

Siuslaw River Sediment Quality Evaluation

Abstract

This evaluation was conducted following procedures set forth in the Inland Testing Manual (ITM) and the Ocean Disposal Testing Manual (Green Book), developed jointly by the Corps and EPA to assess dredged material. Guidelines used are those developed to implement the Clean Water Act (CWA) and the Marine Protection, Research and Sanctuary Act (MPRSA). These guidelines and associated screening levels (SL) are those adopted for use in the Dredge Material Evaluation Framework (DMEF) for the Lower Columbia River Management Area, November 1998.

Eight (8) sediment samples were collected from the Siuslaw River on April 4, 2001 (see Figure 1). All samples were submitted for physical analyses, with 2 samples analyzed for metals (9 inorganic), total organic carbon (TOC), pesticides/polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables, polynuclear aromatic hydrocarbons (PAHs) and organotin (TBT) analysis.

Sediment represented by samples collected during this sampling event meet the Tier II guidelines established in the DMEF for open inwater, unconfined placement without further characterization.

Introduction

This report will characterize the sediment to be dredged at Siuslaw River for the purposes of dredging and disposal. The sampling and analysis objectives are stated in the Sampling and Analysis Plan (SAP) (attached) and are, also, listed below. This report will outline the procedures used to accomplish these goals.

SAMPLING AND ANALYSIS OBJECTIVES

- Characterize sediments in accordance with the regional dredge material-testing manual, the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF) for evaluation of environmental impact of both the dredging and disposal events.
- Collect, handle and analyze representative sediment, of the purposed dredging prism, in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Conduct physical and chemical characterization only, for this sediment evaluation, unless DMEF screening levels are exceeded and further characterization (Tier III Biological Assays) is needed to determine disposal method.

Previous Studies

Previous sediment evaluation studies of the federal project at Siuslaw River were conducted in the early 1960's and 1970's and again in 1987, 1991 and 1996. Sediments from the Siuslaw River were fine to medium sands low in fines and organic content (around 1.0% volatile solids). The material from the Siuslaw River meets "exclusionary" ranking in the DMEF, of greater than 80% sand, less than 5% volatile solids and sufficiently removed from contaminate sources. Chemical analysis has been run on select samples in past years, with no results exceeded guidelines. All material has been found suitable for open inwater disposal.

Current Sampling Event

Eight (8) samples were collected in the Siuslaw River from the entrance to River Mile (RM) 6 (see Figures 1). All samples were sent to Sound Analytical Services, Inc., laboratory of Tacoma, WA. Eight (8) samples were submitted for physical analyses, with two (2) samples being analyzed for: metals, total organic carbon (TOC), pesticides/polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables, polynuclear aromatic hydrocarbons (PAHs) and one (1) sample was submitted for organotin (TBT) (pore water method) analysis. The samples submitted for chemical analysis were taken from the federal channel near the outfall to the sewage treatment plant (sample 5)* and near the boat dock (sample 7). The one (1) sample analyzed for TBT was collected near the boat dock (sample 7).

Bis(2-Ethyl) hexzyl phthalate was detected in the method blank at 3.5 ug/kg; antimony (Sb) at 0.018 mg/kg. Affected data was flagged appropriately. All other QC was within the acceptable limits for all analytical methods performed.

Sediment represented by samples collected during this sampling event meet the Tier II guidelines established in the DMEF for open inwater, unconfined placement without further characterization.

*Sample SR-BC-05 sampling station was added in the field at the request of Siuslaw Port board member. This sample replaced the upstream sample number SR-BC-08 on the proposed sample location map in the SAP.

Results/Discussion

Physical and Volatile Solids, (ASTM methods): Data for these analyses are presented in Table 1. None of the eight (8) samples submitted for analysis exceeded 20% fines and/or 5% volatile solids. All samples submitted were classified as "poorly graded sand". Median grain size for all samples is 0.29 mm, with 99.15% sand and 0.81% fines. All samples were brown to gray in color. Volatile solids ranged from 0.42% to 3.0%.

