Port of Seattle

East Waterway, Harbor Island Superfund Site

EAST WATERWAY OPERABLE UNIT
PHASE 1 REMOVAL ACTION WATER QUALITY MONITORING DATA REPORT

For submittal to:

US Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, WA 98101

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Acronyms

Acronym	Definition
ARI	Analytical Resources, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CPUE	catch per unit effort
CTD	Hydrolab Model H20 Water Quality Multiprobe
DMMU	dredged material management unit
EPA	US Environmental Protection Agency
EWW	East Waterway Operable Unit of the Harbor Island Superfund site
NTCRA	non-time-critical removal action
NTU	nephelometric turbidity units
OU	operable unit
PCB	polychlorinated biphenyl
Port	Port of Seattle
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
TBT	tributyltin

1.0 Introduction

The US Environmental Protection Agency (EPA) has ordered the Port of Seattle (Port) to address sediment contamination issues in the East Waterway (EWW) Operable Unit (OU) of the Harbor Island Superfund site per the process defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Superfund. EPA has determined that a non-time-critical removal action (NTCRA) is warranted for a portion of the EWW. This NTCRA covers approximately 20 acres in the southern portion of the EWW (Figure 1). Approximately 60,000 cubic yards (cy) of material suitable for open water disposal and 200,000 cy of unsuitable material will be removed. The dredging will be conducted in two phases. The first season of dredging commenced on January 2, 2004 and concluded March 2, 2004. The second season of dredging will begin July 15, 2004.

Water quality monitoring was conducted throughout the dredge season. The monitoring design and detailed sampling protocols are presented in the project quality assurance project plan (QAPP; Anchor 2003). The water quality monitoring was comprised of *in situ* measurements of turbidity, pH, dissolved oxygen and grab samples collected for chemical analysis. In addition, a hydroacoustic survey was conducted January 28 and 30 and February 2, 2004 and fish monitoring was conducted from February 15 through March 1, 2004.

This report presents the results of the water quality monitoring and fish monitoring and is organized into sections addressing field methods, laboratory methods, results, conclusions, and references, plus the following appendices:

- Appendix A – weekly progress reports
- Appendix B – water quality monitoring CTD data and hydroacoustic report
- Appendix C – fish monitoring report
- Appendix D – chain of custody forms, field forms, logs and notes

2.0 Field and Laboratory Methods

2.1 FIELD METHODS

2.1.1 *In situ* water quality measurements

Detailed descriptions of the field methods used in the water quality monitoring as well as the hydroacoustic survey are presented in the QAPP (Anchor 2003) as well as Appendix B. The methods used for the water quality measurements are summarized below.

A Hydrolab Model H20 Water Quality Multiprobe (CTD) was used to obtain *in-situ* water quality data for dissolved oxygen, turbidity, salinity, pH, temperature, and depth. The output from the CTD was interfaced into a notebook computer in order to display real time water quality values. CTD data for each profile cast was simultaneously recorded into a unique .TXT data file that was imported into an Excel spreadsheet to produce an X,Y graphic representation of the cast profile for each parameter.

2.1.2 Water chemistry samples

Grab samples for chemical analysis were collected using a Niskin sampler deployed following the CTD cast. Field quality assurance and quality control (QA/QC) samples were collected to evaluate the effectiveness of field decontamination procedures. All samples collected were documented in the site logbook.

Six field duplicates were collected for chemistry analyses. Table 2-1 lists the field duplicate sample IDs and the corresponding sample IDs from the same location.

Table 2-1. Duplicate sample IDs

DATE	SAMPLE ID	DUPLICATE SAMPLE ID
20 January 2004	EW-WQM-DR-100-2e	EW-WQM-DR-100-2e-DUP
23 January 2004	EW-WQM-DR-100-2f	EW-WQM-DR-100-2f-DUP
28 January 2004	EW-WQM-DR-100-2e	EW-WQM-DR-100-2e-DUP
2 February 2004	EW-WQM-DR-100-2e	EW-WQM-DR-100-2e-DUP
11 February 2004	EW-WQM-DR-100-2e	EW-WQM-DR-100-2e-DUP
25 February 2004	EW-WQM-DR-100-2e	EW-WQM-DR-100-2e-DUP

Seven rinsate blanks were collected after processing samples EW-WQM-DR-100-2e (January 20 and 28, February 2, 11, and 25, 2004), EW-WQM-DR-100-2f (January 23, 2004), and EW-WQM-DR-100-1e (February 20, 2004). Rinsate blanks were collected by running deionized water over decontaminated sample processing equipment and collecting the water in clean sample bottles.

