059-0000	48.05	73	20 U	227
97384064	WR-SD-SD011-0000	48.61	120	20 U	23
97394708	WR-SD-SD088-0000	48.94	80	19 U	435
97394753	WR-SD-SD133-0000	49.76	94	19 U	578
97384938	WR-SD-SD067-0000	50.64	11000	200 U	278
97384926	WR-SD-SD066-0000	53.46	220	19 U	239
97384935	WR-SD-SD064-0000	53.66	51000 D	3,900	266

Table 3
Acenaphthene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Acenaphthene	SQL	Reference (Page Number from Ref. 6)
97384082	WR-SD-SD031-0000	56.33	470	98 U	88
97384089	WR-SD-SD029-0000	56.84	88	20 U	106
97384934	WR-SD-SD063-0000	56.94	2600 D	19 U	260
97384079	WR-SD-SD022-0000	60.05	110	19 U	73
97384933	WR-SD-SD062-0000	62.56	15000	200 U	254
97384068	WR-SD-SD018-0000	64.42	270	19 U	32
97384080	WR-SD-SD033-0000	65.41	970	19 U	76
97394734	WR-SD-SD128-0000	69.29	130	20 U	527
97384081	WR-SD-SD032-0000	71.15	7800 D	98 U	82
97384078	WR-SD-SD023-0000	73.65	420	97 U	70

Table 4
Aroclor 1254
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Aroclor 1254	SQL	Reference (Page Number from Ref. 6)
0-24.99 % Fines					
97384098 (Background)	WR-SD-SD012-0000	19.5	19 U	19 U	147
97394760	WR-SD-SD150-0000	16.78	46	17 U	650
25-49.99% Fines					
97384913 (Background)	WR-SD-SD048-0000-CC	31.36	19 U	19 U	375
97394750	WR-SD-SD117-0000-CC	27.21	26	20 U	645
97384961	WR-SD-SD096-0000	28.49	200	20 U	393
97384941	WR-SD-SD070-0000-CC	34.1	51	19 U	385
97394753	WR-SD-SD133-0000	49.76	580	190 U	647
50-74.99% Fines					
97394722 (Background)	WR-SD-SD119-0000	53.74	19 U	19 U	635
97384926	WR-SD-SD066-0000	53.46	54 J	19 U	382
97394734	WR-SD-SD128-0000	69.29	380	200 U	641

Table 5
Benzo(a)pyrene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Benzo(a)pyrene	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384090 (Background)	WR-SD-SD002-0000	3.71	20 U	20 U	110
97394748	WR-SD-SD114-0000	3.13	180	20 U	564
97384952	WR-SD-SD079-0000	4.42	140	20 U	330
97394727	WR-SD-SD136-0000	7.88	85	19 U	484
97384917	WR-SD-SD055-0000	8.11	230	19 U	222
97384060	WR-SD-SD001-0000	9.25	1100	20 U	12
97384091	WR-SD-SD004-0000	10.77	100	19 U	113
97384922	WR-SD-SD058-0000	11.63	310	20 U	231
97384947	WR-SD-SD077-0000	12.99	890	19 U	321
97384950	WR-SD-SD078-0000	14.05	360	19 U	327
97394760	WR-SD-SD150-0000	16.78	140	23 U	594
97394752	WR-SD-SD118-0000	16.99	220	20 U	576
97384901	WR-SD-SD056-0000	18.4	1700 D	190 U	186
97384098	WR-SD-SD012-0000	19.5	120	19 U	134
97394702	WR-SD-SD081-0000	22.01	79	20 U	421
97384062	WR-SD-SD003-0000	22.71	1100	19 U	15
97384105	WR-SD-SD042-0000	24.85	81	20 U	174
25-49.99% Fines					
97384958 (Background)	WR-SD-SD089-0000	38.46	19 U	19 U	339
97384944	WR-SD-SD072-0000	25.01	980	20 U	310A
97384109	WR-SD-SD053-0000	27.5	390	20 U	183
97384961	WR-SD-SD096-0000	28.49	400	20 U	345
97384945	WR-SD-SD075-0000	29.7	1300	19 U	315
97384108	WR-SD-SD051-0000	30.2	390	19 U	180
97384913	WR-SD-SD048-0000-CC	31.36	290	19 U	213
97384925	WR-SD-SD060-0000	32.46	510	20 U	237
97384912	WR-SD-SD050-0000	32.83	140	20 U	372
97384063	WR-SD-SD005-0000	33.13	780	19 U	21
97384941	WR-SD-SD070-0000-CC	34.1	1400	19 U	298
97384910	WR-SD-SD047-0000	34.21	120	19 U	366
97394707	WR-SD-SD087-0000	34.31	150	20 U	433
97394700	WR-SD-SD080-0000	34.71	240	19 U	418
97394705	WR-SD-SD084-0000	35.99	68	20 U	427
97394710	WR-SD-SD090-0000	36.7	180	20 U	439
97384066	WR-SD-SD015-0000	38.66	240	19 U	27
97394731	WR-SD-SD148-0000	39.3	120	20 U	519
97384096	WR-SD-SD009-0000	39.5	120	19 U	128
97384919	WR-SD-SD057-0000	39.76	230	19 U	225
97384094	WR-SD-SD007-0000	40.3	59	19 U	119
97384940	WR-SD-SD069-0000	41	2400 D	980 U	291
97384085	WR-SD-SD025-0000	41.14	260	19 U	98
97384101	WR-SD-SD034-0000	42.04	1000	19 U	143

Table 5
Benzo(a)pyrene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Benzo(a)pyrene	SQL	Reference (Page Number from Ref. 6)
97384916	WR-SD-SD052-0000	42.15	440	20 U	219
97384905	WR-SD-SD039-0000	42.16	500	20 U	198
97394706	WR-SD-SD085-0000	42.44	140	20 U	430
97384911	WR-SD-SD046-0000	42.64	83	20 U	369
97384908	WR-SD-SD044-0000	43.62	260	20 U	210
97384095	WR-SD-SD008-0000	43.79	510	19 U	122
97384937	WR-SD-SD065-0000	44.23	23000 D	2,900	273
97384907	WR-SD-SD043-0000	44.83	150	19 U	207
97384106	WR-SD-SD049-0000	44.98	120	19 U	177
97384100	WR-SD-SD014-0000	45.11	130	19 U	140
97384073	WR-SD-SD028-0000	45.71	78	20 U	62
97384103	WR-SD-SD036-0000	45.91	140	19 U	168
97384076	WR-SD-SD035-0000	45.93	110	19 U	68
97384067	WR-SD-SD017-0000	46.22	110	20 U	30
97384906	WR-SD-SD041-0000	46.24	3700 D	390 U	201
97384903	WR-SD-SD037-0000	46.25	140	19 U	192
97394704	WR-SD-SD083-0000	46.66	240	19 U	424
97384074	WR-SD-SD030-0000	46.8	180	19 U	65
97384071	WR-SD-SD024-0000	46.85	120	19 U	42
97384072	WR-SD-SD026-0000	46.88	120	20 U	59
97384104	WR-SD-SD040-0000	47.25	220	19 U	171
97384939	WR-SD-SD068-0000	47.47	8000 D	980 U	285
97384924	WR-SD-SD061-0000	47.77	330	19 U	234
97384921	WR-SD-SD059-0000	48.05	120	20 U	228
97384064	WR-SD-SD011-0000	48.61	280	20 U	24
97394708	WR-SD-SD088-0000	48.94	150	19 U	436
97384099	WR-SD-SD013-0000	49.03	100	19 U	137
97394744	WR-SD-SD109-0000	49.25	91	20 U	552
97394756	WR-SD-SD020-0000	49.25	78	19 U	585
97394753	WR-SD-SD133-0000	49.76	380	19 U	579
50-74.99% Fines					
97384966 (Background)	WR-SD-SD098-0000	50.96	19 U	19 U	357
97384938	WR-SD-SD067-0000	50.64	15000 D	4,000	279
97384086	WR-SD-SD021-0000-CC	51.07	260	20 U	101
97394725	WR-SD-SD129-0000	51.24	210	19 U	478
97384926	WR-SD-SD066-0000	53.46	410	19 U	240
97384935	WR-SD-SD064-0000	53.66	40000 D	3,900	267
97384930	WR-SD-SD074-0000	54.32	160	20 U	252
97384069	WR-SD-SD019-0000	55.42	130	19 U	36
97384082	WR-SD-SD031-0000	56.33	4900	98 U	89
97384089	WR-SD-SD029-0000	56.84	810	20 U	107
97384934	WR-SD-SD063-0000	56.94	5100 D	390 U	261
97394746	WR-SD-SD112-0000	58.19	71	19 U	558
97384967	WR-SD-SD103-0000	58.31	82	20 U	360

Table 5
Benzo(a)pyrene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Benzo(a)pyrene	SQL	Reference (Page Number from Ref. 6)
97384093	WR-SD-SD006-0000	58.54	110	20 U	116
97384079	WR-SD-SD022-0000	60.05	1300	19 U	74
97394743	WR-SD-SD107-0000	60.51	79	19 U	549
97384933	WR-SD-SD062-0000	62.56	57000 D	2,000	255
97394776	WR-SD-SD149-0000	62.88	63	20 U	504
97384904	WR-SD-SD038-0000	63.46	160	19 U	195
97384068	WR-SD-SD018-0000	64.42	150	19 U	33
97384080	WR-SD-SD033-0000	65.41	12000 D	380 U	77
97394734	WR-SD-SD128-0000	69.29	820	20 U	528
97384083	WR-SD-SD016-0000	71	200	20 U	92
97384081	WR-SD-SD032-0000	71.15	94000 D	2,000	83
97384078	WR-SD-SD023-0000	73.65	4900	97 U	71

