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Study of nature of dredge and pump discharges and resulting deposits at Steep Rock Lake, Ontario: experimental results and data sheets

Sutherland, H.

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Study of Nature of Dredge and Pump Discharges and Resulting Deposits at Steep Rock Lake, Ontario : Experimental Results and Data Sheets

DBR-R4

Sutherland, H.

July 1948

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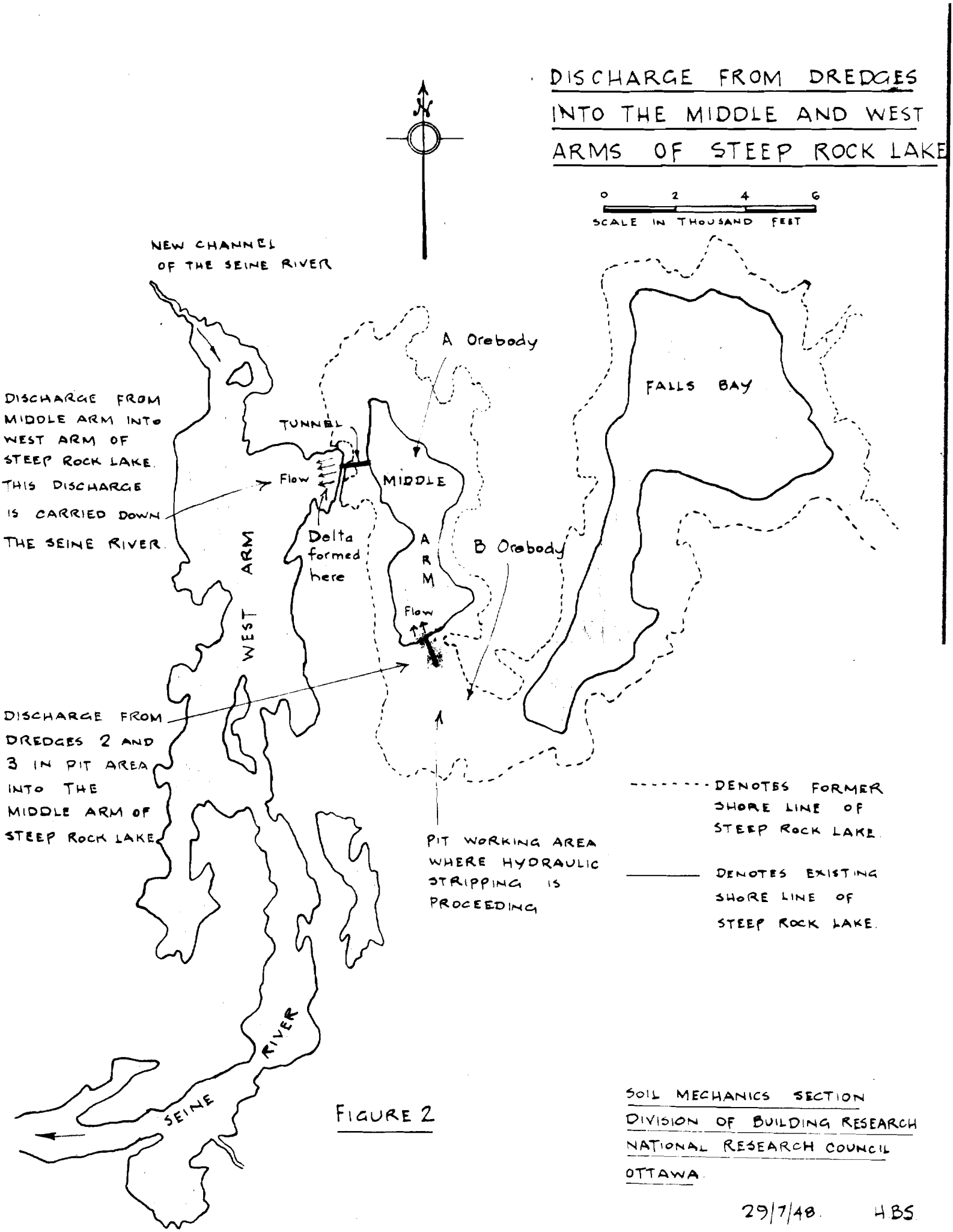


FIGURE 2

SOIL MECHANICS SECTION
DIVISION OF BUILDING RESEARCH
NATIONAL RESEARCH COUNCIL
OTTAWA.

29/7/48. HBS

12th. July 1948

Hydrometer Readings taken on the Discharge from the Pipe discharging into the West Arm from Middle Arm

Samples were taken from the top and bottom of the flow and the hydrometer readings are shown below in gms/litre.

Top of flow	Bottom of flow
44.7	43.9
43.8	44.6
44.9	45.1
44.4	43.9
43.9	44.5
44.2	44.7
44.1	44.6
Average 44.4	Average 44.5

This is an average percentage solids at. this date of 44.5%

There was practically no difference between the top and bottom of the flow.

14th July 1949.

Samples of the Discharges were taken from the pipes leading into the West Arm and the readings are as below.

Hydrometer Readings

Top of Flow	Bottom of Flow
48.2	48.6
47.8	48.7
48.5	47.9
48.1	48.2
48.3	48.5
48.5	48.5
Average 48.2	Average 48.4.

These hydrometer readings are in lbs/litre.
Thus Percentage solids = 4.83% at this date.

There was practically no difference between the top and the bottom of the flow.

14th July 1948

Discharges from Dredges No2 and 3 into the Middle Arm

Samples were taken from the top and bottom of the flow in these pipes.

Dredge No2.

The percentage solids was so high that the hydrometer available could not record the specific gravity of the suspension. Samples of volume 1000cc were evaporated to dryness and the percentage solids found is detailed below

Top of Pipe = 8.33% 8.17%
Bottom of Pipe = 8.5%.

There was practically no difference between the top and the bottom of the flow.

Dredge No3.

The discharge from this pipe was practically clear water and contained a negligible amount of solids.

Discharges from Docks into Middle Arm and West Arm

Record and Summary of Limit Tests on the Deposits formed by these discharges

Deposit at Middle Arm. No.2.

Sample No	Depth	Nat w/c.	P_w.	L_w	P.I.	B.
②.3	3'0"	70.2	22.2	56.1	33.9	-
② 10.	10'0"	64.1	19.5	33.7	14.2	-
② 13.	13'0"	71.4	-	-	-	-

Deposit at West Arm No1

Sample No	Depth	Nat w/c	P_w	L_w	P.I	B.
① 3	3'-0"	130.5 172.5	51.5	122.0	70.5	-
① 7.5	7'6"	52.2 60.3	26.8	40.0	13.2	-
① 10.5	10'6"	165.2 142.1	66.2	130.6	64.4	-
① 12.5	12'6"	182.5 113.1	72.9	172.8	99.9	-

The B values are not reliable due to the variable water content values. These differences in natural water content are due to the varying amount of organic matter throughout the sample.

9th. Aug. 48.

Plots given in lab. record book. Moisture Content Determinations

Name Sutherland

Date 14th July '62

Sample and Test No.

