Fig. 3.5.10(b) BOTTOM SEDIMENTS IN KUANTAN SHORE

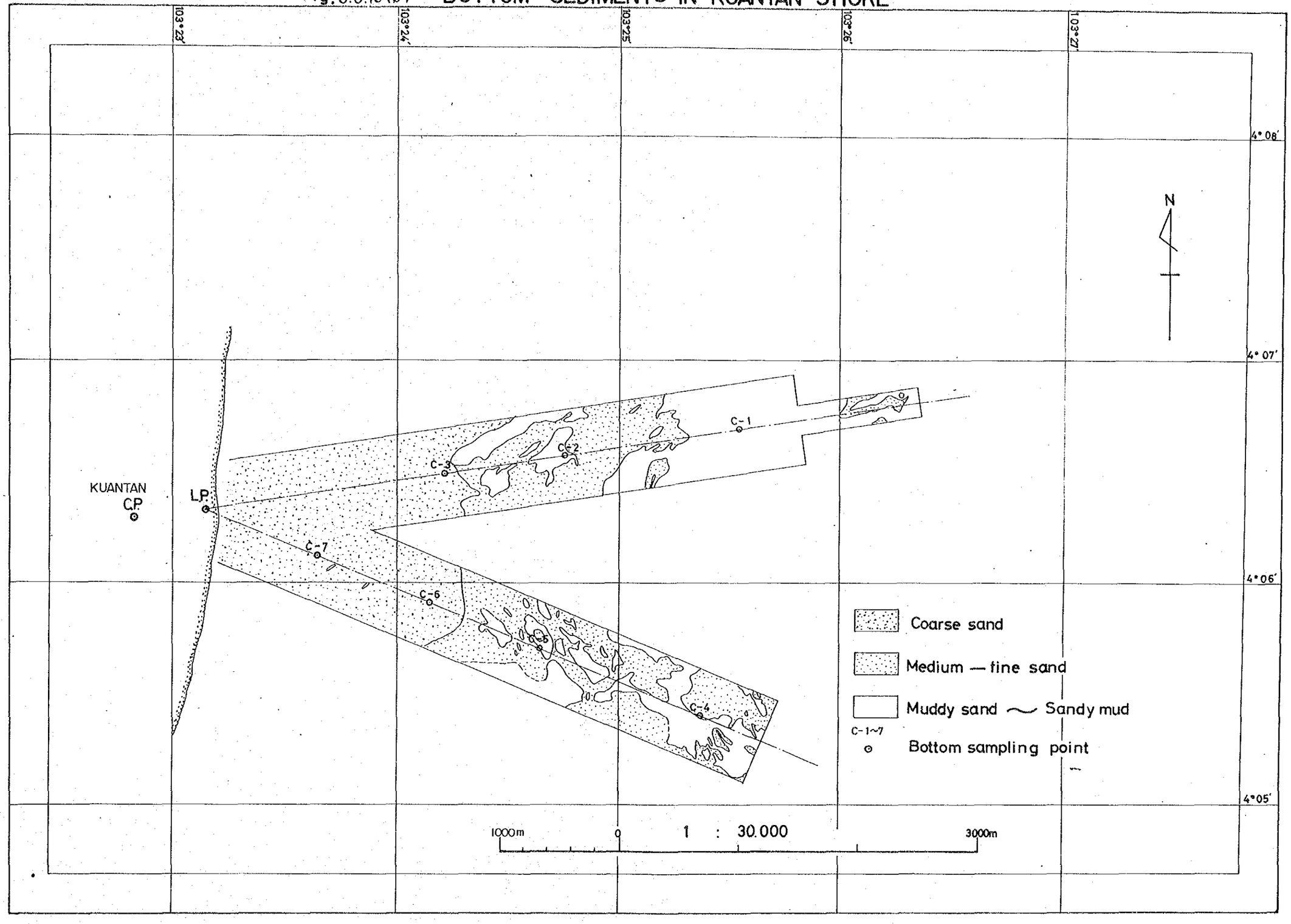
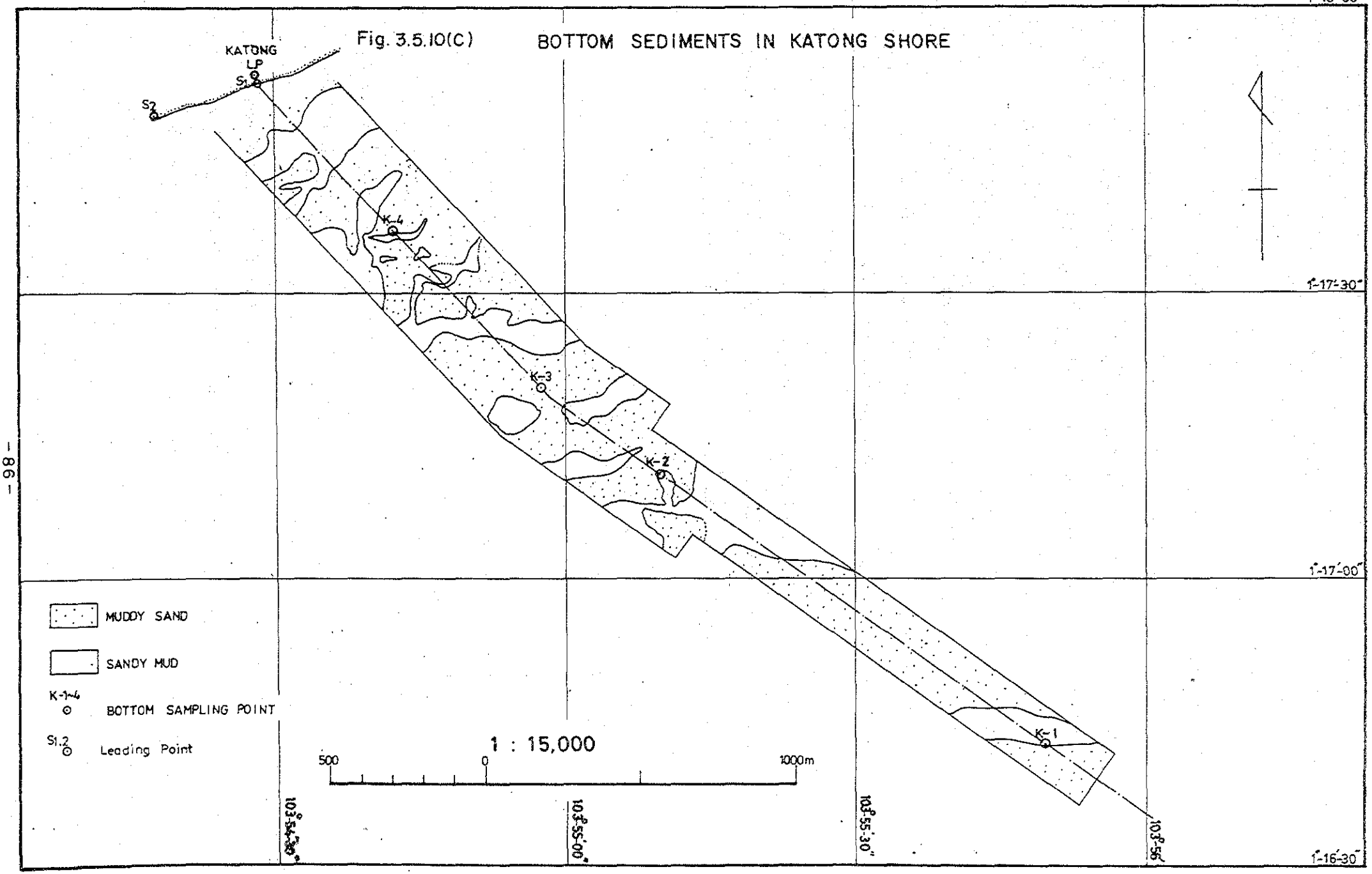


Fig. 3.5.10(C) BOTTOM SEDIMENTS IN KATONG SHORE



3.5.4 Bottom Sediments

Bottom sampling and photographing positions are shown in Figure 3.5.11 and Table 3.5.1(a) and (b). Collected samples were shown in Figures 3.5.13-1 ∿ 16. The results of the grain size analysis of these bottom sampled materials are given in Table 3.5.2(a) and (b). Bottom material distribution and cylindrical samples are shown in Figure 3.5.12. Photographed bottom features at respective points are shown in Figure 3.5.13(a) ∿ (d). Photographing of the bottom was made for about 10 minutes at intervals of 10 seconds by holding the camera 2 ∿ 3 m above the bottom. The flashing time of the camera was set at less than 1/1000 second and the focus depth 1.8 ∿ 8 m at F5.6.

The survey route was divided into 8 sections by sediments encountered.

(a) Pechaburi slope

In this section, six samples were picked up in the in-shore portion and two samples in the offshore portion. The results indicate that the bottom near the shore is of sand and changes to soft mud ∿ sandy mud as it goes offshore. The mud ∿ sandy mud portion gradually thins. At St 1 in the offshore portion sandy mud covers the bottom surface at a thickness of 1 ∿ 2 cm and beneath this solid mud occupies. In southern areas, sandy and mud on the surface disappears and, instead, solid mud covered with an extremely thin,

soft mud appears. Bottom distribution of Pechaburi (Ban Hat Chao Samran) in-shore portion is shown in Figure 3.5.10(a).

(b) Flat section in the Gulf of Thailand

The portion ranging from Pechaburi (Ban Hat Chao Samran) to about 140nm is of a clay layer covered with a 10cm comparatively soft mud. The further portion of the bottom scarecely involves sediments and is occupied by solid clay.

(c) Offing of Samui Island

On the slope formed on both side of this section soft mud of 40cm to 115cm or more in thickness is deposited on the clay layer beneath. Near the flat top in the central area in this section the sedimentation is as thin as 5cm.

(d) Thailand-Malaysia flat section

Soft mud of as thick as more than 1m covers the northern part of this section. In the southern part, the sediment becomes muddy sand which covers soft mud. The sampled lengths were as thick as 35cm∿1m or more.

(e) Kuantan slope

The bottom consists of medium and coarse grains of sand. It can be estimated, from the recorded pattern by the Sparker, that the slope consists of nearly one sandy sediment. The thickness of the sandy sediment varies in a 1m to 20m range. The thickness of sand picked up on the foot of the slope was 10cm and beneath thin sand a

solid clay layer appeared. The bottom materials in the Kuantan in-shore portion are shown in Figure 3.5.10(b).

(f) Offing southeast coast of Malaysia

The bottom surface layer appears to change in the order of mud, muddy sand and sand as the survey route goes on. In the sandy portion, sand waves appear. The surface layer is comparatively soft and the base layer beneath the surface layer is of muddy sand or sand. The sampled length was mostly 60 ~ 110cm.

