

Port Orford Sediment Quality Evaluation

ABSTRACT

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

A total of three (3) surface grab sediment samples were collected from the Port Orford Federal Project on August 21, 2002. All samples were submitted for physical analyses including total volatile solids. All three (3) sediment samples were analyzed for metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons.

None of the contaminants tested were found to be at or above their screening level (SL). All sediment is determined to be suitable for unconfined, in-water placement without further characterization.

INTRODUCTION

This report characterizes the sediment to be dredged at Port Orford Federal Project for the purposes of dredging and disposal. The sampling and analysis objectives are stated in the Sampling and Analysis Plan (SAP August 2002), and are also listed below. This report will outline the procedures used to accomplish these objectives.

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; to be expanded to include all of Oregon).
- Collect, handle and analyze representative sediment of the proposed dredging prism, in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Characterize sediments to be dredged for evaluation of suitability of inwater disposal.

- 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

The U.S. Army Corps of Engineers (Corps), Portland District, routinely evaluates sediment from its projects on a 5-year rotation. The DMEF allows up to a 10-year frequency of sampling for an “exclusionary” ranked area. While this area has not been officially ranked, it fits the “exclusionary” ranking of >80% sand and < 5% volatile solids, with no contaminate sources in the vicinity. The physical and chemical analyses were last conducted in 1993. The results of that study revealed the sediment to be predominantly clean, fine to medium-grained sands, with low organic content. Sediment represented by this study was found to be suitable for unconfined, in-water disposal.

CURRENT SAMPLING EVENT/DISCUSSION

A total of three (3) surface sediment samples were collected from Port Orford Federal Project on August 21, 2002 (see Table 1 and Figure 1), using a Ponar sampling device. All samples were submitted for physical and chemical analyses including total volatile solids (TVS), metals (9 inorganic), total organic carbon (TOC), pesticides and polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons (PAHs).

Table 1. Sample Location Coordinates

PO-P-01	42° 44.398 N 124° 29.903 W
PO-P-02	42° 44.379 N 124° 29.898 W
	42° 44.372 N 124° 29.901 W
PO-P-03	42° 44.347 N 124° 29.875 W

RESULTS

Physical and Volatile Solids (ASTM methods). All three (3) samples were submitted for physical and TVS analyses and the data are presented in Table 2.

Mean grain size for all the samples is 5.43mm, with 46.89% gravel, 51.18% sand and 1.19% fines, with 1.29% Volatile solids.

Metals (EPA method 6020/7471), Total Organic Carbon (EPA method 9060). All three (3) samples were submitted for testing and the data are presented in Table 3. Low levels of all metals were found in the samples and did not approach the screening level (SL). The closest any sample came to approaching the SL was nickel at 24.4%. The TOC ranged from 1,180 to 5,470 mg/kg in the samples.

Pesticides/PCBs (EPA method 8081A/8082), Phenols, Phthalates and Miscellaneous Extractables (EPA method 8270). All three (3) samples were tested and the data are presented in Table 4. No PCBs or pesticides (including DDT) were found at the MDL. Total DDT and its breakdown products, DDD and DDE, were not detected above the MDL. The compound phenol was detected in one sample at 15% of the SL. Two (2) phthalates were detected and all were well below the SL (1%). Benzoic acid and dibenzofuran were found to be below the MDL in all samples.

Polynuclear Aromatic Hydrocarbons (EPA method 8270C). All three (3) samples were tested and the data are presented in Tables 5 and 6. Very low levels of some individual “low molecular weight” PAHs were found at levels ranging from 0.2% to 0.5% of the SL. The highest was phenanthrene at 0.5% of the SL. Low levels of most “high molecular weight” PAHs were found in all samples and ranged from 0.02% to 0.20% of the SL.

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 Department of Environmental Quality and Washington Departments of Ecology and Natural Resources. This document is a guideline for implementing the Clean Water Act (40 CFR 230), Section 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 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.

A total of three (3) sediment samples were collected from the Coquille River Federal channel and the boat basin entrance channel on August 21, 2002. Physical and chemical analyses were run on each sample. The mean grain-size was 5.43 mm, with 47% gravel 52% sand, 1% fines and 1.3% volatile solids. None of the contaminants tested were found to be at or above their SL.

All sediment is determined to be suitable for unconfined, in-water placement without further characterization.

