

II 地 質 調 查

1 INTRODUCTION

- 1.1 This report presents the soil investigation results for Small Hydro Study In Sarawak - Core Drilling Material Investigation For Medamit - 2, Limbang.
- 1.2 Its scope is limited to the presentation of factual data obtained from site boring and in-situ testing results.
- 1.3 All site operations and testing were carried out in accordance with the specification as stated in the Contract or under Clients' Site Engineers direct supervision.

2 WORK PROGRAM

Site work commenced on 17 June 1987 and completed on 10 August 1987. The total of seven numbers of borehole and nine water pressure tests were carried out. Their borehole locations are shown on Location Plan, see Appendix .

3 FIELD EXPLORATION

3.1 Method of boring

Boreholes were advanced with rotary wash boring method by using water as the drilling fluid. NW size of 76mm inter diameter casings were used to line the borehole walls where encountered soft overburden and other unstable soil formation. During boring work in progress, standard penetration tests were carried out including collected disturbed samples. Detailed boring records and standard penetration test results were also furnished in this report.

3.2 Standard Penetration Test (SPT)

The standard penetration tests were performed in accordance with the specification or as directed by SESCO Engineer on site. This test is to determines the relative density of cohesionless soil and to some extent the consistency cohesive soil. The apparatus consists of a 65 kg hammer with a tripping device that release the hammer at a height of 760mm. The falling energy is then transmitted via an anvil and

drill rod to a standard spoon of 5.08cm outer diameter and 3.49cm inner diameter at the bottom of the cleaned-out borehole. The number of blows to penetrate 450mm into the soil is recorded and the numbers of blow required to penetrate the final 300mm is recorded as 'N' value of SPT. (Excluding first 150mm seating drive).

4 SAMPLING

4.1 Disturbed Soil Samples

Disturbed soil samples were taken from standard penetration test spoon sampler. These representative soil samples were then well labelled and sealed in plastic bag for laboratory test.

5 LABORATORY TEST

All disturbed samples collected from SPT spoon tube were used for soil identification. No specific laboratory test been carried out on the collected soil samples.

LKS/Gg

SUMMARY OF FIELD EXPLORATION AND TEST

(Medmit - 2)

Section A - Table 1

Borehole No.	Reduced Level (m)	Borehole Depth (m)	Boring in Soil (m)	Rock Coring (m)	Standard Penetration Test (No.)	Water Pressure Test (No.)	Date of Boring
BME - 1		21.10	1.60	19.50	1	3	31.7 to 5.8.1987
BME - 2		20.95	10.55	10.40	7	2	7.8 to 10.8.1987
BME - 3		25.30	5.10	20.20	4	-	9.7 to 13.7.1987
BME - 4		22.30	-	22.30	-	3	15.7 to 29.7.1987
BME - 5		30.06	26.06	4.00	18	-	26.6 to 28.6.1987
BME - 6		20.305	20.305	-	13	-	22.6 to 24.6.1987
BME - 7		10.40	7.15	3.25	4	-	17.6 to 19.6.1987

Section A - Table 2

GEOTECHNIQUE EAST MALAYSIA SDN. BHD.
 LOT 87 JALAN TAN SRI ONG KEE HUI
 KUCHING SARAWAK MALAYSIA

<u>Core Recovery</u>	<u>Modified Core Recovery</u>	<u>RQD (Rock Quality Designation)</u>	<u>Description of Rock Quality</u>
10"	10"	0 - 25	V. Poor
2"		25 - 50	Poor
2"		50 - 75	Fair
3"		75 - 90	Good
4"	4"	90 - 100	Excellent
5"	5"		
3"	4"		
4"	6"		
6"			
4"			
2"			
5"	5"		
50"	34"		
Core Run = 60"			

Note: If the core is broken by handling or by the drilling process (i.e. the fracture surfaces are fresh irregular breaks rather than natural joint surface), the fresh broken pieces are fitted together and counted as one piece.

Core Recov.
 = 50/60 = 83%

RQD
 = 34/60 = 57%

Section A - Table 3

WEATHERING CLASSIFICATION TABLE








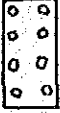




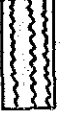
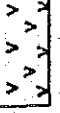



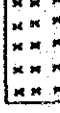
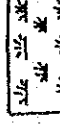






<u>GRADE</u>	<u>TERM</u>	<u>SANDSTONE DESCRIPTION</u>	<u>ARGILLACEOUS DESCRIPTION</u>
I	Fresh	No visible sign of weathering.	No visible sign of weathering.
I	Faintly Weathered	Discolouration only on major discontinuities.	(Term not used).
II	Slightly Weathered	Discolouration may be continuous throughout rock material and on discontinuity surfaces. Rock maybe slightly diminished in strength.	Some indications of chemical discolouration on fracture surfaces.
III	Moderately Weathered	Weathering may extend throughout rock mass, usually totally discoloured. Rock strength diminished. Less than 50% rock decomposed/disintegrated to sand. Rock present either as continuous framework or as corestones. Rock strength diminished.	Rock diminished in strength with zones or partings of silty clay/clayey silt. Discolouration of fracture surfaces and possibly rock mass.
IV	Highly Weathered	Weathering extends throughout Rock mass. Greater than 50% rock decomposed/disintegrated to sand. Rock strength generally greatly diminished. Rock present as discontinuous framework or as corestones.	Weathered to stiff/very stiff silty clay/clayey silt. May contain gradations to very weak rock or lithorelicts.
V	Completely Weathered	Rock material decomposed to sand with possible minor fragments of weak rock. Structure intact.	Weathered to firm silty clay/clayey silt. Essential mass structure intact.
VI	Residual Soil	As above but structure destroyed. (Generally indistinguishable from Colluvium C).	No structure. (Generally indistinguishable from Colluvium C).

Section A - Table 4 : Colour description

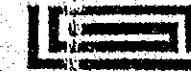
1	2	3
light	pinkish	pink
dark	reddish	red
	yellowish	yellow
	brownish	brown
	olive	olive
	greenish	green
	bluish	blue
		white
	greyish	grey
		black