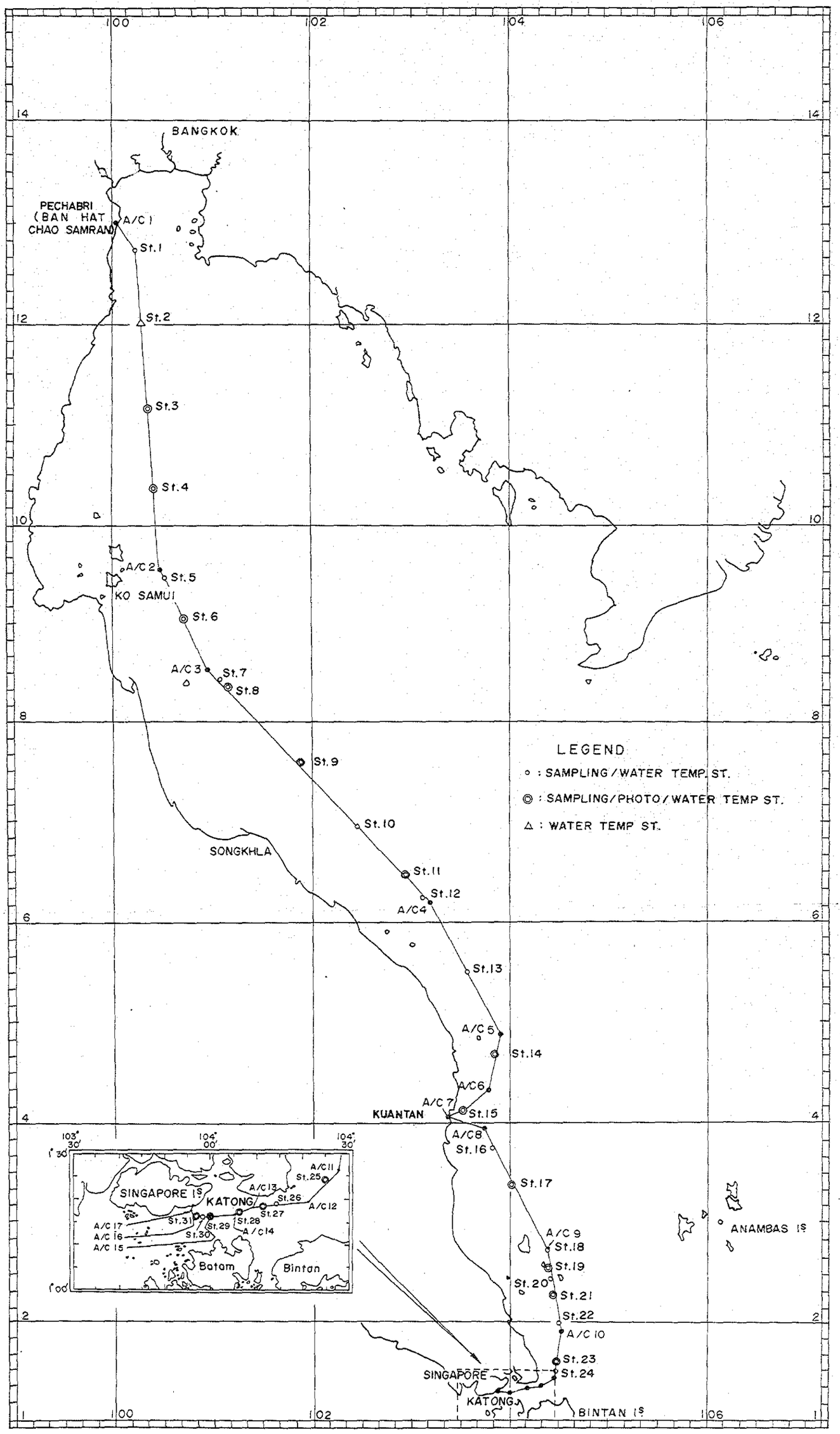
(g) Singapore Strait

The bottom involving marked ups and downs in this section changes its material from place to place but is most covered with sand or sandy gravel. Thick soft mud (75cm in sampled length) was observed as the base layer near the entrance of the Strait. As the route approaches the Katong slope, the base rocks appear approximately 1 meter bellow the surface with less sedimentation of sand.

(h) Katong slope

This section involving marked ups and downs as in the Singapore Strait is covered with comparatively soft muddy sand. At St 30 and St 31 the sampled lengths were 50cm ∿85cm but seem to differ from place to place. Muddy sand and sandy mud are distributed irregularly toward the shore of Katong. Bottom distribution of Katong in-shore portion is shown in Figure 3.5.10(c).

Fig. 3.5.11 SURVEY STATIONS FOR BOTTOM SAMPLING, PHOTOGRAPHING AND TEMPERATURE OBSERVATION



Items \ St. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Date, Time	11th May 18:20	12th May 0:00	12th May 6:45	12th May 14:35	12th May 23:30	13th May 3:15	13th May 9:05	13th May 11:00	13th May 18:28	15th May 22:55	16th May 4:00	16th May 6:52	16th May 12:38	16th May 17:40	16th May 22:40
Position Lat	12° - 44.75'	12° - 00.70'	11° - 09.14'	10° - 22.00'	9° - 26.76'	9° - 02.97'	8° - 25.75'	8° - 20.08'	7° - 36.22'	6° - 56.81'	6° - 26.85'	6° - 16.20'	5° - 28.50'	4° - 40.00'	4° - 07.50'
Position Long	100° - 15.80'	100° - 18.85'	100° - 22.51	100° - 29.25	100° - 32.25'	100° - 43.40'	101° - 05.25'	101° - 09.70'	101° - 53.04'	102° - 27.76'	102° - 57.17'	103° - 06.80'	103° - 35.45'	103° - 51.65'	103° - 30.17'
Depth (m)	25.5	34.1	51.0	64.1	49.0	35.3	49.6	53.8	57.2	50.5	52.9	51.9	56.7	58.8	17.4
Bottom Water temperature	30.7	30.1	29.8	29.0	29.1	30.1	29.1	28.3	27.4	28.6	28.3	28.4	28.2	28.3	30.4
Sampling Method	P.C.	-	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	S.M.
Bottom Material (cm) Upper ↓ Lower	Mud (10)	-	Mud (15)	Clay (10)	Mud (40) Clay (16)	Clay (5) Clay (22)	Mud(105) (with shell)	Mud (115) (with shell)	Mud (125)	Mud (95)	Mud(64)	Muddy Sand(14) Mud (21)	Muddy Sand(24) Mud (86)	M.Sand (5) Clay(19)	C.Sand
Core Length (cm)	10	-	15	10	56	27	105	115	125	95	64	35	110	24	-

Items \ St. No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Date, Time	17th May 2:45	17th May 5:30	17th May 10:50	19th May 13:15	19th May 15:30	19th May 17:08	19th May 22:50	20th May 4:20	20th May 6:00	20th May 7:10	20th May 9:45	20th May 11:00	20th May 12:15	20th May 13:30	23th May 16:00	23th May 16:33
Position Lat.	3° - 45.46'	3° - 22.80'	2° - 43.20'	2° - 33.75'	2° - 26.80'	2° - 17.60'	2° - 00.01'	1° - 54.10'	1° - 28.40'	1° - 24.13'	1° - 19.15'	1° - 18.84'	1° - 17.40'	1° - 16.47'	1° - 16.60'	1° - 16.68'
Position Long.	103° - 49.75'	104° - 02.20'	104° - 22.45'	104° - 23.95'	104° - 25.50'	104° - 25.50'	104° - 30.20'	104° - 29.60'	104° - 28.60'	104° - 25.10'	104° - 13.87'	104° - 11.36'	104° - 07.15'	103° - 59.43'	103° - 58.20'	103° - 56.97'
Depth (m)	25.5	41.8	49.9	48.1	47.8	42.3	41.2	28.3	31.1	36.3	25.3	26.9	35.7	39.7	41.2	38.5
Bottom water temperature	30.0	28.9	28.5	29.0	29.1	29.2	29.4	30.0	30.0	30.1	30.1	30.1	30.2	30.3	30.3	30.4
Sampling Method	S.M.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.	S.M.	P.C.	P.C.	P.C.	P.C.	P.C.
Bottom Material (cm) Upper ↓ Lower	C.Sand	Mud(20) f.Sand (42)	Muddy Sand(65)	Mud (15) Muddy Sand(485) Sandy Mud (16) Muddy Sand(12)	c.f.Sand (6) Muddy Sand (?) c.Sand (70)	Mud (3) Muddy Sand (87)	Muddy Sand (78)	Mud (2) m.f.Sand (19)	Mud (1) Muddy Sand(25) Sandy Mud (75)	Gravelly Sand (6) Sandy Mud (30) Mud (70)	Gravelly sand	f.Sand (10) m.Sand (39)	Muddy Sand(25)	Mud (2) m,c.Sand (18)	Muddy Sand(84)	Muddy Sand (20) Mud (27)
Core Length (cm)	-	62	65	78	85	90	78	21	101	106	-	49	25	20	84	47

P.C. : Piston Corer

S.M. : Smith McIntyre Grab C. : Coarse m. : Medium f. : fine

Table 3.5.1(a) BOTTOM MATERIAL AND WATER TEMPERATURE

St. No. / Items		P-5	P-6	P-7	P-8	P-9	P-10	K-1	K-2	K-3	K-4
DATE TIME		9th May 11:20	9th May 11:31	9th May 11:44	9th May 13:25	9th May 13:40	9th May 14:00	23rd May 17:36	23rd May 17:18	24th May 10:55	24th May 10:42
Position	Lat.	12°-58'.24	12°-58'.08	12°-58'.96	12°-59'.67	12°-59'.87	12°-59'.98	1°-16'.72	1°-17'.18	1°-17'.33	1°-17'.60
	Long.	100°-05'.23	100°-05'.02	100°-04'.36	100°-03'.80	100°-03'.82	100°-03'.91	103°-55'.66	103°-55'.16	103°-54'.96	103°-54'.70
Depth(m)		7.2	6.4	4.7	+0.1	+2.0	+0.4	26.4	26.2	19.2	9.6
Bottom Water Temperature		31.3	31.4	31.4	-	-	-	30.2	29.8	30.3	30.2
Sampling Method		C.S.	C.S.	C.S.	G.S.	G.S.	G.S.	C.S.	C.S.	C.S.	C.S.
Bottom Material (cm) Upper ↓ Lower		Muddy Sand (52)	Muddy Sand (19)	Mud (54)	m. Sand	m-c Sand	m. Sand	Mud (14)	Sandy Mud (22) Mud (22)	Muddy Sand (21) Sandy Mud (21)	Muddy Sand (14) Mud (33)
Core Length (cm)		52	19	54	-	-	-	14	44	42	47

Legend

Sampling Method
S.M. : Smith McIntyre
C.S. : Core Sampler
G.S. : Gravity Corer

Bottom Material
C : Coarse
m : Medium
f : Fine

P-1~10 ; Pechaburi (Ban Hat Chao Samran)
K-1~4 ; Katong

Table 3.5.1(b) BOTTOM MATERIAL AND WATER TEMPERATURE (SHORE)

St.No. / Items		C-1	C-2	C-3	C-4	C-5	C-6	C-7	P-1	P-2	P-3	P-4
Date Time		30th April 13:48	30th April 14:00	30th April 14:08	30th April 14:28	30th April 14:45	30th April 14:54	30th April 15:03	9th May 10:30	9th May 10:42	9th May 10:53	9th May 11:02
Position	Lat	4° - 06.69'	4° - 06.57'	4° - 06.49'	4° - 05.40'	4° - 05.71'	4° - 05.91'	4° - 06.12'	12° - 59.99'	12° - 58.60'	12° - 59.25'	12° - 59.21'
	Long	103° - 25.54'	103° - 24.75'	103° - 24.22'	103° - 25.37'	103° - 24.65'	103° - 24.15'	103° - 23.64'	100° - 05.24'	100° - 04.80'	100° - 04.30'	100° - 04.51'
Depth (m)		9.2	7.5	5.8	8.9	7.5	6.1	4.5	7.3	5.9	4.1	4.2
Bottom Water temperature		29.1	29.2	29.3	29.1	29.3	29.5	29.9	31.3	31.4	31.3	31.4
Sampling Method		C.S.	C.S.	C.S.	S.M.	S.M.	S.M.	S.M.	C.S.	C.S.	C.S.	C.S.
Bottom Material (cm) Upper ↓ Lower		Muddy sand (23.5)	C.sand (6) Muddy C. sand (6) Muddy M. sand (14) Clay (7)	C.sand (15)	C-M.sand	m.sand	m.sand	m-f.sand	Muddy Sand with shell (8) Mud (18)	Sandy mud with shell (17)	Muddy Sand (47)	Muddy Sand (57)
Core Length (cm)		23.5	33	15	-	-	-	-	26	17	47	57

Legend

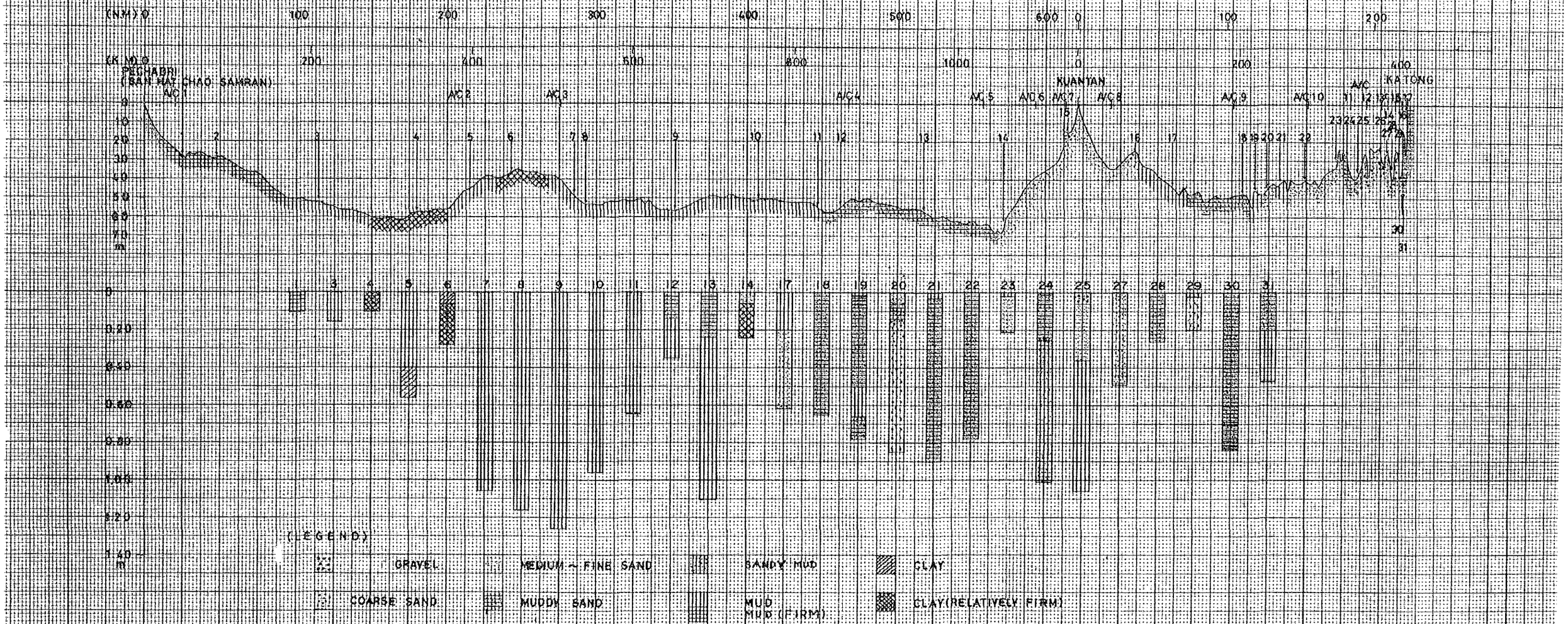
Sampling Method
S.M. : Smith-Mclntyre
C.S. : Core Sampler
G.S. : Gravity Corer

