社会開発調査部報告書

No. 82

JAPAN INTERNATIONAL COOPERATION AGENCY

NATIONAL INSTITUTE FOR RURAL
ENGINEERING AND IRRIGATION
MANAGEMENT

THE STUDY ON [illegible] WATER DEVELOPMENT
IN
THE [illegible]
IN
THE [illegible] REPUBLIC

FINAL REPORT

Vol. 4 DATA BOOK

(Appendix 1/2)

[illegible]

[illegible]

JAPAN INTERNATIONAL COOPERATION AGENCY

NATIONAL INSTITUTE FOR WATER
RESOURCES AND MANAGEMENT
REPUBLIC OF CAPE VERDE

THE STUDY ON GROUNDWATER DEVELOPMENT FOR SANTIAGO ISLAND IN THE REPUBLIC OF CAPE VERDE

FINAL REPORT

Vol. 4 DATA BOOK

September 1999

KOKUSAI KOGYO CO., LTD., TOKYO
JAPAN TECHNO CO., LTD., TOKYO

DATA BOOK

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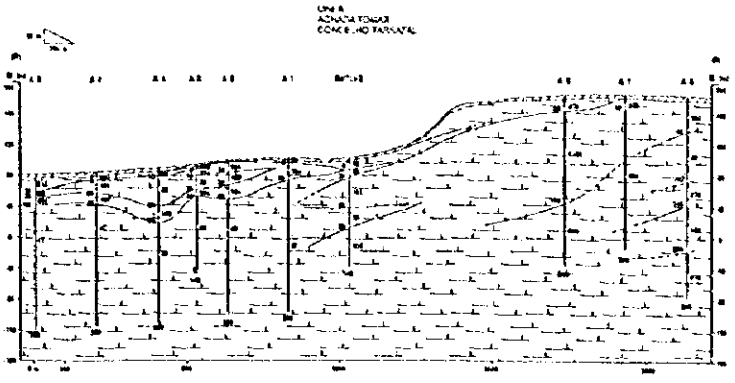
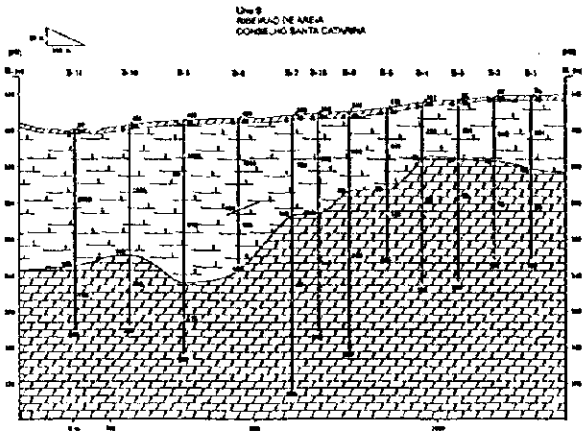
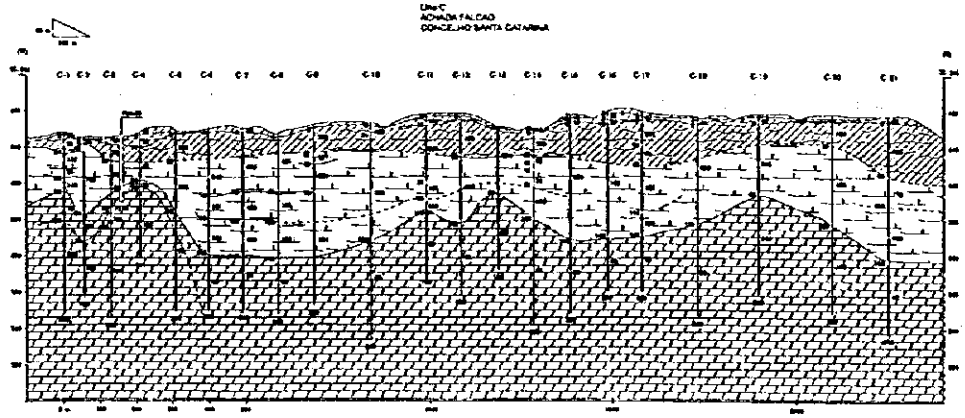
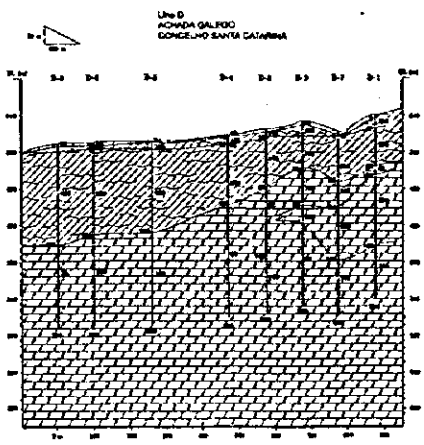


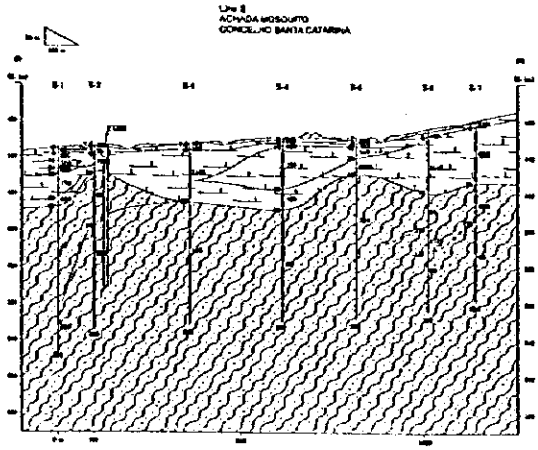


LEGEND

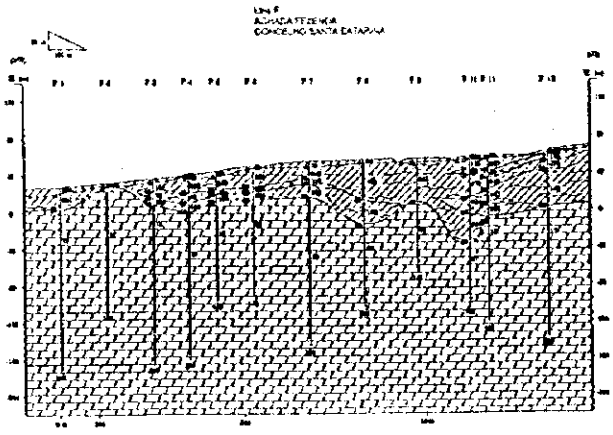
- Dt (sand, conglomerate)
- CA (Basement rocks)
- PA (volcanic lava flow)
- MA (volcanic lava & aggromerate)
- FI (tuff breccia, aggromerate)
- AI (sand, clay, conglomerate)
- CB (volcanic, tuff breccia)

