

A-1-4 Mean Daily Water Level of NC3 Gauging Stations

Table A-1-47 Mean Daily Water Level of NC3 Gauging Station in 1985 (Unit: m)

1985

NC3 MEAN DAILY WATER LEVEL

DAY	1	2	3	4	5	6	7	8	9	10	11	12
1	0.70											
2	0.56											
3	0.56											
4	0.55											
5	0.54											
6	0.54											
7	0.54											
8	0.52											
9	0.50											
10	0.55											
11	0.54											
12	0.53											
13	0.69											
14	0.47											
15	0.40											
16	0.39											
17	0.39											
18	0.47											
19	0.50											
20	0.43											
21	0.39											
22	0.36											
23	0.35											
24	0.34											
25	0.34											
26	0.42											
27	0.39											
28	0.35											
29	0.33											
30	0.30											
31	0.29											
TOTAL												14.23
AVERAGE												0.46
MAXIMUM												0.70
MINIMUM												0.29
MAX-NI CHI DATE < 851201 >												0.70
35-NI CHI DATE < 850104 >												-999999.88
95-NI CHI DATE < 850305 >												-999999.88
105-NI CHI DATE < 850603 >												-999999.88
205-NI CHI DATE < 850901 >												-999999.88
305-NI CHI DATE < 851120 >												-999999.88
MIN-NI CHI DATE < 851130 >												-999999.88
ITEM# 12												

ANNUAL

TOTAL AVERAGE MAXIMUM MINIMUM

-915068.34 0.70 -999999.88

Table A-1-48 Mean Daily Water Level of NC3 Gauging Station in 1986 (Unit: m)

NC3 MEAN DAILY WATER LEVEL

1986

DAY	1	2	3	4	5	6	7	8	9	10	11	12
1	0.39	0.39	0.29	0.49	0.49	0.54	0.39	0.29	0.24	0.19	0.14	0.29
2	0.41	0.39	0.39	0.47	0.57	0.41	0.59	0.29	0.24	0.18	0.26	0.26
3	0.40	0.30	0.34	0.39	0.59	0.64	0.38	0.28	0.24	0.18	0.34	0.26
4	0.43	0.39	0.34	0.41	0.63	0.60	0.38	0.28	0.24	0.18	0.39	0.26
5	0.47	0.43	0.35	0.41	0.56	0.60	0.36	0.28	0.24	0.18	0.39	0.28
6	0.52	0.52	0.33	0.39	0.56	0.58	0.36	0.28	0.24	0.18	0.38	0.29
7	0.50	0.56	0.30	0.39	0.56	0.58	0.36	0.27	0.24	0.18	0.36	0.38
8	0.40	0.50	0.30	0.42	0.54	0.55	0.36	0.27	0.24	0.18	0.35	0.41
9	0.34	0.52	0.30	0.44	0.55	0.53	0.36	0.27	0.23	0.18	0.32	0.40
10	0.30	0.49	0.30	0.48	0.56	0.53	0.36	0.27	0.23	0.18	0.29	0.48
11	0.29	0.45	0.29	0.51	0.56	0.53	0.35	0.27	0.22	0.18	0.29	0.35
12	0.31	0.40	0.29	0.47	0.55	0.52	0.34	0.27	0.22	0.18	0.29	0.33
13	0.30	0.39	0.29	0.47	0.53	0.51	0.34	0.27	0.22	0.18	0.28	0.30
14	0.29	0.39	0.30	0.40	0.53	0.50	0.34	0.27	0.21	0.17	0.28	0.28
15	0.37	0.36	0.30	0.40	0.52	0.48	0.34	0.26	0.20	0.17	0.26	0.29
16	0.42	0.35	0.34	0.45	0.51	0.46	0.33	0.26	0.20	0.17	0.26	0.31
17	0.40	0.40	0.33	0.45	0.51	0.45	0.33	0.26	0.19	0.16	0.26	0.28
18	0.39	0.38	0.34	0.49	0.50	0.45	0.33	0.26	0.19	0.16	0.25	0.35
19	0.41	0.34	0.34	0.57	0.54	0.44	0.32	0.26	0.19	0.15	0.25	0.54
20	0.38	0.34	0.34	0.54	0.53	0.44	0.32	0.26	0.19	0.14	0.25	0.53
21	0.36	0.33	0.37	0.47	0.64	0.42	0.32	0.26	0.19	0.14	0.25	0.47
22	0.35	0.33	0.45	0.39	0.59	0.42	0.31	0.26	0.19	0.14	0.24	0.39
23	0.34	0.34	0.40	0.26	0.58	0.40	0.31	0.26	0.19	0.14	0.24	0.41
24	0.37	0.34	0.39	0.38	0.53	0.41	0.31	0.26	0.19	0.14	0.24	0.39
25	0.40	0.35	0.34	0.40	0.54	0.41	0.31	0.26	0.19	0.14	0.24	0.39
26	0.70	0.33	0.62	0.43	0.56	0.40	0.31	0.25	0.19	0.14	0.24	0.38
27	0.59	0.32	1.25	0.43	0.58	0.40	0.30	0.25	0.19	0.13	0.26	0.38
28	0.58	0.30	0.99	0.40	0.57	0.39	0.30	0.25	0.19	0.13	0.27	0.42
29	0.49	0.30	0.81	0.39	0.55	0.39	0.30	0.25	0.19	0.13	0.29	0.39
30	0.43	0.30	0.69	0.38	0.55	0.39	0.29	0.25	0.19	0.14	0.28	0.36
31	0.43	0.30	0.62	0.38	0.55	0.39	0.29	0.25	0.19	0.14	0.28	0.36
TOTAL	11.01	11.01	15.16	14.53	14.53	14.53	8.22	6.31	4.98	8.44	11.20	11.20
AVERAGE	0.39	0.39	0.44	0.48	0.48	0.48	0.27	0.21	0.16	0.28	0.28	0.36
MAXIMUM	0.80	0.56	1.25	0.57	0.64	0.64	0.39	0.29	0.24	0.19	0.39	0.54
MINIMUM	0.30	0.30	0.30	0.38	0.38	0.39	0.30	0.25	0.19	0.13	0.14	0.26
MAX-NICHI DATE < 860327 >	1.25											
35-NICHI DATE < 860529 >	0.55											
75-NICHI DATE < 860621 >	0.42											
105-NICHI DATE < 860318 >	0.34											
275-NICHI DATE < 861115 >	0.26											
295-NICHI DATE < 861101 >	0.14											
MIN-NICHI DATE < 860710 >	-999999.88											
ITEM(12)	-6999870.28 -19177.73 1.25 -999999.88											
***** ANNUAL *****												
***** TOTAL AVERAGE MAXIMUM MINIMUM *****												

Table A-1-49 Mean Daily Water Level of NC3 Gauging Station in 1987 (Unit: m)

1987

NC3 MEAN DAILY WATER LEVEL

DAY	1	2	3	4	5	6	7	8	9	10	11	12
1	0.34	0.31	0.30	0.28	0.26	0.26	0.22	0.16	0.14	0.13	0.13	0.13
2	0.31	0.30	0.30	0.27	0.26	0.26	0.22	0.16	0.13	0.13	0.13	0.13
3	0.30	0.29	0.34	0.27	0.24	0.26	0.22	0.16	0.13	0.13	0.13	0.13
4	0.35	0.29	0.46	0.27	0.24	0.26	0.21	0.15	0.13	0.13	0.13	0.13
5	0.36	0.29	0.46	0.27	0.24	0.26	0.21	0.15	0.13	0.13	0.13	0.13
6	0.41	0.34	0.40	0.26	0.26	0.26	0.21	0.15	0.13	0.13	0.13	0.13
7	0.43	0.34	0.39	0.26	0.26	0.26	0.21	0.15	0.13	0.13	0.13	0.13
8	0.45	0.34	0.39	0.26	0.26	0.26	0.20	0.15	0.12	0.12	0.12	0.12
9	0.40	0.33	0.40	0.28	0.28	0.28	0.20	0.15	0.12	0.12	0.12	0.12
10	0.39	0.32	0.37	0.28	0.28	0.28	0.20	0.15	0.12	0.12	0.12	0.12
11	0.36	0.32	0.34	0.29	0.28	0.28	0.20	0.15	0.12	0.12	0.12	0.12
12	0.34	0.32	0.33	0.30	0.29	0.28	0.20	0.15	0.12	0.12	0.12	0.12
13	0.36	0.36	0.29	0.30	0.29	0.29	0.20	0.15	0.12	0.12	0.12	0.12
14	0.36	0.36	0.26	0.30	0.26	0.26	0.20	0.15	0.12	0.12	0.12	0.12
15	0.41	0.36	0.25	0.34	0.35	0.26	0.21	0.15	0.12	0.12	0.12	0.12
16	0.40	0.40	0.28	0.39	0.28	0.28	0.21	0.14	0.10	0.10	0.10	0.10
17	0.38	0.40	0.28	0.43	0.33	0.28	0.20	0.14	0.10	0.10	0.10	0.10
18	0.45	0.40	0.45	0.43	0.33	0.33	0.20	0.14	0.10	0.10	0.10	0.10
19	0.47	0.41	0.46	0.43	0.33	0.33	0.20	0.14	0.10	0.10	0.10	0.10
20	0.54	0.43	0.40	0.39	0.33	0.33	0.19	0.14	0.10	0.10	0.10	0.10
21	0.48	0.42	0.38	0.36	0.33	0.33	0.19	0.14	0.10	0.10	0.10	0.10
22	0.45	0.40	0.36	0.36	0.33	0.33	0.19	0.14	0.10	0.10	0.10	0.10
23	0.42	0.35	0.39	0.38	0.33	0.33	0.18	0.14	0.09	0.09	0.09	0.09
24	0.40	0.31	0.38	0.38	0.33	0.33	0.18	0.14	0.09	0.09	0.09	0.09
25	0.36	0.29	0.34	0.40	0.33	0.33	0.18	0.14	0.09	0.09	0.09	0.09
26	0.32	0.27	0.34	0.46	0.33	0.33	0.17	0.14	0.09	0.09	0.09	0.09
27	0.32	0.28	0.32	0.44	0.33	0.33	0.17	0.14	0.09	0.09	0.09	0.09
28	0.34	0.27	0.30	0.40	0.33	0.33	0.16	0.14	0.08	0.08	0.08	0.08
29	0.33	0.27	0.30	0.39	0.33	0.33	0.16	0.14	0.08	0.08	0.08	0.08
30	0.32	0.29	0.29	0.39	0.33	0.33	0.16	0.14	0.08	0.08	0.08	0.08
31	0.31	0.28	0.28	0.39	0.33	0.33	0.16	0.14	0.08	0.08	0.08	0.08
TOTAL	10.93	10.26	10.93	6.01	4.52	3.27	3.27	3.27	3.27	3.27	3.27	3.27
AVERAGE	0.35	0.33	0.35	0.19	0.15	0.11	0.11	0.11	0.11	0.11	0.11	0.11
MAXIMUM	0.54	0.43	0.46	0.43	0.43	0.43	0.22	0.16	0.14	0.14	0.14	0.14
MINIMUM	0.25	0.26	0.25	0.16	0.14	0.14	0.16	0.14	0.08	0.08	0.08	0.08
MAX-NICHI-DATE	< 870120 >											
MIN-NICHI-DATE	< 870428 >											
35-NICHI-DATE	< 870201 >											
75-NICHI-DATE	< 870201 >											
105-NICHI-DATE	< 870824 >											
275-NICHI-DATE	< 871002 >											
355-NICHI-DATE	< 871221 >											
475-NICHI-DATE	< 871231 >											
TOTAL	AVERAGE											0.54
TOTAL	MAXIMUM											0.54
TOTAL	MINIMUM											-999999.88
TOTAL	TOTAL											-391780.61
TOTAL	TOTAL											-999999.88

Table A-1-50 Mean Daily Water Level of NC3 Gauging Station in 1988 (Unit: m)

1988

NC3 MEAN DAILY WATER LEVEL

DAY	1	2	3	4	5	6	7	8	9	10	11	12
1	0.38	0.36	0.35	0.30	0.28	0.24	0.24	0.24	0.22	0.20	0.18	0.17
2	0.36	0.35	0.30	0.28	0.24	0.24	0.24	0.22	0.20	0.18	0.17	0.16
3	0.35	0.30	0.28	0.24	0.24	0.24	0.24	0.22	0.20	0.18	0.17	0.16
4	0.30	0.28	0.24	0.24	0.24	0.24	0.24	0.22	0.20	0.18	0.17	0.16
5	0.28	0.24	0.24	0.24	0.24	0.24	0.24	0.22	0.20	0.18	0.17	0.16
6	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.22	0.20	0.18	0.17	0.16
7	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.22	0.20	0.18	0.17	0.16
8	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.22	0.20	0.18	0.17	0.16
9	0.22	0.20	0.18	0.17	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15
10	0.20	0.18	0.17	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11	0.17	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
13	0.21	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
14	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
15	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
17	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
18	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
19	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
20	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
21	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
22	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
23	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
24	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
25	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
26	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
27	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
28	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
29	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
30	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
31	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
TOTAL	5.22	4.59	2.77	0.91	0.68	0.0	0.0	0.32	0.49			
AVERAGE	0.17	0.15	0.09	0.03	0.02	0.0	0.0	0.01	0.02			
MAXIMUM	0.38	0.36	0.35	0.30	0.28	0.24	0.24	0.24	0.22	0.20	0.18	0.17
MINIMUM	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
MAX-NIGHT DATE	880401											
25-NIGHT DATE	880525											
5-NIGHT DATE	880720											
125-NIGHT DATE	881224											
275-NIGHT DATE	880116											
355-NIGHT DATE	880419											
MIN-NIGHT DATE	880430											
ITEM(12)												
***** ANNUAL *****												
***** TOTAL AVERAGE MAXIMUM MINIMUM *****												
***** -22349.64 0.38 -99999.88 *****												

Table A-1-51 Mean Daily Water Level of NC3 Gauging Station in 1989 (Unit: m)

