APP. II-7 PHYSICAL & CHEMICAL WATER ANALYSIS

APP. 11-7

PHYSICAL & CHEMICAL WATER ANALYSIS

- l. Kikuletwa River
- 2. Himo River
- 3. Yongoma River
- 4. Sesseni River
- 5. Hingilili River

Je/5/87 Ohn Engineer

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF WATER ENERGY, AND MINERALS

		with evaluation	
Telegrams: "YAJI DBOYGO"		SCIL AND W	ATER LABORATORY
Telephone: 49113		P.O. 90X 3	5066
In reply please quote:	11-3	0.11(0) 1000	S SATAAM
Laboratory No. DLS/723/87	11:3	•	/3/1988 19
Laboratory No	iananna ann an an an Israella (1994). Part	Trans	
PHYSICAL AND	CHEMICAL V	VATER ANALYSIS I	REPORT
	(I) ORIGIN OF	THE SAMPLE	
Analysis requested by TANESCO I	r. our sex 9	C24 DSM Ref. No	DP/CPL.E/MIP/II
Dated. 26/10/1997			
Date collected for analysis	€/10/1987		Time
Temp°C water	PTI		
Region. EITIMANUARO		puystch /	L CREVICAL
AT POLER S	Purpose of said	nplingING SITE	************************
Sampling position	***************************************	ING SITE	***************************************
Preservative added/type of treatment t	o water before sam	pling	***************************************
	**********************	***************************************	
	(A) D T		
	(2) PHYSICAL E		•
Appearance:		Colour	mg Pt/1
Appearance: 2C • C Turbidity	N.T.U.	Odeur	8.4
Settleable matter	Ml/1	pH	,
Taste		Conductivity at 25°C	CC uS/cm.
Total filtrable		Total Nonfiltrable	
residue at 105°C	mg/l	residue at 105°C	mg/1
Total volatile and fixed			
residue at 550°C	mg/1		
(3) CHEM	IICAL EXAMINATION	(In milligrams per litre)	· ·
Alkalinity (as CaCO ₃)	Hardness (as CaCO ₃	Calcium	***************************************
Phenophthalein2C.C. C	Carbonate	Magnesium	
	Ion Carbonate		
	Total	Potassium.	

admium		ogen il Nitrogen	NTI		ideide	35 • 5
C.C8 ron	Nitrate Nit	rogen	C.9	(as n		lue /1).1.•2
Manganese				•••••	re	*****
Mecury	Orthophospi	hate			13	*****
Zinc S	Sulphate					
		(4) Rema	ARKS		•	
*****************		***********				
ALKALINE EA	man.					
***************************************	•					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
					·	
		(5) RECOMME				
		(0) 2000,000				
TCC ITTTE	•				STS	
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THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF WATER ENERGY, AND MINERALS

Telegrams: "MAJI UBUNGO".	SOIL AND WATER LABORATORY
Telephone:49.1.1.3	P.C BCX 35066
In reply please quote:	DAR ES SALAAM
Laboratory No. DWS/727/87	Dated 2/3/1988
PHYSICAL AND CHEMICAL W.	ATER ANALYSIS REPORT
(1) Origin of ti	ie Sample
Analysis requested by TANESCO H. OFF BOX S	OC24 DSM Ref. No. DP/CPL.E/MHO/11
Dated	the Laboratory 2/11/1987
Temp°C water sourceRIV	ER HIMC
Region KIJ INAN JARC Distriction Distriction Purpose of samples	rictWardWard
Purpose of sam	PHYSICAL AND CHEMICAL
Sampling position NCSHT TAVETA	
(2) Physical Exa	
	Colour
	Odeur
	pH. 7.0
Taste	Conductivity at 25°C99 us/em.
Total filtrable	Fotal Nonfiltrable
residue at 105°Cmg/1	esidue at 105°Cmg/l
Total volatile and fixed	
residue at 550°Cmg/1	
(3) CHEMICAL EXAMINATION (1	In milligrams per litre)
Alkalinity (as CaCO ₃) Hardness (as CaCO ₃)	Calcium 10.8
	22.C Magnesium 6.1
Total 6C.C Non Carbonate NII	Sodium
	Potassium

	admium
	Chromium Ammonical Nitrozen
	Copper Organic Nitrogen Permanganate Value
	Iron
v.	Lend
	Manganese Total phosphorus
	Mecury Orthophosphate Others
	Zinc Sulphate
	(4) Remarks
	MCDERATELY SCFT VATER

	(5) RECOMMENDATION
	ACCORDING TO THE ANALYSIS PERFORMED THE WATER CAN SE USED
	FOR POWESTIC PURPOSES, BUT IT IS NECESSARY TO BOIL BEFORE
	DRINKING.

	3/3/88 Cminist
	Date Reporting Officer Head of the Laboratory

G & Dam 1747e/2-15,10002ap

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF WATER ENERGY, AND MINERALS

Telegrams: "NAJT UBUNGC"	SCIL AND WATER LABORATORY
Telephone: 49113	P.C BOX 35066
In reply please quote:	DATES SALAAM
Laboratory No. DVS/724/07	Dated3/3/1.98819
PHYSICAL AND CHEMICAL W	ATER ANALYSIS REPORT
(I) Origin of the	
Analysis requested by TANESCO H. OFF. BCX	9C24 DS" Ref. No. DP/CPL.E/NEIF/III
Dated $2\ell/10/10^{\circ}7$ Date received at $3/10/19$	the Laboratory 2/11/1987
Date collected for analysis. 3/10/19	7
Temp°C water source	B AU.C 77/4
Temp C water source	SAVE KIEURIC
Region VII TYANJAVO Dist	PRINTER IND CREATEN
Purpose of sam	pling
Sampling position. SAME KIMUDIC SCAD	
Preservative added/type of treatment to water before samp	ling
(2) Physical Ex	
Appearance:	Celourmg Pt/1
Turbidity 50.0 N.T.U.	Odocr
Settleable matter	8.2 pH
Taste	Conductivity at 25°C
Total filtrable	Total Nonfiltrable
•	residue at 105°Cmg/1
Total volatile and fixed	•
residue at 550°Cmg/1	••••••
(3) CHEMICAL EXAMINATION	(in milligrams per litre)
Alkalinity (as CaCO ₃) Hardness (as CaCO ₃).	
	Magnesium
Total Non Carbonate	

admium	Total Nitrogen	Chloride. 8.5
Chromium		Fluoride
Copper	Organic Nitrogen	Permanganate Value
Iron	Nitrate Nitrogen	(as mg KMnO _d /I)4.6
Lcad	TROC OUTER A SEC	B.O.D. (5 days)
Manganese	Total phosphorus	
Mecury	Orthophosphate	Others
Zinc S	ulphate	•••••
•	(4) REMARKS	
*********************************		***************************************
SITATINE AND S	TICHTY TURBID	***************************************
********************************		***************************************
**************************	•••••••••••••••••••••••••••••••••••••••	************************************
***********************************	•••••	
		••••

	(5) RECOMMENDATION	
**********		***************************************
THE EATER SAMP	IE 1 15 TOO I ITTLE TO COMPLE	TE TUE ANALYSIS.
***************************************		•••••
•		
. 4 2	0	***************************************
3/3/88 Date	Reporting Officer	Hand of the Tabanets
Dut	Reporting Officer	Head of the Laboratory

G P Dam 17470/2-35, 10m tap

THE UNITED REPUBLIC OF TANZANIA MINISTRY OF WATER ENERGY, AND MINERALS

Telegrams: MAJT UBUNGC	17	SCII	AND FATER .	VAULT AURA I
Telephone: 49113	**********	P	.c 20x 35066	
In reply please quote:	· · · · · · · · ·		DAR ES SALA	
Laboratory No. DVS/725/87			Dated 3/3/	1988
PHYSICAL ANI) CHEMICAL	WATER AN	·	
•		OF THE SAMPLE		
Analysis requested by TANESCO			Pof No DP/C	PT.EZMEP/II
Part 26/10/1987	······································	*************************	2/11/19	87
Dated26/10/1987	Date receive	ed at the Laboratory	7	
Date collected for analysis		*************************	Ti	me
Date collected for analysis°C w	ater source. PIVE	P SESSENT	**********	******************
Region FILIMANIADO		District Mostri	. Wa	d .
	-	יייין אווייי	EICAT ASD CH	ENTON
AT MAJT (Purpose of Sautherne stat	Sampling	••••••	***************************************
Sampling position	***************	******************	*****************	*******
Preservative added/type of treatmen	nt to water before s	ampling	****************	
	***************************************	* 4 * * 1 * * * * * * * * * * * * * * *		
	(2) Physicat	EXAMINATION		
Appearance:			e.e	
LC.C		Colour	**********************	mg Pt/I
Settleable matter	Ml/1	рН		******************
Taste	********	Conductivity a	t 25°C 155	uS/cm.
Total filtrable		Total Nonfiltra		
	_			
residue at 105°C	mg/1	residue at 105°C	~ ~~~~~~*******	mg/1
Total volatile and fixed		•		
residue at 550°C	mg/1		<u> </u>	