Table 6 Cadmium Sediment Sample Observed Releases (mg/kg)					
Sample Number	Station ID	Grain Size	Cadmium	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384090 (Background)	WR-SD-SD002-0000	3.71	0.2	0.1 U	940
97384091 (Background)	WR-SD-SD004-0000	10.77	0.2	0.1 U	941
97384098 (Background)	WR-SD-SD012-0000	19.50	0.2	0.1 U	947
97384952	WR-SD-SD079-0000	4.42	0.2	0.1 U	999
97394712 (Background)	WR-SD-SD092-0000-C	7.18	0.3	0.1 U	1034
Average Background Concentration			**0.22**		
97394748	WR-SD-SD114-0000	3.13	0.7	0.1 U	1064
97394727	WR-SD-SD136-0000	7.88	1.0	0.3 U	1046
25-49.99% Fines					
97394715 (Background)	WR-SD-SD100-0000	32.78	0.2	0.2 U	1036
97384096 (Background)	WR-SD-SD009-0000	39.50	0.3	0.2 U	945
97384098 (Background)	WR-SD-SD102-0000	29.33	0.4	0.2 U	1022
97384085 (Background)	WR-SD-SD025-0000	41.14	0.3	0.2 U	936
Average Background Concentration			**0.3**		
97394777	WR-SD-SD151-0000-CC	48.00	1.0	0.2 U	1088
50-74.99% Fines					
97384965 (Background)	WR-SD-SD099-0000	58.02	0.3	0.2 U	1007
97394741 (Background)	WR-SD-SD104-0000	67.83	0.3	0.4 U	1057
97394718 (Background)	WR-SD-SD108-0000	57.45	0.4	0.2 U	1038
97394732 (Background)	WR-SD-SD124-0000	58.71	0.3	0.2 U	1051
Average Background Concentration			**0.33**		
97384082	WR-SD-SD031-0000	56.33	1.3	0.2 U	933
97384089	WR-SD-SD029-0000	56.84	1.1	0.2 U	939
97384080	WR-SD-SD033-0000	65.41	1.6	0.2 U	931
97384081	WR-SD-SD032-0000	71.15	1.7	0.3 U	932
97384078	WR-SD-SD023-0000	73.65	2.2	0.3 U	929

Table 7
Carbazole
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Carbazole	SQL	Reference (Page Number from Ref. 6)
25-49.99% Fines					
97384964 (Background)	WR-SD-SD094-0000	41.50	19 UJ (190 U AC)	19 U	351
97384940	WR-SD-SD069-0000	41.00	3400 DJ	980 U	291
97384937	WR-SD-SD065-0000	44.23	3600 J (340 AC)	96 U	273
50-74.99% Fines					
97384965 (Background)	WR-SD-SD099-0000	58.02	19 UJ (190 U AC)	19 U	354
97384938	WR-SD-SD067-0000	50.64	1800	200 U	279
97384935	WR-SD-SD064-0000	53.66	5500	190 U	267
97384082	WR-SD-SD031-0000	56.33	390	98 U	89
97384933	WR-SD-SD062-0000	62.56	8400 J (840 AC)	2000 U	255
97384080	WR-SD-SD033-0000	65.41	2800 DJ (280 AC)	380 U	77
97384081	WR-SD-SD032-0000	71.15	10000 DJ (1000 AC)	2000 U	83
97384078	WR-SD-SD023-0000	73.65	420	97 U	71
75-100% Fines					
97394728 (Background)	WR-SD-SD139-0000	89.69	19 U	19 U	489
97384084	WR-SD-SD027-0000	80.43	58	19 U	95

Table 8 Copper Sediment Sample Observed Releases (mg/kg)					
Sample Number	Station ID	Grain Size	Copper	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384090 (Background)	WR-SD-SD002-0000	3.71	15.3	0.1 U	940
97384091 (Background)	WR-SD-SD004-0000	10.77	21.5	0.1 U	941
97424918 (Background)	WR-SD-SD055-0000	8.11	18.8	0.1 U	975
Average Background Concentration			**19.55**		
97394727	WR-SD-SD136-0000	7.88	81.5	0.3 U	1046
97384901	WR-SD-SD056-0000	18.40	71.1	0.2 U	965
97384098	WR-SD-SD012-0000	19.50	61.5	0.1 U	947
25-49.99% Fines					
97394715 (Background)	WR-SD-SD100-0000	32.78	23.2	0.2 U	1036
97394750 (Background)	WR-SD-SD117-0000-CC	27.21	29.7	0.2 U	1066
Average Background Concentration			**26.45**		
97384961	WR-SD-SD096-0000	28.49	85.3	0.2 U	1004
97394753	WR-SD-SD133-0000	49.76	543	0.2 U	1069
50-74.99% Fines					
97394741 (Background)	WR-SD-SD104-0000	67.83	30.8	0.2 U	1057
97384935 (Background)	WR-SD-SD064-0000	53.66	45.2	0.2 U	988
97384926 (Background)	WR-SD-SD066-0000	53.46	41.1	0.2 U	981
Average Background Concentration			**39.03**		
97394725	WR-SD-SD129-0000	51.24	131	0.2 U	1044
97394732	WR-SD-SD124-0000	58.71	126	0.2 U	1051
97394734	WR-SD-SD128-0000	69.29	404	0.2 U	1053
75-100% Fines					
97384084 (Background)	WR-SD-SD027-0000	80.43	44.1	0.2 U	935
97394726	WR-SD-SD134-0000	85.44	169	0.3 U	1045
97394728	WR-SD-SD139-0000	89.69	133	0.3 U	1047

Table 9
4,4'-DDT
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	4,4'-DDT	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384091 (Background)	WR-SD-SD004-0000	10.77	1 J (12.82 AC)	1.9 U	148
97384947	WR-SD-SD077-0000	12.99	63	38 U	391
97384950	WR-SD-SD078-0000	14.05	280	95 U	392
97394702	WR-SD-SD081-0000	22.01	490	99 U	621
25-49.99% Fines					
97384076 (Background)	WR-SD-SD035-0000	45.93	1.4 J (17.9 AC)	1.9 U	145
97384944	WR-SD-SD072-0000	25.01	60 D	20 U	387
97384945	WR-SD-SD075-0000	29.7	76 D	19 U	389
97394707	WR-SD-SD087-0000	34.31	810	100 U	625
97394700	WR-SD-SD080-0000	34.71	470	96 U	620
97394705	WR-SD-SD084-0000	35.99	620	98 U	623
97394710	WR-SD-SD090-0000	36.7	2100	200 U	627
97394706	WR-SD-SD085-0000	42.44	370	20 U	624
50-74.99% Fines					
97394765 (Background)	WR-SD-SD137-0000-CC	57.09	2.0 U	2.0 U	651
97394704	WR-SD-SD083-0000	46.66	620	97 U	622
97394711	WR-SD-SD093-0000	47.82	70	19 U	628
97384064	WR-SD-SD011-0000	48.61	15	2.0 U	45
97394708	WR-SD-SD088-0000	48.94	930	190 U	626

Table 10 Dibenz(a,h)antracene Sediment Sample Observed Releases (mg/kg)					
Sample Number	Station ID	Grain Size	Dibenz(a,h)anthracene	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384091 (Background)	WR-SD-SD004-0000	10.77	19 U	19 U	113
97384060	WR-SD-SD001-0000	9.25	150	20 U	12
97384947	WR-SD-SD077-0000	12.99	140	19 U	321
97384950	WR-SD-SD078-0000	14.05	74	19 U	327
97384901	WR-SD-SD056-0000	18.4	300	19 U	186
97384062	WR-SD-SD003-0000	22.71	140	19 U	15
25-49.99% Fines					
97394704 (Background)	WR-SD-SD083-0000	46.66	19 U	19 U	424
97384944	WR-SD-SD072-0000	25.01	160	20 U	295
97384109	WR-SD-SD053-0000	27.5	80	20 U	183
97384961	WR-SD-SD096-0000	28.49	72	20 U	345
97384945	WR-SD-SD075-0000	29.7	220	19 U	315
97384108	WR-SD-SD051-0000	30.2	73	19 U	180
97384925	WR-SD-SD060-0000	32.46	98	20 U	237
97384063	WR-SD-SD005-0000	33.13	100	19 U	21
97384941	WR-SD-SD070-0000-CC	34.1	210	19 U	298
97384940	WR-SD-SD069-0000	41	390	20 U	291
97384101	WR-SD-SD034-0000	42.04	270	19 U	143
97384916	WR-SD-SD052-0000	42.15	67	20 U	219
97384905	WR-SD-SD039-0000	42.16	66	20 U	198
97384095	WR-SD-SD008-0000	43.79	110	19 U	122
97384937	WR-SD-SD065-0000	44.23	3800	96 U	273
97384906	WR-SD-SD041-0000	46.24	560	20 U	201
97384939	WR-SD-SD068-0000	47.47	1500	20 U	285
97384924	WR-SD-SD061-0000	47.77	65	19 U	234
50-74.99% Fines					
97394741 (Background)	WR-SD-SD104-0000	67.83	19 U	19 U	543
97384938	WR-SD-SD067-0000	50.64	2500	200 U	279
97384086	WR-SD-SD021-0000-CC	51.07	63	20 U	101
97384926	WR-SD-SD066-0000	53.46	71	19 U	240
97384935	WR-SD-SD064-0000	53.66	6200	190 U	267

