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)

NC3 MEAN DAILY WATER LEVEL 1985

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-NICHI DATE < 851201 > 0.70
35-NICHI DATE < 850104 > -999999.88
95-NICHI DATE < 850305 > -999999.88
185-NICHI DATE < 850603 > -999999.88
275-NICHI DATE < 850901 > -999999.88
355-NICHI DATE < 851120 > -999999.88
MIN-NICHI 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	********	0.47	0.57	0.57	0.39	0.29	0.24	0.18	0.26	0.26
3	0.40	0.38	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	********	0.27	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	********	0.27	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	0.52	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	********	0.54	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	0.38	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	0.80	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		0.81	0.39	0.55	0.39	0.30	0.25	0.19	0.13	0.29	0.39
30	0.43		0.69	0.38	********	0.39	0.29	0.25	0.19	0.14	0.28	0.36
31	********		0.62		********		0.29	0.25		0.14		0.35
TOTAL	********	11.01	********	13.16	********	14.53	********	8.22	6.31	4.98	8.44	11.20
AVERAGE	********	0.39	********	0.44	********	0.48	********	0.27	0.21	0.16	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	********	0.38	********	0.39	********	0.25	0.19	0.13	0.14	0.26

MAX-NICHI	DATE < 860327 >	1.25
35-NICHI	DATE < 860529 >	0.55
95-NICHI	DATE < 860621 >	0.42
185-NICHI	DATE < 860318 >	0.34
275-NICHI	DATE < 861115 >	0.26
355-NICHI	DATE < 861101 >	0.14
MIN-NICHI	DATE < 860710 >	-999999.88

*ITEM(12)

ANNUAL			
TOTAL	AVERAGE	MAXIMUM	MINIMUM
-6999870.28	-19177.73	1.25	-999999.88

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

NC3 MEAN DAILY WATER LEVEL 1987

DAY	1	2	3	4	5	6	7	8	9	10	11	12
1	0.34	0.31	0.30	0.28	0.36	********	0.22	0.16	0.14	********	********	********
2	0.31	0.30	0.30	0.27	0.36	********	0.22	0.16	0.13	********	********	********
3	0.30	0.29	0.34	0.27	0.34	********	0.22	0.16	0.13	********	********	********
4	0.35	0.29	0.46	0.27	0.34	********	0.21	0.15	0.13	********	********	********
5	0.36	0.29	0.46	0.27	0.34	********	0.21	0.15	0.13	********	********	********
6	0.41	0.34	0.40	0.26	0.36	********	0.21	0.15	0.13	********	********	********
7	0.43	0.34	0.39	0.26	0.39	********	0.21	0.15	0.13	********	********	********
8	0.45	0.34	0.39	0.26	0.42	********	0.20	0.15	0.12	********	********	********
9	0.40	0.33	0.40	0.28	0.42	********	0.20	0.15	0.12	********	********	********
10	0.38	0.32	0.37	0.28	0.43	********	0.20	0.15	0.12	********	********	********
11	0.36	0.32	0.34	0.29	0.43	********	0.20	0.15	0.12	********	********	********
12	0.34	0.32	0.33	0.30	0.39	********	0.20	0.15	0.12	********	********	********
13	********	0.36	0.29	0.30	0.39	********	0.20	0.15	0.12	********	********	********
14	********	0.36	0.26	0.30	0.37	********	0.20	0.15	0.12	********	********	********
15	0.41	0.36	0.25	0.34	0.36	********	0.21	0.15	0.12	********	********	********
16	0.40	********	0.28	0.39	********	********	0.21	0.14	0.10	********	********	********
17	0.38	********	0.28	0.43	********	********	0.20	0.14	0.10	********	********	********
18	0.45	********	0.45	0.43	********	********	0.20	0.14	0.10	********	********	********
19	0.47	0.41	0.46	0.43	********	********	0.20	0.14	0.10	********	********	********
20	0.54	0.43	0.40	0.39	********	********	0.19	0.14	0.10	********	********	********
21	0.48	0.42	0.38	0.36	********	********	0.19	0.14	0.10	********	********	********
22	0.45	0.40	0.36	0.36	********	********	0.19	0.14	0.10	********	********	********
23	0.42	0.35	0.39	0.38	********	********	0.18	0.14	0.09	********	********	********
24	0.40	0.31	0.38	0.38	********	********	0.18	0.14	0.09	********	********	********
25	0.36	0.29	0.34	0.40	********	********	0.18	0.14	0.09	********	********	********
26	0.32	0.27	0.34	0.46	********	********	0.17	0.14	0.09	********	********	********
27	0.32	0.28	0.32	0.44	********	********	0.17	0.14	0.09	********	********	********
28	0.34	0.27	0.30	0.40	********	********	0.16	0.14	0.08	********	********	********
29	0.33		0.30	0.39	********	********	0.16	0.14	0.08	********	********	********
30	0.32		0.29	0.39	********	********	0.16	0.14	0.08	********	********	********
31	0.31		0.28		********		0.16	0.14		********		********
TOTAL	********	********	10.83	10.26	********	********	6.01	4.52	3.27	********	********	********
AVERAGE	********	********	0.35	0.34	********	********	0.19	0.15	0.11	********	********	********
MAXIMUM	0.54	0.43	0.46	0.46	0.43	********	0.22	0.16	0.14	********	********	********
MINIMUM	********	********	0.25	0.26	********	********	0.16	0.14	0.08	********	********	********

MAX-NICHI DATE < 870120 > 0.54
3S-NICHI DATE < 870428 > 0.40
9S-NICHI DATE < 870201 > 0.31
18S-NICHI DATE < 870824 > 0.14
27S-NICHI DATE < 871002 > -999999.88
36S-NICHI DATE < 871221 > -999999.88
MIN-NICHI DATE < 871231 > -999999.88
*ITEM(12)

ANNUAL			
TOTAL	AVERAGE	MAXIMUM	MINIMUM
**********	-391780.61	0.54	-999999.88

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

NC3 MEAN DAILY WATER LEVEL 1988

DAY	1	2	3	4	5	6	7	8	9	10	11	12
1	********	********	********	0.38	0.22	0.16	0.13	0.05	0.03	0.0	0.0	0.0
2	********	********	********	0.36	0.22	0.16	0.13	0.05	0.03	0.0	0.0	0.0
3	********	********	********	0.35	0.20	0.16	0.12	0.05	0.03	0.0	0.03	0.0
4	********	********	********	0.30	0.20	0.16	0.12	0.04	0.02	0.0	0.04	0.0
5	********	********	********	0.28	0.20	0.15	0.12	0.04	0.02	0.0	0.03	0.0
6	********	********	********	0.24	0.18	0.15	0.11	0.04	0.02	0.0	0.03	0.0
7	********	********	********	0.24	0.17	0.15	0.11	0.03	0.02	0.0	0.02	0.0
8	********	********	********	0.22	0.17	0.15	0.11	0.03	0.02	0.0	0.02	0.0
9	********	********	********	0.20	0.16	0.15	0.10	0.03	0.02	0.0	0.02	0.0
10	********	********	********	0.18	0.16	0.15	0.10	0.03	0.02	0.0	0.01	0.0
11	********	********	********	0.17	0.16	0.15	0.10	0.03	0.03	0.0	0.0	0.0
12	********	********	********	0.19	0.15	0.16	0.10	0.03	0.03	0.0	0.01	0.0
13	********	********	********	0.21	0.17	0.16	0.10	0.03	0.03	0.0	0.03	0.0
14	********	********	********	0.23	0.18	0.16	0.09	0.03	0.03	0.0	0.0	0.0
15	********	********	********	********	0.18	0.16	0.09	0.03	0.02	0.0	0.0	0.0
16	********	********	********	********	0.16	0.15	0.09	0.03	0.02	0.0	0.0	0.0
17	********	********	********	********	0.15	0.16	0.08	0.03	0.02	0.0	0.0	0.01
18	********	********	********	********	0.14	0.17	0.08	0.02	0.02	0.0	0.0	0.02
19	********	********	********	********	0.15	0.17	0.08	0.02	0.02	0.0	0.0	0.04
20	********	********	********	********	0.15	0.16	0.08	0.02	0.03	0.0	0.0	0.0
21	********	********	********	********	0.15	0.16	0.07	0.02	0.03	0.0	0.04	0.0
22	********	********	********	********	0.15	0.16	0.07	0.02	0.03	0.0	0.02	0.0
23	********	********	********	********	0.15	0.15	0.07	0.02	0.03	0.0	0.02	0.02
24	********	********	********	********	0.16	0.15	0.07	0.02	0.02	0.0	0.0	0.02
25	********	********	********	********	0.16	0.14	0.06	0.03	0.02	0.0	0.0	0.01
26	********	********	********	********	0.16	0.14	0.06	0.03	0.02	0.0	0.0	0.05
27	********	********	********	********	0.16	0.14	0.06	0.03	0.02	0.0	0.0	0.05
28	********	********	********	********	0.17	0.14	0.07	0.02	0.01	0.0	0.0	0.06
29	********	********	********	********	0.17	0.14	0.07	0.02	0.01	0.0	0.0	0.07
30	********		********	********	0.16	0.13	0.07	0.02	0.01	0.0	0.0	0.07
31	********		********		0.16		0.06	0.02		0.0		0.07
TOTAL	********	********	********	********	5.22	4.59	2.77	0.91	0.68	0.0	0.32	0.49
AVERAGE	********	********	********	********	0.17	0.15	0.09	0.03	0.02	0.0	0.01	0.02
MAXIMUM	********	********	********	0.38	0.22	0.17	0.13	0.05	0.03	0.0	0.04	0.07
MINIMUM	********	********	********	********	0.14	0.13	0.06	0.02	0.01	0.0	0.0	0.0

MAX-NICHI DATE < 880401 > 0.38
35-NICHI DATE < 880525 > 0.16
95-NICHI DATE < 880720 > 0.08
185-NICHI DATE < 881224 > 0.02
275-NICHI DATE < 880116 > -999999.88
355-NICHI DATE < 880419 > -999999.88
MIN-NICHI DATE < 880430 > -999999.88
*ITEM(12)

ANNUAL			
TOTAL	AVERAGE	MAXIMUM	MINIMUM
**********	-292349.64	0.38	-999999.88

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	0.26	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	********	********	********	********	********	********	********	********	********
30	0.47		0.35	********	********	********	********	********	********	********	********	********
31	0.36		********		********		********	********		********		********
TOTAL	8.14	6.79	********	********	********	********	********	********	********	********	********	********
AVERAGE	0.26	0.24	********	********	********	********	********	********	********	********	********	********
MAXIMUM	0.70	0.36	0.50	********	********	********	********	********	********	********	********	********
MINIMUM	0.06	0.13	********	********	********	********	********	********	********	********	********	********

MAX-NICHI DATE < 890126 > 0.70
3S-NICHI DATE < 890214 > 0.27
9S-NICHI DATE < 890405 > -999999.88
18S-NICHI DATE < 890704 > -999999.88
27S-NICHI DATE < 891002 > -999999.88
35S-NICHI DATE < 891221 > -999999.88
MIN-NICHI DATE < 891231 > -999999.88
*ITEM(12)

ANNUAL			
TOTAL	AVERAGE	MAXIMUM	MINIMUM
**********	-756164.23	0.70	-999999.88

A-2 GEOLOGY

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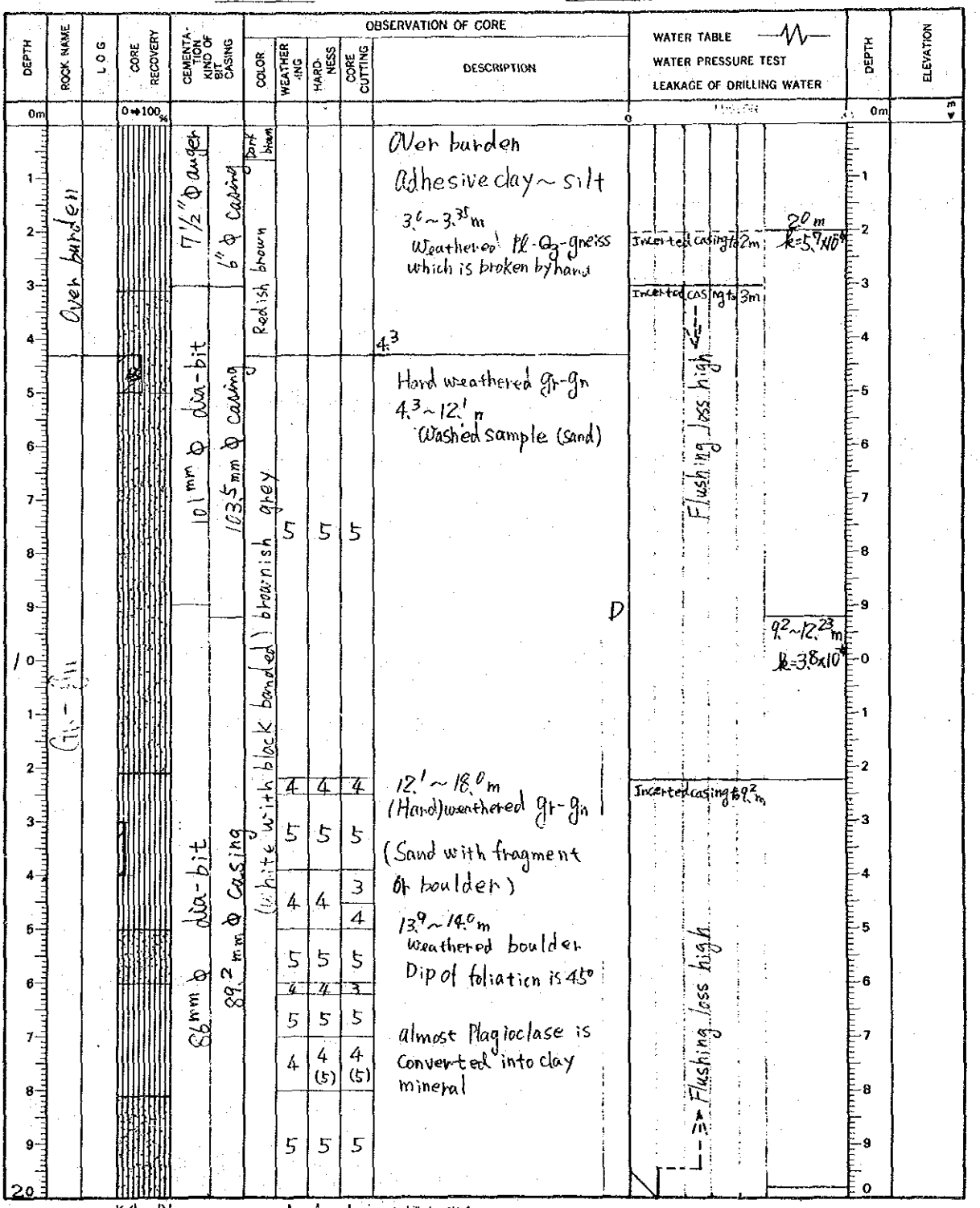
A-2-1 Geologic Log of Drill Hole

GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT HOLE No. KU-1 (SHEET 1 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	16 - 16 - '89
COORDINATE		LENGTH OF ROCK DRILLING	45.7 m	DRILLED BY	M. WILKIE
ANGLE FROM HOLIZONTAL	90 °	TOTAL LENGTH OF CORE	m	LOGGED BY	M. Shigeta
BEARING OF ANGLE HOLE	-	CORE RECOVERY	%		



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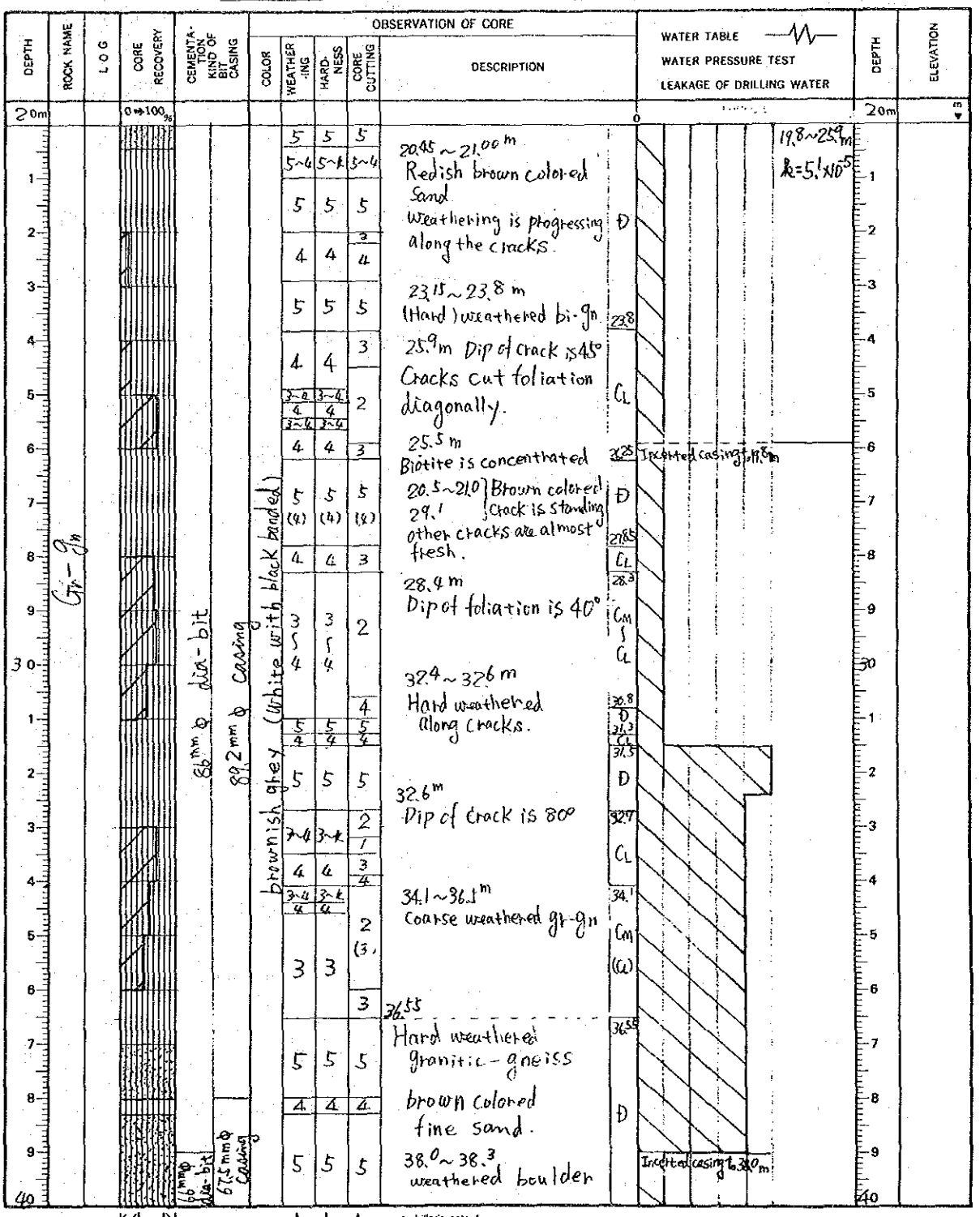
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT HOLE No. KU-1 (SHEET 2 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 HOLIZONTAL	90 °	TOTAL LENGTH OF CORE	m	LOGGED BY	M Shigeta
BEARING OF ANGLE HOLE	-	CORE RECOVERY	%		



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TOKYO, JAPAN

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	Mwilkie
ANGLE FROM HOLIZONTAL	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	DESCRIPTION	WATER TABLE / WATER PRESSURE TEST / LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
4.0m			0→100%							0	0m	m
1	Gr-gn			66mm φ dia-bit	brownish grey	5	5	5	Hard weathered gr-gneiss			
2									Brown colored fine sand (Washed sample)			
3										42.5~45.7m k=2.2×10^-5		
4				67.5mm φ casing								
5										Inserted casing 42.5m		
6										45.7~50.0m k=8.8×10^-7		
7	Bi-gn				brownish dark grey				Hard weathered biotite-gneiss Biotite crystal fragment is standing in washed sample.			
8												
9						4	4	3				
50	Gr-gn				white	3	3	2	Medium grain granitic gneiss Dip of foliation is 45~50°	Inserted casing 45.7m		
										below 50.0 m		

▶ driller's note ◀

1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 grain

1 (hard) ~ 5 (soft)

1 (fresh) ~ 5 (decomposed)

core loss

RQD

washed sample

ELECTRIC POWER DEVELOPMENT CO., LTD.
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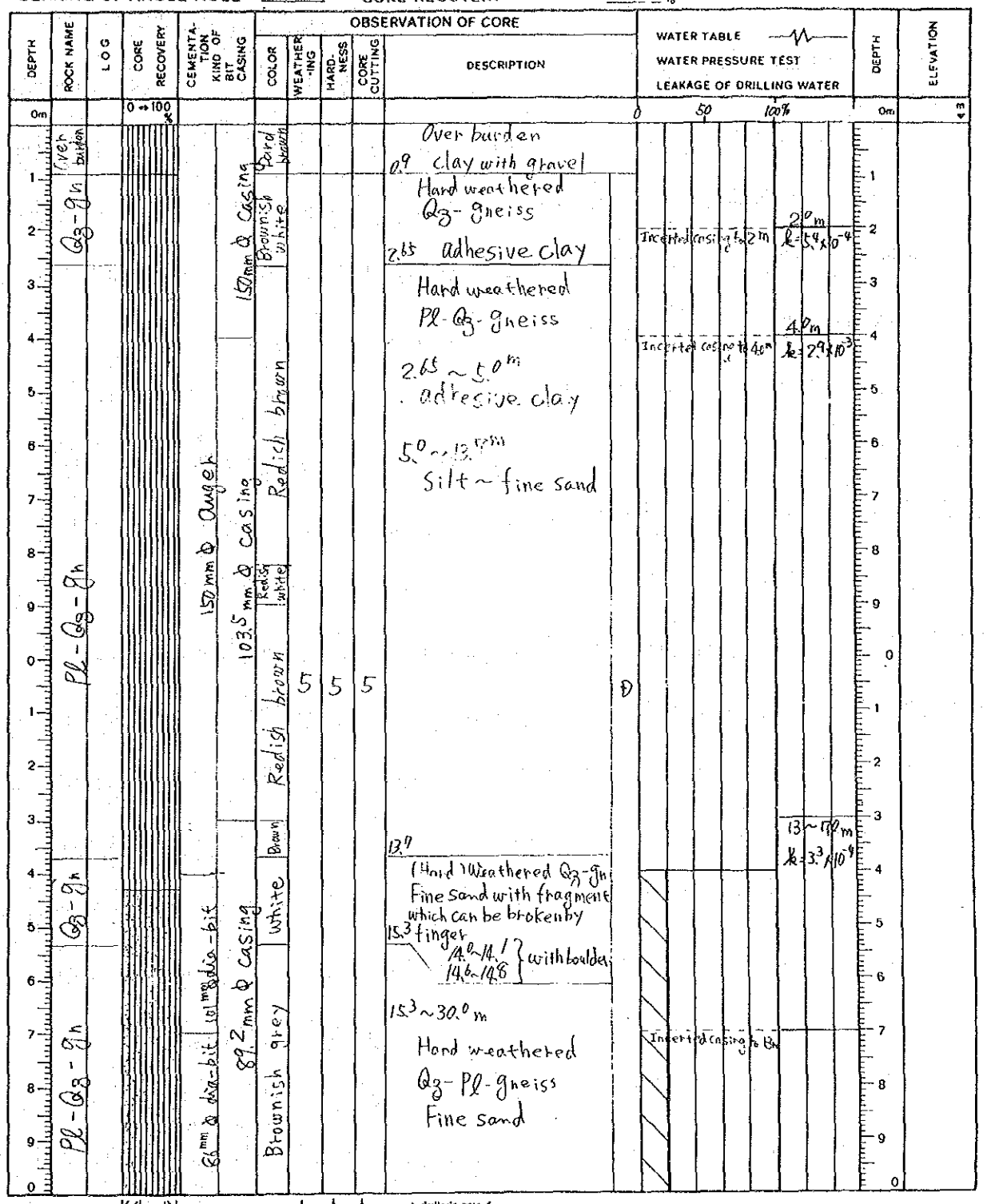
GEOLOGIC LOG OF DRILL HOLE

PROJECT: Khansi — 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	%		



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GEOLOGIC LOG OF DRILL HOLE

PROJECT: Kihansi

HOLE No. KU-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. Shigeta
BEARING OF ANGLE HOLE	-	CORE RECOVERY	%		

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	COLOR	WEATHERING	HARDNESS	CORE CUTTING	DESCRIPTION	WATER TABLE / WATER PRESSURE TEST / LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
0m			0 → 100 %							0 50 100%	0m	m
0–5	Qz-gn			86mm ⌀ dia-bit; 89.2 mm ⌀ casing	Brownish gray	5	5	5	Hard weathered Qz-Pl-gn Fine sand. 14.3~23.3, 25.0~30.0 washed sample	Inserted casing 7m	25~30.0m k=2.5×10⁻⁵	
30.0										Inserted casing 25m; below 30.0 m		

Legend:
- core loss
- RQD
- washed Sample
- driller's note 4
- 1 (stick) 2 (substick) 3 (piece) 4 (fragment) 5 grain
- 1 (hard) ~ 5 (soft)
- 1 (fresh) ~ 5 (decomposed)

