HYDRAULICS DIVISION
TECHNICAL NOTE

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DATE: September 1984 **REPORT NO:** 84-27

TITLE: Particle Size Data Report - St. Lawrence River

AUTHOR: K. Salisbury

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

CORRESPONDENCE FILE NO: Study 84-330

1.0 INTRODUCTION

H. Sloterdijk, I.W.D., Quebec, submitted twenty-three samples to the laboratory requesting sand, silt and clay percentages.

The size-analyses were performed using the Sedigraph Analyzer (Duncan and LaHaie, 1979) by Keith Salisbury,

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).

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.

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.

APPENDIX 1

SIZDIST OUTPUT

LSL 84-F1 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 21.8453

09/11/84

PHI	PCT.	CUMPCT.	
-2.00			
	.27		
-1.50		.27	
	.60		*
-1.00		.87	
	1.33		*
-.50		2.20	
	1.56		**
0.00		3.75	
	2.52		***
.50		6.27	
	5.36		*****
1.00		11.63	
	6.27		******
1.50		17.90	
	8.74		*********
2.00		26.64	
	14.24		**************
2.50		40.88	
	18.22		******************
3.00		59.10	
	6.91		*******
3.50		66.01	
	2.29		**
4.00		68.30	
	.16		
4.50		68.46	
	.64		*
5.00		69.10	
	.64		*
5.50		69.75	
	.97		*
6.00		70.71	
	1.61		**
6.50		72.32	
	1.61		**
7.00		73.93	
	2.25		**
7.50		76.18	
	2.09		**
8.00		78.28	
	2.09		**
8.50		80.37	
	2.57		***
9.00		82.94	
	2.57		***
9.50		85.52	
	2.57		***
10.00		88.09	
	2.25		**
10.50		90.34	
	2.25		**
11.00		92.60	
	1.77		**
11.50		94.37	
	1.61		**
12.00		95.98	
	4.02		****
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
3.95	3.31	.47	-.34	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -1.5 TO 12.0 PHI
4.43	3.70	.60	.38	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES	MEDIAN 2.75	5TH .25	16TH 1.35	25TH 1.91
		75TH 7.24	84TH 9.21	95TH 11.70

PCT.	GRAVEL .87	SAND 67.43	SILT (PIPETTE) 0.00	CLAY (PIPETTE) 0.00
			(SEDIGRAPH) 9.98	(SEDIGRAPH) 21.72

GRAVEL+SAND 68.30 SILT/(SILT+CLAY) 31.47PCT.GRAV+SAND/SILT+CLAY 2.15

LABELS SHEPARD -CLAYEY SAND FOLK(GMS)-MUDDY SAND (SCS)-CLAYEY SANC

COMMENTS -
SHELLS PRESENT

LSL 84-F2 SIEVE ONLY SAMPLE WT.= 73.8700

09/11/84

PHI	PCT.	CUMPCT.	
-4.50			
	7.65		********
-4.00		7.65	
	6.61		*******
-3.50		14.25	
	9.39		*********
-3.00		23.65	
	5.67		******
-2.50		29.32	
	2.53		***
-2.00		31.85	
	4.85		*****
-1.50		36.70	
	3.52		****
-1.00		40.22	
	3.87		****
-.50		44.09	
	5.75		******
0.00		49.84	
	8.69		*********
.50		58.54	
	10.98		**********
1.00		69.51	
	9.88		**********
1.50		79.40	
	9.61		**********
2.00		89.01	
	4.37		****
2.50		93.38	
	2.61		***
3.00		95.99	
	1.45		*
3.50		97.44	
	1.20		*
4.00		98.65	
	1.35		*
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
-.61	2.25	-.09	-1.24	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -4.0 TO 4.0 PHI
-.55	2.34	-.26	.69	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN .01 5TH -4.17 16TH -3.41 25TH -2.88

