

6-1 サイクロンリスト

TROPICAL CYCLONES (1886 - 1989) PASSING WITHIN 75 N. MI. OF GRENADA

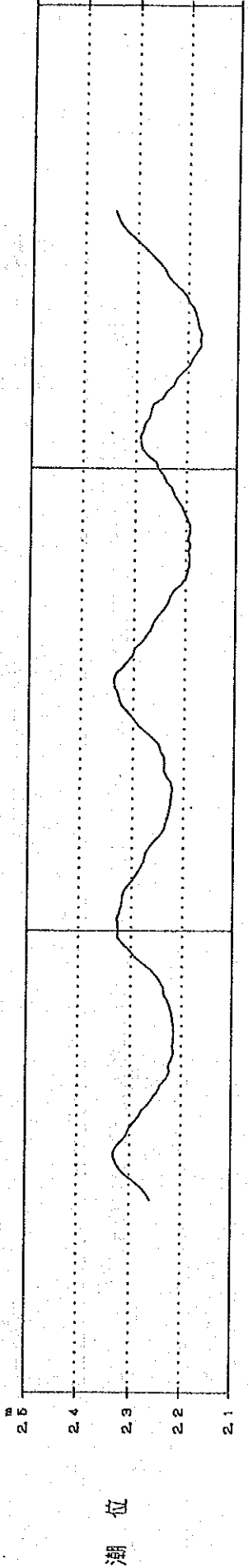
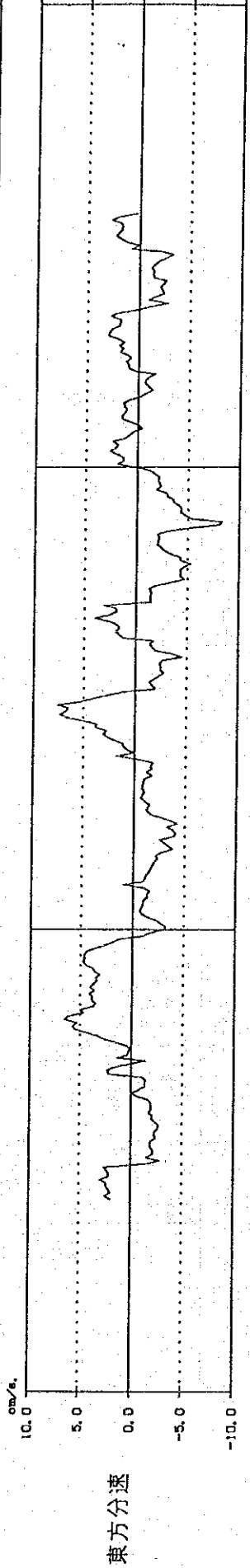
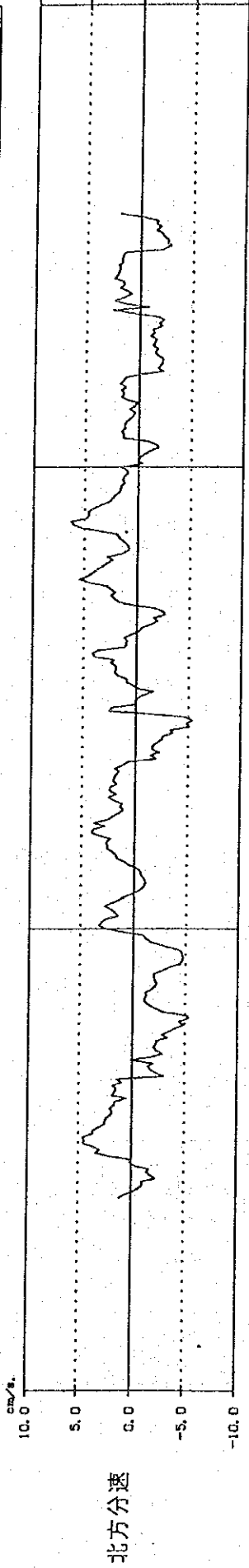
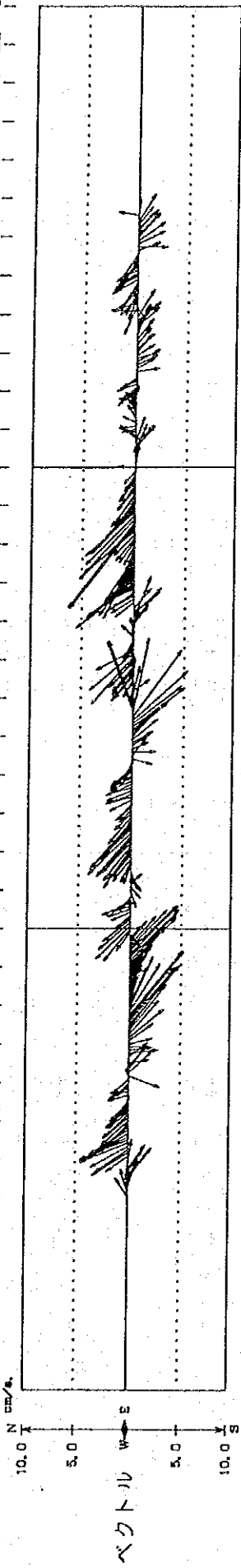
STORM INDEX NUMBER	STORM NAME	YEAR	MONTH	DAY (GMT)	STORM NUMBER FOR YEAR	MAXIMUM WIND (KTS) NEAR STORM CNTR AT CLOSEST PT. OF APPROACH	CLOSEST POINT OF APPROACH (CPA) N. MI.	STORM HEADING (DESS) AT CPA	STORM FORWARD SPEED AT CPA(KTS)
1	NOT NAMED	1886	AUG	12	5	67	6	292	15.9
2	NOT NAMED	1886	AUG	16	6	55	7	275	11.8
3	NOT NAMED	1887	JUL	20	2	53	20	279	26.7
4	NOT NAMED	1887	AUG	2	3	45	70	296	9.7
5	NOT NAMED	1887	DEC	8	17	40	60	279	9.9
6	NOT NAMED	1888	NOV	1	8	35	71	318	14.7
7	NOT NAMED	1891	OCT	12	10	35	34	328	13.0
8	NOT NAMED	1892	OCT	6	7	68	60	270	10.8
9	NOT NAMED	1895	OCT	15	5	100	54	278	13.8
10	NOT NAMED	1897	OCT	9	4	40	18	275	8.9
11	NOT NAMED	1898	OCT	3	8	50	60	285	11.1
12	NOT NAMED	1901	JUL	2	2	35	55	270	16.6
13	NOT NAMED	1909	JUL	13	3	35	12	271	14.7
14	NOT NAMED	1909	JUL	29	4	35	48	289	9.3
15	NOT NAMED	1910	AUG	20	1	35	36	282	12.5
16	NOT NAMED	1916	OCT	7	12	35	67	300	7.9
17	NOT NAMED	1918	AUG	1	1	35	34	277	9.8
18	NOT NAMED	1918	AUG	22	2	64	23	279	11.9
19	NOT NAMED	1921	SEP	9	3	70	70	305	14.9
20	NOT NAMED	1928	AUG	3	1	35	9	306	17.0
21	NOT NAMED	1928	AUG	7	2	35	64	303	9.3
22	NOT NAMED	1931	SEP	6	5	35	38	273	17.6
23	NOT NAMED	1933	AUG	12	6	35	41	292	22.4
24	NOT NAMED	1933	AUG	17	7	35	6	287	12.3
25	NOT NAMED	1933	SEP	17	15	40	27	285	11.1
26	NOT NAMED	1938	AUG	10	2	43	14	285	23.3
27	NOT NAMED	1944	JUL	24	2	47	22	285	21.1
28	NOT NAMED	1944	AUG	17	4	53	58	283	14.0
29	HAZEL	1954	OCT	5	9	73	45	276	9.8
30	JANET	1955	SEP	23	10	98	16	281	10.9
31	ANNA	1961	JUL	20	1	43	26	277	21.7
32	FLORA	1963	SEP	30	7	109	34	287	13.4
33	GERTRUDE	1974	OCT	2	10	34	31	276	8.8
34	CORA	1978	AUG	11	4	40	11	270	18.6
35	DANIELLE	1986	SEP	8	4	50	31	285	18.3
36	EMILY	1987	SEP	21	6	45	64	291	17.8
37	JOAN	1988	OCT	15	11	45	1	272	12.7