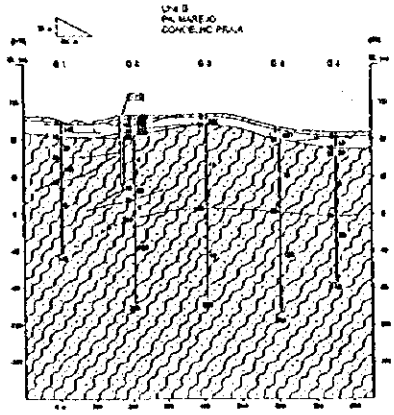


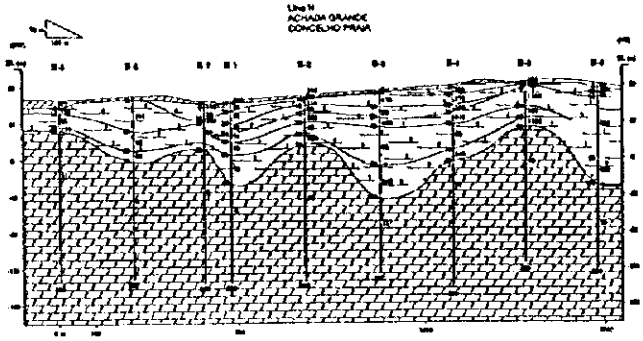


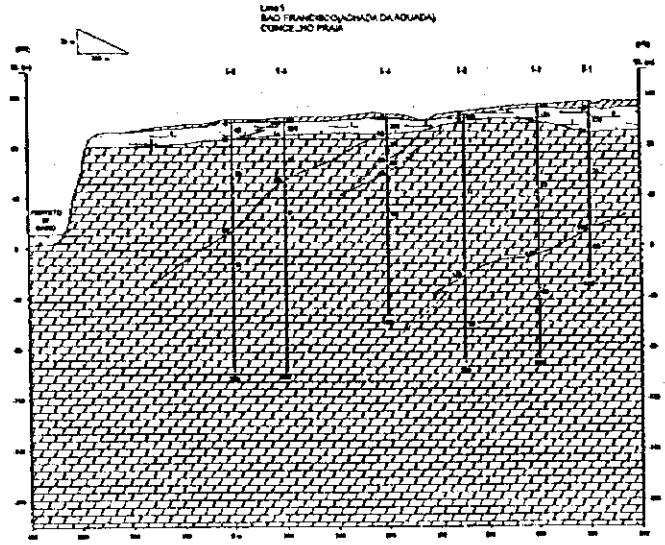


Cross Section of Electrical Resistivity Survey









LEGEND

- Dt (sand, conglomerate)
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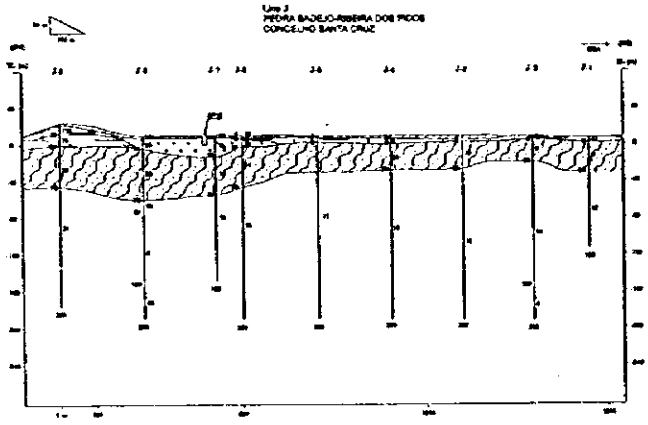
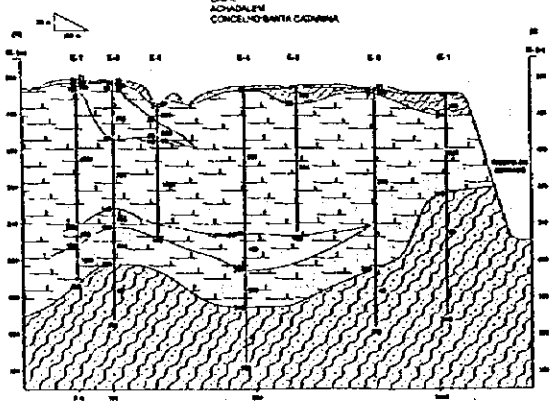
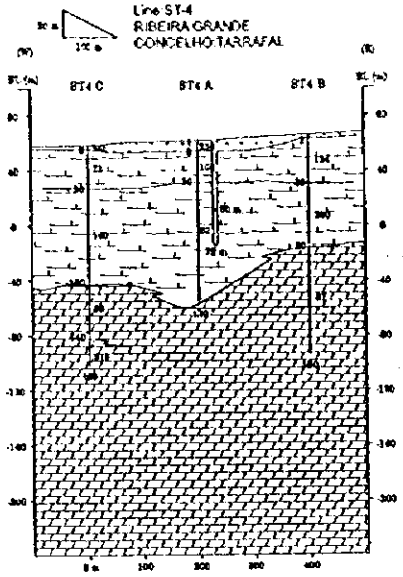