75TH 1.29 84TH 1.74 95TH 2.81

PCT. GRAVEL 40.22 SAND 58.43 SILT+CLAY 1.35

GRAVEL+SAND 98.65 GRAV+SAND/SILT+CLAY 72.87

LABELS SHEPARD -SAND FOLK(GMS)-SANDY GRAVEL (SOS)-

COMMENTS -
PIECES OF CLAM SHELL PRESENT *
PIECE OF SHELLS PRESENT *

LSL 84-F3 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 14.8710

09/11/84

PHI	PCT.	CUMPCT.	
-1.50			
	.27		
-1.00		.27	
	1.55		**
-.50		1.82	
	3.77		****
0.00		5.58	
	7.73		********
.50		13.31	
	11.97		**********
1.00		25.28	
	8.81		*********
1.50		34.09	
	7.26		*******
2.00		41.36	
	4.64		*****
2.50		46.00	
	2.82		***
3.00		48.82	
	2.08		**
3.50		50.90	
	0.00		
4.00		50.90	
	1.47		*
4.50		52.38	
	4.42		****
5.00		56.80	
	5.40		*****
5.50		62.20	
	4.91		*****
6.00		67.11	
	5.89		******
6.50		73.00	
	5.40		*****
7.00		78.40	
	4.42		****
7.50		82.82	
	3.44		***
8.00		86.25	
	2.95		***
8.50		89.20	
	2.45		**
9.00		91.65	
	1.96		**
9.50		93.62	
	1.47		*
10.00		95.09	
	1.47		*
10.50		96.55	
	1.23		*
11.00		97.79	
	.49		
11.50		98.28	
	1.72		**
12.00		100.00	
	0.00		
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
4.05	3.34	.21	-1.00	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -1.0 TO 12.0 PHI
3.86	3.29	.29	.72	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 3.28 5TH -.08 16TH .61 25TH .99

75TH 6.69 84TH 7.67 95TH 9.97

PCT. GRAVEL .27 SAND 50.64 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 31.91 (SEDIGRAPH) 17.18

GRAVEL+SAND 50.90 SILT/(SILT+CLAY) 65.0 PCT.GRAV+SAND/SILT+CLAY 1.04

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

COMMENTS -

LSL 84-F4 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 17.4068

09/11/84

PHI	PCT.	CUMPCT.	
-2.50			
	3.73		****
-2.00		3.73	
	0.00		
-1.50		3.73	
	.17		
-1.00		3.91	
	1.26		*
-.50		5.17	
	1.72		**
0.00		6.89	
	3.91		****
.50		10.80	
	7.99		********
1.00		18.79	
	7.07		*******
1.50		25.85	
	7.41		*******
2.00		33.26	
	6.66		*******
2.50		39.93	
	5.17		*****
3.00		45.10	
	3.62		****
3.50		48.72	
	4.14		****
4.00		52.85	
	0.00		
4.50		52.85	
	5.45		*****
5.00		58.30	
	6.63		*******
5.50		64.94	
	4.74		*****
6.00		69.67	
	4.98		*****
6.50		74.65	
	4.50		*****
7.00		79.15	
	3.79		****
7.50		82.94	
	3.32		***
8.00		86.26	
	2.61		***
8.50		88.86	
	2.61		***
9.00		91.47	
	2.37		**
9.50		93.84	
	1.42		*
10.00		95.26	
	.95		*
10.50		96.21	
	1.18		*
11.00		97.39	
	.71		*
11.50		98.10	
	1.18		*
12.00		99.29	
	.71		*
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
4.05	3.27	.13	-.68	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -2.0 TO 12.0 PHI
4.05	3.30	.18	.84	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 3.66 5TH -.57 16TH .83 25TH 1.44

75TH 6.54 84TH 7.66 95TH 9.91

PCT. GRAVEL 3.91 SAND 48.95 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 33.41 (SEDIGRAPH) 13.74

GRAVEL+SAND 52.85 SILT/(SILT+CLAY) 70.85PCT.GRAV+SAND/SILT+CLAY 1.12

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

COMMENTS -
SHELLS PRESENT

LSL 84-F4 BIS SIEVE, AND SEDIGRAPH SAMPLE WT.=, 23.0169

09/11/84

PHI	PCT.	CUMPCT.	
-2.50			
	.48		
-2.00		.48	*
	.74		
-1.50		1.22	
	.48		
-1.00		1.69	*
	.78		
-.50		2.48	*
	1.09		
0.00		3.56	**
	1.96		
.50		5.52	***
	3.48		
1.00		8.99	*****
	4.69		
1.50		13.69	*********
	8.91		
2.00		22.59	**********
	14.99		
2.50		37.58	**********
	15.73		
3.00		53.31	**********
	14.42		
3.50		67.73	*****
	5.39		
4.00		73.12	
	.27		
4.50		73.39	*
	.82		
5.00		74.22	*
	.82		
5.50		75.04	*
	1.23		
6.00		76.27	**
	1.51		
6.50		77.78	**
	1.78		
7.00		79.57	**
	2.19		
7.50		81.76	**
	2.06		
8.00		83.82	**
	1.65		
8.50		85.46	**
	2.19		
9.00		87.66	**
	1.65		
9.50		89.30	*
	1.10		
10.00		90.40	*
	1.37		
10.50		91.77	*
	1.10		
11.00		92.87	**
	2.06		
11.50		94.93	**
	1.78		
12.00		96.71	***
	3.29		
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
3.76	2.00	.56	.59	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -2.0 TO 12.0 PHI
4.19	3.30	.58	1.35	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 2.89 5TH .37 16TH 1.63 25TH 2.08

75TH 5.48 84TH 8.06 95TH 11.52

PCT. GRAVEL 1.69 SAND 71.43 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 10.70 (SEDIGRAPH) 16.18