Sheet No.

Discharge from the Pit area to Middle Bay and Middle Bay to the West Arm.

Water Content and Limit Tests.

These samples were taken from boreholes in the deposits formed by these discharges.

Notes: w = water content
L_w = liquid limit
P_w = plastic limit

No. of blows refers only to liquid limit tests
Tare is the weight of the container

$$\text{Water content } w\% = \frac{\text{Weight of water}}{\text{Weight of dry soil}} \times 100$$

Depth →	12.5 ft.	12.5 ft.	7.5 ft.	7.5 ft.	10.5 ft.	10.5 ft.
Sample No.	① 12.5	① 12.5	① 7.5	① 7.5	① 10.5	① 10.5
Type of Test	W/P	W/P				
Container No.	20	18	10	13	11	1
No. of Blows.						
Weight of sample wet plus tare	36.51	46.11	40.09	42.40	44.45	50.52
Weight of sample dry plus tare	21.67	24.90	23.89	24.29	26.45	25.18
Weight of water	13.84	21.21	16.11	18.25	7.70	24.74
Tare	13.91	13.94	13.92	14.08	13.92	12.45
Weight of dry soil	7.76	10.96	9.97	10.21	12.73	12.80
Water content w%	178.5	193.1	161.6	178.5	160.2	193.1

Depth →	3 ft.	3 ft.	3 ft.	3 ft.	3 ft.	3 ft.
Sample No.	① 3	① 3	② 3	② 13	② 10	
Type of Test	W/P		W/P	W/P	W/P	
Container No.	4	5	12	6	12	
No. of Blows						
Weight of sample wet plus tare	54.14	58.16	61.40	58.81	62.36	
Weight of sample dry plus tare	32.42	36.45	42.23	38.91	43.28	
Weight of water	21.72	21.71	19.17	19.90	19.08	
Tare	13.92	13.91	13.92	13.92	13.92	
Weight of dry soil	18.50	22.54	28.31	24.99	29.36	
Water content w%	117.4	96.3	67.7	79.6	65.0	

Sample No.						
Type of Test						
Container No.						
No. of Blows						
Weight of sample wet plus tare						
Weight of sample dry plus tare						
Tare						
Weight of water						
Tare						
Weight of dry soil						
Water content w%						

Remarks. Material from bore holes at Discharge into West Arm.

Samples ① 12.5, ① 10.5 and ① 3 showed quantities of organic matter present

Samples ② 3, ② 10 and ② 13 showed no presence of organic matter (visually)

Name A. Gilbert

Sample and Test No.

Date 12/8/48

Sheet No.

Water Content and Limit Tests.

Notes: w_w = water content
L_w = liquid limit
P_w = plastic limit

No. of blows refers only to liquid limit tests
Tare is the weight of the container

$$\text{Water content } w\% = \frac{\text{Weight of water}}{\text{Weight of dry soil}} \times 100$$

Sample No. ① 34.	WEST ARM DISCHARGE - 3'0"					
Type of Test	P.L.	P.L.	P.L.	L.L.	L.L.	L.L.
Container No.	15	16	17	18	19	20
No. of Blows.	—	—	—	32·31·32	18·18·18	21·21·21
Weight of sample wet plus tare	17.093	17.921	18.459	23.955	28.971	22.108
Weight of sample dry plus tare	15.764	16.606	17.093	18.505	20.494	17.578
Weight of water	1.329	1.315	1.366	5.450	8.477	4.530
Tare	13.197	13.340	14.431	13.948	13.780	13.907
Weight of dry soil	2.567	2.666	2.662	4.557	6.714	3.671
Water content w%	51.8	49.3	51.3	119.6	126.3	123.4

Sample No. ③① 1.5	3'0" (Contd)	WEST ARM DISCHARGE - 7'6"				
Type of Test	L.L.	P.L.	P.L.	P.L.	L.L.	L.L.
Container No.	21	25	26	27	22	23
No. of Blows	29.29 -	—	—	—	11·11·12	18·17·19
Weight of sample wet plus tare	23.282	17.925	19.553	19.340	26.015	27.911
Weight of sample dry plus tare	18.023	17.107	18.446	18.175	22.388	23.852
Weight of water	5.259	.818	1.107	1.165	3.627	4.059
Tare	13.675	14.057	14.383	13.771	13.745	13.315
Weight of dry soil	4.348	3.050	4.063	4.404	8.643	9.937
Water content w%	121.0	26.8	27.2	26.5	42.0	40.9

Sample No. ① 10.5	7'6" (Contd)		WEST ARM DISCHARGE 10'6"			
Type of Test	L.L.	L.L.	P.L.	P.L.	P.L.	L.L
Container No.	24	28	36	37	38	39
No. of Blows	29·29	33·33·33	—	—	—	12·12·12
Weight of sample wet plus tare	24.649	27.302	16.646	17.315	17.853	28.144
Weight of sample dry plus tare	21.648	23.550	15.792	15.952	16.373	19.989
Tare / WT WATER	3.001	3.752	.854	1.363	1.480	8.155
Weight of water TARE	14.037	14.012	14.366	14.050	14.153	14.087
Tare						
Weight of dry soil	7.611	9.538	1.426	1.902	2.214	5.902
Water content w%	39.4	39.3	59.9	71.7	66.8	138.2

Remarks.

Name A. Casagrande

Sample and Test No.

Date 12/8/48.

Sheet No.

Water Content and Limit Tests.

Notes: w = water content
L_w = liquid limit
P_w = plastic limit

No. of blows refers only to liquid limit tests
Tare is the weight of the container

$$\text{Water content } w\% = \frac{\text{Weight of water}}{\text{Weight of dry soil}} \times 100$$

Sample No. ① 10.5	10'6" Cont'd			① 12.5 WEST ARM DISCHARGE 12'6"		
Type of Test	L.L.	L.L.	L.L.	P.L.	P.L.	P.L.
Container No.	40	42	41	29	30	35
No. of Blows.	23-23-23	26.26.27	35-35-36	—	—	—
Weight of sample wet plus tare	25.286	28.320	24.159	16.718	17.746	18.993
Weight of sample dry plus tare	18.902	20.359	18.496	15.630	16.062	16.779
Weight of water	6.384	7.969	5.663	1.088	1.684	2.214
Tare	14.071	14.192	13.975	14.073	13.744	13.890
Weight of dry soil	4.831	6.167	4.521	1.557	2.318	2.889
Water content W%	132.1	129.2	125.3	69.9	72.6	76.7

Sample No. ① 12.5	12'6" Cont'd					
Type of Test	L.L.	L.L.	L.L.	L.L.	P.L	P.L.
Container No.	31	32	33	34	3	4
No. of Blows	18-18-19	21-22-23	27-28-29	45-44-44	—	—
Weight of sample wet plus tare	26.310	22.698	27.463	26.937	15.332	16.284
Weight of sample dry plus tare	18.283	17.191	18.961	19.093	14.114	14.936
Weight of water	8.027	5.507	8.502	7.844	1.218	1.348
Tare	13.825	14.047	13.852	14.179	12.544	13.051
Weight of dry soil	4.458	3.144	5.109	4.914	1.570	1.885
Water content W%	180.1	175.2	166.4	159.6	77.6	71.5

Sample No.	W.A.D. 10'6"					
Type of Test	P.L.	P.L.				
Container No.	1	2				
No. of Blows	—	—				
Weight of sample wet plus tare	16.087	16.192				
Weight of sample dry plus tare	14.870	14.935				
Tare						
Weight of water	1.217	1.264				
Tare	12.977	12.842				
Weight of dry soil	1.893	2.093				
Water content W%	64.3	60.5				

Remarks.