NC3 MEAN DAILY WATER LEVEL

1989

DAY#	1	2	3	4	5	6	7	8	9	10	11	12
1	0.07	0.36	0.24									
2	0.08	0.29	0.22									
3	0.10	0.29	0.26									
4	0.14	0.27	0.22									
5	0.14	0.27	0.21									
6	0.13	0.26	0.21									
7	0.10	0.25	0.20									
8	0.10	0.25	0.20									
9	0.10	0.15	0.21									
10	0.09	0.14	0.21									
11	0.09	0.13	0.21									
12	0.08	0.16	0.21									
13	0.07	0.28	0.20									
14	0.06	0.27	0.20									
15	0.06	0.22	0.20									
16	0.09	0.20	0.20									
17	0.18	0.29	0.26									
18	0.21	0.24	0.30									
19	0.23	0.24	0.50									
20	0.29	0.24	0.48									
21	0.32	0.23	0.45									
22	0.48	0.20	0.42									
23	0.51	0.25	0.33									
24	0.57	0.30	0.44									
25	0.67	0.32	0.38									
26	0.70	0.25	0.35									
27	0.63	0.23	0.33									
28	0.55	0.20	0.34									
29	0.47	0.32	0.32									
30	0.47	0.35	0.35									
31	0.36											
TOTAL	8.14	6.79										
AVERAGE	0.26	0.24										
MAXIMUM	0.70	0.26	0.50									
MINIMUM	0.06	0.13										
MAX-NI CHI DATE < 890126 >			0.70									
35-NI CHI DATE < 890214 >			0.27									
75-NI CHI DATE < 890405 >			-999999.88									
125-NI CHI DATE < 890704 >			-999999.88									
275-NI CHI DATE < 891002 >			-999999.88									
355-NI CHI DATE < 891221 >			-999999.88									
MIN-NI CHI DATE < 891231 >			-999999.88									
*ITEM(12)												
ANNUAL												
TOTAL												
AVERAGE												
MAXIMUM												
MINIMUM												

A-2 GEOLOGY

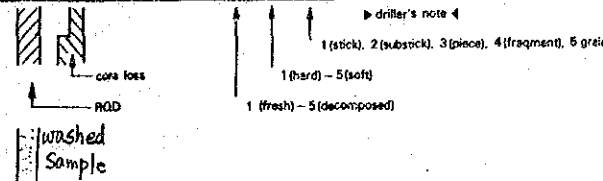
	<u>Page</u>
A-2-1 Geologic Log of Drill Hole	2 - 1
A-2-2 Data Sheet of Permeability Test	2 - 16
A-2-3 Record of Water Level in Borehole during Drilling	2 - 49
A-2-4 Core Photograph	2 - 59
A-2-5 Microscopic Observation	2 - 71
A-2-6 Microscopic Photograph	2 - 75
A-2-7 X-ray Analysis Data	2 - 78

A-2-1 Geologic Log of Drill Hole

GEOLOGIC LOG OF DRILL HOLE

PROJECT Kihansi **HOLE No.** KU-1 (SHEET 1 OF 3)
LOCATION Upper dam site **DEPTH OF HOLE** 52.0 m **COMMENCED** 8-8-89
ELEVATION _____ m **DEPTH OF OVERBURDEN** 4.3 m **COMPLETED** 10-16-89
COORDINATE _____ **LENGTH OF ROCK DRILLING** 45.7 m **DRILLED BY** M. WILKIE
ANGLE FROM HORIZONTAL 90 **TOTAL LENGTH OF CORE** _____ m **LOGGED BY** M. Shigeta
BEARING OF ANGLE HOLE _____ **CORE RECOVERY** _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE	WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING							
0			0-100%										0	0m	
0.3	Over burden			7 1/2" dia. auger	Reddish brown					Adhesive clay ~ silt					
0.3 - 3.6				6" dia. casing						3.6 ~ 3.35 m Weathered Pl. G. gneiss which is broken by hand					
3.6 - 4.3				101 mm dia. bit						4.3					
4.3 - 12.1				103.5 mm dia. casing						Hard weathered Gt-Gn					
12.1 - 18.0				86 mm dia. bit						Washed sample (Sand)					
18.0 - 13.9				89.2 mm dia. casing						13.9 ~ 14.0 m Weathered boulder Dip of foliation is 45°					
13.9 - 14.0										almost Plagioclase is converted into clay mineral					
14.0 - 12.1															
12.1 - 9.2															
9.2 - 8.2															
8.2 - 7.2															
7.2 - 6.2															
6.2 - 5.2															
5.2 - 4.3															
4.3 - 3.6															
3.6 - 2.6															
2.6 - 1.6															
1.6 - 0.3															



ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT HOLE No. KU-1 (SHEET 2 OF 3)

LOCATION Upper dam site DEPTH OF HOLE 57.0 m COMMENCED 8-8-89

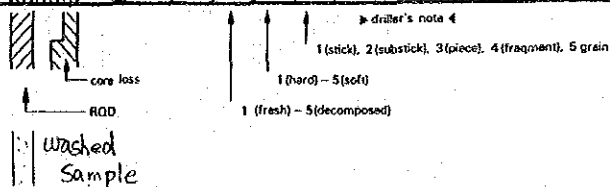
ELEVATION _____ m DEPTH OF OVERBURDEN 4.3 m COMPLETED 10-10-89

COORDINATE _____ LENGTH OF ROCK DRILLING 45.9 m DRILLED BY M. WILKIE

ANGLE FROM HORIZONTAL 90 TOTAL LENGTH OF CORE _____ m LOGGED BY M. Shigeta

BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

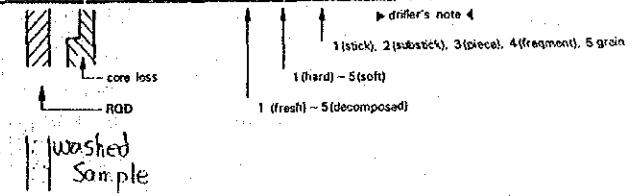
DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION OF KIND OF BIT CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE	WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	GRAIN	CUTTING						
2.0m			0-100%										2.0m		
1					5	5	5			20.45 ~ 21.00 m			1		
2					5-4	5-4	5-4			Redish brown colored Sand			2		
3					5	5	5			Weathering is progressing along the cracks.			3		
4					4	4	4			23.15 ~ 23.8 m			4		
5					5	5	5			(Hard) weathered bi-gr.			5		
6					4	4	3			25.9 m Dip of crack is 45°			6		
7					3-4	3-4	2			Cracks cut foliation diagonally.			7		
8					4	4	2			25.5 m			8		
9					4	4	3			Biotite is concentrated			9		
10					5	5	5			20.5 ~ 21.0 } Brown colored			10		
11					(4)	(4)	(4)			29.1 } Crack is standing			11		
12					4	4	3			other cracks are almost fresh.			12		
13					3	3	2			28.4 m			13		
14					5	5	2			Dip of foliation is 40°			14		
15					4	4	4			32.4 ~ 32.6 m			15		
16					5	5	5			Hard weathered along cracks.			16		
17					4	4	4			32.6 m			17		
18					3	3	2			Dip of crack is 80°			18		
19					4	4	3			34.1 ~ 36.1 m			19		
20					3	3	2			Coarse weathered gr-gr			20		
21					5	5	5			36.55 m			21		
22					4	4	4			Hard weathered granitic-gneiss			22		
23					5	5	5			brown colored fine sand.			23		
24					5	5	5			38.0 ~ 38.3			24		
25					5	5	5			weathered boulder			25		



GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT HOLE No. KU-1 (SHEET 3 OF 3)
 LOCATION Upper dam site DEPTH OF HOLE 50.0 m COMMENCED 8-8-89
 ELEVATION _____ m DEPTH OF OVERBURDEN 4.3 m COMPLETED 10-10-89
 COORDINATE _____ LENGTH OF ROCK DRILLING 45.7 m DRILLED BY M. Wilkie
 ANGLE FROM HORIZONTAL 90 ° TOTAL LENGTH OF CORE _____ m LOGGED BY M. Shigeta
 BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE WATER PRESSURE TEST LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING					
1.0m			0-100%									0m	3
1										Hard weathered gr-gneiss		1	
2										Brown colored fine sand (Washed sample)		2	
3												3	
4	Gr-gn											4	
5												5	
6												6	
7												7	
8	Bi-gn									Hard weathered biotite-gneiss Biotite crystal fragment is standing in washed sample.		8	
9												9	
50										Medium grain granitic gneiss Dip of foliation is 45-52°		0	
1												1	
2												2	
3												3	
4												4	
5												5	
6												6	
7												7	
8												8	
9												9	
0												0	



ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

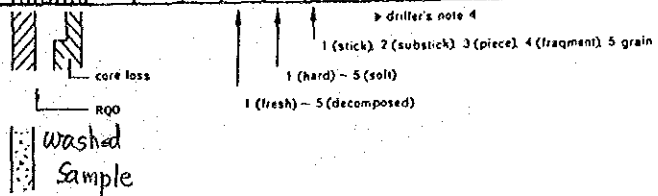
Khansi

PROJECT

HOLE No. KU-2 (SHEET 1 of 2)

LOCATION Upper dam site DEPTH OF HOLE 30.0 m COMMENCED 3-09-89
 ELEVATION _____ m DEPTH OF OVERBURDEN 0.9 m COMPLETED 10-09-89
 COORDINATE _____ LENGTH OF ROCK DRILLING 29.1 m DRILLED BY H. Wilkie
 ANGLE FROM HORIZONTAL 90° TOTAL LENGTH OF CORE _____ m LOGGED BY M. Shigeta
 BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					WATER TABLE			DEPTH	ELEVATION	
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	DESCRIPTION	WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER				
0			0 ~ 100%								0	50	100%	0m	43
0.9	Overburden														
0.9 ~ 1.8	clay with gravel														
1.8 ~ 2.5	Hand weathered Qz-gneiss														
2.5 ~ 3.2	adhesive clay														
3.2 ~ 4.0	Hard weathered Pl-Qz-gneiss														
4.0 ~ 5.0	adhesive clay														
5.0 ~ 13.9	Silt ~ fine sand														
13.9 ~ 14.2	(Hard) Weathered Qz-gn														
14.2 ~ 14.6	Fine sand with fragment which can be broken by finger														
14.6 ~ 15.3	with boulder														
15.3 ~ 30.0	Hand weathered Qz-Pl-gneiss														
30.0	Fine sand														



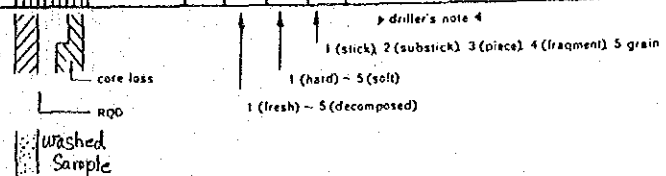
ELECTRIC POWER DEVELOPMENT CO., LTD.
 TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT HOLE No. KV-2 (SHEET 2 OF 2)

LOCATION Upper dam site DEPTH OF HOLE 30.0 m COMMENCED 3-09-89
 ELEVATION _____ m DEPTH OF OVERBURDEN 0.9 m COMPLETED 10-09-89
 COORDINATE _____ LENGTH OF ROCK DRILLING 29.1 m DRILLED BY H. Wilkie
 ANGLE FROM HORIZONTAL 90 ° TOTAL LENGTH OF CORE _____ m LOGGED BY M. Shigetaka
 BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE		DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING		WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER		
0m			0 ~ 100 %							0	50	0m	4.3
1								Hard weathered Qz-Pz-gn Fine sand.					
2													
3								14.3 ~ 23.3 } washed sample 25.0 ~ 30.0 }					
4													
5													
6													
7													
8													
9													
0													
1													
2													
3													
4													
5													
6													
7													
8													
9													
0													

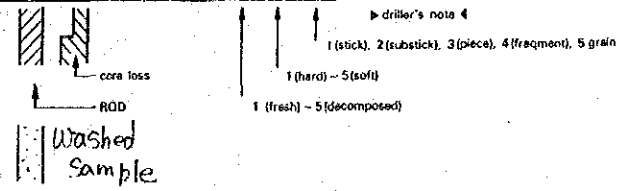


ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT HOLE No. KU-3 (SHEET 1 of 3)
 LOCATION Upper dam site DEPTH OF HOLE 50.0 m COMMENCED 8-8-89
 ELEVATION _____ m DEPTH OF OVERBURDEN 2.6 m COMPLETED 21-10-89
 COORDINATE _____ LENGTH OF ROCK DRILLING 47.4 m DRILLED BY M. Wilkie
 ANGLE FROM HORIZONTAL 90 TOTAL LENGTH OF CORE _____ m LOGGED BY M. Shigeta
 BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE WATER PRESSURE TEST LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING				
0m			0-100%							0m	3	
0-2.6	Overburden				Reddish brown			26	Overburden Adhesive sandy silt with gravel			
2.6-4.0		7 1/2" & Anger 150mm dia casing			Brown		5	5	Hard weathered fine-amphibolite 2.6-4.0m Brown colored fine sand	Incerted casing to 2m k>2x10 ⁻²		
4.0-6.1		103.2mm dia casing					5	4	(4.0-6.1 6.7-11.3m non-core)	Incerted casing to 4m k>2x10 ⁻²		
6.1-11.3		103.2mm dia casing					5	4		Incerted casing to 6m		
11.3-17.3	Amphibolite	103.2mm dia-bit 89.2mm dia casing (Brownish) dark grey			Brownish dark grey		4	4	Weathered fine-amphibolite Partly broken into sand by finger. All cracks are coated with limonite. Brown colored fragment to inner part is standing to 17.3m.			
17.3-18.8		86mm dia-bit			Brownish dark grey		4	4				
18.8-20.0							4	4				