CHART 1

地名：GRENADA 測点：GRANDMAL観測層：-1.4

1993年
9月
28日

10月 18
0 2 4 6 8 10 12 14 16 18 20 22 24
30
29
0 2 4 6 8 10 12 14 16 18 20 22 24
28
0 2 4 6 8 10 12 14 16 18 20 22 24



観測データの経時変化

地名：GRENADA

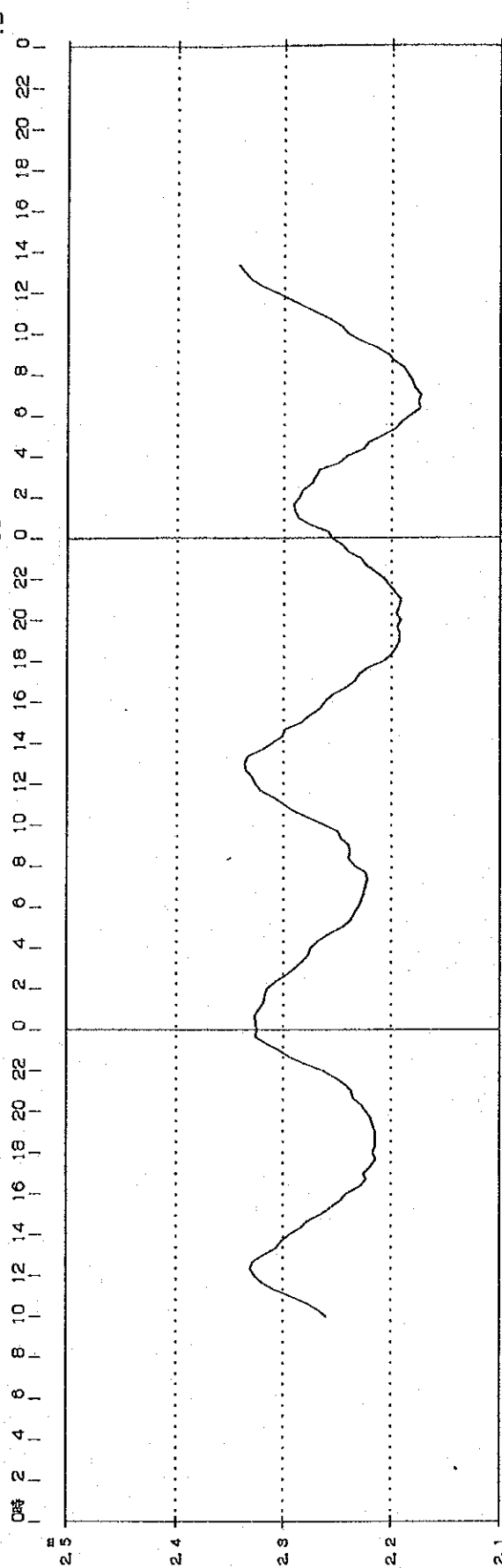
測点：GRANDMAL観測層：-2.6

1993年

9月

28日

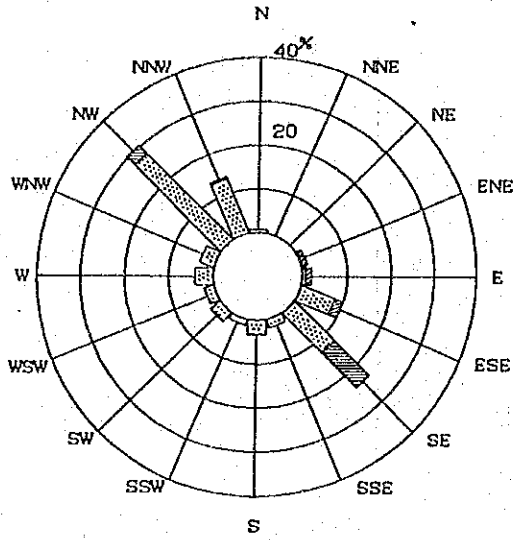
10月
1日



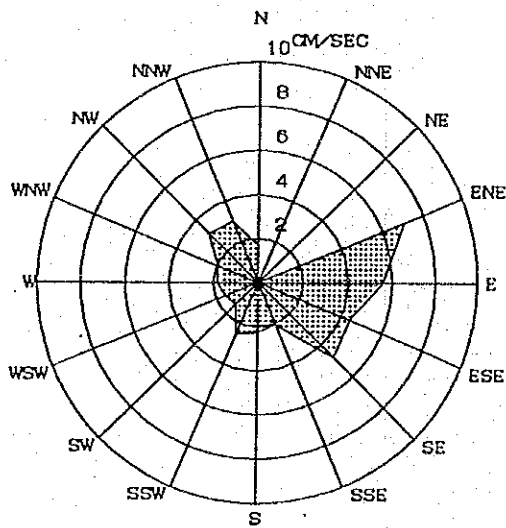
潮位

ST, GRANDMAL -1.4M
1993年9月28日~9月29日

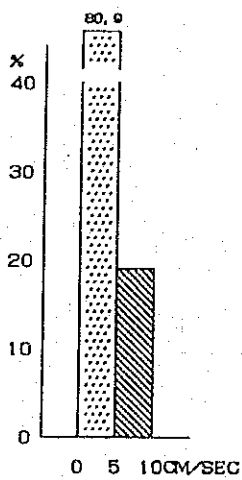
流向頻度圖



平均流速出現圖



流速別頻度圖



圖

流況頻度圖

GRENADE

流向・流速出現頻度

海 域: GRENADA
測 点: GRANDMAL
観測層: -1.4m
観測日: 1993年 9月28日 ~ 9月29日

単位: 回 (%)

流 向 流速 cm/sec	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	合 計
0.0																	
0.1~ 5.0	1 (0.7)				1 (0.7)	12 (7.9)	19 (12.5)	3 (2.0)	5 (3.3)	2 (1.3)	4 (2.6)	3 (2.0)	6 (3.9)	5 (3.3)	42 (27.6)	20 (13.2)	123 (80.9)