Name A. Guibord.

Sample and Test No.

Date 12/8/48.

Sheet No.

Water Content and Limit Tests.

Notes: w = water content
L_w = liquid limit
P_w = plastic limit

No. of blows refers only to liquid limit tests
Tare is the weight of the container

$$\text{Water content } w\% = \frac{\text{Weight of water}}{\text{Weight of dry soil}} \times 100$$

Sample No. (1) 3 ft.	MIDDLE ARM DREDGE DISCHARGE - 30'					
Type of Test	P.L.	P.L.	P.L.	L.L.	L.L.	L.L.
Container No.	11	12	13	26-27-27	9	10
No. of Blows.	—	—	—	No 8	18-18-19	39-39-39
Weight of sample wet plus tare	16.032	16.569	17.672	24.852	23.155	23.585
Weight of sample dry plus tare	15.485	15.908	17.021	20.486	19.440	19.865
Weight of water	.547	.661	.651	4.366	3.715	3.720
Tare	13.020	12.943	14.087	12.623	12.985	13.003
Weight of dry soil	2.465	2.965	2.934	7.863	6.455	6.862
Water content w%	22.2	22.3	22.2	55.5	57.6	54.2

Sample No. (2) 10 ft.	MIDDLE ARM DREDGE DISCHARGE - 10'					
Type of Test	P.L.	P.L.	P.L.	L.L.	L.L.	L.L.
Container No.	1	2	3	4	6	7
No. of Blows	—	—	—	14-14-15	24-24-25	35-34-35
Weight of sample wet plus tare	19.007	19.841	17.781	38.104	38.641	35.383
Weight of sample dry plus tare	18.043	18.697	16.922	31.457	32.156	29.913
Weight of water	.964	1.144	0.859	6.647	6.483	5.470
Tare	12.978	12.842	12.544	13.051	12.928	12.968
Weight of dry soil	5.065	5.855	4.378	18.406	19.230	16.945
Water content W%	19.0	19.5	19.6	36.1	33.7	32.2

Sample No.						
Type of Test						
Containe r No.						
No. of Blows						
Weight of sample wet plus tare						
Weight of sample dry plus tare						
Tare						
Weight of water						
Tare						
Weight of dry soil						
Water content W%						

Remarks.

Mechenical Analysis Test Results

on Samples from Discharge from Pit Working Area

into the Middle Arm

Weight per 1000 c.c. will give G.S. of discharge

3

Name Authorized Sample and Test No. 2a ●

Date 15/4/48 Sheet No.

HYDROMETER ANALYSIS.

Description of sample: Discharge from Pug Lane Excavation Depot at Plant Ore Delivery Bays. Material from Fabrication and Discharge.

Hydrometer No. Evaporating Dish No.

$W\% = \frac{100}{W_s} \cdot \frac{S_s}{S_s - 1} (R_H + m_T - c_d)$

$= \frac{100}{\text{[illegible]}} \cdot \frac{2.65}{1.65} \cdot (R_H + m_T - c_d)$

$= 1.99 \cdot (R_H + m_T - c_d)$

Wt. sample + dish dry = [illegible] gm
Tare = 100.5
W_s = 23.3 gms

Specific Gravity of solids = S_s = 2.65

Dispersing Agent used Sodium Silicate & Ammonia

Meniscus Correction = c_m = +0.3

Amount

c_d = -0.3 Correction for increase in density of liquid due to the addition of the dispersing agent.

Date	Temp.	Time	Elapsed Time	R'_H	$R_H = R'_H + c_m$	D mm	$R_H + m_T - c_d$	W%	Remarks.
	25°	2.36	0						
			30 sec	—	Readings at with the Hydrometer				of
			1 min	—					
			2 min	—					
			4 min	—					
			?	—					
	25°	2.42	1st	34.5	34.9	.0094	34.5	16.3	
	24.5	3.04	30	35.2	35.5	.0067	35.1	68.0	
	24.0	3.34	1 hour	30.8	31.1	.0058	31.6	59.5	
	23.5	4.34	3 hours	26.6	26.9	.0031	27.3	51.3	
	22.5	7.38	15 hrs	21.5	21.9	.0027	22.0	41.5	
	22.5	11.34	9 hours	17	17.3	.0019	17.9	33.8	

Remarks.

Name Sutherland

Sample and Test No. 25 6

Date 15th July 1948.

Sheet No.

HYDROMETER ANALYSIS.

Description of sample: Washings from Bridge No 2 at Flint Ore Road Pipe Line. Sample taken from bottom of pipe and material dispersed

Hydrometer No.

Evaporating Dish No.

Wt. sample + dish dry = 452.1 gm (before testing)

Tare = 412.8

W_s = 39.3 gms

$$W\% = \frac{100}{W_s} \cdot \frac{s_s}{s_s - 1} (R_H + m_T - c_d)$$

$$= \frac{100}{39.3} \cdot \frac{2.15}{1.15} \cdot (R_H + m_T - c_d)$$

$$= 2.04 \cdot (R_H + m_T - c_d)$$

Specific Gravity of solids = s_s = 2.15

Dispersing Agent used Sodium Silicate.

Amount 6 knobs 50% solution.

Meniscus Correction = c_m = _____

c_d = _____ Correction for increase in density of liquid due to the addition of the dispersing agent.

Date	Temp.	Time	Elapsed Time	R_H'	$R_H = R_H' + c_m$	D mm	$R_H + m_T - c_d$	W%	Remarks.
	24.5°	2.16							
			30 sec	23.9	24.2	.0106	24.8	97.8	
			60 sec	23.8	24.1	.0073	24.7	97.2	
			2 min	23.0	23.3	.0521	22.9	90.2	
			4 min	21.8	22.1	.0372	22.7	89.5	
		2.27	11	21.1	21.4	.0265	22.0	86.7	
		2.31	15	20.2	20.5	.0215	21.1	83.1	
	23.5	2.46	30 min	18.0	18.3	.0153	19.7	77.6	
	23.5	3.16	1 hour	16.5	16.8	.0108	17.2	67.7	
	23.0	4.16	2 hour	14.0	14.3	.0078	14.6	57.5	
	22.5	7.00	4.7 hrs	10.5	10.8	.0052	11.0	43.4	
	25°	10.31	8.3 hrs	9.3	9.6	.0021	9.3	36.9	

Remarks.

Name Sutherland

Sample and Test No. 2c 0

Date 15/11/68

Sheet No.

HYDROMETER ANALYSIS.