(3) Cn	EMICAL EXAMINATI	ON (In milligrams p	er litre)	
Alkalinity (as CaCO ₃)	Hardness (as CaC	O ₃)	Calcium	******
Phenophthalein	Carbonate	***************	Magnesium	
Total	Non Carbonate	***********	Sodium	
	~ ~ ***********************************		T OPTIONITY	,

admium Total Nitrogen	Chloride 14.2
Chromium Ammonical Nitrogen	Fluoride
Copper Organic Nitrogen	Permanganate Value
Iron	(as mg $KMnO_4/I$)3.0
Lead Nitrite Nitrogen	B.O.D. (5 days)
Manganese Total phosphorus	Out
Mecury Orthophosphate	Others
Zinc Sulphate	· · · · · · · · · · · · · · · · · · ·
(4) Remarks	
•••••••••••••••••••••••••••••••••••••••	***************************************

	and the second s
•••••••••••••••••••••••••••••••••••••••	
(5) Recommendation	

THE HATER SAMPLE WAS TOO LITTLE TO COMPLET	THE ANALYSIS

3/3/88 Reporting Officer	Head of the Laboratory

THE UNITED REPUBLIC OF TANZANIA

MI	NISTRY OF WAT	ER ENERGY, AND ME	NERALS
Telegrams: "NAJI UBUNGO"	·	SCII AND WATE	LABORATOR
Telephone: 49113			35066
In reply please quote:			SALAAM
Laboratory No.	*************	Dated	3/3/1988 19
PHYSICAL AND	CHEMICAL W	VATER ANALYSIS	REPORT
•	(I) ORIGIN OF	THE SAMPLE	
Analysis requested by TANESCO	P. CFF BCX	9024 DSN Ref. 1	O. DP/CPL.E/MIP/
Dated. 2(/16/1987	Date received a	t the Laboratory. 2/13	/1987
Date collected for analysis	2/10/1987	******************************	Time
Temp °C water	er source	, year manual r	***************************************
ITI IMANJARO Region	Di	strict	Ward
***************************************	Purpose of sar	npling. PPYSTCALA	AD CHEMICAL
			· ·
	to water before sam		
Preservative added/type of treatment of the street of the	to water before sam	pliegXAMENATION 20.	C mg Ft
Preservative added/type of treatment of the second	(2) PHYSICAL E	pling	C mg Ft
Preservative added/type of treatment of the second	(2) PHYSICAL E	plingXAMENATION Colour	C mg Pt
Appearance: 25.0 Settleable matter.	(2) PHYSICAL E	pling	C mg Pt
Preservative added/type of treatment of the second	(2) PHYSICAL E	plingXAMENATION Colour	C mg Pt
Preservative added/type of treatment of the Appearance: Purbidity	(2) PHYSICAL E:N.T.UMl/1	pling	C mg Pt
Appearance: 25.0 Settleable matter. Total filtrable residue at 105°C.	(2) PHYSICAL E:N.T.UMl/1	pling	C mg Pt
Appearance: Eurbidity	(2) PHYSICAL E:N.T.UMl/1	pling	C mg Ft 39 uS/cr
Appearance: 25.0 Settleable matter. Fotal filtrable residue at 105°C. Fotal volatile and fixed residue at 550°C.	(2) PHYSICAL E: N.T.U. MI/1 mg/1	pling	C mg Ft 39 uS/cr
Appearance: 25.0 Settleable matter. Fotal filtrable residue at 105°C. Fotal volatile and fixed residue at 550°C. (3) Ches	(2) PHYSICAL E: N.T.U. MI/1	pling	c mg Pt
Appearance: 25.0 Furbidity	(2) PHYSICAL E: N.T.U. MI/1 mg/1 mg/1 MICAL EXAMINATION Hardness (as CaCO ₃)	pling	c mg Pt
	(2) PHYSICAL E. N.T.U. MI/1 mg/1 mcal Examination lardness (as CaCO ₃)	Plieg	C mg Ft, 39 uS/cn mg/1

Date	Reporting Officer	Head of the Laboratory
3/3/88	Russia D.	
*************************************		***************
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the second of the second of	***************************************	
	(5) RECOMMENDATION	
***************************************		***************************************
	***************************************	the state of the s
* * *		***************************************
TEE LATER WAS	S TOO LITTLE FOR FILL SCALE	ANALYSIS

Zilly.,	(4) Remarks	
	Sulphate	
	Orthophosphate	Others
Manganese	Total phosphorus	
Lead	Nitrite Nitrogen	B.O.D. (5 days)
IronNIT	Nitrate Nitrogen 0 - 12	(as mg KMnO ₄ /1)3.0
Copper	Organic Nitrogen	Permanganate Value
Chromium	Ammonical Nitrogen	Fluoride

Q & Dem 13430/2-26,10m2ap

APP. III -1 GEOLOGIC LOGS OF DRILLHOLES AND CORE PHOTOGRAPHS

Standard of Rock Classification for Drilled Core

	Weathering		Hardness	Core	e Cutting
	Very fresh. No weathering of mineral component.	-	Very hard. Broken into Knifeedged pieces by strong hammer blow.		Over 30cm
7	Fresh. Some minerals are weathered slightly. Usually no brown crack.	2	Hard. Broken into pieces by strong hammer blow.	N	10 - 30 cm
м	Fairly fresh. Some minerals are weathered. Cracks are stained and with weathered material.	М	Brittle. Broken into pleces by medium hammer blow.	М	3 - 10cm
4	Weathered. Fresh portions still remain partially.	4	Very brittle. Easy broken into pieces by medium hammer blow.	4	l - 3 cm
ល	Strongly weathered. Most minerals are weathered and altered to second minerals.	S	Soft. Able to dig with hammer.	S	Under I cm

<u>K</u>	IKI	<u>JLE</u>	TWA				OJE	<u>cr</u>	racar Perio Smalo		0. K - 1 (SHEET		: 2	
	OITA			ver		itlo	n	. .			2 m COMMENCED_			
	VATIO			878.				n			O m COMPLETED			<u>- ' 88 </u>
			X=8,69							NGTH OF ROCK DRILLING <u>24.7</u> ITAL LENGTH OF CORE 19.4	2 m DRILLED BY			
			HOLIZO					_			/ // LUGGED 81	1914	Y	
BEA	KING	i ()	ANGLE	HULE				-	-			-	r	
x	AME	ڻ	<u></u>	i z	ъ ъ		T ₀ ,			BSERVATION OF CORE	WATER TABLE	/=	æ	ELEVATION
DEPTH	ROCK NAME	0 1	CORE	1 ge	KIND OF BIT CASING	COLOR	WEATHER ING	HARO- NESS	CORE	DESCRIPTION	-WATER PRESSURE TEST		DEPTH	LEVA
	ő	"	8	B ;	∠aO	8	3 .	¥	05		LEAKAGE OF DRILLING WAT	ER		
Qт			0 + 100								LUGEON		0 m	878.72 🖑
1	gig	Δ								Overburden. Angular fine to coar 0.6 lava gravel in silty clay matrix.	se Y			878.12
1-2	_					1	4	4	3~4	Tuff breccia		i '	<u>-</u> 1	
, 's) o (}	2	3	3	3	Lave fragments in weathered		ļ '	<u> </u>	
2				١.		grey	14	4	4	fine grained ashy matrix.	2.0		2	876.72
2-	breccia	,o				ء	3	3	2		Lu = 166	/,88	E-2 E-	
3-	ğ.	1		ŀ		SE	5	5	5	2.7~3.15m	K = 2.6 x 10 ³ cm/s	33	3	
3-	*5	,o.				Brownis	3-4		2	Strongly weathered.	• Max.P = 3.2 kg/cm ²	2/	3 	
] . [- -				•	ñ			3_		Max. water Vol. =161 & min		Ē.4	
4-	1	O,	12		۱,		2-3	2~3	1	464	· Ground water table		4	874.08
	ĝ					g	5	5	5	500 Dark grey clay	5.0 = 2.4 m		- 5	873.72
5-	ō		12		•	I S	4~3	4-3		Limestone,		2.4m	<u>-</u>	
1 2					} .	15.2			4-5	Weathered aphanitic	4		6	
8-		-				E 2	5~4	5~4		limestone.		88	F"	
			(<u> </u>			3			🛴	F,	
7-			p	اندا						Irregularly machine	7.3	_	Ę 7	871.42
				a B						broken white gravels.	· Lu = 126 · K = 1.3x 10 ⁻³ cm/s.	98m 33	-	
8-		巴	ЩЩ	ا ۾			4-5	4~5	4			66.75	-8	
8-				O I mm	֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓				'	Up to 6.6m	Max.water Vol.	SS	E	
9-] -					١.	Strong weathered.	=131 2/min • Ground water table	ا ت <u>د</u> ا	<u>-</u> 9	
				=			4	4	3	Brownish Limestone.	IQ.O = 9.6 m) to ≯		868.72
10-	9]]]]				-				£ .		E io	999119
	è			Σ	}		4-5	4.5	۵		Lu = 62		-	
1-	S		ЩЩ	I		•		~~		No.	· K = 7.6 x 10 4cm/s		F-1	
] =	E		XIIIII	pa	£	=					· Max. P.= 3.8kg/cm²		Ē	
2-	-			7	7.3	≥	4	4	3		· Max. water Vol.	Ö	-2	
			4111 11	Imprignat	, ,		5	5			= 119 4min	m	<u>-</u>	
3				בו	sing						· Ground water table		3	
1		+14		튑	08)		4~5	4~5	4		= 10.0 m		Ę.,	
4					ΰ					14.1~15.0m			=4	
					90		5	5	5	Strongly weathered.			Ę-	
5		1,1	##		<u> </u>					(no recovery)	15.0	10.15	5	863.72
					epth		4~5	4~5	4	15.6			E -	863.12
6			taliitti		ŏ			ļ	3~4	Tuff breccia			6	l 1
		X								Weathered phonolitic		88	E-	[}
7.			## HILL				4	4	3	tuff breccia of subangular.			E 7	
, 1114	ecc) d	×				rey						3	E	
8~			ШШ			0			4	Phonolite and basait		9.7m	E 8	
		X	11111111	÷ 0	Sing	×	443	4-8	3	fragments up to 3cm in tine grained matrix.		1	Ę.	
	Tuff			ž ė	5 cd	00	4	4	4	in inie granieu munia.	19.0	88./	E 9	859.72
9-	-	X		MPCH.	Depth of casing 9.45 m					lander i de la companya di seriesa di series Seriesa di seriesa di s		l m	Ę.	
20				ξø	ă De	[3-4	244	2			ò	20	858.72
		-	N				1	1	†	▶ dr#ler's note d		1.50		
		Ì								tick), 2(substick), 3(piece), 4(freqment), 5 grain				· 1
			4	∸core k	765		-		erd) →	•				
				– RQD				fil A \$17]	- 100	composed)				

