HYDRAULICS DIVISION
TECHNICAL NOTE

DATE: August 1984 **REPORT NO:** 84-22

TITLE: Particle Size Data Report - Western Basin, Lake Ontario

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REASON FOR REPORT: This report responds to a request for particle size data from Dr. W. Strachan, Environmental Contaminants Division.

CORRESPONDENCE FILE NO: Study 84-330

1.0 INTRODUCTION

Dr. W. Strachan, ECD, submitted 12 sediment samples to the Sedimentology Laboratory for particle size analysis.

The samples were analyzed using two methods (1) Sieve Analysis, and (2) Sieve and Sedigraph (Duncan and LaHaie, 1979).

The unused portions of the samples were returned to Dr. Strachan.

2.0 PROCEDURE

(1) Sieve analysis which provides gravel, sand and silt/clay percentages was used to analyze 2 samples.

Briefly, the procedure consists of:

1. Splitting the sample to 100-200 g.
2. Sieving the split at 1/2 or 1/4 PHI intervals.
3. Processing the results with SIZDIST: a FORTRAN IV computer program. (Sandilands and Duncan, 1980).

(2) The Sieve and Sedigraph Method which provides sand, silt and clay percentages was used to analyse 10 samples.

Briefly the procedure consists of:

1. Splitting the sample to 2g.
2. Removing particles large enough to block Sedigraph Suction Tube (0.088 mm).
3. Dispersing sample in a Calgon suspension.
4. Automatic analysis with the Sedigraph.
5. Processing the results with SIZDIST: a FORTRAN IV computer program (Sandilands and Duncan, 1980).

3.0 OUTPUT

(1) For the Sieve Method, the output consists of:

1. A histogram of the frequency distribution.
2. The percentage and cumulative percentage of the material occurring within 1/2 PHI unit.
3. Moment measures (Krumbein and Pettijohn, 1938) and graphic (Folk and Ward, 1957) statistics.
4. Percentiles.
5. Percent gravel, sand and silt/clay.
6. Ratios used to plot Folk's Ternary Classification.
7. Shepard (1954) and Folk (1974) Ternary Classification.

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

1. A histogram of the frequency distribution.
2. The percentage and cumulative percentages of the material occurring within each 1/2 PHI unit.
3. Moment measure statistics (Krumbein & Pettijohn, 1938) and graphic (Folk and Ward, 1957) statistics.
4. Percentiles.
5. Percent gravel, sand, silt and clay.
6. Ratios used to plot Folk's Ternary Classification.
7. Shepard (1954) and Folk (1974) Ternary Classifications.

PHI CONVERSION

The results of samples analyzed in the Sedimentology Lab are presented using the PHI scale (Krumbein, 1934). The conversion from this PHI equation, $\phi = -\log_2 \xi$ (where ξ is the diameter in millimeters) to the Wentworth scale is listed below.

PHI (ϕ)	Millimeters	Microns	Wentworth Size Class
-5.0	32		
-4.5	24		
-4.0	16		Pebble (-2 to -6ϕ)
-3.5	12		
-3.0	8		
-2.5	6		
-2.0	4		
-1.5	2.83		Granule
-1.0	2.00		
-0.5	1.41		Very coarse sand
0.0	1.00		
0.5	0.71		Coarse sand
1.0	0.51	500	
1.5	0.35	350	Medium sand
2.0	0.25	250	
2.5	0.177	177	Fine sand
3.0	0.125	125	
3.5	0.088	88	Very fine sand
4.0	0.0625	62.5	
8.0	0.0039	3.9	Silt† Clay†

4.0 REFERENCES

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

Folk, R.L. 1974. 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, pp 3-26.

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

Sandilands, R.G. and Duncan, G.A. 1980. SIZDIST - A Computer Program for Size Analysis. NWRI, CCIW, Hydraulics Division Technical Note No. 80-08.

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

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APPENDIX 1

SIZDIST OUTPUT

(Data available from HSD)