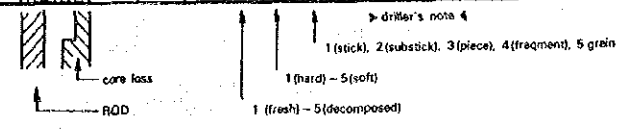


ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT HOLE No. **KU-3** (SHEET 2 of 3)
 LOCATION Upper dam site DEPTH OF HOLE 50.0 m COMMENCED 8-8-89
 ELEVATION _____ m DEPTH OF OVERBURDEN 2.6 m COMPLETED 21-10-89
 COORDINATE _____ LENGTH OF ROCK DRILLING 47.4 m DRILLED BY M. Wilkie
 ANGLE FROM HORIZONTAL 90 TOTAL LENGTH OF CORE _____ m LOGGED BY M. Shigeta
 BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE WATER PRESSURE TEST LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING				
20m			0-100%							0	0m	
1	Amphibolite			86 mm dia-bit 89 mm casing	Brownish dark grey (Brown)	3-4	3-4	4	Hard weathered fine-Amphibolite. 20.55 ~ 22.75 } non-core 23.0 ~ 25.0 } 27.3 m dip of foliation is 50° (29.3 m - 20° dip of crack 29.5 m - 80° dip of crack Brown colored cracks are standing to 30m.	G 20.55 D 25.8 G 27.0 G 31.2 G 35.7	24.0 ~ 24.8 h = 4.1105	
2						5	5	5				
3						5	5	4.5				
4						5	5	5				
5						3-4	3-4	3				
6						5	5	5				
7						4	4	4				
8						3	3	3				
9						5	5	5				
30						4	4	4				
1	Gg-gn			66 mm dia-bit 67.5 mm casing	dark grey	3	3	2	Moderate weathered quartz-gneiss. Hard and fresh rock. Cracks are slightly weathered.	G 31.2 G 35.7		
2						3-4	3-4	3				
3						5	5	5				
4						3-4	3-4	2				
5						5	5	5				
6						4	4	3-4				
7						2-1	2-1	1				
8						3	3	3				
9						2-1	2-1	1				
40						2-1	2-1	2				

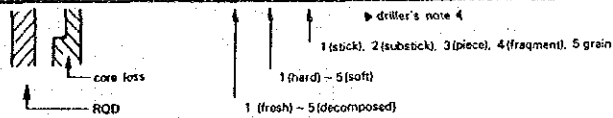


ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

PROJECT Kihansi
HOLE No. KU-3 (SHEET 3 OF 3)
LOCATION Upper dam site
DEPTH OF HOLE 50.0 m
COMPLETED 8-8-89
ELEVATION m
DEPTH OF OVERBURDEN 2.6 m
COMPLETED 21-10-89
COORDINATE
LENGTH OF ROCK DRILLING 47.4 m
DRILLED BY M. Wilkie
ANGLE FROM HORIZONTAL 90°
TOTAL LENGTH OF CORE m
LOGGED BY M. Shigeta
BEARING OF ANGLE HOLE
CORE RECOVERY %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE WATER PRESSURE TEST LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING				
4.0m			0 → 100%							4.0m	EA	
1				67.5 mm dia. casing					40.5~42m Weathering is standing			
2				66 mm dia. bit					41.0~41.5m non-core			
3				white (with red spot)					43.5~50.0m Very hard and fresh rock with slight brown colored (limonite coated) horizontal cracks.			
4									47.1m dip of foliation is 40~50°			
5									Cracks cut foliation diagonally.			
6									Partly red colored garnet is concentrated			
7												
8												
9												
50.0										50.0		
1										below 50.0m		
2												
3												
4												
5												
6												
7												
8												
9												
0												



ELECTRIC POWER DEVELOPMENT CO., LTD.
 TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

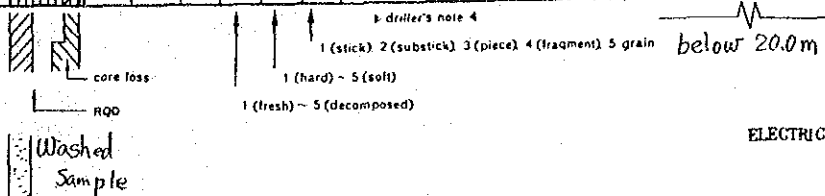
Kihansi

PROJECT

HOLE No. KL-1 (SHEET 1 OF 1)

LOCATION	Lower dam site	DEPTH OF HOLE	20.0 m	COMMENCED	25-09-89
ELEVATION		DEPTH OF OVERBURDEN	2.5 m	COMPLETED	02-10-89
COORDINATE		LENGTH OF ROCK DRILLING	19.5 m	DRILLED BY	M. Wilkie
ANGLE FROM HORIZONTAL	??°	TOTAL LENGTH OF CORE		LOGGED BY	M. Shiozaki
BEARING OF ANGLE HOLE		CORE RECOVERY			

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BITTING CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE	WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING						
0			0 → 100									0m	4.3	
0.5	Over burden								0.5 Over burden					
1				150mm dia Auger			5		Hard weathered gr-gneiss					
2				150mm dia casing	Reddish brown	5	5		Silty fine sand					
2.5				150mm dia casing	Reddish brown	5	5							
3				150mm dia casing	Reddish brown	5	5							
4				150mm dia casing	Brownish grey	4	5							
5				150mm dia casing	Brownish grey	3-4	3-4	1	Weathered gr-gneiss					
6				89.2 mm dia bit	Slight brownish white with banded black	4	4	2	broken by light hammer blow of hand.					
7				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	6.4m weathering is standing along crack					
8				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	6.6m dip of foliation is 40° dip of crack is 43°					
9				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	cracks cut foliation diagonally					
10				89.2 mm dia casing	Slight brownish white with banded black	4	4	2						
11				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	10.45 bi-gneiss					
12				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	11.5 fine gr-gneiss					
13				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	foliation is not clear					
14				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	Weathered gr-gneiss					
15				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	11.5 ~ 13.45 M					
16				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	weathering is standing.					
17				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	Core become soft and brown to inner part.					
18				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	14.1 ~ 14.25 m					
19				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	fine gr-gneiss					
20				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	13.45 ~ 17.2 m					
21				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	weathered rock which is broken by light hammer blow.					
22				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	15.4 m dip of foliation is 40°					
23				89.2 mm dia casing	Slight brownish white with banded black	4	4	2						
24				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	Basalt					
25				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	Hand and fresh.					
26				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	Some stocks are coated with limonite.					
27				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	17.2 ~ 17.5 m					
28				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	cracky					
29				89.2 mm dia casing	Slight brownish white with banded black	4	4	2	and weathering is standing					
30				89.2 mm dia casing	Slight brownish white with banded black	4	4	2						



ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

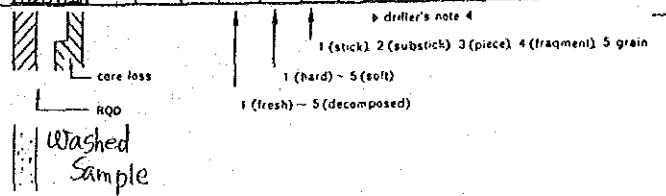
Kihansi

PROJECT

HOLE No. K1-2 (SHEET 1 of 1)

LOCATION	Lower dam site	DEPTH OF HOLE	20.0 m	COMMENCED	18-08-'89
ELEVATION	m	DEPTH OF OVERBURDEN	0.9 m	COMPLETED	21-09-'89
COORDINATE		LENGTH OF ROCK DRILLING	19.1 m	DRILLED BY	M. Wilkie
ANGLE FROM HORIZONTAL	90°	TOTAL LENGTH OF CORE	m	LOGGED BY	M. Shigeta
BEARING OF ANGLE HOLE		CORE RECOVERY	%		

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE				DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING		WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER				
0m			0-100%							0	50	100%	100%	0m	4.3
0.9	Overburden				Dark grey				Silty clay with roots						
1.8					Reddish brown				Hard weathered gr-gneiss						
2.7				175mm Ø Auger	Brownish grey	5	5	5	Micaceous silty sand						
3.6				150mm Ø casing											
4.5				125mm Ø casing											
5.4				101mm Ø dia-bit											
6.3				89mm Ø casing											
7.2				76mm Ø dia-bit											
8.1				62mm Ø casing											
9.0				49mm Ø casing											
9.9				36mm Ø dia-bit											
10.8				23mm Ø casing											
11.7				19mm Ø casing											
12.6				15mm Ø casing											
13.5				11mm Ø casing											
14.4				8mm Ø casing											
15.3				5mm Ø casing											
16.2				3mm Ø casing											
17.1				1mm Ø casing											
18.0				0.5mm Ø casing											
18.9				0.2mm Ø casing											
19.8				0.1mm Ø casing											
20.0				0.05mm Ø casing											



ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

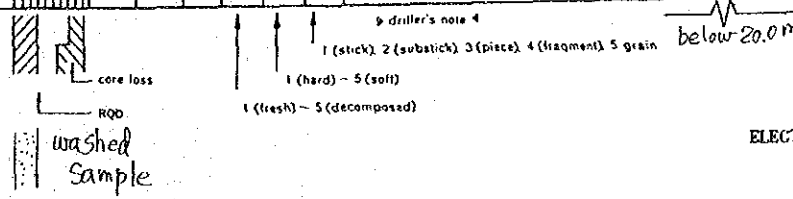
Kihansi

PROJECT

HOLE No. KL-3 (SHEET 1 OF 1)

LOCATION _____ DEPTH OF HOLE 20.0 m COMMENCED 20-08-89
 ELEVATION _____ m DEPTH OF OVERBURDEN 1.2 m COMPLETED 20-08-89
 COORDINATE _____ LENGTH OF ROCK DRILLING 18.9 m DRILLED BY M. Wilkie
 ANGLE FROM HORIZONTAL 90 ° TOTAL LENGTH OF CORE _____ m LOGGED BY M. Shigeta
 BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					WATER TABLE	WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	DESCRIPTION					
0			0-100%									0m	4.5	
0.5	Overburden				Dark brown				Overburden					
1.2					Dark brown				1.2 Gravely silty clay					
1.2-20.0					Reddish brown				1.2-20.0m Hard weathered Q3-Pl gneiss			20m		
1.2-4.0					Reddish brown				Adhesive clay			4.0m		
4.0-20.0					Brownish grey				Clay ~ silt			6.0-20.0m		
7.0-7.35					Brownish grey				White colored hard weathered Q3-gneiss					
16.1-16.5					Little brownish grey	5	5	5	White colored hard weathered Q3-gneiss					



ELECTRIC POWER DEVELOPMENT CO., LTD.
 TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

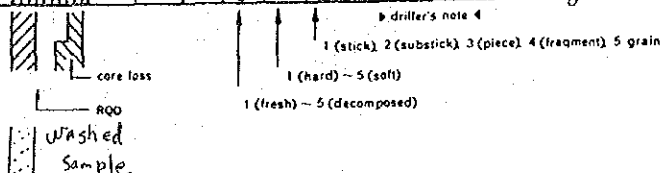
Kihansi

PROJECT

HOLE No. K1-4 (SHEET 1 OF 1)

LOCATION	Lower P/S	DEPTH OF HOLE	20.0 m	COMMENCED	12-09-89
ELEVATION		DEPTH OF OVERBURDEN	0.6 m	COMPLETED	15-08-89
COORDINATE		LENGTH OF ROCK DRILLING	20.0 m	DRILLED BY	M. Milkie
ANGLE FROM HORIZONTAL	90°	TOTAL LENGTH OF CORE		LOGGED BY	M. Shigeta
BEARING OF ANGLE HOLE		CORE RECOVERY			

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	COLOR	WEATHERING	HARDNESS	CORE CUTTING	OBSERVATION OF CORE DESCRIPTION	WATER TABLE			DEPTH	ELEVATION
										WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER			
0.3			0-100%							0	50	100%	0m	43
1	Over burden			176mm dia. Dr. bit 150mm dia. CASING	Reddish brown				Over burden Silt ~ Sand 0~1.6m poor sorting 1.6m Ø5cm pl. Qz-gneiss boulder					
2										Incerted casing to 1.5m Incerted casing to 2.0m				
3.5														
4				10mm dia. bit 103.5mm dia. casing					Hard weathered gr-gneiss 3.5~18.0m Sand with fragment which can be broken into silt by finger easily.	Incerted casing to 4.0m				
5						5	5	5						
6														
7														
8														
9														
10														
11	gr-gn			86mm dia. bit 89.2mm dia. casing	Brownish grey				11.6m Quartz vein	Incerted casing to 9.0m				
12														
13														
14														
15									15.4~15.6m Brownish colored substick weathered gr-gr which has 20~30° dip foliation					
16														
17														
18									18.0~20.0m Sand with substick cores which can be broken into silt by finger					
19						5	5	5						
20						4	4	4	20.0m 18.0~20.0m Quartz vein					



ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

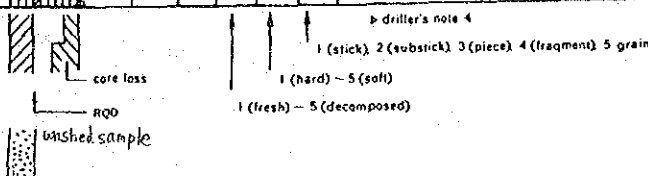
Kihansi

PROJECT

HOLE No. KL-5 (SHEET 1 OF 1)

LOCATION <u>Lower P/s</u>	DEPTH OF HOLE <u>200</u> m	COMMENCED <u>10-07-'89</u>
ELEVATION _____ m	DEPTH OF OVERBURDEN <u>2.0</u> m	COMPLETED <u>12-08-'89</u>
COORDINATE _____	LENGTH OF ROCK DRILLING <u>18.0</u> m	DRILLED BY <u>M. WILKIE</u>
ANGLE FROM HORIZONTAL <u>90°</u>	TOTAL LENGTH OF CORE _____ m	LOGGED BY <u>N. Shigeta</u>
BEARING OF ANGLE HOLE _____	CORE RECOVERY _____ %	