2.1.3 Sample identification scheme

All samples were first identified by the project EW-WQM (East Waterway water quality monitoring). The next set of characters identified the type of activity that was monitored: DR (dredging), RH (rehandling), or DW (dewatering). The next set of characters identified the monitoring station relative to the dredge barge: AU (ambient, >400 m upstream), AD (ambient, >400 m downstream), 10 (10 m downstream, used only during rehandling), 30 (30 m downstream), and 100 (100 m downstream). Any discretionary monitoring taken beyond those stations was clearly identified with the distance and relative position, i.e. 150u for 150 m upstream of the dredge barge. The last set of identifiers indicated the depth (1–1 m below surface; 2–within plume/mid-depth; and 3–1 m above bottom) and tide (e-ebb; f-flood) at which the water quality parameters were measured or sampled. For example, a grab sample taken during

dredging activity during an ebb tide from mid-depth 100 m downstream was labeled EW-WQM-DR-100-2e. Many of the samples had identical sample IDs, but all were distinguished by date and time.

For field duplicates, the sample ID was followed by "-DUP" (i.e. EW-WQM-DR-100-2e-DUP). Rinsate blanks were similarly identified with "-RB", except the depth identifier was eliminated (i.e. EW-WQM-DR-100-e-RB).

2.1.4 Sample documentation procedures

A field data log was used to note the date, time, and location of sampling stations, as well as additional parameters recorded in the field (see Appendix D). The following data were included in the field data log:

- names of field coordinators and person(s) collecting water samples and *in situ* measurements
- unique station identifier
- station coordinates
- date and time of collection of the water sample
- observations made during sample collection, including weather conditions, process descriptions, complications, shipping traffic, and other details associated with sampling equipment or procedures

2.1.5 Fish monitoring methods

Fish monitoring was conducted from February 1 through March 2, 2004. The methods used in the fish monitoring are detailed in Appendix C. From February 1 through February 15, 2004 fish monitoring was conducted weekly at the Turning Basin in the Duwamish River at river mile 5. From February 15 through March 2, 2004 beach seine monitoring was conducted twice weekly at the head end of East Waterway and at Slip 27 which is adjacent to the dredging activity.

2.2 LABORATORY METHODS

Water samples were submitted to Analytical Resources, Inc. (ARI) for chemical analyses. The target detection limit and analytical method for each chemical parameter are presented in Table 2-1. The target detection limits for all analytes were less than the chronic water quality criteria for all analytes except mercury, total DDTs, dieldrin and tributyltin (TBT).

Table 2-1. Data quality objectives

Chemical Parameter	Marine Water Quality Criteria		Target Detection Limits	Method
	Acute	Chronic		
Water Quality Parameters				
Total organic carbon	na	na	1.5 mg/L	EPA 415.1
Total suspended solids	na	na	0.1 mg/L	EPA 160.2
Metals (µg/L)				
Cadmium	42[a]	9.3 [a]	2.0	EPA 200.8
Copper	4.8 [a]	3.1 [a]	0.5	EPA 200.8
Lead	210 [a]	8.1 [a]	0.02	EPA 200.8
Mercury	1.8 [a]	0.025 [a]	0.1	EPA 7074A
Silver	1.9 [a]	na	0.5	EPA 200.8
Zinc	90 [a]	81 [a]	4	EPA 200.8
Organic Compounds (µg/L)				
TBT	0.42[b]	0.0074[b]	0.025	EPA 8270C
total PCBs	10 [a]	0.03 [a]	0.01	EPA 8082
total DDT	0.13 [a]	0.001 [a]	0.1	EPA 8081
Dieldrin	0.71 [a]	0.0019 [a]	0.1	EPA 8081

[a] Ecology 1997

[b] EPA 2003

na – not available

3.0 Results

3.1 *IN SITU* WATER QUALITY RESULTS

The complete dataset generated for the in situ water quality monitoring is presented in Appendix B. The relevant water quality standards for Class B marine water are provided in Table 3-1. The only parameter that exceeded water quality standards was turbidity. Therefore, the following discussion will focus on summarizing the results of the turbidity measurements.