Cross Section of Electrical Resistivity Survey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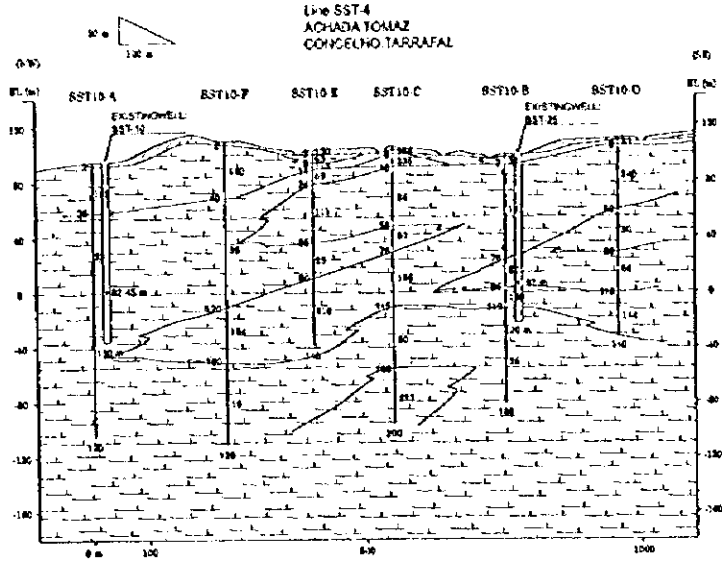
RIBEIRA GRANDE
CONCELHO TARRAFAL
ST4 C
ST4 A
ST4 B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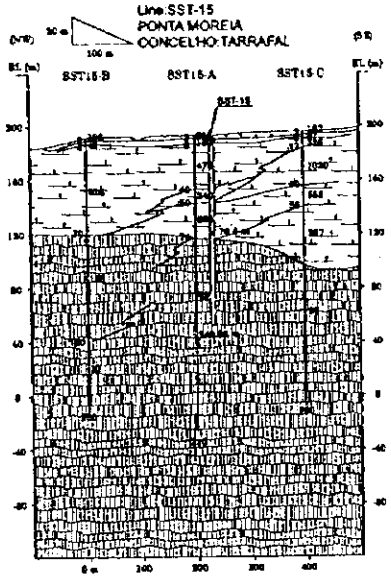
ACHADA TOMAZ
CONCELHO TARRAFAL
SST10 A
SST10 F
SST10 E
SST10 C
SST10 B
SST10 D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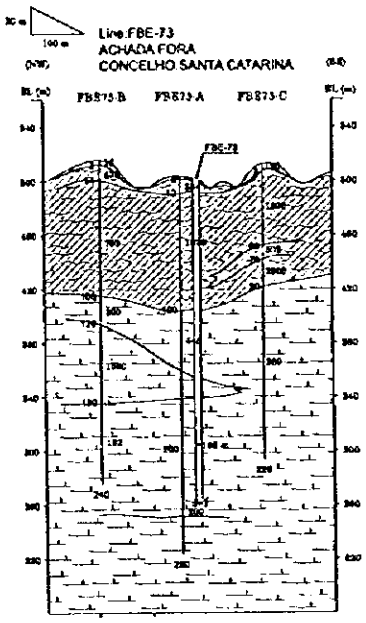
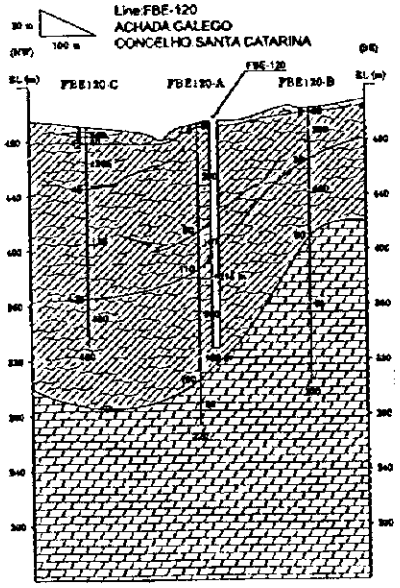
PONTA MOREIA
CONCELHO TARRAFAL
SST15 B
SST15 A
SST15 C


