

Port of Morrow
Messner Cove
Sediment Sampling Evaluation

Abstract

Eleven sediment samples were collected at Messner Cove, Port of Morrow, Boardman Oregon (RM 270) on March 17, 1999 (see Figure 1 for locations). All samples were sent to Sound Analytical Services, Inc. laboratory of Tacoma, WA, for physical and chemical analyses, to include: metals, total organic carbon (TOC), pesticides/polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons (PAHs). The Clean Water Act (CWA) of 1976, as amended regulates dredging activities and requires sediment quality evaluation, including testing, prior to dredging. Guidelines to implement 40 CFR Part 230-Section 404(b)(1) regulations of the CWA, the national Inland Testing Manual (ITM) and the regional Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF-LCRMA) (Final 1998) have adopted a tiered testing approach for the evaluation of dredge material. The Tier IIa (physical testing) and Tier IIb (chemical testing) have been completed for this evaluation. The screening levels (SL) used are those listed in the regional manual.

The proposed dredge material from this project is acceptable for both unconfined in-water and upland disposal. No significant, adverse ecological impacts are expected as a result of sediment toxicity.

Introduction

The purpose of this report is to characterize the sediment of Messner Cove, based on the sampling event described. Reference will be made to the project Sampling and Analysis Plan (SAP) attached to this report. The project description, site history and assessment are detailed in section 1 of the SAP. The sampling and analysis objectives listed below are those stated in the (SAP) (sec. 2.0). This report will outline the procedures used to accomplish these goals.

SAMPLING AND ANALYSIS OBJECTIVES

The sediment characterization program objectives and constraints are summarized below:

- To characterize sediments in accordance with the regional dredge material testing manual, the Dredge Material Evaluation Framework for the Lower Columbia River Management Area.
- Collect, handle and analyze representative sediment, of the purposed dredging prism, in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Characterize sediments to be dredged for evaluation of environmental impact.

- Only physical and chemical characterization will be conducted for this sediment evaluation.

Historical Data

There has been no known physical or chemical sample analysis done on the area of the proposed dredging prism. Emergency dredging was done in three adjoining areas in 1992. No samples for physical or chemical analyses were taken in the three areas dredged (in front of the grain facility dock, at the woodchip loading dock and at the Longview Fibers dock). A field analysis of the dredge material characterized it as silty sand, brown to gray in color with high chroma (clarity of color) and no odor. The field analysis approximated the grain size as follows: none greater than 12", none in 4" to 12" range, 5% in the #4 to 4" range, 5% in the #4 to #40 range, 70% in the #40 to #200 range, and 20% less than #200 screen.

Current Sampling Event

The Corps of Engineers, Portland District personnel, collected 1-gravity core sample and 10 surface grab samples on March 17, 1999. The first sample (PM-GC-01) was taken using a gravity core sampler, collecting a 24-inch core. Due to low penetration of the gravity core sampler, its use was suspended and the balance of the samples were collected using a box core sampler. Due to the sandy nature of the material it is more difficult to penetrate than material containing more silt. The dredging prism is considered to be native undisturbed soil, with a layer of sediment accumulated on the top.

All samples were dark brown to dark gray in color and were classified as "silty sand" and "poorly graded sand with silt". The median grain size for all sediment collected was 0.15mm, with 79.1% sand and 20.6% fines. As mentioned earlier, samples were sent to Sound Analytical laboratory of Tacoma, WA, for physical and chemical analyses, to include: metals, total organic carbon (TOC), pesticides/PCBs, phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons (PAHs).

Sampling and analyses were performed using proper quality control measures, including proper procedures for chain of custody, preservation and cooler receipt. All laboratory QC is acceptable. The following comments were noted in the analytical narrative from Sound Analytical: "Low level contamination was present in the method blank associated with this sample batch. The percent recoveries for some surrogate exceeded the quality control limits due to matrix interferences. All reported values underwent a second column confirmation."

Results/Discussion

Physical and Volatile Solids: Data for these analyses are presented in Table 1. Five of 11 samples submitted for analysis exceeded 20% fines with none exceeded 5% volatile solids. Six samples submitted were classified as "silty sand" (SM) and 4 sample was classified as "poorly graded sand with silt" (SP-SM). Median grain size for all samples is 0.15 mm, with 79.1 % sand and 20.6% fines. All samples were dark brown to dark gray in color with very little odor and no sheen. Only 3 samples contained small amounts of gravel, but the shoreline in the area was covered with

gravel. It is possible that there is gravel beneath the sediment, as some gravel was caught in the sampler jaws on several occasions.

