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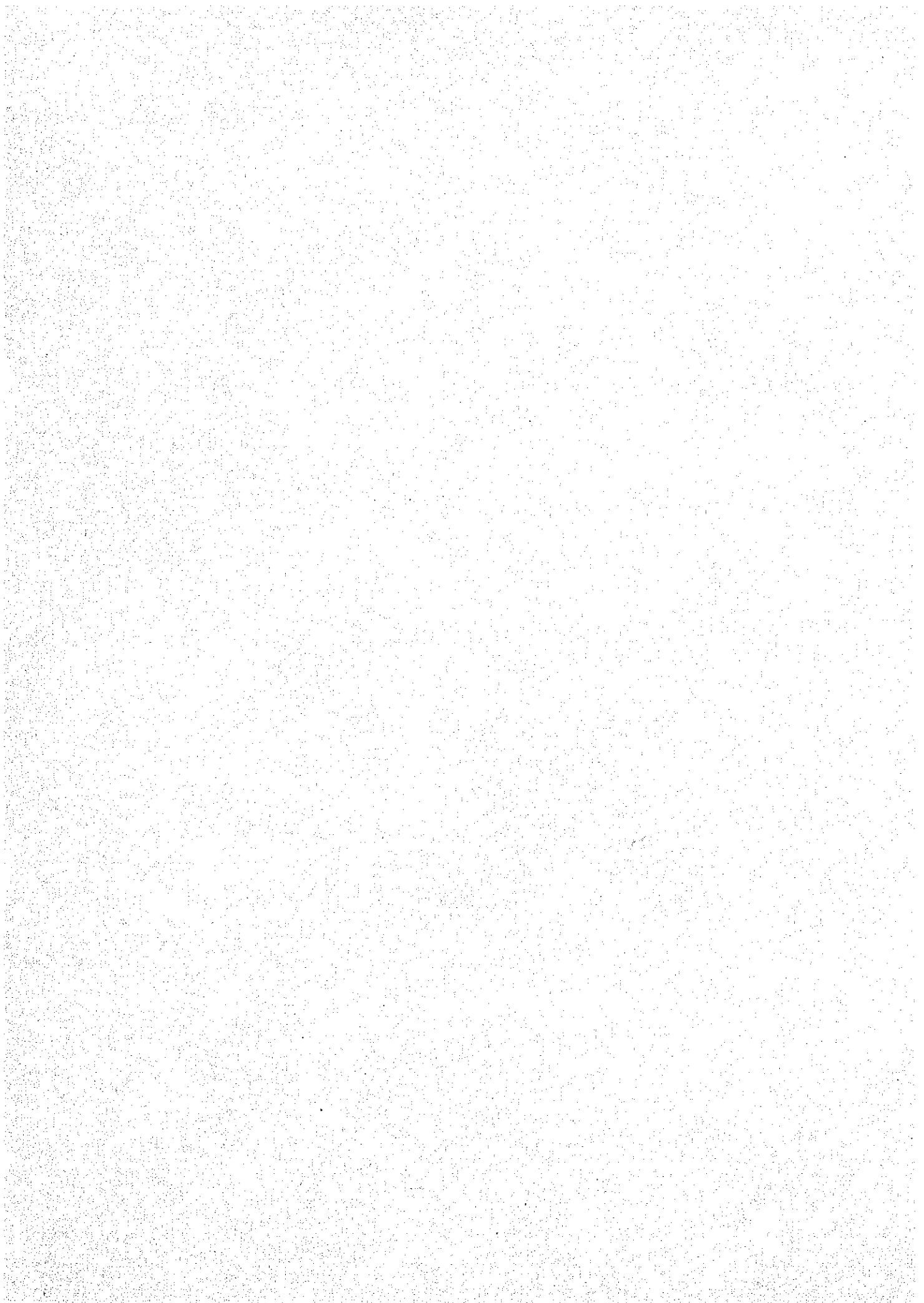
**FEASIBILITY REPORT
ON
AGOS RIVER HYDROPOWER PROJECT**

DATA BOOK III
GEOLOGICAL EXPLORATION

MARCH 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

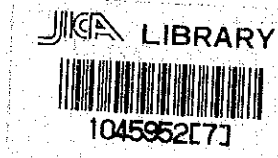
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NATIONAL POWER CORPORATION

**FEASIBILITY REPORT
ON
AGOS RIVER HYDROPOWER PROJECT**

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**DATA BOOK III
GEOLOGICAL EXPLORATION**

MARCH, 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団	
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AGOS RIVER HYDROPOWER PROJECT

FEASIBILITY REPORT

Main Report

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Appendix	C	Power Study
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DATA BOOK III GEOLOGICAL EXPLORATION

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DATA BOOK III
GEOLOGICAL EXPLORATION

This data book contains the results of the geological investigation carried out at the site from June 1979 to the end of 1980 for the feasibility study of the Agos River Hydropower Project.

Included are:

1. Records of core drilling logs
2. Records of seismic exploration
3. Records of water pressure test and diagram.

CHAPTER 1

GEOLOGICAL RECORD OF BORING (BORING LOG)

GEOLOGICAL RECORD OF BORING										HOLE No. <i>AJ-11-1 (DDH-1), 12</i>		
PROJECT		AGOS HYDRO PUMP			LOCATION			DEPTH OF HOLE		INCLINATION OF HOLE		
ELEVATION OF GROUND SURFACE		Diameter of Hole		MACHINE		DATE OF DRILLING		LOGGED BY				
CORE RECOVERY		70 %		DRILLED BY				LOGGED BY		<i>M. Y. 1950</i>		
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	METER	DESCRIPTION	ROD		LOGS ON UNIT		DEPTH
								%				
	20.18		Conglomerate	10	85		20.18-20.20 Strongly marked fragmental coarse. (C ₁)					
	21.28			10	82							
	22.28			10	79		Mostly calcareous coarse. White part of clastic rock. 22.9-23.0 Rusted fragmental coarse. 23.0-23.2					
	23.28			10	76		23.2-23.3 Strongly marked 23.3-23.4 23.4-23.5 23.5-23.6 (C ₁)					
	24.28			10	73		24.1-24.2 mostly fragmental calcareous coarse measured partly limestone coarse and most of them have sharp dipping.					
	25.28		Fragmental	10	70							
	26.28			10	67							
	27.28			10	64							
	28.28		Fragmental	10	61		Two sandstone have bedding planes at dips about 45°					
	29.28			10	58		29.0-29.1 Rather large calcareous coarse measured except mechanical break (C ₁ ~ C ₂)					
	30.28			10	55							
	31.28		Two sandstone	10	52		31.0-31.1 Many cracks happen along calcareous coarse.					
	32.28		Fragmental	10	49		32.0-32.1 Vertical cracks. 32.1-32.2 cracking planes are visible. (C ₁ ~ C ₂)					
	33.28		Two sandstone	10	46		33.0-33.1 Fragmental coarse measured bedding planes dip about 45°					
	34.28			10	43							
	35.28			10	40							
	36.28		Calcareous breccia	10	37		Mostly composed of limestone pebbles and fragmental. Pebble size is about 12-20mm. 36.0-36.1 Sharp marked - vertical cracks. (C ₁ ~ C ₂)					
	37.28			10	34							
	38.28			10	31							
	39.28			10	28							
	40.28			10	25							

