

PHYSICAL ANALYSIS OF BROOKS SLOUGH SEDIMENT SAMPLES

by
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Methods

Three surficial sediment samples were collected from Brook's slough in the lower, middle, and upper portions of a proposed navigation channel, to determine grain size distribution and percentage volatile solids of materials to be dredged from the proposed channel. The samples were taken on 1 May 1984 from 1330 to 1430 hours, with the tide flooding and approaching high slack. Samples were collected adjacent to the gas dock, the Point Adams net rack, and Mr. Kent Martin's boat house in the approximate centerline of the proposed channel (Figure 1).

Ponar and Dietz-LaFond type benthic grabs were cast 8-10 times at each station to obtain enough sample for analysis. Samples appeared to be to be predominately brown fine sand with a thin surficial layer of brown silt. Grabs penetrated 5-7 cm or less into the bottom. Small wood and bark chips were present in some grabs. These chips frequently fouled the grab by holding the jaws open, thus allowing sediments to wash out during retrieval. Wood was most frequently encountered at the downstream gas dock station.

Samples were placed in wide-mouth 1 liter plastic capped jars, labeled, and delivered to the North Pacific Division Materials Lab in Troutdale, OR. Grain size analysis was performed there by seive/hydrometer techniques. Organic content was determined as the fraction of the dry sample volatilized during heating at 600° C. for one hour.

Results

Brooks Slough sediments were either clayey silty or silty fine sands with high silt and clay fractions (Figures 2-4). Percentages silts and clays (particle diameter less than 62u) ranged from 26% for sample C to 38% for sample B. Using the CoE designation of silts and clays as those grain sizes below 74u, samples ranged from 30% for sample B to 49% for sample C. Organic (volatile solids) content ranged from 5.4-6.0%, and was lowest in those samples with the higher silt/clay fractions. Results are summarized in Table 1.

Conclusions

Although each sample had a higher silt/clay fraction, organics were lower than levels present in a sample taken in May 1980 in Skamokawa Creek at mile 0.25, approximately 200 feet downstream of the gas dock sample station in Brooks Slough. Results of a comprehensive series of chemical analyses had already been reported for this sample (Fuhrer and Rinella 1983). Contaminant levels were mostly below EPA water quality standards in elutriate samples, with the exception of ammonia and phenols.

Upon consultation with Stu McKinzie and Greg Fuhrer of the U.S.G.S. in Portland, who in turn consulted with Raleigh Grabbe, a chemist with the U.S.G.S. in Denver, we decided not to proceed with chemical analysis of Brooks Slough sediments. They suggested that the concentration of contaminants in the Brooks Slough samples could be estimated to be directly proportional to the number of available chemically reactive sites in the sediment, which in turn could be represented by the sample's silt/clay fraction. Slough samples averaged 37% silt/clay, about twice the 18% silt/clay that had been observed for the Skamokawa Creek sample (Fuhrer and Rinella 1983). Thus, contaminant levels could be expected to be about twice the level observed in Skamokawa Creek. Contaminant

levels of the adjacent Skamokawa Creek sample were so low, however, that U.S.G.S. considered it extremely unlikely that Brooks Slough sediments would pose any contamination problems during disposal, even considering their higher silt/clay fraction. Phenols were of some concern but, unless all the observed concentration existed as penta-group compounds (an extremely unlikely alternative), there would be no disposal problem.

The U.S. Fish and Wildlife Service has expressed interest in placing the dredged material on a upland site in The Columbian White-tailed Deer National Wildlife Refuge near the project. It is our belief that sediment from Brooks Slough is clean and that, because of the high fraction of fine-grained sediments present, it would be a good substrate on which to grow vegetation at such an upland dredged material disposal site.

Reference

Fuhrer, G.J. and F.A. Rinella. 1983, Analyses of Elutriates, Native Water, and Bottom Material in Selected Rivers and Estuaries in Western Oregon and Washington. Open File Report 82-922. U.S. Geological Survey and U.S. Army Corps of Engineers. Portland, Oregon. 147 pp.