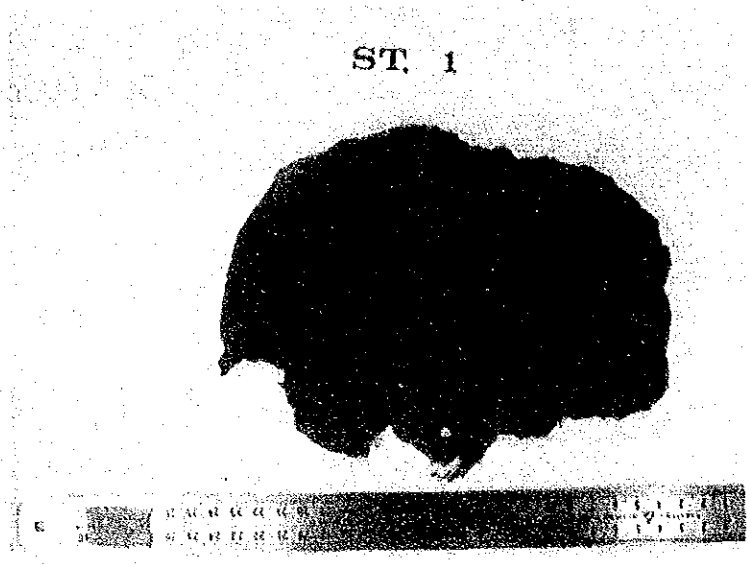
Bottom Material
C : Coarse
m : Medium
f : Fine

C-1～7 Kuantan
P-1～4 Pechaburi (Ban Hat Chao Samran)

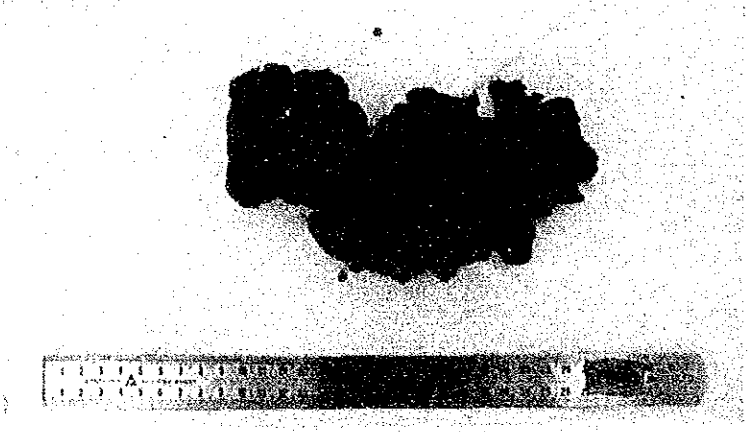
Table 3.5.1(c) BOTTOM MATERIAL AND WATER TEMPERATURE (SHORE)

Fig 3.5.2 LARGE SCALE PROFILE AND BOTTOM SEDIMENT

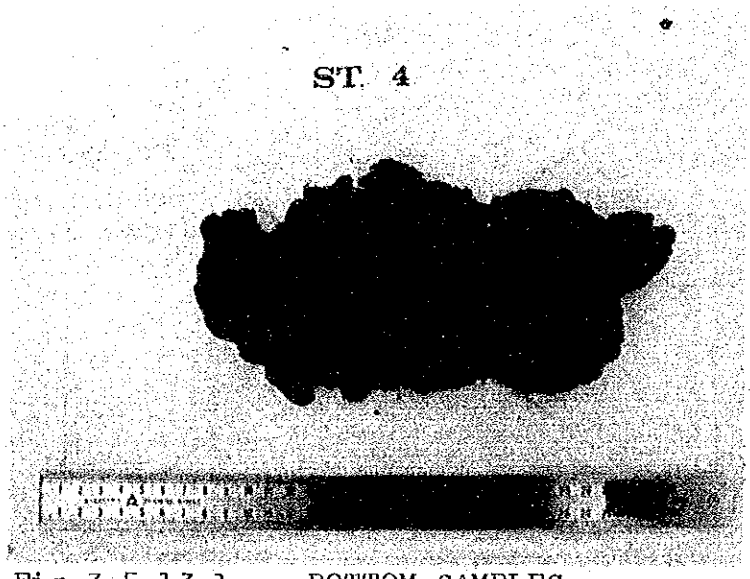




St. 1 (OFFSHORE)
Mud (firm)

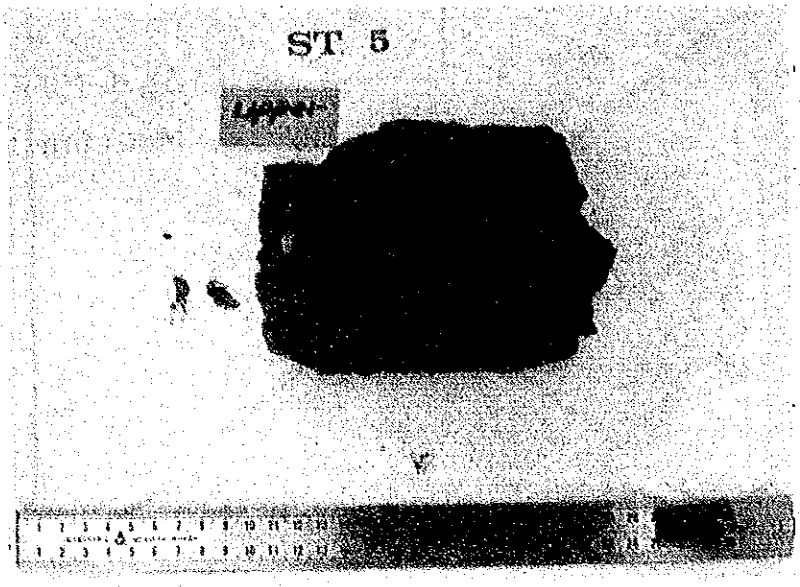


St 3
Mud (relatively firm)



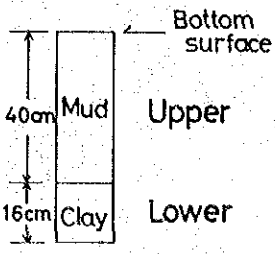
St 4
Clay (relatively firm)

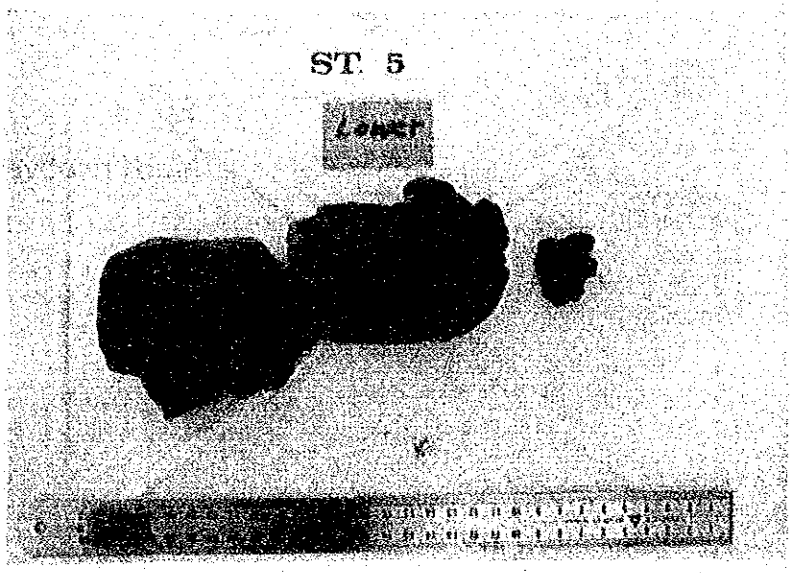
Fig.3.5.13-1 BOTTOM SAMPLES



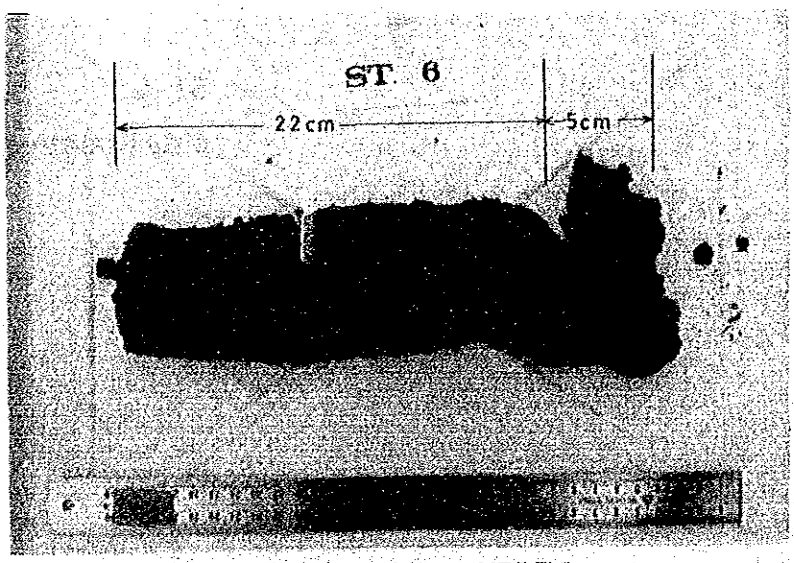
St. 5 (Upper)
Mud

St. 5



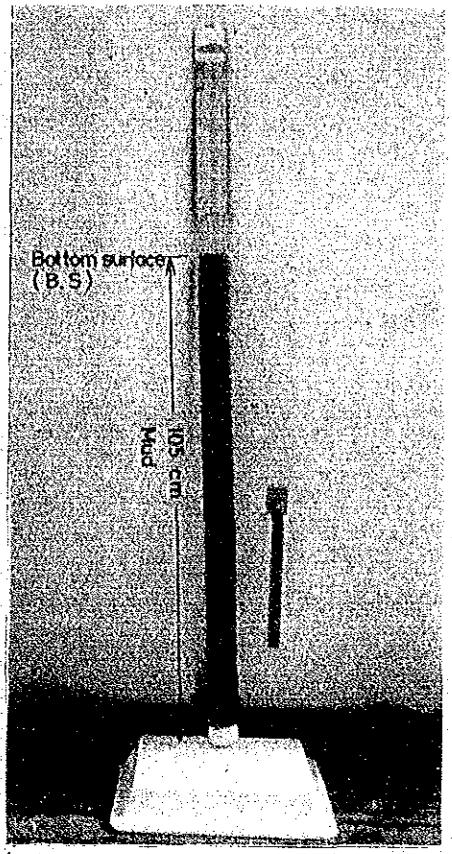


St 5 (Lower)
Clay (relatively firm)