GEOLOGICAL RECORD OF BORING										HOLE No. A1-79-2 (DDH-2), 11)			
PROJECT		AEDS HYDRO POWER			LOCATION		Area WHITE, C-Line, 140-825, 140/140-100						
ELEVATION OF GROUND SURFACE		66.72m			DEPTH OF HOLE		70.0m			INCLINATION OF HOLE		Vertical	
DIAMETER OF HOLE		76.7m			MACHINE		JOY RAMROD			DATE OF DRILLING		2 SEP. ~ 29 SEP. 1979	
CORE RECOVERY		77%			DRILLED BY					LOGGED BY		M. YAKO	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	AS RECORDED	DESCRIPTION	ROD	LEGEND	UNIT	DEPTH		
	1.00		Talus deposit		0	MC	Light brown silty soil with rock fragments.				1		
	2.00	64.72	Residual soil with boulders		0	DB					2		
	3.00				0	MC					3		
	4.00				0	MC					4		
	5.00				0	MC					5		
	6.00				0	MC					6		
	7.00				0	MC					7		
	8.00				0	MC					8		
	9.00	56.72			0	MC					9		
	10.00		Greywacke		0	MC					10		
	11.00				0	MC					11		
	12.00				0	MC					12		
	13.00				0	MC					13		
	14.00				0	MC					14		
	15.00				0	MC					15		
	16.00				0	MC					16		
	17.00				0	MC					17		
	18.00				0	MC					18		
	19.00				0	MC					19		
	20.00				0	MC					20		
	21.00				0	MC					21		
	22.00				0	MC					22		
	23.00				0	MC					23		
	24.00				0	MC					24		
	25.00	36.72	Compilments containing cobbles		0	MC					25		
	26.00				0	MC					26		
	27.00				0	MC					27		
	28.00				0	MC					28		
	29.00				0	MC					29		
	30.00				0	MC					30		
	31.00				0	MC					31		
	32.00				0	MC					32		
	33.00				0	MC					33		
	34.00				0	MC					34		
	35.00				0	MC					35		
	36.00				0	MC					36		
	37.00				0	MC					37		
	38.00				0	MC					38		
	39.00				0	MC					39		
	40.00				0	MC					40		
	41.00				0	MC					41		
	42.00				0	MC					42		
	43.00				0	MC					43		
	44.00				0	MC					44		
	45.00				0	MC					45		
	46.00				0	MC					46		
	47.00				0	MC					47		
	48.00				0	MC					48		
	49.00				0	MC					49		
	50.00				0	MC					50		
	51.00				0	MC					51		
	52.00				0	MC					52		
	53.00				0	MC					53		
	54.00				0	MC					54		
	55.00				0	MC					55		
	56.00				0	MC					56		
	57.00				0	MC					57		
	58.00				0	MC					58		
	59.00				0	MC					59		
	60.00				0	MC					60		
	61.00				0	MC					61		
	62.00				0	MC					62		
	63.00				0	MC					63		
	64.00				0	MC					64		
	65.00				0	MC					65		
	66.00				0	MC					66		
	67.00				0	MC					67		
	68.00				0	MC					68		
	69.00				0	MC					69		
	70.00				0	MC					70		

Course dark grey sandstone with many cracks
 11.0 ~ 11.5
 11.5 ~ 12.5
 12.5 ~ 13.5
 13.5 ~ 14.5
 14.5 ~ 15.5
 No core recovery, only some shales not taken

Below 12.00 m, fresh and hard cylindrical cores are recovered.

Coarse sandstone, cylindrical cores
 17.5 ~ 18.5
 18.5 ~ 19.5
 19.5 ~ 20.5
 20.5 ~ 21.5
 21.5 ~ 22.5
 22.5 ~ 23.5
 23.5 ~ 24.5
 Subvertical or steeply inclined with open cracks.
 Sub-vertical cracks
 Inherently fractured, fractured and friable

Muddy log cylindrical cores sound rock, very hard.
 26.5 ~ 27.5
 27.5 ~ 28.5
 28.5 ~ 29.5
 29.5 ~ 30.5
 30.5 ~ 31.5
 31.5 ~ 32.5
 32.5 ~ 33.5
 33.5 ~ 34.5
 34.5 ~ 35.5
 35.5 ~ 36.5
 36.5 ~ 37.5
 37.5 ~ 38.5
 38.5 ~ 39.5
 39.5 ~ 40.5
 40.5 ~ 41.5
 41.5 ~ 42.5
 42.5 ~ 43.5
 43.5 ~ 44.5
 44.5 ~ 45.5
 45.5 ~ 46.5
 46.5 ~ 47.5
 47.5 ~ 48.5
 48.5 ~ 49.5
 49.5 ~ 50.5
 50.5 ~ 51.5
 51.5 ~ 52.5
 52.5 ~ 53.5
 53.5 ~ 54.5
 54.5 ~ 55.5
 55.5 ~ 56.5
 56.5 ~ 57.5
 57.5 ~ 58.5
 58.5 ~ 59.5
 59.5 ~ 60.5
 60.5 ~ 61.5
 61.5 ~ 62.5
 62.5 ~ 63.5
 63.5 ~ 64.5
 64.5 ~ 65.5
 65.5 ~ 66.5
 66.5 ~ 67.5
 67.5 ~ 68.5
 68.5 ~ 69.5
 69.5 ~ 70.5
 70.5 ~ 71.5
 71.5 ~ 72.5
 72.5 ~ 73.5
 73.5 ~ 74.5
 74.5 ~ 75.5
 75.5 ~ 76.5
 76.5 ~ 77.5
 77.5 ~ 78.5
 78.5 ~ 79.5
 79.5 ~ 80.5
 80.5 ~ 81.5
 81.5 ~ 82.5
 82.5 ~ 83.5
 83.5 ~ 84.5
 84.5 ~ 85.5
 85.5 ~ 86.5
 86.5 ~ 87.5
 87.5 ~ 88.5
 88.5 ~ 89.5
 89.5 ~ 90.5
 90.5 ~ 91.5
 91.5 ~ 92.5
 92.5 ~ 93.5
 93.5 ~ 94.5
 94.5 ~ 95.5
 95.5 ~ 96.5
 96.5 ~ 97.5
 97.5 ~ 98.5
 98.5 ~ 99.5
 99.5 ~ 100.5

(C1)

(C1)

GEOLOGICAL RECORD OF BORING										HOLE No. AL-79-3 (DDN-3), 11)			
PROJECT				AGPS HYDROPOWER		LOCATION		AGPS DAMSITE C-LINE, N 79E. 300 / Y 145. 200					
ELEVATION OF GROUND SURFACE				745.882m		DEPTH OF HOLE		72.8m		INCLINATION OF HOLE		Vertical	
DIAMETER OF HOLE				267/8"		MACHINE		JYI RAMROD		DATE OF DRILLING		28 JULY ~ 31 AUG. 1979	
CORE RECOVERY				87%		DRILLED BY				LOGGED BY		M. YAKO	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		CORRECTION	DESCRIPTION	RQD	LOGGON UNIT		DEPTH	
					N	B							
	0		Top soil				MC	Including some fragments of rock. 0.0-2.0" No core recovery					
	2.0	743.88	Talus deposit				DB	Angular fragments in soil 2.0-2.5" No core recovery					
	2.5							(D)					
	2.5	743.88	Grey rock				DB	Dark brown weathered sandstone. Only fragmental cores are recovered. Low core recovery 2.5-3.5" No core recovery (D)					
	3.0							Mostly short cylindrical coarse crack phases in matrix (CA)					
	3.5							Many irregular cracks, some of which are vertical (CA)					
	4.0							Steeply inclined cracks with slightly rounded planes. (CL)					
	4.5							Upper part cores are fragmental 4.5-5.0" No core recovery (CL)					
	5.0							Dark grey sand rock. Mostly cylindrical long cores. Cracks happen along calcareous. Cracks are slightly rounded planes. (CH)					
	5.5							partly fractured and rounded planes. generally rounded (D)					
	6.0							(D)					
	6.0	743.88	Conglomerate containing small 5-10" pebbles				DB	Mostly sand rock. Long cylindrical cores containing porphyritic pebbles. (B)					
	6.5							cores appear dry, slightly calcareous (part) matrix. some mechanical break. (CH-B)					
	7.0							Mostly long cylindrical cores and few rounded crack phases (B)					
	7.5							Mostly long cylindrical cores and steeply inclined thin quartz veins. (CL)					
	8.0							2.0-2.5" No core recovery (CL)					
	8.5							Very hard cylindrical long cores (B)					
	9.0	743.88	Conglomerate containing cobbles				DB	Dark green sand rock. mostly long hard cores. (B)					
	9.5							Cobbles are mostly composed of matrix or porphyritic rock. 2.0-2.5" No core recovery. (B)					

