HYDRAULICS DIVISION

Technical Note

DATE: April 1981 **REPORT NO:** 81-12

TITLE: "Particle Size Data Report 81-06"

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REASON FOR REPORT: This report responds to a request for particle size data by W. Haras, Shore Properties Section, Dept. of Fisheries and Oceans.

CORRESPONDENCE FILE NO:

5690 (Study 2304)

1.0 INTRODUCTION

This report provides results of particle size analysis on dredge sediments off Port Stanley, Ontario.

W. Haras, Dept. of Fisheries and Oceans, submitted four samples to the Sedimentology Laboratory for grain-size analysis. The samples were analysed by Keith Salisbury and the results checked by G. Duncan.

The samples when received in the Sedimentology Laboratory were very poorly marked, and the numbers were faded.

The following are the numbers given to the samples. The first sample is correct, the next two the area is correct but no other information was readable, the fourth number area E** is a guess.

Sample 1 - Area E, Cut 1, 12+00, 7.6 m
Sample 2 - Area C
Sample 3 - Area E
Sample 4 - Area E**

Samples 1 and 4 are fine sands, sample 2 is a silt and sample 3 is mud.

2.0 PROCEDURE

Three procedures were used to analyse the samples:

(1) The Sieve, Short Pipette and Sedigraph Analyses, which provide sand, silt and clay percentages with 1/2 PHI resolution on the silt and clay classes, was used to analyse two samples (Duncan and LaHaie, 1979).

Briefly, the procedure consists of:

a) splitting the sample to 20 g.
b) dispersing the sample in 50 ml of Calgon solution (50 g/l) and mixing it for 15 minutes.
c) recovering pipette aliquots of 25 ml for (i) sedigraph analysis (ii) clay percentage.
d) automatic analysis by sedigraph.
e) processing the results with SIZDIST: a FORTRAN IV computer program.

(2) The Sieve, Short Pipette and Settling Tube Analysis, which provides gravel, sand, silt and clay percentages with 1/2 PHI resolution of the sand by the setting tube procedure was performed on one sample.

Briefly, the procedure consists of:

a) splitting the sample to 2g.

b) removing particles large enough to block Sedigraph Suction Tube (0.088 mm).

c) dispersing sample in a Calgon suspension.

d) automatic analysis with the Sedigraph.

e) processing the results with SIZDIST: a FORTRAN IV computer program.

3.0 RESULTS

(1) For the Sieve, Short Pipette and Sedigraph Analysis, the output consists of:

a) a histograph of the frequency distribution.

b) the percentage and cumulative percentage of the material occurring within each 1/2 PHI unit.

c) moment measure statistics (Krumbein and Pettijohn, 1938).

d) percentiles.

e) percent gravel, sand, silt and clay. Percentages of silt and clay are expressed as "(PIPETTE)" and "(SEDIGRAPH)" to show reproducibility of the two methods.

f) ratios used to plot Folk's Ternary Classification.

g) Shepard (1954) and Folk (1968) Ternary Classification.

(2) For the Sieve, Short Pipette and Settling Tube Method, the output consists of:

a) a histogram of the frequency distribution.

b) the percentages and cumulative percentages of the material occurring within 1/2 PHI unit.

c) moment measures (Krumbein and Pettijohn, 1938) and graphic (Folk and Ward, 1957) statistics.

d) percentiles.

e) percent gravel, sand, silt and clay.

f) ratios used to plot Folk's Ternary Cassification.

g) Shepard (1954) and Folk (1974) Ternary Classification.

(3) For the Sieve and Sedigraph Method, the output consists of:

a) a histogram of the frequency distribution.

b) the percentage and cumulative percentages of the material occurring within each 1/2 PHI unit.

c) moment measures (Krumbein and Pettijohn, 1938) and graphic (Folk and Ward, 1957) statistics.

d) percentiles.

e) percent gravel, sand, silt and clay.

f) ratios used to plot Folk's Ternary Classification.

g) Shepard (1954) and Folk (1974) Ternary Classifications.

4.0 REFERENCES

Duncan, G. A. and LaHaie, G. G., 1979. "Size Analysis Procedure 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, Vol. 27, pp. 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, Vol. 24, pp. 151-158.

APPENDIX 1

SIZDIST OUTPUT

E-1 250381 SIEVE,SETT.TUBE,PIPETTE(2) SAMPLE WT.= 23.5874

PHI	PCT.	CUMPCT.	
-.50			03/30/81
	0.00		
0.00		0.00	
	.08		
.50		.08	
	.68		*
1.00		.76	
	.76		*
1.50		1.52	
	3.04		***
2.00		4.56	
	15.96		**********
2.50		20.52	
	50.16		**********
3.00		70.67	
	21.28		**********
3.50		91.95	
	2.28		**
4.00		94.23	
	5.45		*****
8.00		99.69	
*****	.31	100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
2.74	.46	-.50	3.19	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURE FOR SIZE RANGE 0.0 TO 4.0 PHI
2.82	.62	.24	1.88	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 2.79 5TH 2.01 16TH 2.36 25TH 2.54
75TH 3.10 84TH 3.31 95TH 4.56