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	LOCA				ver S 878				n		PTH OF HOLE 25.32 PTH OF OVERBURDEN 0.60		COMMENCED			
					93.84						NGTH OF ROCK DRILLING 24.72		DRILLED BY			
					ONTAL		90		•		TAL LENGTH OF CORE 19.41		LOGGED BY		M.S	
					HOLE			•				%	_			
r					ĭ		T				BSERVATION OF CORE					
ļ	E	ROCK NAME	ن	ZE ZERY	Z Z	5 9	-	5	192		OSCIATION OF CORE	WATE	ER TABLE	V==	Œ	ELEVATION
ı	DEPTH	ğ	د	CORE	CEME	SIT CASING	COLOR	WEATHER ING	HARD. NESS	CORE	DESCRIPTION	11	ER PRESSURE TEST		DEPTH	SIE &
ļ		ăż		0 ⇒ 100				*		Ö		LEAK	AGE OF DRILLING WA			
-	20m			KHACU	K L		}					<u> </u>	LUGEON	┌┈╉╌	io 20m	858.72 🔻
	4	i	À	Ш	dia.						Tuff breccla				Ē.	
-	1-				φ Ε			3-4	3-4	2	Fresh phonolitic tuff	Lu	= 3		E 1	
	1		À		86mm	E					breccia as above	·к	= 3.9 x 10 ⁻⁵	1:	<u> </u>	
	2-	c la	17		B1†8	17.5	rey				orecord do aboye	• Ma	x.P.=4.1 kg/cm²	88	-2	
	-1	breccia	χ		W W		2					- Ma	x.water Vol.	3/	E. E	
-	3-	ة ا			Ξ	casing	논						=7.6 L/min	100	-3	
		Tuff	×		† p		00	3-4	3~4	ı		Gre	ound water table		<u> </u>	
Ì	2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	F			Imprignated	ō	١.				•		= 10.8 m		E-4	
	4	:	χ) ju	Depth									Ē	
ı	5~	•			<u> </u>	۵				L	25.32	25.32	<u> </u>	<u> </u>	5	853.40
ſ	1										End of boro hole			8.01	Ē	
-	6-1														E-6	
١	1								İ		N.B/Rotary auger			-	Ē	1
-	7										150 mm dla. 0.0~0.6 m		:		-7	
۱	1										Rotary coring		•		Ē.	
	8-										101mm dia. 0.6~18.0m				-8	
İ	. . .						1.5				86 mm dia. 18.0 ~ 25.32 m				E 9	
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	. : '			N 4		· ·				1,0	tick), 2(substick), 3(piece), 4(fragment), 5 grain					
		**		iza N	core le	220			1 (1	ard) –	5(soft)		J. 1	:		
				<u> </u>	ROO	1.		١,	(fresh)	~ 5(də	composed					

K	IKL	JLE	TWA	No	.2	PR)JE(<u>er</u>	*****	HOLE No.	KD-I (SHEET	OF		-
LOC	ATIO	V	Int	ake	Do	ım		- -		PTH OF HOLE 20	_m COMMENCED _			
ELEV	VATIO	N		822	39		r	n		PTH OF OVERBURDEN 0.15	m COMPLETED			•••
			X≈7,68	-						NGTH OF ROCK DRILLING 19.85	_m DRILLED BY _			1,0
			HOLIZO				0			TAL LENGTH OF CORE 10.74	_m LOGGED BY _	N	1,S	
BEA	RING	OF.	ANGLE	HOLE					CC	RE RECOVERY 53.1	%			
_	A FE		<u>.</u>	و خ	5 0		r-		~~··	BSERVATION OF CORE	WATER TABLE	<u>/</u>	r	ğ
ОЕРТН	ROCK NAME	0 0	CORE	CEMENTA	SIN	COLOR	7. E	HARD. NESS	CUTTING	DESCRIPTION	-WATER PRESSURE TEST		DEPTH	ELEVATION
	8	_	. H	8 3	2000	8	WEATHER ING	HA	85		LEAKAGE OF DRILLING WA	LEB		ដ
0m			0.⇒100%	[0	LUGEON	40	0 Om	822.39 ^m
	L/S	Δ		dia.		UM6				Over barden	. .	-	-	
nihanjim	Talus	Δ		Ε		Dark brown			i	angular fine to coarse Tava gravets in stity clay matrix	•		-1	
1411		Δ	ЩШЦ	101mm		සි			<u></u>	1.5				820.89
3 1 1 2 2 3 1 2 2 2 2 2 2 2 2 2 2 2 2 2)o(<u> </u>	:		5~4	5-4	4	Tuff breccia		88	-2	00000
1	breccia			H.M.Bit			3~4	3~4	3-2	Weathered tulf breccia of	2.3	3	-	820.09
3	ပိ	×				ے	5	5	5	subangular lava fragments	· Lu=113 · K=1.2x10 ⁻³ cm/sec	100	-3	
]	ā			jec		rown	4	4	3	In fine grained matrix	Max. P=3.3 kg/cm ²	က်	_	
1	Tuff-	\o <		Impregnated		67	4~3	4 7	4		Max, water Vol. = 102 1/min		-4	
777	2			å			4^3	4 "3	-+		Ground water level			
5		λά		1	L:		4	4	4	50 5	5.0 = 4.0m		- 5	817.39
					;	8	3	4-3		Lime stone		4.0		
6	8			ļ ¦	ε	brownish) White	_		3	Weathered aphanitic Lime stone	3.0		-6	816.39
"	stone	1	ШШ		1.5	alsh	3	4-3		with irregular fractures	Lu = 54		_	
7-	, s			}		ğ	5	5	5		· K=6.3x10 ⁴ cm/sec		_ 7	
'	Líme			[casing	뷾		4			Max. $P = 2.8 \text{ kg/cm}^2$	8		[
R						تزا	4~3		3~4	80	- Max. water level	м	-8	814.39
		A		G	h. of			3		Tuff breceia	=61 g/min	0	Ξ.	
			ЩШ	E	Depth.						· Ground water level		<u> </u>	
		`Δ		86 n	Δ		i			Weathered tuff breccia of angular lava fragments	=10.0m(DRY)		Ξ.	1 14 14
ي ا						`.				basalt and phonolite Infine	0.0		<u>-</u> 10	812.39
)A(ă						grained ashy matrix		< 10.0 (DRY)	-	,
				≥			5	5	5				_1	
		A		I					! ')	: · · · · · · · · · · · · · · · · · · ·		<u> </u>	
2		/ \		ă					!	9.0 ~ 12.25, 16.5 ~ 20.0 m		88	-2	
2-		Δ		ទី						Strongly weathered unconsoli-		\	=	. 1
3				Im pregnated						-dated tuff breccia		23		
	ā	`Δ΄				>				(recovered as sand)	3.5	=	<u>=</u>	808.89
4	breccia	Α.			2	grey				Occasional less weathered	Lu=2 K=20xl0 ⁵ cm/sec Max. R=3.0 kg/cm ²		4	}
1	2	\ <u>\</u>		} }	K		3-4	3~4	3-4	coarsely porphyritic	Max.water Vol.=1.0 \$/min Graund water level	1 40	_	}
5.4	Tuff -	,Δ(27	Dark			,		5.0 = 9.7 m		-6	807.39
1 1	Ţ	V		흠	casing	Ω				radinella apio coopie size			<u> </u>	}
6-		`A		76mm dia	8	,					· Lu=8 · K=I,0xI0 ^{*4} cm/sec		-6	
]				5	ŏ							88	_	
7,3		X		#18	Ę						Max. P. = 4.0 kg/cm ²	~	-7	
3 4 5 5 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		X		Σį	Depth		5	5	5		Max, water Vol.	8	-	
8-1		~		1	_		-	-	-		=16 0/mln	2	-8	
		\times		a e			3-A	3-4	3		Ground water level		.	
9-1		~		5					. :		= 9.6 m		- 9	
				Impregnated			5	5	5					
20		X									0.0		20	802.39
							1	1		▶ driller's note ◀		eria. Albaria		
		İ						1		ick), 2(substick), 3(piece), 4(fragment), 5 grein			:	
			4	– core la			1	1 (6	erd) ~ !	A				•

	45	DGIC LOG OF DRILL	
	No.2 PROJECT		D. KD-2 (SHEET OF)
LOCATION I	ntake Dam 812.41 m	DEPTH OF HOLE 15.0 DEPTH OF OVERBURDEN 0.0	
Alate Transfer	8.50 ;Y=13.433.60	DEPTH OF OVERBURDEN 0.0 LENGTH OF ROCK DRILLING 15.0	
	ONTAL -90 ·	TOTAL LENGTH OF CORE 2.6	
BEARING OF ANGLE	HOLE	CORE RECOVERY 17.0	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		OBSERVATION OF CORE	44
DEPTH SOCK NAME LOG CORE	CEMENTA TION TION KIND OF BIT CASING COLOR EATHER ING	S HE S	WATER TABLE
10 NO 3	CEMENT TION KIND OF BIT CASING COLOR COLOR HARD HARD	DESCRIPTION DESCRIPTION	LEAKAGE OF DRILLING WATER
0m 0 ⇒ 100 ₉	6		LUGEON
×	n 2 2 west 4~33~	3 Tuff braccia	-
I X	254~33~		888./ 3
'] ×	5 5	5 0 ~ 0.6m Weathered perphyritic	16/2.
2	4 4	3 Phonolite boulder,	0 _2
	5 5	5	
3-1 ×	4 4	0.6~ 20.0 m	88./ 88./
		Strongly weathered ponolitic	
4- X	5 5	5 tuff breccia of angular coarsely	, <u>SE4</u>
54 × 11111	3~43~4	upto boulder size and	5.0 5 807.4
1	5 5	5	· Lu = l
6-3 X	£ 2 2	occasional obsidian?	· K=1.3 x10 ⁻⁵ cm/sec 00 E 6
	일	Particles upto 3mm in fine	
73 5 X	<u>.</u>	grained unconsolidated	=1.80/min $\underline{\omega}$ =7
7-1 Draceia	M. M. Bi	ashy matrix.	Ground water level
N N N N N N N N N N N N N N N N N N N	2 0		0 8 804.41
Tuff breccia XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		Occasional less weathered	
T X	5 5 3-43-4	coarsely porphyritic	-9
10-	5 5	5 fragments upto cobble size.	88.
A A A		4 (Recovered mainly as sand)	
	2 2	3	8 H
2-3 ₂			<u></u>
	\$ 5 5	_	0 =
3-3	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	5	l Fal
	B6mm dia. bof casing:7.(Brownish grey		88.7.2.702
4-1 × 7	元 5 6 周		2 = 4
	Depth of casing: 7,000 Brownish grey Casing: 7,000 Brownis	4 150	8
5	- O 4~34*3	4 I5.0 End of bore hole	15.0 E 5 797.41
7			
6			<u> </u>
			[8
o 🗐			E 0
K4 N		1(stick), 2(substick), 3(piece), 4(fragment), 5 grain	