ELECTRIC POWER DEVELOPMENT CO., LTD.
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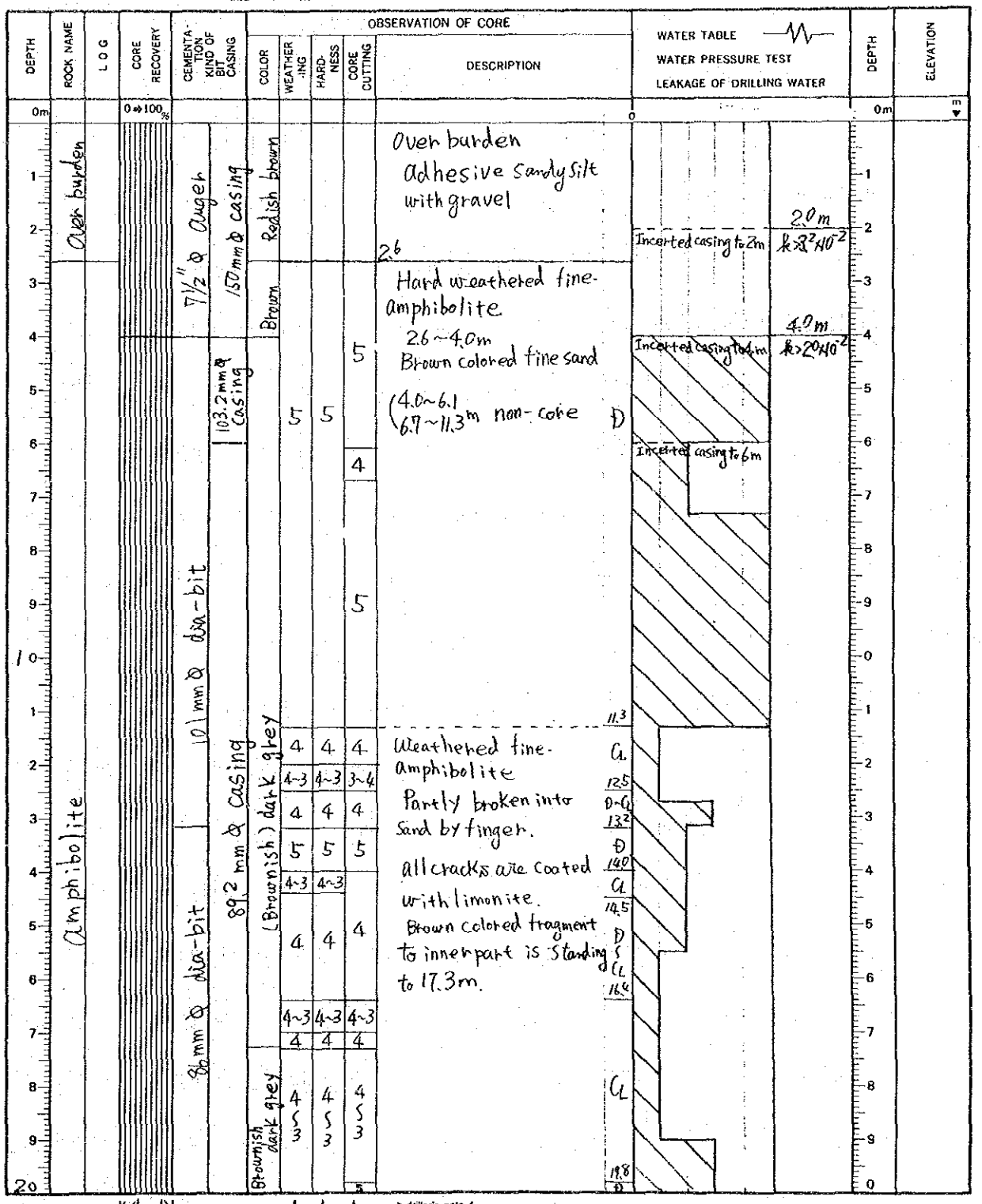
GEOLOGIC LOG OF DRILL HOLE

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 HOLIZONTAL	90 °	TOTAL LENGTH OF CORE	m	LOGGED BY	M. Shigeta
BEARING OF ANGLE HOLE	–	CORE RECOVERY	%		



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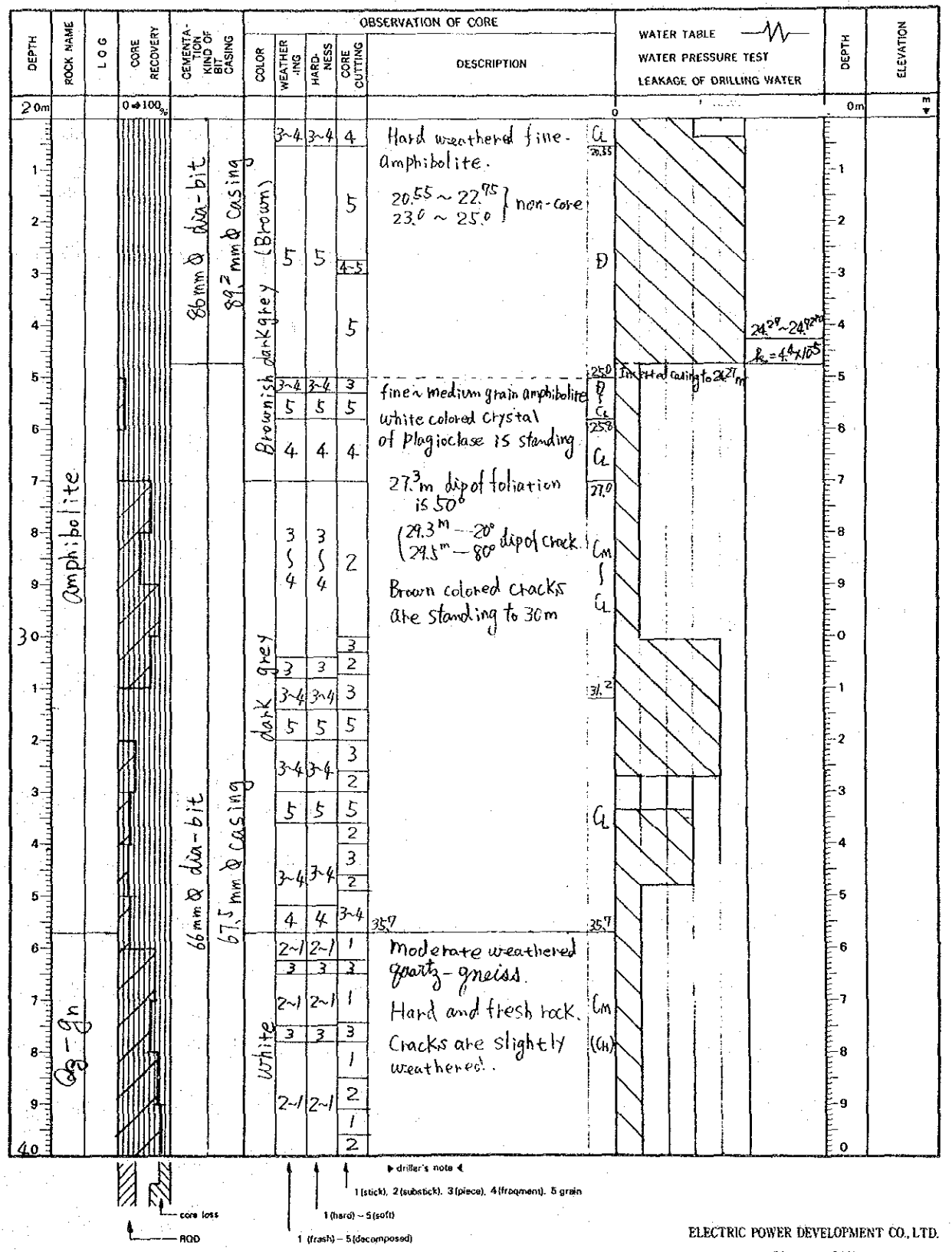
GEOLOGIC LOG OF DRILL HOLE

PROJECT	Kihansi	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 HOLIZONTAL	90°	TOTAL LENGTH OF CORE	m	LOGGED BY	M. Shigeta
BEARING OF ANGLE HOLE	–	CORE RECOVERY	%		



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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	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 HOLIZONTAL	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	DESCRIPTION		WATER TABLE / WATER PRESSURE TEST / LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
40m			0 → 100 %									40m	m
1	Qg-gn			67.5 mm φ casing	white (with red spot)	2~1	2~1	2	40.5~42m Weathering is standing.	CM (CH)	40~45.0m Lu>400 k>5.2×10⁻³	1	
						3	3	3		41.0			
						5	5	5	41.0~41.5m non-core	D 41.5			
2						3	3	2				2	
3								1	43.5~50.0 m Very hard and fresh rock with slight brown colored (limonite coated) holizontal cracks.	CM (CH)		3	
								3		43.5			
4				66 mm φ dia-bit		1	1				Inserted casing to 44.0 m	4	
5						5	5		47.1m dip of foliation is 40~50°			5	
						2	2						
6								1 (2)	Cracks cut foliation diagonally.		45.3~50m Lu=1.2 k=1.6×10⁻⁵	6	
7									Partly red colored garnet is concentrated	CH		7	
8												8	
9												9	
50									50.0	50D	50.0	0	
1											below 50.0 m	1	
2												2	
3												3	
4												4	
5												5	
6												6	
7												7	
8												8	
9												9	
0												0	

▶ driller's note ◀

1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 grain

core loss

RQD

1 (hard) ~ 5 (soft)

1 (fresh) ~ 5 (decomposed)

ELECTRIC POWER DEVELOPMENT CO., LTD.
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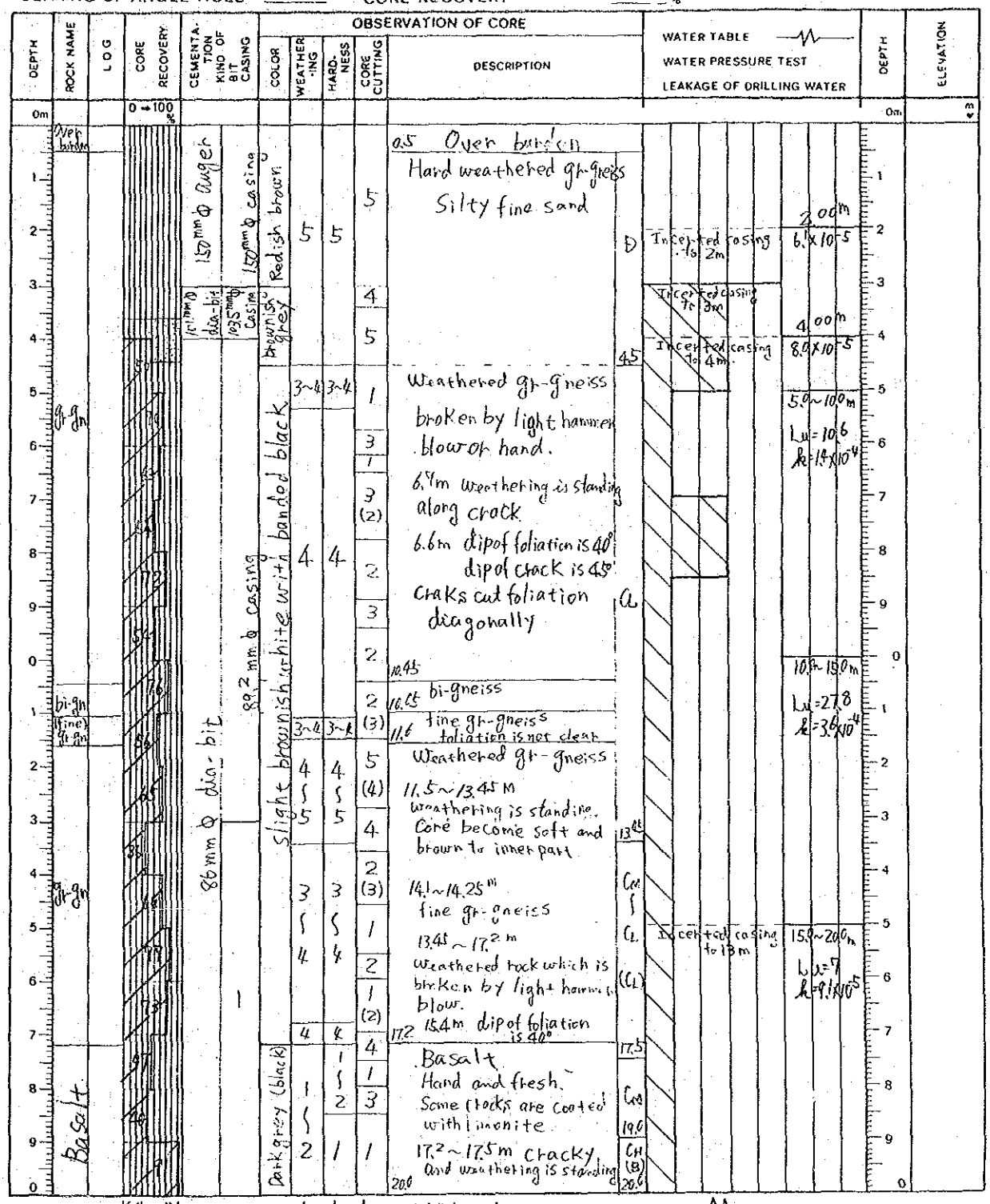
GEOLOGIC LOG OF DRILL HOLE

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	m	DEPTH OF OVERBURDEN	0.5 m	COMPLETED	02-10-'89
COORDINATE		LENGTH OF ROCK DRILLING	19.5 m	DRILLED BY	M. Wilkie
ANGLE FROM HORIZONTAL	90°	TOTAL LENGTH OF CORE	m	LOGGED BY	M. Shigeta
BEARING OF ANGLE HOLE		CORE RECOVERY	%		



GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT HOLE No. KL-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	COLOR	WEATHERING	HARDNESS	CORE CUTTING	DESCRIPTION
0m			0 → 100 %						
0.9	Over burden				Dark grey				Over burden Silty clay with grouts
1.0					Reddish brown				Hard weathered gr-gneiss micaceous silty sand
2.0				175mm φ Auger					Incerted casing to 2.0m
4.0				150mm φ casing	Brownish grey	5	5	5	Incerted casing to 4.0m
7.0									
8.0	gr-g			101mm φ dia-bit	black	4	4	3	Weathered gr-gneiss with quartz veins 9.0~8.0, 11.2~14.1m broken by hand
9.0				102.5mm φ casing	white with banded black	3	3 ∫ 4	2 3 1 3	8.0~11.2m broken by light hammer blow. Dip of foliation is 30°
11.2								2	11.6~11.9m foliation bands is thin alternation.
11.9					Brownish white with banded black	3~4 2	3~4	3 2	11.9~13.0m non-core 13.0~13.5m weathering is standing. whole core become soft and brown
13.5				89.2mm φ casing	Reddish brown	5	5	5	
14.1				86mm φ dia-bit		4 4(3)	4 4(3)	3	Amphibolite 14.1~20.0m Very hard and fresh rock with partly holizontal fresh cracks which is broken by machine round.
14.6	Amph				Dark grey	1	1	1 (2)	14.1~14.6m weathering is standing. Partly whole core become soft and brown.
19.3						3~4 1	3~4 1	4 1	19.3m Cracks are coated with limonite.
20.0									

WATER TABLE
WATER PRESSURE TEST
LEAKAGE OF DRILLING WATER

0 50 100% 100% 0m

Incerted casing to 2.0m — 2.0m — k>6.1×10⁻⁵
Incerted casing to 4.0m — 4.0m — k>5.6×10⁻⁵
Incerted casing to 9.0m — 9.0~14.0m — Lu=23.5 — k=3.6×10⁻⁴
Incerted casing to 13.0m — 15.0~20.0m — Lu=11.0 — k=1.4×10⁻⁴

▶ driller's note 4

1 (stick) 2 (substick) 3 (piece) 4 (fragment) 5 grain

1 (hard) ~ 5 (soft)

1 (fresh) ~ 5 (decomposed)

core loss

RQD

Washed Sample

below 20.0 m

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	24-08-89
ELEVATION	m	DEPTH OF OVERBURDEN	1.2 m	COMPLETED	30-08-89
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	COLOR	WEATHERING	HARDNESS	CORE CUTTING	DESCRIPTION	WATER TABLE / WATER PRESSURE TEST / LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
0m			0 → 100 %								0m	m
1	Over burden				Pink Brown				Over burden 1.2 Gravelly silty clay			
2	Qz-Pl Gn			150 mm φ casing	Reddish brown				1.2~20.0m Hard weathered Qz-Pl gneiss	2.0m k=3.5×10^-5		
4									1.2~4.0m Adhesive clay	4.0m k=1.8×10^-4		
5					Brownish grey				4.0~20.0m Clay ~ silt			
6				176 mm φ auger						6.0~20.0m k>1.6×10^-2		
7									7.0~7.35m White colored hard weathered Qz-gneiss			
8												
9												
0						5	5	5	D		0	
1												
2	Qz-Pl Gn			140 mm φ auger								
3												
4												
5												
6									16.1~16.5m White colored hard weathered Qz-gneiss			
7				101 mm φ auger	Little brownish grey							
8	Qz-Pl Gn											
9												
0											0	

▶ driller's note 4

1 (stick) 2 (substick) 3 (piece) 4 (fragment) 5 grain

1 (hard) ~ 5 (soft)

1 (fresh) ~ 5 (decomposed)

below 20.0m

core loss

RQD

washed Sample

ELECTRIC POWER DEVELOPMENT CO., LTD.
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GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT — HOLE No. KL-4 (SHEET 1 OF 1)

LOCATION	Lower P/s	DEPTH OF HOLE	20.0 m	COMMENCED	12-07-'89
ELEVATION	m	DEPTH OF OVERBURDEN	0.6 m	COMPLETED	15-08-'89
COORDINATE		LENGTH OF ROCK DRILLING	20.0 m	DRILLED BY	M. Nilkie
ANGLE FROM HORIZONTAL	90°	TOTAL LENGTH OF CORE	m	LOGGED BY	M. Shigeta
BEARING OF ANGLE HOLE	—	CORE RECOVERY	%		

OBSERVATION OF CORE

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION / KIND OF BIT / CASING	COLOR	WEATHERING	HARDNESS	CORE CUTTING	DESCRIPTION
0m			0 ~ 100 %						
0–3.5	Over burden			176mm φ Cover; 130mm φ Casing	Reddish brown				Over burden Silt ~ Sand 0~1.6 m Poor sorting 1.6 m φ5cm Pl-Qz-gneiss boulder
3.5–18.0	Gr-Gn			101mm φ dia-bit; 103.5mm φ Casing	Brownish grey	5	5	5	Hard weathered Gr-gneiss 3.5~18.0 m Sand with fragment which can be broken into silt by finger easily.
11.6									Quartz vein
15.4~15.6				86mm φ dia-bit; 89.2mm φ Casing					Brownish colored substick weathered Gr-gn which has 20~30° dip foliation
18.0~20.0						5 4	5 4	5 4	Sand with substick cores which can be broken into silt by finger
20.0						3	3	3	18.0~20.0 m Quartz vein

WATER TABLE / WATER PRESSURE TEST / LEAKAGE OF DRILLING WATER

Incerted casing to 1.5m; Incerted casing to 2.0m; $k = 1.6 \times 10^{-4}$ (2.00 m); Incerted casing to 4.0m; $k = 1.2 \times 10^{-4}$ (4.00 m); Incerted casing to 9.0 m; Incerted casing to 15.25 m; below 20.0 m

core loss; RQD; washed sample; driller's note 4; 1 (stick) 2 (substick) 3 (piece) 4 (fragment) 5 grain; 1 (hard) ~ 5 (soft); 1 (fresh) ~ 5 (decomposed)

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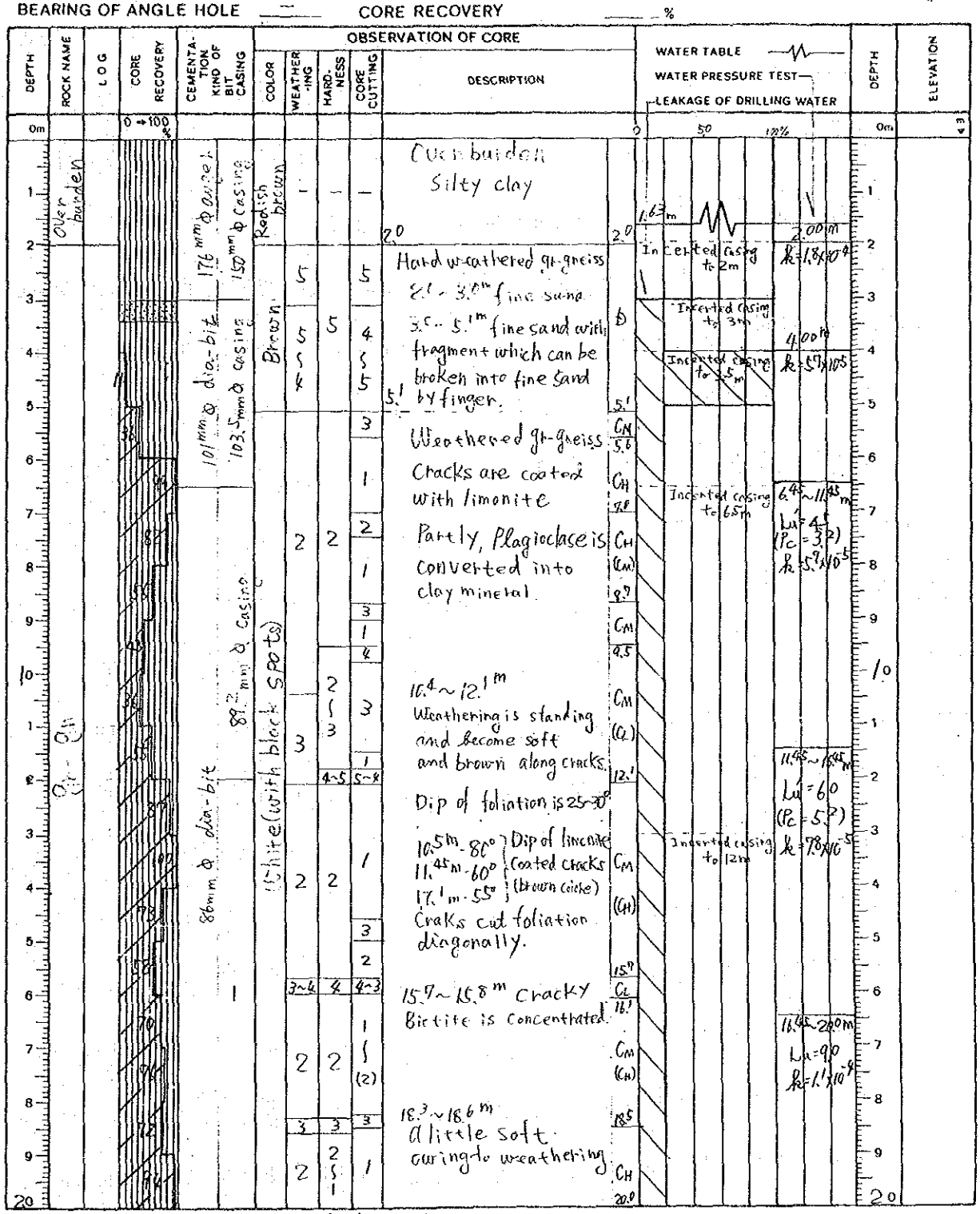
GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT — HOLE No. KL-5 (SHEET 1 OF 1)

LOCATION	Lower P/S	DEPTH OF HOLE	20.0 m	COMMENCED	10-07-'89
ELEVATION	m	DEPTH OF OVERBURDEN	2.0 m	COMPLETED	12-08-'89
COORDINATE		LENGTH OF ROCK DRILLING	18.0 m	DRILLED BY	M. WILKIE
ANGLE FROM HORIZONTAL	90°	TOTAL LENGTH OF CORE	m	LOGGED BY	M. Shizeta
BEARING OF ANGLE HOLE	—	CORE RECOVERY	%		



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GEOLOGIC LOG OF DRILL HOLE

Kihansi PROJECT — HOLE No. KM-1 (SHEET 1 OF 1)

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	M. Wilkie
ANGLE FROM HORIZONTAL	90°	TOTAL LENGTH OF CORE	m	LOGGED BY	M. Shigeta
BEARING OF ANGLE HOLE	—	CORE RECOVERY	%		

OBSERVATION OF CORE

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	COLOR	WEATHERING	HARDNESS	CORE CUTTING	DESCRIPTION	WATER TABLE / WATER PRESSURE TEST / LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION
0m			0 → 100 %								0m	m
	Over burden				dark brown	—	—	—	0.5 Top Soil			
1					Yellowish brown				Hard weathered gr-gneiss	(1.53m)	1	
2									0.5~6.0m Silt~fine sand		2	
3				175mm φ dia-bit	Reddish brown	5			6.0~9.0m fine sand with fragment		3	
4	gr-gn										4	
5				150mm φ casing							5	
6					brown		5	5		Inserted casing to 6m	6	
7						5					7	
8				103.5mm φ casing		5 4					8	
9									9.0		9	
0	bi-gn				Dark grey	5			Hard weathered bi-gneiss Sampled micaceous fine sand.	Inserted casing to 9m	0	
1									11.0		1	
2	gr-gn		20	101mm φ dia-bit	Brownish dark grey	5 5 4		4	Hard weathered gr-gneiss Cracky, Sampled fine sand with fragment 12.6	11.6 D S G 12.6	2	
3				89.2mm φ casing	White	3~4	3(4)	3	Weathered Qz-gneiss (with biotite & Qz min scouted)	G	3	
					White black band	3	2~3		Hard and (almost) fresh	13.6		
4			83					2	Cracks are slightly coated with limonite	CH	4	Inserted casing to 14m
5									13.3m dip of foliation is 40°	15.2	5	
6	Qz-gn		80			1 1 2	2		12.6~13.2m Partly broken into sand by finger	CH	6	
7			72	86mm φ dia-bit	White			1	13.2~13.6m biotite-gneiss. Some biotite is converted into chlorite	(B)	7	
8			77						13.9~14.0m cracky 15.1~15.2 17.9~18.0 Sampled fragment		8	
9			85								9	
0			83					2	20.0	20.0	0	

core loss

RQD

washed Sample

▶ driller's note 4

1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 grain

1 (hard) ~ 5 (soft)

