HYDRAULICS DIVISION

Technical Note

DATE: March 1981 **REPORT NO:** 81-06

TITLE: Particle Size Data Report 81-04

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REASON FOR REPORT:

This report responds to a request for particle size data by W. Haras, Shore Properties Section, Fisheries and Oceans.

CORRESPONDENCE FILE NO:

5690 (Study No. 2304)

1.0 INTRODUCTION

This report provides the results of particle size analysis on a core from the Oshawa Marsh, submitted by W. Haras, Fisheries and Oceans.

The core was 22.75 cm long and had the top 13.5 cm of gravel removed on site by the scientist. The remaining material at 13.5 to 14 cm long was a sandy mud, 14-17.75 cm sandy gravel, and the remaining material at 17.75 to 22.75 cm of gravelly mud (till).

2.0 PROCEDURE

Two procedures were used to analyse the samples:

1. <u>Sieve Settling Tube, Pipette and Sedigraph Procedure</u>

   This procedure provides gravel, sand silt and clay percentages with 1/2 PHI resolution of the size classes (Duncan and LaHaie, 1979). Briefly, the procedure consists of:

   i) Splitting the sample to 20g.
   ii) Sieving the split at - 1/2 PHI (1.41 mm).
   iii) Dispersing the sample in 50 ml of Calgon solution (50 g/l and mixing it for 15 minutes.
   iv) Recovering a pipette aliquot of 25 ml for sedigraph analysis.
   v) Automatic analysis by sedigraph.
   vi) Wet sieving the remaining suspension at 4.5 PHI (0.044 mm).
   vii) Resolving the sand residue with settling tube analysis.
   viii) Processing the results with SIZDIST: A FORTRAV IV computer program.

2. Sieve analysis which provides gravel, sand and silt/clay percentages was used to analyse two samples.

   Briefly, the procedure consists of:

   i) Splitting the sample to 100-200 g.
   ii) Sieving the split at 1/2 or 1/4 PHI intervals.
   iii) Processing the results with SIZDIST: a FORTRAN IV computer program.

3.0 RESULTS

Appendix 1 lists the size analysis results for each sample.

1) For the sieve, settling tube, pipette and sedigraph method, the output consists of:

   i) A histograph of the frequency distribution.
   ii) The percentage and cumulative percentage of the material occurring within each 1/2 PHI unit.
   iii) Moment measure statistics (Krumbein & Pettijohn, 1938).
   iv) Percentiles.
   v) Percent gravel, sand, silt and clay. Percentages of silt and clay are expressed as "(PIPETTE)" and "(SEDIGRAPH)" to show reproducibility of the two methods.
   vi) Ratios used to plot Folk's Ternary Classification.
   vii) Shepard (1954) and Folk (1968) Ternary Classification.

2) For the Sieve Method, the output consists of:

   i) A histograph of the frequency distribution.
   ii) The percentage and cumulative percentage of the material occurring within 1/2 PHI unit.
   iii) Moment measures (Krumbein and Pettijohn, 1938) and graphic (Folk and Ward, 1957) statistics.
   iv) Percentiles.
   v) Percent gravel, sand and silt/clay.
   vi) Ratios used to plot Folk's Ternary Classification.
   vii) Shepard (1954) and Folk (1974) Ternary Classification.

4.0 REFERENCES

Duncan, G. A. and LaHaie, G. G., 1979. "Size Analysis Procedures Used in the Sedimentology Laboratory, NWRI". Hydraulics Division Manual, September 1979.

Folk, R. L., 1968. "Petrology of Sedimentary Rocks". Hemphill Publishing Co., Austin, Texas, 182 p.

Folk, R. L. and Ward, W. C., 1957. "Brazos River Bar: A Study in the Significance of Grain-Size Parameters". Jour. Sed. Petrology, v. 27, p. 3-26.

Krumbein, W. C. and Pettijohn, F. J., 1938. "Manual of Sedimentary Petrography". Appleton-Century-Crofts, New York, 549 p.

Shepard, F. P., 1954. "Nomenclature Based on Sand-Silt Ratios". Jour. Sed. Petrology, V. 24, p. 151-158.

APPENDIX 1

Size Analysis Data

OSHAWA 13.5-14 171280 SIEVE,SETT.TUBE,PIPET,SEDIGRAPH SAMPLE WT.= 22.1010

PHI	PCT.	CUMPCT.		01/09/81
-.50				
	0.00			
0.00		0.00		
	.20			
.50		.20		
	.61		*	
1.00		.82		
	.41			
1.50		1.23		
	1.02		*	
2.00		2.25		
	1.43		*	
2.50		3.68		
	2.25		**	
3.00		5.93		
	2.25		**	
3.50		8.18		
	2.05		**	
4.00		10.23		
	0.00			
4.50		10.23		
	1.80		**	
5.00		12.02		
	4.49		****	
5.50		16.51		
	7.18		*******	
6.00		23.69		
	7.63		********	
6.50		31.32		
	7.63		********	
7.00		38.96		
	8.08		********	
7.50		47.03		
	7.18		*******	
8.00		54.22		
	4.49		****	
8.50		58.70		
	6.28		******	
9.00		64.99		
	4.49		****	
9.50		69.48		
	3.59		****	
10.00		73.07		
	3.59		****	
10.50		76.66		
	3.59		****	
11.00		80.25		
	3.59		****	
11.50		83.84		
	16.16		**********	
*****		100.00		