SKAMOKAWA: F1 1

BROOKS SLOUGH

BENTHIC GRAB SAMPLES:

TAKEN 1 MAY 1984

1330-1430

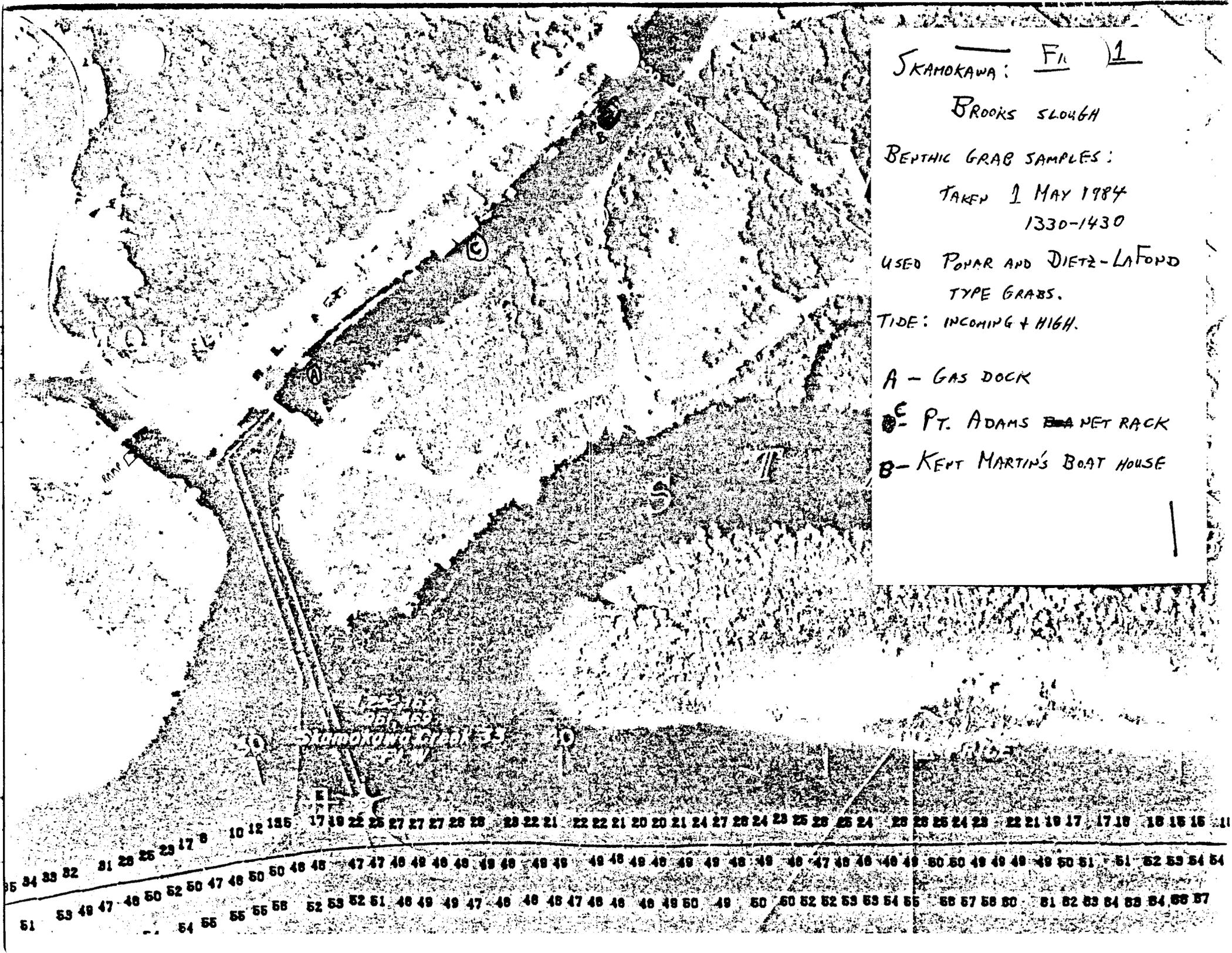
USED POHAR AND DIETZ-LAFOND
TYPE GRABS.

TIDE: INCOMING + HIGH.

A - GAS DOCK

C - PT. ADAMS ~~NET~~ RACK

B - KENT MARTIN'S BOAT HOUSE



35 34 33 32 31 29 28 29 17 8 10 12 13 5 17 18 22 25 27 27 27 28 28 28 22 21 22 22 21 20 20 21 24 27 28 24 23 25 26 25 24 23 23 23 25 24 23 22 21 19 17 17 18 18 15 15 11
51 53 49 47 48 50 52 50 47 48 50 48 48 47 47 48 49 48 48 49 48 49 49 49 48 49 48 47 48 48 48 49 50 49 50 50 52 52 53 53 54 55 56 57 58 59 81 82 83 84 83 84 58 57