GRAVEL+SAND 73.12 SILT/(SILT+CLAY) 39.8 PCT.GRAV+SAND/SILT+CLAY 2.72

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

COMMENTS -
SHELLS PRESENT

*

LSL 84-G1 3 CM SEDIGRAPH ANALYSIS

09/11/84

PHI	PCT.	CUMPCT.	
4.00	ASSUMED UPPER LIMIT		
	5.18		*****
4.50		5.18	
	5.69		******
5.00		10.87	
	18.02		**********
5.50		28.89	
	12.33		**********
6.00		41.21	
	11.38		**********
6.50		52.59	
	7.59		********
7.00		60.18	
	11.38		**********
7.50		71.55	
	6.64		*******
8.00		78.19	
	5.69		******
8.50		83.88	
	2.84		***
9.00		86.73	
	3.79		****
9.50		90.52	
	2.84		***
10.00		93.36	
	5.69		******
10.50		99.05	
	.95		*
*****		100.00	

NO STATISTICS ARE COMPUTED BECAUSE THE UPPER SIZE LIMIT IS ASSUMED
AND THIS AFFECTS MORE THAN 5 PERCENT OF THE SAMPLE

PERCENTILES MEDIAN 6.39 5TH****** 16TH 5.14 25TH 5.39
75TH 7.76 84TH 8.52 95TH 10.14

PCT. GRAVEL .00 SAND 5.18 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00
(SEDIGRAPH) 78.70 (SEDIGRAPH) 16.12

GRAVEL+SAND 5.18 SILT/(SILT+CLAY) 83.0 PCT.GRAV+SAND/SILT+CLAY .05

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

LSL 84-01 SEDIGRAPH ANALYSIS

09/11/84

PHI	PCT.	CUMPCT.	
4.00 ASSUMED UPPER LIMIT			
	1.79		**
4.50		1.79	
	6.92		*******
5.00		8.71	
	11.07		**********
5.50		19.77	
	11.07		**********
6.00		30.84	
	8.30		********
6.50		39.14	
	8.30		********
7.00		47.44	
	8.30		********
7.50		55.74	
	8.30		********
8.00		64.04	
	8.30		********
8.50		72.34	
	2.77		***
9.00		75.10	
	5.53		******
9.50		80.63	
	2.77		***
10.00		83.40	
	2.77		***
10.50		86.17	
	2.77		***
11.00		88.93	
	1.38		*
11.50		90.32	
	4.15		****
12.00		94.47	
	5.53		******
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
7.28	1.95	.31	-.43	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE 4.5 TO 12.0 PHI

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

PERCENTILES	MEDIAN	7.15	5TH	4.73	16TH	5.33	25TH	5.74
			75TH	8.88	84TH	10.11	95TH	******

PCT. GRAVEL	.00	SAND	1.79	SILT (PIPETTE)	0.00	CLAY (PIPETTE)	0.00
				(SEDIGRAPH)	70.55	(SEDIGRAPH)	27.66

GRAVEL+SAND 1.79 SILT/(SILT+CLAY) 71.83 PCT.GRAV+SAND/SILT+CLAY .02

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

LSL 84-G2 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 19.5656

09/11/84

PHI	PCT.	CUMPCT.	
-.50			
	.15		
0.00		.15	
	.10		
.50		.26	
	.26		
1.00		.51	
	.36		
1.50		.87	
	1.07		*
2.00		1.94	
	1.69		**
2.50		3.63	
	2.96		***
3.00		6.59	
	24.69		********** *****
3.50		31.28	
	14.36		**********
4.00		45.64	
	1.09		*
4.50		46.73	
	6.52		*******
5.00		53.25	
	8.70		*********
5.50		61.95	
	5.98		******
6.00		67.93	
	5.16		*****
6.50		73.09	
	4.08		****
7.00		77.17	
	5.44		*****
7.50		82.61	
	3.53		****
8.00		86.14	
	1.90		**
8.50		88.04	
	2.17		**
9.00		90.22	
	1.63		**
9.50		91.85	
	1.09		*
10.00		92.93	
	1.09		*
10.50		94.02	
	1.63		**
11.00		95.65	
	1.09		*
11.50		96.74	
	3.26		***
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
5.09	2.19	.43	.13	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE 0.0 TO 11.5 PHI
5.21	2.35	.40	.98	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 4.75 5TH 2.73 16TH 3.19 25TH 3.37
75TH 6.73 84TH 7.70 95TH 10.80

PCT. GRAVEL 0.00 SAND 45.64 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00
(SEDIGRAPH) 40.50 (SEDIGRAPH) 13.86