Section A - Table 5

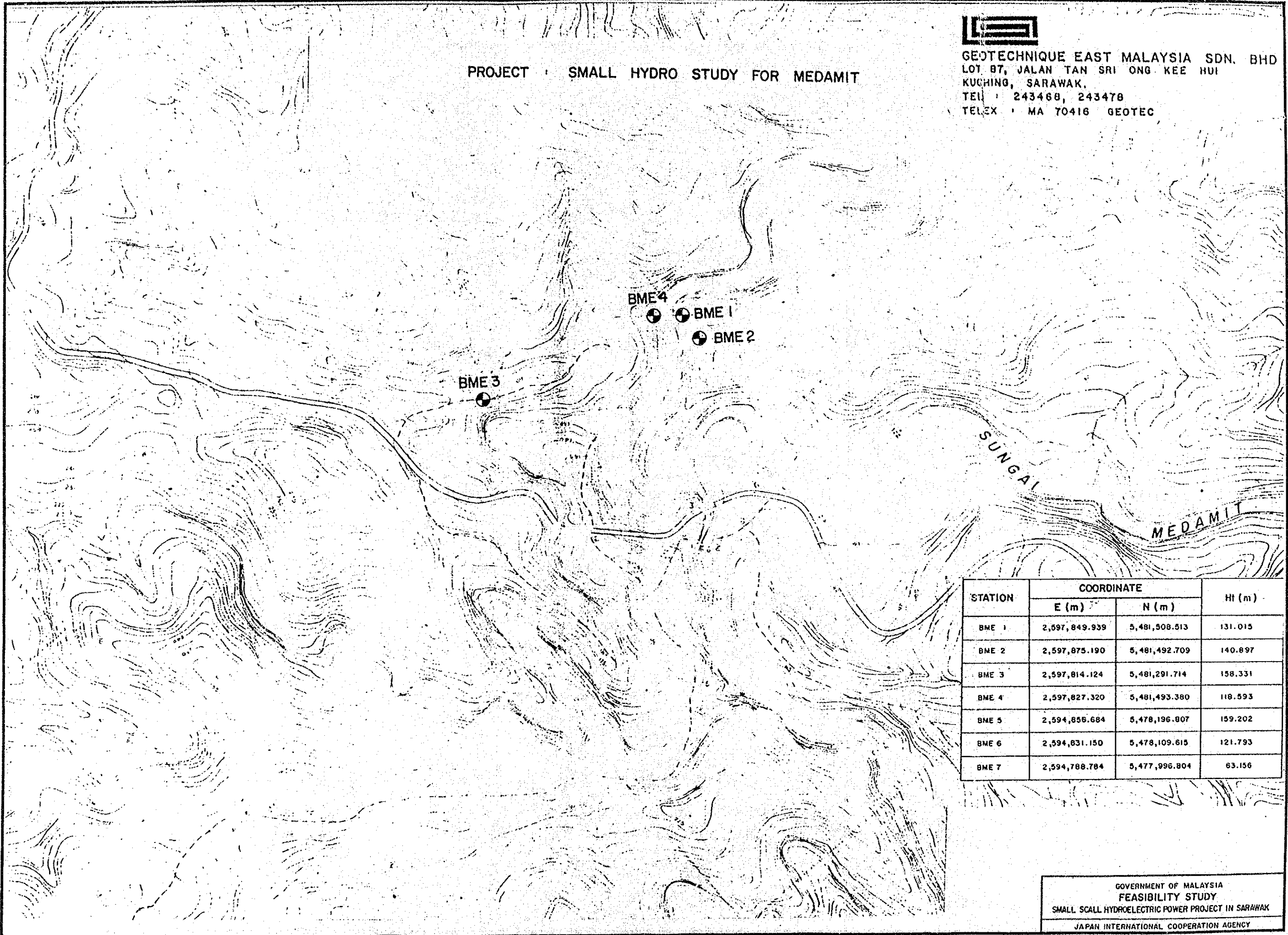
Recommended symbols for soils and rocks

Soil	Rock	Sedimentary	Metamorphic	Igneous
<p>Made ground</p> 	<p>Chalk</p> 			
<p>Boulders and cobbles</p> 	<p>Limestone</p> 		<p>Coarse - grained</p> 	<p>Coarse - grained</p> 
<p>Gravel</p> 	<p>Conglomerate</p> 		<p>Medium - grained</p> 	<p>Medium - grained</p> 
<p>Sand</p> 	<p>Breccia</p> 		<p>Fine - grained</p> 	<p>Fine - grained</p> 
<p>Silt</p> 	<p>Sandstone</p> 			
<p>Clay</p> 	<p>Siltstone</p> 			
<p>Peat</p> 	<p>Mudstone</p> 			
<p>Silty sand</p> 	<p>Shale</p> 			
<p>NOTE: Composite soil types will be signified by combined symbols, e.g.</p>	<p>Coal</p> 			
	<p>Pyroclastic (Volcanic ash)</p> 			
	<p>Gypsum, Rocksalt etc.</p> 			

PROJECT : SMALL HYDRO STUDY FOR MEDAMIT



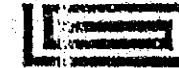
GEOTECHNIQUE EAST MALAYSIA SDN. BHD
 LOT B7, JALAN TAN SRI ONG KEE HUI
 KUCHING, SARAWAK.
 TEL : 243468, 243478
 TELEX : MA 70416 GEOTEC



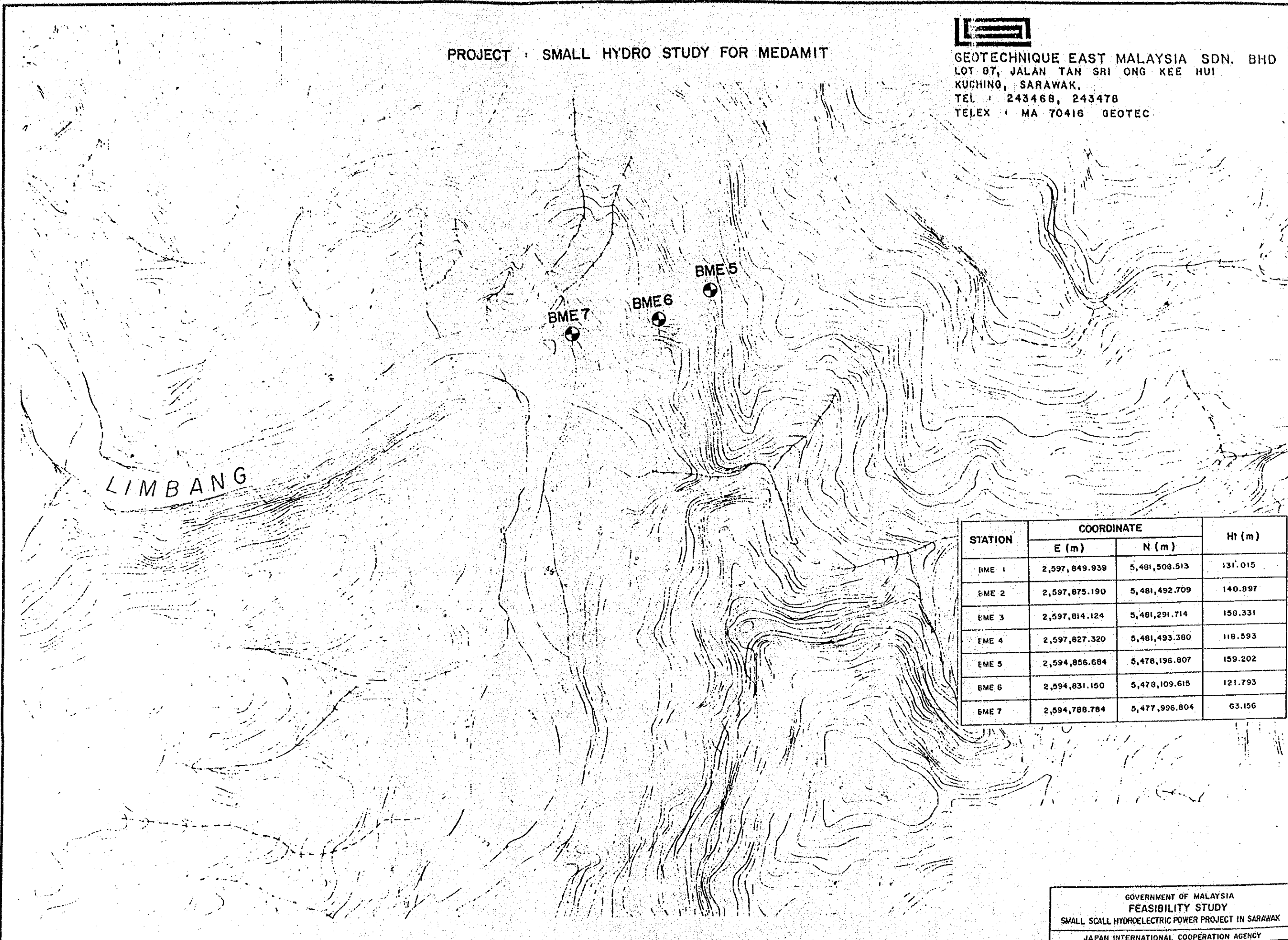
STATION	COORDINATE		Ht (m)
	E (m)	N (m)	
BME 1	2,597,849.939	5,481,508.513	131.015
BME 2	2,597,875.190	5,481,492.709	140.897
BME 3	2,597,814.124	5,481,291.714	158.331
BME 4	2,597,827.320	5,481,493.380	118.593
BME 5	2,594,856.684	5,478,196.807	159.202
BME 6	2,594,831.150	5,478,109.615	121.793
BME 7	2,594,788.784	5,477,996.804	63.156

GOVERNMENT OF MALAYSIA
 FEASIBILITY STUDY
 SMALL SCALL HYDROELECTRIC POWER PROJECT IN SARAWAK
 JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT : SMALL HYDRO STUDY FOR MEDAMIT



GEOTECHNIQUE EAST MALAYSIA SDN. BHD
 LOT 87, JALAN TAN SRI ONG KEE HUI
 KUCHING, SARAWAK.
 TEL : 243468, 243478
 TELEX : MA 70416 GEOTEC



STATION	COORDINATE		Ht (m)
	E (m)	N (m)	
BME 1	2,597,849.939	5,481,508.513	131.015
BME 2	2,597,875.190	5,481,492.709	140.897
BME 3	2,597,814.124	5,481,291.714	158.331
BME 4	2,597,827.320	5,481,493.380	118.593
BME 5	2,594,856.684	5,478,196.807	159.202
BME 6	2,594,831.150	5,478,109.615	121.793
BME 7	2,594,788.784	5,477,996.804	63.156

GOVERNMENT OF MALAYSIA
 FEASIBILITY STUDY
 SMALL SCALL HYDROELECTRIC POWER PROJECT IN SARAWAK
 JAPAN INTERNATIONAL COOPERATION AGENCY