Line FBE-73
ACHADA FORA
CONCELHO SANTA CATARINA
FBE73 B
FBE73 A
FBE73 C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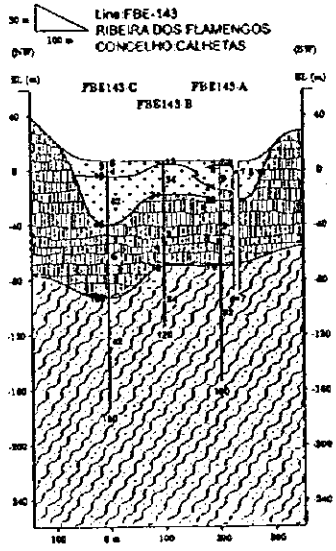
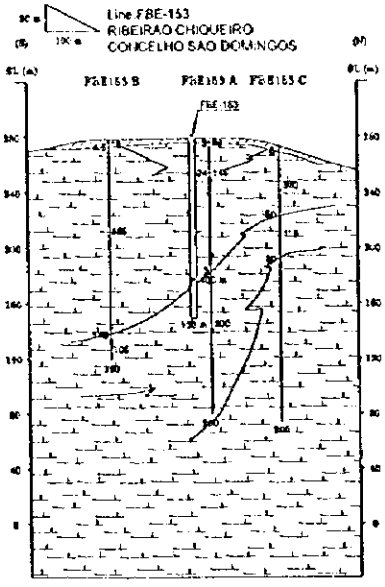
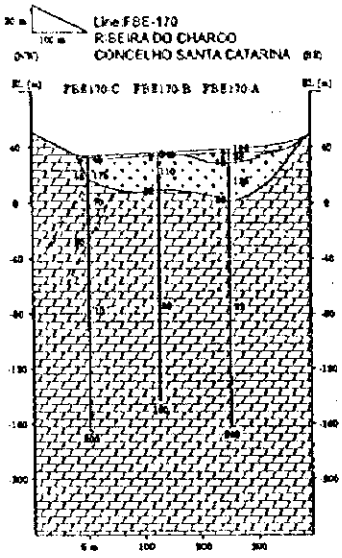
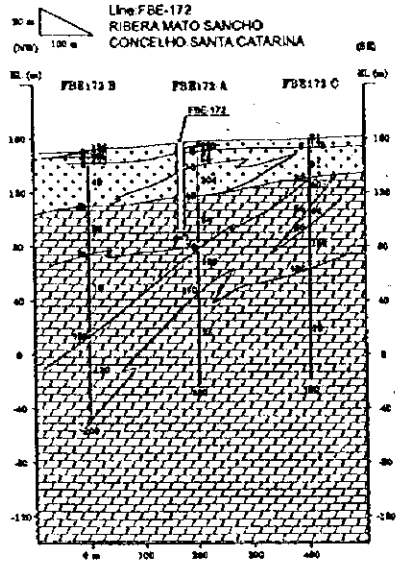
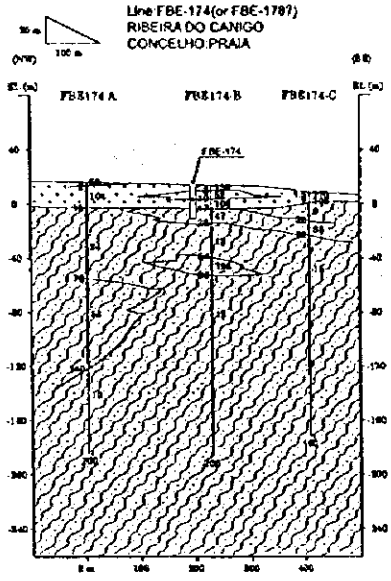
ACHADA GALEGO
CONCELHO SANTA CATARINA
FBE120 C
FBE120 A
FBE120 B