Description of sample: Thick fine Patent Ripping Paper 102 Material from top of the strips material has settled without dispersion

Hydrometer No. 6203

$$W\% = \frac{100}{W_s} \cdot \frac{S_s}{S_s - 1} (R_H + m_T - c_m)$$

$$= \frac{100}{2.7 - 1.15} \cdot \frac{2.15}{1.15} \cdot (R_H + m_T - c_d)$$

$$= 1.425 \cdot (R_H + m_T - c_d)$$

Evaporating Dish No.

Wt. sample + dish dry = 255.7 gm

Tare = 194.0

W_s = 61.7 gm

Specific Gravity of solids = S_s = 2.15

Dispersing Agent used /

Amount /

Meniscus Correction = c_m = 0.3

c_d = -0.2 Correction for increase in density of liquid due to the addition of the dispersing agent.

Date	Temp.	Time	Elapsed Time	R'_H	$R_H = R'_H + c_m$	D mm	$R_H + m_T - c_d$	W%	Remarks.
	23°	2.37	0						
			30 sec		Readings out with range of				
			1 min		hydrometer.				
			2 min						
		2.45	8	36.1	36.4	.015	36.7	10.6	
		46	9	30.2	30.5	.013	30.8	50.3	
	23°	2.52	15	23.0	23.3	.011	23.6	45.5	
	22.5	3.00	23	16.0	16.3	.01	16.5	31.8	
	23.0	3.22	30	9.5	9.8	.0076	10.1	19.4	
	23.0	3.31	45	8.0	8.3	.009	8.6	16.6	
	22.5	3.37	1 hour	7.5	7.8	.0067	8.0	15.4	
	22.5	4.37	2 hours	4.1	4.4	.005	4.6	8.9	
	22.5	1.00	4.5 hours	1.0	1.3	.0033	1.6	3.1	
	24.5	11.35	24 hours	0.7	1.0	.0022	1.6	3.1	

Remarks.

Name Sutherland

Sample and Test No. 2 & 9

Date 15/9/48.

Sheet No.

HYDROMETER ANALYSIS.

Description of sample: Dredgings from Dredge 102 at East One Island Road. The material was tested without dispersion of the grains.

Hydrometer No.

Evaporating Dish No.

$W\% = \frac{100}{W_s} \cdot \frac{s_s}{s_s - 1} (R_H + m_T - c_d)$

Wt. sample + dish dry = 43.6 gm

Tare = 1.2

W_s = 42.6 gm

$= \frac{100}{42.6} \cdot \frac{2.75}{1.75} \cdot (R_H + m_T - c_d)$

Specific Gravity of solids = s_s = 2.75

$= 2.60 \cdot (R_H + m_T - c_d)$

Dispersing Agent used /

Meniscus Correction = c_m = +0.3

Amount /

c_d = -0.3 Correction for increase in density of liquid due to the addition of the dispersing agent.

Date	Temp.	Time	Elapsed Time	R_H'	$R_H - R_H' + c_m$	D mm	$R_H + m_T - c_d$	W%	Remarks.
	24.5	12.27							
			5 sec	28.8	25.9	.0059	26.4	95.0	
			1m	28.5	25.1	.0043	25.7	92.5	
			2 m	28.0	24.3	.0032	24.9	89.6	
			4 m	23.6	23.9	.0021	24.5	88.2	
		12.36	9	20.0	20.3	0.015	20.9	75.3	
	24.5	12.42	15	15.0	15.3	.012	15.9	57.3	
	24	12.51	31	9.0	9.3	.0085	9.9	35.4	
	24	1.07	40	6.0	6.3	.0062	6.9	24.6	
	24	1.22	55	4.0	4.3	.001	4.9	17.3	
	24°	1.45	76	2.0	2.2	.0006	2.7	13.4	/

Remarks. This was diluted with 500cc. of distilled water. Total weight from this sheet and sheet that the below suspension will give total wt. / 1000cc.

Mechanical Analysis Test Results

on Samples from Discharge from Middle Arm

into the West Arm

This sample was taken from the pipe dis harging into the West Arm.

Name Sutherland — Sample and Test No. 1a

Date 15/7/48 — Sheet No.

HYDROMETER ANALYSIS.

Description of sample: Discharge from lake Land from Fowlers Bridges into the West Arm Material dumped after testing

Hydrometer No. 152 H

$$W\% = \frac{100}{W_s} \cdot \frac{s_s}{s_s - 1} (R_H + m_T - c_d)$$

$$= \frac{100}{40.8} \cdot \frac{2.15}{1.15} \cdot (R_H + m_T - c_d)$$

$$= 3.936 \cdot (R_H + m_T - c_d)$$

Evaporating Dish No.

Wt. sample + dish dry = 455.8 gm

Tare = 414.8

W_s = 40.8 gm

Specific Gravity of solids = s_s = 2.15

Dispersing Agent used $Na_2 Al_2 O_3$ 5% sol

Amount 6 mls.

Meniscus Correction = c_m = +0.3

c_d = -0.3 Correction for increase in density of liquid due to the addition of the dispersing agent.

Date	Temp.	Time	Elapsed Time	R_H'	$R_H = R_H' + c_m$	D mm	$R_H + m_T - c_d$	W%	Remarks.
	25.5°	2.24							
			3 secs	21.8	22.1	.056	23.3	84.7	
			16	21.6	21.9	.0143	23.1	84.0	
			2 mins	21.2	21.5	.0101	22.7	82.5	
		2.28	4	21.2	21.5	.0072	22.7	82.5	
		2.32	8	20.9	21.1	.0051	22.3	81.1	
	24.5	2.39	15	20.0	20.3	.0035	21.4	77.8	
	24.5	2.54	30	19.0	19.3	.0025	20.4	74.1	
	24.0	3.24	63	16.9	17.2	.0018	18.3	66.5	
	23.5	4.24	2 hours	15.2	15.5	.0013	16.6	60.3	
	22.5	7.24	5.5 hrs	12.2	12.5	.0008	13.4	48.7	
	21.5	11.24	9.1 hrs.	10.0	10.3	.0006	11.2	40.7	

Remarks.

Discharge into the West Arm. The sample was taken from the ~~top~~ bottom of the discharge pipe.

Name Sutherland — Sample and Test No. 16

Date 12th July 1948. — Sheet No.

HYDROMETER ANALYSIS.

Description of sample: Discharge from Pipe Line into the West Arm. Samples taken from bottom of pipe

Hydrometer No. 152.

$$W\% = \frac{100}{W_s} \cdot \frac{G_s}{G_s - 1} (R_H + m_T - C_d)$$

$$= \frac{100}{43.2} \cdot \frac{2.15}{1.15} \cdot (R_H + m_T - C_d)$$

$$= 3.64 \cdot (R_H + m_T - C_d)$$

Evaporating Dish No.

Wt. sample + dish dry = 443.8 gm

Tare = 400.6

W_s = 43.2

Specific Gravity of solids = G_s = 2.15

Dispersing Agent used ~~Calgon~~ Na$_2$SiO$_3$.