DIAMOND DRILL HOLE - GEOLOGICAL LOG

PROJECT Medamit-2 Small Hydro Project
 FEATURE Diversion Weir
 LOCATION Intake

CO-ORDINATES E 2597 849.94 m
 N 5481 508.51 m
 SYSTEM S'wak Survey Grid

SURFACE ELEVATION 131.02 m
 ANGLE FROM HORIZONTAL 90°
 HORIZONTAL DIRECTION -

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture natural composition	SPT	DEGREE OF WEATHERING CN M SW F/S Fr	CORE SIZE ELEVATION DEPTH SYMBOL LOG	ROD CORROSION LOSS PER CENT	STRUCTURES JOINTS - spacing, attitude, smoothness apertures, cementing, coating, filling BEDDING, TOLATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER PRESSURE TEST LUGEON VALUE EFFECTIVE PRESSURE (BAR) LUGEON PATTERN
Overburden no coring 1.6m							
Sandstone, fine to medium grained light grey, very fractured, some quartz veins could be seen.					70° Joint planar intersected 40° Joint at right angle 40° Joint rough 70° Joint planar 30° Joint planar } limonite stained 45° Joint planar } 35° Joint planar }		
					35° Joint planar intersected 80° Joint planar at oblique angle both limonite stained 45° Joint planar limonite stained 30° Joint intersected 75° Joint at right angle both limonite stained 45° Joint planar.		
					Crushed rock with 45° - 75° Joint planar predominant. Subvertical Joint rough limonite stained 35° Joint planar		
					35° } Joint planar brown 35° } to black coated		
					set of 35° Joint planar brown to black coated 45° Joint planar limonite stained set of 45° Joint planar brown to black coated subvertical Joint slightly warped brown to black coated SW's 15° Joints, 3-9cm spacing planar limonite stained subvertical Joint planar limonite stained. 60° Joint intersected 15° Joint at right angle, both planar with limonite stained 70° Joint rough limonite stained subvertical Joint warped brown to black coated set of 60° Joint warped black coated set of 35° Joint limonite stained		

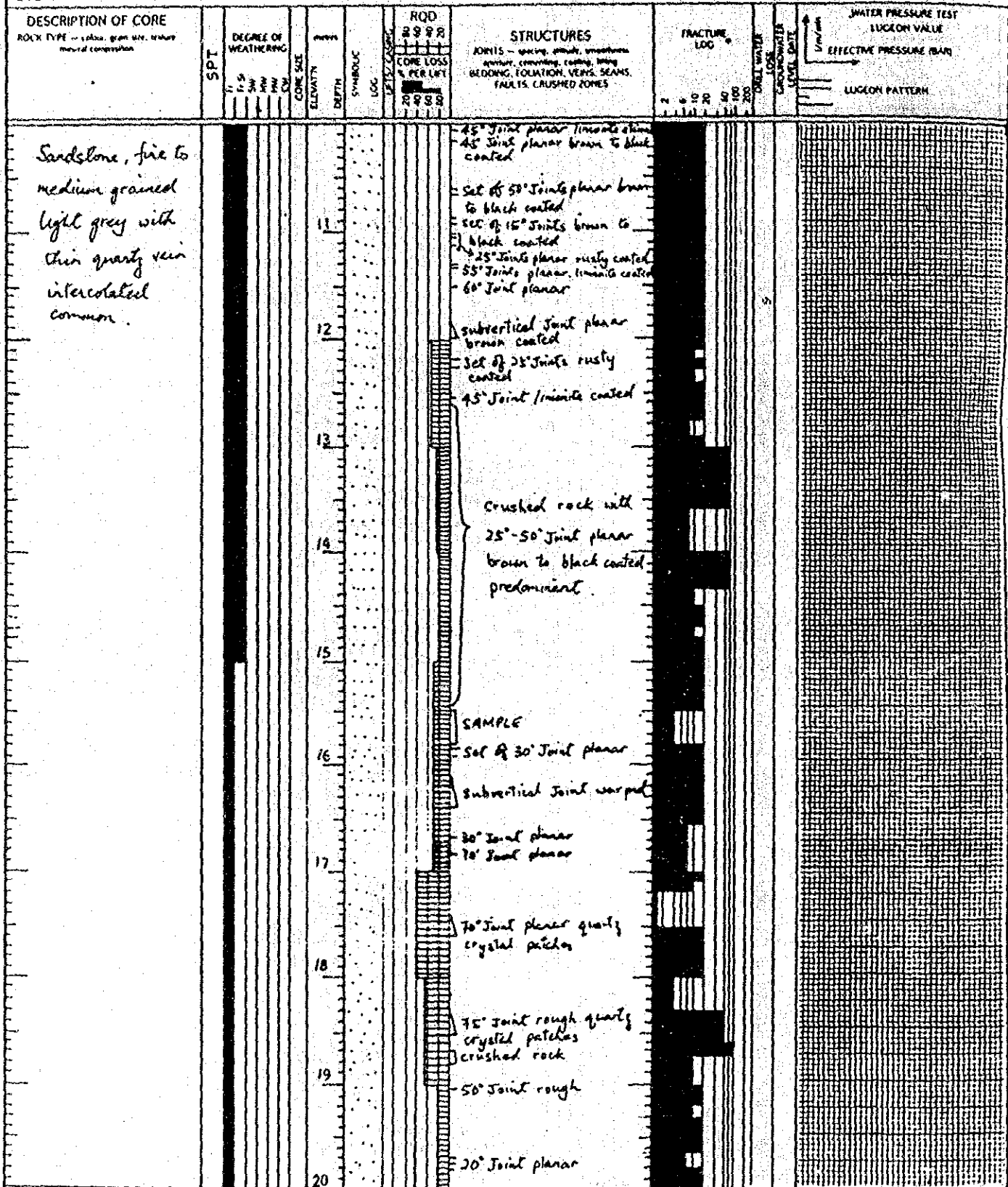
DRILL Make Rotary Type YEM-05 Date 7.8.87 Commenced 10.8.87	FRACTURE LOG 	EXPLANATION Natural break in core per metre Equivalent lengths of core pieces in compression	WEATHERING CW - Completely unweathered M - Moderately weathered SW - Slightly weathered F/S - Fresh, with little to no mineral growth Fr - Fresh	Logged VNT Drawn VNT Checked VNT Sheet 1 of 3
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DIAMOND DRILL HOLE - GEOLOGICAL LOG

PROJECT Medamit-2 Small Hydro. Project
 FEATURE Diversion Weir
 LOCATION Intake

CO-ORDINATES E 2597 849.94 m
 N 5481 508.51 m
 SYSTEM S'wak Survey Grid

SURFACE ELEVATION 131.02 m
 ANGLE FROM HORIZONTAL 90°
 DIRECTION



BME1 Mar Rotary YBM-05 Date Commenced 31.7.87 Completed 5.8.87	FRACTURE LOG 	EXPLANATION Named breaks in core per meter Equivalent lengths of core pieces in centimeters 	WEATHERING CW - Completely unweathered HW - Highly weathered MW - Moderately weathered SW - Slightly weathered Fr - Fresh, with limonite stained joints Fr - Fresh	Logged VNT Drawn VNT Checked VNT Sheet 2 of 3
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DIAMOND DRILL HOLE -- GEOLOGICAL LOG

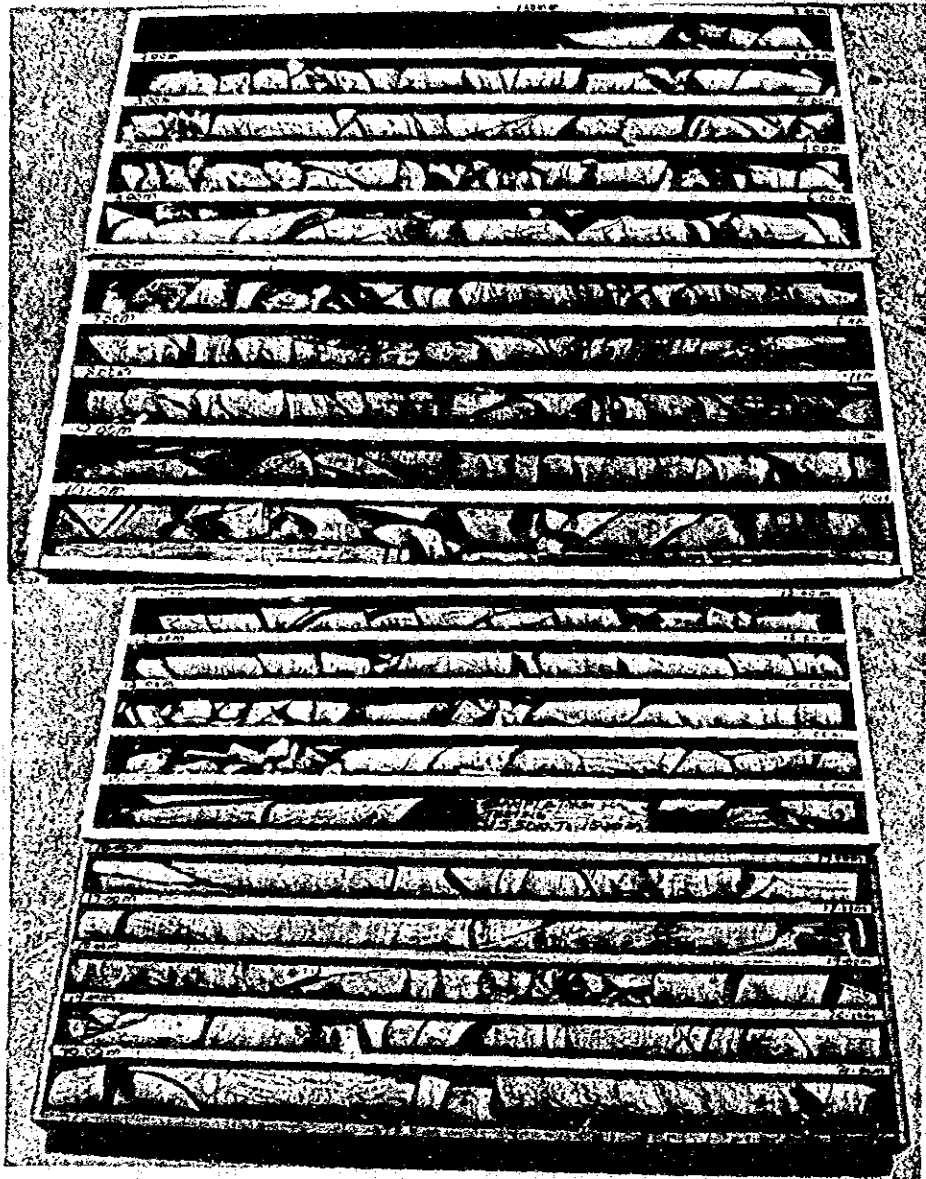
PROJECT Medamit-2 Small Hydro Project
 FEATURE Diversion Weir
 LOCATION Intake