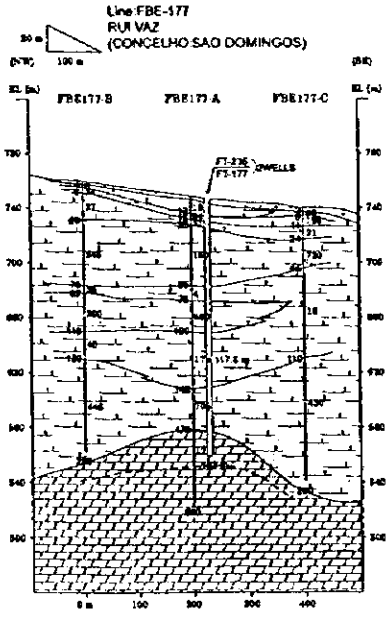

Line FBE-143
RIBEIRA DOS FLAMENGOS
CONCELHO CALHETAS
FBE143 C
FBE143 A
FBE143 B

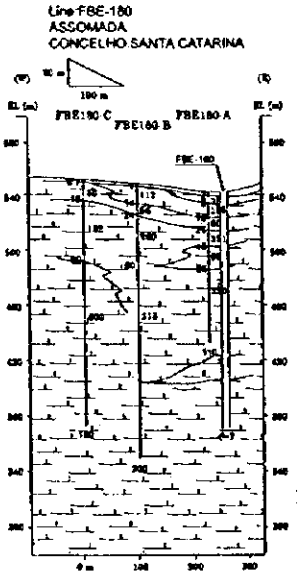

Line FBE-153
RIBEIRAO CHIQUEIRO
CONCELHO SAO DOMINGOS
FBE153-B
FBE153-A
FBE153-C
FBE-152


Line FBE-170
RIBEIRA DO CHARCO
CONCELHO SANTA CATARINA
FBE170-C
FBE170-B
FBE170-A


Line FBE-172
RIBERA MATO SANCHO
CONCELHO SANTA CATARINA
FBE172-B
FBE172-A
FBE172-C
FBE-172


Line FBE-174(or FBE-1787)
RIBEIRA DO CANIGO
CONCELHO:PRAIA
FBE174-A
FBE174-B
FBE174-C
FBE-174


Line FBE-177
RUI VAZ
(CONCELHO SAO DOMINGOS)
FBE177-B
FBE177-A
FBE177-C
FT-236 DWELLS
FS-177


Line FBE-180
ASSOMADA
CONCELHO SANTA CATARINA
FBE180-C
FBE180-B
FBE180-A
FBE-180

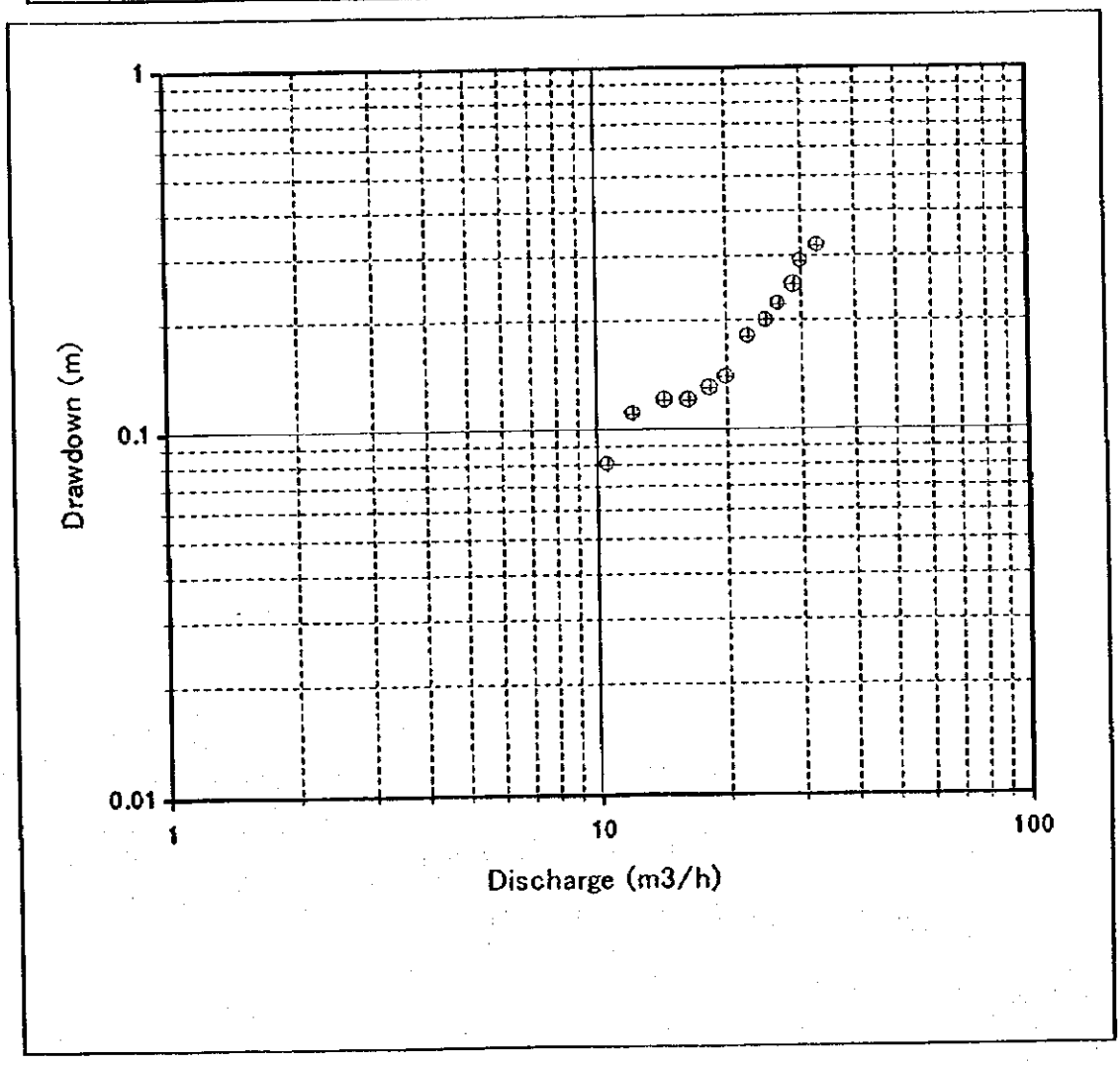
PROSESSED PUMPING TEST DATA

ST-004
SST-10
FBE-116
FT-117
FBE-120
FBE-143
FBE-156
FBE-170
FBE-172
FBE-180
SST-25
FT-271
FBE-97

Fig. Result of Preliminary Test

Well No ST-004 S.W.L. (GL-m) 52.16

Step	Water Level (GL-m)	Drawdown (m)	Discharge (m3/h)	SC (m3/h/m)	SW/Q (m/m3/min)
1	52.24	0.08	10.588	132.35	0.45
2	52.27	0.11	12.203	110.94	0.54
3	52.28	0.12	14.400	120.00	0.50
4	52.28	0.12	16.363	136.36	0.44
5	52.29	0.13	18.367	141.28	0.42
6	52.30	0.14	20.000	142.86	0.42
7	52.34	0.18	22.500	125.00	0.48
8	52.36	0.20	24.827	124.14	0.48
9	52.38	0.22	26.666	121.21	0.50
10	52.41	0.25	28.800	115.20	0.52
11	52.45	0.29	30.000	103.45	0.58
12	52.48	0.32	32.724	102.26	0.59



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

Pumping Test No. SD	Test conducted on: 31/AUG/1998
ST-004	ST-004
Discharge 32.574 m³/h	Distance from the pumping well 0.100 m

Static water level: 52.160 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	52.160	0.000
2	2.00	52.220	0.060
3	4.00	52.240	0.080
4	6.00	52.250	0.090
5	8.00	52.300	0.140
6	10.00	52.340	0.180
7	12.00	52.360	0.200
8	14.00	52.370	0.210
9	16.00	52.370	0.210
10	20.00	52.370	0.210
11	25.00	52.370	0.210
12	30.00	52.370	0.210
13	35.00	52.370	0.210
14	40.00	52.370	0.210
15	50.00	52.370	0.210
16	60.00	52.370	0.210
17	70.00	52.370	0.210
18	80.00	52.370	0.210
19	90.00	52.370	0.210
20	120.00	52.370	0.210
21	150.00	52.370	0.210
22	152.00	52.400	0.240
23	154.00	52.420	0.260
24	156.00	52.430	0.270
25	158.00	52.430	0.270
26	160.00	52.430	0.270
27	162.00	52.430	0.270
28	164.00	52.440	0.280
29	166.00	52.440	0.280
30	170.00	52.440	0.280
31	175.00	52.440	0.280
32	180.00	52.440	0.280
33	185.00	52.440	0.280
34	190.00	52.440	0.280
35	200.00	52.440	0.280
36	210.00	52.440	0.280
37	220.00	52.440	0.280
38	230.00	52.440	0.280
39	240.00	52.440	0.280
40	270.00	52.440	0.280
41	300.00	52.440	0.280
42	302.00	52.440	0.280
43	304.00	52.490	0.330
44	306.00	52.500	0.340
45	308.00	52.510	0.350
46	310.00	52.510	0.350
47	312.00	52.510	0.350
48	314.00	52.510	0.350
49	316.00	52.510	0.350
50	320.00	52.510	0.350