Higher turbidity readings were generally observed in the surface water samples (0-3 m) for both the ambient stations and the stations downstream of the dredge operation (10–40 NTU). The surface water also tended to be less saline due to greater freshwater influence. The more saline water below 3 meters tended to have turbidity readings in the range of 5 to 15 NTU. Turbidity readings above the water quality standard of 10 NTU above background were measured on nine dates and the exceedances ranged from 11 to 56 NTU above the background turbidity readings (Table 3-3). Exceedances were observed on both the ebb and the flood tides and in both surface water and deeper water depths. A summary of the conditions associated with turbidity exceedances will be provided in Section 3.3.

Table 3-1. Summary of water quality standards for Class B marine water[a]

PARAMETER	CONDITION	
Dissolved oxygen	Greater than 5.0 mg/L	If natural conditions cause the ambient dissolved oxygen concentration to be 5.0 mg/L or less, degradation by human activities may be no more than 0.2 mg/L
Temperature	Less than 19.0°C	Incremental increases measured at a mixing zone boundary resulting from point source activities shall not exceed 16/(background water temperature in °C)
pH	Between 7.0 and 8.5	Human caused variation in the above range of less than 0.5 units
Turbidity	Less than 10 NTU over background when background turbidity is 50 NTU or less. No more than 20% increase when background turbidity is greater than 50 NTU.	

[a] Ecology 1997

3.2 CHEMICAL ANALYSIS RESULTS

Results of the water chemistry analyses are presented in Table 3-1. When laboratory duplicates were analyzed, the average concentration for the duplicates was calculated and used as the sample concentration. Field duplicate results were also averaged in the table below. Total suspended solids (TSS) were measured in samples collected in conjunction with the in situ water quality measurements as well as the samples collected for chemical analysis. TSS concentrations ranged from 3.6 to 170 mg/L. The highest TSS concentrations were associated with the highest reported turbidity values. The relationship between turbidity and TSS values is illustrated in Figure 1.