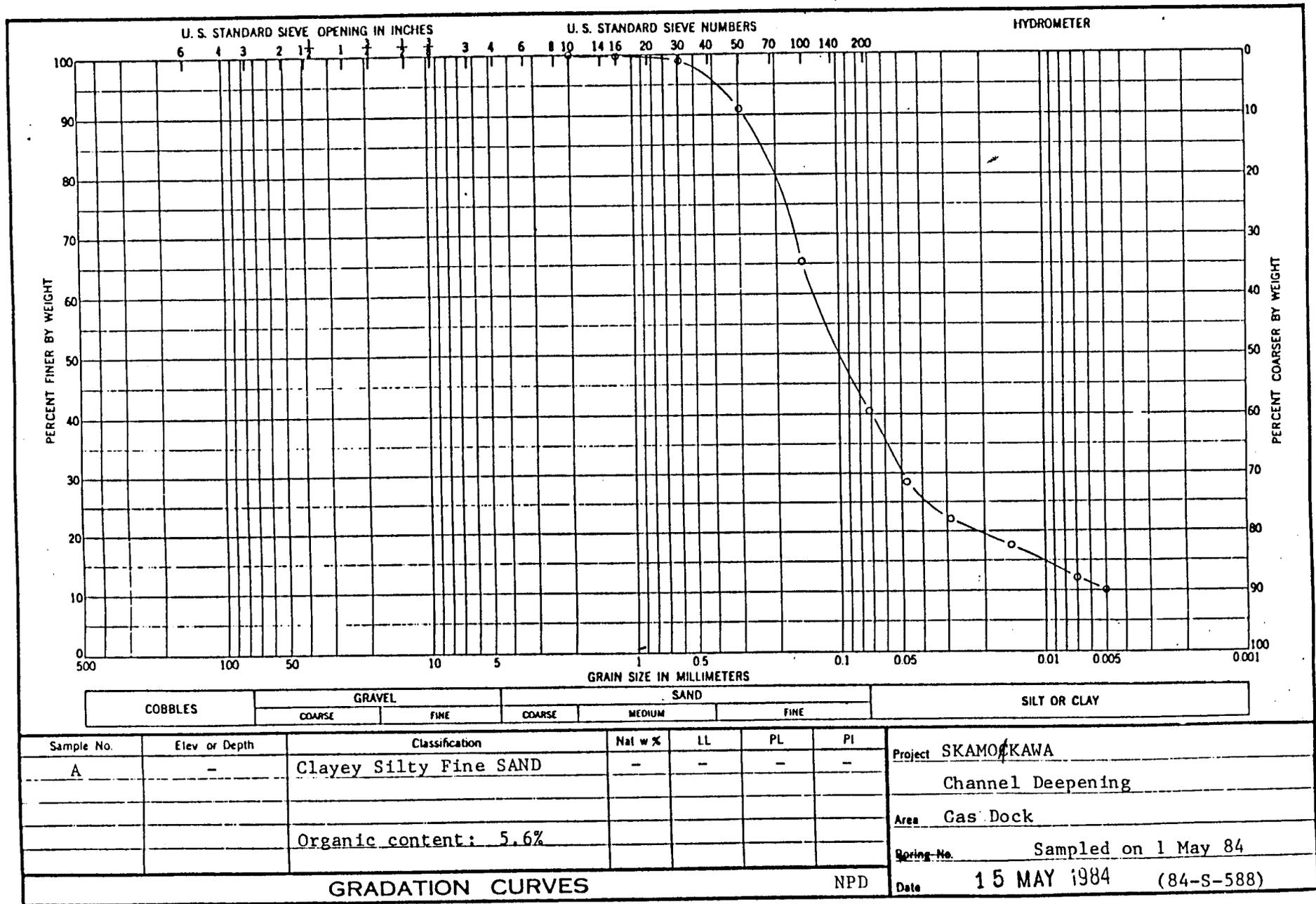
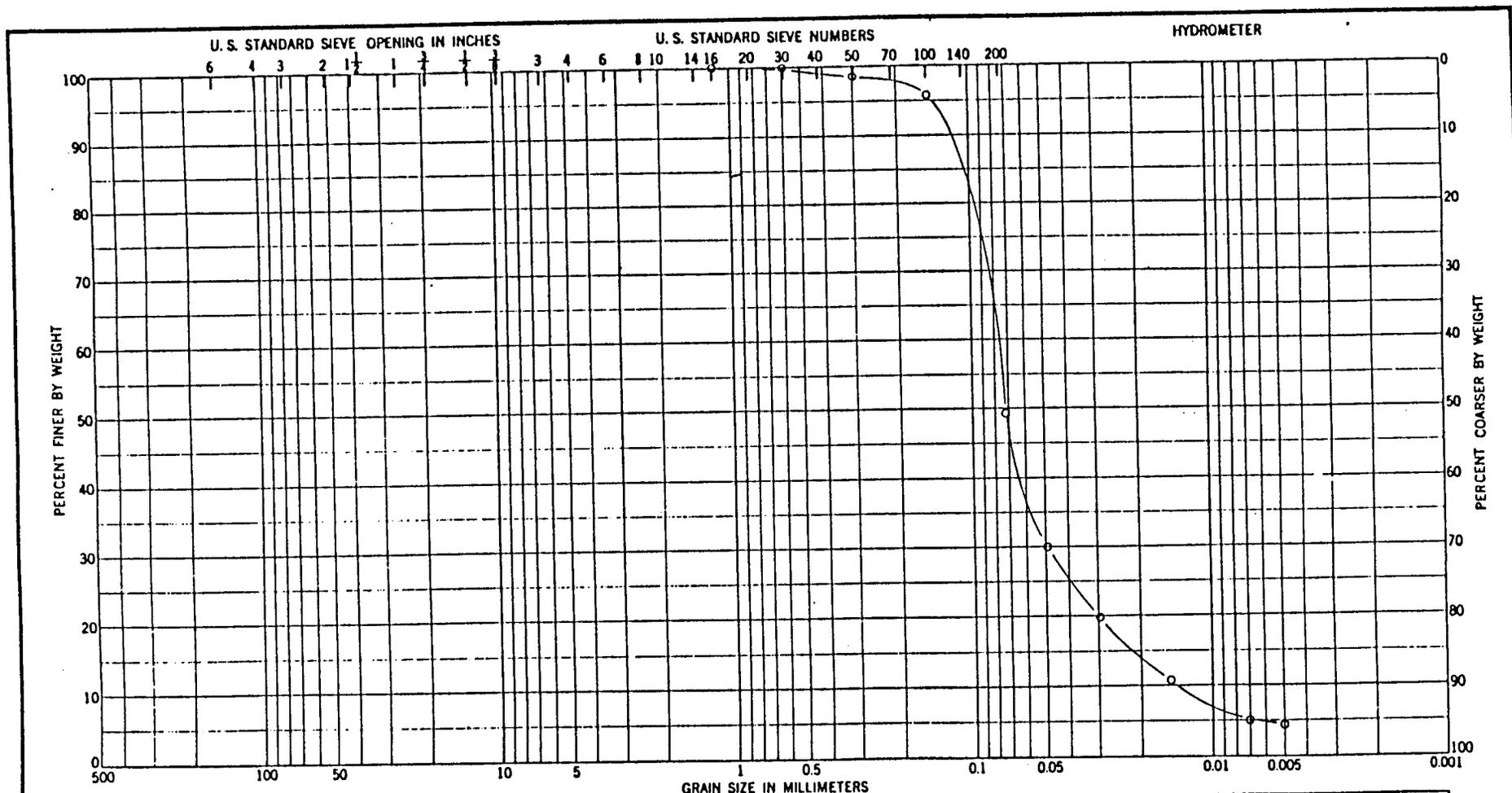


FIGURE 2.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	Project <u>SKAMOZAKAWA</u> <u>Channel Deepening</u> Area <u>Boat House</u> Boring No. <u>Sampled on 1 May 84</u> Date <u>15 MAY 1984</u> (84-S-588)
B	-	Silty Fine SAND	-	-	-	-	
		Organic content: 5.4%					
GRADATION CURVES							
NPD							

FIGURE 4.

Table 1. Grain size and organic content percentages for three Brooks Slough sediment samples collected 1 May 1984 and a Skamokawa Creek sediment sample collected 15 May 1980.

Sample Location	Gas Dock	Point Adams Net Rack	Martin's Boat House	Skamokawa Creek(mile 0.25)
Area of Proposed Channel	Lower End	Middle	Upper End	200 Feet Downstream of Gas Dock
Grain Size				
2-0.42mm(medium sand)	3%	1%	1%	7%
420-62um(fine sand)	60%	73%	61%	75%
62-5um(silt)	27%	18%	34%	12%
less than 5um (clay)	10%	8%	4%	6%
Organic Content	5.6%	6.0%	5.4%	6.3%