Metals and Total Organic Carbon (TOC): Data for these analyses are presented in Table 2. Low levels of some metals were found in most of the samples collected, but levels do not approach the SL. The highest level detected was for lead, which is 55.6% of the SL. Zinc was the most frequently found metal, but at levels less than 25% of the SL. Total Organic Carbon was highest in the sample located just east of the wood chip facility dock.

Pesticide/PCBs, Phenols, Phthalates and Misc. Extractables: Data for these analyses are presented in Table 3. No pesticides or PCBs were found at the method detection limits. Three phenols were detected at low levels (7.3% of SL). Six phthalates were, also, detected at low levels (8.6% of SL). Benzoic Acid and Dibenzofuran were found in 4 of the 11 samples at low levels (highest 2.1% of SL).

Polynuclear Aromatic Hydrocarbons (PAHs): Data for these analyses are presented in Tables 4 & 5. Very low levels of some individual “low molecular weight” PAHs were found in 9 of 11 samples (<2.1% of SL). The highest “Total L-PAH” detected for an individual sample was 0.1% of the SL. Very low levels of some of the “high molecular weight” PAHs were found in 6 of 11 samples (0.4% of the SL). The highest “Total H-PAH” detected for an individual sample was 0.4% of the SL.

Conclusion

Collection and evaluation of the sediment data was completed using guidelines from both the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF-LCRMA) and the Inland Testing Manual (ITM). The DMEF-LCRMA is a regional manual developed jointly with regional EPA, Corps, Oregon Dept. of Environmental Quality and Washington Depts. of Ecology and Natural Resources. The ITM is a national manual developed jointly by EPA and Corps for dredge material evaluation. These documents are guidelines for implementing the Clean Water Act, 40 CFR 230 sec 404 (b)(1).

The screening levels used are those adopted for use in the DMEF-LCRMA, final 1998. The DMEF-LCRMA Tiered testing approach requires that material in excess of 20% fines and greater than 5% volatile solids, as well as any material with prior history or is suspected (“reason to believe”) of being contaminated, be subjected to chemical as well as physical analyses. Under the Tiered approach, if the chemical analytical results do not exceed the established screening levels, the material is suitable for unconfined in-water disposal. The analyses for this material show only low level contamination, water quality standards will not be exceeded during dredging and disposal. Only surface samples were obtained from the study area. These samples are considered adequate coverage of the dredging prism, because the area below the surface sediment has not been dredged or disturbed prior to this sampling event. It is considered to be clean “native” soil with no evidence or detection of any contamination. The newly exposed surface after dredging will be clean “native” soil. Therefore, this material is considered suitable for, both upland and open in-water, disposal with no adverse unacceptable ecological consequences expected.

References

1. U.S. Army Corps of Engineers, Portland District, Seattle District; U.S. Environmental Protection Agency, Region 10; Oregon Department of Environmental Quality; Washington State Department of Natural Resources and Department of Ecology. 1998 Final. Dredge Material Evaluation Framework for the Lower Columbia River Management Area.
2. U. S. Environmental Protection Agency and U. S. Army Corps of Engineers. February 1998. Evaluation of Dredged Material Proposed for Discharge in Inland and Near Coastal Waters – Testing Manual, dated (referred to as the “Inland Testing Manual”).
3. The Clean Water Act, 40 CFR 230 (b) (1).

Physical Analytical

Sample I.D.	Grain Size (mm)				%					
	Median		Mean		Gravel	Sand	Silt/Clay	Volatile solids		
PM-GC-01	0.09		0.13		0.7	62.2	37.0		3.2	
PM-BC-02	0.18		0.06		0.0	94.7	5.3		1.5	
PM-BC-03P	0.15		0.08		0.0	89.9	10.1		1.8	
PM-BC-04	0.06		0.06		0.0	47.7	52.3		2.9	
PM-BC-05	0.12		0.12		0.0	71.8	28.2		2.3	
PM-BC-06	0.12		0.10		0.0	75.0	25.0		2.9	
PM-BC-07	0.21		0.14		0.0	97.5	2.5		1.0	
PM-BC-08	0.25		0.17		0.0	96.9	3.1		4.8	
PM-BC-09	0.04		0.09		0.0	87.2	12.8		3.8	
PM-BC-10	0.08		0.05		0.0	61.7	38.3		3.0	
PM-BC-11	0.26		0.19		2.0	81.2	16.8		1.8	
PM-BC-11 (Lab Dup)	0.19		0.16		0.6	83.7	15.8		2.8	
Mean	0.15		0.11		0.3	79.1	20.6		2.7	
Minimum	0.06		0.05		0.0	47.7	2.5		1.0	
Maximum	0.26		0.19		2.0	97.5	52.3		4.8	