GEOLOGICAL RECORD OF BORING												HOLE No. A1-79-3 (DHN-2), (2)	
PROJECT		AGAS HYDRO POWER				LOCATION		ELEVATION OF GROUND SURFACE		DEPTH OF HOLE		INCLINATION OF HOLE	
DIAMETER OF HOLE		CORE RECOVERY		MAGSNE		DATE OF DRILLING		CORE RECOVERY		DRILLED BY		LOGGED BY	
CORE RECOVERY		%		DRILLED BY		LOGGED BY		ROD		LOGGON UNIT			
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY	DIAMETER	DESCRIPTION	ROD	LOGGON UNIT	DEPTH	DATE	DEPTH (m)	ELEVATION (m)
	0.00		Coarse sand containing cobbles	0	DB	100	Long cylindrical hard core. Some conchoidal breaks (B)						
	1.00			0		100	100-120° fractured. Some ground cracks, few radial planes. Some cracks are vertical. (C)						
	2.00			0		100	Mostly solid long cylindrical cores. 20-30° is steeply inclined with radial planes (Ca-C)						
	3.00			0		100	Mostly cylindrical long cores. Cracks along calcite veins. Included cobbles are composed of amphibole or porphyritic rock. (Ca-B)						
	4.00			0		100	Long solid cylindrical core. 165° cracks along calcite veins. (Ca-B)						
	5.00			0		100	Mostly solid cylindrical core. Breaks by drilling rods and vein along calcite veins. Outlines of including cobbles are not clear. (B)						
	6.00			0		100	Many conchoidal breaks. at about every 10 centimeters. 100-120° Slightly open conchoidal. 100-120° Steep inclined cracks. (Ca)						
	7.00	22.01	Coarse sand containing pebbles	0		100	Generally solid hard rock (Ca)						
	8.00	21.01		0		100							
	9.00	20.01		0		100							

GEOLOGICAL RECORD OF BORING										HOLE No. A1-29-4 (D81) - (1)		
PROJECT <i>AGUS HYDRO POWER</i>					LOCATION <i>AGUS DAMITE LINA-B, XIJACURAN/Y120.790</i>							
ELEVATION OF GROUND SURFACE <i>91.205 m</i>			DEPTH OF HOLE <i>52.2 m</i>		INCLINATION OF HOLE <i>Vertical</i>							
DIAMETER OF HOLE <i>71.4 mm</i>		MACHINE <i>ACKER ACE</i>		DATE OF DRILLING <i>29 OCT. ~ 11 NOV. 1979</i>								
CORE RECOVERY <i>99%</i>			DRILLED BY			LOGGED BY						
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		DESCRIPTION	ROD LOG				DEPTH
					%	Ø		LUGENAL UNIT				
	1.000		Talus deposit		50	100	Fragmental talus with small white patches of limestone. Strongly weathered and fragment is also seen.					
	2.200				30	100						
	3.000				52	100						
	5.000	91.205			20	100						
	7.000		Crystalline (Gygonite?)		20	100	Case is characterized by many fragments of limestone patches. Cylindric cores look whitish - light grey.					
	7.200				20	100	22-27" Very sharp - vertical					
	7.400				20	100	25-29 cracks are present, 2.9-3.1 on the plane resting 15 cm.					
	7.600				20	100	Partly very small cavity is seen in limestone fragments.					
	7.800				20	100	Except cracking zone, cases are measured as in long size.					
	8.000				20	100	Mostly cracks happen along calcite veins.					
	11.200				20	100						
	12.200				20	100						
	14.200				20	100						
	16.200				20	100						
	18.200				20	100						
	18.400		Limestone - Marble		20	100	Mostly short cylindric case is measured. Small open cracks are seen partly.					
	18.600	91.204			20	100						
	18.800		Crystalline		20	100	Case has rather big size (ca. ~ 20 cm) of limestone fragment.					
	19.000				20	100	19.1-19.2" Fragile because of cracks along limestone veins.					
	20.000				20	100						
	20.200		Gygonite		20	100	Case is characterized by small patches of limestone fragments.					
	20.400				20	100	20.9-21.2" Sharp inclined -					
	20.600				20	100	20.9-21.3" vertical cracks are present.					
	20.800				20	100	21.5-21.8" Cases of this zone are fragile.					
	20.900				20	100						
	21.000				20	100	21.1-21.2" mechanical breaks are seen about 15 cm.					
	21.200				20	100	21.5-21.7" Calcite veins are abundant and appear as light grey case.					
	21.400				20	100	Generally long cylindric cases are measured. They are appeared to be solid.					
	21.600				20	100						
	21.800				20	100						
	22.000				20	100						

GEOLOGICAL RECORD OF BORING

HOLE No. A1-99-9 (2011-a), (a)

PROJECT		LOCATION															
A905 HYDROPOWER																	
ELEVATION OF GROUND SURFACE		DEPTH OF HOLE		INCLINATION OF HOLE													
62,604		100.00		Vertical													
DIAMETER OF HOLE		MACHINE		DATE OF DRILLING													
99 mm																	
CORE RECOVERY		DRILLED BY		LOGGED BY													
99 %																	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLOR/SH SECTION	CORE RECOVERY %	BIT DIAMETER	DESCRIPTION	R.Q.D. %		LUGERN UNIT				DEPTH			
								1	2	3	4	5	6		7	8	
	0.00	62,604	Graywacke														
	36.00	62,568	Calcareous lucida				Whitish cylindrical cores because of many limestone fragments. Bedding plane is seen at dips about 25°. 340-363" This part is rather fine grained. Generally cracks happen along calcite veins, on the plane bedding is seen. (C _N)										
	77.00	62,289	Fine sandstone				Dark gray fine sandstone 388-397" Many calcite veins, 407-412 generally dip 45-75°. 420-422 This part are frag. b 422-423 and 423-424 are mostly chert nodules - fragments! Bedding plane is clear and it dips about 25°. Bedding planes are seen slightly. (C _M)										
	85.00	62,201	Graywacke				Core is characterized by small black patches. 483-492 Cores appear as 483-492 light green because of presence of many calcite veins. And they are frag. b and coarse. Bedding plane is not seen. (C _N -C _N)										

GEOLOGICAL RECORD OF BORING										HOLE No. A1-79-5 (D97-C), (11)			
PROJECT		AGOS HYDRO POWER			LOCATION					NEAR DAMISE, CANTON B, XIANGBAI MOUNTAIN, YUNNAN, CHINA			
ELEVATION OF GROUND SURFACE		51.176m		DEPTH OF HOLE		24.0m		INCLINATION OF HOLE			Vertical		
DIAMETER OF HOLE		76mm		MACHINE		HILLY BILLY		DATE OF DRILLING		22 DEC. 1979 - 17 FEB. 1980			
CORE RECOVERY		43%		DRILLED BY		LOGGED BY							
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		DESCRIPTION	LOGGING UNIT				DEPTH	
					%	M		X					
			River bed deposit.										
	2.00												
	5.00												
	2.05												
	2.72												
	11.37												
	16.30												
	16.55												
	18.55												
	22.70												
	21.15												
	24.15												
	27.15												
	27.25	21.94	Granite										

Up to 29m. core recovery is very poor. Boulders and sandy soil are seemed to be present.

11-16m. Rather good core recovery.

Only sh. short synthetic core and fragmental core are recovered.

11.37-18.0m. Rather good core recovery.

Partly sandstone boulders are recovered.

Boundary between river bed deposit and bed rock is not clear because of poor core recovery.

Extremely weathered, more than fragmental core is recovered.