Table 10 Dibenz(a,h)antracene Sediment Sample Observed Releases (mg/kg)					
Sample Number	Station ID	Grain Size	Dibenz(a,h)anthracene	SQL	Reference (Page Number from Ref. 6)
97384082	WR-SD-SD031-0000	56.33	1000	98 U	89
97384089	WR-SD-SD029-0000	56.84	210	20 U	107
97384934	WR-SD-SD063-0000	56.94	1000	19 U	261
97384079	WR-SD-SD022-0000	60.05	300	19 U	74
97384933	WR-SD-SD062-0000	62.56	9200	200 U	255
97384080	WR-SD-SD033-0000	65.41	3600 D	19 U	77
97394734	WR-SD-SD128-0000	69.29	120	20 U	528
97384081	WR-SD-SD032-0000	71.15	25000 D	2,000 U	83
97384078	WR-SD-SD023-0000	73.65	830	97 U	71
75-100% Fines					
97394728 (Background)	WR-SD-SD139-0000	89.69	19 U	19 U	489
97384084	WR-SD-SD027-0000	80.43	120	19 U	95

Table 11
Indeno(1,2,3-cd)pyrene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Indeno(1,2,3 cd)pyrene	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384090 (Background)	WR-SD-SD002-0000	3.71	20 U	20 U	110
97394748	WR-SD-SD114-0000	3.13	160	20 U	564
97384952	WR-SD-SD079-0000	4.42	62	20 U	330
97384917	WR-SD-SD055-0000	8.11	150	19 U	222
97384060	WR-SD-SD001-0000	9.25	570	20 U	12
97384922	WR-SD-SD058-0000	11.63	190	20 U	231
97384947	WR-SD-SD077-0000	12.99	380	19 U	321
97384950	WR-SD-SD078-0000	14.05	190	19 U	327
97394760	WR-SD-SD150-0000	16.78	75	23 U	594
97394752	WR-SD-SD118-0000	16.99	97	20 U	576
97384901	WR-SD-SD056-0000	18.40	1100	190 U	186
97384098	WR-SD-SD012-0000	19.50	72	19 U	134
97394702	WR-SD-SD081-0000	22.01	63	20 U	421
97384062	WR-SD-SD003-0000	22.71	520	19 U	15
25-49.99% Fines					
97394762 (Background)	WR-SD-SD123-0000	46.98	19 U	19 U	601
97384944	WR-SD-SD072-0000	25.01	560	20 U	295
97384109	WR-SD-SD053-0000	27.50	210	20 U	183
97384961	WR-SD-SD096-0000	28.49	300	20 U	345
97384945	WR-SD-SD075-0000	29.70	730	19 U	315
97384108	WR-SD-SD051-0000	30.20	220	19 U	180
97384913	WR-SD-SD048-0000-CC	31.36	160	19 U	213
97384925	WR-SD-SD060-0000	32.46	310	20 U	237
97384912	WR-SD-SD050-0000	32.83	89	20 U	372
97384063	WR-SD-SD005-0000	33.13	400	19 U	21
97384941	WR-SD-SD070-0000-CC	34.10	520	19 U	298
97384910	WR-SD-SD047-0000	34.21	62	19 U	366
97394707	WR-SD-SD087-0000	34.31	96	20 U	433
97394700	WR-SD-SD080-0000	34.71	140	19 U	418
97394710	WR-SD-SD090-0000	36.70	95	20 U	439
97384066	WR-SD-SD015-0000	38.66	140	19 U	27
97394731	WR-SD-SD148-0000	39.30	73	20 U	519
97384096	WR-SD-SD009-0000	39.50	69	19 U	128
97384919	WR-SD-SD057-0000	39.76	140	19 U	225
97384940	WR-SD-SD069-0000	41.00	1100	20 U	291
97384085	WR-SD-SD025-0000	41.14	160	19 U	98
97384101	WR-SD-SD034-0000	42.04	620	19 U	143

Table 11
Indeno(1,2,3-cd)pyrene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Indeno(1,2,3 cd)pyrene	SQL	Reference (Page Number from Ref. 6)
97384916	WR-SD-SD052-0000	42.15	260	20 U	219
97384905	WR-SD-SD039-0000	42.16	280	20 U	198
97394706	WR-SD-SD085-0000	42.44	95	20 U	430
97384911	WR-SD-SD046-0000	42.64	57	20 U	369
97384908	WR-SD-SD044-0000	43.62	140	20 U	210
97384095	WR-SD-SD008-0000	43.79	260	19 U	122
97384937	WR-SD-SD065-0000	44.23	10000 D	1900 U	273
97384907	WR-SD-SD043-0000	44.83	83	19 U	207
97384106	WR-SD-SD049-0000	44.98	58	19 U	177
97384100	WR-SD-SD014-0000	45.11	82	19 U	140
97384073	WR-SD-SD028-0000	45.71	61	20 U	62
97384103	WR-SD-SD036-0000	45.91	75	19 U	168
97384076	WR-SD-SD035-0000	45.93	76	19 U	68
97384067	WR-SD-SD017-0000	46.22	63	20 U	30
97384906	WR-SD-SD041-0000	46.24	2300 D	390 U	201
97384903	WR-SD-SD037-0000	46.25	90	19 U	192
97394704	WR-SD-SD083-0000	46.66	150	19 U	424
97384074	WR-SD-SD030-0000	46.80	94	19 U	65
97384071	WR-SD-SD024-0000	46.85	66	19 U	42
97384072	WR-SD-SD026-0000	46.88	94	20 U	59
97384104	WR-SD-SD040-0000	47.25	120	19 U	171
97384939	WR-SD-SD068-0000	47.47	4200 D	980 U	285
97384924	WR-SD-SD061-0000	47.77	190	19 U	234
97394777	WR-SD-SD151-0000-CC	48.00	68	19 U	507
97384921	WR-SD-SD059-0000	48.05	79	20 U	228
97384064	WR-SD-SD011-0000	48.61	160	20 U	24
97394708	WR-SD-SD088-0000	48.94	82	19 U	436
97384099	WR-SD-SD013-0000	49.03	61	19 U	137
97394744	WR-SD-SD109-0000	49.25	57	20 U	552
97394756	WR-SD-SD020-0000	49.25	61	19 U	585
97394753	WR-SD-SD133-0000	49.76	240	19 U	579
50-74.99% Fines					
97384965 (Background)	WR-SD-SD099-0000	58.02	19 U	19 U	354
97384938	WR-SD-SD067-0000	50.64	9500	4000 U	279
97384086	WR-SD-SD021-0000-CC	51.07	140	20 U	101
97394725	WR-SD-SD129-0000	51.24	130	19 U	478
97384926	WR-SD-SD066-0000	53.46	220	19 U	240
97384935	WR-SD-SD064-0000	53.66	19000 D	3900 U	267
97384930	WR-SD-SD074-0000	54.32	57	20 U	252

Table 11
Indeno(1,2,3-cd)pyrene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Indeno(1,2,3 cd)pyrene	SQL	Reference (Page Number from Ref. 6)
97384069	WR-SD-SD019-0000	55.42	75	19 U	36
97384082	WR-SD-SD031-0000	56.33	3500	98 U	89
97384089	WR-SD-SD029-0000	56.84	470	20 U	107
97384934	WR-SD-SD063-0000	56.94	3000 D	390 U	261
97384093	WR-SD-SD006-0000	58.54	71	20 U	116
97384079	WR-SD-SD022-0000	60.05	730	19 U	74
97384933	WR-SD-SD062-0000	62.56	12000	2000 U	255
97384904	WR-SD-SD038-0000	63.46	89	19 U	195
97384068	WR-SD-SD018-0000	64.42	79	19 U	33
97384080	WR-SD-SD033-0000	65.41	8000 D	380 U	77
97394734	WR-SD-SD128-0000	69.29	430	20 U	528
97384083	WR-SD-SD016-0000	71.00	120	20 U	92
97384081	WR-SD-SD032-0000	71.15	50000 D	2,000 U	83
97384078	WR-SD-SD023-0000	73.65	3300	97 U	71

Table 12 Lead Sediment Sample Observed Releases (mg/kg)					
Sample Number	Station ID	Grain Size	Lead	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384090 (Background)	WR-SD-SD002-0000	3.71	5	1 U	940
97384091 (Background)	WR-SD-SD004-0000	10.77	9.0	1 U	941
97384098 (Background)	WR-SD-SD012-0000	19.50	6.0	1 U	947
Average Background Concentration			**6.67**		
97394748	WR-SD-SD114-0000	3.13	47	1 U	1064
97384952	WR-SD-SD079-0000	4.42	22	1 U	999
97394712	WR-SD-SD092-0000-CC	7.18	186	3 U	1033
97394727	WR-SD-SD136-0000	7.88	24	3 U	1046
97384060	WR-SD-SD001-0000	9.25	15	2 U	910
97384947	WR-SD-SD077-0000	12.99	27	4 U	997
97384950	WR-SD-SD078-0000	14.05	25	3 U	998
97394760	WR-SD-SD150-0000	16.78	25	2 U	1074
97384901	WR-SD-SD056-0000	18.40	89	2 U	965
97394702	WR-SD-SD081-0000	22.01	23	3 U	1025
97384105	WR-SD-SD042-0000	24.85	16	2 U	961
25-49.99% Fines					
97384968 (Background)	WR-SD-SD102-0000	29.33	9	2 U	1022
97394715 (Background)	WR-SD-SD100-0000	32.78	11	2 U	1036
97384096 (Background)	WR-SD-SD009-0000	39.50	9	2 U	945
Average Background Concentration			**9.67**		
97384109	WR-SD-SD053-0000	27.50	122	2 U	964
97384961	WR-SD-SD096-0000	28.49	35	2 U	1004
97384925	WR-SD-SD060-0000	32.46	36	2 U	980
97394770	WR-SD-SD143-0000	37.17	28	2 U	1083
97394731	WR-SD-SD148-0000	39.30	27	2 U	1050
50-74.99% Fines					
97394718 (Background)	WR-SD-SD108-0000	57.45	9	2 U	1038
97394741 (Background)	WR-SD-SD104-0000	67.83	10	2 U	1057
97394739 (Background)	WR-SD-SD130-0000	57.76	12	2 U	1056
Average Background Concentration			**10.33**		
97394777	WR-SD-SD151-0000-CC	48.00	80	2 U	1088
97394753	WR-SD-SD133-0000	49.76	70	2 U	1069
97384938	WR-SD-SD067-0000	50.64	27	2 U	990
97394725	WR-SD-SD129-0000	51.24	38	2 U	1044
97384926	WR-SD-SD066-0000	53.46	28	2 U	981