5.1~ 10.0				2 (1.3)	2 (1.3)	3 (2.0)	17 (11.2)								4 (2.6)	1 (0.7)	28 (19.1)
10.1~ 15.0																	
15.1~ 20.0																	
20.1~ 25.0																	
25.1~ 30.0																	
30.1~ 35.0																	
35.1~ 40.0																	
40.1~ 45.0																	
45.1~ 50.0																	
50.1 以上																	
合 計	1 (0.7)			2 (1.3)	3 (2.0)	15 (9.9)	36 (23.7)	3 (2.0)	5 (3.3)	2 (1.3)	4 (2.6)	3 (2.0)	6 (3.9)	5 (3.3)	46 (30.3)	21 (13.8)	152 (100.0)
平均流速	1.7			7.1	5.6	4.4	4.8	2.1	2.3	2.5	1.4	1.6	1.8	2.0	3.1	3.0	3.5

潮流 1昼夜調和分解成果表

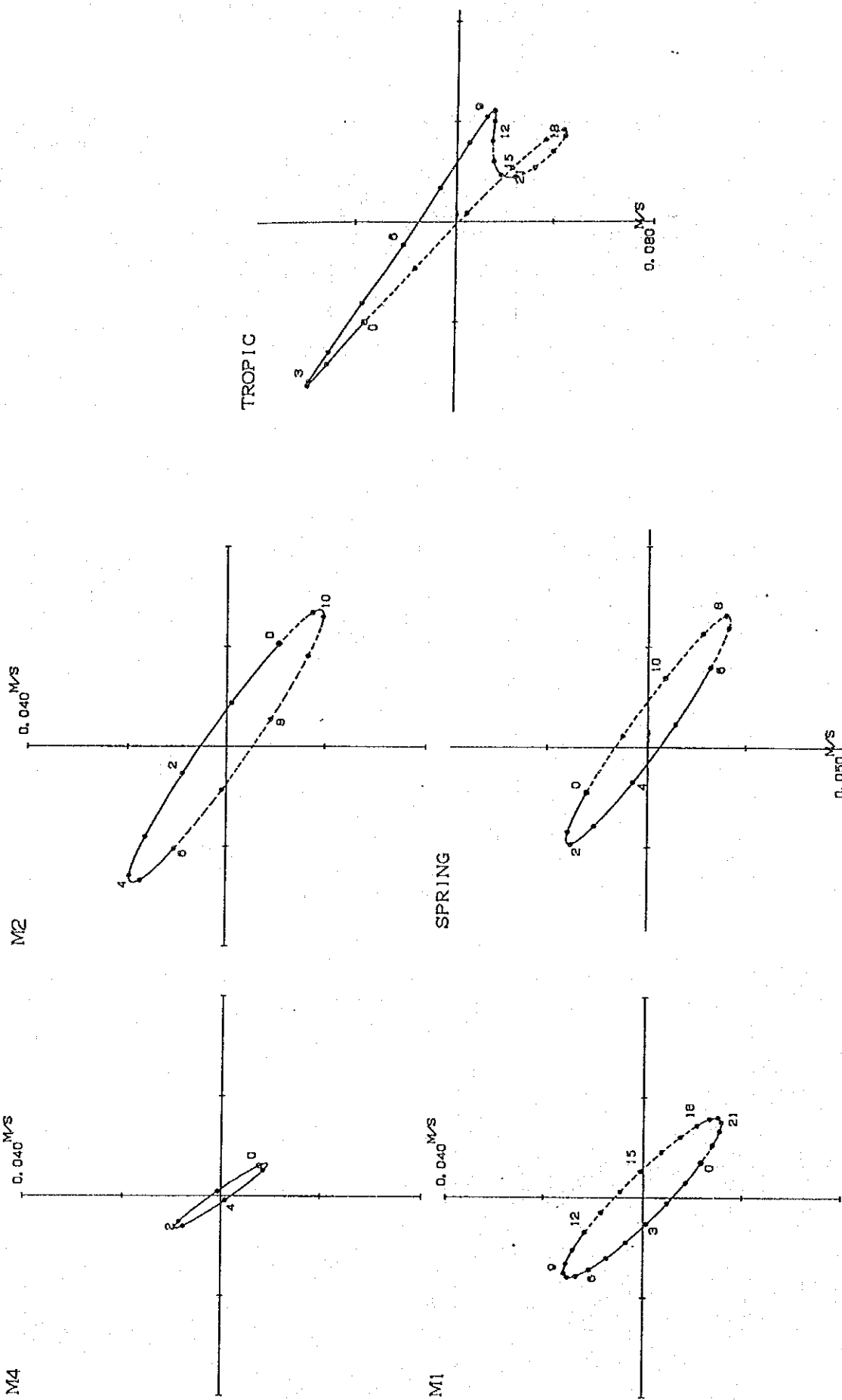
場所 : GRENADA
 測点 : GRANDMAL
 位置 : 東経 61° 45' 6"
 北緯 12° 4' 36"
 観測層 : -1.4 m
 観測年月日 : 1993年 9月 28日 ~ 9月 29日
 測定器 : アーンデラー流速計 (RCM-7)