GEOLOGICAL RECORD OF BORING										HOLE No. <i>AI-99-1 (004-S) (a)</i>	
PROJECT <i>AGOS HYDRAPOWER</i>				LOCATION		ELEVATION OF GROUND SURFACE		DEPTH OF HOLE <i>71.0 m</i>		INCLINATION OF HOLE <i>Vertical</i>	
DIAMETER OF HOLE				MACHINE		DATE OF DRILLING		CORE RECOVERY		LOGGED BY	
CORE RECOVERY <i>63%</i>				DRILLED BY		LOGGED BY		CORE RECOVERY		LUGGON UNIT	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	# OF CORES	DIAMETER (mm)	DESCRIPTION	RQD %	LUGGON UNIT	DEPTH (m)
	31.00		<i>Granite</i>					(D)			
	32.00										
	33.00										
	34.00										
	35.00										
	36.00										
	37.00										
	38.00										
	39.00										
	40.00										
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	42.00										
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	66.00										
	67.00										
	68.00										
	69.00										
	70.00										
	71.00										

*360-365m Only fragmented
370-380 cases are unusual
cracking planes are mostly
vertical.*

*Dark grey granite. Partly
can show to be associated
with pebbles.*

*44.1-44.2m Cases are fragile
45.0-45.2 associated with
45.4-45.6 lots of calcite veins
Calcite veins are generally
slat inclined.*

*47.7-48.2m Long cylindrical
cases #41117.*

*Short cylindrical cases are missing
because of mechanical break (C1)*

*55.0-55.3m Short cylindrical
56.0-56.5 cases are fragmented
57.1-57.5 cases are unusual
Cracks are happened along
calcite veins.*

*58.0-58.5m Vertical - slip
58.7-59.5 inclined cracks.
59.7-60.3 mostly along calcite
61.0-61.8 veins and crack-
planes are highly visible.*

GEOLOGICAL RECORD OF BORING										HOLE No. A1-79-5 (DBH-5) (11)			
PROJECT				LOCATION				ELEVATION OF GROUND SURFACE		DEPTH OF HOLE		INCLINATION OF HOLE	
A905 HYDROPOWER								71.0 m		Vertical			
ELEVATION OF GROUND SURFACE				MACHINE				DATE OF DRILLING					
				DRILLED BY				LOGGED BY					
DIAMETER OF HOLE				CORE RECOVERY				CORE RECOVERY					
				63 x									
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		DESCRIPTION	ROD		LOGGING UNIT		DEPTH	
					%	REMARKS		%	REMARKS	%	REMARKS		
	61.60	-3.24	Greywacke		20		(Cn)					61	
	62.60		Reddish fine sandstone		20		Because of mechanical breaks, most short cylindrical cores are missing. Black shale deep bedding plane. It dips about 30°.					62	
	65.00	-12.14	Greywacke		20		(Cn - Cn)					65	
	66.00				20		Dark - light grey greywacke. mostly 30-cm cylindrical cores are recovered. Mechanical breaks are frequent mostly along calcite veins and often.					66	
	67.00				20							67	
	70.00	-14.34			20		(Cn - Cn)					70	

GEOLOGICAL RECORD OF BORING										HOLE No. A1-99-6 (DD4-6) (11)	
PROJECT		A193 HYDROPOWER			LOCATION		A193 SITE, A-Line, X 649 and Y 213.182				
ELEVATION OF GROUND SURFACE			11,991 m		DEPTH OF HOLE		100 m		INCLINATION OF HOLE		Vertical
DIAMETER OF HOLE		76 mm		MACHINE		JOY RAMROD		DATE OF DRILLING		27 Aug ~ 28 Sep, 1979	
CORE RECOVERY			53%		DRILLED BY			LOGGED BY			M. YAKO
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		CORRECTION	DESCRIPTION	LOGGERS UNIT		DEPTH
					N	B			RQD		
	1.00		Residual soil		NC			Soil with small fragments of rock, brownish, clayey. (D)			
	2.00							1.0-2.0 No core recovery. (D)			
	3.00							light brown soil material			
	4.00							4.0-4.8 No core recovery			
	5.00	11,991									
	6.00		Residual soil with boulders					Light brown soil with small fragments of rock. (D)			
	7.00							6.0-7.0 No core recovery (D)			
	8.00										
	9.00										
	10.00										
	11.00										
	12.00										
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	67.00										
	68.00										
	69.00										
	70.00										

GEOLOGICAL RECORD OF BORING										HOLE No. <u>A1-72-(CODN-6), (2)</u>						
PROJECT <u>AGOS HYDRO POWER</u>			LOCATION							ELEVATION OF GROUND SURFACE		DEPTH OF HOLE <u>54.0 m</u>	INCLINATION OF HOLE <u>Vertical</u>			
DIAMETER OF HOLE			MACHINE			DATE OF DRILLING				CORE RECOVERY <u>33%</u>			DRILLED BY		LOGGED BY <u>M. YAKO</u>	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	EST. DIAMETER	DESCRIPTION	RQD	LOGS ON	UNITS	DEPTH					
	26.50		Compacted with carbon py. pebbles		100	DR 1X	Fragmented rock with radial planes Cylindrical cores with hair cracks. 26.7-28.7" Many part veins 28.7-30.7" Ab. core recovery (C ₁)									
	27.50				100		Mostly cylindrical cores 12.7" Sharp inclined crustal fault planes (C ₁ -C ₂)									
	31.00				100		Cylindrical cores, generally hard 28.7-32.7" Sharp inclined cracks with radial planes (C ₁)									
	34.00				100		Upper part is rather fragile 24.7-26.7" Vertical open cracks 26.7-28.7" Vertical open cracks (C ₁ -D)									
	37.00		Crystalline with some pebbles		100		Cylindrical core, 12.7" radial crack plane (C ₁ -B) Sharp inclined cracks along part veins 28.7-30.7" Several radial cracks (C ₁)									
	38.50				100		Hard long cores are measured. 22.7" Sharp radial cracks along part veins									
	39.50				100		Mostly long cores 12.7" Thin, fine sandstone bed, inclined at 45 degree. 22.7" Slightly inclined cracks along part veins (B)									
	41.00				100		Long cylindrical cores with fine quartz veins, very hard (B)									
	42.00				100		42.0" Cracks along quartz veins 22.7" are mainly radial (C ₁ -B)									
	43.00				100		Mostly long hard cores. 42.0" Sub-vertical inclined radial cracks, along quartz veins 40.0" Horizontal part vein 40.0-42.0" Radial crack planes (C ₁)									
	44.00		Crystalline with subangular cobbles		100		Long cylindrical cores, but frag. very hard. 42.0, 42.5" Radial crack plane (C ₁)									
	45.00				100		Very long core, very hard hard core 42.5, 42.5" Radial cracks along quartz veins 42.5-45.0" Ab. core recovery (C ₁)									
	46.00				100											
	47.00				100											
	48.00				100											
	49.00				100											
	50.00				100											
	51.00				100											
	52.00				100											
	53.00				100											
	54.00				100											