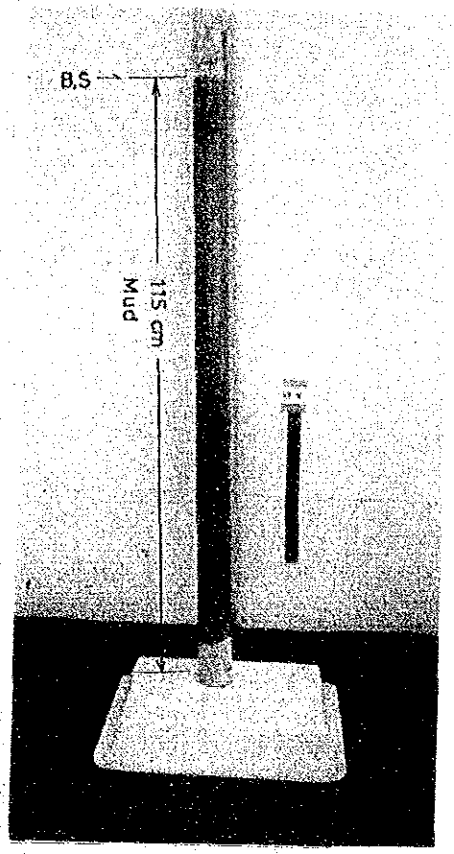


St 6
Clay (Upper 5cm—— the right in the picture)
Relatively firm clay (Lower 22 cm)

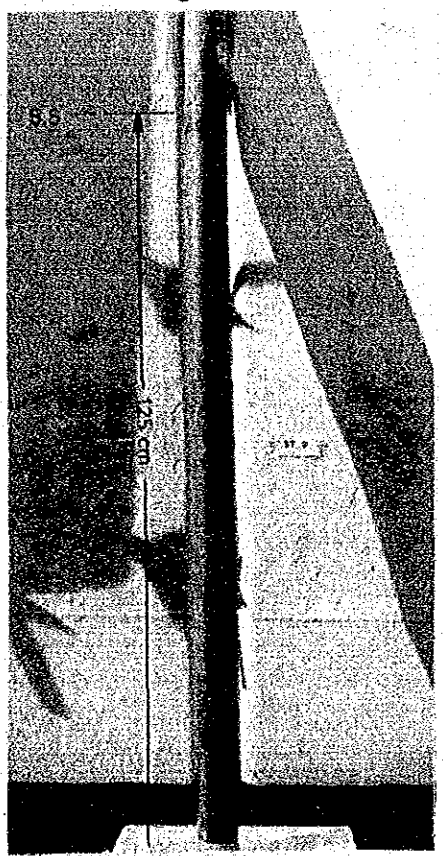
Fig.3.5.13-2 BOTTOM SAMPLES



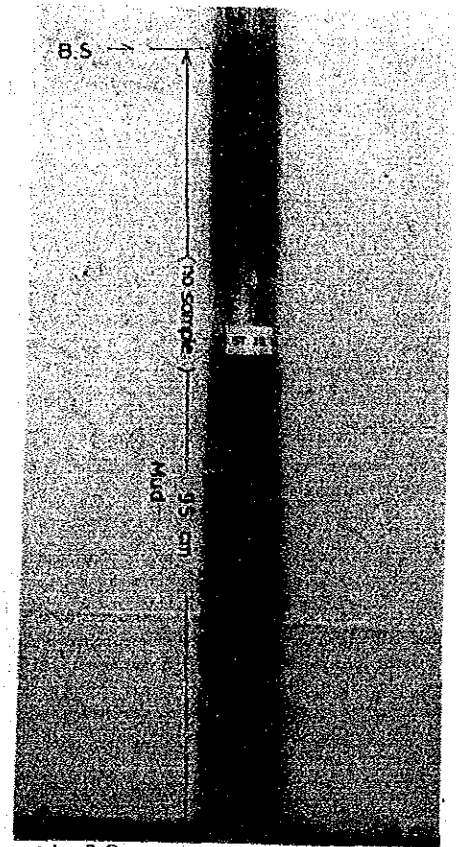
St.7 Mud with shell fragments



St.8 Mud with shell fragments

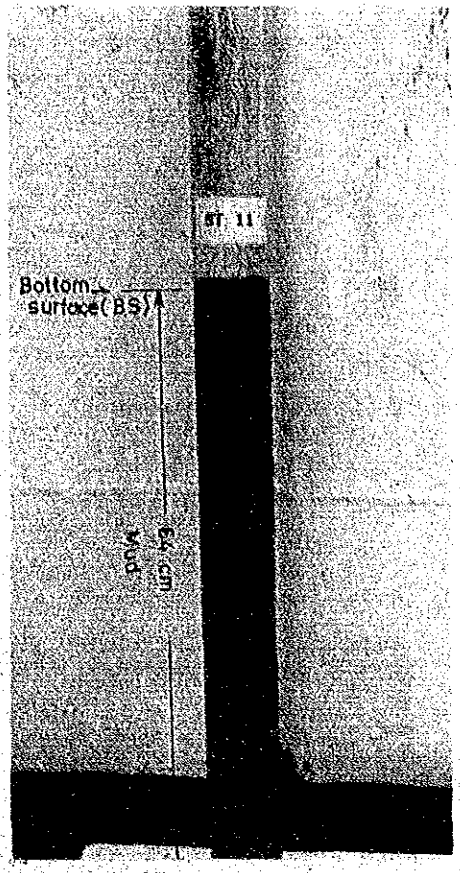


St.9 Mud

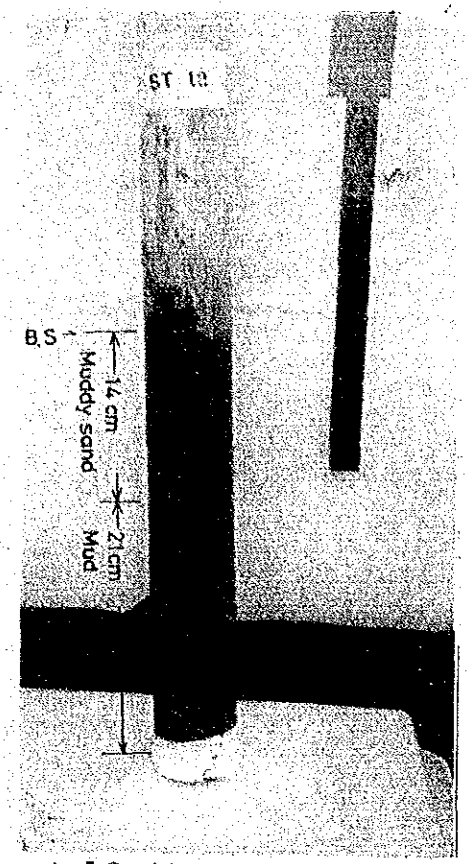


St.10 Mud (95 cm in length)