分 潮	北方分速		東方分速		楕 円 要 素						主 流 向	
					長 軸			短 軸			311°	
	流 速 cm/sec	遅角	流 速 cm/sec	遅角	方向	流 速 cm/sec	遅角	方向	流 速 cm/sec	遅角	流 速 cm/sec	遅角
M2	1.4	106	1.9	301	305	2.3	116	35	0.3	26	2.3	115
S2	0.7	134	1.0	330	305	1.2	144	35	0.2	54	1.2	144
K2	0.4	134	0.6	330	305	0.7	144	35	0.1	54	0.7	144
N2												
K1	2.2	261	2.3	60	314	3.1	250	44	0.6	340	3.1	250
O1	1.9	252	2.0	50	314	2.7	241	44	0.5	331	2.7	240
P1	0.7	261	0.8	60	314	1.0	250	44	0.2	340	1.0	250
Q1												
M4												
MS4												
A0	0.0		0.4		0.4			94			-0.3	

潮流槽円要素表 (1昼夜資料)

GRENADA

測点 観測層	観測日 月 齡	軸	M1			M2			M4			Constant	
			θ	V cm/s	H h	θ	V cm/s	H h	θ	V cm/s	H h	θ	V cm/s
GRANMAL -1.4	年 月 93 9 日 ~ 日 28 29 13.0	L	314	2.2	8.4	305	3.3	4.4	325	1.1	2.5	94	0.4
		S	44	0.4	14.4	35	0.4	1.4	55	0.1	1.0		
		S/L		0.19			0.13			0.10			



潮流楕円の0時は月の子午線上経過時を示す

SPRINGの0時はST. GEORGES島の高潮時を示す
 TROPICの0時はST. GEORGES島の高高潮時を示す
 観測日 1993年9月28日～9月29日

観測日 1993年9月28日～9月29日

GRANDMAL -1.4M

潮流楕円図

GRENADA

潮汐1昼夜調和分解成果表

場 所 : G R E N A D A

測 点 : G R A N D M A L

位 置 : 西経 61° 45' 6"
北緯 12° 4' 36"

観測年月日 : 1993年 9月 28日 ~ 9月 29日

測定器 : 潮位計

分 潮	潮 汐 調 和 定 数	
	振 幅 cm	遅 角 °
M 2	3.7	40
S 2	1.9	69
K 2	1.2	69
N 2		
K 1	5.2	240
O 1	4.6	230
P 1	1.8	240
Q 1		
M 4		
M S 4		
A 0	226.8	

LEON TAYLOR B.Sc. M. Eng. MASCE
Consulting Civil Engineer

NOTES ON BOREHOLE REPORTS

SOIL DESCRIPTION:

Each subsoil stratum is described using the following terminology. The relative density of granular soils is determined by the standard penetration index ("N" value), while the consistency of clayey soils is measured by the value of the undrained shear strength (Cu).









CLASSIFICATION (UNIFIED SOIL CLASSIFICATION)	
Silt and clay	Passing sieve No. 200
Sand	Sieve No. 200 to No. 4
Gravel	Sieve No. 4 to 3 in. (76 mm)
Cobble	3 in. (76 mm) to 8 in. (200 mm)
Boulder	>8 in. (200 mm)

TERMINOLOGY	
"traces"	<10%
"little"	10-20%
adjective (sandy, silty)	20-35%
"and"	35-50%

RELATIVE DENSITY (GRANULAR SOILS)	"N" VALUE (BLOWS/FT. - 300 mm)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	> 50

CONSISTENCY (COHESIVE SOILS)	UNDRAINED SHEAR STRENGTH (Cu)	
	(P.S.F.)	(KPa)
Very Soft	<250	<12
Soft	250-500	12-25
Medium	500-1000	25-50
Stiff	1000-2000	50-100
Very stiff	2000-4000	100-200
Hard	>4000	>200

ROCK QUALITY DESIGNATION (R.Q.D.)	
<25	very poor
25-50	poor
50-75	fair
75-90	good
>90	excellent

STRATIGRAPHIC LEGEND			
			
Sand	Gravel	Cobbles & Boulders	Bedrock
			
Silt	Clay	Organic Soil (topsoil)	Fill

SAMPLES

TYPE AND NUMBER:

The type of sample recovered is shown on the log by the abbreviation listed hereafter. The numbering of samples is sequential for each type of sample.

- | | | |
|-----------------|-------------------------------|-----------------|
| WS: Wash sample | PS: Piston sample (Osterberg) | SS: Split spoon |
| AG: Auger | ST: Thin wall (Shelby) | RC: Rock core |

RECOVERY:

The recovery, shown as a percentage, is the ratio of the length of the sample obtained to the distance the sampler was driven/pushed into the soil.

OTHER TESTS (in-situ or laboratory)

- | | | | |
|---------------------|-----------------------------|-----------------------|---------------------------|
| H: Hydrometer | GS: Grain size distribution | A: Atterberg limits | WP: Plastic limit |
| W: Moisture content | γ: Unit weight | CS: Swedish fall cone | EM: Pressuremeter modulus |
| K: Permeability | PI: Plasticity index | WL: Liquid limit | PL: Limit pressure |
| | | C: Consolidation | |

REFERENCE No.: _____

LEON TAYLOR B.Sc. M. Eng. MASCE
 Consulting Civil Engineer

ENCLOSURE No.: _____

PAGE 1 OF 1

5 Lucas St. St. George's Grenada W.I.

BOREHOLE No. 1

AGENT: OAEIC

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

DATE (finish) _____

OBJECT: _____

Described by: _____ Checked by: _____

LOCATION: _____

STRATIGRAPHY			SAMPLE			TEST RESULTS														
DEPTH	ELEVATION	STRATIGRAPHY	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	Shear test (Cu)		Sensitivity (S)		Water Content (%)		Atterberg limits (%)		"N" Value (Blows/12 in./30 cm)		
										Field	Lab.	W _p	W _L	U _c	U _L	10	20	30	40	50
			GROUND SURFACE			%			N											
0	0		SOFT DARK BROWN PLASTIC SILTY CLAY	X	SS1	72														
1.0			DARK BROWN VERY SOFT FIBROUS PEAT.	X	SS2	100														
2.0				X	SS3	100														
3.0				X	SS4	100		0-0-1	1											
4.0				X	SS5	100		0-0-1	1											
5.0				X	SS6	100		0-0-1	1											
6.0			END OF BOREHOLE REFUSAL ON PROBABLE BEDROCK	X	SS7	0		0-100/2"	2											