COORDINATES E 2597 849.94 m
 N 5481 508.51 m
 SYSTEM S'wak Survey Grid

SURFACE ELEVATION 131.02 m
 ANGLE FROM HORIZONTAL 90°
 DIRECTION

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture material composition	SPT	DEGREE OF WEATHERING	CORE SIZE ELEVATION DEPTH SYMBOLIC LOG	ROD CORE LOSS % PER LFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS FAULTS & FRESH ZONES	FRACTURE LOG	WATER LOSS GROUNDWATER LEVEL, DATE	WATER PRESSURE TEST LUGEON VALUE EFFECTIVE PRESSURE (BAR)	LUGEON PATTERN
Sandstone, fine to medium grained light grey. 21.0m. End of Core.			21		25° Joint planar 25° Joint rough 40° Joint intersected 20° Joint at right angle, both planar				
			2						
			3						
			4						
			5						
			6						
			7						
			8						
			9						
			0						

DRILL Make Rotary Type YBM-05 Date Commenced 31.7.87 Completed 5.8.87	FRACTURE LOG 	EXPLANATION Natural breaks in core per metre Equivalent lengths of core pieces in centimetres 	WEATHERING CW - Completely weathered HW - Highly weathered MW - Moderately weathered SW - Slightly weathered F/S - Fresh with fine, fine stained zone F - Fresh 	Logged VNT Drawn VNT Checked VNT Sheet 3 of 3
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MEDAMIT-2 SMALL HYDRO-ELECTRIC PROJECT

DIAMOND DRILL HOLE BMe 1

1.60 m - 21.00 m

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT Medamit-2 Small Hydro Project
 FEATURE Diversion Weir
 LOCATION Intake

CO-ORDINATES E 2597 875.19 m
 N 5481 492.71 m
 SYSTEM S'wak Survey Grid

SURFACE 140.90 m
 ELEVATION 90°
 HORIZONTAL
 DIRECTION

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	SPT	DEGREE OF WEATHERING	CORE SIZE	ELEVATION	DEPTH	SYMBOLIC LOG	ROD	CORE LOSS PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TEST	
													LOGEON VALUE	EFFECTIVE PRESSURE (BAR)
Overburden no coring 10.55m														
Laminated shale dark grey, very fine grained. Some thin quartz veins intercalated					11 12 13 14 15 16 17 18 19 20				Very fractured rock, common fractures along the bedding plane dipping at 45°, slicken- sided on bedding planes common					

SAMPLE

Rotary YBM-05 7.8.87 10.8.87	FRACTURE LOG 	EXPLANATION Natural breaks in core per metre Equivalent lengths of core pieces in circulation	casing Water Pressure 	WEATHERING CW - Completely weathered HW - Highly weathered MW - Moderately weathered SW - Slightly weathered FSp - Fresh, with less than 50% exposed grains Fc - Fresh	VNT Logged Drawn Checked 1 2
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DIAMOND DRILL HOLE — GEOLOGICAL LOG

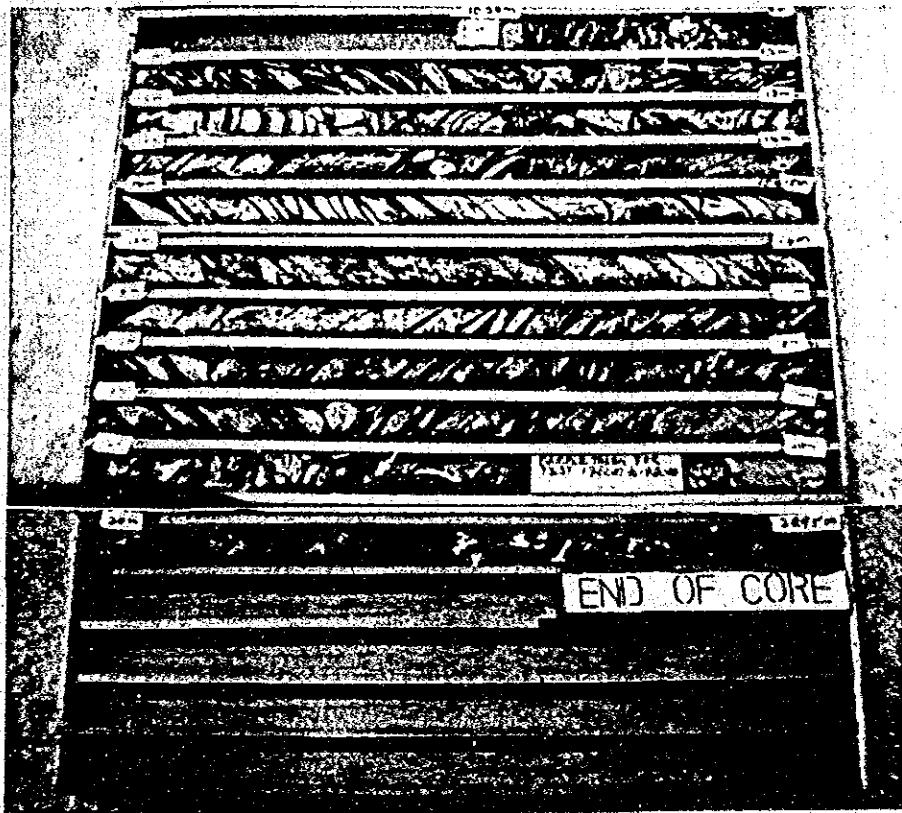
PROJECT Medamit-2 Small Hydro Project
 FEATURE Diversion Weir
 LOCATION Intake

CO-ORDINATES E 2597 875.19 m
 N 5481 492.71 m
 SYSTEM S'wak Survey Grid

SURFACE 140.90 m
 ELEVATION
 ANGLE FROM 90°
 HORIZONTAL
 DIRECTION

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	SPT	DEGREE OF WEATHERING	CORRECTION	SYMBOLIC LOG	ROD CORRECTION CORE LOSS % PER MET	STRUCTURES JOINTS - spacing, attitude, unmineralized apertures, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRAIN WATER LOSS GROUNDEWATER LEVEL DATE	WATER PRESSURE TEST LOGGON VALUE	
									EFFECTIVE PRESSURE (BAR)	LOGGON PATTERN
- do -						55° Joint plane set of 45° bedding plane crushed rock				
20 95m END OF CORE										

HOLE Rotary YBM-05 Date 7.8.87 10.8.87	FRACTURE LOG 	EXPLANATION Natural breaks in core Equivalent lengths of core pieces in centimeters		WEATHERING CW - Completely weathered HW - Highly weathered MW - Moderately weathered SW - Slightly weathered F/S - Fresh, with laterite stained joints F - Fresh	VNT VNT VNT 2 2
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MEDAMIT-2 SMALL HYDRO-ELECTRIC PROJECT

DIAMOND DRILL HOLE BMe 2

11.50 m - 20.95 m

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT Medamit-2 Small Hydro Project
 FEATURE Headrace Tunnel
 LOCATION Intake

CO-ORDINATES E 2597 814.12 m
 N 5481 291.71 m
 SYSTEM Siwak Survey Grid

SURFACE 158.33 m
 ELEVATION
 ANGLE FROM 90°
 HORIZONTAL
 DIRECTION

DESCRIPTION OF CORE ROCK TYPE — colour, grain size, texture natural composition	SPT	DEGREE OF WEATHERING	CORE SIZE ELEVATION DEPTH	SYMBOLIC LOG	ROD	STRUCTURES JOINTS — spacing, attitude, persistence orientation, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER PRESSURE TEST LUCKON VALUE EFFECTIVE PRESSURE (BAR) LUCKON PATTERN
					ROD LOG CORE LOSS % PER LIFT			
Overburden no coring			0-5.10m					
Shale, dark grey fine grained thinly laminated form.			5.10-10.00m			Subvertical Joint. Fairly crushed rock, highly sheared with steep angle Joints, quartz patches and slickensided features predominant. 80° Joint smooth, slicken- sided. 75° Joint warped slightly sheared 60° Joint smooth, slicken- sided.		