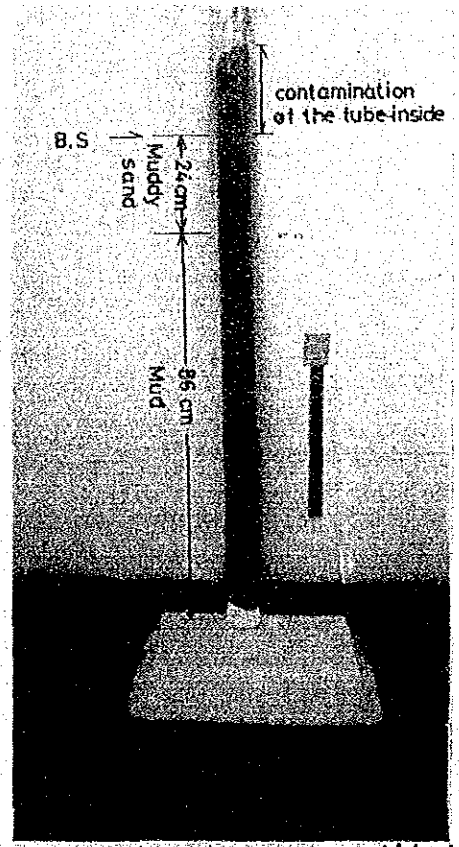
Fig.3.5.13-3 BOTTOM SAMPLES



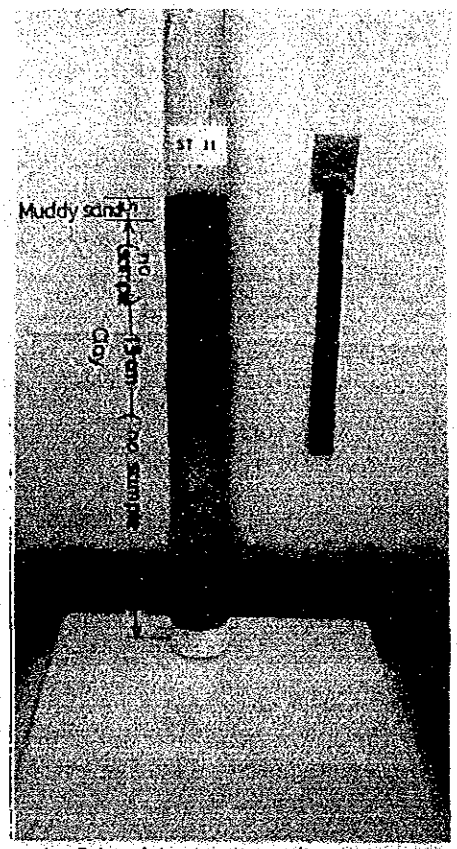
St.11 Mud



St.12 Muddy sand and Mud

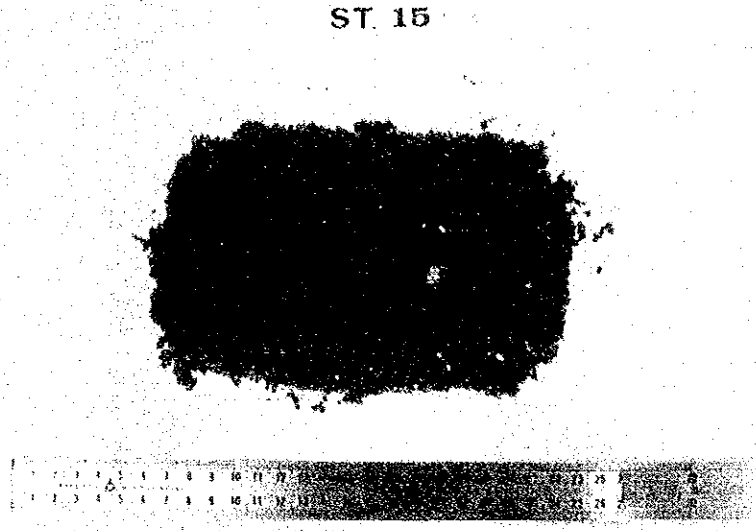


St.13 Muddy sand and Mud

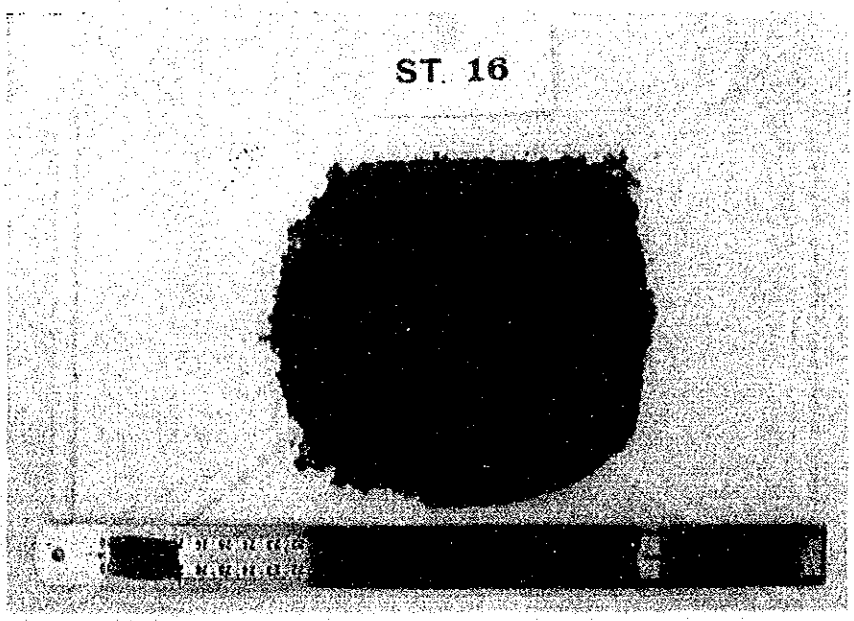


St.14 Muddy sand and Clay

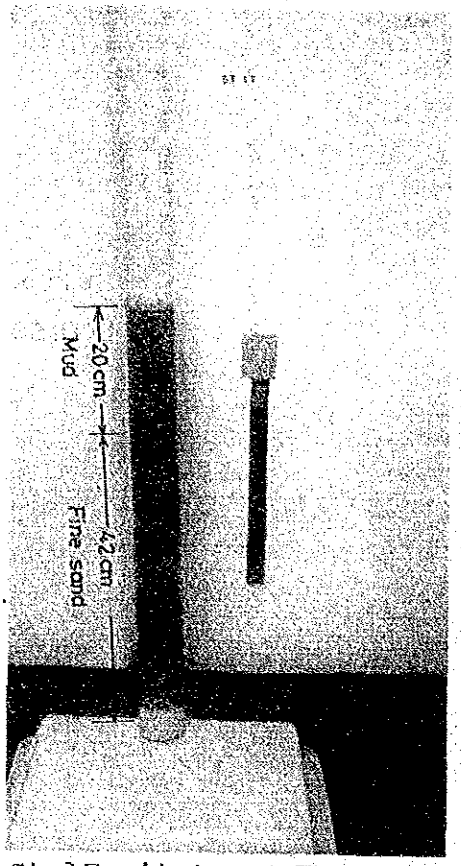
Fig.3.5.13-4 BOTTOM SAMPLES



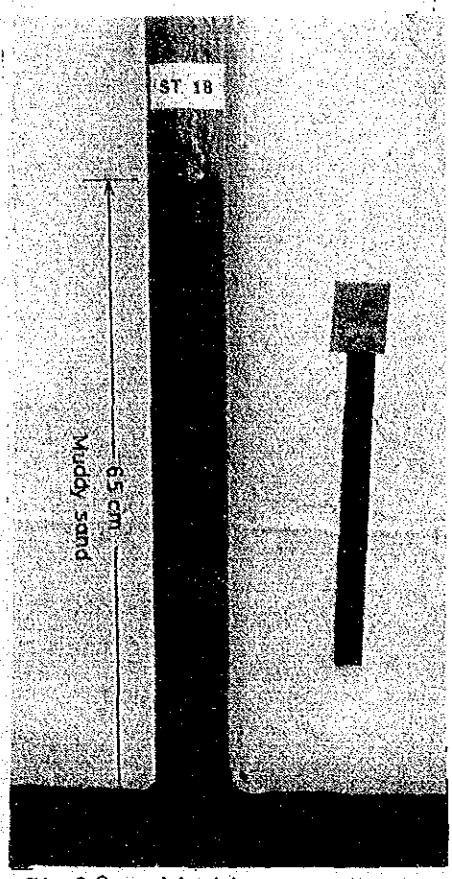
St.15
Coarse sand



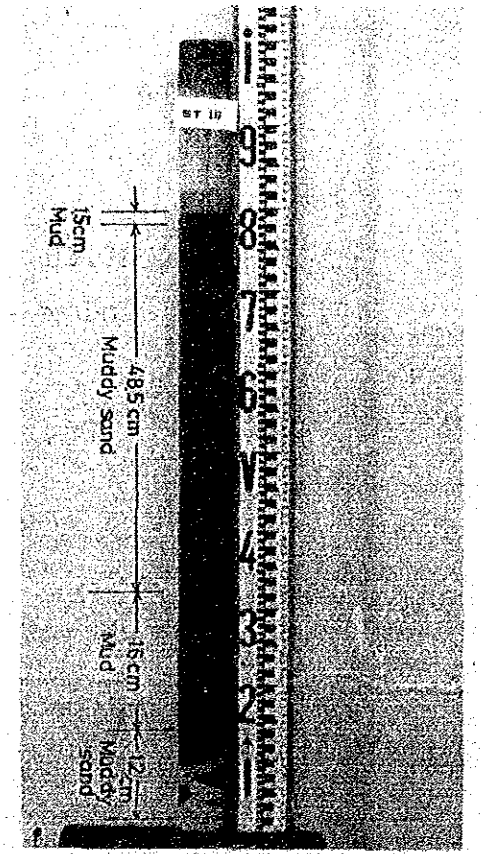
St.16
Coarse sand



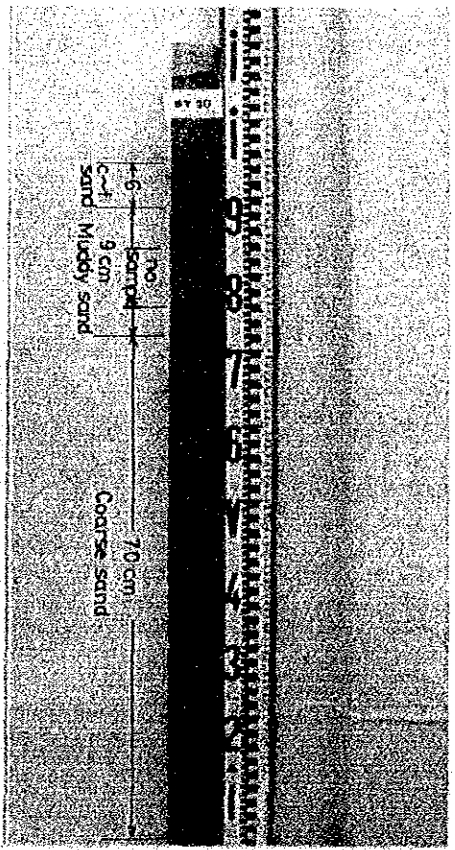
St.17 Mud and Fine sand



St.18 Muddy sand

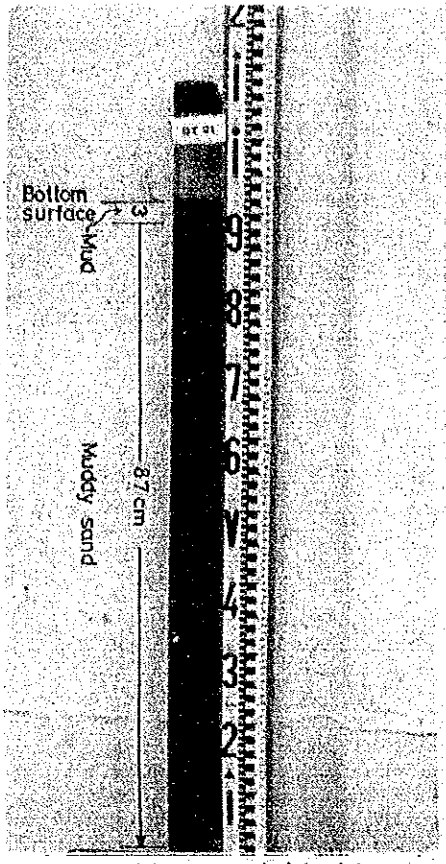


St.19 Mud, Muddy sand and Mud, Muddy sand

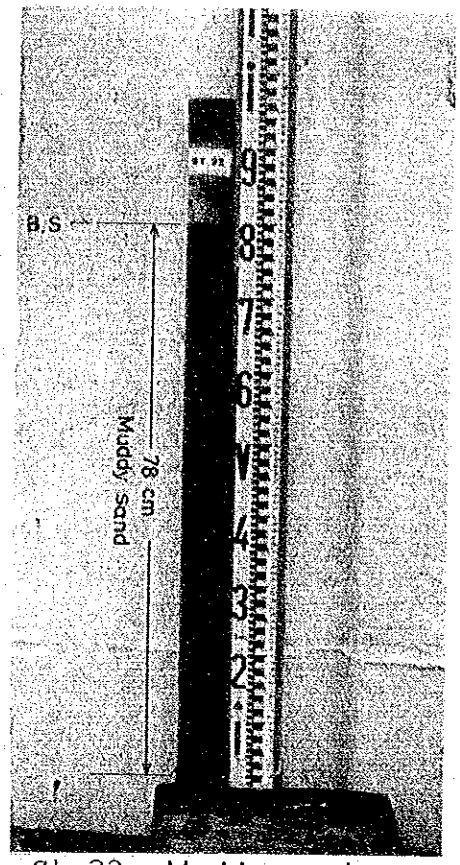


St.20 Coarse~fine sand, Muddy sand and Coarse sand

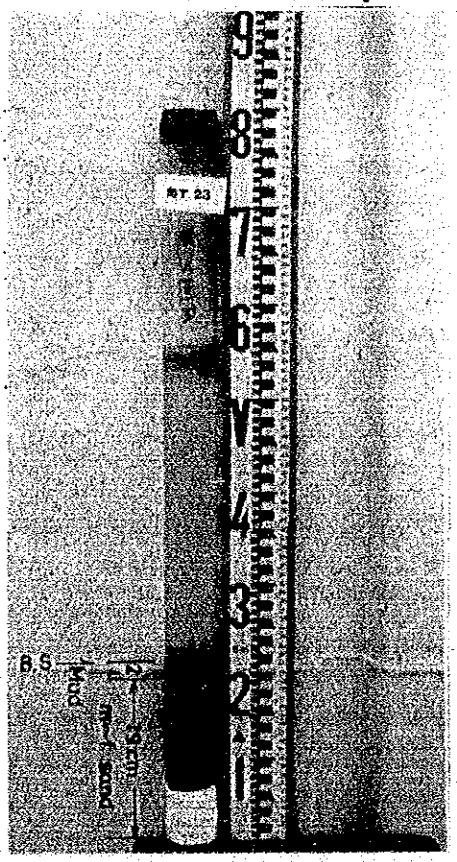
Fig.3.5.13-6 BOTTOM SAMPLES



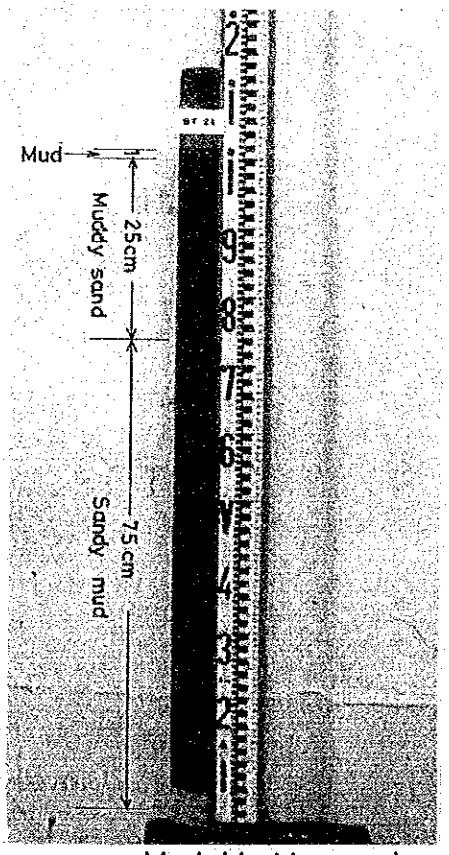
St.21 Mud and Muddy sand



St.22 Muddy sand

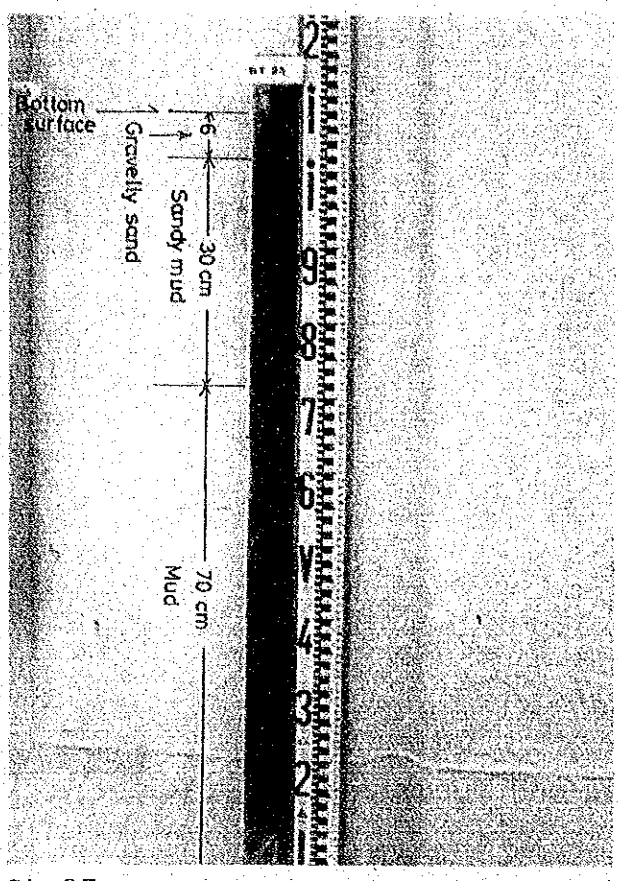


St.23 Mud and Medium ~ fine sand.