REFERENCE No.: 9309

LEON TAYLOR B.Sc. M. Eng. MASCE
Consulting Civil Engineer

ENCLOSURE No.: _____

PAGE 1 Of 2

5 Lucas St. St. George's Grenada W.I.

BOREHOLE No. _____

2

CLIENT: OAFIC

SS SPLIT SPOON

DATE (start) _____

PROJECT: GRAND VAL. PROJECT

ST SHELBY TUBE

DATE (finish) _____

LOCATION: _____

LS LOST SAMPLE

Described by: BB Checked by: EJ

RC ROCK CORE

WATER LEVEL

DEPTH		ELEVATION		STRATIGRAPHY		SAMPLE			TEST RESULTS			
Feet	Meters			DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	Shear test (Cu) Sensitivity (S) Water Content (%) Atterberg limits (%) W _p W _L "N" Value (Blows/12 in. 30 cm)	<input type="checkbox"/> Field <input type="checkbox"/> Lab.
				GROUND SURFACE			%			N	10 20 30 40 50 60 70 80 90	
0	0			BROWN PLASTIC SOFT SILTY CLAY WITH OCCASIONAL ORGANICS	<input checked="" type="checkbox"/>	SS1	67		1-0-1	1		
	1.0			SOFT	<input checked="" type="checkbox"/>	SS2	100		1-1-1	2		
5	2.0			DARK BROWN FIBROUS PEAT. OCCASIONALLY INTER-BEDDED WITH THIN BANDS OF GREY SILTY CLAY.	<input checked="" type="checkbox"/>	ST3	100		—			
	3.0			(VERY SOFT)	<input checked="" type="checkbox"/>	SS4	100		0-0-1	1		
	4.0				<input checked="" type="checkbox"/>	SS5	100		0-0-1	1		
15	5.0				<input checked="" type="checkbox"/>	ST6	100		0-0-1	1		
	6.0			DENSE BECOMING COMPACT DARK GREY MEDIUM TO FINE SAND WITH SOME GRAVEL AND TRACES OF SILT.	<input checked="" type="checkbox"/>	SS7	100		1-1-2	3		
	7.0			OCCASIONAL OXIDATION STAINS.	<input checked="" type="checkbox"/>	SS8	100		2-3-4	7		
25	8.0				<input checked="" type="checkbox"/>	SS9	100		8-6-4			
	9.0				<input checked="" type="checkbox"/>	SS10	100		10-10-9			

REFERENCE No.: _____

LEON TAYLOR B.Sc. M. Eng. MASCE
Consulting Civil Engineer

5 Lucas St. St. George's Grenada W.I.

ENCLOSURE No.: _____

PAGE _____ Of _____

BOREHOLE No. _____

2

CLIENT: _____

PROJECT: _____

LOCATION: _____

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

DATE (finish) _____

Described by: _____ Checked by: _____

STRATIGRAPHY			SAMPLE			TEST RESULTS													
DEPTH	ELEVATION	STRATIGRAPHY	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	Shear test (Cu) Field Sensitivity (S) Lab. Water Content (%) Atterberg limits (%) W _p W _L L "N" Value (Blows/12 in. 30 cm)									
										N	10	20	30	40	50	60	70	80	90
0	0		GROUND SURFACE			%													
0.5	0.5		LOOSE GREY DARK GREY SILTY FINE SAND WITH OCCASIONAL POCKETS OF (OXIDIZED) SILT	X	SS11	100		7-10-12	22										
1.0	1.0			X	SS12	100		2-1-2	3										
1.5	1.5			X	SS13	100		4-7-20	11										
2.0	2.0		SOFT TO FIRM GREENISH -BROWN OXIDIZED WITH SILTY CLAY WITH OCCASIONAL OXIDATION STAINS.	X	SS14	100		2-1-2	3										
3.0	3.0			X	SS15	80		8-14-16	30										
4.0	4.0		COMPACT TO DENSE BROWN SILT AND FINE TO MEDIUM SAND WITH SOME TO TRACES OF GRAVEL.	X	SS16	100		9-11-15	26										
5.0	5.0			X	SS17	100		8-12-14	26										
6.0	6.0		END OF BORING																
7.0	7.0																		
8.0	8.0																		
9.0	9.0																		

REFERENCE No.: _____

LEON TAYLOR B.Sc. M. Eng. MASCE
 Consulting Civil Engineer

ENCLOSURE No.: _____

PAGE 1 of 2

5 Lucas St. St. George's Grenada W.I.

BOREHOLE No. 3

CLIENT: OAFIC

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

DATE (finish) _____

PROJECT: _____

Described by: _____ Checked by: _____

LOCATION: _____

DEPTH		STRATIGRAPHY		SAMPLE			TEST RESULTS											
		ELEVATION	STRATIGRAPHY	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	Shear test (Cu) <input type="checkbox"/> Field Sensitivity (S) <input type="checkbox"/> Lab. Water Content (%) Atterberg limits (%) W _p W _L "N" Value (Blows/12 in.-30 cm)								
Feet	Meters		DESCRIPTION OF SOILS AND BEDROCK			%			N	10	20	30	40	50	60	70	80	90
0	0		GROUND SURFACE															
			WATER															
5	1.5		Loose grey medium coral sand	X	SS1	100		4-1-1	2									
			Soft to very soft dark brown fibrous peat. Occasionally interbedded with thin bands of grey silty clay	X	SS2	100		1-0-1	1									
				X	SS3	55		1-0-1	1									
				X	SS4	45		1-0-6	6									
15	4.5		Loose dark grey fine to medium sand, with some fine gravel and traces of silt	X	SS5	100		6-4-5	9									
				X	SS6	67		5-6-6	12									
				X	SS7	100		4-4-5	9									
				X	SS8	67		2-3-2	5									
30	9.0																	