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

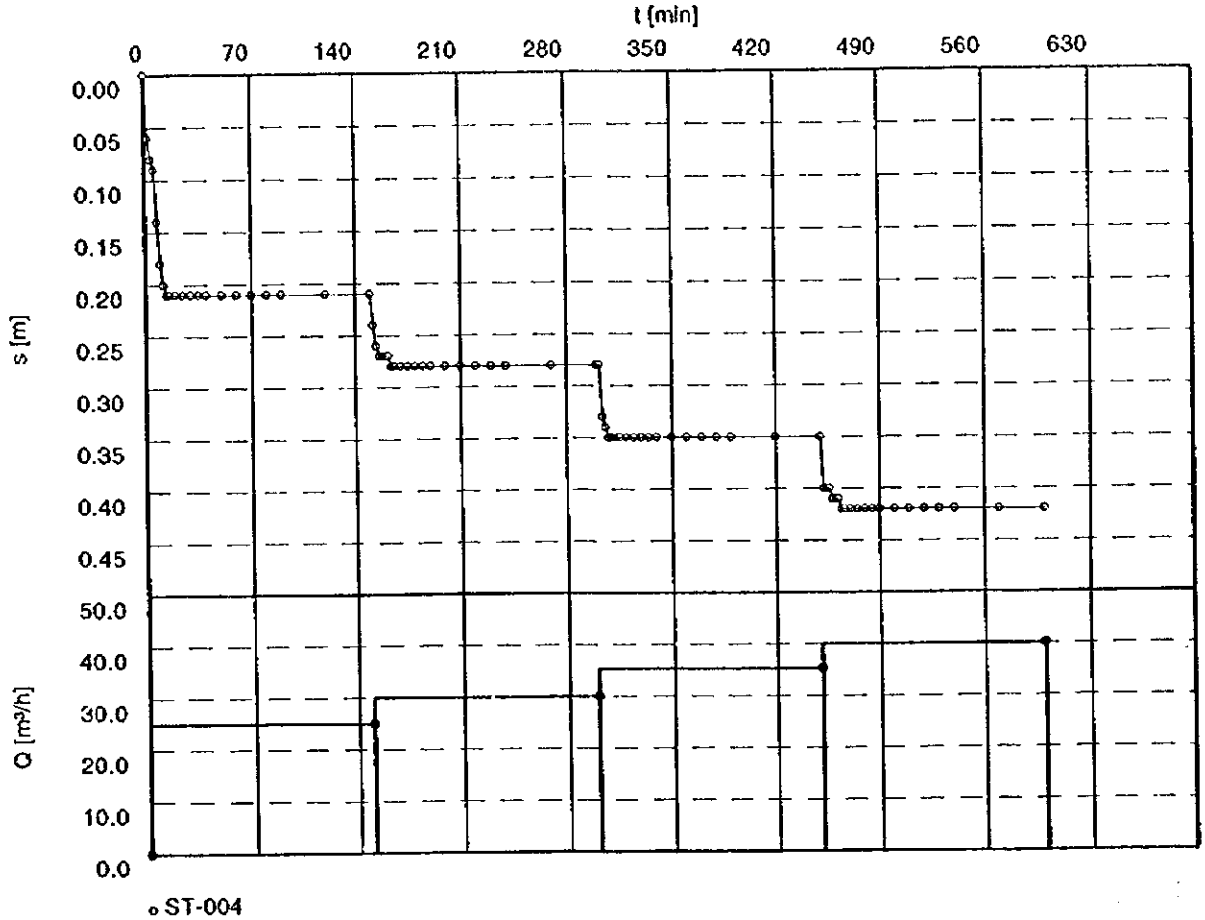
Pumping Test No. SD	Test conducted on: 31/AUG/1998
ST-004	ST-004
Discharge 32.574 m³/h	Distance from the pumping well 0.100 m

Static water level: 52.160 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
51	325.00	52.510	0.350
52	330.00	52.510	0.350
53	335.00	52.510	0.350
54	340.00	52.510	0.350
55	350.00	52.510	0.350
56	360.00	52.510	0.350
57	370.00	52.510	0.350
58	380.00	52.510	0.350
59	390.00	52.510	0.350
60	420.00	52.510	0.350
61	450.00	52.510	0.350
62	452.00	52.560	0.400
63	454.00	52.560	0.400
64	456.00	52.560	0.400
65	458.00	52.570	0.410
66	460.00	52.570	0.410
67	462.00	52.570	0.410
68	464.00	52.580	0.420
69	466.00	52.580	0.420
70	470.00	52.580	0.420
71	475.00	52.580	0.420
72	480.00	52.580	0.420
73	485.00	52.580	0.420
74	490.00	52.580	0.420
75	500.00	52.580	0.420
76	510.00	52.580	0.420
77	520.00	52.580	0.420
78	530.00	52.580	0.420
79	540.00	52.580	0.420
80	570.00	52.580	0.420
81	600.00	52.580	0.420

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1 Project: JICA-INGRH Evaluated by: KI | Date: 07.11.1998

Pumping Test No. SD	Test conducted on: 31/AUG/1998
ST-004	
Discharge 32.574 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