Metals (method 6020/7471), Total Organic Carbon (TOC) (method 9060) Organotin (TBT) (pore water method): Data for these analyses are presented in Table 2. Low levels of most metals analyzed for were found in all of the samples collected, but levels do not approach the SL. The highest level detected was for zinc, which is 6.8% of the SL. TOC ranged from 1400 to 3200 mg/kg. Organotin was not detected at the method detection limit (0.052 ug/l).

Pesticide/PCBs (method 8081A/8082), Phenols, Phthalates and Misc. Extractables (method 8270): Data for these analyses are presented in Table 3. No PCBs were found at the method detection limits (MDL). The compounds bis(2-ethyl)hexyl phthalate and butylbenzyl phthalate were detected in both samples at levels < 7.8% of the SL. Total DDT and its breakdown products, DDD and DDE were not detected above the MDL. No phenols or other extractable were detected above the method detection limit.

Polynuclear Aromatic Hydrocarbons (PAHs) (method 8270): Data for these analyses are presented in Tables 4 & 5. No individual “low molecular weight” or “high molecular weight” PAHs were found in either of the samples tested.

Conclusion

Collection and evaluation of the sediment data was completed using guidelines from the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF). The DMEF is a regional manual developed jointly with regional EPA, Corps, Oregon Dept. of Environmental Quality and Washington Depts. of Ecology and Natural Resources. This document is a guideline for implementing the Clean Water Act, 40 CFR 230 sec 404 (b)(1) and for the Marine Protection, Research and Sanctuary Act (MPRSA). The screening levels used are those adopted for use in the DMEF, final November 1998. The DMEF Tiered testing approach exempts material from chemical testing that contains greater than 80% sand and less than 5% volatile solids, that has no prior history of contamination or is not suspected (“reason to believe”) of being contaminated. Under the Tiered approach, if the chemical analytical results do not exceed the established screening levels (SL), the material is considered suitable for unconfined in-water disposal.

The sediment collected at the Siuslaw River qualifies for the “exclusionary” ranking, as it is greater than 80% sand and less than 5% volatile solids and has no history of contamination. To confirm the “exclusionary” ranking, chemical analysis was conducted on two (2) samples. Neither sample exceeded SLs of the DMEF.

Sediment represented by samples collected during this sampling event meet the Tier II guidelines established in the DMEF for open inwater, unconfined placement without further characterization.

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).
4. Navigation Branch, Operations Division, U.S. Army Corps of Engineers, Portland District. 1991. Federal Navigation Projects: The Oregon Coast Maintenance Program.
5. U.S. Army Corps of Engineers, Portland District. 1991. Siuslaw River Sediment Evaluation, 1991.
6. U.S. Army Corps of Engineers, Portland District. 1996. Siuslaw River Sediment Quality Evaluation, 1996.

Physical Analysis & Volatile Solids

Sample I.D.	Grain Size (mm)				%				
	Median		Mean		Gravel	Sand	Silt/Clay	Volatile solids	
SR-BC-01	0.28		0.203		0.00	100.0	0.00		0.42
SR-BC-02	0.24		0.183		0.00	98.91	1.09		0.45
SR-BC-03	0.30		0.212		0.00	98.33	1.67		0.44
SR-BC-04	0.28		0.293		0.00	98.82	1.18		0.97
SR-BC-05	0.30		0.233		0.11(wood)	99.38	0.51		1.56
SR-BC-06	0.30		0.222		0.00	100.0	0.00		1.25
SR-BC-07	0.30		0.253		0.23(wood)	98.78	0.99		3.00
SR-BC-08	0.30		0.220		0.00	100.0	0.00		1.99
SR-BC-08 DUP	0.30		0.234		0.25(wood)	97.91	1.85		1.52
Mean	0.29		0.228		0.07	99.15	0.81		1.29
Minimum	0.24		0.183		0.00	97.91	0.00		0.42
Maximum	0.30		0.253		0.25	100.0	1.85		3.00