GEOLOGICAL RECORD OF BORING										HOLE No. AL-22-2 (004-7) (1)		
PROJECT			AGOS HYDROPOWER			LOCATION		Mts DAMITE L. No - A, X 12310 (alt) / Y 011, 716				
ELEVATION OF GROUND SURFACE			138.5 METERS		DEPTH OF HOLE		50.0		INCLINATION OF HOLE		Vertical	
DIAMETER OF HOLE			76 mm		MACHINE		ACKER ACE		DATE OF DRILLING		21 OCT ~ 4 DEC. 1979	
CORE RECOVERY			80%		DRILLED BY		LOGGED BY					
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		DESCRIPTION	RQD		LUGAN UNIT		DEPTH
					%	BT DIAMETER		%				
	0.00	138.5					Yellow brown surface soil associated with weathered rock fragment					0
	2.20	136.3					Only shales recovered except 10cm long cylindrical core at 6.2m. Shales is not much clayey and is dark yellowish brown.					2.2
	3.00											3.0
	4.00											4.0
	5.00											5.0
	6.00											6.0
	7.00											7.0
	8.00											8.0
	9.00											9.0
	10.00											10.0
	11.00											11.0
	11.60	125.785										11.6
	11.80		Graywacke				Core is characterized by small white patches. These patches are composed of limestone fragments. 5.6-5.9m only fragmental cores are recovered. 27-28" Vertical crack, no plan is noted. 62-28" mechanical break happens on every 10cm. Fresh part is very hard.					11.8
	12.00											12.0
	12.20											12.2
	12.25											12.25
	12.60		Calcareous breccia				Core is characterized by lots of white patches of limestone fragments. These fragments have the size of 1.5-2cm. 12.0-12.5 Vertical cracks, no plan is noted.					12.6
	13.00											13.0
	13.20											13.2
	13.40											13.4
	13.60											13.6
	13.80											13.8
	14.00											14.0
	14.20											14.2
	14.40											14.4
	14.60											14.6
	14.80											14.8
	15.00											15.0
	15.20											15.2
	15.40											15.4
	15.60											15.6
	15.80											15.8
	16.00											16.0
	16.20											16.2
	16.40											16.4
	16.60											16.6
	16.80											16.8
	17.00											17.0
	17.20											17.2
	17.40											17.4
	17.60											17.6
	17.80											17.8
	18.00											18.0
	18.20											18.2
	18.40											18.4
	18.60											18.6
	18.80											18.8
	19.00											19.0
	19.20											19.2
	19.40											19.4
	19.60											19.6
	19.80											19.8
	20.00											20.0
	20.20											20.2
	20.40											20.4
	20.60											20.6
	20.80											20.8
	21.00											21.0
	21.20											21.2
	21.40											21.4
	21.60											21.6
	21.80											21.8
	22.00											22.0
	22.20											22.2
	22.40											22.4
	22.60											22.6
	22.80											22.8
	23.00											23.0
	23.20											23.2
	23.40											23.4
	23.60											23.6
	23.80											23.8
	24.00											24.0
	24.20											24.2
	24.40											24.4
	24.60											24.6
	24.80											24.8
	25.00											25.0
	25.20											25.2
	25.40											25.4
	25.60											25.6
	25.80											25.8
	26.00											26.0
	26.20											26.2
	26.40											26.4
	26.60											26.6
	26.80											26.8
	27.00											27.0
	27.20											27.2
	27.40											27.4
	27.60											27.6
	27.80											27.8
	28.00											28.0
	28.20											28.2
	28.40											28.4
	28.60											28.6
	28.80											28.8
	29.00											29.0
	29.20											29.2
	29.40											29.4
	29.60											29.6
	29.80											29.8
	30.00											30.0

GEOLOGICAL RECORD OF BORING										HOLE No. <i>A1-79-1(00N-7), (1)</i>					
PROJECT <i>ASOS HYDRO POWER</i>			LOCATION			DEPTH OF HOLE <i>52.8 m</i>		INCLINATION OF HOLE <i>Vertical</i>							
ELEVATION OF GROUND SURFACE			MACHINE			DATE OF DRILLING		LOGGED BY							
DIAMETER OF HOLE			CORE RECOVERY <i>80%</i>			DRILLED BY									
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		BT DIAMETER	DESCRIPTION	RQD		LUGEON UNIT				DEPTH
					%	#			%		10	20	30	40	
	26.82		Greywacke					311-323 ^m Thin layer of black shale. This layer dips 40°							
	27.00		Greywacke					(Cm-Cn) Fine sandstone associated with black shale. This layer dips 25° (Cm-Cn) Same as 25.45-25.9 m							
	27.25		Greywacke					252-253 ^m Fragmental Crack happens along calcite vein							
	27.45		Greywacke					(Cm-Cn) Very thin calcite vein present							
	27.85		Greywacke					(Cm) Same as 25.45-25.9 m							
	28.25		Greywacke					(Cm) Associated with angular fragments of shale. Making dips 25° (Cm)							
	28.50		Greywacke					This zone is characterized by small black angular patches of black shale.							
	28.75		Greywacke					322-323 ^m Fine sandstone, partly associated with thin layer of black shale.							
	29.00		Greywacke					425-426 427-428 429-430 Vertical - very steep cracks along calcite vein							
	29.25		Greywacke					(Cm) Lots of angular black patch of shale. The largest patch is 25-28 cm d.							
	29.45		Greywacke					(Cm-Cn) Except of very calcite vein almost same as 25.45-25.9 m. Calcite veins dipping steep.							
	29.65		Greywacke					431-432 vertical crack (Cm-Cn)							

GEOLOGICAL RECORD OF BORING										HOLE No. A1-77-2 (ODH-2), 113	
PROJECT <i>AGAS HYDROPOWER</i>				LOCATION <i>AGAS BASINITE Line-A, X 1024/1025/Y 200, 101</i>							
ELEVATION OF GROUND SURFACE <i>40.893 m</i>			DEPTH OF HOLE <i>70.0 m</i>			INCLINATION OF HOLE <i>Vertical</i>					
DIAMETER OF HOLE <i>76.5 m</i>		MACHINE <i>JAY RAMROD</i>		DATE OF DRILLING <i>17 OCT ~ 1 NOV 1979</i>				LOGGED BY			
CORE RECOVERY <i>78%</i>		DRILLED BY				LOGGED BY					
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	ROD LOG	DESCRIPTION	LUSEAN UNIT	DEPTH (m)		
	1.00		Residual soil				Light brown clayey soil with small rounded pebbles				
	2.00										
	3.10	47.893									
	4.00		Talus deposit				<p>Core recovery is not good most of the cores are gypsiferous associated with few amount of white calcite patches.</p> <p>Cores are divided by vertical planes.</p>				
	4.50		River bed deposit								
	6.00										
	7.65										
	9.45										
	11.00										
	12.65										
	14.15										
	15.65										
	17.15										
	18.65	32.463					(D)				
	19.65		Gypsiferous				<p>The boundary between river bed deposit and bed rock is not clear because of poor core recovery.</p> <p>From weathering condition the bed rock seems to be from about 18.0 m.</p>				
	21.15						<p>18.5-20.0 m</p> <p>Only short cylindrical core is recovered</p> <p>Many cracks are visible and most of them are radial.</p>				
	22.65										
	24.15										
	25.65										
	27.15										
	28.65										
	30.15										
	31.65										
	33.15										
	34.65										
	36.15										
	37.65										
	39.15										
	40.65										
	42.15										
	43.65										
	45.15										
	46.65										
	48.15										
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	52.65										
	54.15										
	55.65										
	57.15										
	58.65										
	60.15										
	61.65										
	63.15										
	64.65										
	66.15										
	67.65										
	69.15										
	70.00										

GEOLOGICAL RECORD OF BORING										HOLE No. A1-79-2 (ODH-2), (1)	
PROJECT <u>AGS HYDROPOWER</u>			LOCATION								
ELEVATION OF GROUND SURFACE			DEPTH OF HOLE			74.0°		INCLINATION OF HOLE <u>Vertical</u>			
DIAMETER OF HOLE			MACHINE		DATE OF DRILLING						
CORE RECOVERY			75%		DRILLED BY			LOGGED BY			
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	BIT DIAMETER	DESCRIPTION	ROD	LUGEON	UNIT	DEPTH
	31.30		Greywacke								
	33.00	7.873	Fine sandstone				2.16, bedding plane dips 25°				
	34.30		Greywacke Coarse sandstone				Generally sand good cores are recovered Partly steep inclined calcite veins are visible, these cause cores to be frag. b.				
	37.35						36.4-38.1, 38.7-38.8 m Fragile fragmental cores are recovered. Cylindric cores show restricted cracking planes				
	41.35	9.973	Sandstone (not so fine grained)				(C ₁₁ ~ C ₁₂)				
	44.35	7.193	Greywacke				Generally dark green grey core is recovered, it has partly calcite veins. 42.2-42.9 m still shows the bedding plane dips about 25°			Step at 42.2 m remains of inclined bedding	
	45.85	5.873	Fine sandstone				Dark grey greywacke, core shows a few amount of white patches of limestone fragments (C ₁₁)				
	47.35						45.2-45.8, 45.8-49.0 m Siltstone - shaly is visible This layer has bedding plane and it dips about 25°				
	49.35						49.2-52.6, 52.9-52.9 m Steep inclined cracks along calcite veins, the cracking planes are restricted				
	52.45	1.173	Greywacke				(C ₁₁ ~ C ₁₂) This part is characterized by a lot of white patches of limestone patches.				
	54.45						52.25-52.85 m Ground water was first flowing				
	55.45						50.4-52.6, 52.6-52.7 m S-S-10 52.2-52.8 m Mostly fragmental cores are recovered, and they are frag. b. A lot of calcite veins are seen.				
	57.45						55.8-62.0 m Partly core has angular pebbles, they are mostly andesites. Fragments (cores) in limestone fragments. 55.16-54.4 m No return water.				