Meniscus Correction = C_m = +0.3

Amount

C_d = −0.3. Correction for increase in density of liquid due to the addition of the dispersing agent.

Date	Temp.	Time	Elapsed Time	R_H'	$R_H = R_H' + C_m$	D mm	$R_H + m_T - C_d$	W%	Remarks.
12/7/48	23°	11.15	0'						
	23°		30 sec.	25.6	25.4	.06	28.2	95.4	
	"		60	25.3	25.6	.044	28.9	94.3	
	"		2 min.	25.2	25.5	.031	28.9	93.9	
	"		4	24.9	25.2	.022	28.5	92.8	
	"	11.24	9	22.1	22.4	.015	25.7	82.6	
	"	11.35	20	14.4	14.7	.011	16.0	54.6	
	23.5	11.49	33	7.2	7.5	.009	7.9	28.8	
	23.5	12.09	54	4.0	4.3	.0072	4.7	17.1	
	25°	13.02	107	1.6	1.9	.0052	2.4	8.5	
	25.5	13.54	159	0.8	1.1	.0043	2.2	8.0	
	24	14.42	207 min.	-0.2	+0.1	.0036	1.1	4.0	

Remarks. This sample has not been dispersed but the grain size distribution determined with the material as it left the pipe line.

Name Sutherland. Sample and Test No. 8 Hole 1c

Date 14/7/08 Sheet No.

HYDROMETER ANALYSIS.

Description of sample: Discharge from Eagle Lake into West Arm. Sample tested without grains being dispersed.

Hydrometer No. 6403. Evaporating Dish No.

$W\% = \frac{100}{W_s} \cdot \frac{s_s}{s_s - 1} (R_H + m_T - c_d)$

Wt. sample + dish dry = 723.1 gm

Tare = 121.7

W_s = 41.4 gm

$= \frac{100}{41.4} \cdot \frac{2.45}{1.45} \cdot (R_H + m_T - c_d)$

Specific Gravity of solids = s_s = 2.45

$= 3.19 \cdot (R_H + m_T - c_d)$

Dispersing Agent used /

Meniscus Correction = c_m = +0.3

Amount /

c_d = -0.3 Correction for increase in density of liquid due to the addition of the dispersing agent.

Date	Temp.	Time	Elapsed Time	R_H'	$R_H = R_H' + c_m$	D mm	$R_H + m_T - c_d$	W%	Remarks.
	23.5	12.10							
			30	25.5	25.8	.0062	24.2	94.3	
			60	23.1	23.4	.0042	25.8	99.8	
			2 hr	25.0	25.3	.0030	25.7	99.2	
			4 hr	24.5	24.6	.0022	25.0	96.2	
			7	21.6	21.8	.0017	22.3	86.5	
		12.35	1K	13.1	13.4	.0012	13.9	53.4	
	24	12.40	30	4.0	4.2	.0007	4.8	18.2	
	24	12.56	46	1.3	1.6	.0006	2.1	8.0	
	24	1.06	56	0.6	1.0	.0005	1.4	5.3	
	24	1.35	85	0	0.3	.0004	0.8	3.0	/

Remarks.

Discharge into the West Arm. The sample was taken from the top of the discharge pipe.

Name Sutherland Sample and Test No. 48 4

Date 12th July 1948. Sheet No.

HYDROMETER ANALYSIS.

Description of sample: Discharge from Pipe Line into the West Arm. Sample from top of Specimen.

Hydrometer No. Evaporating Dish No.

$W\% = \frac{100}{W_s} \cdot \frac{S_s}{S_s - 1} (R_H + m_T - c_d)$

$= \frac{100}{42.1} \cdot \frac{2.15}{1.15} \cdot (R_H + m_T - c_d)$

$= 3.72 \cdot (R_H + m_T - c_d)$

Wt. sample + dish dry = 216.5 gm
Tare = 174.4
W_s = 42.1

Specific Gravity of solids = S_s = 2.15

Dispersing Agent used /

Amount /

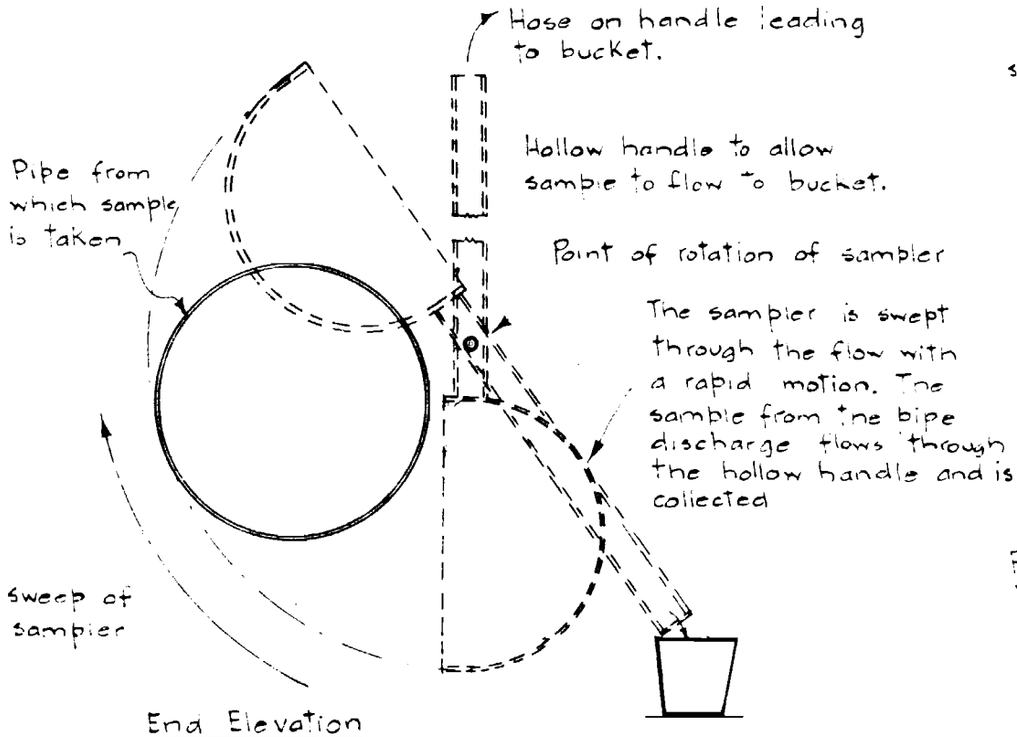
Meniscus Correction = c_m = +0.3.

c_d = -0.3. Correction for increase in density of liquid due to the addition of the dispersing agent.