Table 12 Lead Sediment Sample Observed Releases (mg/kg)					
Sample Number	Station ID	Grain Size	Lead	SQL	Reference (Page Number from Ref. 6)
97384930	WR-SD-SD074-0000	54.32	28	2 U	985
97384082	WR-SD-SD031-0000	56.33	85	2 U	933
97384089	WR-SD-SD029-0000	56.84	77	2 U	939
97384934	WR-SD-SD063-0000	56.94	29	2 U	987
97384079	WR-SD-SD022-0000	60.05	34	2 U	930
97384933	WR-SD-SD062-0000	62.56	27	2 U	986
97394776	WR-SD-SD149-0000	62.88	39	2 U	1087
97384080	WR-SD-SD033-0000	65.41	142	2 U	931
97394734	WR-SD-SD128-0000	69.29	110	2 U	1053
97384081	WR-SD-SD032-0000	71.15	262	3 U	932
97384078	WR-SD-SD023-0000	73.65	94	3 U	929
75-100% Fines					
97384084 (Background)	WR-SD-SD027-0000	80.43	13	2 U	935
97394726	WR-SD-SD134-0000	85.44	40	3 U	1045
97394728	WR-SD-SD139-0000	89.69	44	3 U	1047

Table 13
Mercury
Sediment Sample Observed Releases
(mg/kg)

Sample Number	Station ID	Grain Size	Mercury	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384090 (Background)	WR-SD-SD002-0000	3.71	0.01 U	0.01 U	940
97384091 (Background)	WR-SD-SD004-0000	10.77	0.02	0.01 U	941
97424918 (Background)	WR-SD-SD055-0000	8.11	0.02	0.01 U	975
97384952 (Background)	WR-SD-SD079-0000	4.42	0.02	0.01 U	999
97394748 (Background)	WR-SD-SD114-0000	3.13	0.02	0.01 U	1064
Average Background Concentration			**0.018**		
97394727	WR-SD-SD136-0000	7.88	0.06	0.01 U	1046
97384060	WR-SD-SD001-0000	9.25	0.18 J (0.10 AC)	0.02 U	910
97384922	WR-SD-SD058-0000	11.63	0.1	0.02 U	978
97384950	WR-SD-SD078-0000	14.05	0.1	0.02 U	998
97394760	WR-SD-SD150-0000	16.78	0.07	0.02 U	1074
97394752	WR-SD-SD118-0000	16.99	0.06	0.02 U	1068
97384901	WR-SD-SD056-0000	18.4	0.12	0.02 U	965
97384098	WR-SD-SD012-0000	19.5	0.03	0.01 U	947
97384062	WR-SD-SD003-0000	22.71	0.12 J (0.07 AC)	0.02 U	911
97394759	WR-SD-SD145-0000	23.09	0.06	0.02 U	1073
25-49.99% Fines					
97394715 (Background)	WR-SD-SD100-0000	32.78	0.04	0.02 U	1036
97384096 (Background)	WR-SD-SD009-0000	39.50	0.05	0.02 U	945
Average Background Concentration			**0.045**		
97384925	WR-SD-SD060-0000	32.46	0.14	0.02 U	980
97384927	WR-SD-SD071-0000	37.06	0.15	0.02 U	982
97394731	WR-SD-SD148-0000	39.3	0.16	0.02 U	1050
97394777	WR-SD-SD151-0000-CC	48	0.27	0.02 U	1088
97394753	WR-SD-SD133-0000	49.76	0.3	0.02 U	1069
50-74.99% Fines					
97394732 (Background)	WR-SD-SD124-0000	58.71	0.05	0.02 U	1051
97394718 (Background)	WR-SD-SD108-0000	57.45	0.05	0.02 U	1038
Average Background Concentration			**0.05**		
97384938	WR-SD-SD067-0000	50.64	0.24	0.02 U	990

Table 13 Mercury Sediment Sample Observed Releases (mg/kg)					
Sample Number	Station ID	Grain Size	Mercury	SQL	Reference (Page Number from Ref. 6)
97394725	WR-SD-SD129-0000	51.24	0.16	0.02 U	1044
97384926	WR-SD-SD066-0000	53.46	0.23	0.02 U	981
97384934	WR-SD-SD063-0000	56.94	0.18	0.02 U	987
97384933	WR-SD-SD062-0000	62.56	0.2	0.02 U	986
97394734	WR-SD-SD128-0000	69.29	0.86	0.02 U	1053
75-100% Fines					
97384084 (Background)	WR-SD-SD027-0000	80.43	0.05	0.02 U	935
97394728	WR-SD-SD139-0000	89.69	0.16	0.03 U	1047

Table 14
Naphthalene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Naphthalene	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384098 (Background)	WR-SD-SD012-0000	19.50	19 U	19 U	133
97384952	WR-SD-SD079-0000	4.42	92	20 U	329
97384060	WR-SD-SD001-0000	9.25	260	20 U	11
97384922	WR-SD-SD058-0000	11.63	90	20 U	230
97384947	WR-SD-SD077-0000	12.99	300	19 U	320
97384901	WR-SD-SD056-0000	18.40	680	19 U	185
97384062	WR-SD-SD003-0000	22.71	170	19 U	14
25-49.99% Fines					
97394777 (Background)	WR-SD-SD151-0000-CC	48.00	19 U	19 U	506
97384944	WR-SD-SD072-0000	25.01	210	20 U	309
97384109	WR-SD-SD053-0000	27.50	210	20 U	182
97384945	WR-SD-SD075-0000	29.70	350	19 U	314
97384108	WR-SD-SD051-0000	30.20	360	19 U	179
97384913	WR-SD-SD048-0000-CC	31.36	63	19 U	212
97384925	WR-SD-SD060-0000	32.46	160	20 U	236
97384912	WR-SD-SD050-0000	32.83	86	20 U	371
97384063	WR-SD-SD005-0000	33.13	180	19 U	20
97384941	WR-SD-SD070-0000-CC	34.10	510	19 U	297
97384066	WR-SD-SD015-0000	38.66	120	19 U	26
97394731	WR-SD-SD148-0000	39.30	110	20 U	518
97384919	WR-SD-SD057-0000	39.76	62	19 U	224
97384940	WR-SD-SD069-0000	41.00	200	20 U	290
97384916	WR-SD-SD052-0000	42.15	97	20 U	218
97384905	WR-SD-SD039-0000	42.16	130	20 U	197
97384937	WR-SD-SD065-0000	44.23	20000 D	1,900 U	272
97384106	WR-SD-SD049-0000	44.98	62	19 U	176
97384906	WR-SD-SD041-0000	46.24	1000	390 U	200
97384074	WR-SD-SD030-0000	46.80	57	19 U	64
97384939	WR-SD-SD068-0000	47.47	790	20 U	284
97384064	WR-SD-SD011-0000	48.61	270	20 U	23
50-74.99% Fines					
97394746 (Background)	WR-SD-SD112-0000	58.19	19 U	19 U	557
97384938	WR-SD-SD067-0000	50.64	13000	200 U	278
97394725	WR-SD-SD129-0000	51.24	62	19 U	477
97384926	WR-SD-SD066-0000	53.46	320	19 U	239
97384935	WR-SD-SD064-0000	53.66	130000 D	3,900 U	266
97384082	WR-SD-SD031-0000	56.33	200	98 U	88
97384089	WR-SD-SD029-0000	56.84	74	20 U	106
97384934	WR-SD-SD063-0000	56.94	1200	19 U	260

Table 14
Naphthalene
Sediment Sample Observed Releases
(ug/kg)

Sample Number	Station ID	Grain Size	Naphthalene	SQL	Reference (Page Number from Ref. 6)
97384933	WR-SD-SD062-0000	62.56	1900	200 U	254
97384068	WR-SD-SD018-0000	64.42	150	19 U	32
97384080	WR-SD-SD033-0000	65.41	160	19 U	76
97394734	WR-SD-SD128-0000	69.29	57	20 U	527
97384081	WR-SD-SD032-0000	71.15	990	98 U	82
97384078	WR-SD-SD023-0000	73.65	100	97 U	70

Table 15
Silver
Sediment Sample Observed Releases
(mg/kg)