Inorganic Metals and TOC

Sample I.D.	As	Sb	Cd	Cu	Pb	Hg	Ni	Ag	Zn	TOC
	mg/kg (ppm)									
PM-GC-01	<22	<65	0.98	12	<11	<.11	6.5	<2.1	72	10000
PM-BC-02	<20	<59	0.61	9.5	16	<0.095	6.2	<1.9	93	1600
PM-BC-03C	<21	<61	0.74	13	250	<.01	7.7	<2.0	41	3000
PM-BC-04	<22	<64	0.96	17	<11	<0.11	13	<2.1	100	7300
PM-BC-05	<21	<61	<0.5	15	<10	<0.11	9.9	<1.9	91	5200
PM-BC-06	<21	<61	<0.5	15	10	<0.1	6.2	<1.9	91	8400
PM-BC-07	<19	62	<1.1	7.7	<9	<0.11	6.6	2.2	44	750
PM-BC-08	<18	<53	<1.1	8	<8.7	<0.11	<3.9	<1.7	38	480
PM-BC-09	<20	65	<0.48	9.6	<9.7	<0.11	4.4	<1.9	69	2400
PM-BC-10	<22	<63	1.0	15	<11	0.1	9.8	<2.0	110	6000
PM-BC-11	<19	<53	<1.1	10	12	<0.097	9.6	<1.7	70	3200
Screening level (SL)	57	150	5.1	390	450	0.41	140	6.1	410	
Mean	<20	11.5	0.39	11.98	26.2	0.009	7.3	0.2	74.5	
Maximum	<22	65	1	17	250	0.1	13	2.2	110	
Symbol (<) = Non-detect at the value listed (Method Detection Limit)										

Pesticides/PCBs, Phenols, Phthalates, Chlorinated Organic Compounds and Extractables

Sample I.D.	Phenols			Phthalates						Extractables	
	ug/kg (ppb)										
	Phenol	Pentachloro phenol	3-&4-Methyl phenol	Dimethyl phthalate	bis(2-Ethylbenzyl phthalate	Butylbenzyl phthalate	Di-n-octyl phthalate	Diethyl phthalate	Di-n-butyl phthalate	Benzoic acid	Dibenzo furan
PM-GC-01	<3.1	<1.8	<1.6	10.0	29.0	6.7	<1.7	64.0	65.0	<6.9	<2.8
PM-BC-02	<3.1	<1.8	<1.6	12.0	27.0	3.2	<1.7	<4.5	14.0	<6.9	<2.8
PM-BC-03C	<3.1	<1.8	<1.6	79.0	19.0	3.0	5.8	<4.5	11.0	<6.9	<2.8
PM-BC-04	<3.1	11.0	5.8	54.0	19.0	<1.5	<1.7	<4.5	18.0	<6.9	<2.8
PM-BC-05	5.4	<1.8	13.0	120.0	21.0	<1.5	<1.7	<4.5	15.0	<6.9	5.6
PM-BC-06	<3.1	<1.8	<1.6	110.0	23.0	<1.5	7.1	<4.5	20.0	14.0	<2.8
PM-BC-07	<3.1	<1.8	<1.6	13.0	15.0	<1.5	<1.7	<4.5	12.0	<6.9	<2.8
PM-BC-08	<3.1	29.0	<1.6	27.0	16.0	<1.5	<1.7	<4.5	9.4	<6.9	<2.8
PM-BC-09	<3.1	<1.8	<1.6	18.0	17.0	4.0	2.7	<4.5	15.0	<6.9	<2.8
PM-BC-10	<3.1	<1.8	<1.6	39.0	22.0	<1.5	<1.7	<4.5	12.0	13.0	<2.8
PM-BC-11	<3.1	<1.8	<1.6	7.3	21.0	9.7	<1.7	<4.5	19.0	11.0	<2.8
Screening level (SL)	420.0	400.0	670.0	1400.0	8300.0	1200.0	6200.0	970.0	8300.0	650.0	540.0
Mean	0.5	3.6	1.7	120.0	20.8	2.4	1.4	5.8	19.1	3.5	0.5
Maximum	5.4	29.0	12.0	37.9	29.0	9.7	5.8	64.0	65.0	14.0	5.6
PCBs = Non-detect <18.0 (SL = 130) Pesticides = Non-detect <3.6 (SL = 10, Total DDT = 6.9) Symbol (<) = Non-detect at the value listed (Method Detection Limit)											