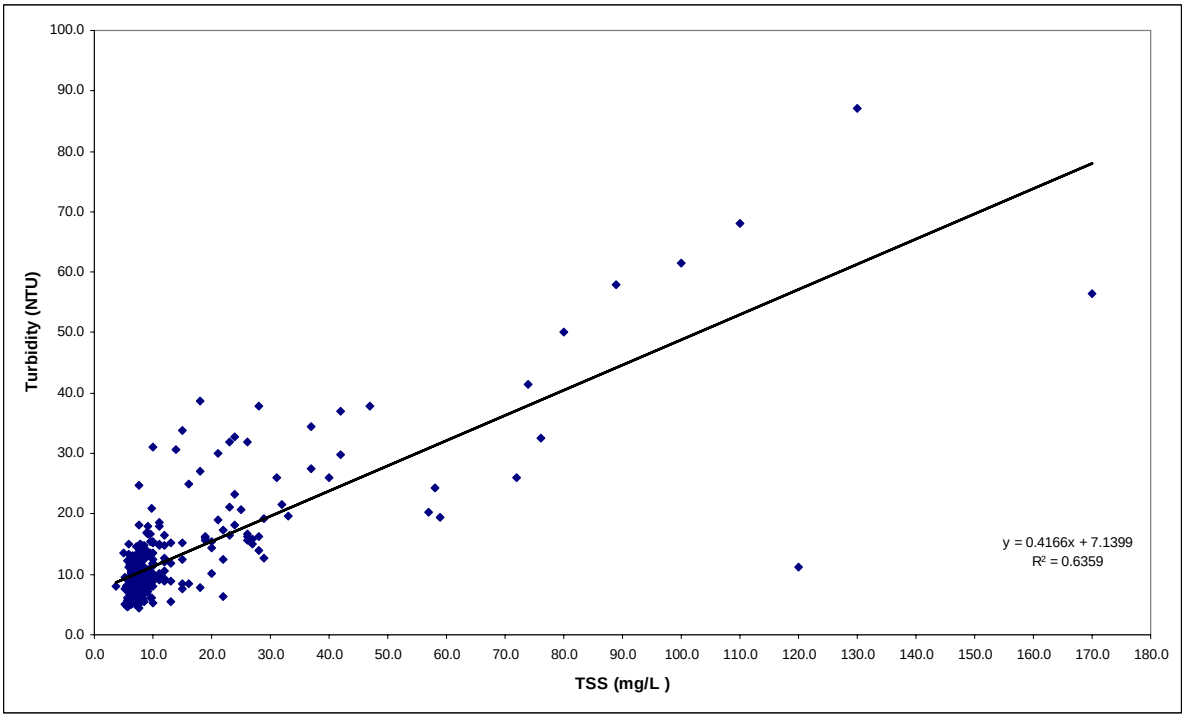

Figure 1. TSS vs. turbidity

Seventeen water samples were analyzed for six trace metals: cadmium, copper, lead, mercury, silver and zinc, polychlorinated biphenyls (PCBs) and pesticides, and TBT. The only metal that was detected in every water sample was copper. Exceedances of the both the chronic and acute water quality criteria for copper (3.1 and 4.8 µg/L respectively) were seen in all samples. Copper concentrations ranged from 6 to 9 µg/L in both the ambient upstream and 100-meter downstream stations. These results appear to reflect elevated copper concentrations throughout the waterway. PCBs were detected in one sample EW-WQM-DR-100-3e collected March 1st. This sample had a PCB total of 0.32 µg/L based on detected Aroclors 1254 and 1260, reported at 0.14 µg/L and 0.18 µg/L, respectively. The total PCB concentration (0.32 µg/L) exceeded the chronic ambient water criteria for total PCBs (0.03 µg/L). It should be noted that this sample was collected at the depth of the observed turbidity maximum. The associated total suspended solids value was110 mg/L. If the total PCB concentration is assumed to be associated with the suspended solids, the calculated PCB concentration associated with the solids is 2.9 µg/g which is consistent with some of the reported sediment PCB concentrations in the area that was being dredged at the time of the exceedance. No detected concentrations were reported for pesticides or TBT.

Table 3-2. Water chemistry results

PARAMETER	EW-WQM-DR-AU-2e	EW-WQM-DR-100-2e	EW-WQM-DR-AU-2f	EW-WQM-DR-100-2f	EW-WQM-DR-AU-2e	EW-WQM-DR-100-2e	EW-WQM-DR-AU-2e	EW-WQM-DR-100-2e	EW-WQM-DR-AU-2e	EW-WQM-DR-100-2e	EW-WQM-DR-100-2e	EW-WQM-DR-AU-2e	EW-WQM-DR-100-1e	EW-WQM-DR-AU-2e	EW-WQM-DR-100-2e	EW-WQM-DR-100-2e	EW-WQM-DR-100-3e
Sample Date	1/20/04	1/20/04	1/23/04	1/23/04	1/28/04	1/28/04	2/2/04	2/2/04	2/11/04	2/11/04	2/12/04	2/20/04	2/20/04	2/25/04	2/25/04	2/27/04	3/1/04
TSS (mg/L)	7.6	20	6.2	26	7.1	9.4	18	58	10	40	22	8.2	26	8.8	76	80	110
Metals (µg/L)																	
Cadmium	2U[a]	2U[b]	2U[a]	2U[b]	2U[a]	2U[b]	2U[a]	2U[b]	2U[a]	2U[b]	2U	2U[a]	2U[b]	2U	2U[b]	2U[a]	2U[a]
Copper	**8[a]**	**8[b]**	**7[a]**	**7[b]**	**6[a]**	**8[b]**	**6[a]**	**7[b]**	**9[a]**	**8[b]**	**7**	**8[a]**	**8[b]**	**8**	**7[b]**	**8[a]**	**7[a]**
Lead	10U[a]	10U[b]	10U[a]	10U[b]	10U[a]	10U[b]	10U[a]	10U[b]	10U[a]	10U[b]	10U	10U[a]	10U[b]	10U	10U[b]	10U[a]	10U[a]
Mercury	0.1U[a]	0.1U[b]	0.1U[a]	0.1U[b]	0.1U[a]	0.1U[b]	0.1U[a]	0.1U[b]	0.1U[a]	0.1U[b]	0.1U	0.1U[a]	0.1U[b]	0.1U	0.1U[b]	0.1U[a]	0.1U[a]
Silver	5U[a]	5U[b]	5U[a]	5U[b]	5U[a]	5U[b]	5U[a]	5U[b]	5U[a]	5U[b]	5U	5U[a]	5U[b]	5U	5U[b]	5U[a]	5U[a]
Zinc	40U[a]	40U[b]	40U[a]	40U[b]	40U[a]	40U[b]	40U[a]	40U[b]	40U[a]	40U[b]	40U	40U[a]	40U[b]	40U	40U[b]	40U[a]	40U[a]
PCBs (µg/L)																	
Aroclor 1016	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
Aroclor 1242	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
Aroclor 1248	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
Aroclor 1254	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	0.14
Aroclor 1260	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	0.18
Aroclor 1221	< 0.20U	< 0.20U	< 0.20U	< 0.20U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
Aroclor 1232	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
Total PCBs	< 0.20U	< 0.20U	< 0.20U	< 0.20U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	**0.32**
Pesticides (µg/L)																	
Dieldrin	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
4, 4' DDE	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
4, 4' DDD	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
4,4' DDT	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U	< 0.10U
TBT (µg/L)																	
TBT ion	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U	< 0.022U

