RESULTS OF 1987 BAKER BAY AT ILWACO, WA SEDIMENT QUALITY TESTING

Introduction

The Ilwaco navigation channel between RM 1.39 and RM 3.1 contains shoals of fine grained material. In order to return the navigation channel to project depth of -16 feet, approximately 70,000 cubic yards (cy) of material will have to be dredged. Dredging is proposed for 1989. All dredged materials with acceptable water and sediment quality will be disposed at a dispersive in-water site in the Columbia River estuary.

Chemical testing for contaminants in shoal sediments is necessary to determine whether the disposal discharges into the Columbia River will meet Clean Water Act Section 401 water quality standards, to avoid unacceptable adverse impacts on either water column or benthic aquatic life.

Sampling Procedures

Sediment samples were collected on 31 July 1987 at each shoal in the project (Figure 1). A gravity corer and Ponar grab sampler were used to collect all the samples. Choice of the sampler type was determined by the type of sediment and the thickness of the shoal. The grab sampler was used for sandy materials and the gravity corer for fine grained materials.

Testing of sediment samples included physical analysis, bulk chemistry and elutriate testing. Samples of similar sediments at RM 2.5 were composited.

Sediments

Sediments sampled between RM 1.39 and RM 3.1 contained a high percentage of fine-grained material. In direct contrast sediments between RM 0 and RM 1.32 were more coarse grained, containing little very fine sand or silt.

Results from Chemical and Biological Testing

Results from chemical and biological testing were returned to PL-CH during September 1987 (Table 1). They are summarized as follows:

1. Elutriate test results for metals showed that all were below freshwater chronic toxicity standards for water quality (EPA "Gold Book" water quality criteria, 1986) for three samples at RM 3.1, 2.5, and 1.32. Ammonia releases were high for the fine-grained sediments at RM 3.1 and 2.50, ranging from 19.0 to 35.7 ug/L. These releases exceeded both the chronic toxicity standard of 2.2 ug/L and the acute toxicity standard of 15.5 ug/L. The highest ammonia release occurred at RM 3.1, near the entrance of the Mooring Basin.

2. Sediment contaminant levels in Ilwaco channel sediments generally fall below screening levels for "clean" sediments in other areas of the country (Great Lakes, New England and Puget Sound). However, sediments at RM 3.1 showed cadmium and mercury values substantially elevated above what is considered to be background levels for Oregon sediments.

Recommendations

The chemical test data generated in this program exceed previous sediment quality evaluations in the Ilwaco Channel at Baker Bay and are considered representative of the Federal project sediments to be dredged. In regards to the RM 3.1 shoal, the Port of Ilwaco removed a large portion of the contaminated shoal at RM 3.1 after our sampling occurred in 1987; therefore, this shoal should be resampled and chemical tests for cadmium and mercury, the two elevated species in the old shoal, run to check current contamination levels.

Except for the old shoal at RM 3.1, sediments to be dredged are acceptable, from a toxicity standpoint, for unconfined in-water disposal in the Columbia River. We would not reasonably expect acute or chronic toxicity/bioaccumulation effects from most of the sediments.

Elevated dissolved ammonia levels in elutriate test results are a concern. If disposed in-water, the sediments should be disposed of at a dispersive site, during high flow conditions. Some localized, temporary elevation of ammonia levels within and downstream of the disposal site is expected to occur. However, ammonia levels will be below toxicity levels in the water column as sediments disperse downstream.

This sediment quality evaluation was completed by Mr. Rudd Turner, and Ms. Sally Babcock of the Coastal and Flood Plain Management Branch, Planning

Division, USACE Portland District. Analytical chemistry was performed under the direction of Dr. Eric Crecilius, Battelle Northwest Marine Sciences Laboratory, Sequim, Washington. Heavy metal analyses were run by Battelle at the Sequim lab while organic analyses were run by Analytical Resources Inc., Seattle, Washington, under contract to Battelle.