REFERENCES

1. U.S. Army Corps of Engineers, Portland District and 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. Army Corps of Engineers, U.S. Environmental Protection Agency. February 1998. Evaluation of Dredged Material Proposed for Discharge in Inland and Near Coastal Waters - Testing Manual (referred to as the "Inland Testing Manual").
3. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency. February 1991. Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual (referred to as the "Green Book").
4. Clean Water Act, 40 CFR 230 (b)(1).
5. Marine Protection, Research and Sanctuaries Act of 1972.
6. U.S. Army Corps of Engineers. August 1993. Port Orford Sediment Evaluation, 1993. Portland District.

Physical Analysis & Volatile Solids

Sample I.D.	Grain Size (mm)		Percent			
	Median	Mean	Gravel	Sand	Silt/Clay	Volatile Solids
PO-P-01	0.40	0.37	0.57	98.40	1.03	0.75
PO-P-02	NA	9.98	92.64	7.19	0.17	1.90
PO-P-03	0.43	5.95	47.46	50.18	2.36	1.23
Mean	0.42	5.43	46.89	51.92	1.19	1.29
Minimum	0.40	0.37	0.57	7.19	0.17	0.75
Maximum	0.43	5.95	92.64	98.4	2.36	1.90

Inorganic Metals and TOC

Sample I.D.	As	Sb	Cd	Cu	Pb	Hg	Ni	Ag	Zn	TOC
	mg/kg (ppm)									
PO-P-01	4.6	0.27 JB1	<0.009	6.9 B2	2.6 B2	0.023	24.9 B2	0.034 J	21.1 B1	1180
PO-P-02	2.6	0.36 JB1	0.10 J	11.7 B2	2.4 B2	0.030	34.1 B2	0.085 J	28 B1	5470
PO-P-03	4.5	0.21 JB1	<0.0076	8.3 B2	3.1 B2	0.022	32.2 B2	0.051 J	26.8 B1	1180
Screening level (SL)	57	150	5.1	390	450	0.41	140	6.1	410	
<p>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). B2 = 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).</p>										

Pesticides, PCBs*, Phenols, Phthalates and Extractables

Sample I.D.	Pesticides				Phenols		Phthalates					Extractables	
	ug/kg (ppb)												
	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Phenol	3- & 4-Methylphenol	Di-n-octylphthalate	bis(2-Ethylhexyl)phthalate	Butylbenzylphthalate	Dimethylphthalate	Diethylphthalate	Benzoic Acid	Dibenzo-furan
PO-P-01	<0.21	<0.25	<0.28	ND	<3.05	<2.3	<3.96	10.7 J	3.7 J	<1.7	<2.6	<95	<1.8
PO-P-02	<0.29	<0.34	<0.39	ND	62.8	<2.9	<5.1	15.2 J	10.2 J	<2.2	<3.4	<123	<2.3
PO-P-03	<0.23	<0.27	<0.30	ND	<3.2	<2.36	<4.15	15.2 J	<3.04	<1.8	<2.7	<11	<3.8
Screen level (SL)	DDD + DDE + DDT = 6.9				420	670	6200	8300	970	1400	1200	650	540

* **No PCBs** were found in any sample at the MDL (SL = 130 ppb).

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

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
PO-P-01	<0.75	<0.66	<0.38	<0.71	0.75	<0.71	1.14 J	1.9
PO-P-02	<0.98	<0.86	<0.50	<0.92	<0.31	<0.92	7.5	7.5
PO-P-03	1.2 J	<0.70	0.60 J	1.6 J	3.2	2.1	4.3	13
Screen level (SL)	500	560	960	540	670	2100	1500	5200
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)-fluro-anthene	Benzo(k)-fluro-anthene	Benzo-(g,h,i)-perylene	Chrysene	Pyrene	Benzo(a)-pyrene	Dibenz(a,h)-anthracene	Indeno-(1,2,3-cd)-pyrene	Fluor-anthene	Total High PAHs
PO-P-01	<0.93	<0.67		<0.25	<0.89	0.60 J	<0.89	<0.36	<0.36	<0.71	0.60
PO-P-02	<1.2	0.873 J		<0.33	2.3 J	3.9	<1.2	<0.46	<0.46	4.8	11
PO-P-03	<0.98	<0.703		<0.26	<0.94	1.7	<0.94	<0.37	<0.37	2.5	4.2
Screen level (SL)	1300	b + k = 3200		670	1400	2600	1600	230	600	1700	12000
<p>J = Estimated value (reported values are above the MDL, but below the PQL). Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).</p>											