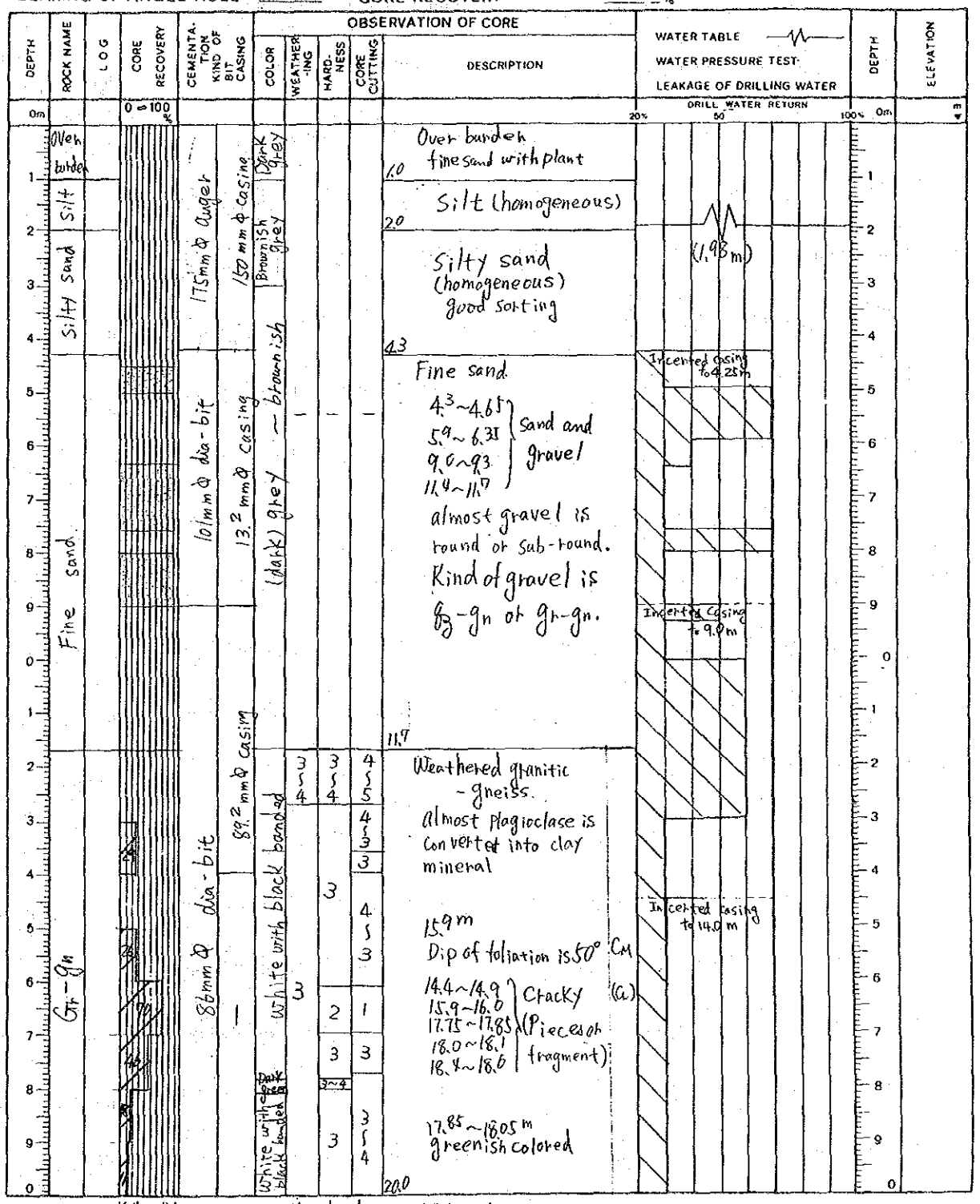
1 (fresh) ~ 5 (decomposed)

ELECTRIC POWER DEVELOPMENT CO., LTD.
TOKYO, JAPAN

GEOLOGIC LOG OF DRILL HOLE

Klhansi PROJECT — HOLE No. KM-2 (SHEET 1 OF 1)

LOCATION	Sand quarry	DEPTH OF HOLE	20.0 m	COMMENCED	6-7-89
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	%		



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TOKYO, JAPAN

A-2-2 Data Sheet of Permeability Test

Permeability Test Reading
(Falling head)

Kihansi Project

Date 8/8/'89

Drillhole NO.		KU-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 φmm
Casing Depth	(H_2)	2.0 m
Casing Diameter	(2R)	150 φmm
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	$4.9\times10^{-4} < k < 5.7\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(7.5)^2\cdot\pi\cdot 33/1200=4.9$ (cm³/sec.) $H=2.4$ m $H'=2.07$ m

$4.9\times10^{-4} < k < 5.7\times10^{-4}$

KU-1 (Sheet 1 of 5)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 24/8

Drillhole NO.		KV-1
Depth of Test	($H_2 \sim H_1$)	9.2 m ~ 12.23 m
Length of Test	($L=H_1-H_2$)	3.03 m
Drillhole Depth	(H_1)	12.23 m
Drillhole Diameter	(2r)	86 φmm
Casing Depth	(H_2)	9.2 m
Casing Diameter	(2R)	103.5 φmm
Head of Casing (Height above Ground Level)	(h)	0.8 m
Depth of Ground Water Level	(H_0)	NIL. m
Time Started	(T_1)	1:30 PM
Time Completed	(T_2)	1:39'9" PM
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.	$1.5\times10^{-4} < k < 2.9\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(5.2)^2\cdot\pi\cdot 500/549 = 77.3$ cm³/s $H=11.12$ m $H'=6.12$ m

$1.5\times10^{-4} < k < 2.9\times10^{-4}$

KV-1 (Sheet 2 of 5)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 7/10/'89

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)

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

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

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

$Q=(4.5)^2 \cdot \pi \cdot 500/529 = 60.1 (cm^3/s)$ $H=23.25_{(m)}$ $H'=18.25_{(m)}$

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

KU-1 , (Sheet 3 of 5)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 9/12/'89

Drillhole NO.		KU-1
Depth of Test	($H_2 \sim H_1$)	42.50 m ~ 45.34 m
Length of Test	($L=H_1-H_2$)	2.84 m
Drillhole Depth	(H_1)	45.34 m
Drillhole Diameter	(2r)	66 φmm
Casing Depth	(H_2)	42.50 m
Casing Diameter	(2R)	[illegible] φmm
Head of Casing (Height above Ground Level)	(h)	1.5 m
Depth of Ground Water Level	(H_0)	NIL. m
Time Started	(T_1)	10:00 AM
Time Completed	(T_2)	10:15' 34" AM
Time Elapsed	($T=T_2-T_1$)	15min. 34 sec.
Water Fell	(ℓ)	5.0 m

Water Fell (m)	Lap Time (min.)	Remarks
0 ~ 1.0	2 min. 45 sec.	
1.0 ~ 2.0	1 min. 38 sec.	
2.0 ~ 3.0	2 min. 57 sec.	
3.0 ~ 4.0	3 min. 39 sec.	
4.0 ~ 5.0	4 min. 16 sec.	
0 ~ 5.0	15 min. 34 sec.	$1.9\times10^{-5} < k_e < 2.2\times10^{-5}$

Permeability Value (K)

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

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

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

$Q=(4.5)^2\cdot\pi\cdot500/934=34.0\ (cm^3/s)$ $H=44.44m$ $H'=39.44$ (m)

$1.9\times10^{-5} < k_e < 2.2\times10^{-5}$

KU-1 (Sheet 4 of 5)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 10/11/89

Drillhole NO.		KU-1
Depth of Test	($H_2 \sim H_1$)	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 φmm
Casing Depth	(H_2)	45.7 m
Casing Diameter	(2R)	55 φmm
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. [illegible]	
0 ~ 5.0	3h. 7min. 38 sec.	$5.3\times10^{-7} < k < 5.9\times10^{-7}$

Permeability Value (K)

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

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

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

$Q=(3.4)^2\cdot\pi\cdot500/11258 = 1.6\ cm^3/sec.$ $H=4.835m$ $H'=4.335m$

$5.3\times10^{-7} < k < 5.9\times10^{-7}$

KU-1 (Sheet 5 of 5)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 3/9/89

Drillhole NO.		KU-2
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)	191 φmm
Casing Depth	(H_2)	20 m
Casing Diameter	(2R)	150φmm
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.	$4.8\times10^{-4} < k < 5.5\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(7.5)^2\cdot\pi\cdot40/1200=5.9$ (cm³/sec) $H=3.0$ (m) $H'=2.6$ (m)

$4.8\times10^{-4} < k < 5.5\times10^{-4}$

KU-2 (Sheet 1 of 4)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 4/9/'8?

Drillhole NO.		KU-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)	19 φmm
Casing Depth	(H_2)	4.0 m
Casing Diameter	(2R)	150 φmm
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.	$k < 2.9 \times 10^{-3}$

Permeability Value (K)

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

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

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

$Q=(7.5)^2 \cdot \pi \cdot 202/1200 = 29.7$ (cm³/s) $H=4.5$ (m) $H'=2.48$

$1.6 \times 10^{-3} < K < 2.9 \times 10^{-3}$

KU-2 (Sheet 2 of 4)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 8/9/89

Drillhole NO.		KU-2
Depth of Test	($H_2 \sim H_1$)	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 φmm
Casing Depth	(H_2)	13.0 m
Casing Diameter	(2R)	103.5 φmm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	nil. 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.	$k < 2.1 \times 10^{-4}$

Permeability Value (K)

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

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

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

$Q=(5.2)^2 \cdot \pi \cdot 980/1200 = 69.3 (cm^3/s)$ $H=15.50_{(m)}$ $H=5.70_{(m)}$

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

KU-2 , (Sheet 3 of 4)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 8/9/89

Drillhole NO.		KU-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.IL 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)

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

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

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

$Q=(4.5)^2 \cdot \pi \cdot 1120/1200 = 59.3$ (cm³/sec) $H=28$ (m) $H'=16.8$ (m)

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

KU-2 (Sheet 4 of 4)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 8/8/82

Drillhole NO.		KU-3
Depth of Test	($H_2 \sim H_1$)	2.0 m
Length of Test	($L=H_1-H_2$)	– m
Drillhole Depth	(H_1)	22 m
Drillhole Diameter	(2r)	φmm
Casing Depth	(H_2)	22 m
Casing Diameter	(2R)	150 φmm
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 PM
Time Completed	(T_2)	14:50 PM
Time Elapsed	($T=T_2-T_1$)	20 min.
Water Volume		>400 ℓ

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

Permeability Value (K)

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

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

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

$Q > 400\,\ell / 20\,\text{min} = 333$ (cm³/sec.) $H < 2.5$ (m)

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

KU-3 (Sheet 1 of 3)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 9/8/80

Drillhole NO.		KU-3
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 φmm
Casing Depth	(H_2)	4.0 m
Casing Diameter	(2R)	150 φmm
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 >1.8×10⁻²

Permeability Value (K)

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

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

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

$Q>400\ell/20min = 333$ (cm³/sec) $H<4.5$ (m)

$K > 333/(5.5 \cdot 7.5 \cdot 450) = 1.8 \times 10^{-2}$

KU-3 (Sheet 2 of 3)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 14/11 '7?

Drillhole NO.		KU-3
Depth of Test	($H_2 \sim H_1$)	24.27 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 φmm
Casing Depth	(H_2)	24.27 m
Casing Diameter	(2R)	89.2 φmm
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	($T=T_2-T_1$)	48min. 4sec.
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)

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

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

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

$Q=(4.5)^2 \cdot \pi \cdot 500/2884 = 11.0$ (cm³/sec) $H=24.73$m $H'=19.73$m

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

KU-3 (Sheet 3 of 3)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 26/2/'97

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 φmm
Casing Depth	(H_2)	4.0 m
Casing Diameter	(2R)	103.5 φmm
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)	$7.8\times10^{-5} < K < 8.0\times10^{-5}$

Permeability Value (K)

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

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

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

$Q=(5.2)^2\cdot\pi\cdot 14/1200 = 1.0\ cm^3/sec$. $H=4.5m$, $H'=4.361m$

$7.8\times10^{-5} < K < 8.0\times10^{-5}$

KL-1 (Sheet 1 of 2)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 25/9/82

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)	194.5 φmm
Casing Depth	(H_2)	2.0 m
Casing Diameter	(2R)	150 φmm
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.)	$1.5\times10^{-4} < K < 1.8\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(9.5)^2\cdot\pi\cdot 12/1200=1.8\,(cm^3/s)$ $H=2.5\,(m)$ $H'=2.38\,(m)$

$1.5\times10^{-4} < K < 1.8\times10^{-4}$

KL-1 (Sheet 2 of 2)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 18/8/'89

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)	190.5φ 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.)	$1.7\times10^{-4} < K < 1.8\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(7.5)^2\cdot\pi\cdot 12/1200=1.8$ (cm³/sec) $H=2.5$ (m) $H'=2.38$ (m)

$1.7\times10^{-4}<K<1.8\times10^{-4}$

KL-2 (Sheet 1 of 2)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 18/8/'99

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)	19.5 φmm
Casing Depth	(H_2)	4.0 m
Casing Diameter	(2R)	150 φmm
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)	$1.1\times10^{-4} < K < 1.2\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(7.5)^2\cdot\pi\cdot 14.5/1200=2.1$ (cm³/sec.) $H=4.5$ (m) $H'=4.36$ (m)

$1.1\times10^{-4} < K < 1.2\times10^{-4}$

KL-2 (Sheet 2 of 2)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 24/7/79

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)	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)	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)	$2.3\times10^{-4} < K < 2.5\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(7.5)^2\cdot\pi\cdot 20/1200 = 2.9$ (cm³/sec.) $H=3.0$ (m), $H'=2.8$ (m)