GRAVEL+SAND 45.64 SILT/(SILT+CLAY) 74.58PCT.GRAV+SAND/SILT+CLAY .84

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

COMMENTS -
3.0000

LSL 84-G3 SIEVE ONLY SAMPLE WT.=177.7200

09/11/84

PHI	PCT.	CUMPCT.	
-1.50			
	.15		
-1.00		.15	
	.29		
-.50		.44	
	.70		*
0.00		1.14	
	2.50		***
.50		3.64	
	12.95		**********
1.00		15.59	
	23.41		**********
1.50		40.00	
	27.37		**********
2.00		67.38	
	22.88		**********
2.50		90.26	
	4.23		****
3.00		94.49	
	2.54		***
3.50		97.03	
	1.41		*
4.00		98.44	
	1.56		**
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
1.66	.72	.03	.84	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -1.0 TO 4.0 PHI
1.67	.73	.05	1.06	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES	MEDIAN	1.68	5TH	.55	16TH	.98	25TH	1.18
			75TH	2.17	84TH	2.36	95TH	3.10

PCT. GRAVEL .15 SAND 98.29 SILT+CLAY 1.56

GRAVEL+SAND 98.44 GRAV+SAND/SILT+CLAY 63.16

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

COMMENTS -
SHELLS PRESENT *

LSL 84-G4 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 17.0004

09/11/84

PHI	PCT.	CUMPCT.	
.50			
	.41		
1.00		.41	
	.59		*
1.50		1.00	
	5.53		******
2.00		6.53	
	12.53		**********
2.50		19.06	
	19.65		**********
3.00		38.70	
	18.59		**********
3.50		57.29	
	7.18		*******
4.00		64.47	
	.90		*
4.50		65.37	
	4.49		****
5.00		69.85	
	4.31		****
5.50		74.16	
	3.05		***
6.00		77.21	
	2.69		***
6.50		79.90	
	2.87		***
7.00		82.77	
	3.95		****
7.50		86.72	
	3.59		****
8.00		90.31	
	2.15		**
8.50		92.46	
	1.97		**
9.00		94.44	
	1.44		*
9.50		95.87	
	1.08		*
10.00		96.95	
	.90		*
10.50		97.85	
	.36		
11.00		98.21	
	.54		*
11.50		98.74	
	.36		
12.00		99.10	
	.90		*
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
4.24	2.28	.57	.41	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE 1.0 TO 12.0 PHI
4.28	2.31	.61	1.01	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD, 1957

PERCENTILES MEDIAN 3.30 5TH 1.86 16TH 2.38 25TH 2.65
75TH 5.64 84TH 7.16 95TH 9.20

PCT. GRAVEL 0.00 SAND 64.47 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00
(SEDIGRAPH) 25.84 (SEDIGRAPH) 9.69

GRAVEL+SAND 64.47 SILT/(SILT+CLAY) 72.73PCT.GRAV+SAND/SILT+CLAY 1.81

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

COMMENTS -
SHELLS PRESENT

LSL 84-H1 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 16.8787

09/11/84

PHI	PCT.	CUMPCT.	
-1.00			
	.18		
-.50		.18	
	.06		
0.00		.24	
	.30		
.50		.53	
	.71		*
1.00		1.24	*
	.95		
1.50		2.19	
	1.54		**
2.00		3.73	
	1.78		**
2.50		5.51	
	2.49		**
3.00		8.00	
	12.62		**********
3.50		20.62	
	8.71		*********
4.00		29.33	
	0.00		
4.50		29.33	
	2.83		***
5.00		32.15	
	7.77		********
5.50		39.93	
	6.71		*******
6.00		46.64	
	6.71		*******
6.50		53.36	
	6.36		******
7.00		59.72	
	7.42		*******
7.50		67.14	
	6.36		******
8.00		73.50	
	5.30		*****
8.50		78.80	
	4.95		*****
9.00		83.75	
	4.24		****
9.50		87.99	
	2.83		***
10.00		90.81	
	2.12		**
10.50		92.93	
	2.12		**
11.00		95.05	
	1.41		*
11.50		96.47	
	.71		*
12.00		97.17	
	2.83		***
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
6.09	2.53	.02	-.73	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -.5 TO 12.0 PHI
6.20	2.74	.04	.81	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 6.25 5TH 2.36 16TH 3.32 25TH 3.75
75TH 8.14 84TH 9.03 95TH 10.99

PCT. GRAVEL 0.00 SAND 29.33 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00
(SEDIGRAPH) 44.17 (SEDIGRAPH) 26.50