KI	ΚU	LE	ΓWΑ	No.	2	PR	OJE				O. KD-3 (SHEET	1 0	1	<u>)</u>
LOCA	TIOI	V .		tak				<u> </u>		PTH OF HOLE 20.0				
EFEA				7, 45		7 41		<u>m</u>		PTH OF OVERBURDEN 0.2 NGTH OF ROCK DRILLING 19.8				
			X≈7,63! HOLIZO			<u>- 9</u>	-	·		TAL LENGTH OF CORE 67.9			. S.	· · · · · · · · · · · · · · · · · · ·
			ANGLE					_		RE RECOVERY 34.0				-
ГТ	ы			<u>.</u>		Γ	,		0	BSERVATION OF CORE	WATER TABLE			ž.
DEPTH	ROCK NAME	0	CORE	CEMENTA TION KIND OF	SING	8	£ .	SS	F. S	DESCRIPTION	WATER PRESSURE TEST	7	DEРТН	ELEVATION
ď	ğ	٦	REC	3	ක්රි	80,00	WEATHER	A Z	CORE	DESCRIPTION	LEAKAGE OF DRILLING WA	TER	^	8
Oπ	_		0 → 100 _%								LUGEON		o Om	817.45 [™]
		β				¥ 8	4	4	4	O.2 Over barden Cobbiy tuff brecala gravels in clay				817.25
1-5			 			Ogrk grey		-					E-1	. [
1 1	-	×						:	i	0 ~ 5.0			<u>.</u>	
2-		×		6		ę.	4	4~3		Weathered tuff breccia	2.5		2	814.95
1 4				mm dia	i	S				of angular perphyritic		<u> </u>		614.55
3-1		×		<u>0</u>		nish			2-3	phonolite fragments	• K=2.0×10 ⁻⁴ cm/sec	1	-3 E	h
13	Í	×		i		Browni	4	4		upto 5cm in fine grained	Max.P=1 kg/cm² Max. water Vol.	88	E_4	
1		×		<u></u>		<u> </u>	.,				=6.3 L/mln Ground water level	2	4	
5-				Ή. Σ		}				ashy matrix.	5.0 = 3.4 m	21/	E-5	812.45
1 1		X					5	5	5	Cracks subhortzontal				1
6-				mprignated			4		4	to steep rough calcite lineal			6	
1 1		×	+	Pre				4		ilmonite stained.			Ē.,	
7-1		×		E	1		5	5	5	the and the property			7	
8-1	Ì	()	ДШШШ				4	4~3	4 3~4	5.0 ~ 17.7 m	·		E 8	
	S D	X								Strongly weathered tuff		4.3	يىلى:	
9-	brecc									breccia as above with			9	
1 1	ļ	×								unconsolidated ashy		i i i i		
10-	Tur							į		matrix.			10	
1	- 1	X							•	(Recovered as sand washings)		88	Ē.	
1	- 1	×		1			5	5	5				E,	
2-	- 1			1	:							2	2	
1 1	Ì	X		9	j	rey				17.7 ~ 20.0 m		22		
3~	1	Ì		8	ļ	9				Weathered cracks partly			3	
1 1		X		6 mm		ark				horizontally machine broken			E	
4-				ã		Õ				dark grey tuff breccia			E-4	
	1	×		<u>a</u>	1		3 ~4	ვ∞4	4	as above.			E ,	1
5-		\times		Σ Γ				1		• • • • • • • • • • • • • • • • • • •		5.0	E	
					ε								6	
]]		\times		mprignated	14.0		5	5	5			en en		
7-		ļ	#!!!!	prig								38,	E-7	700 05
6 7 7 17 17 17		\times		ξ	casing	. !					175 • Lu ≈ 19	12	Ē	799.95
8-		., [00 to					•	· K=1.9 x IO-4 cm/sec		8] [
1		X			e e		4 (3)	4~3	3		Max.P.=3.42 kg/cm² Max. water Vol.		E.	
9-		×		1	Depth		. ,5/				= 20.0 \$/min Ground water level		-9 9	
20		$\overline{}$								200	20.0 = 4.2 m	0.00	E 20	797.45
		E	A.			_	1		1	> differ's note 4 End of bore hole		4,45		
		Ŷ.	以杨	- core los	15			10:	1 (s : (bus	tick), 2(substick), 3(piece), 4(fregment), 5 grein 5(soft)				
			<u> </u>	4QD			1	(fræsh)	5 (dec	composed)		. v		

KIKULETWA No.2 PROJECT	HOL	E No. KD -	4 (SHEET C	r I j
LOCATION Head race Canal	DEPTH OF HOLE	20,0 m C	OMMENCED 24	- 2 - '88
ELEVATION 825.89 m	DEPTH OF OVERBURDEN	0.2 m C0	OMPLETED <u>28</u>	- 2 - '88
COORDINATE X=6,952.37; Y=14,152.01	LENGTH OF ROCK DRILLING	19.8 m Di	RILLED BY A.W	/. M.O.
ANGLE FROM HOLIZONTAL -90 .	TOTAL LENGTH OF CORE	14.4 m LC	OGGED BY	M.S.
BEARING OF ANGLE HOLE	CORE RECOVERY	<u>72.1 %</u>		

	BEA	RING	OF	ANGLE	HOLI	Ε	_			CC	ORE RECOVERY 72.	<u> </u> %		
		žE		à	ė.,	ሁ <i>''</i>		,	1		BSERVATION OF CORE	WATER TABLE		z
	DEPTH	ROCK NAME	FOG	CORE	CEMENT	KIND OF BRIT CASING	COLOR	WEATHER	HARD. NESS	CORE	DESCRIPTION	WATER PRESSURE TEST LEAKAGE OF DRILLING WA	TER HIGHO	ELEVATION
ļ	0m			0 → 100 ₉₃								LUGEON	40 Om	825.89 °
Ì	1111		Δ.	7		<u> </u>	 		4~3	-	Over borden Gravelly clayey silt		_	825.69
	1 2 3 4 5 5		× ×					4	43		Tuff breccia		E-1	
	1		, X								Weathered tuff breccia of		E_	
	-)ο(ļ						angular porphyritic phonolite		<u> </u> 2	
•	3.			13 III					:		fragments upto lOcm occasiona	14	3	
	<u> </u>		oʻ	73.III	P		20	4	4~3	3-2	-ly upto boulder size, and		,88 	
	4-				E		grey				obsidian particles upto 3 mm		8 4	
	-		ο(ō		dark			. :	in fine grained matrix.		2,	
	5-				# 8						Cracks subhorizontal to		25,	
	4) (l		Brownish	4	4~3	3	steep rough clay lined			
	6				Σ		1 %				Ilmonite coated.		6	
- [. =		ጆ		l		ã						Ē.	
ı	7-	Ì			1180			4	4~3	3~2			E-7	
Ì	. =		×(, a								E	
ŀ	8-				Imprignated						•			
	_ =	0	¤					4	4	4	•			
I	10 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	breccia	. ,				٠. ا	-	7	7			E-9	
		مَّ	ኦ								9.6 ~ 12.6 m		E.	
- 1			×				2				Strongly weathered		10	
1	1 =	2				5	grey	_		_	unconsolidated ashy		88 -	
-			×			epth of casing;10.5m	Dark	5	5	5	tuff breccia.		* E I	
-	2-					Depth of casing:	Ω				(Recovered as sand washings)		72	,
	: 4		×	ЩШ		<u>a</u> 8							26,	
	3 =			#	-								3	1
	=		×		dla			4~3	4~3	3~4			<u>E</u> .	
	4-			#IIII	E					_	15.0 ~ 20.0 m		<u>-</u> 4	
	1 2 3 4 4 mpropriet		×		86	E 9		3~4	3~4	3~4			<u>E</u> .	010.00
I	5-4				9 i÷	12.6	grey			,	Fresh tuff breccia of	15.0 % %	13.0 E	810.89
	4		×		∞ Σ	••				3~4	angular porphyritic ponotite tragments upto 3cm, occasionally	Lues, Kesakio ^d Max. Pes. 2 kakm ² Max. water Voi. = 4.18/min Ground water level = 11.6 m		
	6				Ŧ	lng	dark		ł	4		3, K# P=6,2 wore =4, rrd we	E-6	
			×		b	Depth of casing				2	Cobble size or boulder size	Max. Max. Seu	88 89 7	808.89
	7	.].			Imprignated	7	Brownish	3~2	3~2		feldspar crystals in fine grained matrix with sparse	17.0	- > E	
	. 8		×		Č	뒫	M O		. •		secondary calcite.	ol.	2 8	
	1		×		E D	ឹ	9	* .		3~2	Cracks horizontal or	3 k10-5 =4.4 kg/a vater Vol. = 3 &/min 1 water le = 14.2 m	7 2 E 8	ŕ
	9 =				-		.			اعتد	medium steep, rough black	1.3 7×10-5 P=4.4 kg/c water Vol = 3 \$/min = 14.2 m	E-9	
	4		×							٠.	ilmonite stained,	-Lu=1.3 -K=1.7x10-5 -Max. P=4.4 kg/cm ² -Max. water Vol. = 3 \$/min -Ground water level = 14.2 m		
L	20			Malli							20.0	l ń x ș ś ġ	20	805.89
	-	4.00						t	†		▶ driller's note 4 End of bore hole	•	F7. C	

