

Evaluation of Sediment at U. S. Coast Guard Station Ilwaco, Washington

Introduction

1. The channel leading into the U. S. Coast Guard boat basin at Ilwaco, Washington is being encroached by a shoal that is threatening to limit movement of Coast Guard boats in and out of the boat basin. Before this shoal can be dredged the sediment must be evaluated according to provisions of the Clean Water Act (CWA). The sediment is being proposed for disposal at a flow lane site in the Columbia River at mile 2.5 or at Area D located at river mile 6.5. Both sites are located in the state of Oregon. There is no historical evidence of contaminant point sources in the local area. Studies of nearby areas in Baker Bay, such as Chinook Channel and Baker Bay West Channel, have shown the sediments to be acceptable for unconfined in-water disposal (1,2,3).

Methods

2. On 19 March 1992 two samples of sediment were taken from the boat basin, using a modified, 0.96m², Gray O'Hare box corer, at the sites shown on the enclosed map. This sampler was used because the average dredging depth for the project is about 2 feet, which is the approximate depth of the sampler. Initial field observations of the sediment samples indicated that no additional testing, other than routine physical analyses, would be necessary to evaluate the suitability of the material for unconfined in-water disposal. Because of a lack of information on sediment chemistry in the area and because the sediment is in a boat basin, chemical analyses were also conducted to provide background information. The samples were subjected to physical and chemical analyses according to standard methods approved by the USACE and the EPA (4). Physical samples were cold stored in plastic baggies until analysis. The physical analyses pertinent to this evaluation included volatile solids content and grain size distribution. The chemical samples were cold stored in EPA approved, Pilcher Brand, acid washed and hexane rinsed glass containers with teflon lined lids. Chemical analyses were performed on the sediment samples to test for metals, tributyltin (TBT), acid volatile sulfides (AVS), pesticides, polychlorobiphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs) and phenols. See the appended raw data for a complete list of contaminants. A quality control and quality assurance report on the results of the chemical analyses was prepared by the U. S. Army Corps of Engineers Materials Lab, Troutdale, Oregon. That report is included with the enclosed raw data and chain of custody forms.

Results/Discussion

3. Table 1 shows the results of the physical analyses of the sediment samples. These results confirm field observations regarding the probable suitability of the material for unconfined in-water disposal. The sediment is low in organic content as evidenced by the low percentage of volatile solids - about 1%. The material is around 89 % sand, 9% silt and 2% clay. Mean grain size of the sediment particles is 0.20 mm or that of fine sand. This shows the material to be similar in grain size to that in the proposed disposal sites. The mean grain size of sediment at Area D is 0.19 mm (5,6) and that of the flow lane site is approximately 0.21 to 0.29 mm as determined from examining grain sizes of samples from the mouth of the Columbia River to the flow lane area (7,8).

4. Table 2 shows the results of chemical analyses of the sediment samples. All values for contaminants were compared to established screening levels for sediment. Metals concentrations were below screening levels. Pesticides, PCBs, PAHs and TBT were undetected. Phenol was found in both samples in amounts below concern levels (100 and 91 ppb). The actual amount of phenol is probably lower because some phenol in the samples may have been contributed by the method blank, which was also found to contain a small amount of phenol (72 ppb). None of 4 other kinds of phenols were detected in the samples. AVS ranged from 0.04 to 0.07 μ moles/g dry weight basis. This is less than 0.003 % sulphur in the sediment. The sulphur content of sediment can be important if there is metals contamination since the sulphur can form metal sulfides that render metals less toxic. Since there is no metals contamination in the sediment samples, the AVS content is less important but does provide background information.

5. A quality assurance appraisal of the contract chemical analyses was conducted by USACE Materials Lab in Troutdale, Oregon. That appraisal is attached to this report. Detection limits, reported here as Method Reporting limits (MRLs), for metals, pesticides, PCBs, PAHs and TBT, were acceptable as they were lower than established screening levels of concern. None of the above mentioned analytes were found in the method blanks. Likewise, holding times, surrogate recoveries, matrix spike recoveries and relative percent differences were acceptable and within quality control (QC) limits. The project data and QC for these analytes were considered acceptable.