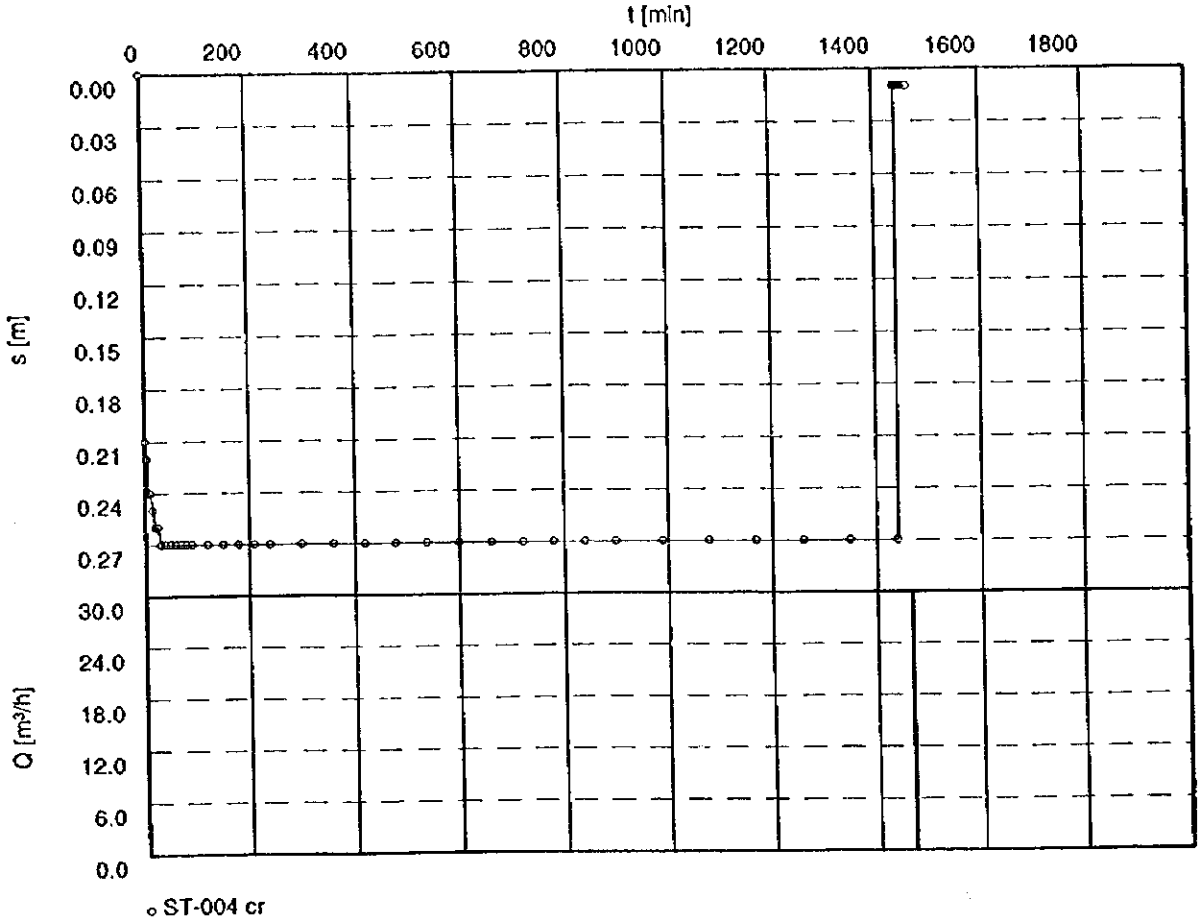
Pumping Test No. CR	Test conducted on: 2/SEP/1998
ST-004	ST-004 cr
Discharge 30.000 m³/h	Distance from the pumping well 0.100 m

Static water level: 52.160 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	52.160	0.000
2	2.00	52.370	0.210
3	4.00	52.380	0.220
4	6.00	52.400	0.240
5	8.00	52.400	0.240
6	10.00	52.400	0.240
7	15.00	52.410	0.250
8	20.00	52.420	0.260
9	25.00	52.420	0.260
10	30.00	52.430	0.270
11	40.00	52.430	0.270
12	50.00	52.430	0.270
13	60.00	52.430	0.270
14	70.00	52.430	0.270
15	80.00	52.430	0.270
16	90.00	52.430	0.270
17	120.00	52.430	0.270
18	150.00	52.430	0.270
19	180.00	52.430	0.270
20	210.00	52.430	0.270
21	240.00	52.430	0.270
22	300.00	52.430	0.270
23	360.00	52.430	0.270
24	420.00	52.430	0.270
25	480.00	52.430	0.270
26	540.00	52.430	0.270
27	600.00	52.430	0.270
28	660.00	52.430	0.270
29	720.00	52.430	0.270
30	780.00	52.430	0.270
31	840.00	52.430	0.270
32	900.00	52.430	0.270
33	990.00	52.430	0.270
34	1080.00	52.430	0.270
35	1170.00	52.430	0.270
36	1260.00	52.430	0.270
37	1350.00	52.430	0.270
38	1440.00	52.430	0.270
39	1441.00	52.170	0.010
40	1442.00	52.170	0.010
41	1444.00	52.170	0.010
42	1446.00	52.170	0.010
43	1448.00	52.170	0.010
44	1450.00	52.170	0.010
45	1452.00	52.170	0.010
46	1454.00	52.170	0.010
47	1456.00	52.170	0.010
48	1458.00	52.170	0.010
49	1460.00	52.170	0.010
50	1465.00	52.170	0.010