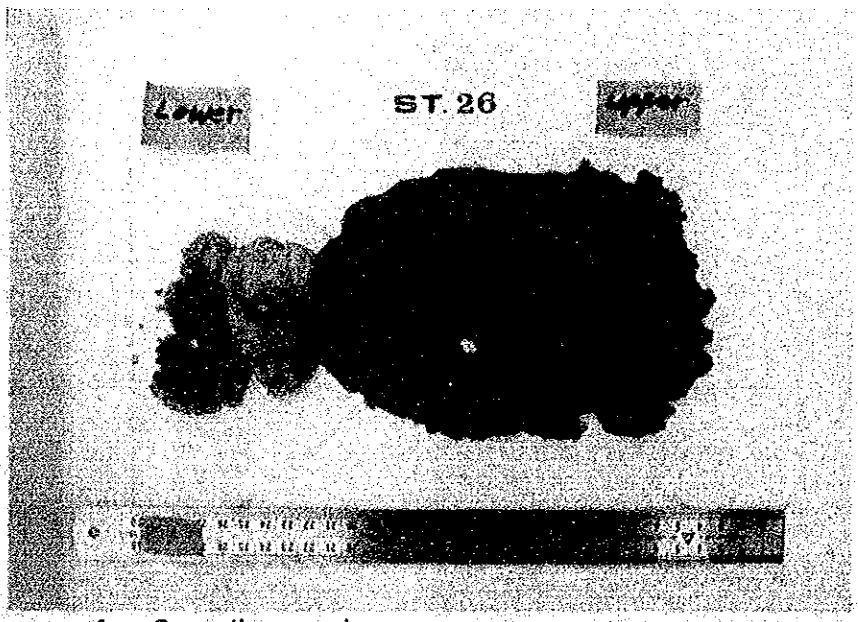


St.24 Mud, Muddy sand and Sundy mud

Fig.3.5.13-7 BOTTOM SAMPLES

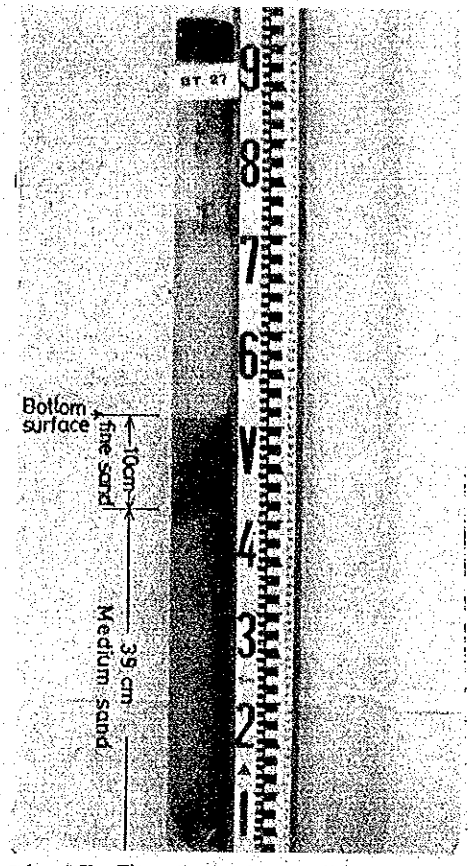


St.25 Gravelly sand, Sandy mud and Mud

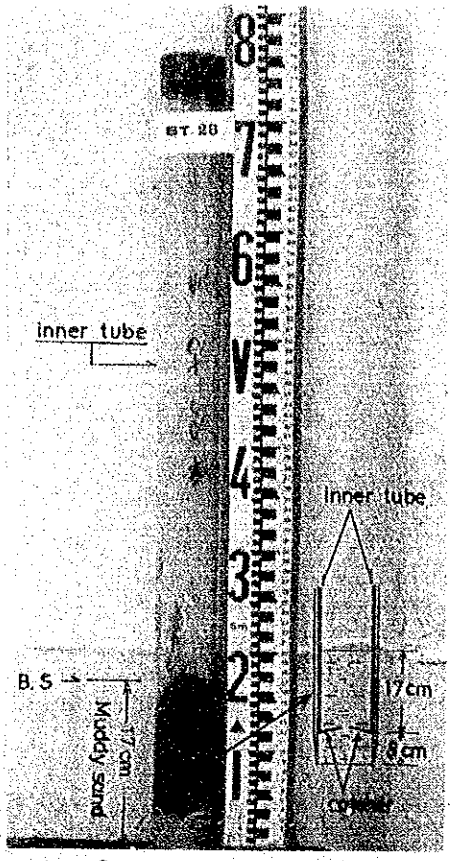


St.26 Gravelly sand

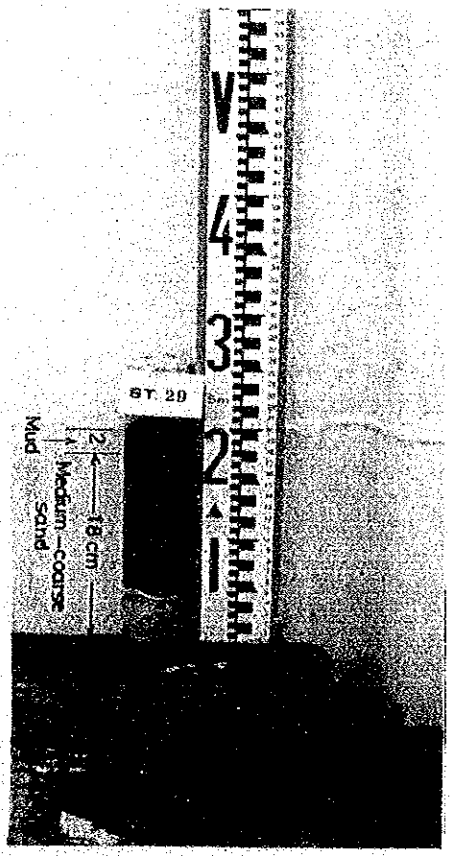
Fig.3.5.13-8 BOTTOM SAMPLES



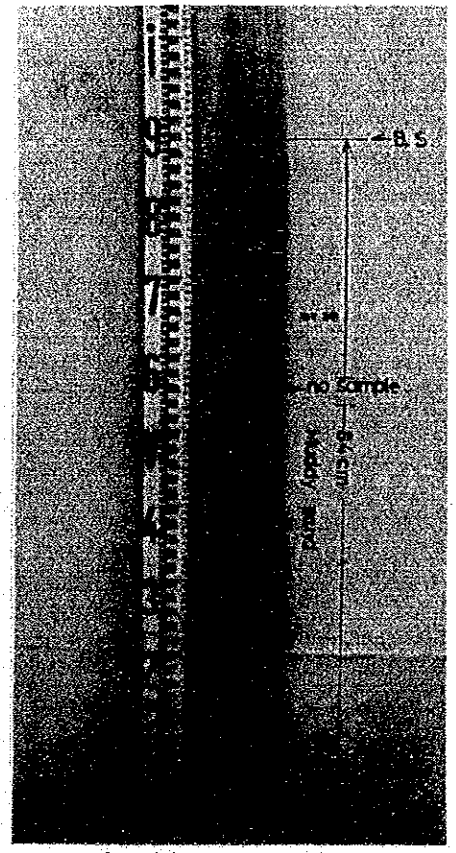
St.27 Fine and medium sand



St.28 Muddy sand (Total length; 25 cm)



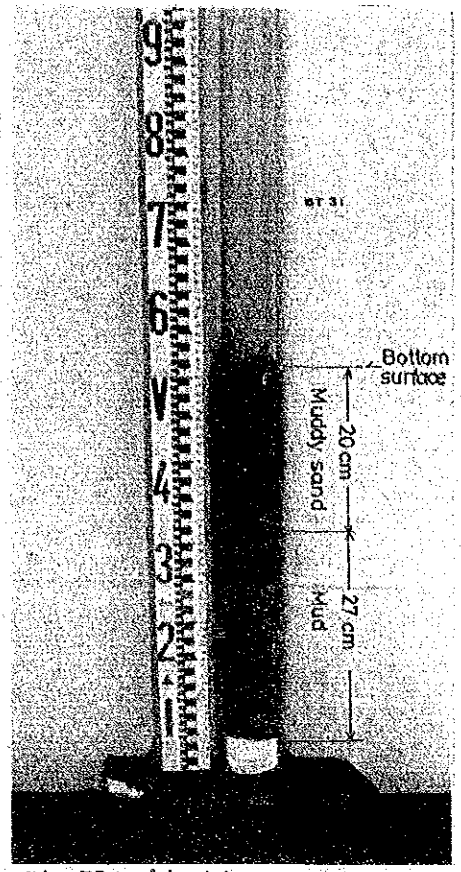
St.29 Medium~coarse sand



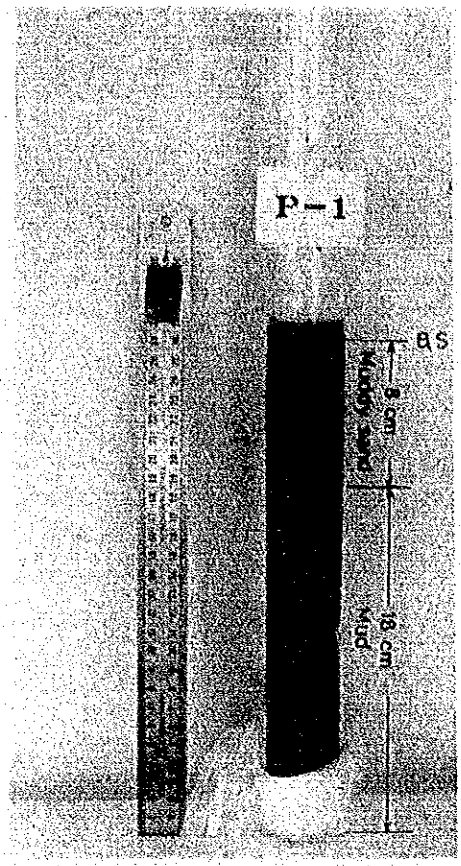
St.30 Muddy sand

Fig.3.5.13-9 BOTTOM SAMPLES

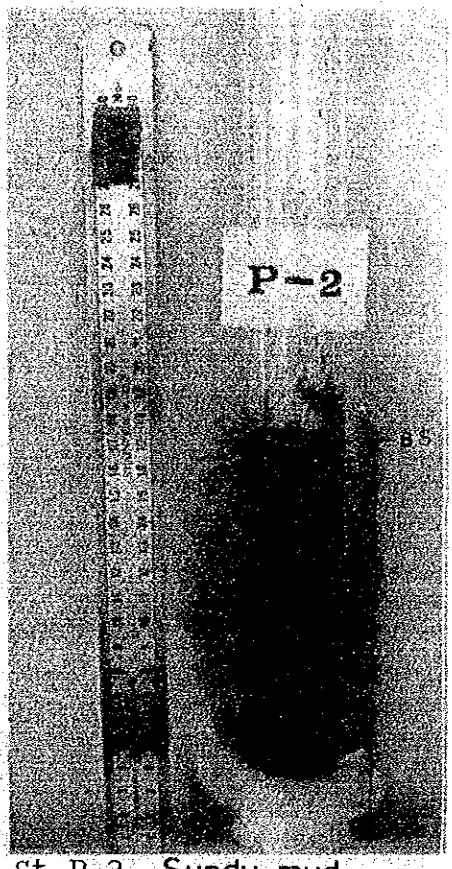
OFFSHORE
PECHABURI (BAN HAT CHAO SAMRAN) SHORE