K	akı	JLE	TWA	No. 2	2 PR	OJE	СТ		HOLE N	O. KD-5 (SHEET		-	خند
LOC	ATIO	N		roce		al_	<u>.</u>		PTH OF HOLE 20.00				•
	VATIO			829.66			m		PTH OF OVERBURDEN 0.00				
				54,63 ; Y		42.8	<u>7</u> _		NGTH OF ROCK DRILLING 20.00				
				NTAL		0			TAL LENGTH OF CORE 18.52	-	M	. S	
BEA	RING	OF	ANGLE	HOLE				CC	RE RECOVERY 92.6	%			
	w							Ç	BSERVATION OF CORE	4.4			z
ОЕРТН	NAME	9	CORE	FZO S	2 2	5	1 %	9		WATER TABLE/	V	OEPTH	ELEVATION
220	ğ	7	8 8	CEMENTA TION KIND OF BIT	20 S	WEATHER -ING	HARD	CORE	DESCRIPTION	WATER PRESSURE TEST		8	ELEV
	<u> </u>					¥	II.	ō		LEAKAGE OF DRILLING WA	IEK		m
0m		ļ	0 => 100 _%		- 1	 				LUGEON	r	io um F	829.68
		×		ان	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3~4	3-4	3	Phonolitic tuff breccia.		m	_	
1.3				dla.		*	ļ	ļ	0.9~1.5m		7/3/188	E	
1 3		×		E	Grey	3	3	2~3	Hard and fresh, fine grained		3	<u> </u>	
1 2 2 minutes				₫.		L			coarsely perphyritic phonolite.	2.0	1.2	2	827,68
1 4		×		≥	_			4		-Lu = 38	1.2	-	
			HA III	x.	Grey				in the second se	·K = 4.3 x 10 ⁴ cm/s	1	Ē. '	
3		×		řed Ped		3~4	3-4	2~3	Brownish grey, Occasionally	Max.P. = 2.3 kg/cm ²		[3	
=		()		prignated	brownish			2~3	brown clored weathered	Max. water Vol		E	
4-		×			8				phonolitic tuff breccia of	•Ground water level		E-4	
		~		E	- 1	ļ			angular coarsely porphyritic	= 3. tm		F	
5-					Little	4~3	Į		fragments upto 5cm in fine	5.3		5	824.38
1 -	1	×		å	=	1	1		grained matrix.		88. /	Ē	
6	1			E	<u> </u>	 	1			· Lu = 12	5	-6	
		×		36 m	Brown		ļ	_	Cracks generally subhorizontal	i i ionio omi	.03	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
7.	1				Į ž		•	3	rough limonite stained/	- Max.P. = 3.6 kg/cm ²	80	Ę.,	
	1	×		Σ.		1		1 .	clay lined.	• Max, water Vol. = (9,7 \$\mathcal{D} min	,	E_	
	1				Ì		3~4			Ground water level		E-8	
8-	1	×		mprignated	1	١.	}			= 5.7 m	}. :	<u> </u>	
				5	- {	4			•			Ē.	
9-	, i	×	KKKIIII	ם								E-9	[
=	breccia	(``		-		1			Toward the lower part.	9.8		F	817.88
10-	1	X		·				2	gradually shifting into fresh		5.7	Ē 10	
	Tur	^							and hard.	Lu = 3		F	
110	-					}	}			-K =4.3x10 5cm/s		Ē 1	
1 ±	1 1	X	HALL.							• Max. P. = 3.4 kg/cm ²	ക	Ē	1,
2-	l				20	ļ				-Max.water Vol. = 5.8 Vmin	88	2	
	l	×		5	grey	,		3~2		Ground water level	3	Ē.	
				dia	۽ ا	}			•	±4.1m	8	3	
377		Ŕ		٤	brownish							E	1
				76	} 0.	3	3	├─┤				E_4	
3 4 5 6 6 11 11 11 11 11 11 11 11 11 11 11 11		þ (م ا	-						Ē,	
1			KKKKIII	-	9					15.0	4.9	Ę.,	814.68
5-		'n		≥	Little			2	. 1			E-6 E	
1 4		~		I I] -]		·Lu = 4	88./	Ė	
6-3				33						·K = 5.1x10 cm/s	3	E-6	
4		×		9			 		18.2 ~ 20.0m	-Max.P. = 3.4 kg/cm ²	0/3	È.	
7-				mprignate	1				Strongly weathered with	-Max.water Vol.	<u> </u>	7	
1		×		7	1	4~3	4~3	2~3	close fractures brown phonolitic	the contract of the contract o	4.6	Ē.,	
 				Ë				\vdash	tuff-breccia.	• Ground water level		<u> 8</u>	
8-1		×		H .		4~3	4~3	4	Especially 1885~19.30m	= 3.8m	7,88	Ē.	199
1 3						}_		<u></u>	machine disintegrated to		10	E 9	∫ {
9-		×			1	5	5	5	sand washings.		=	- 1	
_ =						4~3	4~3	3	20.0	20.0		20	809.68
20]						1	+	لنسستا إ	addition of the state of the st		5.2		
								1 (1	ick), 2(substick), 3(piece), 4(fragment), 5 grain				inger in the second sec
			IN RE	-core loss			10	ard) - !					
			4			İ							

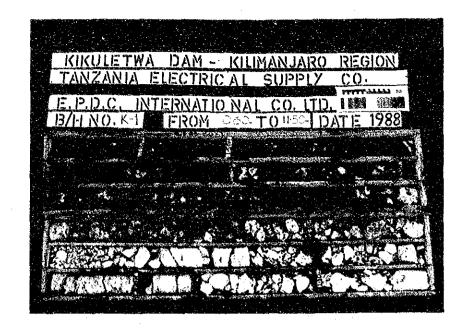
i	******	KL		TWA Head					π	DE	HOLE NO		l of 1		~
		ATIO			811			r	_ <u>n</u>	DE	PTH OF OVERBURDEN 1.0	m COMPLETED	6 - 3	3	- '88
				X=5.81	364;	Y= 15	,29	0.85	5	LE	NGTH OF ROCK DRILLING 19.0	m DRILLED BY	A.W.	H. V	V
·A	NGI	E FF	ROM	HOLIZO	NTAL		9(0	<u>:</u>	TO	TAL LENGTH OF CORE 19.4	6 m LOGGED BY	M. S	<u>s . </u>	
В	EAF	ING	OF A	ANGLE	HOLE				_	CO	RE RECOVERY 97.3	%			
	T	m l		>-					:	0	BSERVATION OF CORE	WATER TABLE			ž
	E L	ROCK NAME	9	CORE RECOVERY	SEMENTA TION KIND OF	SIS	e S	WEATHER ING	ESS	RE ING	250000071011	WATER PRESSURE TEST	1 5	DEPTH	ELEVATION
	ວ່	ğ	יי	2 8	CEMEN	සිරි	COLOR	Ä	HARD. NESS	CORE CUTTING	DESCRIPTION	LEAKAGE OF DRILLING WAT		۱ -	33
-	Om			0 → 100 ₉₆								LUGEON	40	0m	811.33 *
	- 1		Δ		5			<u>-</u> -			Overburden		E		
	4	Ta	Δ		Augar		Brown	ļ			LO Brown silty clay sand.		[1	.	810.33
	1-				d la.		910	·			Phonolitic tuff breccia.				
İ	4		×		פ			4	4	4	1.0~2.0 ^m		88. / 12 11 12 12 12 12 12 12 12 12 12 12 12 12 1		
	2	i		[]]]]]]	E						Strongly weathered brown		n = 2	<u> </u>	
	-		×		으						tuff breccia of angular	3.0	4 E		808.33
	3-				E E				1		phonolite fragments upto	Lu = 8	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	5	~ - ~ . ~ . ~ .
	4) (8					3~2	Zem in fine argined matrix	· K = 7.8 x 10 ⁻⁵ cm/s	E		
	4				mprignated H.M. 101 mm	: .				ے~د		Max.P.=1.2kg/cm ² Max.water Vol.	E ⁴	+	,
	4]	×	ШИ	ട്ല	, ,	Ι.				Weathered brownish grey	= 2.20/min			
	5-				Ē		١,				tuff breccia of angular	Ground water level		5	805.93
	4		×	Willi				3~2	3-2		coasely porphyritic phonolitic				805.58
1	6						}				fragments, Occasionally upto	1	88	ô	
i	킠		X.								boulder size in fine grained matrix.	Lu = 6 K = 7.7 x 10 cm.5	\ ► E		
ł	7=		\-/		1 1					3	inditix.	• Max .P. =1.5 kg/cm ²	8	7	
	릨		У(σ́		Ì					· Max.water Vol.	8	. 1	
	8				d d						Cracks are subhorizontal medium steep, rarely steep,	Ground water level		8	
	-		\o (E				 		rough with calcite coating	≠ 5 m			
	9-	0	×		98						/clay veneer.		F.	9	
		breccia	,		Σ						/ City Veneer.				801.33
1	0-	ត់	X		=		1				Toward the lower part				301.33
	-	Tuff			P	:			1		gradually shifting into	· Lu = 4	1		
	1	F	α′		gnated		5				fresh and hard.	K = 4.4 x 10 ⁵ cm/s Max. P. = 3.4 kg/cm ²		1	
					2		5				and the profession of		E		
	2-		Þ.		Impri		يء					- Max, water Vol. .= 6 // min		2	
١.	. =					a 11	Brownish					- Ground water level			
	3-		۱۵			E	0				The National Control	= 4.2 ^m		3	
	tul					75	68				A Committee of the Comm				
	4-		`oʻ	HHH		. 10	"	3	2	1~2			388	4	
	1					_									700 77
	5		×	HHH	ļ	casing						15.0	18	5	796.33
	1	:			_	200		-				· Lu = 0.5	0 F		
1	6		×	HHHH	76mm dia	70	1	1		:		· K = 6.3 x lŌ ⁶ cm√s		6	
	البيا	÷			E	177.5						 Max.P. = 1.2 kg/cm² Max.water vol. 	E		
	7		×		92	Depth						= 0.3 4 min		7	
	1111	-		HHHH	≆	۵						· Ground water level	<u>E</u>	. •	
1	8:		×		∥ <u> </u>					1		= 2.4 ^m		8	
	Trin I	ļ			3 ec										
	9		×		Ĕ					1			E	9	
	عاتا	:::		HHHH	Imprignated H. M.						The second secon		E		
نا	20	1. A.	×		1 5		<u></u>			<u>_</u>	20.0	20.0	E	20	791.33
				L N	3			•	4 1	1	a driller's note 4 End of bore hole	$\mathcal{H}(\frac{1}{2}, \mathbb{R}^{n}) = \mathcal{H}(\mathbb{R}^{n}) = \mathbb{R}^{n}$	erti. Kajaran		
	'			N	ore k	:					stick), 2(substick), 3(piece), 4(freqment), 5 grein 5(soft)				
				<u> </u>	ROD		:	1,			ocomposed)	$(S_{i,j}, S_{i,j}, $			
											· · · · · · · · · · · · · · · · · · ·	4			

