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Technical Note

DATE: February 1978 REPORT NO: 78-05

TITLE: "Particle Size Data Report 78-2"

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REASON FOR REPORT:

This report responds to a request for particle size data from Dr. W. Strachan, Acting Division Chief, Process Research Division.

CORRESPONDENCE FILE NO:

5895-2

1.0 INTRODUCTION

Dr. W. Strachan, Activing Division Chief, Process Research Division, submitted two samples to the Sedimentology Laboratory for particle size analysis on February 2, 1978. The samples were analyzed on February 7, 1978 by G. G. LaHaie and the results were checked by D. A. St. Jacques. The unused portion of the samples was returned to Dr. W. Strachan following the analysis.

2.0 PROCEDURE

Two procedures were required: sieve, settling tube, pipette and sedigraph analysis for sample MUD 2 - low organic, sedigraph analysis for sample MUD 1 - high organic. For sample MUD 1 - high organic, two sample splits were taken and analyzed.

2.1 Sieve, Settling Tube, Pipette and Sedigraph Procedure

This procedure provides gravel, sand, silt and clay percentages with ½ PHI resolution of the size classes.

Briefly, the procedure consists of:

1) splitting the sample to 20 g.
2) sieving the split at - ½ PHI (1.41 mm).
3) dispersing the sample in 50 ml of calgon solution (50 g/l) and mixing it for 15 minutes.
4) recovering a pipette aliquot of 25 ml for sedigraph analysis.
5) automatic analysis by sedigraph.
6) wet sieving the remaining suspension at 4.5 PHI (0.044 mm) and splitting the residue to 3 to 5 g.
7) resolving the sand residue with settling tube analysis.
8) processing the results with SIZDIST: a FORTRAN IV computer program.

2.2 Sedigraph Procedure

The sedigraph procedure measures particle size in the silt-clay range by recording the amount of X-rays absorbed by a small prism of sedimenting suspension and converting it to particle size data. The particle size data is plotted on a chart recorder as a cumulative frequency distribution.

Briefly, the procedure consists of:

1) splitting the sample to 3.5 g.
2) dispersing the sample in 25 ml of calgon solution (5 g/l) and mixing it for 20 minutes.
3) automatic analysis by sedigraph.
4) processing the results with SIZDIST: a FORTRAN IV computer program.

3.0 RESULTS

Appendix I lists the size analysis results for each sample. The output consists of:

1) a histogram of the frequency distribution.
2) the percentage and cumulative percentage of the material occurring within each ½ PHI unit.
3) moment measure (Krumbein and 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.

REFERENCES

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

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

Rukavina, N. A. and G. G. LaHaie. "Changes in Size Analysis Procedures, CCIW Sedimentology Laboratory". CCIW Hydraulics Research Division Technical Note, Report No. 76-1.

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

APPENDIX I

MUD 1 HIGH ORG SP1070275 SEDIGRAPH ANALYSIS

02/24/78

PHI	PCT.	CUMPCT.	
3.50	ASSUMED UPPER LIMIT		
4.00	1.00	1.00	*
4.50	0.50	1.50	*
5.00	1.50	3.00	**
5.50	0.50	3.50	*
6.00	4.00	7.50	****
6.50	8.50	16.00	*********
7.00	10.50	26.50	**********
7.50	12.50	39.00	**********
8.00	11.00	50.00	**********
8.50	7.50	57.50	********
9.00	8.50	66.00	*********
9.50	6.00	72.00	******
10.00	4.00	76.00	****
10.50	4.00	80.00	****
11.00	3.50	83.50	****
11.50	2.00	85.50	**
12.00	2.50	88.00	***
*****	12.00	100.00	**********

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
7.95	1.67	0.13	-0.17	KRUMBEIN + PETTIJOHN (1938) 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 8.00 5TH 5.69 16TH 6.50 25TH 6.93
75TH 9.87 84TH 11.12 95TH******

PCT. GRAVEL 0.00 SAND 1.00 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00
(SEDIGRAPH) 49.00 (SEDIGRAPH) 50.00

GRAVEL+SAND 1.00 SILT/(SILT+CLAY) 49.49PCT.GRAV+SAND/SILT+CLAY 0.01

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

MUD 1 HIGH ORG SP2070278 SEDIGRAPH ANALYSIS

02/24/78

PHI	PCT.	CUMPCT.	
3.50	ASSUMED UPPER LIMIT		
	2.00		**
4.00		2.00	
	0.00		
4.50		2.00	
	0.00		
5.00		2.00	
	2.00		**
5.50		4.00	
	-.00		****
6.00		8.00	
	7.50		********
6.50		15.50	
	11.50		**********
7.00		27.00	
	12.50		**********
7.50		39.50	
	9.50		**********
8.00		49.00	
	9.00		*********
8.50		58.00	
	8.00		********
9.00		66.00	
	6.00		******
9.50		72.00	
	-.00		****
10.00		76.00	
	-.00		****
10.50		80.00	
	3.00		***
11.00		83.00	
	2.00		**
11.50		85.00	
	2.50		***
12.00		87.50	
	12.50		**********
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
7.93	1.68	0.11	-0.04	KRUMBEIN + PETTIJOHN (1938) 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 6.06 5TH 5.53 16TH 6.52 25TH 6.91
75TH 9.87 84TH 11.25 95TH******

PCT. GRAVEL 0.00 SAND 2.00 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00
(SEDIGRAPH) 47.00 (SEDIGRAPH) 51.00

GRAVEL+SAND 2.00 SILT/(SILT+CLAY) 47.96PCT.GRAV+SAND/SILT+CLAY 0.02

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

MUD NO. 2 LOW OSG 070278 SIEVE,SETT.TUBE,PIPET,SEDIGRAPH SAMPLE WT.= 20.8543

18191

02/24/78

PHI	PCT.	CUMPCT.	
-0.50			
	0.00		
0.00		0.00	
	0.00		
0.50		0.00	
	0.06		
1.00		0.06	
	0.57		*
1.50		0.64	
	2.55		***
2.00		3.19	
	2.55		***
2.50		5.74	
	2.55		***
3.00		8.29	
	9.57		**********
3.50		17.86	
	16.58		**********
4.00		34.44	
	3.91		****
4.50		38.35	
	10.27		**********
5.00		48.63	
	8.32		********
5.50		56.94	
	5.87		******
6.00		62.82	
	4.40		****
6.50		67.22	
	4.40		****
7.00		71.62	
	4.89		*****
7.50		76.52	
	3.91		****
8.00		80.43	
	1.96		**
8.50		82.39	
	2.94		***
9.00		85.32	
	2.94		***
9.50		88.26	
	1.96		**
10.00		90.21	
	2.45		**
10.50		92.66	
	1.96		**
11.00		94.62	
	2.45		**
11.50		97.06	
	2.94		***
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
5.55	2.41	0.34	-0.38	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE 0.0 TO 11.5 PHI
5.73	2.66	0.37	0.98	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 5.08 5TH 2.38 16TH 3.40 25TH 3.72

75TH 7.35 84TH 8.77 95TH 11.08

PCT. GRAVEL 0.00 SAND 34.44 SILT (PIPETTE) 45.18 CLAY (PIPETTE) 20.38

(SEDIGRAPH) 45.99 (SEDIGRAPH) 19.57

GRAVEL+SAND 34.44 SILT/(SILT+CLAY) 70.15 PCT.GRAV+SAND/SILT+CLAY 0.53

LABELS SHEPARD -SANDY SILT FOLK(GMS)-SANDY MUD (SCS)-SANDY SILT

STOP