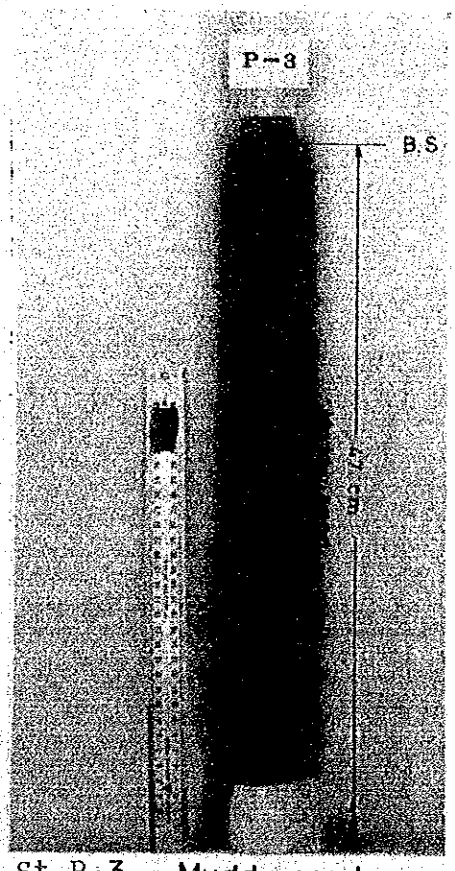
St.31 Muddy sand and Mud



St.P-1 Muddy sand and Mud

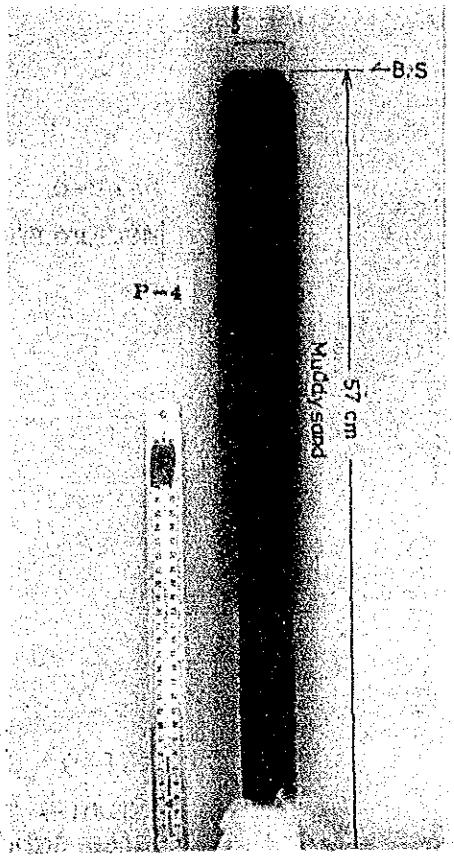


St.P-2 Sundy mud

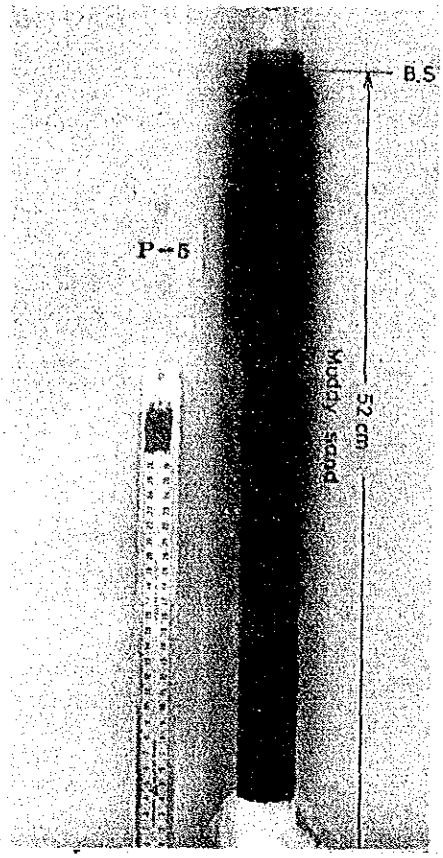


St.P-3 Muddy sand

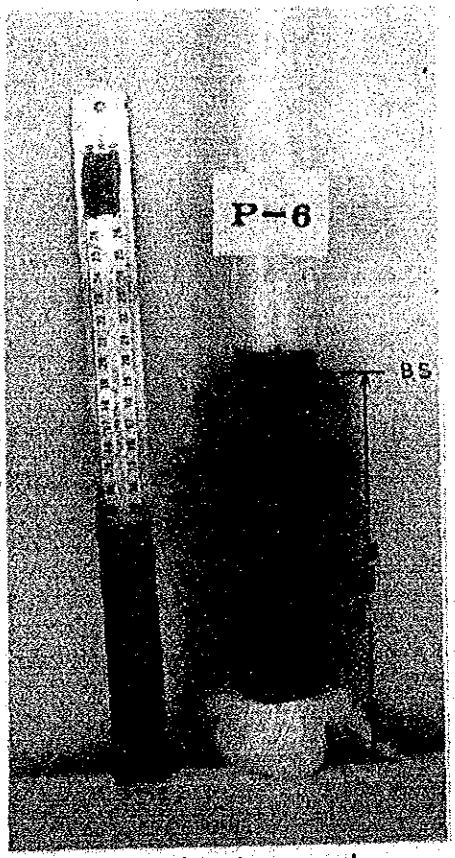
Fig.3.5.13-10 BOTTOM SAMPLES



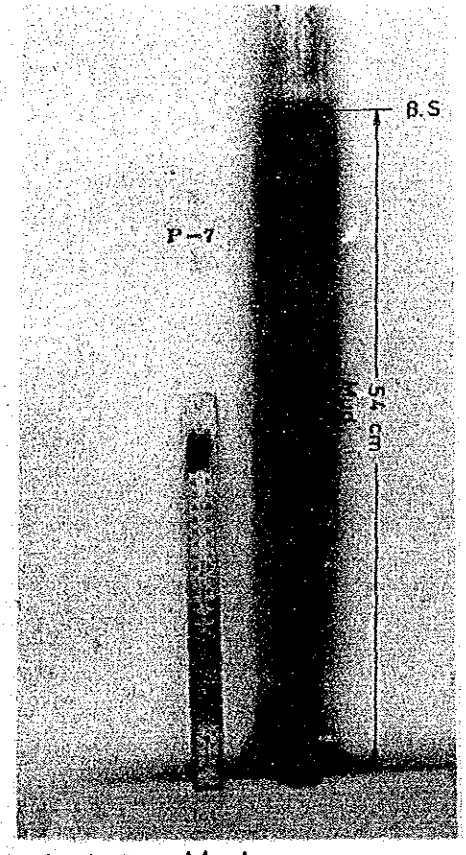
St.P-4 Muddy sand



St.P-5 Muddy sand

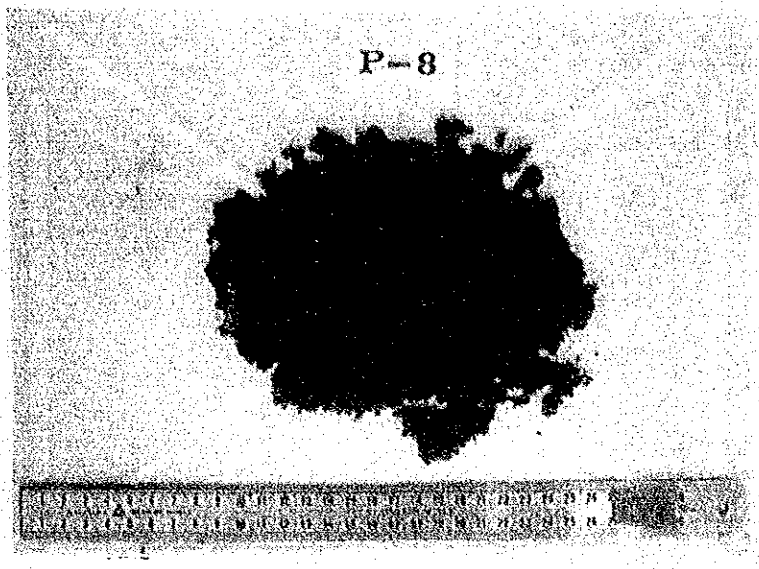


St.P-6 Muddy sand

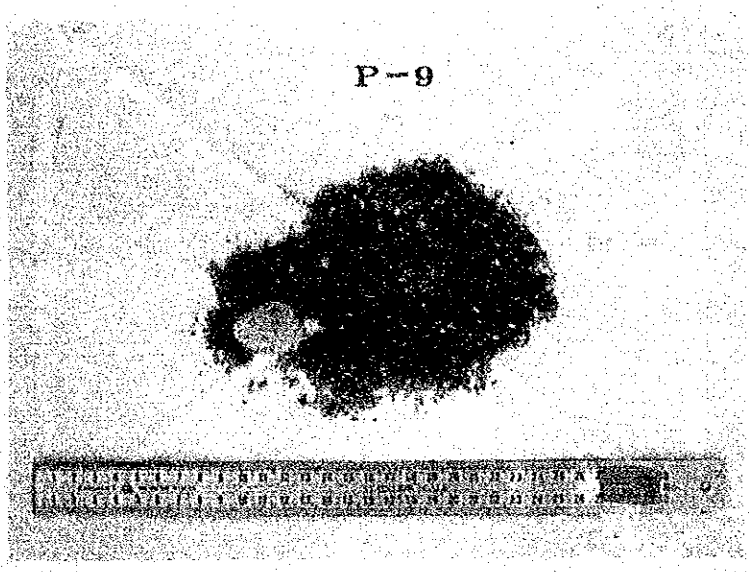


St.P-7 Mud

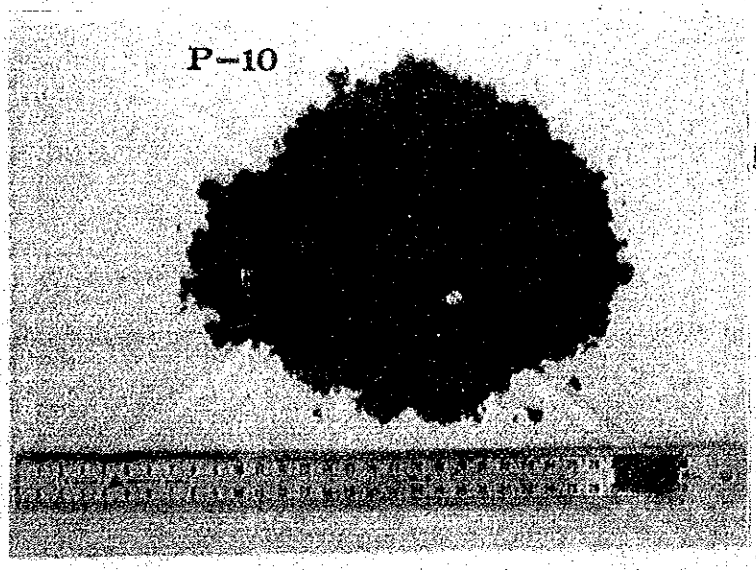
Fig.3.5.13-11 BOTTOM SAMPLES



St.P-8
Medium sand

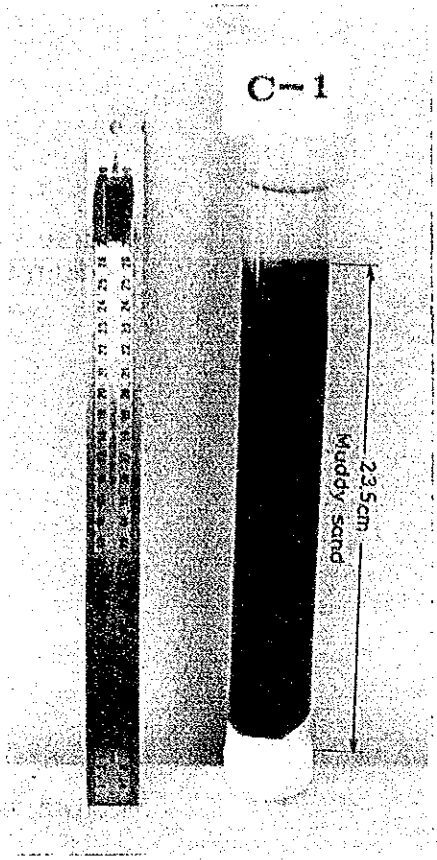


St.P-9
Medium —
coarse sand

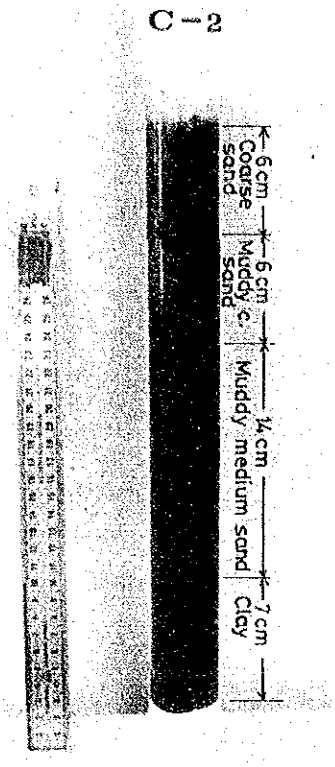


St.P-10
Medium sand

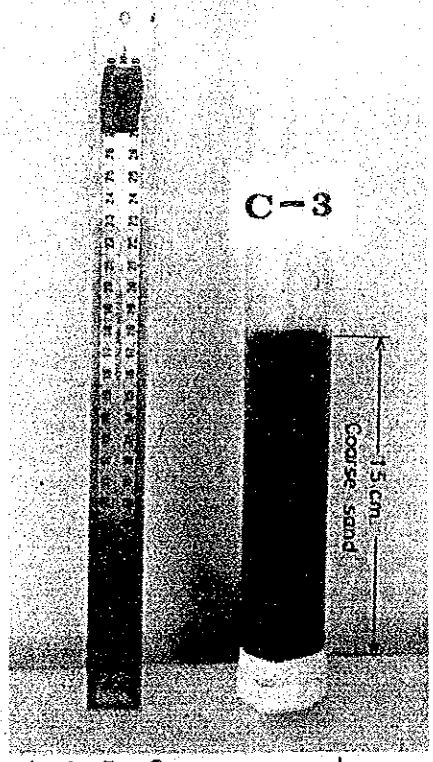