GEOLOGICAL RECORD OF BORING										HOLE No. A1-77-9 (D04-9), (1)						
PROJECT			AGAS HYDROELECTRIC			LOCATION				AGAS DAMSITE, A-LINE, X 528.42 / Y 004.221						
ELEVATION OF GROUND SURFACE			446.97 M			DEPTH OF HOLE		39.0 M		INCLINATION OF HOLE		Vertical				
DIAMETER OF HOLE			260 mm			MACHINE		MILLY BILLY		DATE OF DRILLING		25 JULY - 21 SEP 1977				
CORE RECOVERY			82%			DRILLED BY				LOGGED BY		M YAKO				
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	CORRECTION	DESCRIPTION	ROD				LOGGON UNIT				DEPTH
								1	2	3	4	1	2	3	4	
	1.00		Top soil				Reddish brown clayey soil.									
	2.00	144.97														
	3.00		Residual soil				Light brown clay									
	4.00						60-65 cm cobb									
	5.00						67-70 cm core recovery									
	6.00						21-22 cm									
	7.00															
	8.00	132.97														
	9.00		Residual soil with boulders				Light brown soil with some fragments of bed									
	10.00						8.01-8.05 No core recovery									
	11.00						8.06-8.10 No core recovery									
	12.00						8.11-8.15 No core recovery									
	13.00						8.16-8.20 No core recovery									
	14.00	122.97					8.21-8.25 No core recovery									
	15.00		Conglomerate including small size pebbles				8.26-8.30 No core recovery									
	16.00						8.31-8.35 No core recovery									
	17.00						8.36-8.40 No core recovery									
	18.00						8.41-8.45 No core recovery									
	19.00						8.46-8.50 No core recovery									
	20.00	122.97					8.51-8.55 No core recovery									
	21.00						8.56-8.60 No core recovery									
	22.00		Conglomerate including cobbles				8.61-8.65 No core recovery									
	23.00						8.66-8.70 No core recovery									
	24.00						8.71-8.75 No core recovery									
	25.00						8.76-8.80 No core recovery									
	26.00						8.81-8.85 No core recovery									
	27.00	112.97					8.86-8.90 No core recovery									
	28.00		Gryssacke				8.91-8.95 No core recovery									
	29.00						8.96-9.00 No core recovery									
	30.00						8.91-9.00 No core recovery									
	31.00						8.91-9.00 No core recovery									
	32.00	112.97					8.91-9.00 No core recovery									
	33.00		Conglomerate Gryssacke				8.91-9.00 No core recovery									

GEOLOGICAL RECORD OF BORING										HOLE No. AP-99-9 (AMN-9) (12)	
PROJECT AGAS HYDROELECTRIC				LOCATION		ELEVATION OF GROUND SURFACE		DEPTH OF HOLE		INCLINATION OF HOLE Vertical	
DIAMETER OF HOLE				MACHINE		DATE OF DRILLING		CORE RECOVERY		LOGGED BY M. YAKO	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	DIAMETER (mm)	DESCRIPTION	RQD	LUGEON UNIT		
	21	115.47	Gygnonite Conglomerate		72	DB	Mostly cylindrical long cores 31.2-31.5 Cracks planes along gangway veins.				
	22		Gygnonite		111		31.5-31.8 Rubid steep inclined cracks (CH - B)				
	23	114.67			102		Dart gray long cylindrical cores very hard. 31.5-31.8 Rubid cracks (CH)				
	24				117		solid rounded cores 31.8-32.3 cracks along gangway veins. (B)				
	25		Conglomerate containing cobbles, partly boulders.		119		From base possible patterns on cores are clear, these patterns seems to be caused by deformation of core barrel. 32.3-32.5 Rubid cracks plane 32.5-32.8 Steep inclined open crack along gangway veins. CH				
	26				118		long cylindrical cores Sound rock, very hard (CH - B)				
	27				101		Partly cobbles - boulders are contained steeply inclined with crack plane.				
	28	112.67	Conglomerate containing pebbles, partly cobbles		114		Mostly long cylindrical cores very hard, generally do not have contained cobbles are not clear. 32.8-33.1 Frag. b 33.1-33.4 open cracks along gangway veins (about vertical)				
	29				117		33.4 Steeply inclined cracks along gangway veins. 33.7 slightly opened crack (CH - B)				
	30				100		33.8-34.1 Steeply inclined crack along gangway veins 34.2-34.3 slightly opened cracks (B)				
	31	96.67			70						

GEOLOGICAL RECORD OF BORING										HOLE No. <u>A1-99-10 (004-11), 11</u>	
PROJECT <u>AGS HYDROPOWER</u>			LOCATION <u>AGS DAMSITE, R-L.M., X 185.549, Y 222.273</u>								
ELEVATION OF GROUND SURFACE <u>126.95m</u>		DEPTH OF HOLE <u>78.1m</u>		INCLINATION OF HOLE <u>60° SSE</u>							
DIAMETER OF HOLE <u>26 1/2</u>		MACHINE <u>JTY 241110</u>		DATE OF DRILLING <u>17 OCT - 2 NOV 1979</u>							
CORE RECOVERY <u>61%</u>		DRILLED BY		LOGGED BY							
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY	DIAMETER	DESCRIPTION	RQD	LUGEN	UNIT	DEPTH
	1		Overburden ~ weathered bed rock.		0	1x	No core recovery except few short cylindrical cores and rock fragments. Recovered short cylindrical core are graywacke				
	1.55				0						
	2				0						
	2.55				0						
	3				0						
	4				0						
	4.5				0						
	4.70				0						
	5.25				0						
	6				0						
	7				0						
	8				0						
	9				0						
	10				0						
	11				0						
	12				0						
	13				0						
	14				0						
	15				0						
	16				0						
	17				0						
	18				0						
	19				0						
	20				0						
	21				0						
	22				0						
	23				0						
	24				0						
	25				0						
	26				0						
	27				0						
	28				0						
	29				0						
	30				0						
	31				0						
	32				0						
	33				0						
	34				0						
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GEOLOGICAL RECORD OF BORING										HOLE No. A1-77-10 (ODH-10), 121	
PROJECT AGOS HYDROPOWER				LOCATION				DEPTH OF HOLE 76.0m		INCLINATION OF HOLE 10° SSE	
ELEVATION OF GROUND SURFACE				MACHINE		DATE OF DRILLING		CORE RECOVERY 61%		DRILLED BY	
DIAMETER OF HOLE				LOGGED BY		ROD		LOGGING UNIT		DEPTH	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	ROD DIAMETER (mm)	DESCRIPTION	ROD %	LOGGING UNIT	DEPTH (m)	
	31.22		Granite				Few calc. veins are found, most of them cause cracking.			11	
	31.20						200-220m Long cores are required.			12	
	32.22									13	
	33.22									14	
	34.22									15	
	35.70									16	
	36.66									17	
	38.00									18	
	38.70									19	
	40.30									20	
	41.30									21	
	42.31						(Cm - Ch)			22	
	42.86		Fine sandstone				Disruptive sandstone. Except mechanical breaks cores are good condition. (Cm)			23	
	46.45		Granite				Mostly long cores are recovered. 42.0-46.5m Only fragmental cores are recovered and they are fragile.			24	
	47.41						(Cm - Ch)			25	
	48.08		Fine sandstone				Bedding plane dips 25° about 45°			26	
	50.00		Granite				Partly calc. veins are present and cracks happen along these calc. veins. Mostly cracking planes have no rusting.			27	
	50.2						50.2-50.8m fragmental cores 51.0-51.3 not recovered. But 51.2-51.3 thin cores are. Some to be recovered by mechanical breaks.			28	
	52.75						52.75m No return water			29	
	57.30		Fine sandstone				(Cm - Ch)			30	
	76.56						Very hard and homogeneous. Bedding plane dips 35° (Ch)			31	