Sample Number	Station ID	Grain Size	Silver	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384090 (Background)	WR-SD-SD002-0000	3.71	0.2 U	0.2 U	940
97384091 (Background)	WR-SD-SD004-0000	10.77	0.3	0.2 U	941
97384098 (Background)	WR-SD-SD012-0000	19.50	0.3	0.2 U	947
Average Background Concentration			**0.27**		
97394712	WR-SD-SD092-0000-CC	7.18	0.9	0.4 U	1033
97394727	WR-SD-SD136-0000	7.88	0.9	0.4 U	1046
97384947	WR-SD-SD077-0000	12.99	1.6	0.6 U	997
97384950	WR-SD-SD078-0000	14.05	1.0	0.5 U	998
97394702	WR-SD-SD081-0000	22.01	1.0	0.5 U	1025
25-49.99% Fines					
97384095 (Background)	WR-SD-SD008-0000	43.79	0.4	0.3 U	944
97384096 (Background)	WR-SD-SD009-0000	39.50	0.4	0.3 U	945
97384085 (Background)	WR-SD-SD025-0000	41.14	0.4	0.3 U	936
Average Background Concentration			**0.4**		
97384944	WR-SD-SD072-0000	25.01	1.3	0.5 U	995
97384945	WR-SD-SD075-0000	29.70	1.7	0.5 U	996
97384941	WR-SD-SD070-0000-CC	34.10	1.4	0.5 U	993
97394731	WR-SD-SD148-0000	39.30	1.6	0.3 U	1050
97384940	WR-SD-SD069-0000	41.00	1.5	0.5 U	992
97394704	WR-SD-SD083-0000	46.66	1.4	0.4 U	1026
97394708	WR-SD-SD088-0000	48.94	1.3	0.3 U	1030
75-100% Fines					
97384084 (Background)	WR-SD-SD027-0000	80.43	0.4	0.3 U	935
97394729	WR-SD-SD141-0000-CC	82.39	1.9	0.4 U	1048
97394726	WR-SD-SD134-0000	85.44	1.6	0.4 U	1045
97394728	WR-SD-SD139-0000	89.69	1.9	0.4 U	1047

Table 16
Tributyl Tin
Sediment Sample Observed Release
(ug/kg)

Sample Number	Station ID	Grain Size	Tributyl Tin	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97394760 (Background)	WR-SD-SD150-0000	16.78	5.7 U	5.7 U	1193
97384922	WR-SD-SD058-0000	11.63	90	5.9 U	1246
97384947	WR-SD-SD077-0000	12.99	44	5.7 U	1257
97384901	WR-SD-SD056-0000	18.40	480 DJ (48 AC)	56 U	1239
97384098	WR-SD-SD012-0000	19.50	47000 D	1,200	1156
97394759	WR-SD-SD145-0000	23.09	19	5.8 U	1192
25-49.99% Fines					
97394770 (Background)	WR-SD-SD143-0000	37.17	5.7 U	5.7 U	1197
97384109	WR-SD-SD053-0000	27.50	210 J (21 AC)	5.9 U	1238
97384961	WR-SD-SD096-0000	28.49	180	5.9 U	1260
97384925	WR-SD-SD060-0000	32.46	350 J (35 AC)	5.9 U	1248
97384927	WR-SD-SD071-0000	37.06	180 J (18 AC)	6.0 U	1250
97384958	WR-SD-SD089-0000	38.46	160	5.8 U	1258
97394716	WR-SD-SD106-0000	41.49	230 J (23 AC)	5.9 U	1167
97384964	WR-SD-SD094-0000	41.50	280	5.7 U	12652
97384970	WR-SD-SD101-0000	41.95	220 J (22 AC)	5.7 U	1166
97384101	WR-SD-SD034-0000	42.04	72	5.8 U	1158
97384960	WR-SD-SD091-0000	43.18	130	5.8 U	1259
97384106	WR-SD-SD049-0000	44.98	120 J (12 AC)	5.8 U	1236
97394775	WR-SD-SD147-0000	47.87	230	5.7 U	1200
97394724	WR-SD-SD121-0000	47.91	320 DJ (32 AC)	18 U	1174
97384963	WR-SD-SD095-0000	48.29	150	5.8 U	1261
97384064	WR-SD-SD011-0000	48.61	81	6.0 U	1148
97394753	WR-SD-SD133-0000	49.76	3300 D	570 U	1188
50-74.99% Fines					
97394772 (Background)	WR-SD-SD146-0000	58.86	5.7 U	5.7 U	1199

Table 16
Tributyl Tin
Sediment Sample Observed Release
(ug/kg)

Sample Number	Station ID	Grain Size	Tributyl Tin	SQL	Reference (Page Number from Ref. 6)
97384929	WR-SD-SD076-0000	50.49	86 J (8.6 AC)	5.9 U	1252
97394719	WR-SD-SD111-0000	50.88	300 J (30 AC)	6.0 U	1169
97384966	WR-SD-SD098-0000	50.96	180	5.8 U	1264
97394738	WR-SD-SD127-0000	52.57	710 D	120 U	1182
97394722	WR-SD-SD119-0000	53.74	230 J (23 AC)	5.8 U	1171
97394720	WR-SD-SD116-0000	55.99	360 J (36 AC)	5.9 U	1170
97384928	WR-SD-SD073-0000	57.39	66 J (6.6 AC)	6.0 U	1251
97394718	WR-SD-SD108-0000	57.45	310 J (31 AC)	5.9 U	1168
97394739	WR-SD-SD130-0000	57.76	420 D	120 U	1184
97384965	WR-SD-SD099-0000	58.02	100	5.8 U	1263
97384967	WR-SD-SD103-0000	58.31	180	5.9 U	1265
97394732	WR-SD-SD124-0000	58.71	1800 DJ (180 AC)	590 U	1176
97394736	WR-SD-SD125-0000	63.48	540 DJ (54 AC)	57 U	1180
97394723	WR-SD-SD122-0000	64.53	440 DJ (44 AC)	110 U	1172
97394734	WR-SD-SD128-0000	69.29	5000 DJ (500 AC)	600 U	1178

Table 17
Zinc
Sediment Sample Observed Releases
(mg/kg)

Sample Number	Station ID	Grain Size	Zinc	SQL	Reference (Page Number from Ref. 6)
0-24.99% Fines					
97384090 (Background)	WR-SD-SD002-0000	3.71	66.0	0.2 U	940
97384091 (Background)	WR-SD-SD004-0000	10.77	70.3	0.3 U	941
97424918 (Background)	WR-SD-SD055-0000	8.11	67.3	0.3 U	975
97394712 (Background)	WR-SD-SD092-0000-C	7.18	72.1	0.3 U	1034
Average background concentration			**68.93**		
97394748	WR-SD-SD114-0000	3.13	212.0	0.3 U	1064
25-49.99% Fines					
97394715 (Background)	WR-SD-SD100-0000	32.78	64.6	0.3 U	1036
97384096 (Background)	WR-SD-SD009-0000	39.50	90.9	0.4 U	945
97384098 (Background)	WR-SD-SD102-0000	29.33	90.5	0.4 U	1022
Average background concentration			**82**		
97394777	WR-SD-SD151-0000-CC	48.00	265	0.4 U	1088
97394753	WR-SD-SD133-0000	49.76	539	0.4 U	1069
50-74.99% Fines					
97394741 (Background)	WR-SD-SD104-0000	67.83	69.5	0.4 U	1057
97394718 (Background)	WR-SD-SD108-0000	57.45	92.6	0.4 U	1038
97394732 (Background)	WR-SD-SD124-0000	58.71	122	0.4 U	1051
Average background concentration			**94.7**		
97384080	WR-SD-SD033-0000	65.41	310	0.5 U	931
97394734	WR-SD-SD128-0000	69.29	361	0.5 U	1053
97384081	WR-SD-SD032-0000	71.15	373	0.5 U	932
97384078	WR-SD-SD023-0000	73.65	349	0.5 U	929
75-100% Fines					
97384084 (Background)	WR-SD-SD027-0000	80.43	95.9	0.4 U	935
97394726	WR-SD-SD134-0000	85.44	335	0.5 U	1045
97394728	WR-SD-SD139-0000	89.69	465	0.6 U	1047

Sediment Quality Study - Willamette and Columbia Rivers (USACE July 1997) (Ref. 16; Ref. 17)

In July 1997 the USACE collected 52 sediment samples from 43 stations on the Willamette River from RM 0.10 to RM 11.55 (Ref. 16 pp. 2, 3, 24, and 46 through 53). Of these, 21 were collected between RM 3.5 and RM 9.2 in Portland Harbor (Ref. 16 pp. 2, 3, 24, and 46 through 53). The samples were collected to determine the quality of sediments in this reach prior to dredging which is projected to occur in the year 2003 (Ref. 16 p. 3). Samples were analyzed for selected total metals (Methods 200.8 and 7471A), pesticides and PCBs (Method 8080A), polycyclic aromatic hydrocarbons (PAHs) (Method SIM), grain size (ASTM D 2487), and TOC (ASTM D4129-82M) (Ref. 17).

Selected analytical results of samples collected between RM 3.5 and RM 9.2 that document an observed release by chemical analysis are provided in Table 18 below (Ref. 1, Section 2.3). Not all analytes meeting observed release criteria are presented. Blank cells in the table are for sample results that did not document observed releases or for which no sample results are available. For purposes of documenting observed releases, sediment samples were segregated by grain size into four classifications denoted as Classes A, B, C, and D: 0 to 25% fines (Class A), 25 to 50% fines (Class B), 50 to 75% fines (Class C), and 75 to 100% fines (Class D). Background and release samples from the same classifications were used when comparing concentrations to determine observed releases. Background samples were selected from locations generally upstream of the study area between RM 10 and RM 11.1 (Ref. 16, p. 24). Release samples were not identified for classifications B and C, therefore, these two classifications are not included in Table 18. All SQLs are provided in parenthesis. The following data qualifiers apply to the this table:

AC - Adjusted concentration as per EPA Guidance Document “Using Qualified Data to Document an Observed Release and Observed Contamination” (Ref. 19).