DRILL Make Rotary Type YBM-05 Date Commenced 9.7.87 Completed 13.7.87	FRACTURE LOG 	EXPLANATION Number beside is core per metre Equivalent lengths of core pieces in continuous	WEATHERING CW — Completely weathered MW — Moderately weathered SW — Slightly weathered F# — Fresh, with laminar mineral zones F — Fresh	Logged VNT Drawn VNT Checked VNT Sheet 1 of 3
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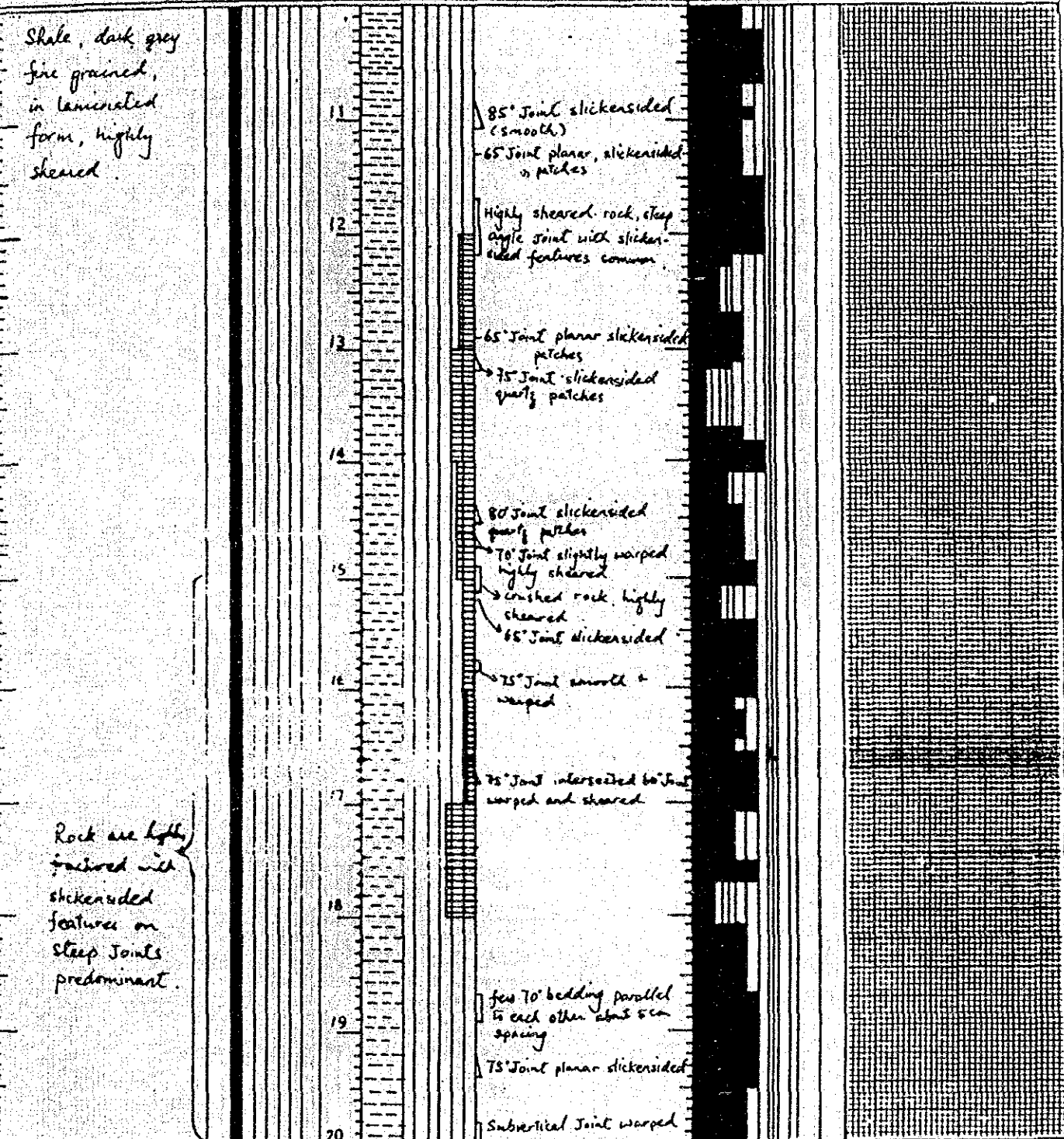
DIAMOND DRILL HOLE -- GEOLOGICAL LOG

PROJECT Medamit-2 Small Hydro Project
 FEATURE Headrace Tunnel
 LOCATION Intake

CO-ORDINATES E 2597 814.12 m
 N 5481 291.71 m

SURFACE ELEVATION 158.33 m
 ANGLE FROM HORIZONTAL 90°
 HORIZONTAL DIRECTION

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	DEGREE OF WEATHERING L S M H V W	SYMBOLIC LOG	RQD CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling, bedding, foliation, veins, seams, faults, crushed zones	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TEST
								LUGEON VALUE



DRILL Make Rotary Type YBM-05 Date Commenced 9.7.87 Completed 13.7.87	FRACTURE LOG 	EXPLANATION Symbols for casing, water pressure, and test section.	WEATHERING CW - Completely weathered HW - Highly weathered MW - Moderately weathered SW - Slightly weathered FSL - Fresh, with Limestone stained joint F - Fresh	Logged VNT Drawn VNT Checked VNT Sheet 2 of 3
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SARAWAK ELECTRICITY SUPPLY CORPORATION

HOLE No. **BMe 3**

DIAMOND DRILL HOLE — GEOLOGICAL LOG

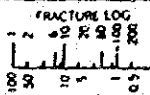
PROJECT Medamit-2 Small Hydro Project
 FEATURE Headrace Tunnel
 LOCATION Intake

COORDINATES E 2597 814.12 m
 N 5481 291.71 m
 SYSTEM Siwak Survey Grid

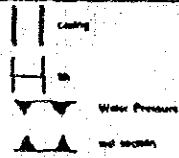
SURFACE 158.33 m
 ELEVATION
 ANGLE FROM 90°
 HORIZONTAL
 DIRECTION

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	SPT	DEGREE OF WEATHERING	CORRECTION		ROD CORRECTION CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, structure, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SCALDS, TALYS, CRUSHED ZONES	FRACTURE LOG	WATER PRESSURE TEST LUGEON VALUE EFFECTIVE PRESSURE (BAR) LUGEON PATTERN
			method	SYMBOLIC LOG				
Shale, dark grey very fine grained in laminated form, highly fractured. (highly sheared)								
						Subvertical Joint warped		
						65° Joint slickensided		
						65° Joint warped and rough		
						70° Joint smooth and slickensided		
						subvertical Joint warped sheared, slickensided		
						Subvertical Joint warped		
						70° Joint slickensided		
						75° Joint warped and slickensided (sheared)		
25.30m END OF CORE								