Inorganic Metals, TOC and TBT

Sample I.D.	As	Sb	Cd	Cu	Pb	Hg	Ni	Ag	Zn	TOC
	mg/kg (ppm)									
SR-BC-05	2.9	0.12 J,B1	0.13 J	2.7	2.8	<0.033	7.2	<0.05	23	1400
SR-BC-07	3.0	0.89 J,B1	0.18 J	3.7	3.5	<0.026	8.9	<0.06	28	3200
Screening level (SL)	57	150	5.1	390	450	0.41	140	6.1	410	
Mean	3.0	0.51	0.16	3.2	3.2	ND	8.1	ND	26	
Maximum	3.0	0.89	0.18	3.7	3.5	ND	8.9	ND	28	

J = Estimated value (reported values are above the MDL, but below the PQL).

B1 = Low level contamination was present in the method blank (reported level was < 10 times blank concentration).

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

Organotin

Interstitial (Pore) Water

Sample ID		Tetrabutyltin	Tributyltin	Dibutyltin	Monobutyltin		Total TBT
Ug/L (ppb)							
SR-BC-07		<0.0037	<0.052	<0.037	<0.035		ND
Screening level (SL)		+	+	+	+	=	0.15
TBT = Total organotin (interstitial water).							
Symbol (<) = Non-detect at the value listed (Method Detection Limit).							

Pesticides/PCBs, Phenols, Phthalates, Herbicides and Extractables

Sample I.D.	Pesticides				Phenols			Phthalates		Extractables
	ug/kg (ppb)									
	4,4'- DDD	4,4'- DDE	4,4'- DDT	Total DDT					bis(2-Ethyl) hexzyl phthalate	Butyl Benzyl phthalate
SR-BC-05	<0.15	<0.18	<0.22	ND					7.8 J B1	1.5 J
SR-BC-07	<0.15	<0.18	<0.22	ND					7.3 J B1	2.0 J
Screen level (SL)	DDD + DDE + DDT = 6.9								8300	970
Mean	ND	ND	ND						7.6	1.8
Maximum	ND	ND	ND						7.8	2.0

PCBs = Non-detect (ND) at <0.005 ppb (SL = 130 ppb).

Bis(2-Ethyl) hexzyl phthalate detected in the method blank at 3.5 ug/kg

J = Estimated value (reported values are above the MDL, but below the PQL).

B1 = Low level contamination was present in the method blank (reported level was < 10 times blank concentration).

Symbol (<) = Non-detect (ND) 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-Methyl naphthalene	Naphthalene	Phenanthrene	Total Low PAHs
SR-BC-05	<0.58	<0.66	<0.79	<0.66	<1.2	<1.6	<0.54	ND
SR-BC-07	<0.60	<0.69	<0.82	<0.69	<1.2	<1.7	<0.56	ND
Screen level (SL)	500	560	960	540	670	2100	1500	5200
Mean	ND	ND	ND	ND	ND	ND	ND	
Maximum	ND	ND	ND	ND	ND	ND	ND	

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

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

Sample I.D.	Benzo(a) anthracene	Benzo(b) fluoroanthene	Benzo(k) fluoroanthene	Benzo(g,h,i) perylene	Chrysene	Pyrene	Benzo(a) pyrene	Dibenz(a,h) anthracene	Indeno (1,2,3-cd) pyrene	Fluoranthene	Total High PAHs
SR-BC-05	<0.52	<0.54		<0.25	<0.68	<0.46	<0.68	<0.38	<0.61	<0.52	ND
SR-BC-07	<0.54	<0.56		<0.25	<0.71	<0.48	<0.7	<0.39	<0.63	0.69	ND
Screen level (SL)	1300	3200		670	1400	2600	1600	230	600	1700	12000
Mean	ND	ND		ND	ND	ND	ND	ND	ND	ND	
Maximum	ND	ND		ND	ND	ND	ND	ND	ND	ND	

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

Figure 1, Siuslaw River

Sampled April 4, 2001