GRAVEL+SAND 29.33 SILT/(SILT+CLAY) 62.50PCT.GRAV+SAND/SILT+CLAY .41

LABELS SHEPARD -SAN SIL CLY FOLK(GMS)-SANDY MUD (SCS)-SANDY MUD

LSL 84-H2 SEDIGRAPH ANALYSIS

09/11/84

PHI	PCT.	CUMPCT.	
4.00	ASSUMED UPPER LIMIT		
	10.21		**********
4.50		10.21	
	4.94		*****
5.00		15.15	
	6.73		*******
5.50		21.88	
	8.08		********
6.00		29.97	
	9.43		**********
6.50		39.39	
	7.63		********
7.00		47.03	
	3.59		****
7.50		50.62	
	6.29		******
8.00		56.90	
	8.98		**********
8.50		65.88	
	6.73		*******
9.00		72.61	
	7.18		*******
9.50		79.80	
	5.39		*****
10.00		85.18	
	3.14		***
10.50		88.33	
	3.14		***
11.00		91.47	
	2.24		**
11.50		93.71	
	2.69		***
12.00		96.41	
	3.59		****
*****		100.00	

NO STATISTICS ARE COMPUTED BECAUSE THE UPPER SIZE LIMIT IS ASSUMED
AND THIS AFFECTS MORE THAN 5 PERCENT OF THE SAMPLE

PERCENTILES MEDIAN 7.41 5TH****** 16TH 5.06 25TH 5.69
75TH 9.17 84TH 9.89 95TH 11.74

PCT. GRAVEL .00 SAND 10.21 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00
(SEDIGRAPH) 55.67 (SEDIGRAPH) 34.12

GRAVEL+SAND 10.21 SILT/(SILT+CLAY) 62.0 PCT.GRAV+SAND/SILT+CLAY .11

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

COMMENTS -
SHELLS PRESENT

LSI 84-H3 SEDIGRAPH ANALYSIS

09/11/84

PHI	PCT.	CUMPCT.	
4.00	ASSUMED UPPER LIMIT		
	6.69		*******
4.50		6.69	
	7.54		********
5.00		14.23	
	11.31		**********
5.50		25.54	
	8.48		********
6.00		34.02	
	9.43		*********
6.50		43.45	
	8.01		********
7.00		51.46	
	8.95		*********
7.50		60.41	
	7.54		********
8.00		67.95	
	6.60		*******
8.50		74.55	
	5.66		******
9.00		80.21	
	4.71		*****
9.50		84.92	
	3.30		***
10.00		88.22	
	2.36		**
10.50		90.57	
	2.83		***
11.00		93.40	
	2.36		**
11.50		95.76	
	2.36		**
12.00		98.11	
	1.89		**
*****		100.00	

NO STATISTICS ARE COMPUTED BECAUSE THE UPPER SIZE LIMIT IS ASSUMED AND THIS AFFECTS MORE THAN 5 PERCENT OF THE SAMPLE

PERCENTILES MEDIAN 6.91 5TH****** 16TH 5.08 25TH 5.48

75TH 8.54 84TH 9.40 95TH 11.34

PCT. GRAVEL .00 SAND 6.69 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 67.86 (SEDIGRAPH) 25.45

GRAVEL+SAND 6.69 SILT/(SILT+CLAY) 72.73 PCT.GRAV+SAND/SILT+CLAY .07

LABELS SHEPARD -CLAYEY SILT FOLK(GMS)-MUD (SOS)-SILT

COMMENTS -
SHELLS PRESENT

*

LSL 84-I1 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 27.1646

09/11/84

PHI	PCT.	CUMPCT.	
-2.50			
	19.35		**********
-2.00		19.35	
	13.61		**********
-1.50		32.96	
	5.70		******
-1.00		38.66	
	5.00		*****
-.50		43.66	
	2.72		***
0.00		46.39	
	2.50		***
.50		48.89	
	3.13		***
1.00		52.01	
	3.83		****
1.50		55.84	
	8.42		********
2.00		64.26	
	14.86		**********
2.50		79.13	
	7.50		********
3.00		86.63	
	1.84		**
3.50		88.47	
	.74		*
4.00		89.20	
	0.00		
4.50		89.20	
	0.00		
5.00		89.20	
	.05		
5.50		89.26	
	.54		*
6.00		89.80	
	.65		*
6.50		90.45	
	.98		*
7.00		91.43	
	1.30		*
7.50		92.73	
	1.19		*
8.00		93.92	
	1.08		*
8.50		95.01	
	1.19		*
9.00		96.20	
	.87		*
9.50		97.07	
	.65		*
10.00		97.72	
	.60		*
10.50		98.32	
	.38		
11.00		98.70	
	.43		
11.50		99.13	
	.27		
12.00		99.40	
	.60		*
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
.92	3.16	.61	1.26	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -2.0 TO 12.0 PHI
.47	2.87	.16	1.07	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN .68 5TH -2.37 16TH -2.09 25TH -1.79

75TH 2.36 84TH 2.82 95TH 8.50

PCT. GRAVEL 38.66 SAND 50.54 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 4.72 (SEDIGRAPH) 6.09