REFERENCE No.: _____

LEON TAYLOR B.Sc. M. Eng. MASCE
Consulting Civil Engineer

ENCLOSURE No.: _____

PAGE _____ Of _____

5 Lucas St. St. George's Grenada W.I.

BOREHOLE No. 3

CLIENT: OAFIC

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

DATE (finish) _____

PROJECT: _____

Described by: _____ Checked by: _____

LOCATION: _____

DEPTH		STRATIGRAPHY		SAMPLE			OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	TEST RESULTS									
		ELEVATION	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	RECOVERY				Shoar test (Cu)	Sensitivity (S)	Water Content (%)	Atterberg limits (%)	W _p W _L @ "N" Value (Blows/12 in.-30 cm)					
Feet	Meters		GROUND SURFACE			%		N	10	20	30	40	50	60	70	80	90		
0	0			X	SS9	60		1-1-2	3										
	1.0		Very dense brown silt and fine to medium sand with traces of gravel.	X	SS10	100		18-44-77	21										
	2.0			X	SS11	100		12-24-44	68										
	4.0			X	SS12	58		15-27-31	58										
	6.0			X	SS13	100		18-30-42	72										
	20		END OF BORING																

REFERENCE No.: 9309

LEON TAYLOR B.Sc. M. Eng MASCE
Consulting Civil Engineer

ENCLOSURE No.: _____

PAGE _____ Of _____

BOREHOLE No. 4

5 Lucas St. St. George's Grenada W.I.

CLIENT: OVERSEAS AGRO FISHERIES CO. SS SPLIT SPOON
PROJECT: ARTISANAL FISHERIES COMPLEX. ST SHELBY TUBE
LOCATION: GRAND MAL, LS LOST SAMPLE
GRENADA. W.I. RC ROCK CORE
 WATER LEVEL

DATE (start) _____

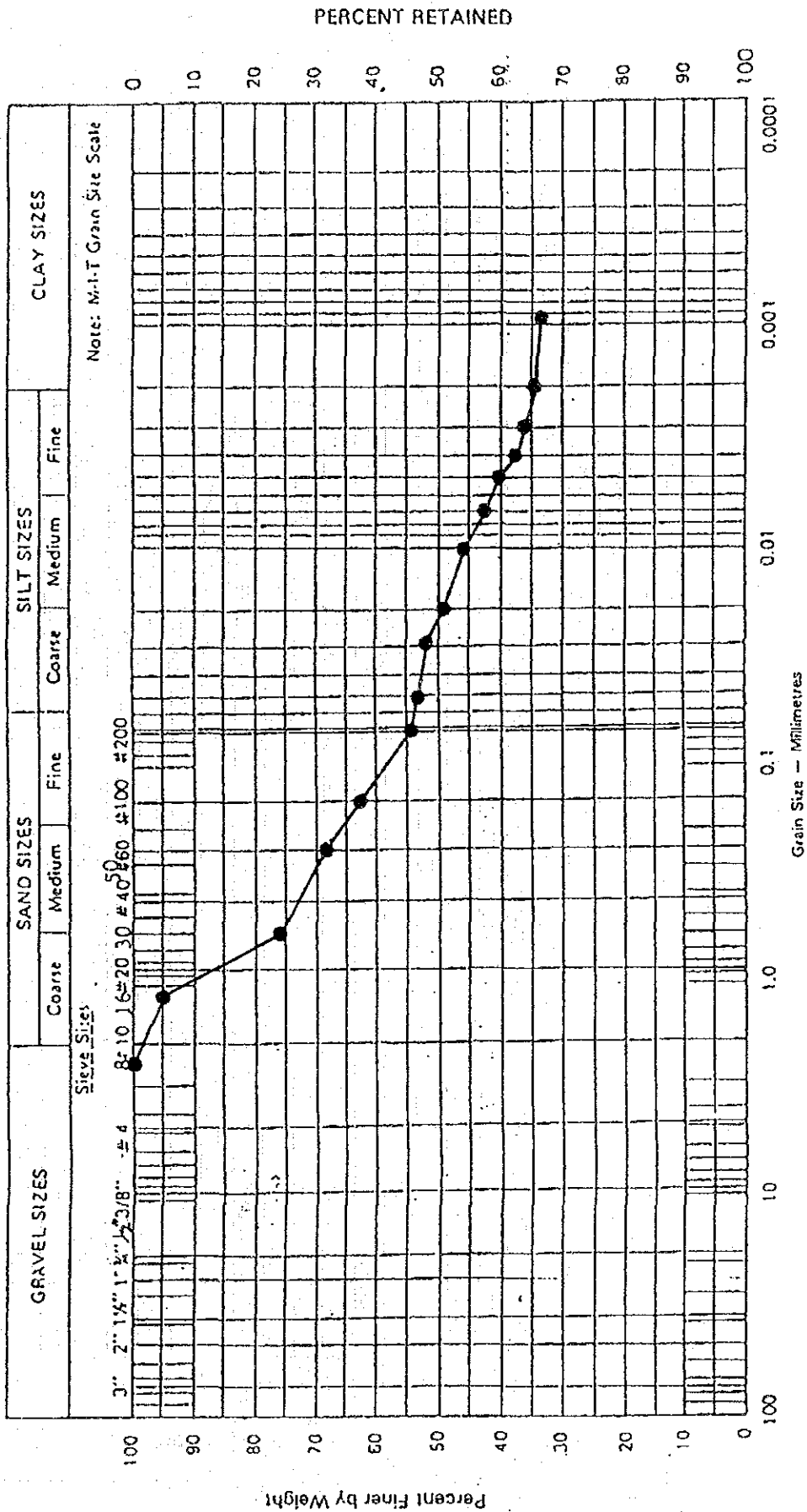
DATE (finish) _____

Described by: _____ Checked by: _____

STRATIGRAPHY			SAMPLE			TEST RESULTS							
DEPTH	ELEVATION	STRATIGRAPHY	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	OTHER TESTS	BLOW 3 8 in./15 cm	PENETRATION INDEX	Shear test (Cu)	Sensitivity (S)	Water Content (%)	Atterberg limits (%)	Field Lab.
									W _p	W _L	"N" Value (Blows/12 in./30 cm)		
Feet	Meters	~1.60m	GROUND SURFACE					N					
0	0		WATER.										
1.0													
5													
2.0													
10	3.0		LOOSE DARK GREY SAND WITH TRACES OF SILT	X	SS1 100		1-2-2	4					
15	4.0		COMPACT GREY MEDIUM CORAL SAND AND GRAVEL	X	SS2 100		4-5-7	10					
20	6.0		VERY DENSE DARK BROWN GRAVEL (WELL CEMENTED)	X	SS3 10		7-6-7						
25	8.0			X	SS4 80		7-50-92						
30	9.0			X	SS5 100		100/44	12					
				X	SS6 80		100/34	12					
			END OF BORE HOLE										

GEOTECH ASSOCIATES LTD.
TRINIDAD, W.I.