J - Estimated concentration (Ref. 17).

Table 18
Columbia River and Willamette River Channel Improvement Feasibility Study - Sediment Quality Study
July 1997

Analyte	RM 11.1 WR-GC-37A (Class A) Back-ground	RM 10.1 WR-GC-35A (Class D) Back-ground	RM 3.8 WR-BC-15 (Class D)	RM 4.1 WR-BC-16 (Class A)	RM 5.1 WR-GC-18A (Class D)	RM 5.1 WR-GC-19A (Class A)	RM 5.15 WR-BC-20 (Class A)	RM 5.9 WR-BC-21 (Class A)	RM 6.2 WR-BC-22 (Class A)	RM 6.5 WR-BC-23 (Class A)	RM 6.7 WR-GC-24A (Class D)	RM 6.7 WR-GC-25A (Class D)
Reference	Ref. 17, pp. 34, 54, 72, 88	Ref. 17, pp. 33, 55, 73, 89	Ref. 17, pp. 1, 124, 147, 184	Ref. 17, pp. 9, 134, 157, 194	Ref. 17, pp. 36a, 309, 320, 329	Ref. 17, pp. 36b 310, 321, 330	Ref. 17, pp. 36c, 123, 146, 183	Ref. 17, pp. 10, 247, 264, 272	Ref. 17, pp. 36d 248, 265, 274	Ref. 17, pp. 11, 249, 266, 274	Ref. 17, pp. 26, 311, 322, 331	Ref. 17, pp. 36e, 136, 159, 196
Grain Size as % fines	0.2	64	92.0	19.5	79.0	0.5	6.3	4.7	0.6	7.0	84.5	87.2
Metals in ppm												
Arsenic	<0.5 (0.5)	<0.5 (0.5)		3.5 (0.5)		1.4 (0.5)	2.1 (0.5)	2.7 (0.5)	3.3 (0.5)	1.4 (0.5)	2.1 (0.5)	3.7 (0.5)
Mercury	0.01 (0.05)	0.18 (0.05)				0.03 (0.05)	0.11 (0.05)			0.03 (0.05)		
Pesticides in ppb												
DDT	0.2 (2)	<2.0 (2)					2.0 (2)	14.0 (20)			94.0 (2)	
DDD	0.4 (2)	4.0 (2)					2.0 (2)	3.3 (20)			100.0 (2)	
Polycyclic Aromatic Hydrocarbons in ppb												
Naphthalene	0.5 (5)	32.0 (5)	98.0 (5)	22 (5)	230.0 (5)		280.0 (5)	7.0 (5)	5300.0 (5)		129.0 (5)	
2-Methylnaphthalene	<5.0 (5)	25.0 (5)		12 (5)	170.0 (5)		135.0 (5)		1700.0 (5)		82.0 (5)	
Acenaphthene	<5.0 (5)	10.0 (5)	112.0 (5)	30 (5)	148.0 (5)		1700.0 (500)	145.0 (500)	79000.0 (5)		104.0 (5)	129.0 (5)
Ideno(1,2,3-cd)pyrene	<5.0 (5)	30.0 (5)	880.0 (50)	660 (50)			4500.0 (500)	74.0 (5)	74000.0 (5)		179.0 (5)	125.0 (5)
Dibenz(a,h)anthracene	<5.0 (5)	7.0 (5)	207.0 (5)	173 (5)			690.0 (500)	10.0 (5)	9100.0 (5)		21.0 (5)	22.0 (5)

- Hazardous Substances Released

The substances detected in source samples meeting observed release criteria are acenaphthene, benzo(a)pyrene, cadmium, carbazole, copper, DDT, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, lead, mercury, 2-methylnaphthalene, 4-methylphenol, naphthalene, silver, TBT, and zinc.

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

Unknown and not evaluated.

Hazardous Constituent Quantity Value (S): 0

2.4.2.1.2 Hazardous Wastestream Quantity

Unknown and not evaluated.

Hazardous Wastestream Quantity Value (W): 0

2.4.2.1.3 Volume

Contaminated sediments are present from RM 3.5 to RM 9.2 (see Section 2.2) a length of 5.7 miles or 30,096 feet (5.7 miles X 5,280 feet per mile). The width of contaminated sediments is not known but is estimated to be a minimum of 10 feet since contamination is known to be present on both sides of the river throughout this segment (see Section 2.2). The depth of contamination is 10 centimeters (i.e., 0.39 inches, or 0.08 feet). Therefore, the volume of contaminated sediments is estimated to be a minimum of 892 cubic yards [(30,096 feet X 10 feet X 0.08 feet)/27 cubic feet per 1 cubic yard]. A source type of "other" is used for this source, therefore, the volume for this source is 892 ÷ 2.5 = 356.8 (Ref. 1, Section 2.4.2.1.3, Table 2-5).

Volume Assigned Value: 356.8

2.4.2.1.4 Area

Not evaluated since the volume measure has been determined (Ref. 1, Section 2.4.2.1.3).

Area Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The Hazardous Waste Quantity Value for the site is 356.8.

Source Hazardous Waste Quantity Value: 356.8

SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous Waste Quantity Value	Containment Value for Surface Water
1. Contaminated Sediments	356.8	10[a]

a – Ref. 1, pp. Table 4-2; See section 2.2.

4.1 OVERLAND /FLOOD MIGRATION COMPONENT

4.1.1.1 Definition of Hazardous Substance Migration Path for Overland/Flood Component

The site consists solely of contaminated sediments with no identified source. The Target Distance Limit begins at SI sediment sample point SD150 located at RM 9.2 in Portland Harbor on the Willamette River to the river's confluence with the Columbia River, and continues in the Columbia River for an additional 5.8 miles (Ref. 4, p. 32; Ref. 3).

The Columbia River is the largest river in Oregon and is tidally-influenced (Ref.10, p. 3). The Lower Reach of the Willamette River from RM 0 to RM 26.5 is slow moving and tidally-influenced (Ref. 9, p. F4). The Willamette River is the second largest river in Oregon with an average annual flow rate of 31,370 cubic feet per second within the segment between RM 3.5 and RM 9.5 (Ref. 10, p. 3; Ref. 11, pp. 2 and 3). This river reach is extensively dredged from the mouth (RM 0) to approximately RM 14 to maintain a deep navigation channel (Ref. 9, p. F4). During the Summer low-flow period when net downstream movement is relatively slow, tidal effects cause flow reversals twice daily (Ref. 9, p. F4). Flow reversals have been measured as far upstream as RM 15 (Ref. 4, p. 2-1). Columbia River sediments have been documented to intrude into the Willamette River as far as RM 6 (Ref. 9, p. F6). Most industrial development has occurred in an area referred to as Portland Harbor between RM 3.5 and RM 9.2 (Ref. 4, pp. 1-1, 2-1, and Figure 1-1). This harbor is contained within the river segment between RM 3 and RM 10 which is the primary depositional area of the Willamette River system (Ref. 9, p. F5).

The Willamette River is an important fish stream with spawning populations of chinook and coho salmon, steelhead, American shad, Pacific lamprey, and white sturgeon (Ref. 11, p. 1). The Lower Reach of the Willamette River to Willamette Falls provides a migratory corridor for both juvenile and adult anadromous fish and juvenile rearing habitat for several anadromous fish species (Ref. 11, p. 1). Three runs of chinook, two runs of steelhead, and individual runs of coho and sockeye salmon occur in this area (Ref. 11, p. 1). Several of these runs are either listed or proposed for listing under the Endangered Species Act (Ref. 11, p. 1).

4.1.2.1 LIKELIHOOD OF RELEASE

4.1.2.1.1 Observed Release

Direct Observation

An observed release by direct observation is not being scored.

Chemical Analysis

- Basis for Chemical Analysis

Observed releases by chemical analysis are documented in sediment samples collected from RM 3.5 to RM 9.2 (see Section 2.2).

- Attribution

Sediments in Portland Harbor are contaminated with metals, SVOCs, DDT, PCBs, and TBT, from RM 3.5 to RM 9.2 (see Section 2.2).

Portland Harbor contains a multitude of facilities and both private and municipal waste water outfalls. Up to 17 industrial operations have been identified as potential sources of contamination to Portland Harbor between RM 3.5 and RM 9.2, however, since not all sources of contamination to this river segment have been throughly investigated, the site is being evaluated as contaminated sediments with no identified source. Two sites listed on the National Priorities List (NPL) are located on opposite sides of the Willamette River between RM 6 and 7. These sites are Gould Inc. (CERCLIS ID: ORD095003687) and McCormick and Baxter Creosote Company (CERCLIS ID: ORD009020603). Although the two NPL sites are partially attributable to the site, they are not solely responsible for the sediment contamination in the Willamette River. The 15 other industries discussed above are also partially attributable, therefore, the existing NPL sites are not excluded from this listing.

Portland Harbor has been the subject of several environmental investigations over time. Many of these investigations have focused on potential point sources of contamination with limited sampling conducted near these potential sources. However, several reach-wide investigations also have been conducted which provide a broader study of this river reach using synoptic sampling conducted throughout the reach. Many of these investigations document elevated concentrations of hazardous substances in Portland Harbor sediments. Summaries of several of these investigations, with tables of contaminants documenting potential additional observed releases when data are available, are provided below in reverse date order.