Bold – indicates a value that exceeds the corresponding water quality criteria value

[a] Result averaged with laboratory duplicate

[b] Result averaged with field duplicate

3.3 SUMMARY OF WATER QUALITY EXCEEDANCES

The dates, dredging locations, tidal conditions associated with water quality exceedances are summarized in Table 3-3. Exceedances of the turbidity criteria were observed during both flood and ebb tides. Turbidity exceedances were also observed throughout the water column with the depths in the water column at which exceedances were observed ranging from 1 to 18.5m.

A summary of the operational responses to the reported turbidity exceedances is also presented in Table 3-3. In most cases, the operational response was to slow the dredging operation down by increasing the dredge cycle time and to shake the bucket in order to remove any external debris prior to raising the bucket out of the water. In most cases, the exceedances persisted despite the operational responses. On February 20, 2004, an exceedance was measured in the surface water (< 1m water depth) that appeared to be due to a tear in the filter fabric lining on the barge. The fabric lining was repaired and no further exceedances were observed.

Table 3-3. Summary of Phase 1 water quality monitoring exceedances

Date	DMMU	Tide	Turbidity Exceedance Above Background (NTU) at 100m	Depth in Water Column (m)	Persistence After Resampling?	Exceedance at 150m?	Operational Response	Chemistry?	Chemical Exceedance
2-Feb-2004	1C31; 1C32	ebb	19-24[a]	17.6	no	not sampled	Slowed down cycle; shake bucket before raising	yes	Copper[b]
4-Feb-2004	1C31; 1C32 1C37; 1C38	flood	11-16	13	yes	not sampled	Slowed down cycle; shake bucket before raising	no	na
9-Feb-2004	1C37; 1C38	ebb	11-20	15-17.5	yes	not sampled	Slowed down cycle; shake bucket before raising	no	na
11-Feb-2004	1C38	ebb	11-19	1-12	yes	yes	Slowed down cycle; let bucket dewater; shake bucket before raising; < 30m downstream of outfall; Held meeting w/ Port	yes	Copper[b]
12-Feb-2004	1C38, 1C32; 1C33	ebb	21-25	1	yes	yes	Operator adjusted dredging procedures; <50m downstream of outfall	no	na
			47-49	15.8	yes	yes		yes	Copper[b]
13-Feb-2004	1C32; 1C38; 1C33; 1C39	ebb	13-27	17-18.5	not sampled[d]	yes	Operator adjusted dredging procedures; <130m downstream of outfall	no	na
20-Feb-2004	1C31; 1C37	ebb	19-23	1	no	not sampled	Repaired filter fabric	yes	Copper[b]
25-Feb-2004	1C31; 1C32, 1C33	flood	19	1	no	not sampled	none[c]	yes	Copper[b]
27-Feb-2004	1C38; 1C44; 1C39	ebb	12-34	1-17.7	yes	yes	Slowed down cycle; let bucket dewater; shake bucket before raising; < 30m downstream of outfall	yes	Copper[b]
1-Mar-2004	1C33; 1C39	flood	11-20	4.5-7	yes	no	Slowed down cycle; let bucket dewater; shake bucket before raising; < 30m downstream of outfall	no	na
		ebb	18-56	8.5-15	not sampled[d]	not sampled		yes	PCB and Copper[b]