Make Rotary
 Type YEM-05
 Date 9.7.87
 Commenced 13.7.87
 Completed

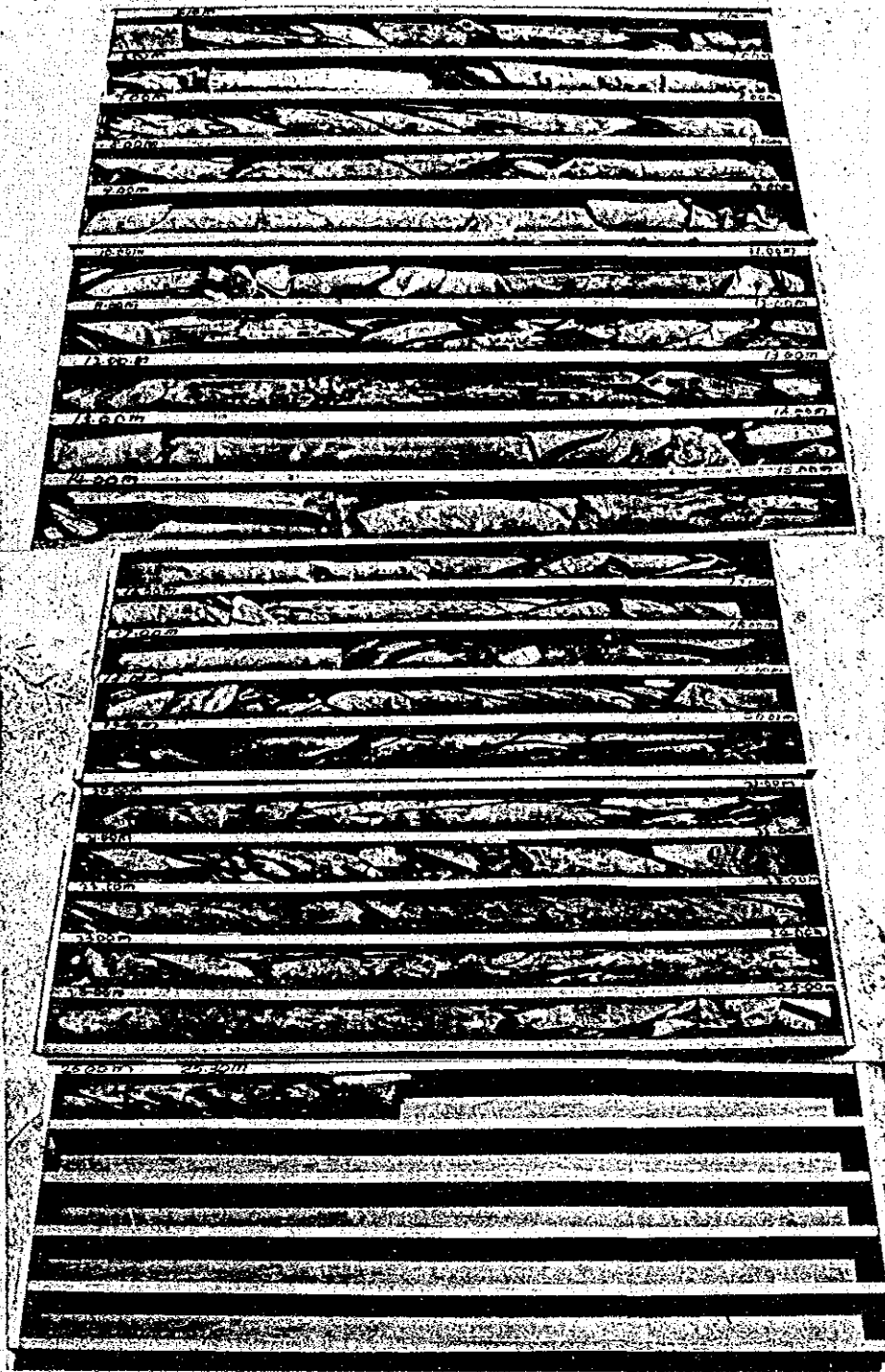


EXPLANATION
 Natural breaks in core per metre
 Equivalent lengths of core pieces in centimetres



WEATHERING
 CW - Completely weathered
 HW - Highly weathered
 MW - Moderately weathered
 SW - Slightly weathered
 Fz - Fresh, with laminar stained part
 Fr - Fresh

Loggert VNT
 Drawn VNT
 Checked VNT
 Sheet 3 of 3



MEDAMIT-2 SMALL HYDRO-ELECTRIC PROJECT

DIAMOND DRILL HOLE BMe 3

5.10 m - 25.30 m

DIAMOND DRILL HOLE -- GEOLOGICAL LOG

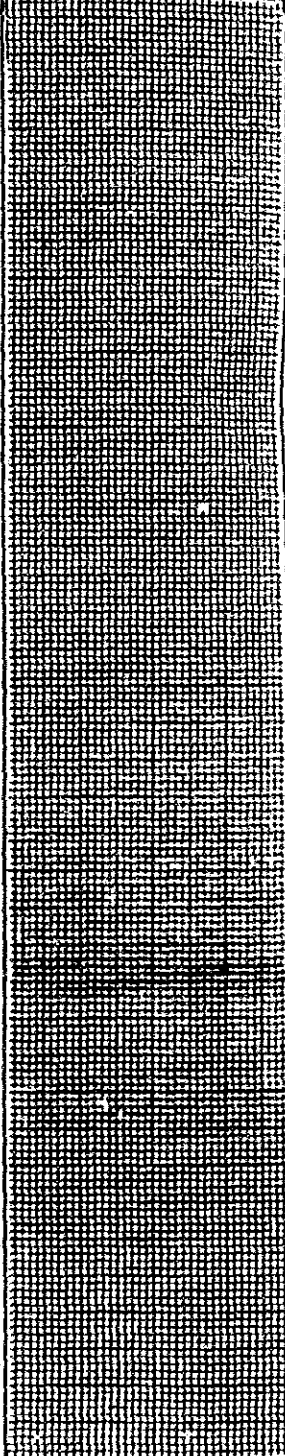
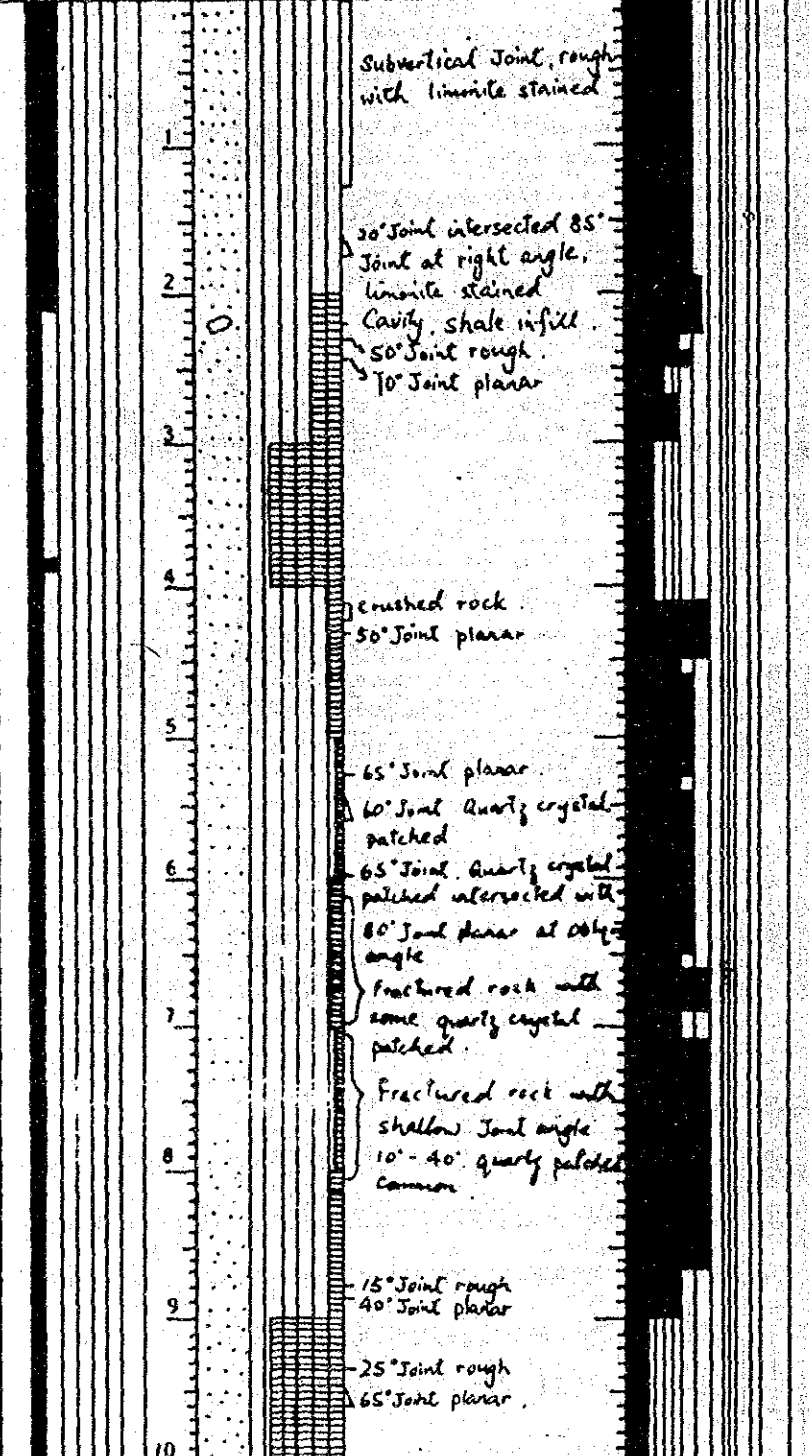
PROJECT Medamit-2 Small Hydro Project
 FEATURE Diversion Weir
 LOCATION Intake

COORDINATES E 2597 827.32 m
 N 5481 493.38 m
 SYSTEM S'wak Survey Grid

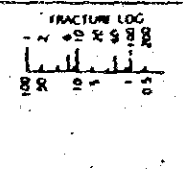
SURFACE 118.59 m
 ELEVATION
 ANGLE FROM 90°
 HORIZONTAL
 DIRECTION

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture natural composition	SPT	DEGREE OF WEATHERING	CORE SIZE	ELEVATION	DEPTH	SYMBOLIC LOG	ROD	STRUCTURES JOINTS - spacing, attitude, smoothness apertures, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	WATER CALCULATION	WATER TEST
							LOSS					

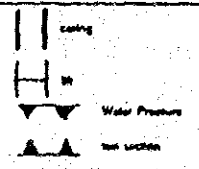
Sandstone, fine to medium grained, light grey.