GRAVEL+SAND 89.20 SILT/(SILT+CLAY) 43.72PCT.GRAV+SAND/SILT+CLAY 8.26

LABELS SHEPARD -SAND FOLK(GMS)-MUDDY SANDY GRAVEL (SCS)-

COMMENTS -
SHELLS PRESENT

*

LSL 84-I2 SEDIGRAPH ANALYSIS

09/12/84

PHI	PCT.	CUMPCT.	
4.00	ASSUMED UPPER LIMIT		
	7.80		********
4.50		7.80	
	2.81		***
5.00		10.61	
	5.15		*****
5.50		15.76	
	4.68		*****
6.00		20.44	
	6.55		*******
6.50		26.99	
	5.62		******
7.00		32.61	
	7.49		*******
7.50		40.09	
	6.55		*******
8.00		46.65	
	6.55		*******
8.50		53.20	
	6.55		*******
9.00		59.75	
	4.68		*****
9.50		64.43	
	7.49		*******
10.00		71.92	
	6.55		*******
10.50		78.47	
	4.68		*****
11.00		83.15	
	4.68		*****
11.50		87.83	
	2.81		***
12.00		90.64	
	9.36		*********
*****		100.00	

NO STATISTICS ARE COMPUTED BECAUSE THE UPPER SIZE LIMIT IS ASSUMED AND THIS AFFECTS MORE THAN 5 PERCENT OF THE SAMPLE

PERCENTILES MEDIAN 8.26 5TH****** 16TH 5.53 25TH 6.35

75TH 10.24 84TH 11.09 95TH******

PCT. GRAVEL .00 SAND 7.80 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 45.40 (SEDIGRAPH) 46.80

GRAVEL+SAND 7.80 SILT/(SILT+CLAY) 49.24PCT.GRAV+SAND/SILT+CLAY .08

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

LSL 84-T3 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 24.6856

09/11/84

PHI	PCT.	CUMPCT.	
-1.50			
	.20		
-1.00		.20	
	.24		
-.50		.45	
	.24		
0.00		.69	
	.36		
.50		1.05	
	.41		
1.00		1.46	
	.45		
1.50		1.90	*
	.77		
2.00		2.67	****
	3.52		
2.50		6.20	**********
	29.61		
3.00		35.81	**********
	32.57		
3.50		68.38	******
	6.32		
4.00		74.70	*
	.98		
4.50		75.68	***
	2.77		
5.00		78.45	***
	2.61		
5.50		81.07	**
	1.63		
6.00		82.70	**
	1.96		
6.50		84.66	**
	1.96		
7.00		86.62	**
	1.96		
7.50		88.57	**
	1.96		
8.00		90.53	*
	1.31		
8.50		91.84	*
	1.31		
9.00		93.14	*
	1.47		
9.50		94.61	*
	1.14		
10.00		95.76	*
	.82		
10.50		96.57	*
	.82		
11.00		97.39	*
	.82		
11.50		98.20	*
	.98		
12.00		99.18	*
*****	.82	100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
4.04	2.23	.84	2.42	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -1.0 TO 12.0 PHI
4.07	2.03	.73	2.25	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 3.22 5TH 2.37 16TH 2.67 25TH 2.82

75TH 4.15 84TH 6.33 95TH 9.67

PCT. GRAVEL .20 SAND 74.50 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 15.83 (SEDIGRAPH) 9.47

GRAVEL+SAND 74.70 SILT/(SILT+CLAY) 62.58PCT.GRAV+SAND/SILT+CLAY 2.95

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

COMMENTS -
SHELLS PRESENT

LSL 84-J1 SEDIGRAPH ANALYSIS

09/11/84

PHI	PCT.	CUMPCT.	
4.00	ASSUMED UPPER LIMIT		
	9.53		**********
4.50		9.53	
	2.71		***
5.00		12.24	
	5.43		*****
5.50		17.67	
	8.14		********
6.00		25.81	
	10.86		**********
6.50		36.67	
	10.86		**********
7.00		47.53	
	12.67		**********
7.50		60.19	
	8.59		*********
8.00		68.79	
	5.88		******
8.50		74.67	
	6.33		******
9.00		81.00	
	5.43		*****
9.50		86.43	
	2.71		***
10.00		89.14	
	2.71		***
10.50		91.86	
	2.71		***
11.00		94.57	
	2.71		***
11.50		97.29	
	2.71		***
*****		100.00	

NO STATISTICS ARE COMPUTED BECAUSE THE UPPER SIZE LIMIT IS ASSUMED
AND THIS AFFECTS MORE THAN 5 PERCENT OF THE SAMPLE

PERCENTILES MEDIAN 7.10 5TH****** 16TH 5.35 25TH 5.95
75TH 8.53 84TH 9.28 95TH 11.08

PCT. GRAVEL .00 SAND 9.53 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00
(SEDIGRAPH) 65.14 (SEDIGRAPH) 25.33