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
7.14	2.37	-.20	-.11	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE 0.0 TO 11.5 PHI

> 5 PERCENT OF THE FINES ARE NOT RESOLVED, OBTAIN FOLK STATS. GRAPHICALLY

PERCENTILES	MEDIAN 7.71	5TH 2.79	16TH 5.44	25TH 6.09
		75TH 10.27	84TH******	95TH******

PCT. GRAVEL	0.00	SAND	10.23	SILT (PIPETTE)	45.49	CLAY (PIPETTE)	44.28
				(SEDIGRAPH)	43.99	(SEDIGRAPH)	45.78

GRAVEL+SAND 10.23 SILT/(SILT+CLAY) 49.00PCT.GRAV+SAND/SILT+CLAY .11

LABELS SHEPARD -SILTY CLAY FOLK(GMS)-SANDY MUD (SCS)-SANDY MUD

COMMENTS -
OSHAWA 13.5-14 ORGANIC DETRITIS PRESENT

OSHAWA 14-17.75 171280 SIEVE ONLY SAMPLE WT.=172.2700

01/09/81

PHI	PCT.	CUMPCT.	
-4.50			
	15.83		**********
-4.00		15.83	
	18.00		**********
-3.50		33.82	
	3.48		***
-3.00		37.31	
	6.98		*******
-2.50		44.29	
	3.20		***
-2.00		47.49	
	3.69		****
-1.50		51.18	
	3.86		****
-1.00		55.04	
	3.38		***
-.50		58.43	
	2.87		***
0.00		61.30	
	3.66		****
.50		64.96	
	2.90		***
1.00		67.86	
	2.83		***
1.50		70.69	
	4.66		*****
2.00		75.35	
	8.12		********
2.50		83.46	
	8.49		********
3.00		91.95	
	4.10		****
3.50		96.05	
	1.71		**
4.00		97.76	
	2.24		**
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
-1.13	2.74	.17	-1.46	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -4.0 TO 4.0 PHI
-1.04	2.80	.29	.55	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN -1.66 5TH -4.34 16TH -4.00 25TH -3.75
75TH 1.96 84TH 2.53 95TH 3.37

PCT. GRAVEL 55.04 SAND 42.72 SILT+CLAY 2.24
GRAVEL+SAND 97.76 GRAV+SAND/SILT+CLAY 43.63
LABELS SHEPARD -SAND FOLK(GMS)-SANDY GRAVEL (SCS)-

OSHAWA 17.75-22.75171280 SIEVE,SETT.TUBE,PIPET,SEDIGRAPH SAMPLE WT.= 32.7780

PHI	PCT.	CUMPCT.	01/09/81
-4.00			
	10.62		**********
-3.50		10.62	
	0.00		
-3.00		10.62	
	.88		*
-2.50		11.50	
	3.60		****
-2.00		15.10	
	2.17		**
-1.50		17.27	
	.98		*
-1.00		18.24	
	.64		*
-.50		18.88	
	.22		
0.00		19.10	
	1.97		**
.50		21.07	
	1.97		**
1.00		23.03	
	2.40		**
1.50		25.43	
	3.71		****
2.00		29.15	
	2.95		***
2.50		32.09	
	4.48		****
3.00		36.57	
	6.33		******
3.50		42.90	
	5.46		*****
4.00		48.36	
	.53		*
4.50		48.89	
	2.90		***
5.00		51.79	
	4.22		****
5.50		56.00	
	5.53		******
6.00		61.53	
	4.74		*****
6.50		66.28	
	3.43		***
7.00		69.70	
	3.95		****
7.50		73.65	
	3.19		***
8.00		76.84	
	3.14		***
8.50		79.98	
	2.11		**
9.00		82.08	
	1.58		**
9.50		83.66	
	1.84		**
10.00		85.51	
	1.32		*
10.50		86.83	
	1.58		**
11.00		88.41	
	1.84		**
11.50		90.25	
	9.75		**********
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
3.54	4.23	-.13	-.85	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -3.5 TO 11.5 PHI

> 5 PERCENT OF THE FINES ARE NOT RESOLVED, OBTAIN FOLK STATS. GRAPHICALLY

PERCENTILES MEDIAN 4.69 5TH -3.76 16TH -1.79 25TH 1.41

75TH 7.71 84TH 9.59 95TH******

PCT. GRAVEL 18.24 SAND 30.12 SILT (PIPETTE) 30.42 CLAY (PIPETTE) 21.22

(SEDIGRAPH) 28.48 (SEDIGRAPH) 23.16

GRAVEL+SAND 48.36 SILT/(SILT+CLAY) 55.15PCT.GRAV+SAND/SILT+CLAY .94

LABELS SHEPARD -SAN STL CLY FOLK(GMS)-GRAVELLY MUD (SCS)-

23688