DRILL
 Make Rotary
 Type YEM-05
 Date 15.7.87
 Commenced 15.7.87
 Completed 29.7.87



EXPLANATION
 Pattern symbols to show joint nature
 Equivalent lengths of joint pieces
 in continuous



WEATHERING
 CW - Completely weathered
 HW - Highly weathered
 MW - Moderately weathered
 SW - Slightly weathered
 f/s - Fresh, with limonite stained joints
 ff - Fresh

Logged VNT
 Drawn VNT
 Checked VNT
 Sheet 1 of 3

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT Medamit-2 Small Hydro Project
 FEATURE Diversion Weir
 LOCATION Intake

COORDINATES E 2597 827.32 m
 N 5481 493.38 m
 SYSTEM S'wak Survey Grid

SURFACE 118.59 m
 ELEVATION 90°
 HORIZONTAL DIRECTION

DESCRIPTION OF CORE ROCK TYPE — color, grain size, texture (mineral composition)	SPL	DEGREE OF WEATHERING	CORRECTION	SYMBOLIC LOG	ROD LOSS % PER LIFT	STRUCTURES JOINTS — spacing, attitude, unweathered surfaces, cementing, coating, filling, BEDDING, FOLIATION, VENS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TEST	
										LOGEON VALUE	EFFECTIVE PRESSURE BAR
Sandstone, fine to medium grained light grey						Crushed rock.					
						25° Joint rough					
						50° Joint warped					
						20° Joint planar					
						Three 20° Joints planar, parallel to each other					
						55° Joint warped and rough					
						50° Joint planar					
						Quartz crystal vein at 60° angle					
						Set of 40° Joint rough					
						30° Joint planar					
						30° Joint, slickensided thin shale patches					
						20° Joint planar					
						50° Joint warped					
						Crushed rock.					
						Three 25° Joints planar					
						Set of 65° Joint planar					
						50° Joint warped slightly sheared					
						Quartz vein irregular shape					
						75° Joint planar					
						20° Joint planar					
					Sample 17.15-17.35m						
					20° Joint planar						
					25° Joint warped						
					15° Joint slightly slickensided dark grey coated						
					50° Joint rough sheared zone						
					Set of 30° Joints slickensided						
					15° Joint rough are common						

DRILL Make Rotary Type YBM-05
 Date 15.7.87
 Commenced 15.7.87
 Completed 29.7.87

FRACTURE LOG
 --- -- -- -- --
 --- -- -- -- --
 --- -- -- -- --

EXPLANATION
 Natural breaks in core per above
 Corrosion lengths of core pieces in parentheses

--- casing
 --- m
 --- Water Pressure
 --- test section

WEATHERING
 CW - Completely weathered
 HW - Highly weathered
 MW - Moderately weathered
 SW - Slightly weathered
 Fd - Fresh, with lim. or other joints
 F - Fresh

Logged VNT
 Drawn VNT
 Checked VNT
 Sheet 2 of 3

DIAMOND DRILL HOLE - GEOLOGICAL LOG

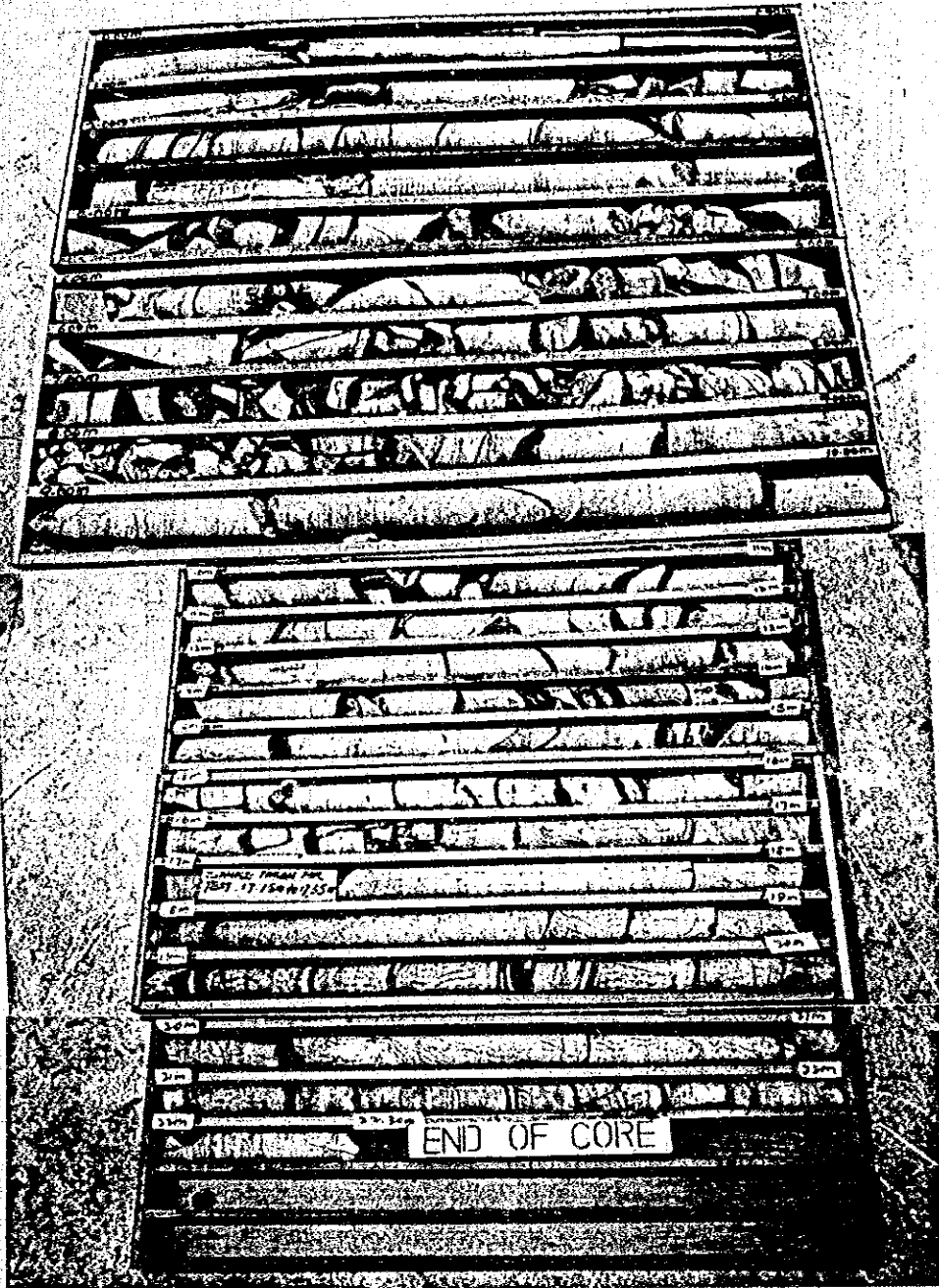
PROJECT Medamit-2 Small Hydro Project
 FEATURE Diversion Weir
 LOCATION Intake

COORDINATES E 2597 827.32 m
 N 5481 493.38 m
 SYSTEM S'wak Survey Grid

SURFACE ELEVATION 118.59 m
 ANGLE FROM HORIZONTAL 90°
 HORIZONTAL DIRECTION

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture mineral composition	SPT	DEGREE OF WEATHERING C1 C2 C3 C4 C5 C6 C7	CORE SIZE ELEVATION DEPTH	SYMBOLIC LOG	ROD	STRUCTURES JOINTS - spacing, attitude, orientation bedding, foliation, veins, seams, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER PRESSURE TEST LUGGON VALVE EFFECTIVE PRESSURE (BAR) LUGGON PATTERN
					ROD LOSS % PER LIFT			
Sandstone, fine to medium grained light grey.			21		Set of 20° Joint, slicken-sided (highly sheared)			
			21		20° Joint warped			
			22		Set of 20° Joint slicken-sided			
			22		Three 20° Joints slicken-sided, dark brown coated			
			22		Set of 20° Joints rough			
22.30 m END OF CORE								
			2					
			4					
			5					
			6					
			7					
			8					
			9					
			0					

DRILL Make Rotary Type YBM-05 Date 15.7.87 Commenced 29.7.87 Completed	FRACTURE LOG 	EXPLANATION Natural breaks in core per metre Equivalent lengths of core pieces in cylinders 	WEATHERING CW - Completely weathered HW - Highly weathered MW - Moderately weathered SW - Slightly weathered F&F - Fresh, with limestone stained joints Fr - Fresh 	VNT Layered VNT Open VNT Cherted VNT Sheet 3 of 3
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MEDAMIT-2 SMALL HYDRO-ELECTRIC PROJECT