GRAVEL+SAND 9.53 SILT/(SILT+CLAY) 72.0 CPCT.GRAV+SAND/SILT+CLAY .11

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

LSL 84-J2 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 25.0761

09/11/84

PHI	PCT.	CUMPCT.	
-1.50			
	.20		
-1.00		.20	
	.20		
-.50		.40	
	.48		
0.00		.88	
	.60		*
.50		1.48	
	.76		*
1.00		2.23	
	.80		*
1.50		3.03	
	1.04		*
2.00		4.07	
	1.52		**
2.50		5.58	
	3.95		****
3.00		9.53	
	17.55		**********
3.50		27.08	
	15.55		**********
4.00		42.63	
	1.16		*
4.50		43.79	
	5.79		******
5.00		49.58	
	5.79		******
5.50		55.38	
	4.93		*****
6.00		60.30	
	4.93		*****
6.50		65.23	
	4.06		****
7.00		69.29	
	5.79		******
7.50		75.08	
	4.06		****
8.00		79.14	
	3.48		***
8.50		82.62	
	3.77		****
9.00		86.38	
	2.61		***
9.50		88.99	
	2.32		**
10.00		91.31	
	2.03		**
10.50		93.34	
	1.74		**
11.00		95.07	
	.87		*
11.50		95.94	
	1.74		**
12.00		97.68	
	2.32		**
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
5.46	2.61	.24	-.42	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -1.0 TO 12.0 PHI
5.63	2.69	.35	.98	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 5.04 5TH 2.31 16TH 3.18 25TH 3.44

75TH 7.49 84TH 8.68 95TH 10.98

PCT. GRAVEL .20 SAND 42.43 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 36.51 (SEDIGRAPH) 20.86

GRAVEL+SAND 42.63 SILT/(SILT+CLAY) 63.64PCT.GRAV+SAND/SILT+CLAY .74

LABELS SHEPARD -SAN SIL CLY FOLK(GMS)-SANDY MUD (SCS)-SANDY MUD

COMMENTS -
SHELLS PRESENT

LSL 84-J3 SIEVE, AND SEDIGRAPH SAMPLE WT.=, 18.0236

09/11/84

PHI	PCT.	CUMPCT.	
-2.50			
	2.16		**
-2.00		2.16	
	1.05		*
-1.50		3.22	
	.39		
-1.00		3.61	
	.44		
-.50		4.05	
	.44		
0.00		4.49	
	.61		*
.50		5.10	
	.50		
1.00		5.60	
	.44		
1.50		6.05	
	.89		*
2.00		6.94	
	1.50		*
2.50		8.43	
	1.61		**
3.00		10.04	
	2.16		**
3.50		12.21	
	3.50		***
4.00		15.70	
	.86		*
4.50		16.56	
	1.72		**
5.00		18.28	
	.86		*
5.50		19.14	
	1.29		*
6.00		20.43	
	2.15		**
6.50		22.58	
	.86		*
7.00		23.44	
	2.58		***
7.50		26.02	
	2.15		**
8.00		28.17	
	3.44		***
8.50		31.62	
	3.87		****
9.00		35.49	
	6.02		******
9.50		41.51	
	6.02		******
10.00		47.53	
	8.60		*********
10.50		56.13	
	9.46		*********
11.00		65.59	
	7.31		*******
11.50		72.90	
	6.02		******
12.00		78.93	
	21.07		**********
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS
7.87	3.75	-.58	.38

KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES
FOR SIZE RANGE -2.0 TO 12.0 PHI

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

PERCENTILES	MEDIAN 10.14	5TH .41	16TH 4.17	25TH 7.30
		75TH 11.67	84TH******	95TH******

PCT. GRAVEL 3.61 SAND 12.10 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 12.47 (SEDIGRAPH) 71.83

GRAVEL+SAND 15.70 SILT/(SILT+CLAY) 14.8 (PCT.GRAV+SAND/SILT+CLAY .19

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

COMMENTS -
SHELL PRESENT *

LSL 84-J4 SEDIGRAPH ANALYSIS

09/11/84

PHI	PCT.	CUMPCT.	
4.00	ASSUMED UPPER LIMIT		
	5.62		******
4.50		5.62	
	13.76		**********
5.00		19.38	
	15.73		**********
5.50		35.11	
	8.85		*********
6.00		43.96	
	10.32		**********
6.50		54.28	
	6.39		******
7.00		60.67	
	5.88		*******
7.50		67.56	
	4.92		*****
8.00		72.47	
	3.93		****
8.50		76.40	
	3.93		****
9.00		80.34	
	2.46		**
9.50		82.79	
	1.97		**
10.00		84.76	
	1.97		**
10.50		86.73	
	2.46		**
11.00		89.19	
	1.97		**
11.50		91.15	
	1.97		**
12.00		93.12	
	6.88		*******
*****		100.00	