6. The project data for phenolics were acceptable except for the compound phenol. Phenolic surrogates, matrix spike and matrix spike duplicates were above QC limits. This suggests that the method would overestimate the concentrations of phenolics in the sediment samples. However, this did not effect the data since phenolics were not detected in the sediment except phenol, which was also found in the method blank. Table 3 shows a comparison of phenols concentrations at other locations in the estuary. An examination of Table 3 shows that the phenol levels in the Coast Guard samples are similar to other locations in the area. Sediments from the locations shown in Table 3 have been disposed in-water at approved disposal sites. There are no known point sources of phenols in the area of the Coast Guard boat basin. And, as mentioned above, the analytical method would tend to overestimate the concentrations of phenolics in the sediment but none were detected.

7. In conclusion, the bulk sediment concentrations of metals, pesticides, PCBs, PAHs and TBT are below concern levels. Overall evidence indicates that phenolics are probably below concern levels. There is little organic carbon in the sediment and the sulphur content is low. The material is primarily clean fine-grained sand.

Recommendations

8. The sediment is uncontaminated sandy material similar in grain size to the proposed disposal sites located in Oregon. No unacceptable adverse ecological impacts are expected from its disposal.

9. This sediment quality report was prepared by Jim Britton, U. S. Army Corps of Engineers, Portland District, Reservoir Regulation and Water Quality Section (326-6471).

Table 1. Results of physical analyses of sediment from the U. S. Coast Guard boat basin at Ilwaco, Washington

sample	sand %	silt %	clay %	volatile solids %	mean grain size mm
CG-BC-1	90.2	7.8	2.0	1.05	0.19
CG-BC-2	87.6	9.8	2.6	1.02	0.21

Table 2. Results of chemical analyses of sediment from the U. S. Coast Guard boat basin at Ilwaco, Washington.

sample	metals										organics				
	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	AVS	TBT	pesticides	PCBs	PAHs	phend	
	ppm										ppb				
	umoles														
CG-BC-1	2	ND	8	6	ND	ND	ND	34	0.04	ND	ND	ND	ND	100~	
CG-BC-2	3	ND	10	8	ND	ND	ND	40	0.07	ND	ND	ND	ND	91~	
MRL*	1	1	1	1	0.2	10	20	1	0.01	2.3	1-30	10	33-88	43	