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE	WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING						
0m			0-100%									0m	43	
0-2.0	Overburden								Overburden Silty clay					
2.0-3.0				176 mm dia. auger	Reddish brown	5	5	5	Hard weathered gr. gneiss 2.0-3.0m fine sand			In cased casing to 2m R=180/100		
3.0-4.0				150 mm dia. casing	Brown	5	5	4	3.0-5.1m fine sand with fragment which can be broken into fine sand by finger.			In cased casing to 3m R=57/100		
4.0-5.1				101 mm dia. bit 103.5 mm dia. casing		5	5	5	Weathered gr. gneiss Cracks are coated with limonite			In cased casing to 5.1m R=57/100		
5.1-6.4							3	1	Partly, plagioclase is converted into clay mineral.					
6.4-7.7						2	2	2	16.4-12.1m Weathering is standing and become soft and brown along cracks.			In cased casing to 6.4m Lu=4.1 Pc=3.2 R=5.7/100		
7.7-8.9							1	1	Dip of foliation is 25-30°					
8.9-10.0				89.2 mm dia. casing			3	1	10.5m-80° Dip of lineation 11.45m-60° coated cracks 17.1m-55° (brown color)			In cased casing to 8.9m Lu=6.0 Pc=5.2 R=7.8/100		
10.0-11.45				86 mm dia. bit	White (with black spots)		3	1	Cracks cut foliation diagonally.					
11.45-15.7						2	2	3	15.7-15.8m cracky Biotite is concentrated.					
15.7-16.3						2	2	1	16.3-18.6m A little soft owing to weathering.					
16.3-18.6						3	3	3						
18.6-20.0						2	2	1						



ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

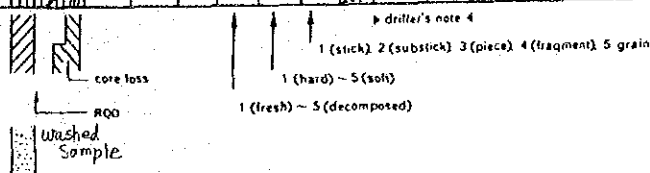
GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT

HOLE No. KM- / (SHEET / OF /)

LOCATION	Upper P/s site	DEPTH OF HOLE	20.0 m	COMMENCED	16-08-'89
ELEVATION	m	DEPTH OF OVERBURDEN	0.5 m	COMPLETED	16-09-'89
COORDINATE		LENGTH OF ROCK DRILLING	19.5 m	DRILLED BY	N. Wilkit
ANGLE FROM HORIZONTAL	90°	TOTAL LENGTH OF CORE	m	LOGGED BY	A. Shigeta
BEARING OF ANGLE HOLE	-	CORE RECOVERY	%		

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF CASING	OBSERVATION OF CORE					WATER TABLE	WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	DESCRIPTION					
0.5	Ver. burden		0 + 100									0.5	4.5	
1	gr-gn			175 mm dia-bit	150 mm dia-bit	yellowish brown	5	5	0.5	Top Soil			1	
2	gr-gn			103.5 mm dia-bit	89 mm dia-bit	dark grey	5	5	0.5-6.0 m	Hard weathered gr-gneiss		(1.53 m)	2	
3	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5	6.0-9.0 m	Silt-fine sand with fragment.			3	
4	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5					4	
5	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5					5	
6	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5					6	
7	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5					7	
8	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5					8	
9	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5	9.0	Hard weathered bi-gneiss			9	
10	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		Sampled micaceous fine sand.			10	
11	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5	11.0	Hard weathered gr-gneiss			11	
12	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		Cracky, sampled fine sand with fragment			12	
13	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5	12.6	Weathered G ₂ -gneiss (with biotite and muscovite)			13	
14	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		Hard and almost fresh			14	
15	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		Cracks are slightly coated with limonite			15	
16	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		13.3 m dip of foliation is 40°			16	
17	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		12.6-13.2 m partly broken into sand by finger			17	
18	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		13.2-13.6 m biotite-gneiss			18	
19	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		Some biotite is converted into chlorite			19	
20	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		13.9-14.0 m cracky			20	
21	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		15.1-15.7 m Sampled			21	
22	gr-gn			101 mm dia-bit	89 mm dia-bit	dark grey	5	5		17.9-18.0 m fragment			22	



ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

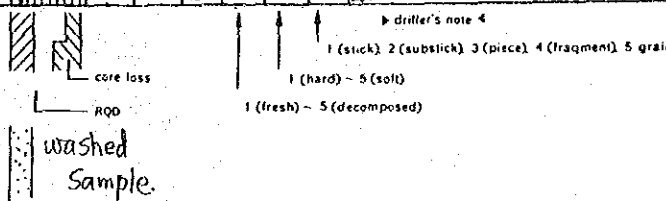
GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT

HOLE No. KM-2 (SHEET / OF /) 69

LOCATION Sand quarry DEPTH OF HOLE 20.0 m COMMENCED 6-9-89
 ELEVATION _____ m DEPTH OF OVERBURDEN 1.0 m COMPLETED 7-8-89
 COORDINATE _____ LENGTH OF ROCK DRILLING 19.0 m DRILLED BY M. Wilkie
 ANGLE FROM HORIZONTAL 90° TOTAL LENGTH OF CORE _____ m LOGGED BY M. Shigeta
 BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	COLOR	WEATHERING	HARDNESS	CORE CUTTING	OBSERVATION OF CORE			DEPTH	ELEVATION
									DESCRIPTION	WATER TABLE	WATER PRESSURE TEST		
0			0-100%									0	4.3
1	Overburden								1.0	fine sand with plant		1	
2	Silt								2.0	Silt (homogeneous)		2	
3	Silty sand			175mm dia Auger					3.0	Silty sand (homogeneous) good sorting	(1.98m)	3	
4	Sand			150mm dia Casing					4.3	Fine sand		4	
5	Fine sand			101mm dia-bit	13.2mm dia Casing	(dark) grey - brownish			4.3-4.65	Sand and gravel	almost gravel is round or sub-round. Kind of gravel is G ₂ -G ₁ or G ₁ -G ₁ .	5	
5.9-6.31									6				
9.0-9.3									7				
11.4-11.7									8				
9											9		
10												10	
11												11	
12												12	
13												13	
14												14	
15												15	
16												16	
17												17	
18												18	
19												19	
20												20	



A-2-2 Data Sheet of Permeability Test

Permeability Test Reading
(Falling head)

Kihansi Project

Date 8/8/89

Drillhole NO.		KV-1
Depth of Test	($H_2 \sim H_1$)	2.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	2.0 m
Drillhole Diameter	($2r$)	191 ϕ mm
Casing Depth	(H_2)	2.0 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.4 m
Depth of Ground Water Level	(H_0)	Nil m
Time Started	(T_1)	3:20 PM
Time Completed	(T_2)	3:40 PM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(l)	0.33 m

Water Fell (m)	Lap Time (min.)	Remarks
0.33 m	20 min	$4.9 \times 10^{-4} < k < 5.7 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2.75 \cdot H \cdot l) < K < Q \cdot \ln(L/r) / (2.75 \cdot H' \cdot l)$$~~

$$Q = (7.5)^2 \cdot \pi \cdot 33 / 1200 = 4.9 \text{ (cm}^3/\text{sec.)} \quad H = 2.4 \text{ m} \quad H' = 2.07 \text{ m}$$

$$\underline{4.9 \times 10^{-4} < k < 5.7 \times 10^{-4}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 24/8

Drillhole NO.		KV-1
Depth of Test	(H ₂ ~ H ₁)	9.2 m ~ 12.2 m
Length of Test	(L = H ₁ - H ₂)	3.0 m
Drillhole Depth	(H ₁)	12.2 m
Drillhole Diameter	(2r)	86 φ mm
Casing Depth	(H ₂)	9.2 m
Casing Diameter	(2R)	163.5 φ mm
Head of Casing (Height above Ground Level)	(h)	0.4 m
Depth of Ground Water Level	(H ₀)	NIL m
Time Started	(T ₁)	1:30 P.M.
Time Completed	(T ₂)	1:39'9" P.M.
Time Elapsed	(T = T ₂ - T ₁)	9 min 09 sec.
Water Fell	(l)	5.0 m

Water Fell (m)	Lap Time (min.)	Remarks
0 ~ 1	1 min. 35 sec.	
1 ~ 2	2 min. 11 sec.	
2 ~ 3	1 min. 26 sec.	
3 ~ 4	1 min. 48 sec.	
4 ~ 5	2 min. 09 sec.	
0 ~ 5	9 min. 09 sec.	$1.5 \times 10^{-4} < k_r < 2.9 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

~~$$Q / (5.5 R H) < K < Q / (5.5 R H')$$~~

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (5.2)^2 \cdot \pi \cdot 509 / 549 = 777.3 \text{ cm}^3/\text{s} \quad H = 11.2 \text{ m} \quad H' = 6.12 \text{ m}$$

$$\underline{1.5 \times 10^{-4} < k_r < 2.9 \times 10^{-4}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 7/15/83

Drillhole NO.		KU-1
Depth of Test	($H_2 \sim H_1$)	19.8 m ~ 25.9 m
Length of Test	($L = H_1 - H_2$)	6.1 m
Drillhole Depth	(H_1)	25.9 m
Drillhole Diameter	($2r$)	86.0 ϕ mm
Casing Depth	(H_2)	19.8 m
Casing Diameter	($2R$)	89.2 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.4 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	9:10 AM
Time Completed	(T_2)	9:18'49" AM
Time Elapsed	($T = T_2 - T_1$)	8 min. 49 sec.
Water Fell	(l)	5.0 m

Water Fell (m)	Lap Time (min.)	Remarks
0 ~ 1.0	1 min. 20 sec.	
1.0 ~ 2.0	1 min. 29 sec.	
2.0 ~ 3.0	1 min. 40 sec.	
3.0 ~ 4.0	1 min. 56 sec.	
4.0 ~ 5.0	2 min. 24 sec.	
0.0 ~ 5.0	8 min. 49 sec.	$3.4 \times 10^{-5} < k < 4.3 \times 10^{-5}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

~~$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$~~

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (4.5)^2 \cdot \pi \cdot 500 / 529 = 60.11 \text{ cm}^3/\text{s} \quad H = 23.25 \text{ (m)}, \quad H' = 18.25 \text{ (m)}$$

$$\underline{3.4 \times 10^{-5} < k < 4.3 \times 10^{-5}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 9/12/89

Drillhole NO.		KV-1
Depth of Test	($H_2 \sim H_1$)	42.30 m ~ 45.30 m
Length of Test	($L = H_1 - H_2$)	2.80 m
Drillhole Depth	(H_1)	45.30 m
Drillhole Diameter	($2r$)	66 ϕ mm
Casing Depth	(H_2)	42.30 m
Casing Diameter	($2R$)	200 ϕ mm
Head of Casing (Height above Ground Level)	(h)	1.5 m
Depth of Ground Water Level	(H_0)	N/L m
Time Started	(T_1)	10:00 AM
Time Completed	(T_2)	10:15:34 AM
Time Elapsed	($T = T_2 - T_1$)	15 min. 34 sec.
Water Fell	(ℓ)	5.0 m

Water Fell (m)	Lap Time (min.)	Remarks
0 ~ 1.0	2 min. 1 sec.	
1.0 ~ 2.0	3 min. 39 sec.	
2.0 ~ 3.0	2 min. 57 sec.	
3.0 ~ 4.0	3 min. 23 sec.	
4.0 ~ 5.0	4 min. 16 sec.	
0 ~ 5.0	15 min. 34 sec.	$1.9 \times 10^{-5} < k_e < 2.2 \times 10^{-5}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_0)$$

~~$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$~~

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (4.5)^2 \cdot \pi \cdot 500 / 934 = 34.0 \text{ (cm}^3/\text{s)} \quad H = 44.44 \text{ m} \quad H' = 39.44 \text{ m}$$

$$\underline{1.9 \times 10^{-5} < k_e < 2.2 \times 10^{-5}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 10/10/82

Drillhole NO.		KU-1
Depth of Test	(H ₂ ~ H ₁)	45.7 m ~ 50.0 m
Length of Test	(L = H ₁ - H ₂)	4.3 m
Drillhole Depth	(H ₁)	50.0 m
Drillhole Diameter	(2r)	66 φ mm
Casing Depth	(H ₂)	45.7 m
Casing Diameter	(2R)	75 φ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H ₀)	NIL m
Time Started	(T ₁)	13:30 PM
Time Completed	(T ₂)	16: 7' 38" PM
Time Elapsed	(T = T ₂ - T ₁)	3h 7min 38sec
Water Fell	(l)	5.0 m

Water Fell (m)	Lap Time (min.)	Remarks
0 ~ 1.0	22 min. 35 sec.	
1.0 ~ 2.0	25 min.	
2.0 ~ 3.0	41 min.	
3.0 ~ 4.0	43 min.	
4.0 ~ 5.0	45 min. 7 sec.	
0 ~ 5.0	3h. 7min. 38 sec.	$5.3 \times 10^{-7} < k < 5.9 \times 10^{-7}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

~~$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$~~

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (3.4)^2 \cdot \pi \cdot 500 / 11258 = 1.6 \text{ cm}^3/\text{sec.} \quad H = 4.335 \text{ m}, \quad H' = 4.335 \text{ m}$$

$$\underline{5.3 \times 10^{-7} < k < 5.9 \times 10^{-7}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 3/9/82

Drillhole NO.		KV-2
Depth of Test	($H_2 \sim H_1$)	2.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	2.0 m
Drillhole Diameter	($2r$)	191 ϕ mm
Casing Depth	(H_2)	2.0 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	1.0 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	9:45 AM
Time Completed	(T_2)	10:00 AM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(ℓ)	0.4 m

Water Fell (m)	Lap Time (min.)	Remarks
0.4 m	20 min.	$4.8 \times 10^{-4} < k < 5.5 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$~~

$$Q = (7.5)^2 \cdot \pi \cdot 40 / 1200 = 5.9 \text{ (cm}^3\text{/sec.)} \quad H = 3.6 \text{ (m)}, \quad H' = 2.6 \text{ (m)}$$

$$\underline{\underline{4.8 \times 10^{-4} < k < 5.5 \times 10^{-4}}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 4/9/80