K	<u>(IK</u>	ULI	ETWA	No.	2	PR	OJE	CT_		HOLE No. KD - 7 (SHEET OF)
LOCA	OITA	N	He		Tor		<u></u>	. .		EPTH OF HOLE 20.15 m COMMENCED 29 - 2	- '88
ELEV				807				m		EPTH OF OVERBURDEN 0.30 m COMPLETED 3 - 3	- '88
			X=5,210					6		ENGTH OF ROCK DRILLING 19.85 m DRILLED BY A.W. H	.W
			HOLIZO				0	<u>.</u>		OTAL LENGTH OF CORE 19.76 m LOGGED BY M.S	
BEA	RING	OF	ANGLE	HOLE					CC	ORE RECOVERY 98.1 %	ATTACAMA PARTIES AND A STATE OF
	Ä			e 1					- 0	OBSERVATION OF CORE WATER TABLE	š
DEPTH	ROCK NAME	200	CORE	CEMENTA TION KIND OF	SING	8	E C	S	CORE	DESCRIPTION WATER PRESSURE TEST	ELEVATION
ä	Ď.	-	0 22	9	සිරි	COLOR	WEATHER	HARD	85	LEARAGE OF DRILLING WATER	
om)			0+100			 	 -			LUGEON 40 C	[™] 807.59 ▼
	Ϋ́ο	Δ				 	-			0.3 Sundy ckeyey siltwith some	807.29
=======================================		jo,					3	3	3	-1	. i
1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1						3-2	3~2	2	Tuff breccia	
=)×				grey	-	-		Hard tuff breccia of	005 50
2-						1	2	2	3	subangular phonolite, devitrified 2.0	805.59
=	breccia	×		d.		brownish				glass, feldspar crystals, upto 3cm · Lu = 125 rarely upto 10cm in medium · K = 1.4x10 ⁻³ cm/s	[]
3-	bre			5		3				• Max.P.= 2.1 kg/cm ² \ =3	
1	-	×		Ē		Pro P	3-2	3~2	2~3	, Max. Auder Aoi	
4-	Tuff	^		IOI mm	1	<u></u>	-	-	(1)	Clucks delictally submotivation in a condition in the	
11		×	KKK			11118				clay veneer limonite coating. = 3.6 m	
5-		^		Ξ		~		<u> </u>	L	50	802.59
1			HHH		i		2	2~1		Lu = 10	
6-		×		mprignated	i	<u> </u>	ļ			5.9 · K = 1.2x10 ⁻⁴ cm/s	801.69
2	Te l	١.		밀	.]					Phonolite • Max. P. = 3.6kg/cm ² DRY E	
1	Phonolite	×		=		ج	1~2			Very hard and fresh with white . Max, water Vol.	
7-	, –	<u> </u>	MM	ם		grey	L				
1	16.	ब		7-1		F	12	2~1	1-2	-cam \$ E-	
8~	=					Greenish				Cracks is rare and clean	
9-	Phonotite	×				ree	1~2	1		7.4~9.6m tuff breccia.	
9-3	ď.		HAHA	1		9			•	E9	
1							├			9.6	797.99 797.59
10-		×		 						Tuff breccia 6.3 E 10	(31,39
- 4				اغ	١,		2	2~1	2	Hard tuff breccia of angular. Lu = 1.6	
1-		×		mm dia	z		-		~	Phonolite, feldspar crystals . K = 2.1x 10.5cm/s & = 1	
1				E 9	1					up to 3cm in fine grained . Max.P. = 3.4 kg/cm ²	
2-		×		. 86		} ;	2~3	2~3		little weathered matrix. Max. water Vol. With accasional large = 2.8 / min a E	
4		*		Σ					1-2		
3-1		×				grey		<u> </u>		up to boulder size coasely porphyritic phonolite Ground water level 4.1 m 6.5	
1	o	۸		9		0			}	fragments,	
1	23	ٔ ر		5		5			١.	Trugments,	
2 2 2 2 2 3 4 4 5 5 6 7 7 7 7 8 7 8 7 8 7 8 8 8 8 8 8 8 8 8	breccia	×		Imprignated		brownish		•]	Cracks are rare and coated	
1				P-F		۾			}	with limonite.	792.49
9-7	Tuff	χ.				ه ا	1		<u> </u>		
1	'			76mm dla.		Little	2	2~1	2	- Lu = 0.7 - K = 8.7×10 ⁶ cm/s \tilde{\tilde{\tilde{\tilde{\tilde{K}}}} = 6.6	
6-1	į	×		Ę		-	}			K = 8.7 x 10° cm/s 00° = 6 00°	
-1							} ;		1	Max. water Vol. M. E. 7.	
7-		×		ĭ Z			1			= 1.5 L/min	
					·					Ground water level	
8		፞፠		5				1	١.	≠4,1m	L. Fast
4				mprignated		<u> </u>	ļ	<u> </u>		8.6	798.99
9	E e			ē		es.			}	Phonolite Very hard and fresh with green	
4	Phonolite	×				Greenish grey	1		ļ	tint. Porthyritic fine grained	
20	₺		minnin			<u>ં</u>		ـــا	<u> </u>	phonolife. 200 E20	787.59
-		Ì	K. N				1		1	Pulliar a note of residence of the second se	
								1.		(stick), 2(substick), 3(piece), 4(fragment), 8 grein	
			1	- com los			١,	-		-5 (soft)	••
				- ROD			•	(in each)	- 5109	***************************************	

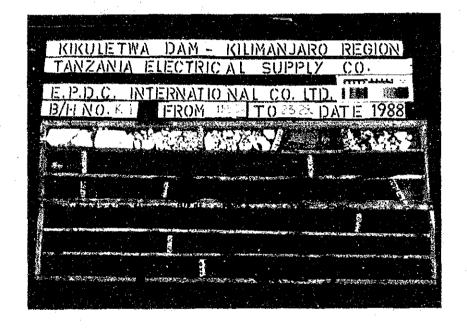
K	IKL	JLE	TWA	No	2	PR	OJE	<u>CT</u>	-	HOLE N	o. KD-8 (SHEET	OI	F 2	<u>)</u>
	ATIO				rock	:		_	DI	EPTH OF HOLE 30.0	m COMMENCED_			<u>- '88</u>
	ATIC		7					m		EPTH OF OVERBURDENO.7				- '88
			X=4,45							NGTH OF ROCK DRILLING 29.3	m DRILLEO BY _	<u>T, c</u>).; [М.О
			HOLIZO			- 9	0	-	TO	OTAL LENGTH OF CORE 25.3	m LOGGED BY _		M.S	
BEA	RING	OF	ANGLE	HOLE	·	I			C	DRE RECOVERY 84.2	%			
	w	-				<u> </u>			(DBSERVATION OF CORE	1.4	*********		
DEPTH	ROCK NAME	0	CORE	NO.	SIT CASING	~	ä	1 8	و		WATER TABLE	V	E	ELEVATION
130	ğ	7	ខ ខ្លួ	Sewi T	<u> </u>	COLOR	WEATHER	HARD. NESS	CORE	DESCRIPTION	WATER PRESSURE TEST		DEPTH	LE Y
	Ğ.					L	≱	r	ರ		LEAKAGE OF DRILLING WA	TER		ü
Om			0 ⇒ 100 _%			L	ļ	<u> </u>			LUGEON		10 Om	779.57 ₩
		Δ] .			Limestone gravel 0.7 in silty clay matrix.		-	Ē .	# 70.05
1 .1		Ш			ļ		 	-					Ē.	778.87
']	}	11	WIIIII				3	3	3	Limestone		88	E-1	
			KA III				3-4	3~4	3~4	Markey die		2/	Ē	
2-1		7					-			Meditielen Milite Line		//	-2	
				·						and medium grained bioclastic				·
3		L					3~4	3-4	21	limestone.	3.2	Li	3	776.37
4	ł	<u> </u>					'	3 4	2-0	Occasional vugs upto 5cm	 Lu=137 ·K=1.3x10 m/s Max.P. = 3.4 kg/cm² 	NiL	ш.	
4	[H					İ			empty or rarelly filled with			4	* :
l alan	ļ	Щ	KKKKIII				<u></u>			clay.	・Max. water Vol. = 84.6 Vmin • Ground water level			
5_	2	Щ	KMMIII				3~4	4	4		5.0 = 3.2 m	1.88	-5	774.57
	stone	Ц		٠.		₩hii				5.0 ~ 5.45, 9.35 ~ 9.80 ^m	· Lu = 56	27		
Ē	t	Ш					3~4	4	3	Loosely consolidated	K = 6.8xIO ⁻⁴ cm/s		6	
"	ε				E	brownish	3~4			bioclastic limestone	• Max.P. = 3.6 kg/cm ²	- 20		·
- 1	Ē	\mathbf{H}	KKATIII		51:	5.0	3~4	4	4	as coarse sand.	· Max, water Vol.			1
']	- }				ğ		3~4	4	3		= 101.12/min		7	
5 6 7 7 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Ì			-	casing	Little	5	4 5	5		· Ground water level	4.5		
8-	ļ			dla	ر و		3	3	3		≠ 6.8m		-8	
9 11 11		Ш	<u> </u>	101 mm			4 7	4~3	· 24	•		7.88		.
9-3		1	#	-	Depth		4~3	4.43	J~4			2	9	
=		┸┦					5	5	5	·		3/6	: 	
10		円	, 	Σ			4~3	4~3	3		10.0	9.3	10	769.57
=	Į	딖	4	I		.:						9.3		
1-		山		ed	ε		3~4	5~4 4	≎~4	11.0	,		1	
1 3		\ <u>a'</u>	31 I I I I	-	~	:	4	4		Tuff-breccio				
1	В	´`	X IIIIII	mprigna	6	2			3	Weathered fine to coarse	·	00	2	
1	, <u>, ,</u>	X	ИШШ	, i	of casing :	0	4~3	4~3		grained tuff with subround lava		7 '88		
]	ř.		4444111	Ε	S	is				inclusions upto 1cm(II.O~I3.75 ^m)		OI		,
2 3-1-11111-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	Tuff breccia	X			7	Brownish	4	4	4	upto 5cm (13.75 ~ 14.5m)		702	3	
					두	õ	ļ				14.0	Ñ	<u> </u>	765.57
4-		×			Depth				_ :	14.5		İ	-4	
1 4		{			-		4~3	4~3	3	14.5 Trachytic tuff breccia	IEA		Ē.	765.07
5-		Д		.	—		<u> </u>			Weathered dark grey with	Lu= 32	NIL.	5	764.57
=		$^{\prime\prime}$ $ $			ε	>			4~3	patches and green staining	-K=41x10 ⁻⁴ -Lu=19	788	F	
6 7 7					: 12.7 m	dark grey			5	trachytic tuff breccia of	cm/s K=23x10 ⁴ ·Max.P. 2 cm/s	1/2	6	
‡	010	X				¥			_	s ubangular vesicular accasionally	=4.6kg/cm Max P	21/2	E	
7.	Tuff breccia	,			casing			4~5	4	compoct porphyritic, trachytic	Max.water =2.7kg/cm Vol.=88.5 Max.water	NIL	E -7	
	مَ	片	ЩЩ		- 8 8	Š	4	(3)		tuff preccia fragments upto	₽/min Vol.=25.3		E.	
8-11 1411-141	#		}		يّ اة	brownish			-	Ocm occasionally upto boulder	Ground Umin	œ	EΩ	
5-	-	义	7						2.0	size in thin fine grained matrix.	### ##################################	88./	E-8	·
		ļ			Depth	∓e			4~3	шинга	≠17.5m	N	E	
9-		Х	W		ادّ	Little						22 /	E-9	
_ = =		^`			:					30.0			E	759.57
20 1	Щ,		VALUE IN					1	ı	20.0 ▶ driller's note € Confd. Shee!	2	NIL	= 20	108.01
									1 16	tick), 2(substick), 3(piece), 4(fragment), 5 grain	-			
	1	·l	M KM	- core lo	55			1 (h	(bıs	*				
			ŧ	- ROD			. 1			отрозеф)	1	. 1		•