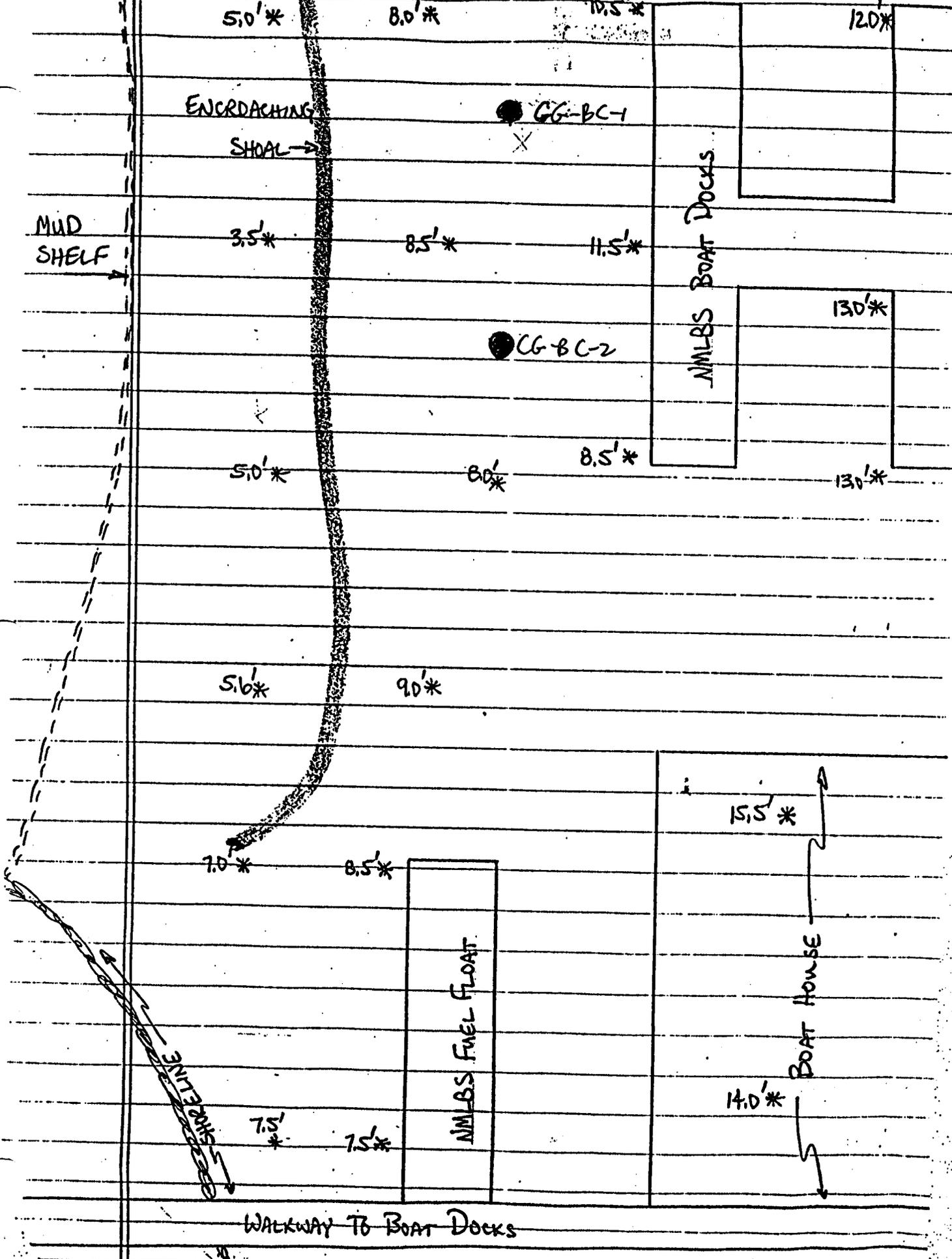
* Method Reporting Limit (detection limit)

~ questionable, method blank contaminated

REFERENCES

1. Turner R. and Babcock S. U. S. Army Corps of Engineers, Portland District. 28 December. 1988. Results of 1987 Baker Bay at Ilwaco, Washington Sediment Quality testing.
2. U. S. Army Corps of Engineers, Portland District. June 1981. Factual determinations Columbia River at Baker Bay Proposed Channel Improvement.
3. CENPP, Portland District. 1980. Findings of Compliance Dredged Material Disposal Operations Chinook Federal Navigation Project July - August 1980.
4. EPA (Environmental Protection Agency). 1977. Ecological evaluation of proposed discharge of dredged material into ocean waters. Published by Environmental Effects Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
5. Britton J. U. S. Army Corps of Engineers, Portland District. 29 August 1990. Area D Interim Site Sediment Evaluation.
6. Ogden Beeman & Associates and Shapiro & Associates. 1987. Evaluation of effects of dredged material disposal at Area "D" Columbia River estuary. Prepared for: U.S. Army Corps of Engineers, Portland District.
7. Britton J. U. S. Army Corps of Engineers, Portland District. 21 August 1990. Mouth of Columbia River Sediment Evaluation.
8. Britton J. U. S. Army Corps of Engineers, Portland District. May 1991. Sediment Evaluation of Proposed New Area D In-Water Disposal Area.

SOUNDINGS TAKEN AT '0 TIDE



DRAWINGS NOT TO SCALE

Table 3. Comparison of phenol concentrations* at other locations in the Columbia River estuary to that of U. S. Coast Guard boat basin sediment.

compound	Coast Guard Boat Basin (1992)	Tongue Point Boat Basin (1988)	Warrenton Boat Basin (1991)	Astoria West Mooring (1990)	Proposed Area D Disposal Site (1991)
	ppb				
phenol	100~	<67	80	<100	100
2 methylphenol	<44	-	<20	<100	<20
4 methylphenol	<44	<67	100	<100	<20
2,4-dimethylphenol	<44	<130	<20	<100	<20
pentachlorophenol	<110	<330	<50	<100	<20

* maximum concentration reported

~ questionable, method blank contaminated