Drillhole NO.		KV-2
Depth of Test	(H ₂ ~ H ₁)	4.0 m
Length of Test	(L = H ₁ - H ₂)	— m
Drillhole Depth	(H ₁)	4.0 m
Drillhole Diameter	(2r)	171 φ mm
Casing Depth	(H ₂)	4.0 m
Casing Diameter	(2R)	150 φ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H ₀)	NIL m
Time Started	(T ₁)	8:15 AM
Time Completed	(T ₂)	8:35 AM
Time Elapsed	(T = T ₂ - T ₁)	20 min.
Water Fell	(l)	2.02 m

Water Fell (m)	Lap Time (min.)	Remarks
2.02 m	20 min.	k < 8.9 x 10 ⁻³

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$~~

$$Q = (7.5)^2 \cdot \pi \cdot 202 / 1200 = 29.9 \text{ (cm}^3/\text{s)} \quad H = 4.5 \text{ (cm)} \quad H' = 2.48$$

$$\underline{1.64 \times 10^{-3} < K < 2.9 \times 10^{-3}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 2/9/89

Drillhole NO.		KU-2
Depth of Test	(H ₂ ~ H ₁)	13.0 m ~ 17.0 m
Length of Test	(L = H ₁ - H ₂)	4.0 m
Drillhole Depth	(H ₁)	17.0 m
Drillhole Diameter	(2r)	101 φ mm
Casing Depth	(H ₂)	13.0 m
Casing Diameter	(2R)	103.5 φ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H ₀)	111.0 m
Time Started	(T ₁)	5.40 PM
Time Completed	(T ₂)	6.00 PM
Time Elapsed	(T = T ₂ - T ₁)	20 min.
Water Fell	(ℓ)	9.8 m

Water Fell (m)	Lap Time (min.)	Remarks
9.8 (m)	20 min.	k < 2.1 × 10 ⁻⁴

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (5.2)^2 \cdot \pi \cdot 980 / 1200 = 69.3 (\text{cm}^3/\text{s}) \quad H = 1550 \text{ cm}, \quad H' = 5.70 (\text{m})$$

$$\underline{7.8 \times 10^{-5} < k < 2.1 \times 10^{-4}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 8/9/89

Drillhole NO.		KV-2
Depth of Test	($H_2 \sim H_1$)	25.0 m ~ 30.0 m
Length of Test	($L = H_1 - H_2$)	5.0 m
Drillhole Depth	(H_1)	30.0 m
Drillhole Diameter	($2r$)	86.0 ϕ mm
Casing Depth	(H_2)	25.0 m
Casing Diameter	($2R$)	89.2 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	N.I.L. m
Time Started	(T_1)	7:30 AM
Time Completed	(T_2)	7:50 AM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(ℓ)	11.2 m

Water Fell (m)	Lap Time (min.)	Remarks
11.20 (m)	20 (min)	$k < 5.4 \times 10^{-5}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_0)$$

~~$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$~~

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (4.5)^2 \cdot \pi \cdot 1120 / 200 = 59.3 \text{ (cm}^3/\text{sec)} \quad H = 28 \text{ (cm)} \quad H' = 16.8 \text{ (cm)}$$

$$\underline{3.2 \times 10^{-5} < k < 5.4 \times 10^{-5}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 3/8/22

Drillhole NO.		KU-3
Depth of Test	($H_2 \sim H_1$)	20 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	22 m
Drillhole Diameter	($2r$)	ϕ mm
Casing Depth	(H_2)	20 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	14:30 P.M.
Time Completed	(T_2)	14:50 P.M.
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Volume		> 400 l

Water Volume	Lap Time (min.)	Remarks
400 l	20 min	$k > 3.2 \times 10^{-2}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - L, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q > 400 \text{ l} / 20 \text{ min} = 333 \text{ (cm}^3/\text{sec.)} \quad H < 2.5 \text{ (cm)}$$

$$\underline{K > 333 / (5.5 \cdot 7.5 \cdot 250) = 3.2 \times 10^{-2}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 9/8/80

Drillhole NO.		KV-3
Depth of Test	($H_2 \sim H_1$)	5.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	4.0 m
Drillhole Diameter	($2r$)	190.5 ϕ mm
Casing Depth	(H_2)	4.0 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	11:10 AM
Time Completed	(T_2)	11:30 AM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Volume		>400 l

Water Volume	Lap Time (min.)	Remarks
400 l	20 min	$k > 1.8 \times 10^{-2}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q > 400 \text{ l} / 20 \text{ min} = 333 \text{ (cm}^3/\text{sec.)} \quad H < 4.5 \text{ (m)}$$

$$K > 333 / (5.5 \cdot 75 \cdot 450) = 1.8 \times 10^{-2}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 11/1/82

Drillhole NO.		KU-3
Depth of Test	($H_2 \sim H_1$)	24.25 m ~ 24.72 m
Length of Test	($L = H_1 - H_2$)	0.45 m
Drillhole Depth	(H_1)	24.72 m
Drillhole Diameter	($2r$)	86 ϕ mm
Casing Depth	(H_2)	24.25 m
Casing Diameter	($2R$)	89.2 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.23 m
Depth of Ground Water Level	(H_0)	Nil. m
Time Started	(T_1)	13:00 PM.
Time Completed	(T_2)	13:48' 4" PM.
Time Elapsed	($T = T_2 - T_1$)	48 min. 4 sec.
Water Fell	(l)	5.0 m

Water Fell (m)	Lap Time (min.)	Remarks
0~1	21 min. 4 sec.	
1~2	14 min. 56 sec.	
2~3	3 min.	
3~4	5 min. 1 sec.	
4~5	4 min. 3 sec.	
0~5	48 min. 4 sec.	

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T$$

$$H = H_0 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

~~$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$~~

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (4.5)^2 \cdot \pi \cdot 500 / 2884 = 11.0 \text{ (cm}^3/\text{sec)} \quad H = 24.73 \text{ m} \quad H' = 19.73 \text{ m}$$

$$1.6 \times 10^{-5} < K < 4.5 \times 10^{-5}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 26/7/22

Drillhole NO.		KL-1
Depth of Test	($H_2 \sim H_1$)	4.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	4.0 m
Drillhole Diameter	($2r$)	101 ϕ mm
Casing Depth	(H_2)	4.0 m
Casing Diameter	($2R$)	103.5 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	11:30 AM
Time Completed	(T_2)	11:50 AM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(l)	0.14 m

Water Fell (m)	Lap Time (min.)	Remarks
0.14 (m)	20 (min)	$7.8 \times 10^{-5} < K < 8.0 \times 10^{-5}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$~~

$$Q = (52)^2 \cdot \pi \cdot 14 / 1200 = 1.0 \text{ cm}^3/\text{sec} \quad H = 4.5 \text{ m}, \quad H' = 4.36 \text{ m}$$

$$\underline{\underline{7.8 \times 10^{-5} < K < 8.0 \times 10^{-5}}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 25/12/82

Drillhole NO.		KL-1
Depth of Test	($H_2 \sim H_1$)	2.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	2.0 m
Drillhole Diameter	($2r$)	176.5 ϕ mm
Casing Depth	(H_2)	2.0 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.50 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	12:45 PM.
Time Completed	(T_2)	13:05 PM.
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(ℓ)	0.12 m

Water Fell (m)	Lap Time (min.)	Remarks
0.12 (m)	20 (min.)	$1.7 \times 10^{-4} < K < 1.8 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_2)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$~~

$$Q = (7.5)^2 \cdot \pi \cdot 12 / 1200 = 1.8 \text{ (cm}^3/\text{s)} \quad H = 2.5 \text{ (m)} \quad H' = 2.38 \text{ (m)}$$

$$\underline{1.7 \times 10^{-4} < K < 1.8 \times 10^{-4}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 18/8/20

Drillhole NO.		KL-2
Depth of Test	($H_2 \sim H_1$)	2.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	2.0 m
Drillhole Diameter	($2r$)	190.5 ϕ mm
Casing Depth	(H_2)	2.0 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	15:00 PM
Time Completed	(T_2)	15:20 PM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(ℓ)	0.12 m

Water Fell (m)	Lap Time (min.)	Remarks
0.12 (m)	20 (min.)	$1.7 \times 10^{-4} < K < 1.8 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$~~

$$Q = (75)^2 \cdot \pi \cdot 12 / 1200 = 1.8 \text{ (cm}^3\text{/sec)} \quad H = 2.5 \text{ (m)} \quad H' = 2.38 \text{ (m)}$$

$$\underline{1.7 \times 10^{-4} < K < 1.8 \times 10^{-4}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 18/8/79

Drillhole NO.		KL-2
Depth of Test	($H_2 \sim H_1$)	4.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	4.0 m
Drillhole Diameter	($2r$)	190.5 ϕ mm
Casing Depth	(H_2)	4.0 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.50 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	17:20 PM
Time Completed	(T_2)	17:40 PM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(l)	0.145 m

Water Fell (m)	Lap Time (min.)	Remarks
0.145 (m)	20 (min)	$1.1 \times 10^{-4} < K < 1.2 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$~~

$$Q = (7.5)^2 \cdot \pi \cdot 14.5 / 1200 = 2.1 \text{ (cm}^3/\text{sec.)} \quad H = 4.5 \text{ (m)} \quad H' = 4.36 \text{ (m)}$$

$$1.1 \times 10^{-4} < K < 1.2 \times 10^{-4}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 24/7/77

Drillhole NO.		KL-3
Depth of Test	($H_2 \sim H_1$)	20 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	20 m
Drillhole Diameter	($2r$)	190.5 ϕ mm
Casing Depth	(H_2)	22 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	1.0 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	11:00 AM
Time Completed	(T_2)	11:20 AM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(ℓ)	0.2 m

Water Fell (m)	Lap Time (min.)	Remarks
0.2 (m)	20 (min)	$2.3 \times 10^{-4} < K < 2.5 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$~~

$$Q = (9.5)^2 \cdot \pi \cdot 20 / 1200 = 2.9 \text{ (cm}^3/\text{sec.)} \quad H = 3.0 \text{ (m)}, \quad H' = 2.8 \text{ (m)}$$

$$\underline{2.3 \times 10^{-4} < K < 2.5 \times 10^{-4}}$$

Permeability Test Reading
(constant head)

Kihansi Project

Date 24/8/72

Drillhole NO.		KL-3
Depth of Test	($H_2 \sim H_1$)	4.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_0)	4.0 m
Drillhole Diameter	($2r$)	190.5 ϕ mm
Casing Depth	(H_2)	4.0 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	13:15 PM
Time Completed	(T_2)	13:30 PM
Time Elapsed	($T = T_2 - T_1$)	15 min
Water Volume		4000

Water Volume	Lap Time (min.)	Remarks
4000 (cm ³)	25 (min)	$K = 1.8 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

~~$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$~~

$$Q = 4000 / 1200 = 3.3 \text{ (cm}^3/\text{sec.)} \quad H = 4.5 \text{ (m)}$$

$$K = 1.8 \times 10^{-4}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 29/8/20

Drillhole NO.		KL-3
Depth of Test	($H_2 \sim H_1$)	6m ~ 20 m
Length of Test	($L = H_1 - H_2$)	14.0 m
Drillhole Depth	(H_1)	20.0 m
Drillhole Diameter	($2r$)	101 ϕ mm
Casing Depth	(H_2)	6.0 m
Casing Diameter	($2R$)	152.4 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	NIL. m
Time Started	(T_1)	11:45 AM
Time Completed	(T_2)	12:05 PM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Volume		>400 l

Water Volume	Lap Time (min.)	Remarks
>400 l	20 min.	$K > 8.7 \times 10^{-2}$

Permeability Value (K)

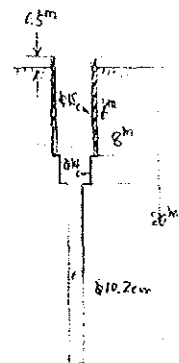
$$Q = R^2 \cdot \pi \cdot l / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = 400000 / 1200 = 333 \text{ cm}^3/\text{sec} \quad H < 13.5$$

$$\underline{K > 8.7 \times 10^{-2}}$$



Permeability Test Reading
(Falling head)

Kihansi Project

Date 13/8/89

Drillhole NO.		KL-4
Depth of Test	($H_2 \sim H_1$)	2.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	2.0 m
Drillhole Diameter	($2r$)	101 ϕ mm
Casing Depth	(H_2)	2.0 m
Casing Diameter	($2R$)	103.5 ϕ mm
Head of Casing (Height above Ground Level)	(h)	1.0 m
Depth of Ground Water Level	(H_0)	N/L. m
Time Started	(T_1)	2:15 PM
Time Completed	(T_2)	2:35 PM
Time Elapsed	($T = T_2 - T_1$)	20 min.
Water Fell	(l)	0.18 m

Water Fell (m)	Lap Time (min.)	Remarks
0.18 (m)	20 (min)	$1.5 \times 10^{-8} < K < 1.6 \times 10^{-8}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T,$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (52)^2 \cdot \pi \cdot 18 / 1200 = 1.3 \text{ (cm}^3/\text{sec)} \quad H = 3.0 \text{ (m)} \quad H' = 2.82 \text{ (m)}$$

$$\underline{1.5 \times 10^{-8} < K < 1.6 \times 10^{-8}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 13/8/20

Drillhole NO.		KL-4
Depth of Test	($H_2 \sim H_1$)	4.0 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	4.0 m
Drillhole Diameter	($2r$)	101 ϕ mm
Casing Depth	(H_2)	4.0 m
Casing Diameter	($2R$)	103.5 ϕ mm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	N/L m
Time Started	(T_1)	3:45 PM.
Time Completed	(T_2)	4:05 PM.
Time Elapsed	($T = T_2 - T_1$)	20 (min.)
Water Fell	(ℓ)	0.21 m

Water Fell (m)	Lap Time (min.)	Remarks
0.21 (m)	20 (min)	$K = 1.2 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (5.2)^2 \cdot \pi \cdot 21 / 200 = 1.5 \text{ (cm}^3/\text{s)} \quad H = 4.5 \quad H' = 4.29$$

$$\underline{1.17 \times 10^{-4} < K < 1.22 \times 10^{-4}}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 9/8/89