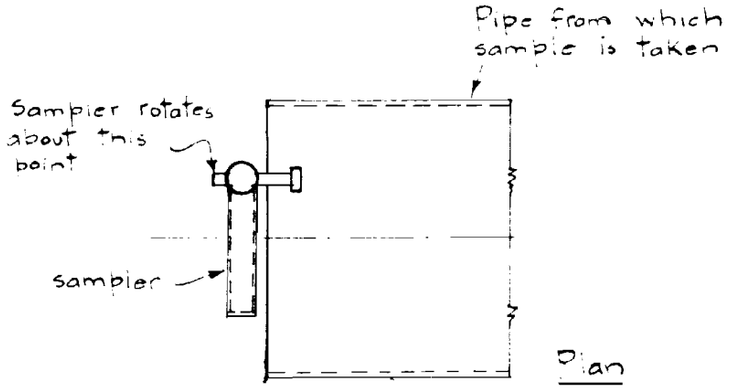
Date	Temp.	Time	Elapsed Time	R'_H	$R_H = R'_H + C_m$	D mm	$R_H + m_T - C_d$	W%	Remarks.
12/7/48	24°	11.02	0						
	"		30 sec.	25.5	25.8	.036	26.1	97.1	
	"		60 sec.	24.9	25.2	.042	25.9	96.0	
	"		2 min	24.8	25.1	.073	25.7	95.5	
	"		4	24.3	24.6	.021	25.2	93.6	
	"		9	22.1	22.4	.0125	23.0	85.5	
	"		16	17.1	17.4	.012	18.0	67.0	
	"		23	12.6	12.9	.0103	13.5	50.2	
	"		31	7.6	7.9	.0091	8.5	31.6	
	24°		45	4.5	4.8	.008	5.4	20.1	
	24°	12.09	67	2.9	3.2	.0065	3.9	14.5	✓
	25°	13.02	120	1.0	1.3	.0049	2.0	7.45	
	25.5	13.53	171	0.5	0.8	.004	1.9	7.1	
	26	14.43	221	-0.3	0.	.0035	1.0	3.7	

Remarks. This sample had not been dispersed but the grain size distribution was determined on the sample in the state it is in when leaving the pipe.

FIGURE 3A



End Elevation



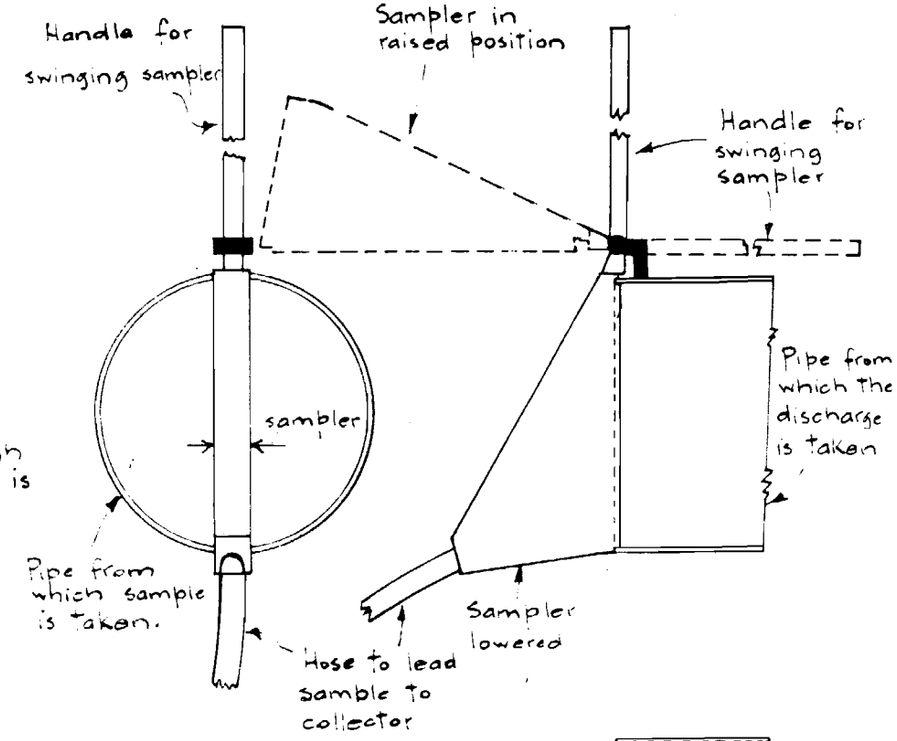
Plan

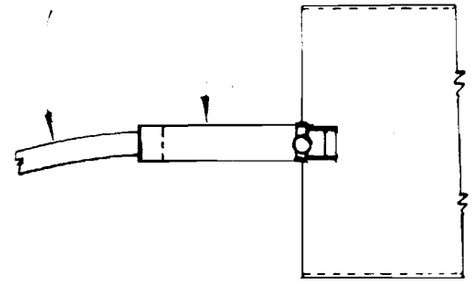
SKETCH OF SAMPLER USED FOR DREDGE PIPE DISCHARGES IN BRITISH GUIANA.

FIGURE 3B.

End Elevation.

Front Elevation





Plan

SKETCH OF PROPOSED SAMPLER FOR DREDGE PIPE DISCHARGES WHERE THERE IS UNEVEN DISTRIBUTION OF SOLIDS.

SCALE : 3/4" = 1'-0".

SOIL MECHANICS SECTION
DIVISION OF BUILDING RESEARCH
NATIONAL RESEARCH COUNCIL
OTTAWA CANADA

H.B.S. 28/7/48.

NO. 31,289. 10 DIVISIONS PER INCH (70 DIVISIONS) BY FIVE 2-INCH CYCLES RATIO RULING.
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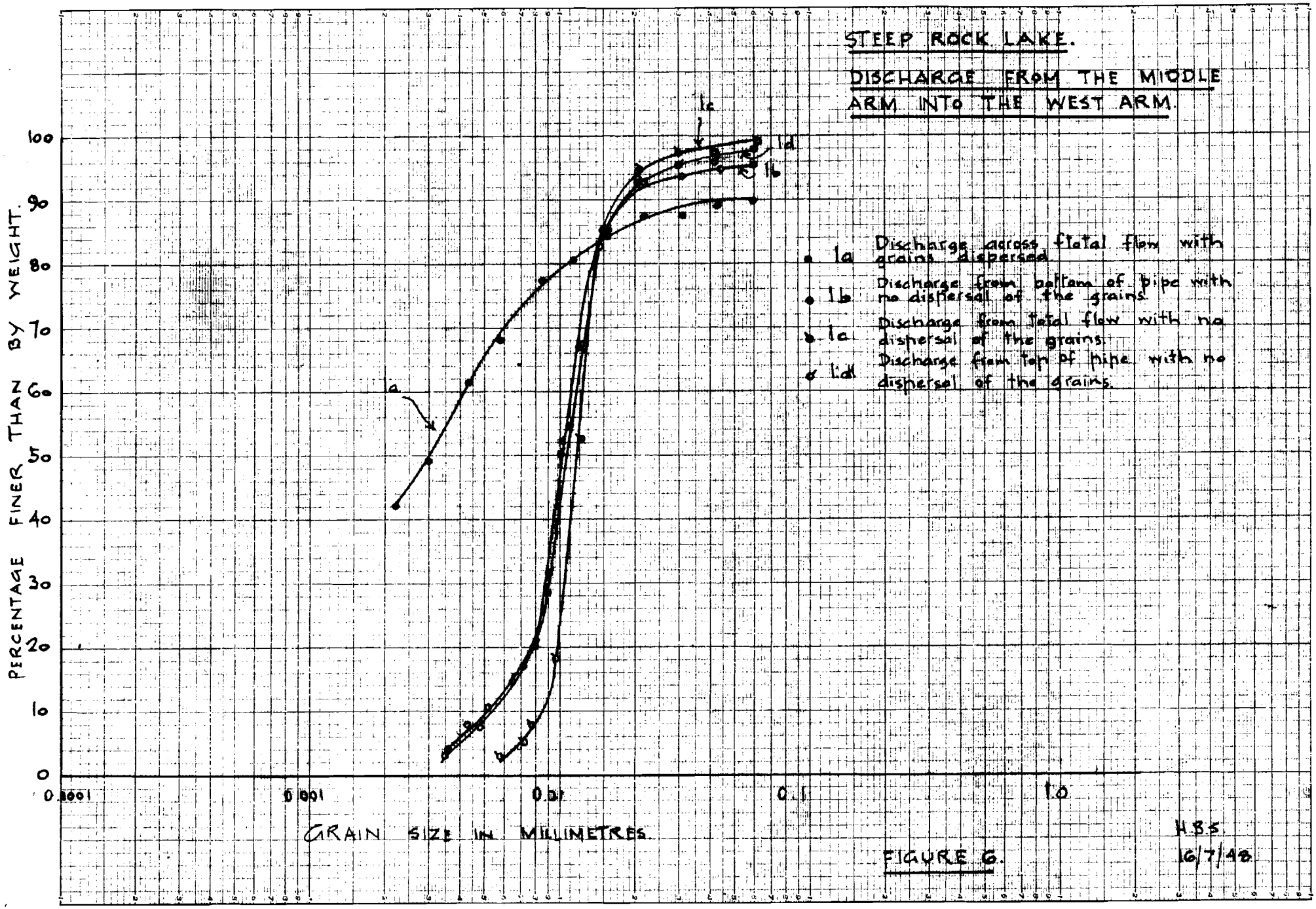