$2.3\times10^{-4} < K < 2.5\times10^{-4}$

KL-3 (Sheet 1 of 3)

Permeability Test Reading
(Constant head)

Kihansi Project

Date 24/8/79

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_1)	4.0 m
Drillhole Diameter	(2r)	190.5 φmm
Casing Depth	(H_2)	4.0 m
Casing Diameter	(2R)	155 φmm
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)	13:35 PM
Time Elapsed	($T=T_2-T_1$)	25 min
Water Volume		4 (ℓ)

Water Volume	Lap Time (min.)	Remarks
4000 (cm³)	25 (min)	$K=1.8\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=4000/1200=3.3$ (cm³/sec.) $H=4.5$ (m)

$K=1.8\times10^{-4}$

KL-3 (Sheet 2 of 3)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 29/8/'89

Drillhole NO.		KL-3
Depth of Test	($H_2 \sim H_1$)	6 m ~ 20 m
Length of Test	($L=H_1-H_2$)	14.0 m
Drillhole Depth	(H_1)	20.0 m
Drillhole Diameter	(2r)	101 φmm
Casing Depth	(H_2)	6.0 m
Casing Diameter	(2R)	152.4 φmm
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)

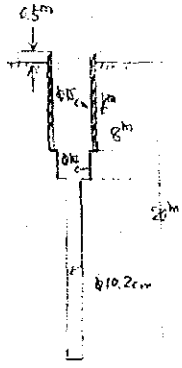
$Q=R^2 \cdot \pi \cdot \ell / T$,
$H=H_2+(H_1-H_2)/2+h=(H_1+H_2)/2+h$, $H'=H-\ell$, $(H_1<H_0)$

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

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

$Q = 400000/1200 = 333\ cm^3/sec$ $H < 13.5$

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



KL-3 , (Sheet 3 of 3)

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 φmm
Casing Depth	(H_2)	2.0 m
Casing Diameter	(2R)	103.5 φmm
Head of Casing (Height above Ground Level)	(h)	1.0 m
Depth of Ground Water Level	(H_0)	NIL. 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)	$1.5\times10^{-4} < K < 1.6\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(5.2)^2\cdot\pi\cdot 18/1200=1.3$ (cm³/sec) $H=3.0$ (m) $H'=2.82$ (m)

$1.5\times10^{-4}<K<1.6\times10^{-4}$

KL-4 (Sheet 1 of 2)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 13/8/'89

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 φmm
Casing Depth	(H_2)	4.0 m
Casing Diameter	(2R)	103.5φmm
Head of Casing (Height above Ground Level)	(h)	0.5 m
Depth of Ground Water Level	(H_0)	NIL 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)	$K=1.2\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(5.2)^2\cdot\pi\cdot 21/1200=1.5$ (cm³/s) $H=4.5$ $H'=4.29$

$1.19\times10^{-4}<K<1.22\times10^{-4}$

KL-4 (Sheet 2 of 2)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 9/8/'89

Drillhole NO.		KL-5
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)	175 φmm
Casing Depth	(H_2)	2.0 m
Casing Diameter	(2R)	150 φmm
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.)	$1.2\times10^{-4} < K < 1.3\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(7.5)^2\cdot\pi\cdot10/1200=1.5$ (cm/sec.) $H=3.0$ (m) $H'=2.9$ (m)

$1.2\times10^{-4}<K<1.3\times10^{-4}$

KL-5 (Sheet 1 of 2)

Permeability Test Reading
(Falling head)

Kihansi Project

Date 10/8/89

Drillhole NO.		KL-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 φmm
Casing Depth	(H_2)	3.5 m
Casing Diameter	(2R)	103.5 φmm
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	$1.3\times10^{-4} < K < 1.4\times10^{-4}$

Permeability Value (K)

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

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

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

$Q=(5.2)^2\cdot\pi\cdot 22/1200=1.6$ (cm³/sec) $H=4.25$ (m) $H'=4.03$ (m)

$1.3\times10^{-3}<K<1.4\times10^{-4}$

(Sheet 2 of 2)

PERMEABILITY TEST IN DRILL HOLE (SHEET 1 OF 2)

PROJECT: Kihansi HOLE No. KU-3

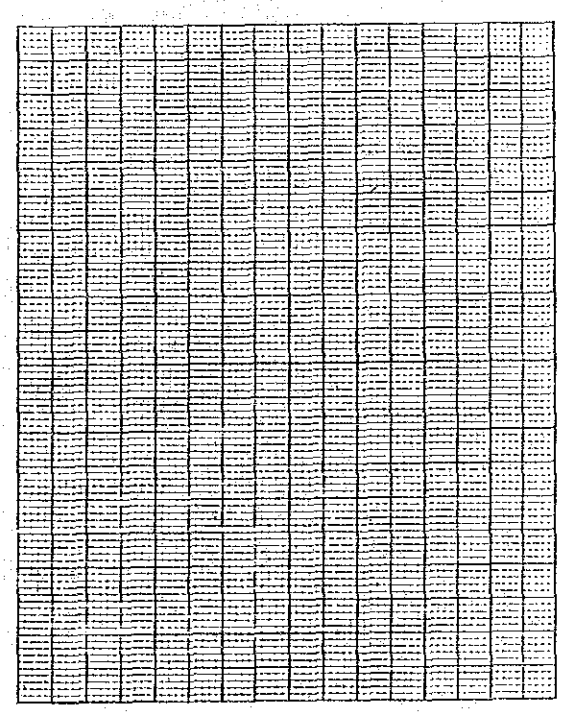
LOCATION: Upper dam site
ELEVATION: 1361.23 m
COORDINATE:
ANGLE FROM HOLIZONTAL: 90°
BEARING OF ANGLE HOLE: –

DEPTH OF HOLE: 50.0 m
DIAMETER OF HOLE: 2r = 6.6 cm
DRILLED DEPTH: 45.0 m
LEVEL OF WATER TABLE
BEFORE.T. 42.3 m AFTER.T. 42.3 m

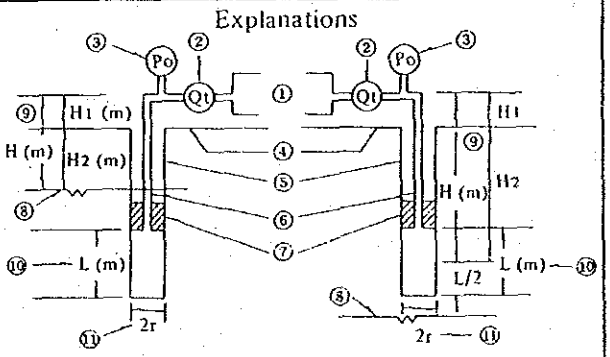
TEST DATE: 20/10/89
TESTED BY: A. Isamal
DRILLED BY: M. Wilkie
CHECKED BY:

TEST SECTION FROM 40.0 m TO 45.0 m

L (m)	H1 (m)	H2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (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	$>5.2 \times 10^{-3}$
			$K = 1.3 \times 10^{-5} \cdot Lu$							



Explanations



[Saturated strata] [Unsaturated strata]

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

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H^{(m)}/10$. $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

PERMEABILITY TEST IN DRILL HOLE (SHEET 2 OF 2)

PROJECT: Kihansi HOLE No. KU-3

LOCATION: Upper dam site
ELEVATION: 1361.23 m
COORDINATE:
ANGLE FROM HOLIZONTAL: 90°
BEARING OF ANGLE HOLE: —

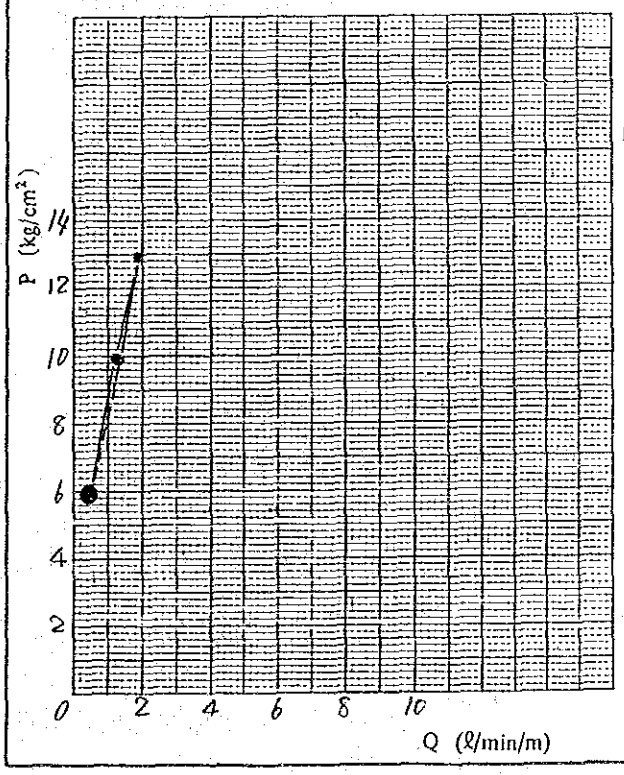
DEPTH OF HOLE: 50.0 m
DIAMETER OF HOLE 2r = 6.6 cm
DRILLED DEPTH: 50.0 m
LEVEL OF WATER TABLE
BEFORE.T. 48.6 m AFTER.T. 48.6 m

TEST DATE: 21/10/89
TESTED BY: A. Isarol
DRILLED BY: M. Wilkie
CHECKED BY:

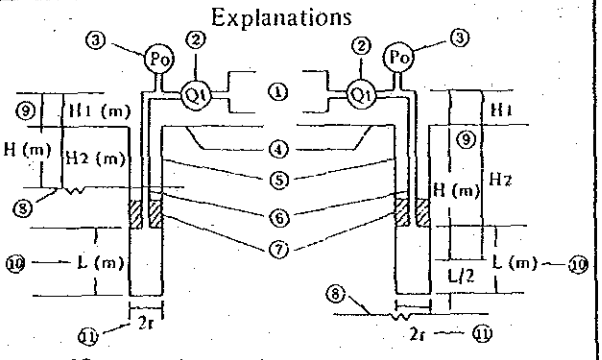
TEST SECTION FROM 45.03 m TO 50.0 m

L (m)	H1 (m)	H2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (ℓ/min)	Q (ℓ/min/m)	Lu (Lugeon)	K (cm/sec)
4.99	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	1.7×10^{-5}
"	"	"	1	5.9	"	23	2.3	0.5	0.8	1.0×10^{-5}
									Lu=1.2	1.6×10^{-5}

$$K = \frac{Q'}{2\pi \cdot P' L} \log_e \frac{L'}{r} = \frac{\frac{1000}{60} \cdot Q_o}{2\pi \cdot 100 P \cdot L} \cdot \log_e \frac{100L}{r}$$
$$= \frac{10^{-5}}{1.2 \cdot \pi} \cdot \frac{10 Q_o}{P \cdot L} \log_e \frac{499}{3.3} = 1.3 \cdot 10^{-5} \cdot Lu$$



Explanations



[Saturated strata] [Unsaturated strata]

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

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H^{(m)}/10$, $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

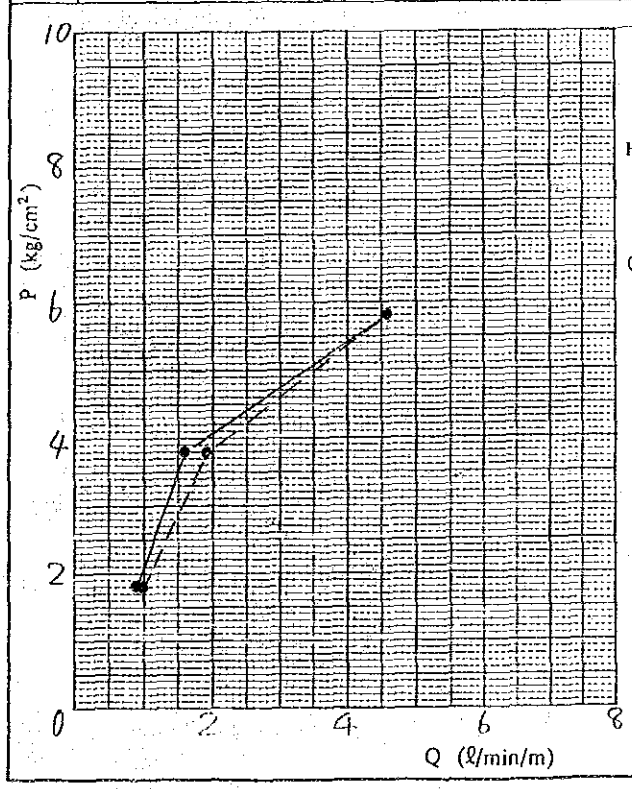
PERMEABILITY TEST IN DRILL HOLE (SHEET 1 OF 3)