к	akı	ULE	ETWA	No:	2	PR	DJE(CT	<i>,</i> (4)		HOLE N	о. KD-8 (SHEET 2	2 of 2) <u> </u>
	ATIO		Pe						DE	EPTH OF HOLE	30.0			
ELE	VATIO	NO		779	.57	<u> </u>	1	n		EPTH OF OVERBURDEN				
				••••			837.42 LENGTH OF ROCK DRILLING 29.3							
			HOLIZO							OTAL LENGTH OF CORE DRE RECOVERY			<u>M,S,</u>	
BEA	RING	OF	ANGLE	HULE							84.2	<i>7</i> ⁄		1
æ	AME		}	≰ _z u	j O		: 		C	DBSERVATION OF CORE		WATER TABLE	, _#	OL NO
рертн	POCK NAME	0	CORE	CEMENTA	S Si	COLOR	YEATHER ING	HARD. CORE		DESCRIPTION		WATER PRESSURE TEST	DEPTH	ELEVATION
	8			5 '		8	34	¥.	2			LEAKAGE OF DRILLING WAT		
20m		 	10 → 100 _%	ļ							<u> </u>	LUGEON [20.0]	40 20m NIL E	779,57 🖫
) <u>h</u>				당			4-3		đ with		-	1 1
1-		`				g brown				limonite.		· Lu = 57	<u>-</u> 1	1
1)o(W			Little brownish dork grey			4	Crocks subharizon		. K = 6.9 x 10 cm/sec 10	Ē	
2-			94	dia		Litile dark				steep rough with gree			<u></u>	}
1		X	(A)						4-3	Voneer/limonite s	itain.	• Max.water Vol. 8	Ė	
3-						9 9 2 9			5	23.0 ~ 23.5 m		• Ground water level	<u></u>	1
)a(MIIII	Н.М. ІОІ т	0					Dark greyed ash		=22.5m ≥	E ₄	
4-	ā		и	Σ								1		
5-	breccia	ì	И		 1271	 _	4	4-5				25.0	5 5 5	754.57
1	مَا	<u>`</u> `o(na t	casing	grey	·	(3)					23.4	
րաքակակակակակակակականութութութութութութութութութութութութութո	1,0			mprignated	ទ	dark						' Lu = 0	<u></u>]]
	ı,F	X	Ø	E	Depth				İ	: •	•	- K=<10 ⁻⁶ cm/sec	E	{
7-				-	ြီ	ish			4-3			• Max.P.=5,27kg/cm ²	E-7	1 1
		\X	АШ	1		brownish		:				• Max. water Vol. = O 1/min	Ē	
8-			XIII III			1 1						Ground water level	արույրույլում Ծ	
1		义				11116						=22.4m	Ē	1
9]]]			7				·			E-9]]
		À								30.0		30.0		749.57
30-				 						End of bore hole	•		26.1	1.2
]									E 1	
1 1													Ē.	} .
2-				{					- 1		:		<u></u>	}
1				}	. 1					* 4*			<u> </u>	
3				ļ						e de la companya de l			<u>E</u> -3	
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4-				}									<u> </u>	
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5-					·						: .		E-5]
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6-													E 6	
1														
7-					7.5%		.	j	.		1		E 7	}
أساسائس										en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de			E 8	
8-1							- 1							
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1 1					-		1							
[ه													Εo	لــــا
	٠	ŀ					1	1	1	b driffer's note (E are-			
		,	N	care la	15			1,0	1 (9 ard) ~ :	tick), 2(substick), 3(piece), 4(fragment), 5(soft)	o Gravu			
			A -		. •		1	- (1)			* -		•	

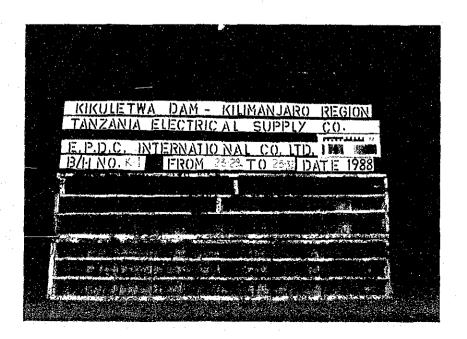
LOC/			TWA Pow).2 Stati			CT	DE	13 Mily (14 Carlos and 14 Carl	No. KD-9 (SHEET	1 o	*****	
ELEV	/ATIC	N		730	.74			m	DE	PTH OF OVERBURDEN	2.45 m COMPLETED			
C00	RDÍN	ATE	X=4,40	7.68	3 ; Y≈ [<u>7,04</u>	<u>19.5</u>	<u>0</u>	LΕ	NGTH OF ROCK DRILLING	.55 m DRILLED BY	J.D.	Μ.	0.
ANG	LE F	ROM	HOLIZO	NTAI	L	- 9	0		TO	TAL LENGTH OF CORE	1.62 m LOGGED BY	N	1.S	
BEA	RING	OF	ANGLE	HOLE	Ē		-	_	CC	RE RECOVERY 9:	<u>3.1_</u> %			
	เม							:		BSERVATION OF CORE			T	7
Ę	ROCK NAME	Ø	CORE	N N	NG OF	~	œ	92	1		WATER TABLE	∿	E	ELEVATION
ОЕРТН	Š	7 0	8 8	AN I	KIND OF BIT CASING	COLOR	WEATHER ING	HARD. NESS	CUTTING	DESCRIPTION	WATER PRESSURE TEST		ОЕРТН	EVA
	8		ax.			0	3	ì	2		LEAKAGE OF DRILLING W	ATER		បី
0m			0 → 100 _%			L					UGEON LUGEON		40 Qm	730.74 ^m
		Δ			Ť					Over burden			E	
	burden									0 ~ 2.0 m			<u> </u>	
'-	ğ	Δ								Gravelly silty clay 2.0 ~ 2.45 m			F 1	l .
						>-	,				au l		<u>-</u>	
2-	Over	Δ				grey		Ì		Lava gravel in dense slity c	uy.	88	-2	1.
4			77 777) H		1		<u> — </u>		-	2.45		\	Ē.	728.29
3	Ì	`A(rownish		<u> </u>		Tuff breccia		/2	3	
						- M.C				Weathered tuff breccia of angular phorolitic fragments		26	E	
الله ا		×				e e	4	a	2	up to 3cm in finegrained matri	y 19		Ė.	
1 1	breccia		ини				'	ļ `	-	Cracks subhorizontal rough	"		-4	
. 51	ခ်	X								clay veneer.	· .		Ē	
5-1	ľ		WW.							5.05		-	-5 ,	725.69
=	Tuff)r(KKKK	dia	٠. ا	. S				Tuff breccia		ĺ	E	
6-3	-	/-\	MUUN	E 101		grey				Fairly fresh and hard	· Lu=79		E-6	
4	-	. ,	XXXXX	5	ارا	1	2-3	2~3	1~2	trachytic tuff breccla.	K = 9.7 x 10 ⁻⁴ cm/se	٠.	È.	[[
7.3		义	WIIII	.2	'	۵					• Max.P.=3.41 kg/cm²	00	-7	}
1 3		_	XXIIII	×						7.35	Max. water Vol.	/ '88	['	723.39
		0	1441111	Ξ		grey				Conglometate	= 139.2 ½/min	1 2	Ē	
8 -				mprignated		dark				776 . 13 6	: Ground water level	1	E-8	
		٥	911111	nat		Ą				7.35 ~ 11.0 m	= 3.8m	27	Ē.	
9-3		0 0	/IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	5		brownish				Weathered conglomerate			E-9	
		٥		Ğ.		ρ̈́				mainly rounded phonolite			-	
10-	•	0 0	7	ᇽ		-	4-5	4-5	4-3	fragmente upto 10 cm in	10.15		E-10	720.59
	٠. ا	0	ЯШЩ		pth of sing 3.05m	<u> </u>	(3-4)	(3-4)		fine grained matrix.	10.30	3.8	E	720.44
1=			(pth of sing 3.						1.0.00	3,88,72/	Ē.	1.0.3
		_			Oept					11.0 ~ 11.5 , 12.7 ~ 14.0	Lu = 71		<u> </u>	.
2		١	/		0.0	grey				15.2~ 17.0 m	· K = 8.9 x 10 ⁻⁴ cm/sec	3.8	-	
23	1	9	ДШШ			5				Fairly fresh conglomerate			-2	ł
=	. }	°	ИШШ			<u>‡</u>				cfrounded lava, gneiss, and			1.	
3-	k	0	KKAIII			Light	_		١, ا	limestone particles upto	' Max. water Vol.	1.88	3	·
-	.	0		dia	•		3	3	(2)	5 cm in fin e sandy or calcit	Ground water level	2/2	E-	. 1
4=	9			E						matrix.	=3.4 m	28/	4	
3 4 5 6 6	Conglamerate	۰		86mm dia			4~5		4~3	11.5 ~ 12.7 , 14 ~ 15.2 m		"	E.	.
5-	Ĕ	, ,		100	اے	74	3~4	(3~4)	7-3	Weathered conglomerate,	I5.00		5	715.74
	ğ	۱ ۱		Σ	æ	Sark				as above.	15.20	3.8	E "	715.54
	Ö	0	WIIII	Σ	õ		: • 					3.5	<u> </u>	1.0.07
6	·	, o	W	9	Ď	grey	3	3	1		• Lu=66		6,	
		0	ИШП	Imprignated	casing	5	-	_	(2)	17.0	• K = 8.3 x 10 4 cm/sec		E	
7		i of		2					ł	<u>17.0</u>	+ Max.P. = 3.41 kg/cm ²	88.	7	
=====================================		•		E	ò					17.0 ~ 20.0 m	• Max. water Vol.	-		
8					Depth	grey				Strongly weathered	=112.6 L/min	2/5	8:	
8-1	٦			. 1	ă					tuffaceous marly ash as	Ground water level	59		
<u>- 1</u>		Ì				ş	5~4	5~4	3	sand.	≈ 3.8 m		Ĕ . l	
	ľ					Brownish	-,	.	- 44				9	
20	20.0	٩				80			· .	20.0 End of bore hole			_	710.74
<u></u> -1		! Y	/ N				<u>_</u>	1		SUO ENG OF BOSE HOLE		3.8	20	117.14
	: 1, 1	K	1						1 (61)	ck), 2(substick), 3(piece), 4(fragment), 5 grain	e e		. :	
		r,	A KI	core lo	15			104	ırd) — 5					
		٠	t	RQD			. }{			enposed)		*:		