Drillhole NO.		KL-5
Depth of Test	($H_2 \sim H_1$)	20 m
Length of Test	($L = H_1 - H_2$)	- m
Drillhole Depth	(H_1)	20 m
Drillhole Diameter	($2r$)	175 ϕ mm
Casing Depth	(H_2)	20 m
Casing Diameter	($2R$)	150 ϕ mm
Head of Casing (Height above Ground Level)	(h)	1.0 m
Depth of Ground Water Level	(H_0)	NIL m
Time Started	(T_1)	9:20 AM
Time Completed	(T_2)	9:40 AM
Time Elapsed	($T = T_2 - T_1$)	20 (min.)
Water Fell	(l)	0.1 m

Water Fell (m)	Lap Time (min.)	Remarks
0.1 (m)	20 (min.)	$1.2 \times 10^{-4} < K < 1.3 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot l / T$$

$$H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - l, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (7.5)^2 \cdot \pi \cdot 10 / 1200 = 1.5 \text{ (cm}^3/\text{sec.)} \quad H = 3.0 \text{ (m)} \quad H' = 2.9 \text{ (m)}$$

$$1.2 \times 10^{-4} < K < 1.3 \times 10^{-4}$$

Permeability Test Reading
(Falling head)

Kihansi Project

Date 10/8/89

Drillhole NO.		K1-5
Depth of Test ($H_2 \sim H_1$)		3.5 m ~ 4.0 m
Length of Test ($L = H_1 - H_2$)		— m
Drillhole Depth (H_1)		4.0 m
Drillhole Diameter ($2r$)		101 ϕ mm
Casing Depth (H_2)		3.5 m
Casing Diameter ($2R$)		103.5 ϕ mm
Head of Casing (Height above Ground Level) (h)		0.5 m
Depth of Ground Water Level (H_0)		NIL. m
Time Started (T_1)		13:10 PM
Time Completed (T_2)		13:30 PM
Time Elapsed ($T = T_2 - T_1$)		20 min
Water Fell (ℓ)		0.22 m

Water Fell (m)	Lap Time (min.)	Remarks
0.22	20 min	$1.3 \times 10^{-4} < K < 1.4 \times 10^{-4}$

Permeability Value (K)

$$Q = R^2 \cdot \pi \cdot \ell / T, \quad H = H_2 + (H_1 - H_2) / 2 + h = (H_1 + H_2) / 2 + h, \quad H' = H - \ell, \quad (H_1 < H_0)$$

$$Q / (5.5 \cdot R \cdot H) < K < Q / (5.5 \cdot R \cdot H')$$

$$Q \cdot \ln(L/r) / (2\pi \cdot H \cdot L) < K < Q \cdot \ln(L/r) / (2\pi \cdot H' \cdot L)$$

$$Q = (5.2)^2 \cdot \pi \cdot 22 / 1200 = 1.6 \text{ (cm}^3\text{/sec)} \quad H = 4.25 \text{ (m)} \quad H' = 4.03 \text{ (m)}$$

$$1.3 \times 10^{-3} < K < 1.4 \times 10^{-4}$$

PERMEABILITY TEST IN DRILL HOLE (SHEET 1 OF 2)

Kihansi

PROJECT

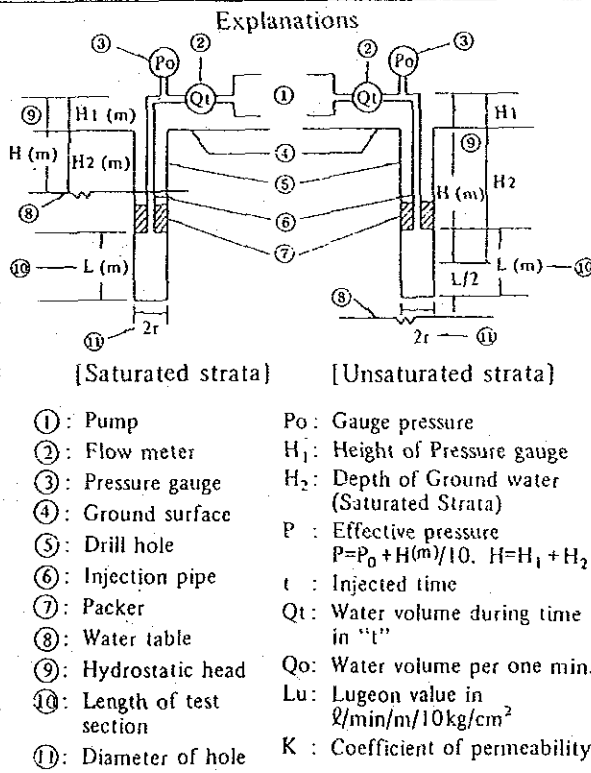
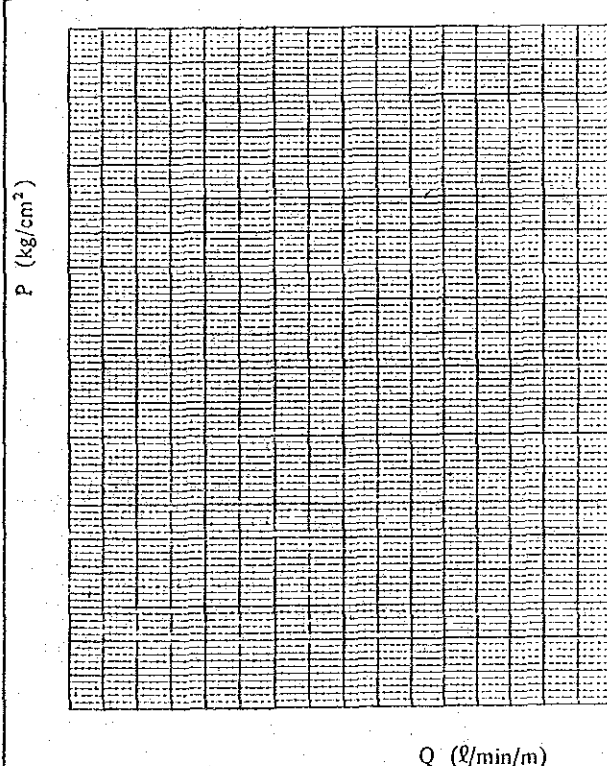
HOLE No. KU-3

LOCATION Upper dam site DEPTH OF HOLE 52.0 m TEST DATE 20/10/89
 ELEVATION 1361.23 m DIAMETER OF HOLE 2r = 6.6 cm TESTED BY A. Isami
 COORDINATE _____ DRILLED DEPTH 45.0 m DRILLED BY M.W. Kie
 ANGLE FROM HORIZONTAL 90° LEVEL OF WATER TABLE BEFORE T. 42.3 m AFTER T. 42.3 m CHECKED BY _____
 BEARING OF ANGLE HOLE _____

TEST SECTION FROM 40.0 m TO 45.0 m

L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (ℓ)	Q ₀ (ℓ/min)	Q (ℓ/min/m)	Lu (Lugeon)	K (cm/sec)
				not increasing above 0 atm						
				all water flushing						
				(more than 100ℓ/min)						
5	0.5	4.3	0	0.5			100	20	>400	>5.2 × 10 ⁻³

$K = 1.3 \times 10^{-5} \cdot Lu$



PERMEABILITY TEST IN DRILL HOLE (SHEET 2 OF 2)

Kihansi

PROJECT

HOLE No. KV-3

LOCATION Upper dam site

DEPTH OF HOLE 50.0 m

TEST DATE 21/10/89

ELEVATION 1361.23 m

DIAMETER OF HOLE $2r = 6.6$ cm

TESTED BY A. J. Sarat

COORDINATE

DRILLED DEPTH 50.0 m

DRILLED BY M. Wilkie

ANGLE FROM HORIZONTAL 90°

LEVEL OF WATER TABLE

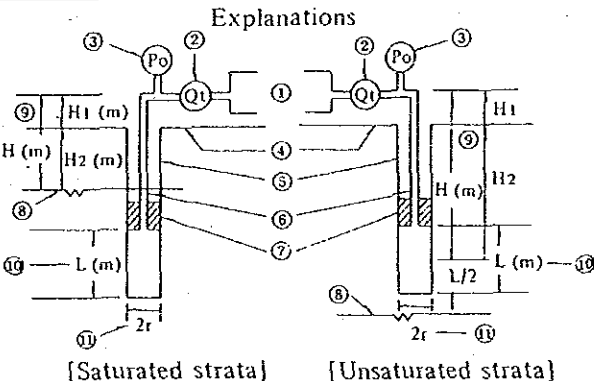
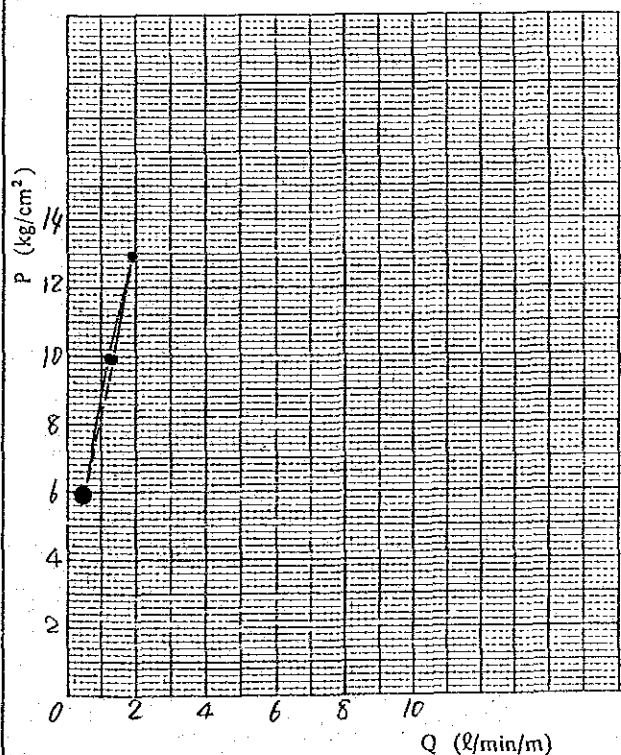
CHECKED BY

BEARING OF ANGLE HOLE

BEFORE T. 48.6 m AFTER T. 48.6 m

TEST SECTION FROM 45.03 m TO 50.0 m

L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (ℓ)	Q ₀ (ℓ/min)	Q (ℓ/min/m)	Lu (Lugeon)	K (cm/sec)
4.97	0.5	48.6	1	5.9	10	26	2.6	0.5	0.8	1.0 × 10 ⁻⁵
"	"	"	5	9.9	"	62	6.2	1.2	1.2	1.6 × 10 ⁻⁵
"	"	"	8	12.9	"	94	9.4	1.9	1.5	2.0 × 10 ⁻⁵
"	"	"	5	9.9	"	66	6.6	1.3	1.3	1.9 × 10 ⁻⁵
"	"	"	1	5.9	"	23	2.3	0.5	0.8	1.0 × 10 ⁻⁵
									Lu = 1.2	1.6 × 10 ⁻⁵
$K = \frac{Q}{2\pi r L} \log_e \frac{t'}{t} = \frac{1000 \cdot Q_0}{2\pi \cdot 1000 \cdot L} \cdot \log_e \frac{100t}{t} = \frac{10^{-5}}{1.2 \cdot \pi} \cdot \frac{1000 \cdot Q}{P \cdot L} \cdot \log_e \frac{497}{3.3} = 1.3 \cdot 10^{-5} \cdot Lu$										



- Explanations**
- ①: Pump
 - ②: Flow meter
 - ③: Pressure gauge
 - ④: Ground surface
 - ⑤: Drill hole
 - ⑥: Injection pipe
 - ⑦: Packer
 - ⑧: Water table
 - ⑨: Hydrostatic head
 - ⑩: Length of test section
 - ⑪: Diameter of hole
 - P₀: Gauge pressure
 - H₁: Height of Pressure gauge
 - H₂: Depth of Ground water (Saturated Strata)
 - P: Effective pressure
P = P₀ + H(m)/10. H = H₁ + H₂
 - t: Injected time
 - Q_t: Water volume during time in "t"
 - Q₀: Water volume per one min.
 - Lu: Lugeon value in ℓ/min/m/10kg/cm²
 - K: Coefficient of permeability

PERMEABILITY TEST IN DRILL HOLE (SHEET / OF 3)

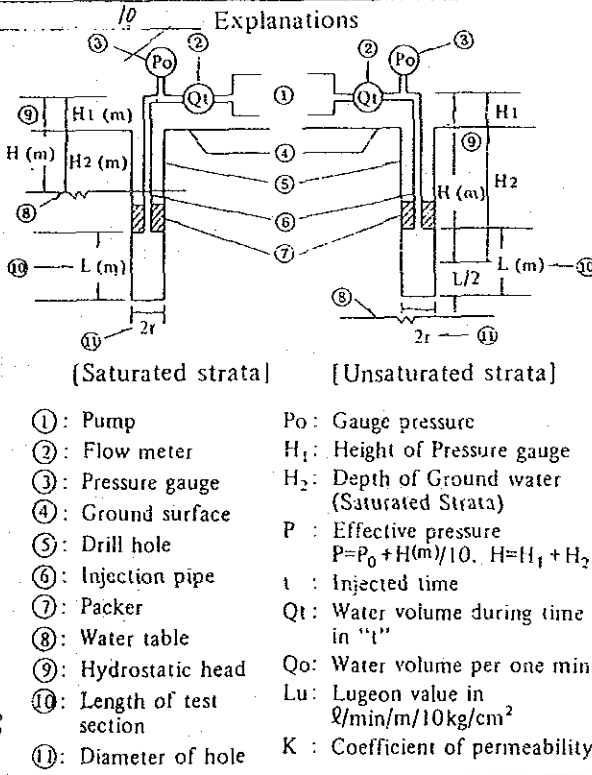
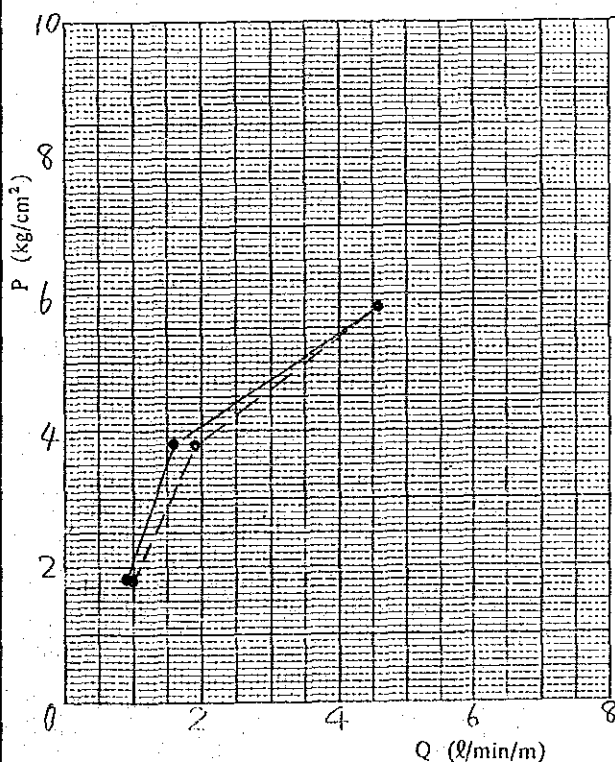
Kihansi