Polynuclear Aromatic Hydrocarbons (PAHs)
Low Molecular Weight Analytes
ug/kg (ppb)

Sample I.D.	Acenaphthene	Acenaphthylene	Anthracene	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Total Low PAHs
PM-GC-01	2.7	<2.4	<2.2	<2.3	3.5	2.7	<1.8	8.9
PM-BC-02	<1.9	<2.4	<2.2	<2.3	<2.2	<1.9	<1.8	<2.3
PM-BC-03C	<1.9	<2.4	<2.2	<2.3	3.3	<1.9	2.8	6.1
PM-BC-04	<1.9	<2.4	<2.2	<2.3	10.0	4.3	11.0	25.3
PM-BC-05	<1.9	<2.4	<2.2	<2.3	14.0	8.6	8.9	31.5
PM-BC-06	<1.9	<2.4	<2.2	<2.3	8.5	6.8	7.7	23.0
PM-BC-07	2.7	<2.4	<2.2	<2.3	4.9	<1.9	<1.8	4.9
PM-BC-08	<1.9	<2.4	<2.2	<2.3	8.7	<1.9	2.7	14.1
PM-BC-09	<1.9	<2.4	<2.2	<2.3	5.2	<1.9	<1.8	5.2
PM-BC-10	<1.9	<2.4	<2.2	<2.3	4.2	<1.9	4.2	8.4
PM-BC-11	<1.9	<2.4	<2.2	<2.3	<2.2	<1.9	<1.8	<2.4
Screening level	500.0	560.0	960.0	540.0	670.0	2100.0	1500.0	29000.0
Mean	0.5	<2.4	<2.2	<2.3	5.7	1.8	3.4	11.1
Maximum	2.7	<2.4	<2.2	<2.3	14.0	8.6	11.0	31.5

Symbol (<) = Non-detect at the value listed (Method Detection Limit)

Polynuclear Aromatic Hydrocarbons (PAHs)
High Molecular Weight Analytes
ug/kg (ppb)

Sample I.D.	Benz(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Pyrene	Benzo(a)pyrene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Fluoranthene	Total High PAHs
PM-GC-01	<1.4	<2.1	<1.9	<1.5	<2.4	5.5	<1.5	<1.4	<1.8	<2.2	5.5
PM-BC-02	<1.4	<2.1	<1.9	<1.5	<2.4	<2.2	<1.5	<1.4	<1.8	<2.2	<2.4
PM-BC-03C	<1.4	<2.1	<1.9	<1.5	<2.4	<2.2	<1.5	<1.4	<1.8	<2.2	3.5
PM-BC-04	<1.4	3.5	<1.9	<1.5	3.5	4.1	<1.5	<1.4	<1.8	5.8	16.9
PM-BC-05	3.5	<2.1	<1.9	<1.5	3.5	4.2	<1.5	<1.4	<1.8	6.7	14.4
PM-BC-06	<1.4	3.7	<1.9	<1.5	<2.4	5.4	<1.5	<1.4	<1.8	7.4	12.8
PM-BC-07	<1.4	<2.1	<1.9	<1.5	<2.4	<2.2	<1.5	<1.4	<1.8	<2.2	<2.4
PM-BC-08	<1.4	<2.1	<1.9	<1.5	<2.4	<2.2	<1.5	<1.4	<1.8	<2.2	<2.4
PM-BC-09	<1.4	<2.1	<1.9	<1.5	<2.4	<2.2	<1.5	<1.4	<1.8	<2.2	<2.4
PM-BC-10	<1.4	<2.1	<1.9	<1.5	<2.4	6.2	<1.5	<1.4	<1.8	5.3	11.5
PM-BC-11	<1.4	<2.1	<1.9	<1.5	<2.4	<2.2	<1.5	<1.4	<1.8	<2.2	<2.4
Screening level	1300.0	3200.0		670.0	1400.0	2600.0	1600.0	230.0	600.0	1700.0	12000.0
Mean	0.3	0.3	<1.9	<1.5	0.6	2.3	<1.5	<1.4	<1.8	2.3	5.9
Maximum	3.5	3.5	<1.9	<1.5	3.5	6.2	<1.5	<1.4	<1.8	7.4	16.9

Symbol (<) = Non-detect at the value listed (Method Detection Limit)

**Figure 1, Port of Morrow
Messner Cove
Sampled March 17, 1999**

**Sample locations are approximates
Map is not to scale**



