HYDRAULICS DIVISION
TECHNICAL NOTE

DATE: August 1984 **REPORT NO:** 84-24

TITLE: Particle Size Data Report

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REASON FOR REPORT: This report responds to a request for particle size data from Harry Sloterdijk, Head, Survey and Interpretation Division, Water Quality and Quantity Program, I.W.D., Longueuil (Québec).

CORRESPONDENCE FILE NO: Study 84-330

1.0 INTRODUCTION

This report provides the results of particle size analysis on bottom sediments submitted to the laboratory by H. Sloterdijk, IWD, Québec.

These samples, the first in a series of three, were submitted with a request to determine percentages of gravel, sand, silt, and clay.

The samples were analyzed using the sieve, and sieve-sedigraph procedures (Duncan and LaHaie 1979) by Keith Salisbury.

Three replicate samples were received for sample LSL-84-D4, and were tested using the sieve-sedigraph procedure. The slight differences in the results could be from sub-sampling the sample, or more likely from the amount of shell material within the sample.

In the testing procedure shells and large shell fragments as well as fibrous material were removed.

The small shell and fibrous debris could not be removed and therefore classed as sediment.

2.0 PROCEDURE

(1) The Sieve and Sedigraph Method which provides sand, silt and clay percentages was used to analyse 17 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).

(2) Sieve analysis which provides gravel, sand and silt/clay percentages was used to analyse 3 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).

3.0 RESULTS

(1) 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.

(2) 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.

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 HO)