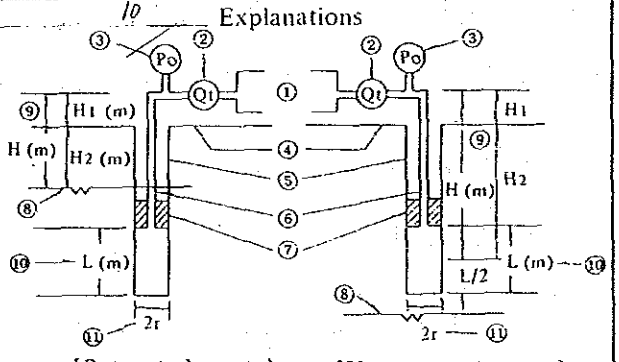
Kihansi PROJECT HOLE No. KL-1

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

TEST SECTION FROM 5.0 m TO 10.0 m

L (m)	H1 (m)	H2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (ℓ/min)	Q (ℓ/min/m)	Lu (Lugeon)	K (cm/sec)
5	0.5	7.5	1	1.8	10	43	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}
		$K = 1.3 \cdot 10^{-5} \cdot Lu$								
									Lu = 10.6	1.4×10^{-4}





[Saturated strata] [Unsaturated strata]

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

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H^{(m)}/10$. $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

PERMEABILITY TEST IN DRILL HOLE (SHEET 2 OF 3)

PROJECT: Kihansi HOLE No.: KL-1

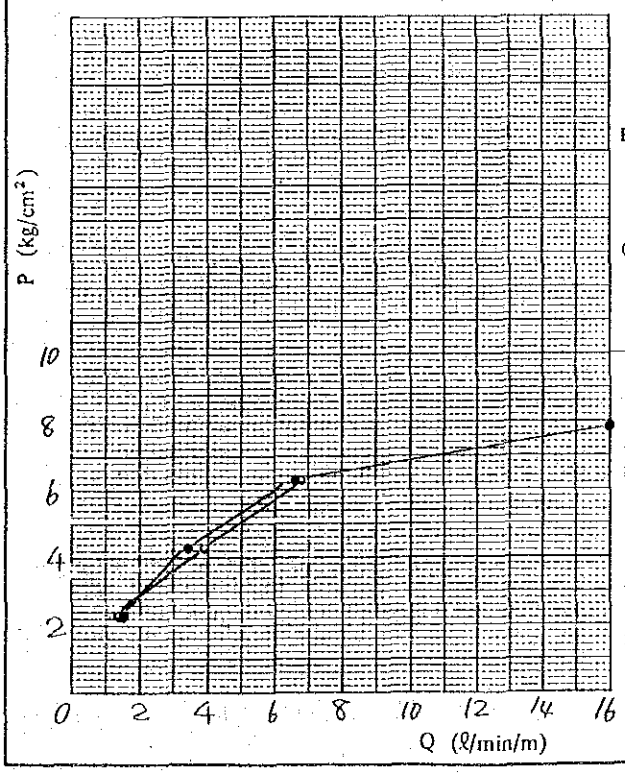
LOCATION: Lowerdam site
ELEVATION: 1153.3 m
COORDINATE:
ANGLE FROM HOLIZONTAL: 90°
BEARING OF ANGLE HOLE: -

DEPTH OF HOLE: 20.0 m
DIAMETER OF HOLE: 2r = 8.6 cm
DRILLED DEPTH: 15.0 m
LEVEL OF WATER TABLE
BEFORE.T. 4.0 m AFTER.T. 4.0 m

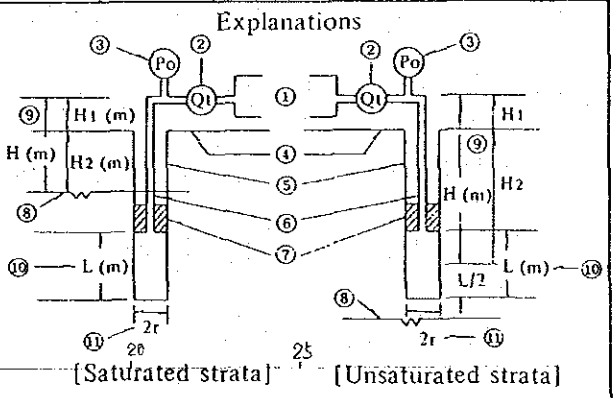
TEST DATE: 28/9/83
TESTED BY: A. W. Gracch
DRILLED BY: M. W. Kie
CHECKED BY:

TEST SECTION FROM 10 m TO 15 m

L (m)	H_1 (m)	H_2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (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}
			$K = 1.3 \times 10^{-3} \times L_u$							
									$L_u = 27.8$	3.6×10^{-4}



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

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H(m)/10$. $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

PERMEABILITY TEST IN DRILL HOLE (SHEET 3 OF 3)

Kihansi PROJECT HOLE No. KL-1

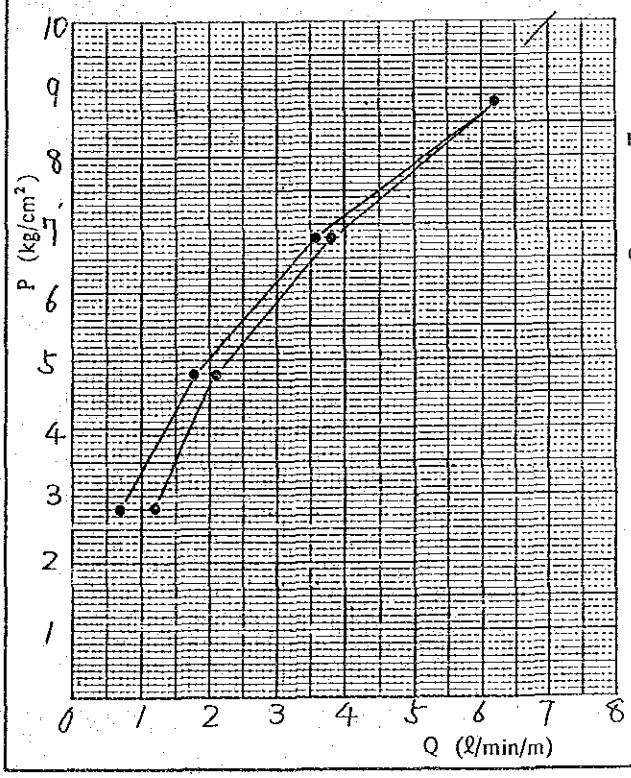
LOCATION Lower dam Site
ELEVATION 1153.30 m
COORDINATE —
ANGLE FROM HOLIZONTAL 90 °
BEARING OF ANGLE HOLE —

DEPTH OF HOLE 20.0 m
DIAMETER OF HOLE 2r = 8.6 cm
DRILLED DEPTH 20.5 m
LEVEL OF WATER TABLE
BEFORE.T. 4.0 m AFTER.T. 4.0 m

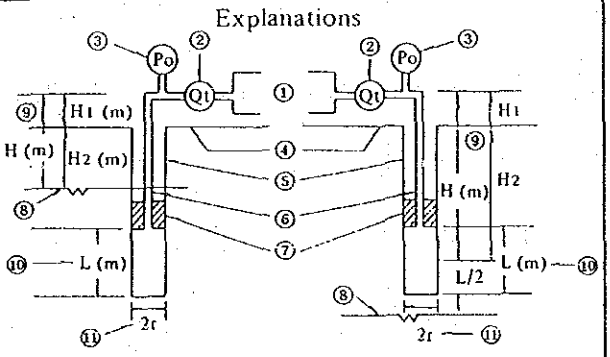
TEST DATE 29/9/69
TESTED BY A. Israel
DRILLED BY M. W. Kie
CHECKED BY

TEST SECTION FROM 15.0 m TO 20.0 m

L (m)	H1 (m)	H2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (ℓ/min)	Q (ℓ/min/m)	Lu (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}
			$K = 1.3 \times 10^{-5} \cdot Lu$							
									$Lu = 7$	9.1×10^{-5}



Explanations



[Saturated strata] [Unsaturated strata]

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

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H^{(m)}/10$, $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

PERMEABILITY TEST IN DRILL HOLE (SHEET 1 OF 2)

PROJECT: Kihansi

HOLE No.: KL-2

LOCATION: Lower dam site

ELEVATION: 1132.2 m

COORDINATE:

ANGLE FROM HOLIZONTAL: 90°

BEARING OF ANGLE HOLE: –

DEPTH OF HOLE: 20.0 m

DIAMETER OF HOLE: 2r = 8.6 cm

DRILLED DEPTH: 14.0 m

LEVEL OF WATER TABLE

BEFORE T. NiL m AFTER T. NiL m

TEST DATE: 22/9/86

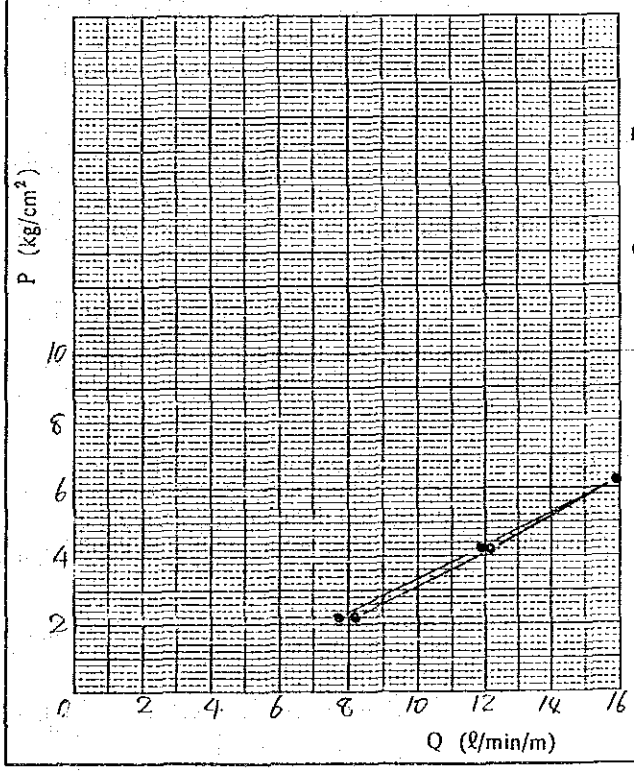
TESTED BY: N. Mike

DRILLED BY: A. Isenal

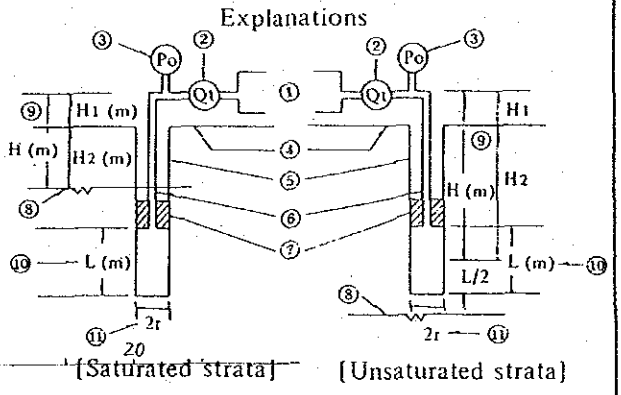
CHECKED BY:

TEST SECTION FROM 9.0 m TO 14.0 m

L (m)	H_1 (m)	H_2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (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	"	594	59.4	11.9	28.3	3.7×10^{-4}
"	"	"	5	6.2	"	795	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							



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

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H^{(m)}/10$, $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

Fig. 8

PERMEABILITY TEST IN DRILL HOLE (SHEET 2 OF 2)

PROJECT: Kihansi HOLE No. KL-2

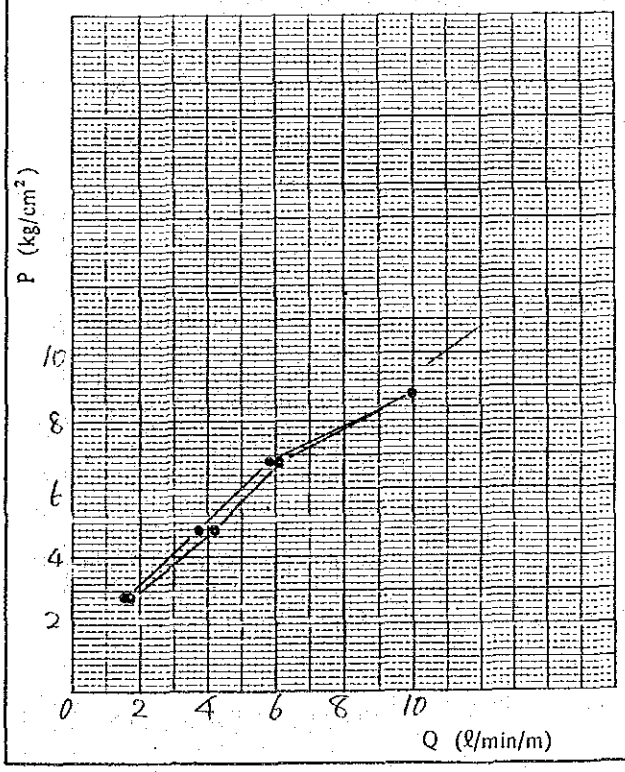
LOCATION: Lower dam site
ELEVATION: 1132.2 m
COORDINATE:
ANGLE FROM HOLIZONTAL: 90°
BEARING OF ANGLE HOLE: –