DIAMOND DRILL HOLE BMe 4

0.00 m - 22.30 m

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT Medamit-2 Small Hydro Project
 FEATURE Surge Tank
 LOCATION Power House

CO-ORDINATES E ... 2,594,856.684 m
 N ... 5,478,196.807 m
 SYSTEM Siwak Survey Grid

SURFACE ELEVATION 159.20 m
 ANGLE FROM HORIZONTAL 90°
 DIRECTION -

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture mineral composition	SPT	DEGREE OF WEATHERING	CORE SIZE	SYMBOLIC LOG	DEPTH	ROD	CORE LOSS % PER LIT	STRUCTURES	FRACTURE LOG	WATER LOSS	GEO-PHYSICAL DATA	WATER PRESSURE TEST	
												LOGEON VALUE	EFFECTIVE PRESSURE (BAR)
Overburden no coring 26.06 m					1 2 3 4 5 26								
Shale, very fine grained, dark grey.					27 28 29 30			Set of 55° Joint rough SAMPLE subvertical joint rough crushed & fractured rock. 70° Joint rough Set of 70° Joint rough. slightly fractured rock.					
30.06m END OF													

Date Commenced 26.6.87 Completed 28.6.87	DRILL Rotary YBM-05	CORE STRUCTURE LOG --- 09 X 888 88 54 - 0	EXPLANATION Natural scale in core per meter Equal length of core pieces = centimeters	casing bit Water Pressure and section	WEATHERING CW - Completely weathered HW - Highly weathered MW - Moderately weathered SW - Slightly weathered F/S - Fresh, not later re-weathered F - Fresh	Logged VNT Drawn VNT Checked VNT Sheet 1 of 1
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MEDAMIT-2 SMALL HYDRO-ELECTRIC PROJECT

DIAMOND DRILL HOLE BMe 5

26.00 m - 30.06 m

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT Medamit-2 Small Hydro Project
 FEATURE Penstock Line
 LOCATION Power House

COORDINATES E 2594 831.15 m
 N 5478 109.62 m
 SYSTEM Siwak Survey Grid

SURFACE 121.79 m
 ELEVATION
 ANGLE FROM 90°
 HORIZONTAL
 DIRECTION

DESCRIPTION OF CORE <small>ROCK TYPE - colour, grain size, texture, mineral composition</small>	SPT	DEGREE OF WEATHERING <small>FS, SW, MW, HW, CW</small>	CORE SIZE <small>mm</small>	ELEVATION <small>m</small>	DEPTH <small>m</small>	SYMBOLIC LOG	ROD <small>2 2 2 2</small> CORE LOSS <small>% PER LIFT</small> <small>2 2 2 2</small>	STRUCTURES <small>JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS FAULTS, CRUSHED ZONES</small>	FRACTURE LOG <small>2 2 2 2</small>	WATER LOSS <small>PERCENT</small>	GROUT/WATER LEVEL, DATE	WATER PRESSURE TEST <small>LOGGON VALVE EFFECTIVE PRESSURE (BAR)</small>	LOGGON PATTERN

TYPE Rotary No. YBM-05 Started 22.6.87 Completed 24.6.87	FRACTURE LOG 	EXPLANATION Natural breaks in core per metre Equalized lengths of core pieces in containers 	WEATHERING CW - Completely weathered HW - Highly weathered MW - Moderately weathered SW - Slightly weathered Ffr - Fresh, with little or no surface joint Fr - Fresh	Logged VNT Drawn VNT Checked VNT Sheet 1 of 1
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DIAMOND DRILL HOLE — GEOLOGICAL LOG

SURFACE ELEVATION 63.16 m
 ANGLE FROM HORIZONTAL 90°
 HORIZONTAL DIRECTION

PROJECT Medamit-2 Small Hydro Project
 FEATURE Power Station
 LOCATION Power House
 CO-ORDINATES E 2,594,788.784 m
 N 5,477,996.804 m
 SYSTEM S'wak Survey Grid

DESCRIPTION OF CORE ROCK TYPE — colour, grain size, texture, mineral composition	SPT	DEGREE OF WEATHERING	CORRECTION	ELEVATION	DEPTH	SYMBOL	LOG	RQD CORE LOSS % PER LMT	STRUCTURES JOINTS — striking, attitude, smoothness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TEST		
													LUCEON VALUE	EFFECTIVE PRESSURE (BAR)	
Overburden no coring 7.15m					1-7										
Limestone, very grained, light grey with thin (mm to cm thick) quartz veins intercalated redominant					8-10				40° Joint warped 30° Joint rough 35° Joint warped 25° Joint warped 20° Joint rough 25° Joint rough 35° Joint rough 30° Joint planar 30° Joint rough 15° Joint rough						

DRILL No. Rotary Log YBM-05 Date 17.6.87 Commenced 19.7.87 Completed	FRACTURE LOG 	EXPLANATION Mineral breaks in core per metre Equivalent lengths of core pieces in centimetres	WEATHERING CW — Completely weathered HW — Highly weathered MW — Moderately weathered SW — Slightly weathered Ffs — Fresh, with fine silty stained zones fi — Fresh	Logged VNT Drawn VNT Checked VNT Scale 1 of 2
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DIAMOND DRILL HOLE — GEOLOGICAL LOG

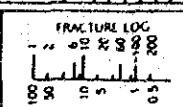
PROJECT Medamit-2 Small Hydro Project
 FEATURE Power Station
 LOCATION Power House

CO-ORDINATES E ... 2,594,788,784 ... m
 N ... 5,477,996,804 ... m
 SYSTEM S'wak Survey Grid

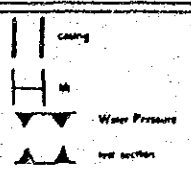
SURFACE ELEVATION 63.16 m
 ANGLE FROM HORIZONTAL 90°
 DIRECTION

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture mineral composition	SP-1 DEGREE OF WEATHERING 1 2 3 4 5 6 7 8 9 10	CORE SIZE ELEVATION DEPTH SYMBOLIC LOG	ROD CORE LOSS % PER LFT 1 2 3 4 5 6 7 8 9 10	STRUCTURES JOINTS - spacing, attitude, smoothness fracture, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG N S E W 100 200	WATER PRESSURE TEST LUGEON VALUE EFFECTIVE PRESSURE (BAR) LUGEON PATTERN
- do -				15' Joint rough in cavity form		
10.40m End of Core						

DRILL
 Make Rotary
 Type YBM-05
 Date
 Commenced 17.6.87
 Completed 19.7.87



EXPLANATION
 Natural breaks in core per metre
 Equivalent lengths of core pieces
 in centimeters



WEATHERING
 CW - Completely weathered
 YW - Highly weathered
 MW - Moderately weathered
 SW - Slightly weathered
 FG - Fresh, with limestone stained joints
 fr - Fresh

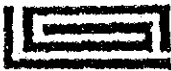
Logged VNT
 Drawn VNT
 Checked VNT
 Sheet 2 of 2



MEDAMIT-2 SMALL HYDRO-ELECTRIC PROJECT

DIAMOND DRILL HOLE BMe 7

7.15 m - 10.40 m



WATER PRESSURE TEST IN DRILL HOLE			HOLE NO.: BME-1 (Test 1)		
Project: Small Hydro Study For Medamit			Coordinates:		
Location: Medamit			Date of Test: 1.8.1987		
Job No : KSI/87(J18)			Reporter: B.J.O.		
Borehole	Elevation C. D. (m):		Diameter (mm): 75		
	Dip Angle (°): 90°		Bearing (°):		
Test Section	Stage No:		GEOLOGY: Moderately weathered gray strong fine-grained SANDSTONE (Greywacke) with iron stained weak joints		
	Depth	Packer (m)			5.60
		Hole Bottom (m)			10.60
	Elev.	Packer (m)			
		Hole Bottom (m)			
Length, L (m): 5.00					
Height of Gauge (m): 0.40					
Water Head (m): 3.20			Temp. of Injected Water °C: 26		
Pump	Model, Type: SP 40B		Flow Meter	Type:	
	Max. Discharge (l/min): 105			Min. Precision (l): 1 Litre	
	Max. Pressure (g/cm ²): 40,000		Pressure Gauge	Min. Reading (g/cm ²): 500	
Type of Packer	Hydraulically inflated single packer	Max. Reading (g/cm ²): 20,000			
<p>*Effective Pressure (Kg/cm²) $P = P_a + 1/10 (h-h_l)$ where, $h = h_1+h_2$ h_l = head loss</p> <p>** Lugeon Value (l/min/m/10kg/cm²) = $Lu = 10Q/PL$</p>					
<p>Unsaturated Strata:</p>			<p>Saturated Strata:</p>		