PCT. GRAVEL 0.00 SAND 94.23 SILT (PIPETTE) 5.45 CLAY (PIPETTE) .3
(SEDIGRAPH) 0.00 (SEDIGRAPH) 0.0

GRAVEL+SAND 94.23 SILT/(SILT+CLAY) 94.54 PCT.GRAV+SAND/SILT+CLAY 16.34

LABELS SHEPARD -SAND FOLK(GMS)-SAND (SCS)-SAND

C 250381 SIEVE, SH. PIP., SEDIGRAPH SAMPLE WT.= 16.7463

03/30/81

PHI	PCT.	CUMPCT	
3.50			
	0.00		
4.00		0.00	
	2.03		**
4.50		2.03	
	10.14		**********
5.00		12.16	
	14.86		**********
5.50		27.03	
	13.51		**********
6.00		40.54	
	10.81		**********
6.50		51.35	
	6.76		*******
7.00		58.11	
	5.41		*****
7.50		63.51	
	5.41		*****
8.00		68.92	
	0.00		
8.50		68.92	
	6.76		*******
9.00		75.68	
	4.05		****
9.50		79.73	
	2.70		***
10.00		82.43	
	2.70		***
10.50		85.14	
	1.35		*
11.00		86.49	
	2.70		***
11.50		89.19	
	5.41		*****
12.00		94.59	
	5.41		*****
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
7.04	2.11	.43	-.38	KRUMBEIN + PETTIJOHN (1935) MOMENT MEASURES FOR SIZE RANGE 4.0 TO 12.0 PHI

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

PERCENTILES MEDIAN 6.44 5TH 4.65 16TH 5.13 25TH 5.43
75TH 8.95 84TH 8.29 95TH******

PCT. GRAVEL 0.00 SAND -.00 SILT (PIPETTE) 79.05 CLAY (PIPETTE) 20.9
(SEDIGRAPH) 68.92 (SEDIGRAPH) 31.0

GRAVEL+SAND -.00 SILT/(SILT+CLAY) 68.92PCT.GRAV+SAND/SILT+CLAY -.00

LABELS SHEPARD =CLAYEY SILT FOLK(GMS)=MLD (SCS)=SILT

E 300381 SEDIGRAPH ANALYSIS

03/30/81

PHI	PCT.	CUMPCT.	
3.50			
	0.00		
4.00		0.00	
	0.00		
4.50		0.00	
	0.00		
5.00		0.00	
	.51		*
5.50		.51	
	3.54		****
6.00		4.04	
	6.06		******
6.50		10.10	
	8.08		********
7.00		18.18	
	12.12		**********
7.50		30.30	
	8.08		********
8.00		38.38	
	8.08		********
8.50		46.46	
	8.08		********
9.00		54.55	
	7.07		*******
9.50		61.62	
	5.05		*****
10.00		66.67	
	6.06		******
10.50		72.73	
	6.06		******
11.00		78.79	
	4.04		****
11.50		82.83	
	8.08		********
12.00		90.91	
	9.09		*********
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
8.64	1.78	.12	-1.04	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURE FOR SIZE RANGE 4.0 TO 12.0 PHI

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

PERCENTILES MEDIAN 8.72 5TH 6.08 16TH 6.87 25TH 7.23
75TH 10.69 84TH 11.57 95TH******

PCT. GRAVEL .00 SAND 0.00 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.0
(SEDIGRAPH) 38.38 (SEDIGRAPH) 61.6

GRAVEL+SAND .00 SILT/(SILT+CLAY) 38.38PCT.GRAV+SAND/SILT+CLAY .00

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

23695

E ** 240381 SIEVE,SETT.TUBE,PIPETTE(2) SAMPLE WT.= 24.0245

03/30/81

PHI	PCT.	CUMPCT.	
-.50			
	0.00		
0.00		0.00	
	.07		
.50		.07	
	.67		*
1.00		.75	
	1.49		*
1.50		2.24	
	3.73		****
2.00		5.96	
	19.37		**********
2.50		25.33	
	41.35		**********
3.00		66.69	
	19.75		**********
3.50		86.43	
	1.86		**
4.00		88.29	
	8.64		*********
8.00		96.94	
	3.06		***
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
2.69	.49	-.44	2.03	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE 0.0 TO 4.0 PHI
2.83	1.09	.37	2.98	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 2.80 5TH 1.87 16TH 2.26 25TH 2.49
75TH 3.21 84TH 3.44 95TH 7.10

PCT. GRAVEL 0.00 SAND 88.29 SILT (PIPETTE) 8.64 CLAY (PIPETTE) 3.0
(SEDIGRAPH) 0.00 (SEDIGRAPH) 0.0

GRAVEL+SAND 88.29 SILT/(SILT+CLAY) 73.82PCT.GRAV+SAND/SILT+CLAY 7.54

LABELS SHEPARD -SAND FOLK(GMS)-MUDDY SAND (SCS)-SILTY SAND