Executive Summary of Historical Sediment Data, Site Investigation, Portland Harbor Area of the Willamette River – (Weston, June 1997) (Ref. 12)

In June 1997, Roy F. Weston, acting as a consultant to the EPA completed a memorandum summarizing chemical data for the Portland Harbor portion of the Willamette River (Ref. 12, p. 1). The study area was defined as the Willamette River, extending from RM 3.5 to RM 9.2 (Ref. 12, p. 1). The study summarized data from a variety of sources including work completed by both the EPA and by contractors representing private industrial clients (Ref. 12, pp. 1 and 9 through 13). This memorandum identified seventeen industrial operations and several storm water outfalls as potential sources of contamination to the Willamette River within the study area (Ref. 12, pp. 1 through 8, and Figures 1 through 4).

Summary of Recent Scientific Reports on the Willamette River – (Tetra Tech, August 1995) (Ref. 10)

In August 1995, environmental consultants for ODEQ completed a summary of scientific reports on the Willamette River which included an assessment of the health of the Willamette River based on a synthesis of over 40 documents generated in the course of the Willamette River Basin Water Quality Study (Ref.10, pp. 1 and 11). The health assessment was in the form of a river health index that was based on quality of “beneficial uses” which in summary form include:

Water supply (public, private, and industrial;
Irrigation and livestock watering;
Anadromous fish passage, spawning, and rearing;
Resident fish, aquatic life, and wildlife;
Hunting and fishing;
Boating and water contact recreation;
Esthetic quality
Hydro power; and

Commercial navigation and transportation (Ref. 10, p. 11).

The Tidal Reach (RM 0 to RM 26.5) received an overall score of 4.8 on a scale from 1 to 9 which indicates a marginal-to-poor overall condition for this segment (Ref. 10, pp. 11, 12, and 13). This health assessment states that standards and guidelines for toxics in water and sediments were commonly exceeded, that overall fish health was poor, and that the quality of habitat was impaired in many areas (Ref. 10, p. 13).

Willamette River Toxics Study (ODEQ, 1994) (Ref. 13)

In July 1994 the ODEQ generated a document summarizing sediment and fish tissue results from sampling conducted throughout the entire Willamette River Basin from 1988 to 1991 (Ref. 13, p. 1). Sediment samples collected by ODEQ in January 1988, August 1988, October 1989, and August 1990 were used to determine whether potential observed releases had occurred in the river segment between RM 3.5 and RM 9.2 (Ref. 13, pp. 1, and C-3, C-4, C-7, C-9, and C-12). All sediment samples were collected with a decontaminated stainless steel Eckman dredge (Ref. 13, p. 2). Three to five grabs were collected per sample (Ref. 13, p. 2). Grabs were placed in a decontaminated stainless steel bucket and homogenized with a stainless steel or Teflon spatula (Ref. 13, p. 2). The homogenized sample was placed in a sample jar and placed in an iced cooler (Ref. 13, p. 2).

Sediment samples were analyzed in varying combinations for chlorinated herbicides (EPA Method 8080), PCBs (EPA Method 8080), dioxins (EPA Method 1613A), PAHs (EPA Method 8270), and selected total metals (EPA Methods for the Chemical Analysis of Water and Wastes, EPA-600/4-82-020) (Ref. 13, pp. 2 and 3). Analytical results of samples collected between RM 3.5 and RM 9.2 that may document an observed release by chemical analysis are provided in Table 19 below (Ref. 1, Section 2.3). Blank cells in the table are for sample results that did not document observed releases or for which no sample results are available. Estimated concentrations were not evaluated as it is not known if these values were estimated because they are below their corresponding SQL, or for some other reason. Background locations were selected from areas generally upstream of the study area between RM 14 and RM 16 (Ref. 3). Regardless of the date of sample collection, the highest concentration per analyte of the background samples is used for comparison to the release samples.

Table 19
ODEQ 1988 to 1991 Sediment Analytical Results Documenting an Observed Release
(Ref. 1, Section 2.3; Ref. 13, pp. C-3, C-4, C-7, C-9, C-12)

Analyte	RM 14 10/26/89 Bkg	RM 16 8/15/88 Bkg	RM 6 8/10/88	RM 7 8/10/88	RM 7 South 8/15/88	RM 7 South 10/26/89	RM 7 8/23/90	RM 7 8/23/90	RM 7 8/23/90	RM 8 (1A) 1/26/88	RM 8 (1B) 1/26/88	RM 8 (2A) 1/26/88	RM 8 10/26/89
Total Metals in mg/kg-wet weight (Ref. 13, pp. A-1 through A-5 and C-3)													
Arsenic	2.33	14.8	45.5	54									
Cadmium	0.092 J	0.5 U	0.9										
Chromium	18.9	25.3										90.8	
Copper	14.6	32.3									101	320	197
Lead	12.4	22.8										151	
Mercury	0.033	0.03								0.106	0.139	1.74	
Zinc	73.2	107										703	214
Pesticides in mg/kg-wet weight (Ref. 13, pp. A-1 through A-5 and C-4)													
Alpha BHC	0.005 U	0.003 U						0.006					
Beta BHC	0.005 U	0.003 U					0.018	0.007					
DDE	0.005 U	0.003 U	0.006	0.27	0.084								
DDD	0.005 U	0.003 U	0.035	1.4	0.49		0.009	0.008	0.006				
DDT	0.005 U	0.003 U	0.006	0.021	0.16								
Polycyclic Aromatic Hydrocarbons in mg/kg-wet weight (Ref. 13, pp. A-1 through A-5 and C-7)													
Naphthalene	0.0083 J	0.52 U					30.2						
Acenaphthylene	0.268 U	0.89 U					0.11						
Acenaphthene	0.268 U	0.89 U					14.9						
Dibenzofuran	0.268 U	NA					11.4	0.36					
Fluorene	0.268 U	0.1 U					3.16	0.43					
Phenanthrene	0.0077 J	0.19	10	800	0.9		27.6	1.36					0.754
Anthracene	0.268 U	0.03	4	200	0.32		8.3						
Carbazole	0.268 U	NA				0.3							
Fluoranthene	0.0067 J	0.24	20	900	2.6	0.88	17.4						1.14

Table 19
ODEQ 1988 to 1991 Sediment Analytical Results Documenting an Observed Release
(Ref. 1, Section 2.3; Ref. 13, pp. C-3, C-4, C-7, C-9, C-12)

Analyte	RM 14 10/26/89 Bkg	RM 16 8/15/88 Bkg	RM 6 8/10/88	RM 7 8/10/88	RM 7 South 8/15/88	RM 7 South 10/26/89	RM 7 8/23/90	RM 7 8/23/90	RM 7 8/23/90	RM 8 (1A) 1/26/88	RM 8 (1B) 1/26/88	RM 8 (2A) 1/26/88	RM 8 10/26/89
Pyrene	0.0094 J	0.14		500		0.788	15.5	0.69					0.777
Retene	0.0444 J	NA											
Benzo(a)anthracene	0.268 U	0.05	5	200	1.1		2.95	0.55	0.19				
Chrysene	0.268 U	0.03	6	300	1.3	0.345	2.9						0.497
Benzo(b)fluoranthene	0.268 U	0.15	7	300	1.6		2.06						0.476
Benzo(k)fluoranthene	0.268 U	0.02	3	100	0.51		1.32	0.54					
Benzo(a)pyrene	0.268 U	0.05	6	300	1.7		0.34						
Indeno(1,2,3-cd)pyrene	0.268 U	0.07	6	300			0.44						
Dibenz(a,h)anthracene	0.268 U	0.03 U	10	500									
Benzo(g,h,I)perylene	0.268 U	0.16	9	200									
Polychlorinated Biphenyls in mg/kg-wet weight (Ref. 13, pp. A-1 through A-5 and C-9)													
PCB - 1254	0.045 U	0.015 U										4.2	
PCB – 1260	0.045 U	0.015 U		0.05						0.26			
Total Organic Carbon in mg/kg-wet weight (Ref. 13, pp. A-1 through A-5 and C-4)													
TOC	2,000	37,900	5,100	29,900	41,900	12,000	7,040	6,410	8,970	NA	NA	NA	8,000

- Hazardous Substances Released

The substances found in the observed releases by chemical analysis as indicated by Portland Harbor SI analytical results are acenaphthene, benzo(a)pyrene, cadmium, carbazole, copper, DDT, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, lead, mercury, 2-methylnaphthalene, 4-methylphenol, naphthalene, silver, PCBs, TBT, and zinc.

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Observed Release Factor Value: 550

4.1.3.2 WASTE CHARACTERISTICS

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

Table 20 below provides Human Food Chain Threat Waste Characteristics Factor Values for a partial list of those analytes present at observed release concentrations in the contaminated sediment source (see Section 2.2).

Table 20

HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS FACTOR VALUE

Hazardous Substance	Source	Toxicity Factor Value	Persis-tence Factor Value[a]	Bioaccum-ulation Factor Value[b]	Toxicity/ Persistence/ Bioaccumu-lation Value (Table 4-16)	Reference
Acenaphthene	1	10	0.4	500	2,000	Ref. 2, p. B-1
Benzo(a)pyrene	1	10,000	1	50,000	5×10^8	Ref. 2, p. B-2
Cadmium	1	10,000	1	5,000	5×10^7	Ref. 2, p. B-4
Carbazole	1	10	0.4	500	2,000	Ref. 2, p. B-4
Copper	1	---	1	50,000	---	Ref. 2, p. B-6
DDT	1	1,000	1	50,000	5×10^7	Ref. 2, p. B-6
Dibenz(a,h)anthracene	1	10,000	1	50,000	5×10^8	Ref. 2, p. B-7
Indeno(1,2,3-cd) pyrene	1	1,000	1	50,000	5×10^7	Ref. 2, p. B-12
Lead	1	10,000	1	50	5×10^5	Ref. 2, p. B-13
Mercury	1	10,000	0.4	50,000	2×10^8	Ref. 2, p. B-13
2-Methylnaphthalene	1	---	0.4	5,000	---	Ref. 2, p. B-14
Naphthalene	1	100	0.4	500	2×10^4	Ref. 2, p. B-14
Silver	1	100	1	50	5,000	Ref. 2, p. B-17
Zinc	1	10	1	500	5,000	Ref. 2, p. B-20

a. River persistence values (Ref. 2)
b. Food Chain bioaccumulation values for fresh water (Ref. 2)

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Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.3.2.2 Hazardous Waste Quantity

Source No.	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (yes/no)
1. Contaminated Sediments	356.8	no

Sum of values: 356.8

4.1.3.2.3 Waste Characteristics Factor Category Value

Since targets within the Surface Water Migration Pathway Target Distance Limit are subject to Level II concentrations a hazardous waste quantity factor value of 100 is assigned (Ref. 1, Section 2.4.2.2; see Section 4.1.1.1).