GRAIN SIZE DISTRIBUTION



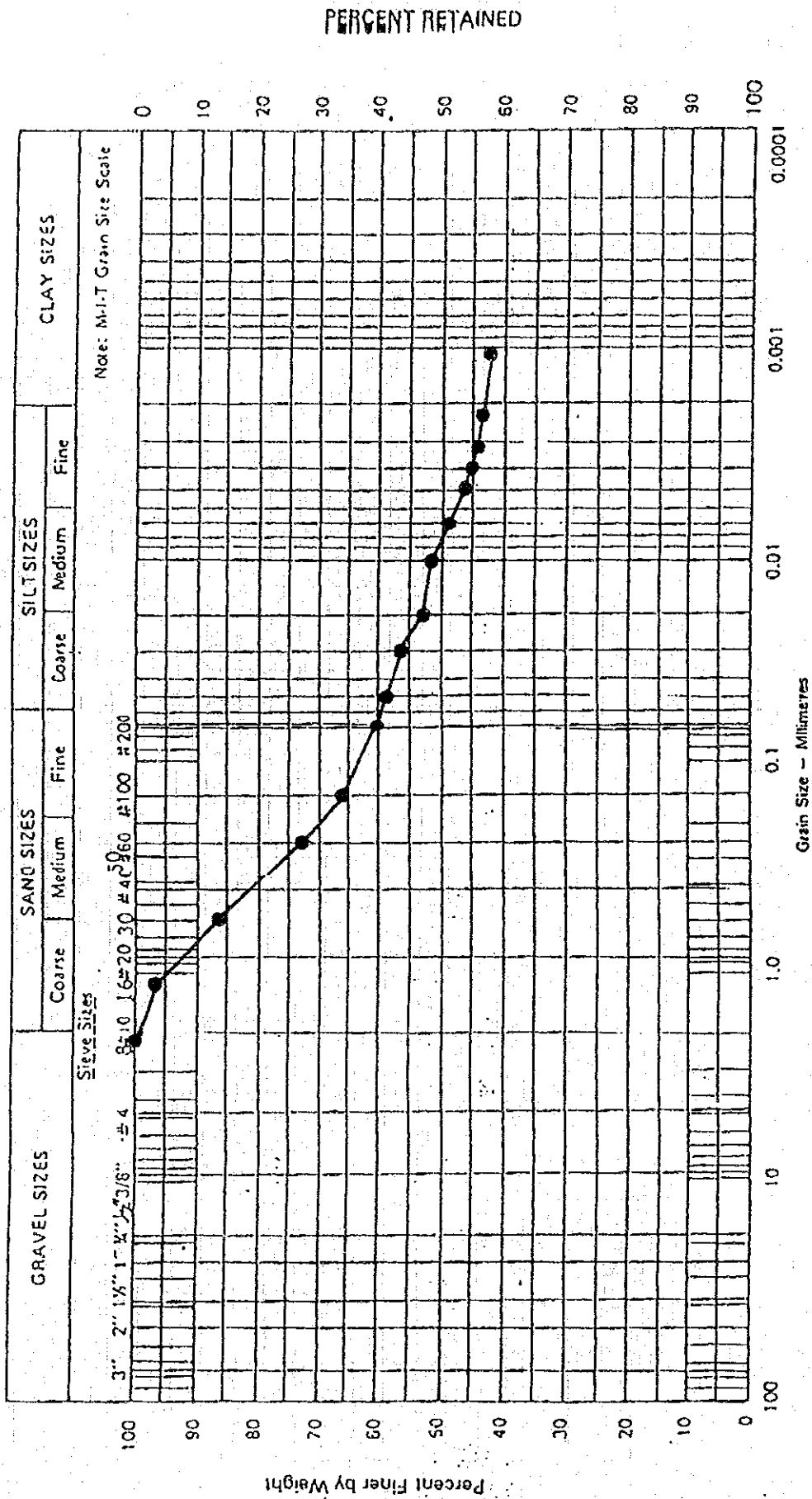
Client OVERSEAS AGED FISHERIES CONSULTANTS Co.
PROJECT ST. GEORGE'S FISHERIES COMPLEX

Sample: source: BH 2, S51

Legend:

GEOTECH ASSOCIATES LTD.
TRINIDAD W.I.