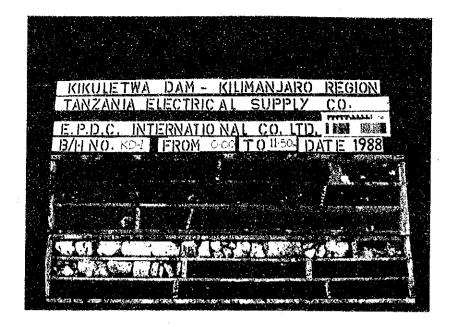


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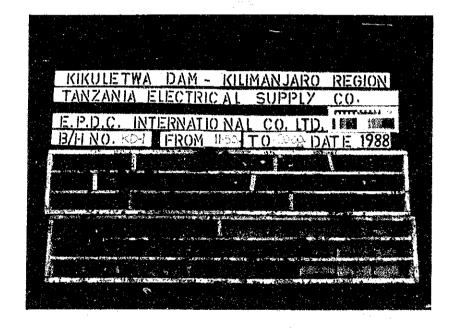


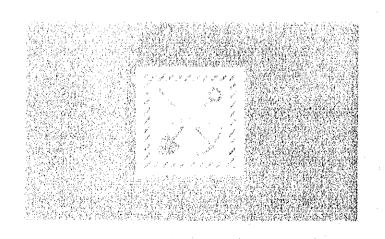
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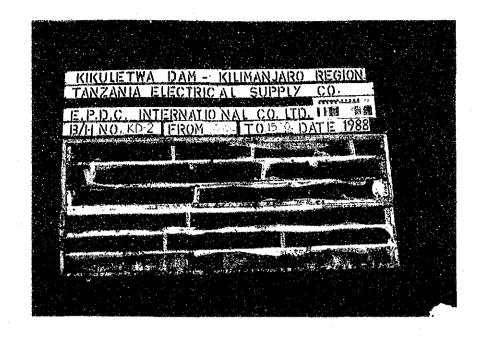


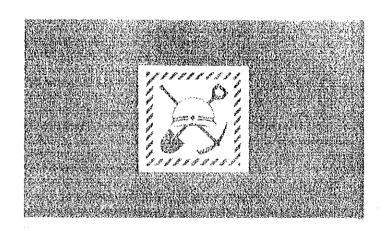


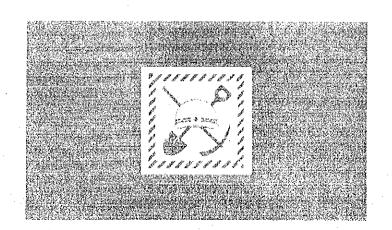
KD+1



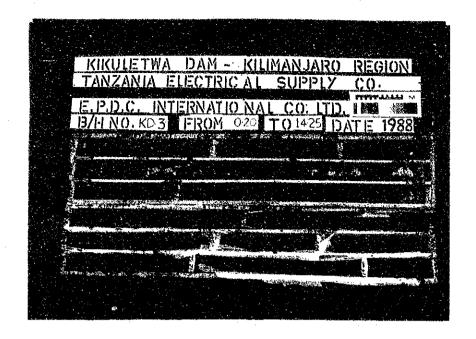


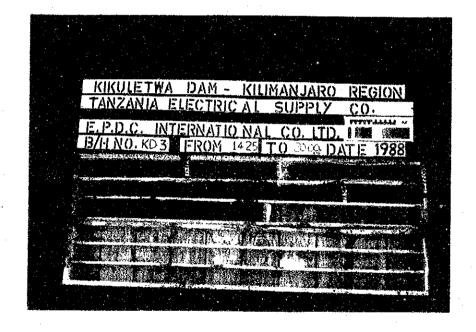


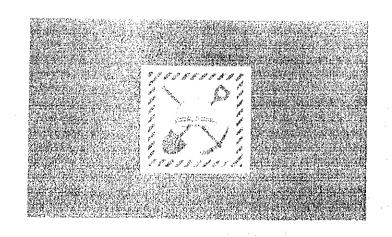


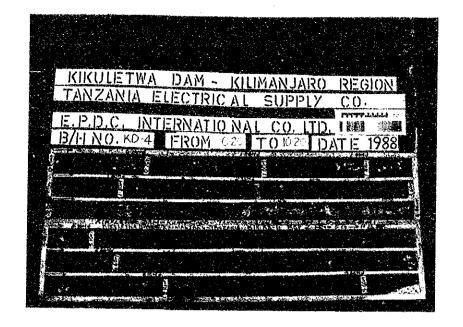


KD~3







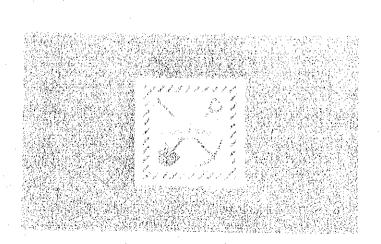


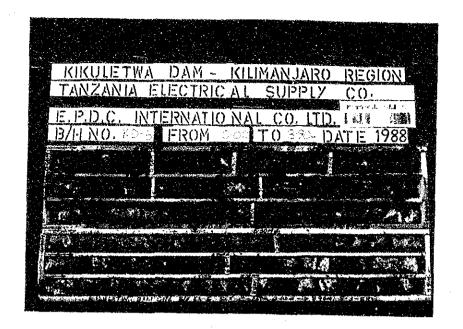
KIKULETWA DAM - KILIMANJARO REGION
TANZANIA ELECTRICAL SUPPLY CO.

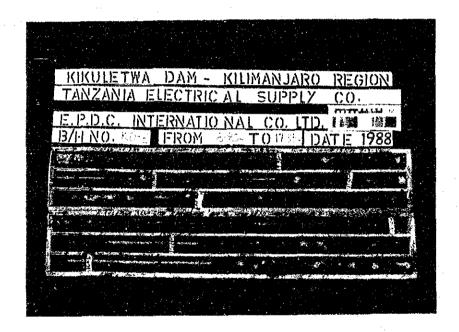
E.P.D.C. INTERNATIO NAL CO. LTD.

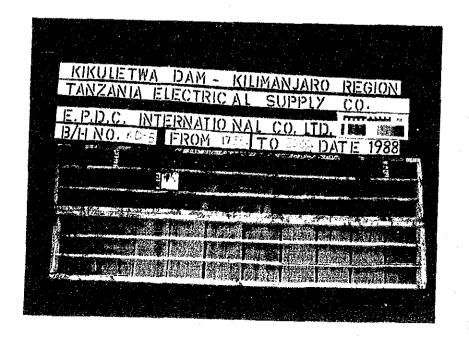
B/H NO. KO 4 FROM 1020 TO DATE 1988

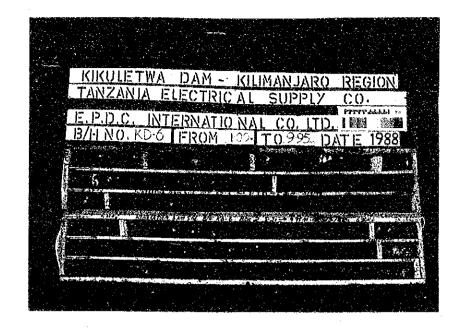
KD~4

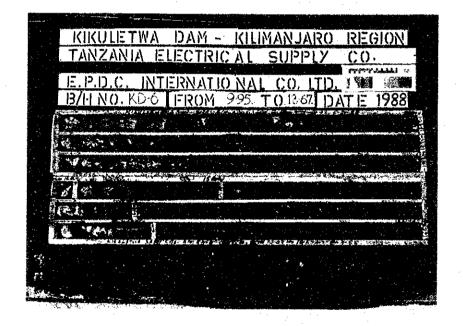




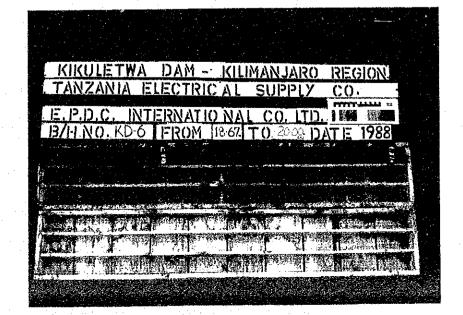




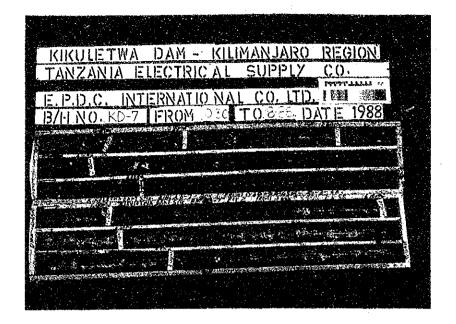


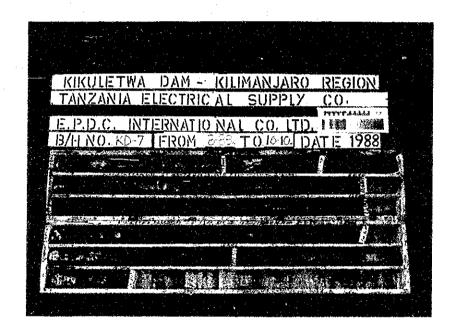


KD-6

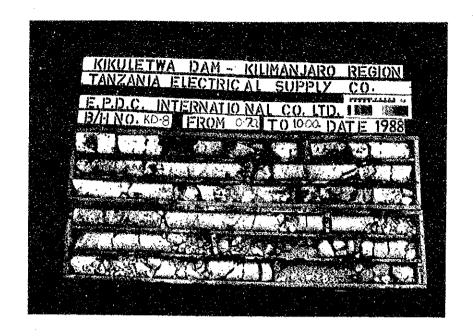


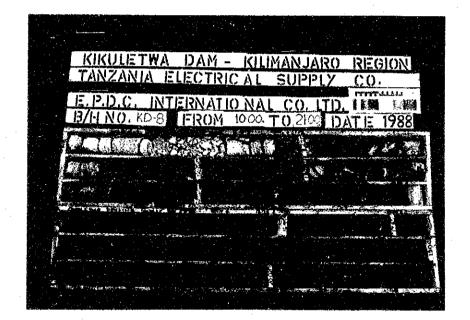
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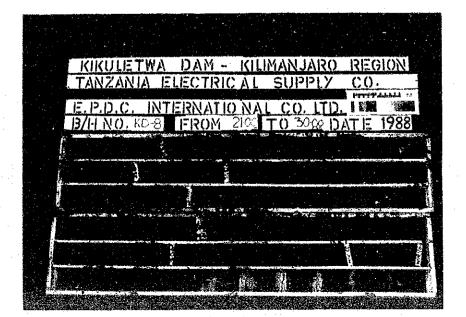




KIKULETWA DAM - KILIMANJARO REGION TANZANIA ELECTRICAL SUPPLY CO.	
TANZANIA ELECTRICAL SUPPLY CO.	
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