PROJECT

HOLE No. KL-1

LOCATION	Lower dam site	DEPTH OF HOLE	20.0 m	TEST DATE	27/9/89
ELEVATION	1153.3 m	DIAMETER OF HOLE	2r = 8.6 cm	TESTED BY	A.W. Gorch
COORDINATE		DRILLED DEPTH	10.0 m	DRILLED BY	A.W. Gorch
ANGLE FROM HORIZONTAL	90°	LEVEL OF WATER TABLE		CHECKED BY	
BEARING OF ANGLE HOLE	-	BEFORE T.	4.0 m	AFTER T.	4.0 m
TEST SECTION	FROM 5.0 m TO 10.0 m				

L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (l)	Q ₀ (l/min)	Q (l/min/m)	Lu (Lugeon)	K (cm/sec)
5	0.5	7.5	1	1.8	10	4.3	4.3	0.9	5.0	6.5 × 10 ⁻⁵
"	"	"	3	3.8	"	82	8.2	1.6	4.2	3.2 × 10 ⁻⁵
"	"	"	5	5.8	"	228	22.8	4.6	7.9	1.0 × 10 ⁻⁴
"	"	"	3	3.8	"	93	9.3	1.9	5.0	6.5 × 10 ⁻⁵
"	"	"	1	1.8	"	51	5.1	1.0	5.6	4.3 × 10 ⁻⁵
K = 1.3 · 10 ⁻⁵ Lu										
Lu = 10.6 1.4 × 10 ⁻⁴										



PERMEABILITY TEST IN DRILL HOLE (SHEET 2 OF 3)

Kihansi

PROJECT

HOLE No.

KL-1

LOCATION Lowendam site

DEPTH OF HOLE 20.0 m

TEST DATE 28/9/87

ELEVATION 1153.3 m

DIAMETER OF HOLE 2t = 8.6 cm

TESTED BY A.W. Greach

COORDINATE _____

DRILLED DEPTH 15.0 m

DRILLED BY M.W.K. e

ANGLE FROM HORIZONTAL 90°

LEVEL OF WATER TABLE

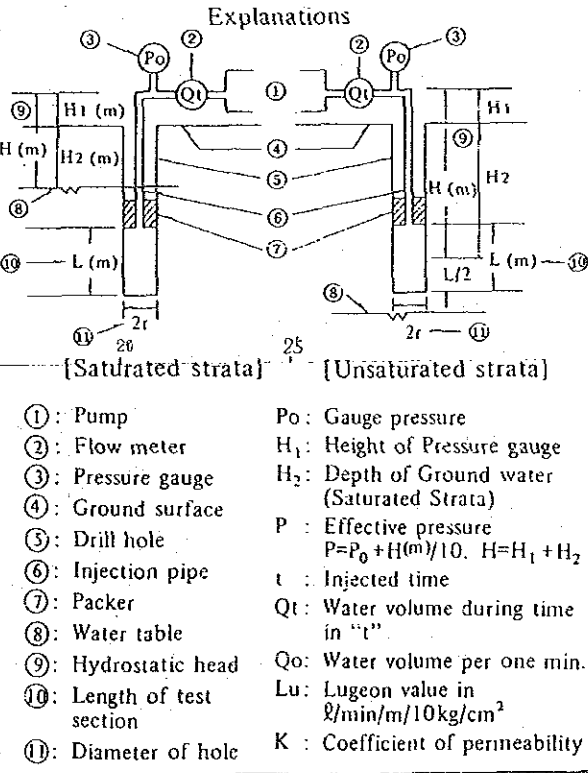
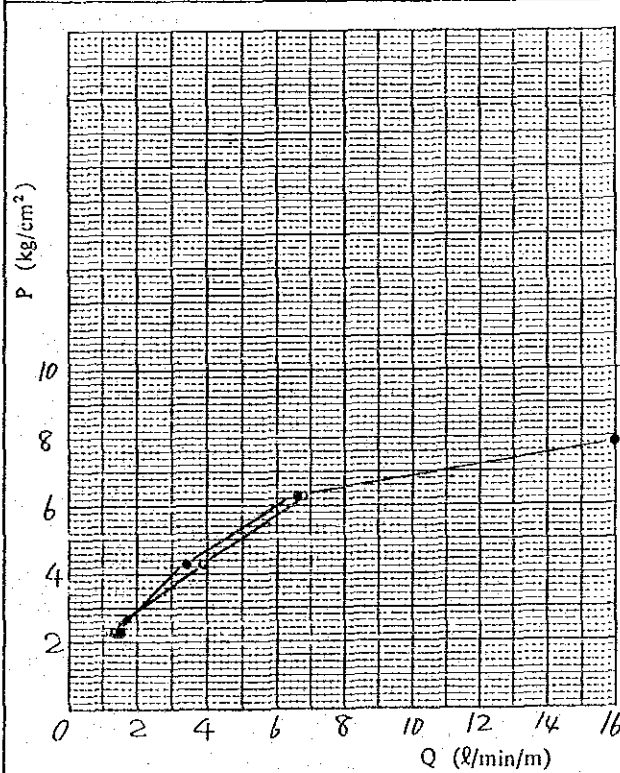
CHECKED BY _____

BEARING OF ANGLE HOLE _____

BEFORE T. 4.0 m AFTER T. 4.0 m

TEST SECTION FROM 10 m TO 15 m

L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (ℓ)	Q ₀ (ℓ/min)	Q (ℓ/min/m)	Lu (Lugeon)	K (cm/sec)
5	0.5	12.5	1	2.3	10	76	7.6	1.5	6.5	8.5 × 10 ⁻⁵
"	"	"	3	4.3	"	174	17.4	3.4	7.9	1.0 × 10 ⁻⁴
"	"	"	5	6.3	"	329	32.9	6.6	10.5	1.4 × 10 ⁻⁴
"	"	"	6.5	7.8	"	801	80.1	16.0	20.5	2.1 × 10 ⁻⁴
"	"	"	5	6.3	"	342	34.2	6.8	8.7	1.1 × 10 ⁻⁴
"	"	"	3	4.3	"	195	19.5	3.9	9.1	1.2 × 10 ⁻⁴
"	"	"	1	2.3	"	68	6.8	1.4	6.1	7.9 × 10 ⁻⁴
$K = 1.3 \times 10^{-4} \times Lu$										
										$Lu = 27.8; 3.6 \times 10^{-4}$



PERMEABILITY TEST IN DRILL HOLE (SHEET 3 OF 3)

Kihansi

PROJECT

HOLE No.

KL-1

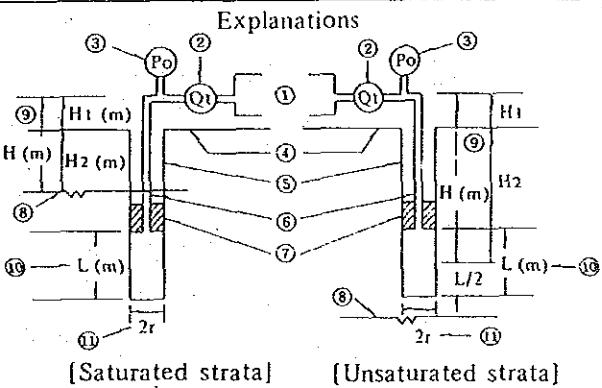
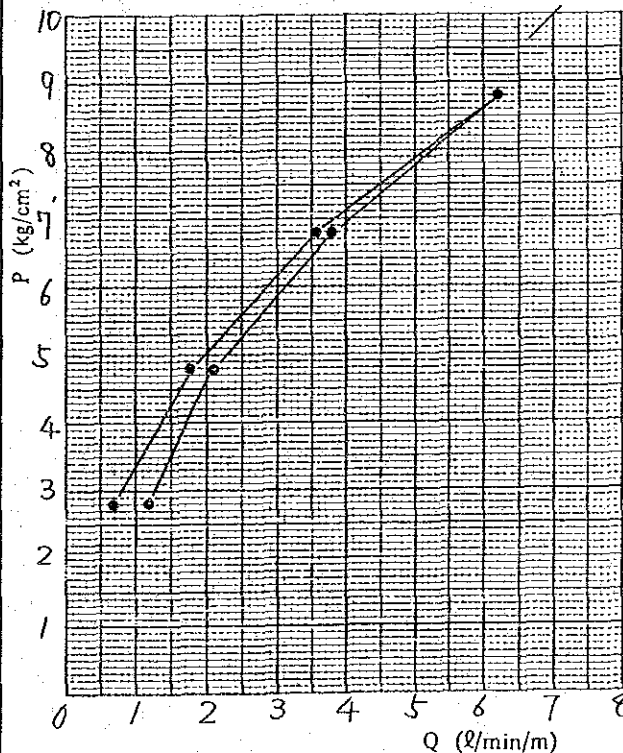
LOCATION	Lower dam Site	DEPTH OF HOLE	20.0 m	TEST DATE	29/9/69
ELEVATION	1153.30 m	DIAMETER OF HOLE	2r = 8.6 cm	TESTED BY	A. Ismail
COORDINATE	-	DRILLED DEPTH	22.5 m	DRILLED BY	M. W. Kie
ANGLE FROM HORIZONTAL	90°	LEVEL OF WATER TABLE		CHECKED BY	
BEARING OF ANGLE HOLE	-	BEFORE T.	4.0 m	AFTER T.	4.6 m

TEST SECTION FROM 15.0 m TO 20.0 m

L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (l)	Q ₀ (l/min)	Q (l/min/m)	L _u (Lugeon)	K (cm/sec)
5	0.5	17.5	1	2.8	10	36	3.6	0.7	2.5	3.3 × 10 ⁻⁵
"	"	"	3	4.8	"	88	8.8	1.8	3.8	4.9 × 10 ⁻⁵
"	"	"	5	6.8	"	180	18.0	3.6	5.3	6.9 × 10 ⁻⁵
"	"	"	7	8.8	"	312	31.2	6.2	7.0	9.1 × 10 ⁻⁵
"	"	"	5	6.8	"	194	19.0	3.8	5.6	6.5 × 10 ⁻⁵
"	"	"	3	4.8	"	104	10.4	2.1	4.4	5.7 × 10 ⁻⁵
"	"	"	1	2.8	"	58	5.8	1.2	4.3	5.6 × 10 ⁻⁵

$K = 1.3 \times 10^{-5} \cdot L_{u0}$

$L_{u0} = 7 \quad 9.1 \times 10^{-5}$



- ① : Pump
 - ② : Flow meter
 - ③ : Pressure gauge
 - ④ : Ground surface
 - ⑤ : Drill hole
 - ⑥ : Injection pipe
 - ⑦ : Packer
 - ⑧ : Water table
 - ⑨ : Hydrostatic head
 - ⑩ : Length of test section
 - ⑪ : Diameter of hole
- P₀ : Gauge pressure
 - H₁ : Height of Pressure gauge
 - H₂ : Depth of Ground water (Saturated Strata)
 - P : Effective pressure
 - $P = P_0 + H(m)/10$. $H = H_1 + H_2$
 - t : Injected time
 - Q_t : Water volume during time in "t"
 - Q₀ : Water volume per one min.
 - L_u : Lugeon value in l/min/m/10kg/cm²
 - K : Coefficient of permeability

PERMEABILITY TEST IN DRILL HOLE (SHEET 1 OF 2)

Kihansi PROJECT HOLE No. KL-2

LOCATION Lower dam site DEPTH OF HOLE 20.0 m TEST DATE 22/9/89
 ELEVATION 1132.2 m DIAMETER OF HOLE $2r = 8.6$ cm TESTED BY N. M. Ke
 COORDINATE DRILLED DEPTH 14.0 m DRILLED BY A. Iscol
 ANGLE FROM HORIZONTAL 90° LEVEL OF WATER TABLE CHECKED BY
 BEARING OF ANGLE HOLE BEFORE T. NIL m AFTER T. NIL m
 TEST SECTION FROM 9.0 m TO 14.0 m

L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (l)	Q ₀ (l/min)	Q (l/min/m)	Lu (Lugeon)	K (cm/sec)
5	0.5	11.5	1	2.2	10	386	38.6	7.7	35	4.5×10^{-4}
"	"	"	3	4.2	"	598	59.8	11.9	28.3	3.7×10^{-4}
"	"	"	5	6.2	"	791	79.5	15.9	25.6	3.3×10^{-4}
"	"	"	3	4.2	"	606	60.6	12.1	28.8	3.7×10^{-4}
"	"	"	1	2.2	"	412	41.2	8.2	37.3	4.8×10^{-4}
									Lu = 23.5	3.6×10^{-4}
									$K = 1.3 \times 10^{-5} Lu$	