GRAIN SIZE DISTRIBUTION



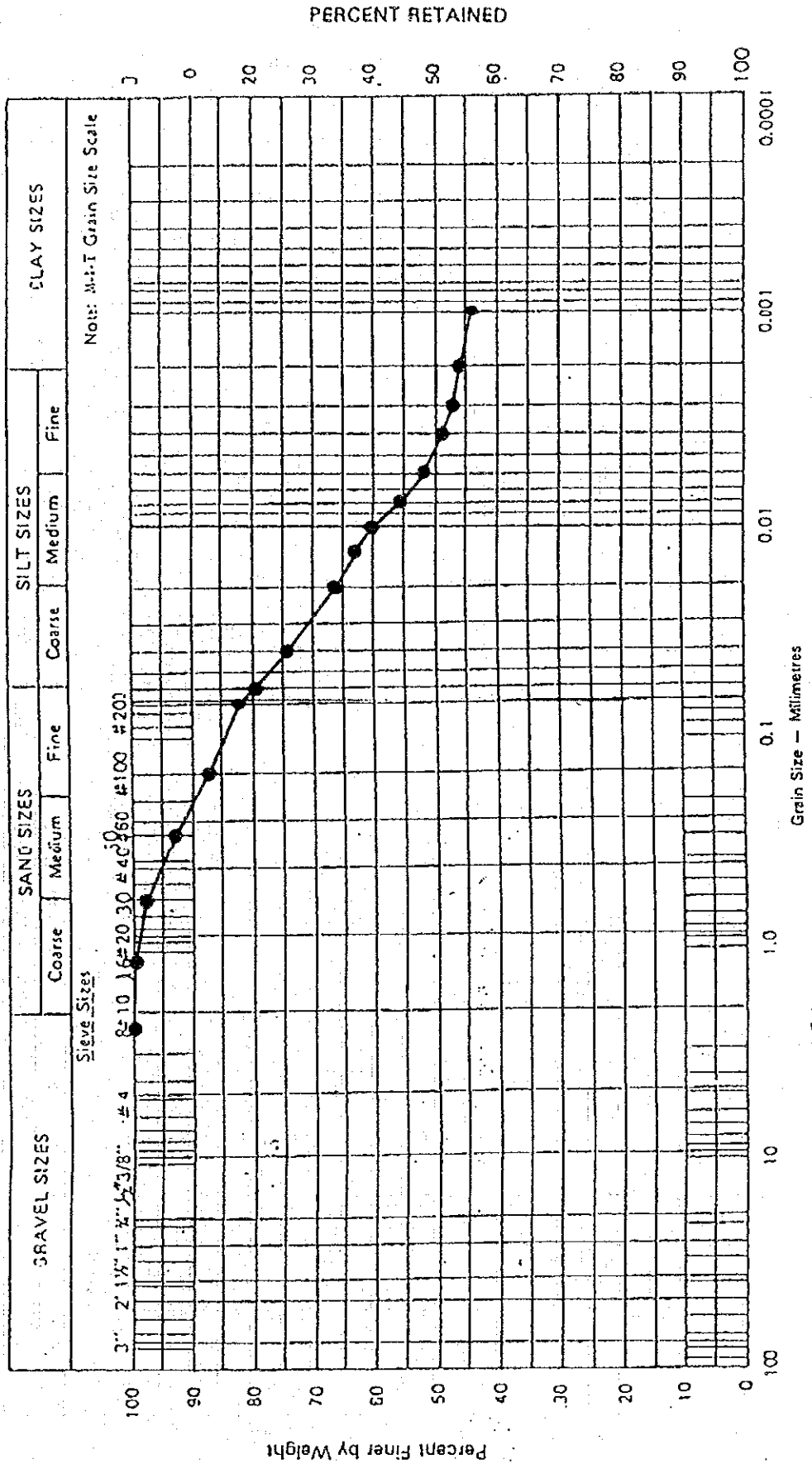
Sample: Source: BH1, SS1

Legend:

Client: OVERSEAS AGRICULTURE FISHERIES CONSULTANTS
PROJECT: ST. GEORGE'S FISHERIES COMPLEX

GEOTECH ASSOCIATES LTD.
TRINIDAD, W.I.

GRAIN SIZE DISTRIBUTION

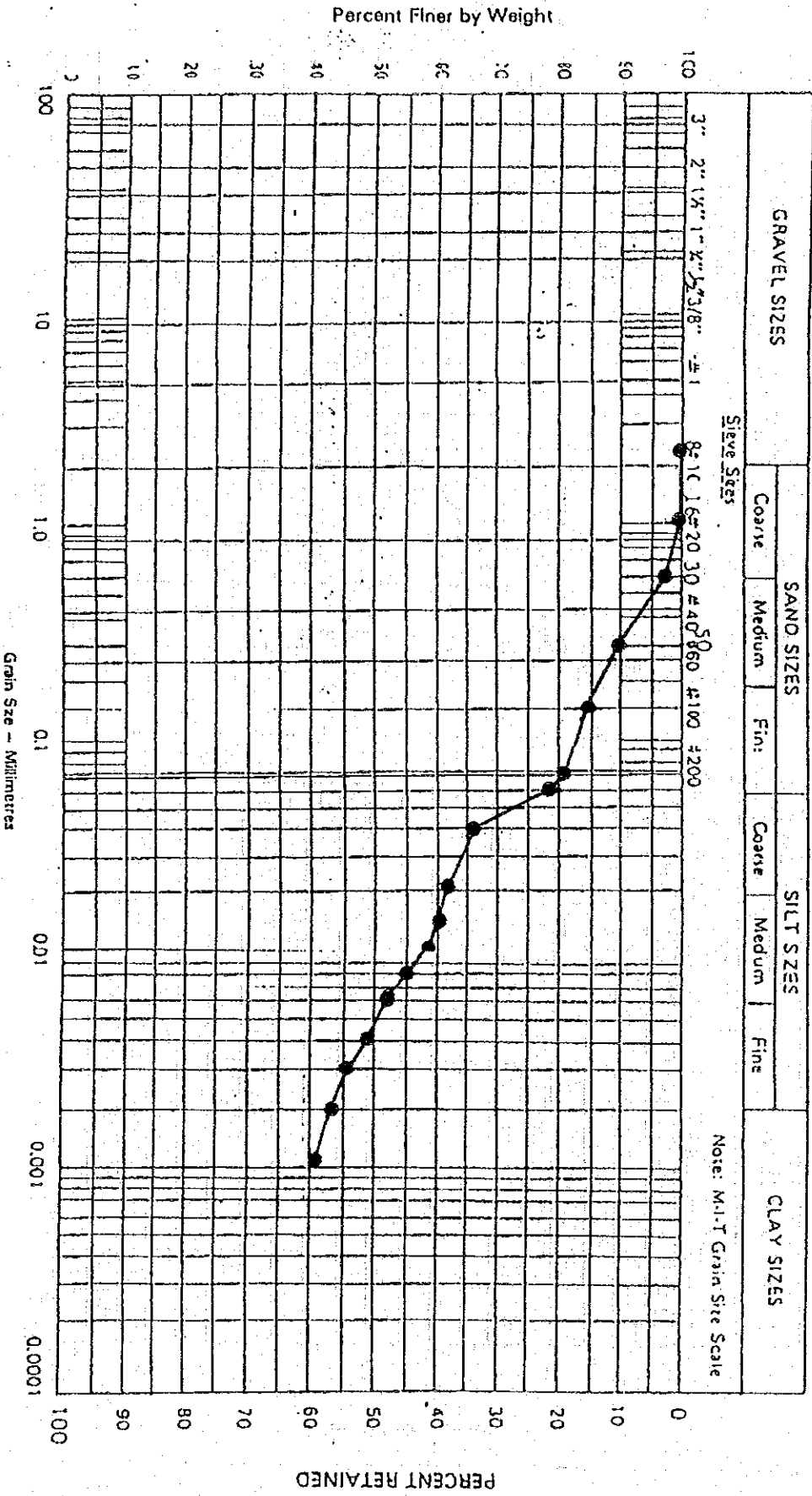


Sample Source: BH 1, ST 4

Legend:

Client OVERSEAS AGRICULTURE CONSULTANTS, W.I.
PROJECT ST. GEORGE'S FISHERIES COMPLEX

GRAIN SIZE DISTRIBUTION



Report No. 9809-1

Sample: Source: BM 2, 554

Legend:

Client: OVERSEAS AGRO FISHERIES CONSULTANTS CO. A
PROJECT

Enclosure No. 4

JICA