Date	DMMU	Tide	Turbidity Exceedance Above Background (NTU) at 100m	Depth in Water Column (m)	Persistence After Resampling?	Exceedance at 150m?	Operational Response	Chemistry?	Chemical Exceedance
2-Mar-2004	1C39	flood	30	16.8	not sampled[d]	no	Slowed down cycle; let bucket dewater; shake bucket before raising; < 30 to 10m downstream of outfall	no	na
		ebb	12-22	6.9-8	not sampled[d]	yes		no	na

COC – chemical of concern

[a] turbidity exceedances also reported 100m upstream of dredge operation likely due to T-18 dredge activity

[b] copper concentrations similar to those measured at ambient locations and reflect ambient concentrations

[c] exceedance not reported to Anchor

[d] no resampling since no operational changes occurred

3.4 DISCRETIONARY SAMPLING

In addition to the required water quality measurements, discretionary samples were collected in an effort to determine the areal extent of the observed turbidity plumes associated with the dredge operation. The dates and locations of the discretionary sampling are summarized in Table 3-4. Samples were collected at upstream locations February 2 to determine whether dredging being conducted at T-18 upstream of the dredging operation was influencing the turbidity readings downstream of the EW dredging. Upstream sampling was conducted on the flood and ebb tides March 2 to determine whether or not material was moving upstream of the dredge location. One turbidity exceedance was reported for 100m upstream of the barge on the flood tide. However, there was no exceedance 30 m upstream of the barge so the turbidity measured at 100m upstream may not have been associated with the dredge operation. All the remaining discretionary samples were collected downstream of the barge location when exceedances were reported at 100m in an attempt to determine the length of the plume.

Table 3-4. Discretionary sampling summary table

DATE	LOCATION	TURBIDITY EXCEEDANCE?	TURBIDITY EXCEEDANCE ABOVE BACKGROUND (NTU)	NOTES
February 2	100m upstream	yes	11	sample location between EW barge and T-18 barge
February 11	150 m downstream	yes	14	
February 12	150 m downstream	yes	15 and 30	exceedances in surface water and at 18m depth
February 18	100m downstream	no	na	visible surface plume associated with barge spill
February 25	150 m downstream	yes	21	turbidity at 150 m greater than that observed at 100m
February 27	150 m downstream	yes	13 and 15	similar turbidity to that observed at 100m
March 1	Slip 27	no	na	chinook observed in Slip 27 February 27th
	150 downstream	no	na	
March 2	30 m upstream	no	na	flood tide
	100 m upstream	yes	15	flood tide
	30 m upstream	no	na	ebb tide
	100 m upstream	no	na	ebb tide
	150 m downstream	yes	14	narrow band of turbidity
	200 m downstream	yes	21	narrow band of turbidity
	250 m downstream	yes	19	narrow band of turbidity

DATE	LOCATION	TURBIDITY EXCEEDANCE?	TURBIDITY EXCEEDANCE ABOVE BACKGROUND (NTU)	NOTES
March 2	300 m downstream	yes	17	narrow band of turbidity[a]
	350 m downstream	no	na	

[a] estimated to be less than 0.5 m in width

na – not applicable

3.5 FISH MONITORING RESULTS

A detailed report of the results of the fish monitoring is presented in Appendix C. The fish monitoring data was evaluated in terms of the number of chinook salmon or bull trout per beach seine as an average catch (per unit effort; CPUE). The criteria used for notification of EPA and the Services was 3 CPUE of chinook or bull trout. This criteria was exceeded once on February 27 , 2004. The CPUE of chinook was 3.8 with 19 chinook captured in one beach seine set at Slip 27. As a result of this exceedance, daily monitoring was conducted until March 2 when the dredging ended.

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