Fig.3.5.13-12 BOTTOM SAMPLES



St.C-1 Muddy sand

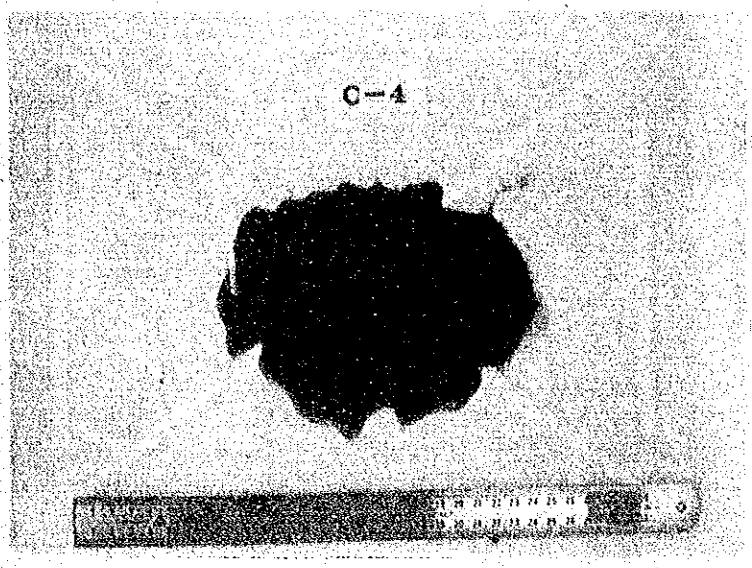


St.C-2 Sand, Muddy sand and Clay

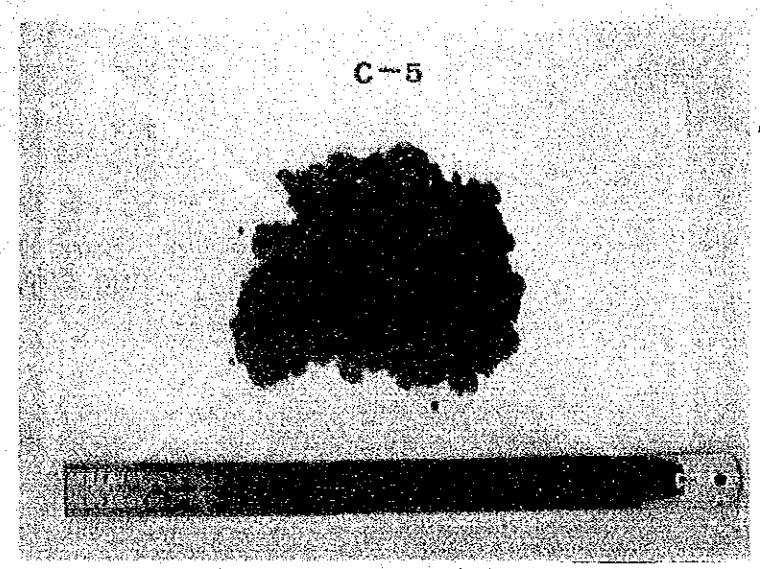


St.C-3 Coarse sand

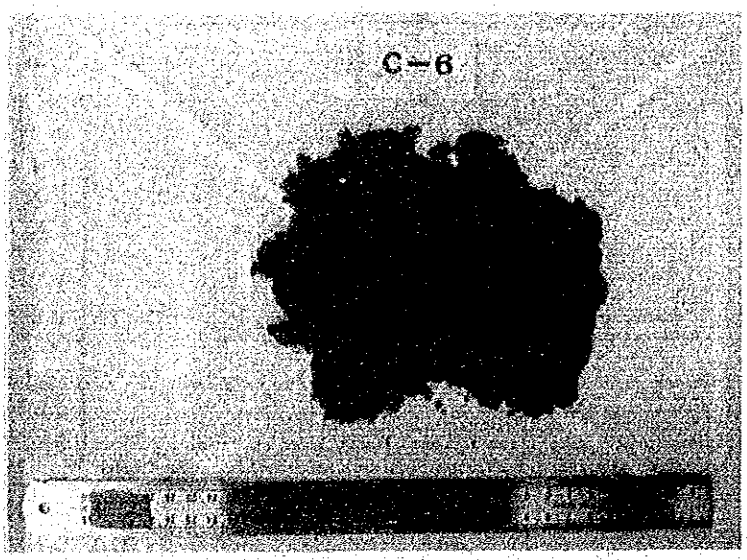
Fig.3.5.13-13 BOTTOM SAMPLES



St.C-4
Coarse ~ medium sand

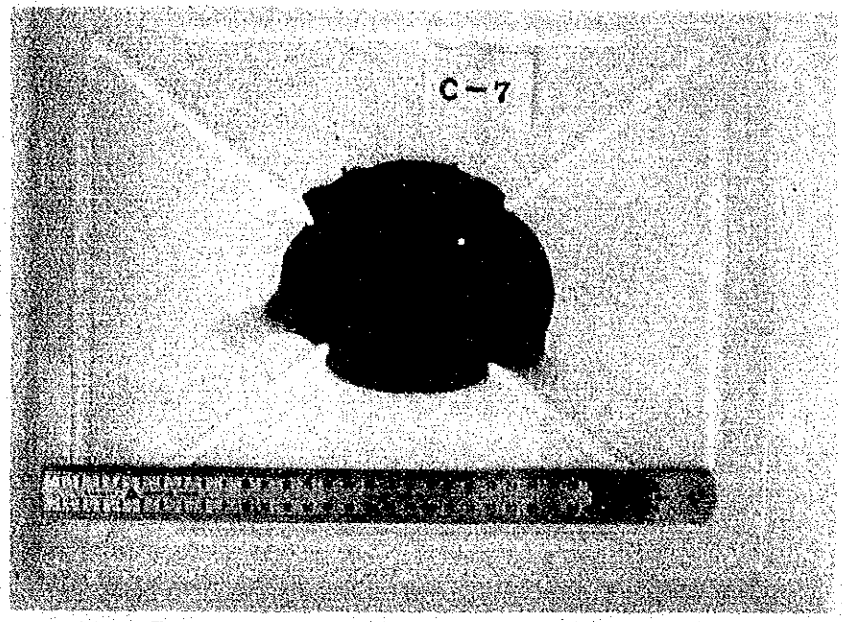


St.C-5
Medium sand



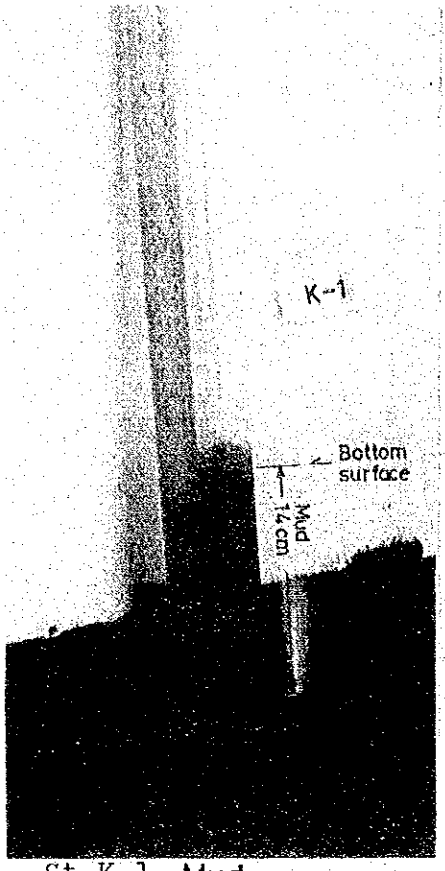
St.C-6
Medium sand

Fig.3.5.13-14 BOTTOM SAMPLES

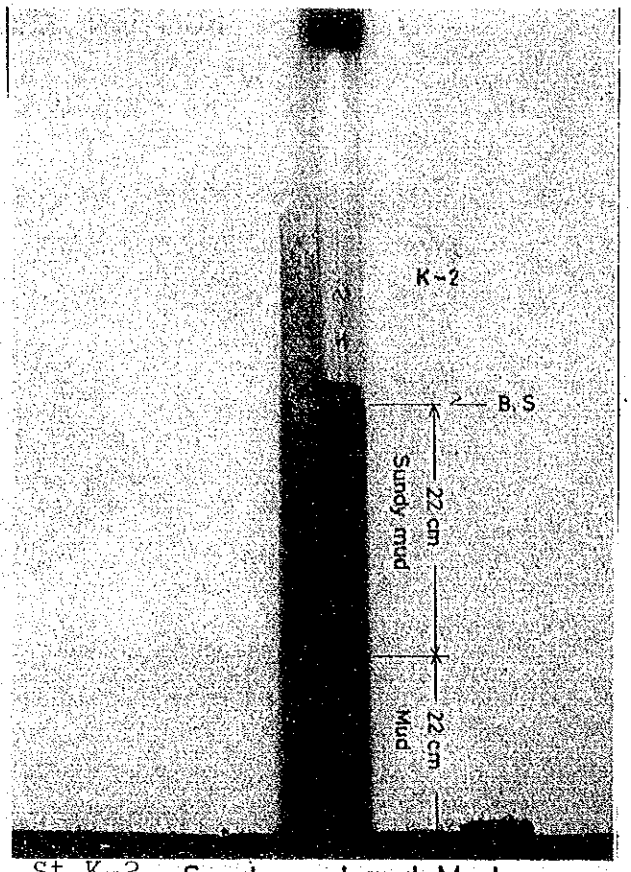


St.C-7 Medium~fine sand

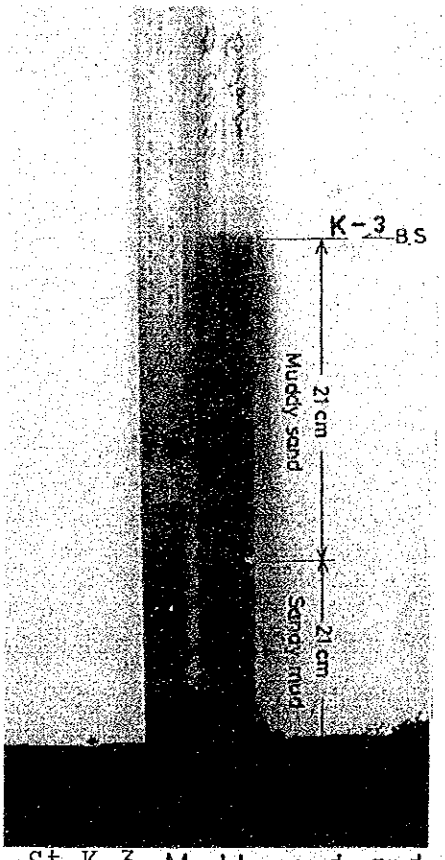
Fig.3.5.13-15 BOTTOM SAMPLES



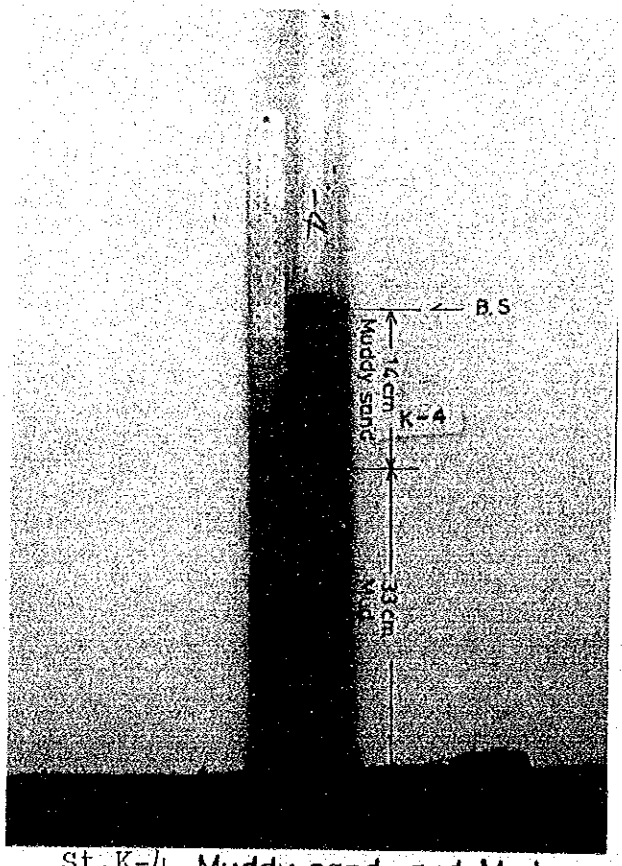
St.K-1 Mud



St.K-2 Sundy mud and Mud



St.K-3 Muddy sand and Sandy mud



St.K-4 Muddy sand and Mud

Fig.3.5.13-16 BOTTOM SAMPLES