FIGURE 6.

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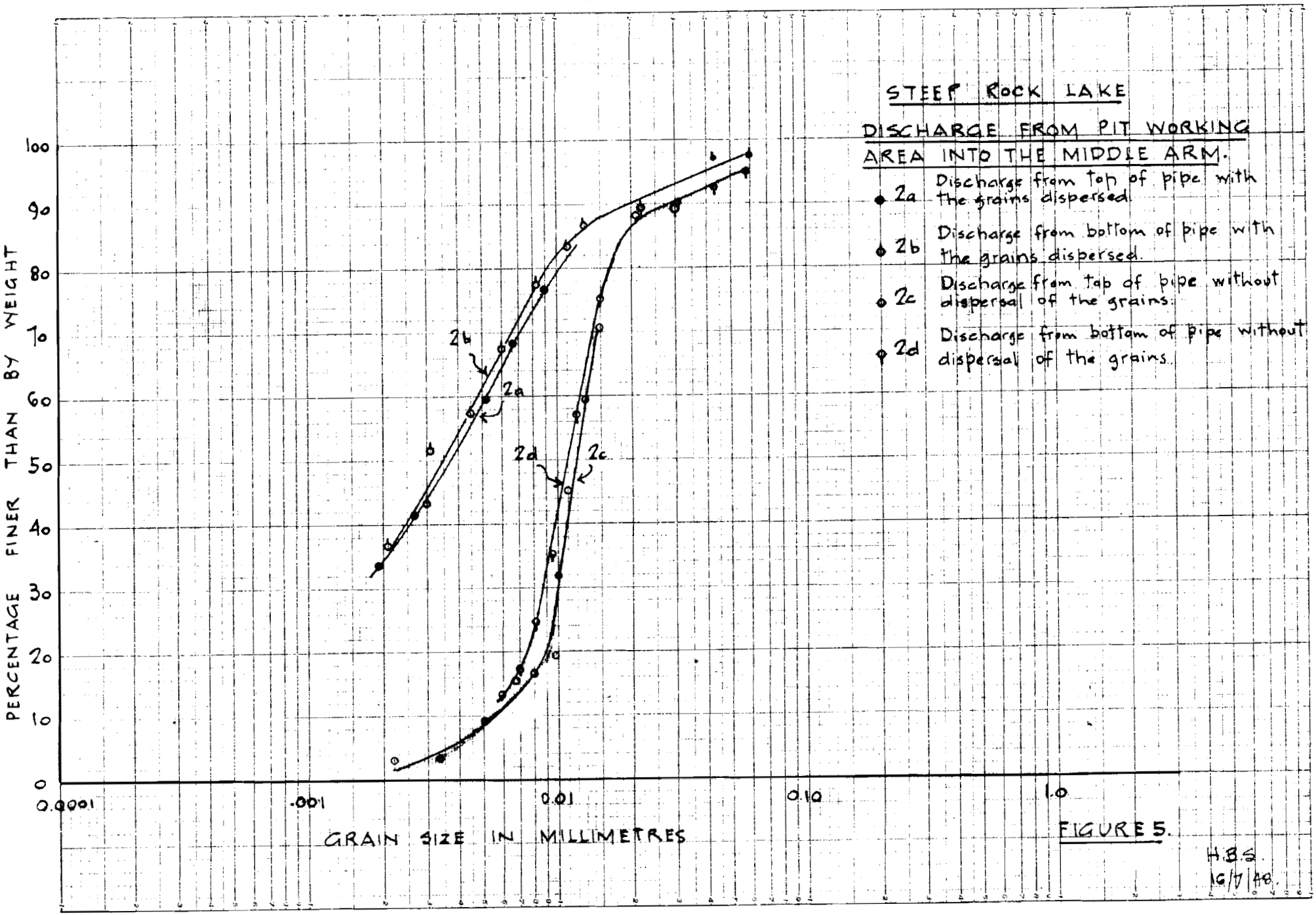


FIGURE 5.

H.B.S.
16/7/48.