NO STATISTICS ARE COMPUTED BECAUSE THE UPPER SIZE LIMIT IS ASSUMED AND THIS AFFECTS MORE THAN 5 PERCENT OF THE SAMPLE

PERCENTILES MEDIAN 6.29 5TH****** 16TH 4.83 25TH 5.18

75TH 8.32 84TH 9.81 95TH******

PCT. GRAVEL .00 SAND 5.62 SILT (PIPETTE) 0.00 CLAY (PIPETTE) 0.00

(SEDIGRAPH) 70.79 (SEDIGRAPH) 23.60

GRAVEL+SAND 5.62 SILT/(SILT+CLAY) 75.0 (PCT.GRAV+SAND)/SILT+CLAY .06

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

COMMENTS -
CLAM PRESENT

LSL 84-K1 SIEVE ONLY SAMPLE WT.=142.2900

09/11/84

PHI	PCT.	CUMPCT.	
-4.00			
	1.51		**
-3.50		1.51	
	4.39		****
-3.00		5.90	
	2.99		***
-2.50		8.89	
	2.08		**
-2.00		10.97	
	5.05		*****
-1.50		16.03	
	4.29		****
-1.00		20.32	
	5.27		*****
-.50		25.60	
	6.02		******
0.00		31.62	
	7.46		*******
.50		39.08	
	11.22		**********
1.00		50.31	
	15.59		**********
1.50		65.90	
	18.07		**********
2.00		83.97	
	1.51		**
2.50		85.48	
	4.39		****
3.00		89.87	
	2.99		***
3.50		92.86	
	2.08		**
4.00		94.94	
	5.06		*****
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
.44	1.77	-.29	-.29	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -3.5 TO 4.0 PHI

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

PERCENTILES	MEDIAN .99	5TH -3.10	16TH -1.50	25TH -.56
		75TH 1.75	84TH 2.01	95TH******

PCT. GRAVEL 20.32 SAND 74.62 SILT+CLAY 5.06

GRAVEL+SAND 94.94 GRAV+SAND/SILT+CLAY 18.76

LABELS SHEPARD -SAND FOLK(GMS)-GRAVELLY SAND (SOS)-

LSL 84-K3 SIEVE ONLY SAMPLE WT.=138.4600

09/11/84

PHI	PCT.	CUMPCT.	
-1.50			
	.07		
-1.00		.07	
	.10		
-.50		.17	
	.11		
0.00		.28	
	.22		
.50		.50	
	.92		*
1.00		1.42	
	4.04		****
1.50		5.45	
	31.38		**********
2.00		36.83	
	43.54		**********
2.50		80.38	
	9.64		**********
3.00		90.02	
	5.75		******
3.50		95.77	
	2.69		***
4.00		98.46	
	1.54		**
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
2.17	.56	.09	2.90	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -1.0 TO 4.0 PHI
2.17	.56	.17	1.30	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES	MEDIAN	2.15	5TH	1.44	16TH	1.67	25TH	1.81
			75TH	2.44	84TH	2.69	95TH	3.43

PCT. GRAVEL .07 SAND 98.39 SILT+CLAY 1.54

GRAVEL+SAND 98.46 GRAV+SAND/SILT+CLAY 64.00

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

COMMENTS -
SHELLS PRESENT

*

23278

LSL 84-K4 SIEVE ONLY SAMPLE WT.=146.3500

09/11/84

PHI	PCT.	CUMPCT.	
-3.00			
	1.22		*
-2.50		1.22	
	2.10		**
-2.00		3.32	
	3.60		****
-1.50		6.92	
	2.57		***
-1.00		9.49	
	3.04		***
-.50		12.53	
	2.74		***
0.00		15.27	
	6.11		******
.50		21.38	
	24.93		**********
1.00		46.31	
	27.69		**********
1.50		74.00	
	15.11		**********
2.00		89.11	
	3.16		***
2.50		92.27	
	.81		*
3.00		93.08	
	1.22		*
3.50		94.30	
	2.10		**
4.00		96.40	
	3.60		****
*****		100.00	

MEAN	ST.DEV.	SKEWNESS	KURTOSIS	
.85	1.19	-.40	1.50	KRUMBEIN + PETTIJOHN (1938) MOMENT MEASURES FOR SIZE RANGE -2.5 TO 4.0 PHI
.99	1.27	-.09	2.32	FOLK GRAPHIC STATISTICAL PARAMETERS FOLK AND WARD,1957

PERCENTILES MEDIAN 1.07 5TH -1.77 16TH .06 25TH .57
75TH 1.53 84TH 1.83 95TH 3.67

PCT. GRAVEL 9.49 SAND 86.91 SILT+CLAY 3.60

GRAVEL+SAND 96.40 GRAV+SAND/SILT+CLAY 26.77

LABELS SHEPARD -SAND FOLK(GMS)-GRAVELLY SAND (SGS)-

COMMENTS -
SHELLS PRESENT

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