GEOLOGICAL RECORD OF BORING										HOLE No. A1-29-11 (DDH-N), (13)		
PROJECT <i>AGOS HYDRO POWER</i>			LOCATION									
ELEVATION OF GROUND SURFACE			DEPTH OF HOLE <i>28.8 m</i>		INCLINATION OF HOLE <i>80° S5 E</i>							
DIAMETER OF HOLE			MACHINE		DATE OF DRILLING							
CORE RECOVERY <i>61%</i>			DRILLED BY		LOGGED BY <i>M. YAKU</i>							
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		EST. DIAMETER	DESCRIPTION	RQD		LUGEN UNIT	DEPTH
					%	ft			X			
			<i>grygnite</i>									
	<i>16.32</i>							<i>Rather fine grained grygnite</i>				
								<i>112-125m fragmental cores are</i>				
								<i>only recovered. Cracking</i>				
								<i>planes are visible.</i>				
	<i>16.520</i>											
		<i>71.245</i>	<i>fine sandstone</i>					<i>(C1)</i>				
								<i>many thin calcite veins are present</i>				
		<i>70.745</i>	<i>grygnite</i>					<i>bedding - clear dipping SW (C1)</i>				
	<i>16.805</i>							<i>Rather fine grained grygnite</i>				
								<i>associated with many calcite</i>				
								<i>veins.</i>				
								<i>Generally long cylindrical cores</i>				
								<i>are recovered.</i>				
	<i>17.29</i>							<i>112-115m Short cylindrical cores</i>				
								<i>115-120 and fragmental cores</i>				
								<i>121-123 are recovered. This is</i>				
								<i>caused by steep vertical cracking</i>				
	<i>28.7600</i>	<i>66.145</i>						<i>(C1-C2)</i>				

GEOLOGICAL RECORD OF BORING										HOLE No. A1-99-11 (D04-11), 111					
PROJECT		A925 HYDRO POWER			LOCATION		ASD'S DAMITE, Line B, X 286, RPE / Y IN. 60E								
ELEVATION OF GROUND SURFACE				192.123		DEPTH OF HOLE		542M			INCLINATION OF HOLE			Vertical	
DIAMETER OF HOLE		7 7/8"		MACHINE		HILLY BILLY		DATE OF DRILLING			27 NOV ~ 18 DEC 1979				
CORE RECOVERY		85%		DRILLED BY			LOGGED BY								
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		DESCRIPTION	LOGS					DEPTH		
					X	B		RQD	X	U	L	T			
	1.20		Talus deposit												
	2.00														
	3.00														
	4.00														
	5.00	178.423	Fine sandstone												
	5.32	176.623	Gneiss												
	6.60														
	7.70	176.223	Fine sandstone												
	8.70		Gneiss												
	10.00														
	10.60														
	11.60														
	12.00														
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GEOLOGICAL RECORD OF BORING										HOLE No. A1-79-11(DDH-11), (2)		
PROJECT			LOCATION			DEPTH OF HOLE		INCLINATION OF HOLE				
1905 HYDRO POWER			58.8 m			Vertical						
ELEVATION OF GROUND SURFACE		DIAMETER OF HOLE		MACHINE		DATE OF DRILLING		LOGGED BY				
CORE RECOVERY		DRILLED BY		LOGGED BY								
85%												
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		DESCRIPTION	ROD LOG			DEPTH	
					%	Ø		%	Ø	Ø		
	32.12		Graywacke									
	32.49						32.7-32.12m Many calcite veins, many cracks and open cracks happen in this zone. The calcite part generally long cylindrical hard case is observed.					
							(Cm - Cn)					
	32.73						32.8-32.5m Sharply inclined calcite veins zone. Cracks break easily along calcite veins. Along the cracking plane shiftable like smooth plane appear.					
							32.7-32.9m vertical crack along calcite vein. On the crack plane calcite is recrystallized.					
							(Cm)					
	32.73	146.123	Graywacke				This graywacke is characterized by red fragmental patches.					
							44.8-44.1m Sharp inclined ~ vertical cracks along calcite vein.					
							Mainly long cylindrical case are observed.					
							(Cn)					

GEOLOGICAL RECORD OF BORING										HOLE No. A1-79-12 (DDA-12), 11)			
PROJECT				AGAS HYDROPOWER		LOCATION				AGAS DAMSITE, LINE-B, X803,400/Y 270,662			
ELEVATION OF GROUND SURFACE				783.70m		DEPTH OF HOLE		72.0m		INCLINATION OF HOLE		Vertical	
DIAMETER OF HOLE				78mm		MACHINE		JOY RANDO		DATE OF DRILLING		16 NOV - 9 DEC. 1979	
CORE RECOVERY				73%		DRILLED BY				LOGGED BY		M. YAKO	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		# OF CORES	CORRECTION	DESCRIPTION	ROD		LUGS	DEPTH
					%	RECOVERED				%	TYPE		
	0		River bed deposits						Boulders with silty soil material. Boulders are mostly composed of conglomerate.				
	3.45												
	6.45												
	9.45												
	12.45								4.5-1.0m Carbonated sand				
	15.45												
	18.45												
	21.45												
	24.45												
	27.45												
	30.45												
	33.45												
	36.45												
	39.45												
	42.45												
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	297.00												
	300.00												

GEOLOGICAL RECORD OF BORING										HOLE No. <i>AI-79-22(DDH-11), (12)</i>	
PROJECT		<i>ASGS HYDROPOWER</i>			LOCATION		DEPTH OF HOLE		INCLINATION OF HOLE		
ELEVATION OF GROUND SURFACE					70.8 m		Vertical				
DIAMETER OF HOLE		MACHINE		DATE OF DRILLING		CORE RECOVERY		DRILLED BY		LOGGED BY	
						73%				<i>H YARD</i>	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	BIT DIAMETER	DESCRIPTION	RQD %	LUGEON	UNIT	DEPTH
	31.2100		<i>Gneiss</i>				215-218" steep inclined - vertical 214-217 cracks. Occurs of strong weathering case is frag. and half of it is brown fragment case.				
	33.65						217-218 Only fragment case is recovered. Partly calcareous is appeared.				
	34.100	32.37					(C _L - C _M)				
	37.20		<i>Conglomerate</i>				Cases are measured in every 10cm length and are composed of andesite pebbles.				
		32.17					(C _L - C _M)				
	39.45		<i>Gneiss</i>				215-225" Vertical crack. No cracking plane is visible.				
							227-231" fragmental cases are measured. (C _L)				
	42.15						230-230" Calc. veins and calc. veins are appeared in every 10-20cm interval.				
	43.15						230-250" Rather long case recovery. Partly mechanical breaks are happened.				
	46.15						most of cracks are happened along calc. veins but on the plane existing is seen.				
							(C _M - C _N)				
	49.30										
	49.35										
	51.25						partly cracks are happened along calc. veins. Partly mechanical breaks are also happened.				
	52.25						No big change of grain size or colour is observed.				
	56.20										
	56.81										
	57.35										
	59.25										
							(C _N)				

GEOLOGICAL RECORD OF BORING										HOLE No. A1-79-12 (DDH-12), 13)							
PROJECT		AGOS HYDRO POWER			LOCATION			DEPTH OF HOLE			70.0 m		INCLINATION OF HOLE		Vertical		
ELEVATION OF GROUND SURFACE		DIAMETER OF HOLE		MACHINE		DATE OF DRILLING		CORE RECOVERY		73 %		DRILLED BY		LOGGED BY		M YAKO	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		DESCRIPTION	RQD		LUZON UNIT		DEPTH					
					%	FT		%									
	16.10		Greywacke														
	17.70																
	18.85																
	18.85	-21.973	Transverse	18.85			Reels fine grained grey sandstone. Bedding plane is not clear. Partly cores are fragmented										
	17.70						(Cm)										
	17.70	-24.683	Greywacke				62.4-67.8 Several cores are totally fragmented. Cracks are happened along calc. veins										
	17.70						(Cm)										
	20.10	-25.623															