NO. 31.289. 10 DIVISIONS PER INCH (70 DIVISIONS) BY FIVE 2-INCH CYCLES RATIO RULING.
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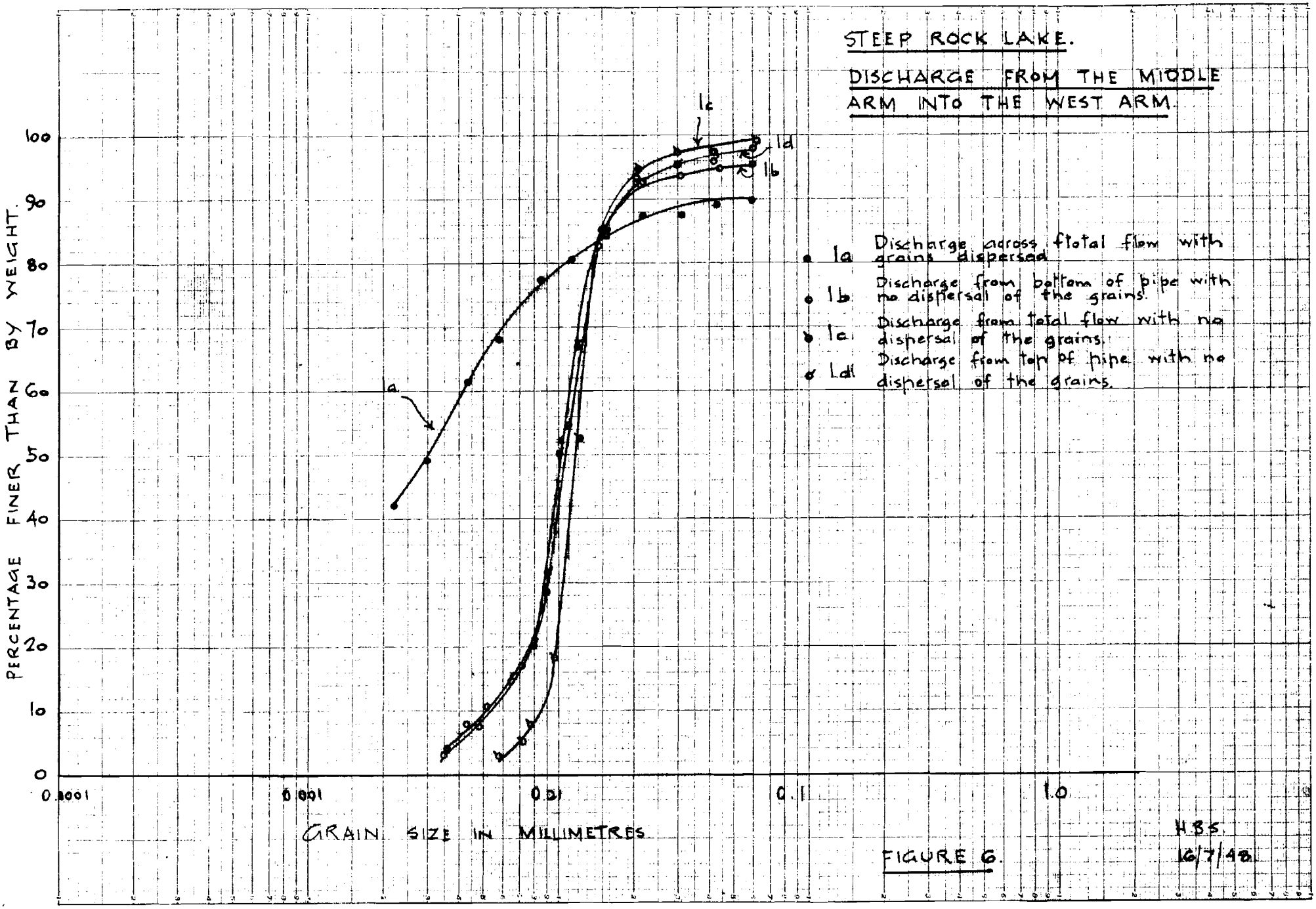


FIGURE 6.

H.B.S.
6/7/48.

NO. 315. 10 DIVISIONS PER INCH BOTH WAYS. 70 BY 100 DIVISIONS. CODEX BOOK COMPANY, INC. NORWOOD, MASSACHUSETTS. PRINTED IN U.S.A.

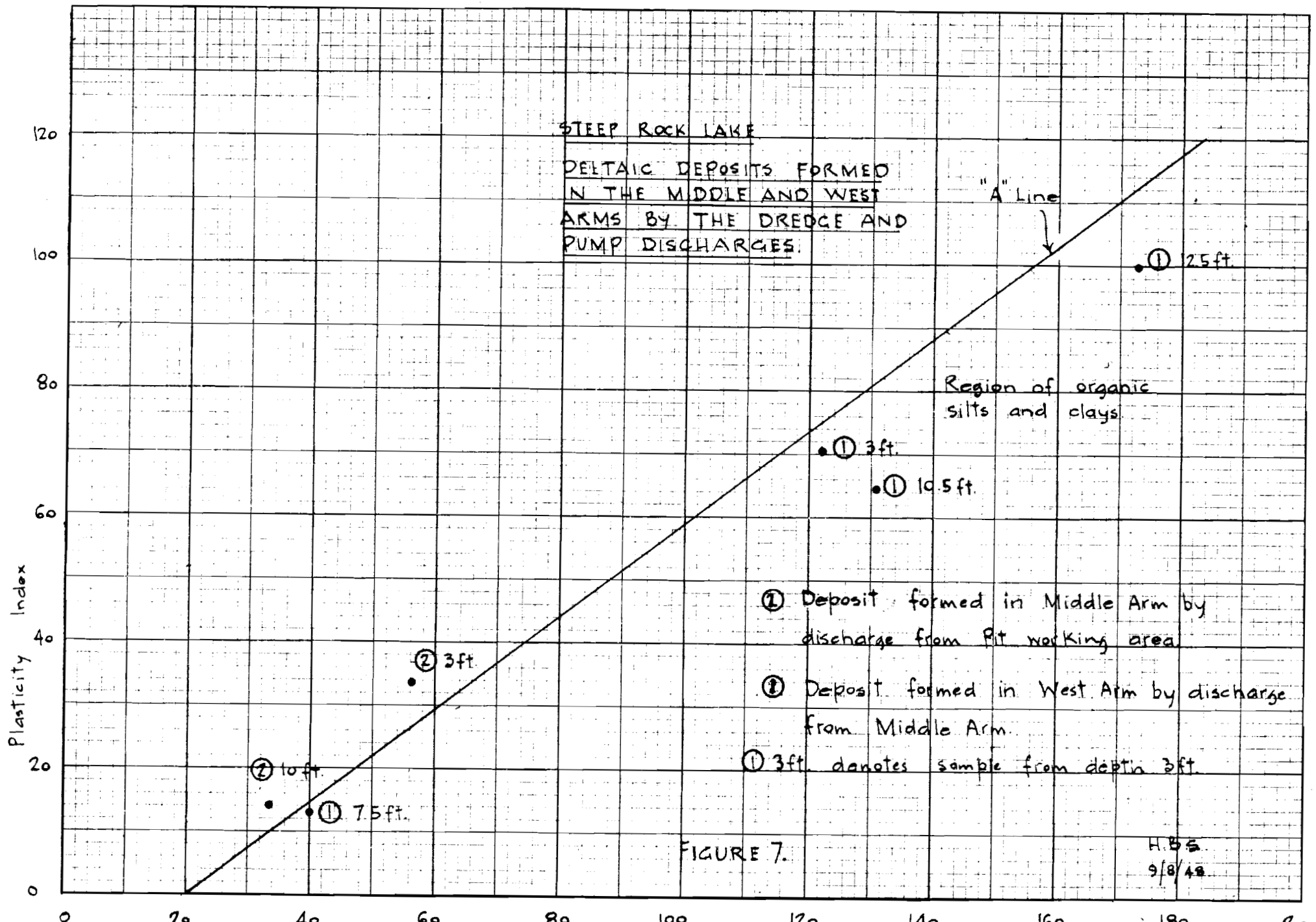


FIGURE 7.

H.B.S.
9/8/42