Toxicity/persistence factor value x hazardous waste quantity factor value: 1×10^6
[$(10{,}000 \times 100) = 10^6$, capped at 10^8]

(Toxicity/persistence x hazardous waste quantity) x food chain bioaccumulation factor value: 5×10^{10}
($10^6 \times 5 \times 10^4 = 5 \times 10^{10}$)

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Waste Characteristics Factor Category Value: 320

4.1.3.3 HUMAN FOOD CHAIN THREAT - TARGETS

Actual Food Chain Contamination

Contamination of a watershed which contains a fishery has been established by the presence of hazardous substances with bioaccumulation factor values of 500 or greater in an observed release by chemical analysis (Ref. 1, Section 4.1.3.3).

Hazardous Substance	Bioaccumulation Potential Factor Value[a]	Location	Reference
Acenaphthene	500	See Section 2.2 of this document	See Section 2.2 of this document
Benzo(a)pyrene	50,000		
Cadmium	5,000		
Carbazole	500		
Copper	50,000		
DDT	50,000		
Dibenz(a,h)anthracene	50,000		
Indeno(1,2,3-cd)pyrene	50,000		
Mercury	50,000		
2-Methylnaphthalene	5,000		
Naphthalene	500		
Zinc	500		

a. Fresh water values (Ref. 2).

Closed Fisheries

While there is no evidence that a fishery has been formally closed due to adverse effects caused by hazardous substances attributable to the site, two fish advisories have been issued within the river reach of concern (Ref. 11, p. 8). One is for arsenic, creosote, and pentachlorophenol in crustaceans and crayfish near the McCormick and Baxter site (Ref. 11, p. 8). The other advisory is for mercury in large- and smallmouth bass and squawfish in the mainstem of the Willamette River (Ref. 11, p. 8).

4.1.3.3.1 Food Chain Individual

Recreational fishing is extremely popular throughout the Lower Willamette River basin (Ref. 11, p. 8). Species most desired are spring chinook, steelhead, coho, shad, and white sturgeon (Ref. 11, p. 8). Spring chinook contribute substantially to the mainstem Columbia River sport fishery and consistently support the largest recreational fishery in the Lower Willamette River (Ref. 11, p. 8). The chinook fishery in the Willamette River occurs between Oregon City and the confluence of the Willamette and Columbia Rivers which includes the area of Level II concentrations (RM 26.5 to RM 0; Ref. 9, p. F4; Ref. 11, p. 8).

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Food Chain Individual Factor Value: 45 (Ref. 1, Section 4.1.3.3.1)

4.1.3.3.2 Population

4.1.3.3.2.1 Level I Concentrations

Not evaluated.

4.1.3.3.2.2 Level II Concentrations

Portland Harbor from RM 3.5 to RM 9.2 on the Willamette River is subject to Level II concentrations (see Section 2.2). Recreational fishing is extremely popular throughout the lower Willamette River basin from RM 0 to RM 26.5 (Ref. 3; Ref. 11, p. 8). Species most desired are spring chinook, steelhead, coho, shad, and white sturgeon (Ref. 11, p. 8). In 1997, 544 chinook salmon were caught by sport fisherman from between the Southern Pacific Railroad bridge located at RM 20.5 and the St. Johns Bridge located at RM 6 (Ref. 3; Ref. 14, pp. 6, 8, and 15). Fish catch was determined by contacting anglers at three sample stations located at three river access points (Ref. 14, pp. 3 and 6). Two of these three stations occur between RM 3.5 and RM 9.2: one at the St. Johns boat ramp and one at the Swan Island boat ramp (Ref. 14, p. 3). The average weight for the fish caught was 16.7 pounds (Ref. 14, p. 26). For HRS scoring purposes is it estimated that more than one pound of fish was caught from within the area of Level II concentrations.

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Level I Concentrations Factor Value: 0
Level II Concentration Factor Value: 0.03 (Ref. 1, Table 4-18)

4.1.3.3.2.3 Potential Human Food Chain Contamination

Not evaluated.

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Potential Human Food Chain Contamination Factor Value: 0

4.1.4.2 WASTE CHARACTERISTICS

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

Table 21 below provides Environmental Threat Waste Characteristics Factor Values for a partial list of those analytes attributable to Source 1.

Table 21
ENVIRONMENTAL THREAT WASTE CHARACTERISTICS FACTOR VALUES

Hazardous Substance	Sources	Eco-system Toxicity Factor Value[a]	Persistence Factor Value[b]	Bioaccu-mulation Factor Value[c]	Ecosystem Toxicity/ Persistence/ Bioaccum-ulation Value (Table 4-16)	Reference
Acenaphthene	1	10,000	0.4	500	2×10^6	Ref. 2, p. B-1
Arsenic	1	10	1	500	5,000	Ref. 2, p. B-2
Benzo(a)pyrene	1	10,000	1	50,000	5×10^8	Ref. 2, p. B-2
Cadmium	1	1,000	1	5,000	5×10^6	Ref. 2, p. B-4
Carbazole	1	---	0.4	500	---	Ref. 2, p. B-4
Copper	1	100	1	50,000	5×10^6	Ref. 2, p. B-6
DDT	1	10,000	1	50,000	5×10^8	Ref. 2, p. B-6
Dibenz(a,h)anthracene	1	---	1	50,000	---	Ref. 2, p. B-7
Indeno(1,2,3-cd) pyrene	1	---	1	50,000	---	Ref. 2, p. B-12
Lead	1	1,000	1	5,000	5×10^6	Ref. 2, p. B-13
Mercury	1	10,000	0.4	50,000	2×10^8	Ref. 2, p. B-13
2-Methylnaphthalene	1	1,000	0.4	5,000	2×10^6	Ref. 2, p. B-14
Naphthalene	1	1,000	0.4	500	2×10^5	Ref. 2, p. B-14
Silver	1	10,000	1	50	5×10^5	Ref. 2, p. B-17
Zinc	1	10	1	500	5,000	Ref. 2, p. B-20

a. Fresh water values (Ref. 2)
b. River persistence values (Ref. 2)
c. Fresh water values (Ref. 2)

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Ecosystem Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.3.2.2 Hazardous Waste Quantity

Source No.	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (yes/no)
1. Contaminated Sediments	356.8	no

Sum of values: 356.8

4.1.3.2.3 Waste Characteristics Factor Category Value

Since targets within the Surface Water Migration Pathway Target Distance Limit are subject to Level II concentrations a hazardous waste quantity factor value of 100 is assigned (Ref. 1, Section 2.4.2.2; see Section 4.1.1.1).

Ecosystem toxicity/persistence factor value x hazardous waste quantity factor value: 1×10^6

[$(10{,}000 \times 1 \times 100) = 1 \times 10^6$, capped at 1×10^8]

(Ecosystem toxicity/persistence factor value x hazardous waste quantity factor value) x environmental bioaccumulation factor value: 5×10^{10}

($1 \times 10^6 \times 5 \times 10^4 = 5 \times 10^{10}$)

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Hazardous Waste Quantity Factor Value: 100
Waste Characteristics Factor Category Value: 320

4.1.4.3 ENVIRONMENTAL THREAT - TARGETS

4.1.4.3.1 Sensitive Environments

Not evaluated.

4.1.4.3.1.1 Level I Concentrations

Not evaluated.

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Level I Concentrations Factor Value: 0

4.1.4.3.1.2 Level II Concentrations

Sensitive Environments

The area of Level II concentrations is habitat for the federal-listed threatened species: Chinook salmon, the federal-proposed threatened species Coastal Cutthroat trout; and the federal candidate species Coho salmon (Ref. 15). The Lower Reach of the Willamette River to Willamette Falls provides a migratory corridor for both juvenile and adult anadromous fish and juvenile rearing habitat for several anadromous fish species (Ref. 11, p. 1). This reach, however, has not been designated as critical for the maintenance of these species.

Sensitive Environment	Location	Sensitive Environment Value (Ref. 1, Table 4-23)	Reference
Federal Threatened Chinook Salmon	Willamette River	75	Ref. 15
Federal Proposed Threatened Coastal Cutthroat Trout	Willamette River	50	
Federal Candidate Coho Salmon	Willamette River	50	

Wetlands

No wetlands have been identified along the area of Level II concentrations in the Willamette River.

Sum of sensitive environment value + wetland value:

1 x (175 + 0) = 175

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Level II Concentrations Factor Value: 175

SWOF/Environment-Potential Contamination

4.1.4.3.1.3 Potential Contamination

Sensitive Environments

Not evaluated.

Wetlands

Not evaluated.

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Potential Contamination Factor Value: 0