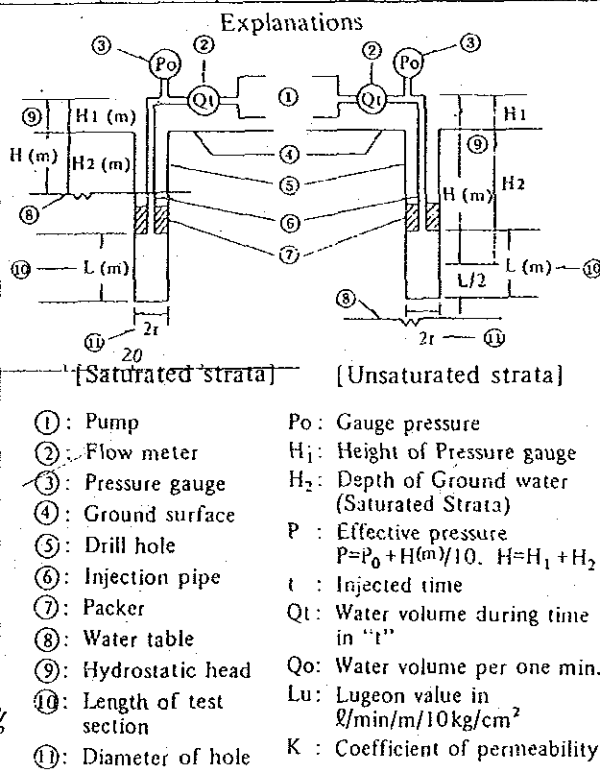
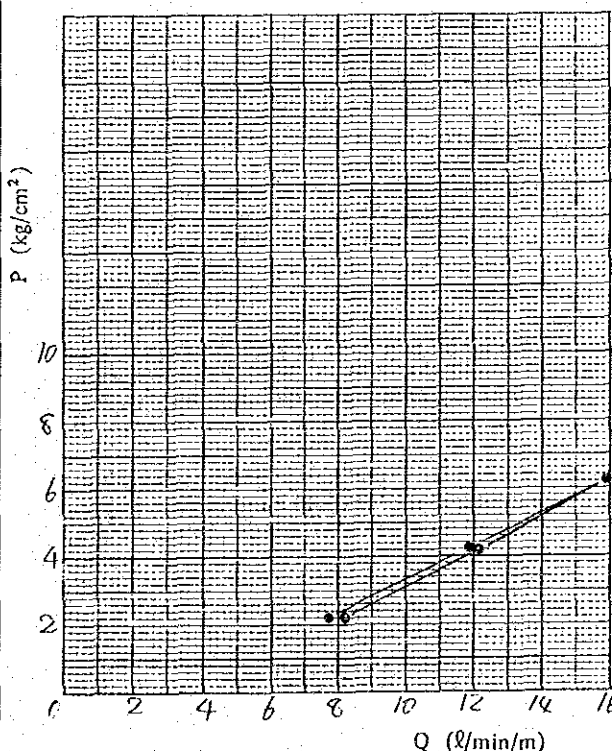
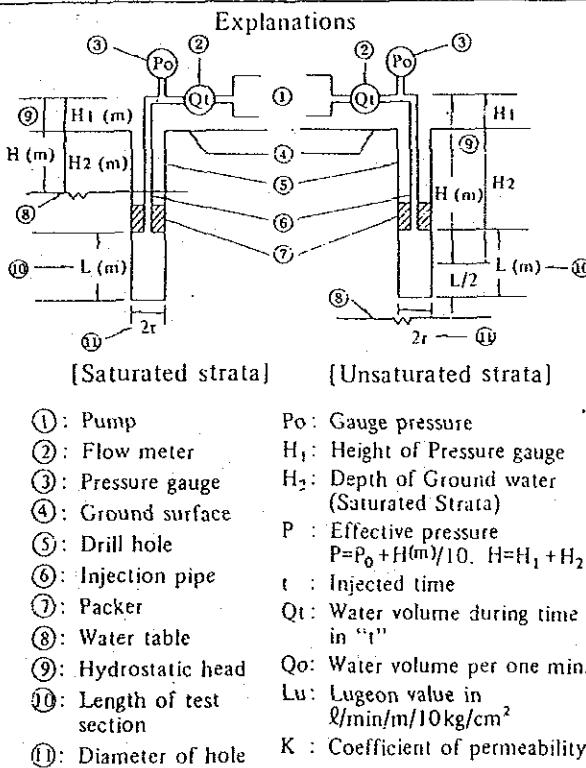
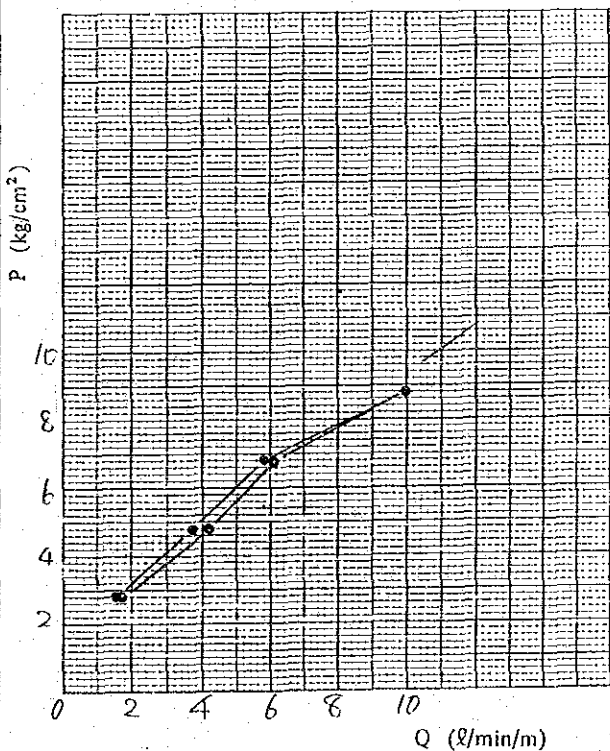


Fig. 8

PERMEABILITY TEST IN DRILL HOLE (SHEET 2 OF 2)

LOCATION Kihansi PROJECT Lower dam site HOLE No. KL-2
 ELEVATION 1132.2 m DEPTH OF HOLE 20.0 m TEST DATE 24/9/89
 COORDINATE _____ DIAMETER OF HOLE 2r=8.6 cm TESTED BY M. Mike
 ANGLE FROM HORIZONTAL 90° DRILLED DEPTH 20.0 m DRILLED BY A. T. Seral
 BEARING OF ANGLE HOLE _____ LEVEL OF WATER TABLE BEFORE T. Nil m AFTER T. Nil m CHECKED BY _____
 TEST SECTION FROM 15.0 m TO 20.0 m

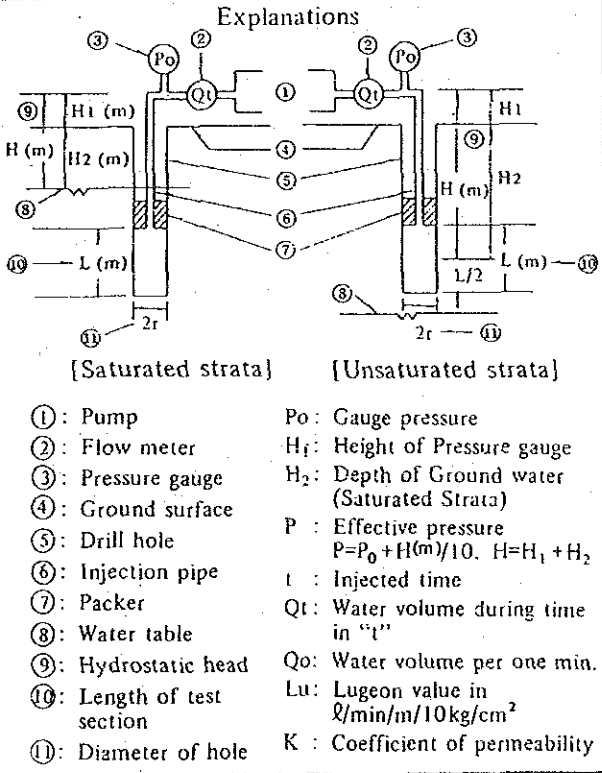
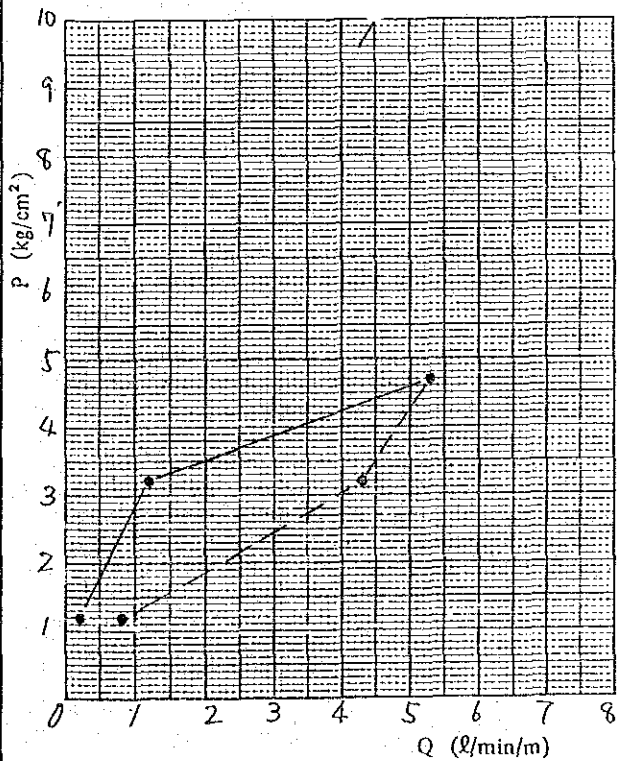
L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (l)	Q ₀ (l/min)	Q (l/min/m)	Lu (Lugeon)	K (cm/sec)
5	0.5	17.5	1	2.8	10	73	7.3	1.5	5.4	7.0×10^{-5}
"	"	"	3	4.8	"	183	18.3	3.7	7.7	1.0×10^{-4}
"	"	"	5	6.8	"	288	28.8	5.8	8.5	1.1×10^{-4}
"	"	"	7	8.8	"	483	48.3	10.0	11.4	1.5×10^{-4}
"	"	"	5	6.8	"	304	30.4	6.1	9.0	1.2×10^{-4}
"	"	"	3	4.8	"	209	20.9	4.2	8.8	1.1×10^{-4}
"	"	"	1	2.8	"	83	8.3	1.9	6.1	7.9×10^{-5}
$K = 1.3 \times 10^{-5} Lu$										
									$Lu = 11.0$	1.4×10^{-4}



PERMEABILITY TEST IN DRILL HOLE (SHEET 1 OF 3)

LOCATION Kihansi PROJECT LOWEN P/S HOLE No. KL-5
 ELEVATION 325.04 m DEPTH OF HOLE 20.0 m TEST DATE 11/8/89
 COORDINATE _____ DIAMETER OF HOLE 2r = 8.6 cm TESTED BY A.W. Geach
 ANGLE FROM HORIZONTAL 90° DRILLED DEPTH 11.45 m DRILLED BY M. Mike
 BEARING OF ANGLE HOLE _____ LEVEL OF WATER TABLE _____ CHECKED BY _____
 BEFORE T. 1.6 m AFTER T. 1.6 m
 TEST SECTION FROM 6.45 m TO 11.45 m

L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (ℓ)	Q ₀ (ℓ/min)	Q (ℓ/min/m)	Lu (Lugeon)	K (cm/sec)
5	0.5	1.6	1	1.2	10	10	1	0.2	1.6	2.1 × 10 ⁻⁵
"	"	"	3	3.2	"	59	5.9	1.2	3.8	6.1 × 10 ⁻⁵
"	"	"	4.5	4.7	"	263	26.3	5.3	11.3	1.5 × 10 ⁻⁴
"	"	"	3	3.2	"	213	21.3	4.3	13.4	1.9 × 10 ⁻⁴
"	"	"	1	1.2	"	42	4.2	0.8	6.9	5.1 × 10 ⁻⁵
$K = 1.3 \times 10^{-5} \cdot Lu$										
									Lu = 4.5	5.9 × 10 ⁻⁵
									(P _c = 3.2)	



PERMEABILITY TEST IN DRILL HOLE (SHEET 3 OF 3)

LOCATION Rihansi PROJECT _____ HOLE No. KL-5
 LOCATION Lower P/S DEPTH OF HOLE 20.0 m TEST DATE 12/8/89
 ELEVATION 315.66 m DIAMETER OF HOLE 21=8.6 cm TESTED BY A.W. Geoch
 COORDINATE _____ DRILLED DEPTH 20.0 m DRILLED BY M. Mike
 ANGLE FROM HORIZONTAL 90° LEVEL OF WATER TABLE _____ CHECKED BY _____
 BEARING OF ANGLE HOLE _____ BEFORE T. 1.6 m AFTER T. 1.6 m
 TEST SECTION FROM 16.45 m TO 20.0 m

L (m)	H ₁ (m)	H ₂ (m)	P ₀ (kg/cm ²)	P (kg/cm ²)	t (min)	Q _t (ℓ)	Q ₀ (ℓ/min)	Q (ℓ/min/m)	Lu (Lugeon)	K (cm/sec)
3.55	0.5	1.6	1	1.2	10	23	2.3	0.6	5	6.0 × 10 ⁻⁵
"	"	"	3	3.2	"	54	5.4	1.5	4.7	5.6 × 10 ⁻⁵
"	"	"	5	5.2	"	118	11.8	3.3	6.3	7.6 × 10 ⁻⁵
"	"	"	6.5	6.7	"	220	22.0	6.2	9.2	1.1 × 10 ⁻⁴
"	"	"	5	5.2	"	136	13.6	3.8	7.3	8.8 × 10 ⁻⁵
"	"	"	3	3.2	"	81	8.1	2.3	7.2	8.6 × 10 ⁻⁵
"	"	"	1	1.2	"	25	2.5	0.7	5.8	7.0 × 10 ⁻⁵
$K = 1.2 \times 10^{-5} \times Lu$										
$Lu = 9.0$										1.1 × 10 ⁻⁴