Figure 1. Port Orford Federal Project Sampling Locations

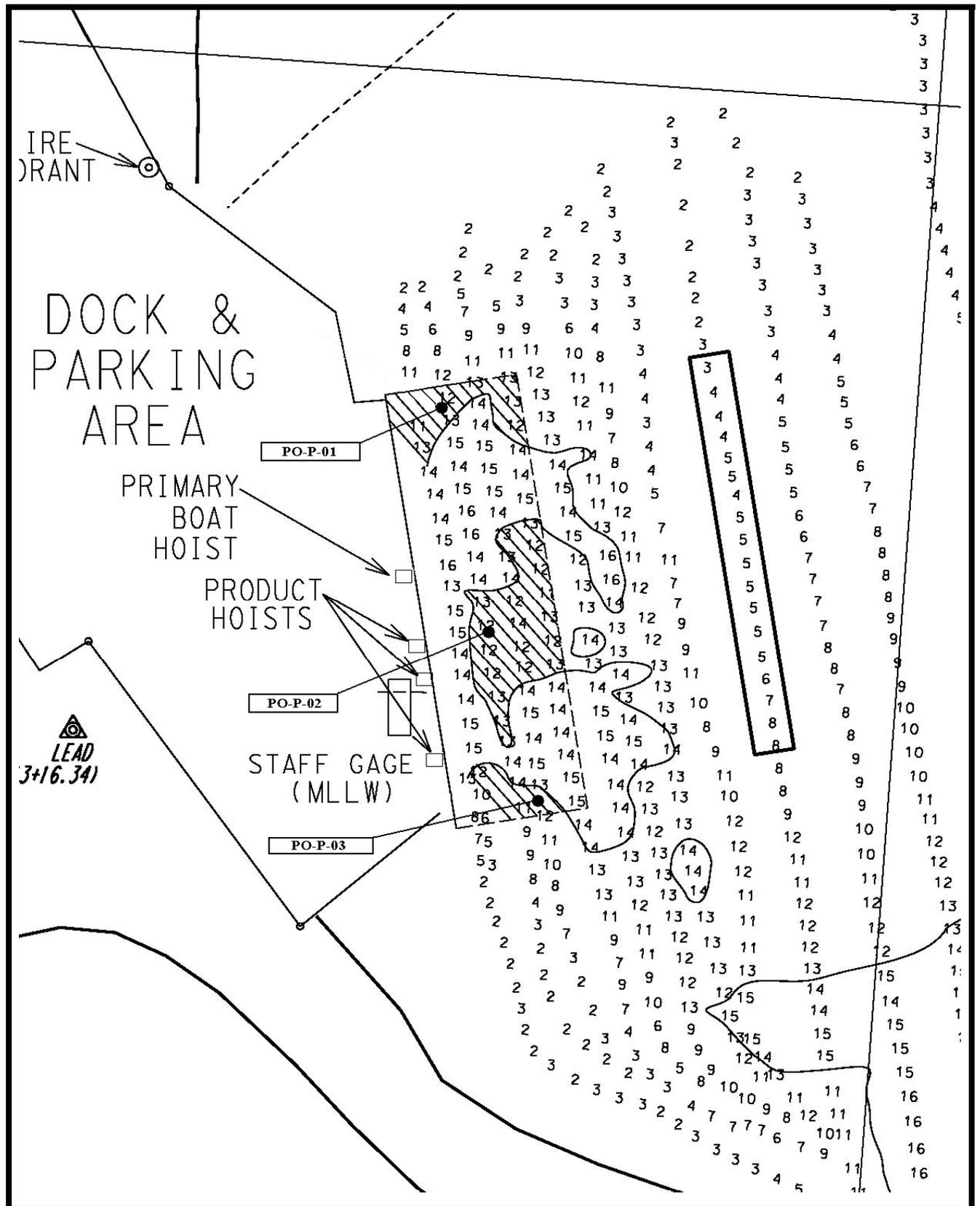


Figure 2. Port Orford Vicinity Map