DEPTH OF HOLE: 20.0 m
DIAMETER OF HOLE: 2r=8.6 cm
DRILLED DEPTH: 20.0 m
LEVEL OF WATER TABLE
BEFORE.T. Nil m AFTER.T. Nil m

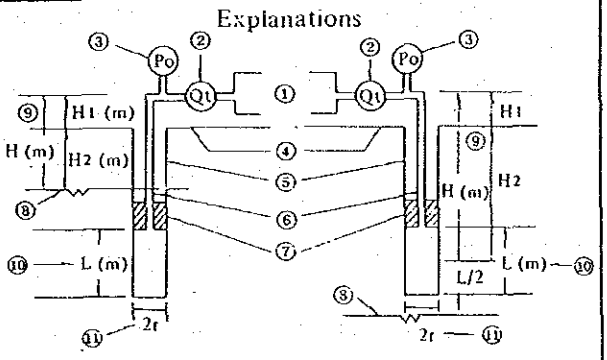
TEST DATE: 24/9/89
TESTED BY: Mmike
DRILLED BY: A. Isaiah
CHECKED BY:

TEST SECTION FROM 15.0 m TO 20.0 m

L (m)	H1 (m)	H2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (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	〃	207	20.9	4.2	8.8	1.1×10^{-4}
〃	〃	〃	1	2.8	〃	83	8.3	1.7	6.1	7.9×10^{-5}
			$K = 1.3 \times 10^{-5}$ Lu							
									Lu = 11.0	1.4×10^{-4}



Explanations



[Saturated strata] [Unsaturated strata]

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

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H^{(m)}/10$. $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

Fig. 8

PERMEABILITY TEST IN DRILL HOLE (SHEET 1 OF 3)

PROJECT Kihansi HOLE No. KL-5

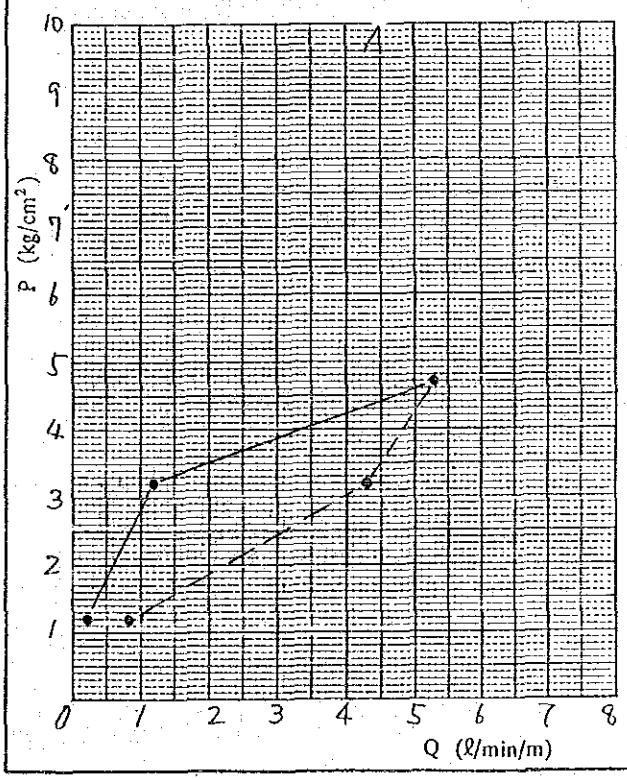
LOCATION Lower P/S
ELEVATION 325.04 m
COORDINATE
ANGLE FROM HOLIZONTAL 90°
BEARING OF ANGLE HOLE –

DEPTH OF HOLE 20.0 m
DIAMETER OF HOLE 2r = 8.6 cm
DRILLED DEPTH 11.45 m
LEVEL OF WATER TABLE
BEFORE. T. 1.6 m AFTER. T. 1.6 m

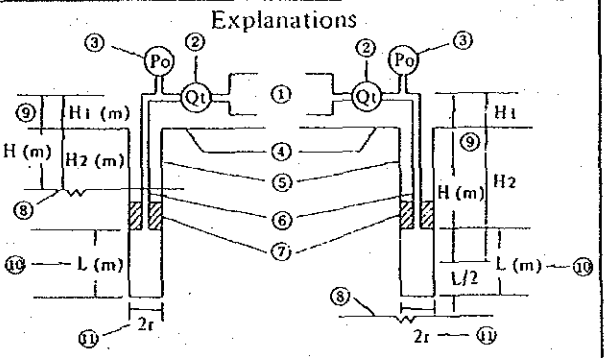
TEST DATE 11/8/89
TESTED BY A.W. Geach
DRILLED BY M. m:Ke
CHECKED BY

TEST SECTION FROM 6.45 m TO 11.45 m

L (m)	H1 (m)	H2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (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	1.7×10^{-4}
"	"	"	1	1.2	"	42	4.2	0.8	6.7	5.1×10^{-5}
				$K = 1.3 \times 10^{-5} \cdot Lu$						
									Lu = 4.5	5.9×10^{-5}
									(P_c = 3.2)	



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

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H(m)/10$. $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

PERMEABILITY TEST IN DRILL HOLE (SHEET 2 OF 3)

PROJECT: Kihansi HOLE No. KL-5

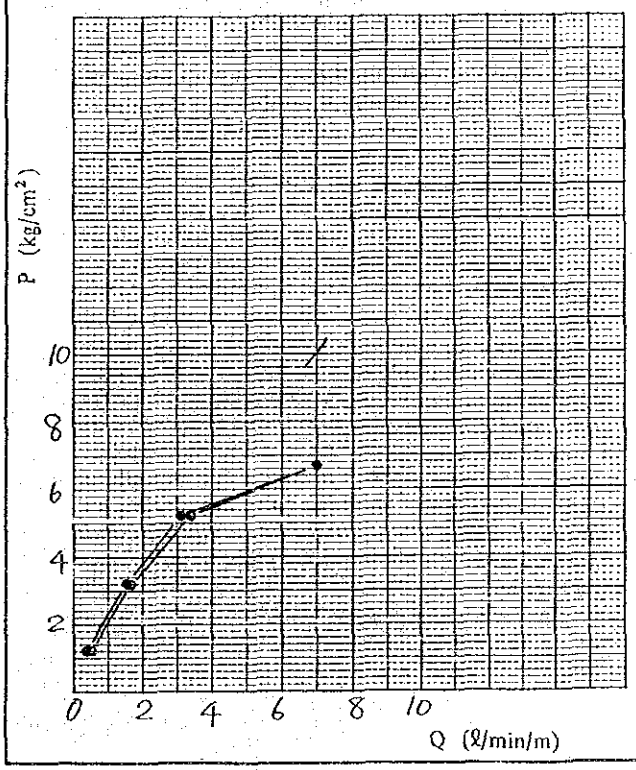
LOCATION: Lowen P/S
ELEVATION: 315.66 m
COORDINATE:
ANGLE FROM HOLIZONTAL: 90 °
BEARING OF ANGLE HOLE: —

DEPTH OF HOLE: 20.0 m
DIAMETER OF HOLE: 2r=8.6 cm
DRILLED DEPTH: 16.95 m
LEVEL OF WATER TABLE
BEFORE. T. 1.6 m AFTER. T. 1.6 m

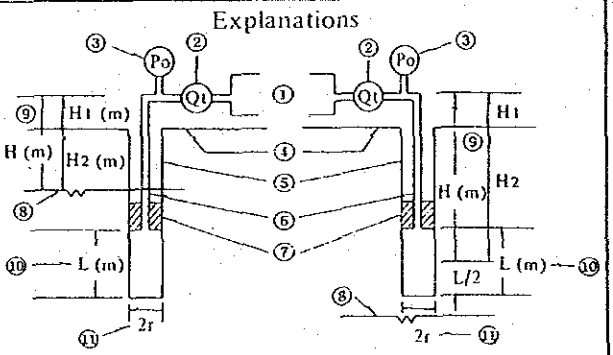
TEST DATE: 12/8/'89
TESTED BY: A.W. Geach
DRILLED BY: M. mike
CHECKED BY:

TEST SECTION FROM 11.45 m TO 16.95 m

L (m)	H1 (m)	H2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (ℓ/min)	Q (ℓ/min/m)	Lu (Lugeon)	K (cm/sec)
5	0.5	1.6	1	1.2	10	22	2.2	0.4	3.3	4.3×10^{-5}
"	"	"	3	3.2	"	73	7.3	1.5	4.7	6.1×10^{-5}
"	"	"	5	5.2	"	155	15.5	3.1	6.0	7.8×10^{-5}
"	"	"	6.5	6.7	"	350	35.0	7.0	10.4	1.4×10^{-4}
"	"	"	5	5.2	"	170	17.0	3.4	6.5	8.5×10^{-5}
"	"	"	3	3.2	"	81	8.1	1.6	5.0	6.5×10^{-5}
"	"	"	1	1.2	"	27	2.7	0.5	4.2	5.5×10^{-5}
									Lu'=6.0 (Pc=5.2)	7.8×10^{-5}
			Lu=1.3 x 10⁻⁵ · Lu							



Explanations



[Saturated strata] [Unsaturated strata]

① : Pump
② : Flow meter
③ : Pressure gauge
④ : Ground surface
⑤ : Drill hole
⑥ : Injection pipe
⑦ : Packer
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⑨ : Hydrostatic head
⑩ : Length of test section
⑪ : Diameter of hole

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P=P_0+H(m)/10$, $H=H_1+H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability

PERMEABILITY TEST IN DRILL HOLE (SHEET 3 OF 3)

PROJECT: Kihansi HOLE No. KL-5

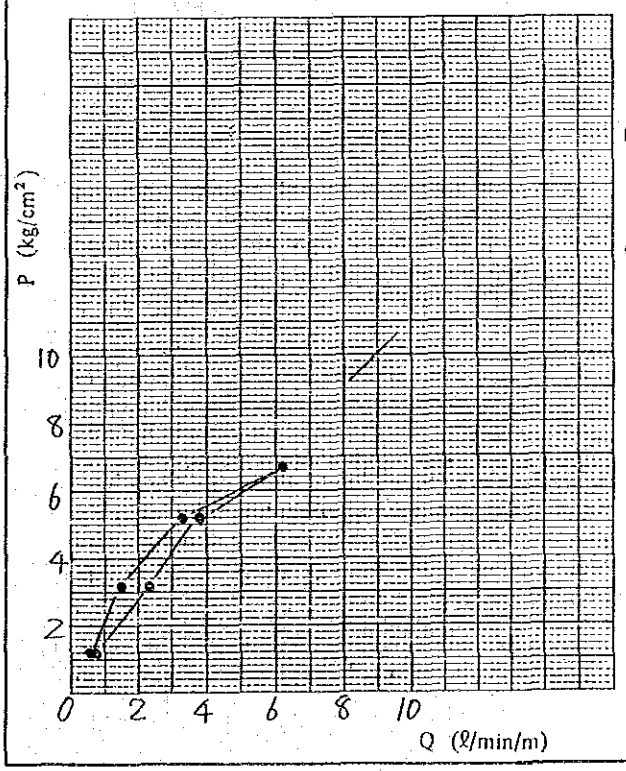
LOCATION: Lower P/S
ELEVATION: 315.66 m
COORDINATE:
ANGLE FROM HOLIZONTAL: 90°
BEARING OF ANGLE HOLE: –

DEPTH OF HOLE: 20.0 m
DIAMETER OF HOLE: 2r=8.6 cm
DRILLED DEPTH: 20.0 m
LEVEL OF WATER TABLE
BEFORE.T. 1.6 m AFTER.T. 1.6 m

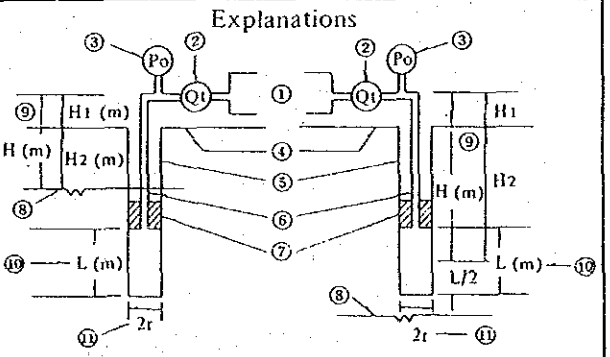
TEST DATE: 12/8/89
TESTED BY: A.W. Geach
DRILLED BY: M. mixe
CHECKED BY:

TEST SECTION FROM 16.45 m TO 20.0 m

L (m)	H1 (m)	H2 (m)	Po (kg/cm²)	P (kg/cm²)	t (min)	Qt (ℓ)	Qo (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}



Explanations



{Saturated strata} {Unsaturated strata}

① : Pump
② : Flow meter
③ : Pressure gauge
④ : Ground surface
⑤ : Drill hole
⑥ : Injection pipe
⑦ : Packer
⑧ : Water table
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⑩ : Length of test section
⑪ : Diameter of hole

Po : Gauge pressure
H_1 : Height of Pressure gauge
H_2 : Depth of Ground water (Saturated Strata)
P : Effective pressure $P = P_0 + H(m)/10$, $H = H_1 + H_2$
t : Injected time
Qt : Water volume during time in "t"
Qo : Water volume per one min.
Lu : Lugeon value in ℓ/min/m/10kg/cm²
K : Coefficient of permeability