GEOLOGICAL RECORD OF BORING										HOLE No. A1-77-13 (DDH-13), 11		
PROJECT 4645 HYDROELECTRIC				LOCATION AGAS DAMUTE, B-LINE, X 221-266 / Y 200-919								
ELEVATION OF GROUND SURFACE 77.123 m			DEPTH OF HOLE 50.0 m		INCLINATION OF HOLE Vertical							
DIAMETER OF HOLE 76 mm		MACHINE JOY RAMROD		DATE OF DRILLING 14 JULY ~ 19 AUG. 1979								
CORE RECOVERY 73 1/2 %		DRILLED BY				LOGGED BY M YAKO						
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	CORRECTION	DESCRIPTION	RQD		LUGEN UNIT		DEPTH
								1	2	1	2	
	1		Residual soil				Light brown soil 211-220" No core recovery					1
	2											2
	3	78.303	Gray rocks				Dark gray sandstone, very hard (B)					3
	4						Partly fractured intensely. Cracks and radial planes, inclining more than 90 degrees.					4
	5											5
	6											6
	7						58-570" No core recovery					7
	8	78.00					White patches of calcite veins. Slightly inclined cracks and radial planes 761-801" No core recovered (C1)					8
	9	77.22					Sandstone, partly cracks and radial planes. Small calcite veins 721-740" No core recovery (C1)					9
	10											10
	11	76.123	Compaction containing small 5-10' subangular pebbles				Heavily inclined cracks along calcite veins Mostly cylindrical long cores (C1-B)					11
	12											12
	13	75.22					Sandstone with rather big subangular pebbles 14.75-150" core recovery (B)					13
	14	74.44					Calcite nodules appear very clear. Slightly inclined radial cracks occur every 70 cm. 15.25-180" No core recovery (B)					14
	15											15
	16											16
	17	73.52					partly fractured and radial white patches of calcite veins (C1)					17
	18											18
	19	72.64					Radial crack planes in every 20 cm calcite veins has about 1 cm thickness (C1)					19
	20											20
	21						partly fractured in deep Radial cracks appear in every 20 cm. 21.25-220" No core recovery (C1-C1)					21
	22	71.72					Cracks are slightly radial 22.25-22.25" core recovery (C1-C1)					22
	23											23
	24	70.84					partly fractured. Frequent calcite veins. Open cracks with radial planes which have about vertical inclination 23.25-240" No core recovery (C1)					24
	25											25
	26	70.00					Cracks are somewhat horizontal with some calcite veins. 24.25-250" Only shales recovered (C1)					26
	27											27
	28	69.12					Fractured zone and radial cracks which are strongly inclined. 25.25-260" No core recovered (C1)					28
	29											29
	30	68.24	fine matrix partly containing pebbles				About 20 percent of shales with cracks are associated with calcite veins, very hard (C1-B)					30

GEOLOGICAL RECORD OF BORING										HOLE No. A1-79-22 (DDM-13), (a)			
PROJECT				AGPS HYDROELECTRIC		LOCATION		ELEVATION OF GROUND SURFACE		DEPTH OF HOLE		INCLINATION OF HOLE	
DIAMETER OF HOLE				MACHINE		DATE OF DRILLING		CORE RECOVERY		72%		DRILLED BY	
LOGGED BY				M YAKA									
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY	DESCRIPTION	R O D	LOGS UNIT		DEPTH			
	31.85	49.133	Fine Sandstone		DB NX	Lower half is intensely fractured only shales is recovered from lower part 16.6-20.7 vertical core (C1-C4)							
	31.85	49.133				Fine, alk. amount granitic colored calcite veins. (C10)							
	31.85	49.133	Crystalline containing calcite and nodules			Most of cracks occur along calcite veins, which are inclined about 45 to 50 degree (C10)							
	31.85	49.133				Upper and lower parts are fractured. From lowest part only shales is recovered (C10-C11)							
	31.85	49.133				Rather long cylindrical cores partly fractured. containing small patches of calcite veins. 32.0-32.5 No core recovery (C10)							
	31.85	49.133				Cracks, Calc. layers are mostly less than 10 centimeter. 32.5-33.0 vertical core (C10)							
	31.85	49.133				Mostly small fresh cracks, thin appear calcite veins at every 10m interval. (C10-C11)							
	31.85	49.133				Many thin calcite veins associated with cracks. (C10-C11)							
	31.85	49.133				Core is fragmented in the lower half part. Many calcite veins (C10)							
	31.85	49.133				Rather frequently cracked Core length is less than 20 centimeter. (C10-C11)							
	31.85	49.133				Mostly long cylindrical cores partly calcite veins appear with steep inclination (C10-C11)							

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GEOLOGICAL RECORD OF BORING										MOLE No. A1-79-12 (DDH-14), (11)	
PROJECT <u>AGUS HYDROELECTRIC POWER</u>				LOCATION <u>AGUS DAMSITE, L.M. 0, X 57.168 / Y 282.315</u>		ELEVATION OF GROUND SURFACE <u>186.422</u>		DEPTH OF HOLE <u>340.00</u>		INCLINATION OF HOLE <u>Vertical</u>	
DIAMETER OF HOLE <u>76 mm</u>		MACHINE <u>JOY RAMMO</u>		DATE OF DRILLING <u>19 NOV ~ 20 DEC 1979</u>		CORE RECOVERY <u>41%</u>		DRILLED BY		LOGGED BY	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY		DESCRIPTION	SPT		DEPTH	
					%	Ø		Blows	Penetration		
			Overburden Residual soil				Sample is partly taken by SPT.				
	1.00	185.422					red brown clayey soil water stained				
	2.00										
	4.00										
	6.00										
	8.00										
	10.00										
	12.00										
	14.00										
	16.00										
	18.00										
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	90.00										
	92.00										
	94.00										
	96.00										
	98.00										
	100.00										

GEOLOGICAL RECORD OF BORING										HOLE No. A1-20-15 (DDH-15)													
PROJECT AGOS HYDROPOWER					LOCATION AGOS DAMSITE					AGOS DAMSITE													
ELEVATION OF GROUND SURFACE			174.50		DEPTH OF HOLE		30.0 M		INCLINATION OF HOLE VERTICAL														
DIAMETER OF HOLE		76 MM		MACHINE		DATE OF DRILLING			9 AUG - 30 AUG 1980														
CORE RECOVERY		81 %		DRILLED BY			LOGGED BY S. NISHIOKA																
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE	COLUMN SECTION	CORE RECOVERY %	CORRECTION	DIAMETER	DESCRIPTION	Water pressure test			DEPTH											
									Lugeon unit														
									R. Q. D. %														
									SV			IM			10			20			30		
			Soil				NWL MC	No core															
	2.70	171.80						Containing slaty fragments and calcareous debris.															
			Greywacke				DC	Fresh, hard and massive. Cracks at 3.8-4.1m, dipping at 70° and water-stained. Bedding plane, discerned by intercalating thin slate layers in 8.0-9.7m, dips 40°-45°. 5.0m-12.25m Cracks are frequent at places, all water-stained; i.e. at 5.70m, 6.7-6.8m, 7.0-7.8m, 10.6-11.85m.															
								(C4-C4)															
	12.25	162.25						Dark grey, homogeneous dense. Fresh and hard. 12.5m-13.7m Cracky. Recovering cores are fragmental. Below 13.7m are solid rock. Bedding plane dips 45°.															
			Slaty fine sandstone					(C4)															
	17.40	152.10						Fresh, hard, solid. Cracks are water-stained and at 70cm intervals.															
			Greywacke					(C4)															
	21.40	143.10						Fresh, hard, solid. Fine grained greywacke sandstone. Bedding dips 40°.															
	22.70	141.80	Sandstone					Fresh, hard. Solid rock. Subvertical cracks at 22.0m, 24.70m, 25.10m, 25.95m, 26.45m, 28.15m.															
			Greywacke					(B)															