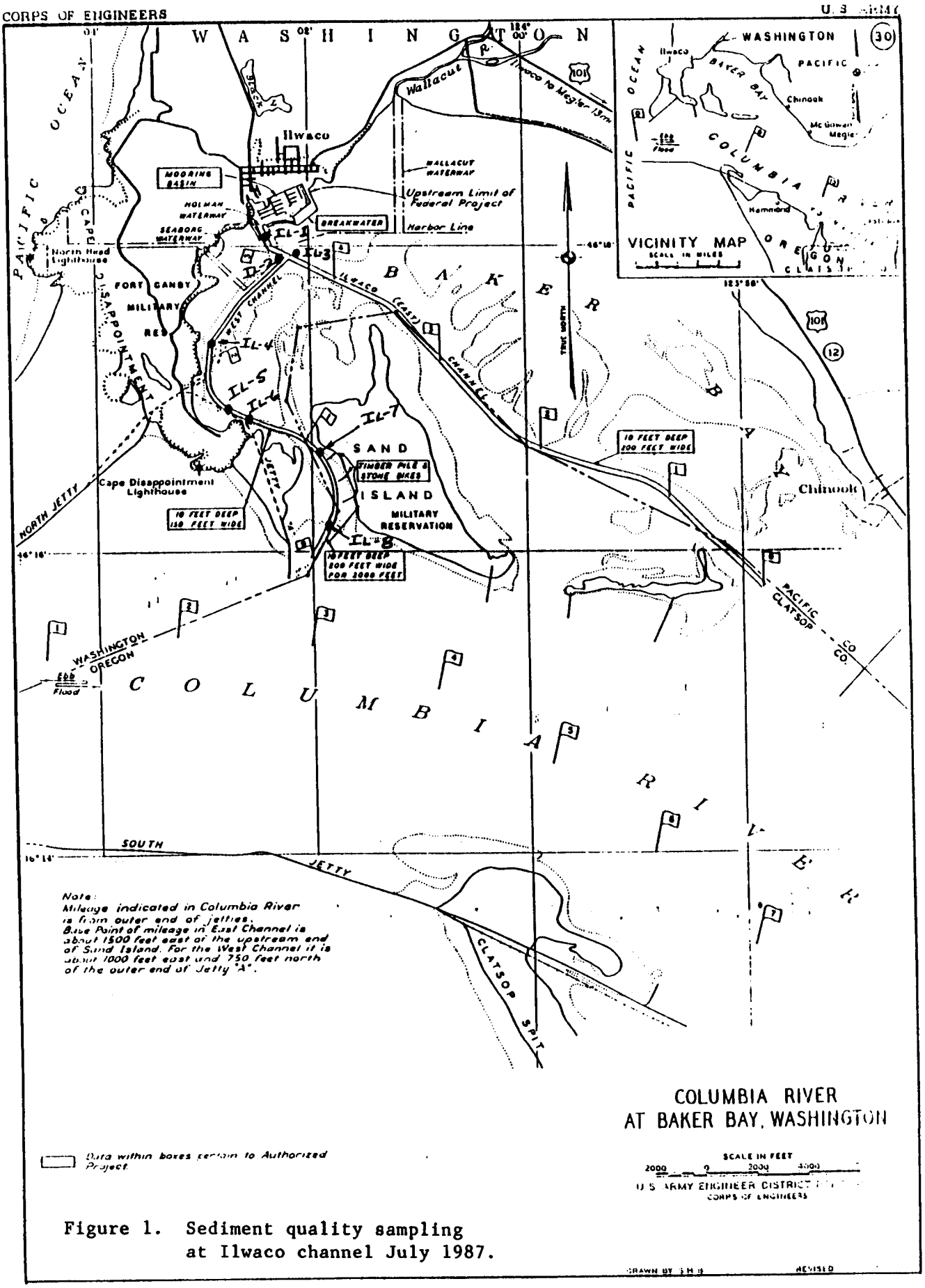

Figure 1. Sediment quality sampling at Ilwaco channel July 1987.

Table 1. Sediment and water quality analysis results for Ilwaco channel.

ILWACO SEDIMENT QUALITY ANALYSES FOR SEDIMENT SAMPLES									ILWACO WATER QUALITY ANALYSES FOR ELUTRIATES			
SAMPLE NUMBERS	IL-1	IL-2	IL-3	IL-4	IL-5-1	IL-6-1	IL-7-1/2	IL-8-2	RE EIVING	IL-1	IL-2/3	IL-6
RIVER MILE	3.10	2.5	2.5	2.10	1.39	1.32	0.48	0.22	WATER	ELUTRIATE	ELUTRIATE	ELUTRIATE
FINE SAND	98.00	97.00	99.70	98.00	94.80	68.10	54.60	17.40				
V.F. SAND	89.50	83.80	99.00	86.30	73.00	5.20	1.00	1.00				
SILT	86.00	77.30	94.20	79.40	69.20	3.30	0.30	0.30				
CLAY	16.00	16.00	20.00	13.50	10.00	0.00	0.00	0.00				
VOL SOL	5.50	4.70	6.00	4.40	3.90	0.80	0.60	0.60				
TOC				8.57	7.63	0.53	0.24	0.18				
OIL/GREASE						343						
AMMONIA (NH4)									0.39	35.70	19.00	0.13
METALS (ppm)												
As	8.10	4.90	5.80	5.60	5.00	1.90	1.90	2.70	0.43	5.50	6.50	0.65
Cd	1.13	0.46	0.56	0.62	0.24	0.13	0.02	0.05	0.110	0.006	0.005	0.092
Cr	23.20	11.60	13.90	13.90	16.30	8.40	7.40	5.20	0.20	0.24	0.14	< 0.06
Cu	39.20	29.40	35.30	31.40	27.40	7.84	3.92	5.88	1.71	0.68	0.58	0.48
Fe (seds in %)	2.44	2.00	2.26	2.14	2.08	1.06	0.98	1.22	23.50	66.80	98.10	17.40
Hg	0.184	0.066	0.093	0.087	0.061	0.012	0.002	< 0.002	0.0013	0.0007	0.0003	0.0012
Mn	265.00	185.00	242.00	167.00	192.00	107.00	110.00	155.00	15.30	1180.00	2170.00	35.10
Ni	22.60	10.00	15.10	12.60	15.10	12.60	12.60	7.54	1.94	1.74	1.98	1.01
Pb	21.50	10.90	14.70	12.20	5.56	3.24	1.66	2.10	0.41	0.41	0.10	0.05
Zn	154.00	88.00	110.00	96.00	54.00	26.00	18.00	22.00	17.40	2.63	2.32	3.20
PESTICIDES (ppb)												
Aldrin				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
alpha-BHC				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chlordane				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDD				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDE				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDT				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dieldrin				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endosulfan				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endrin				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PCBs	14.00			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lindane				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Methoxychlor				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Toxaphene				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PAHs (ppb)												
Low Molecular PAHs												
Acenapthene				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acenaphthylene				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Anthracene				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fluoranthene				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Napthalene		600	400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phenanthrene				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL LM PAHs	0	600	400									
High Molecular PAHs												
B.anthracene				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
B.fluoranthane				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
B.Perylene				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
B.Pyrene				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
Chrysene				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
D.anthracene				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
Fluorene				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
I.Pyrene				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
Pyrene				N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
TOTAL HM PAHs	0	0	0				0					