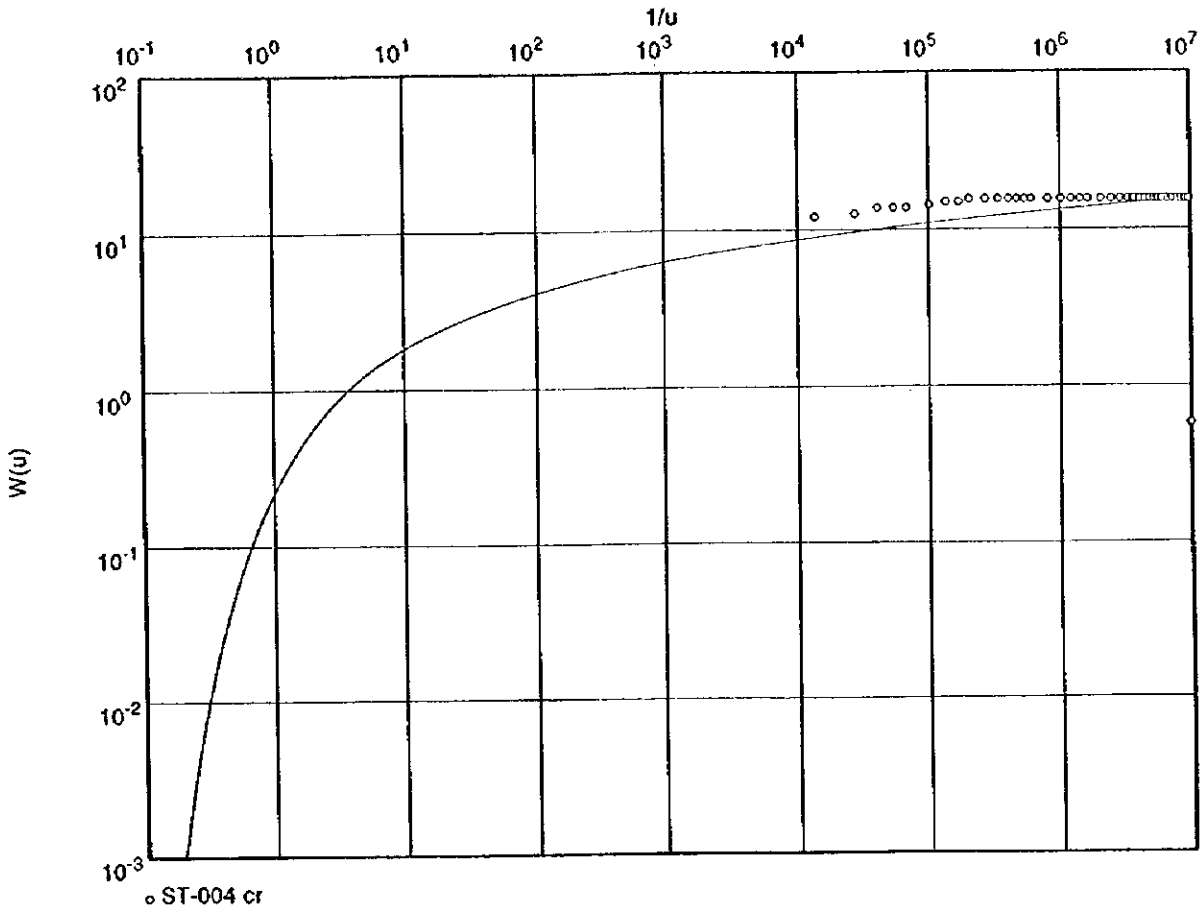
INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1 Project: JICA-INGRH Evaluated by: KI | Date: 07.11.1998

Pumping Test No. CR	Test conducted on: 2/SEP/1998
ST-004	
Discharge 30.000 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Theis analysis method Confined aquifer	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

Pumping Test No. CR	Test conducted on: 2/SEP/1998
ST-004	
Discharge 30.000 m³/h	



Transmissivity [m²/min]: 2.27×10^{0}

Storativity: 1.33×10^{-1}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

Pumping Test No. CR	Test conducted on: 2/SEP/1998
ST-004	
Discharge 30.000 m³/h	
	Pumping test duration: 1440.00 min

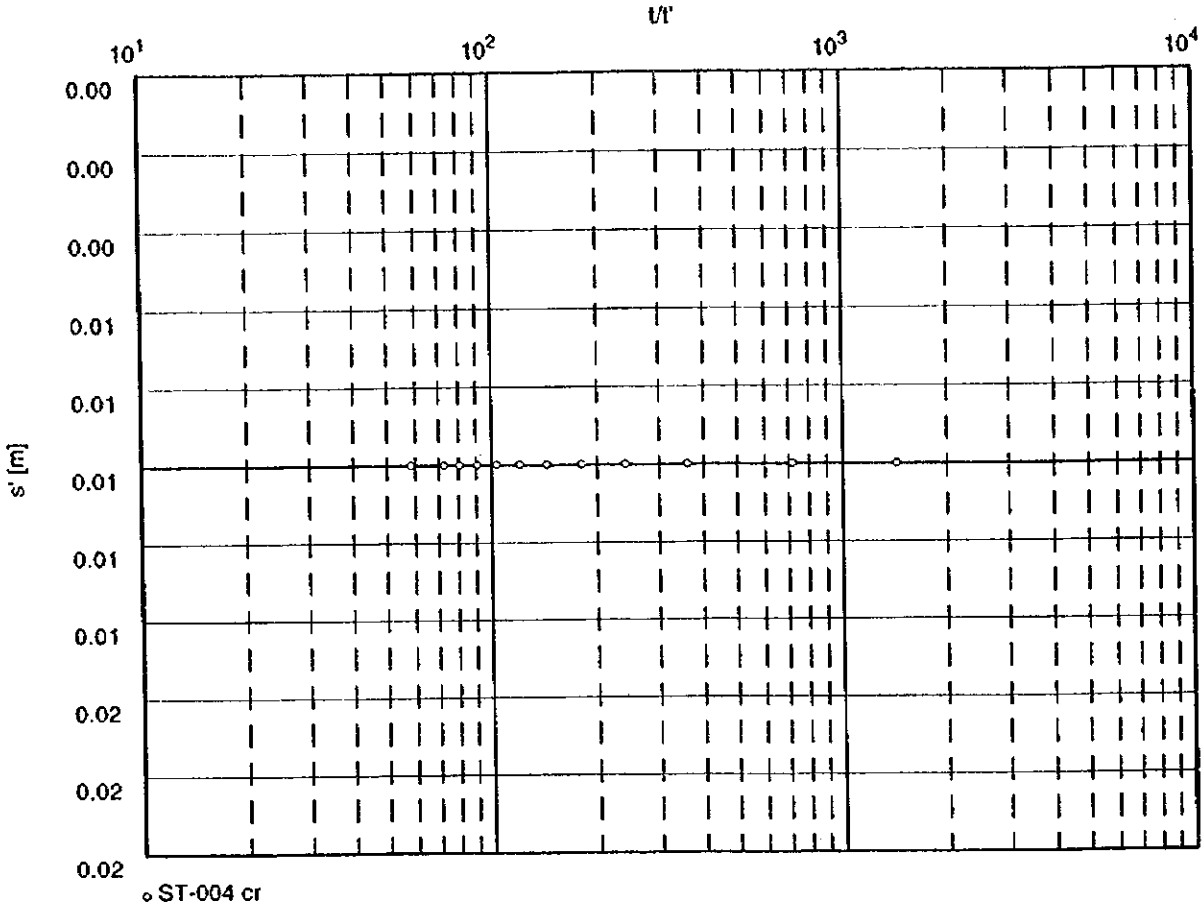
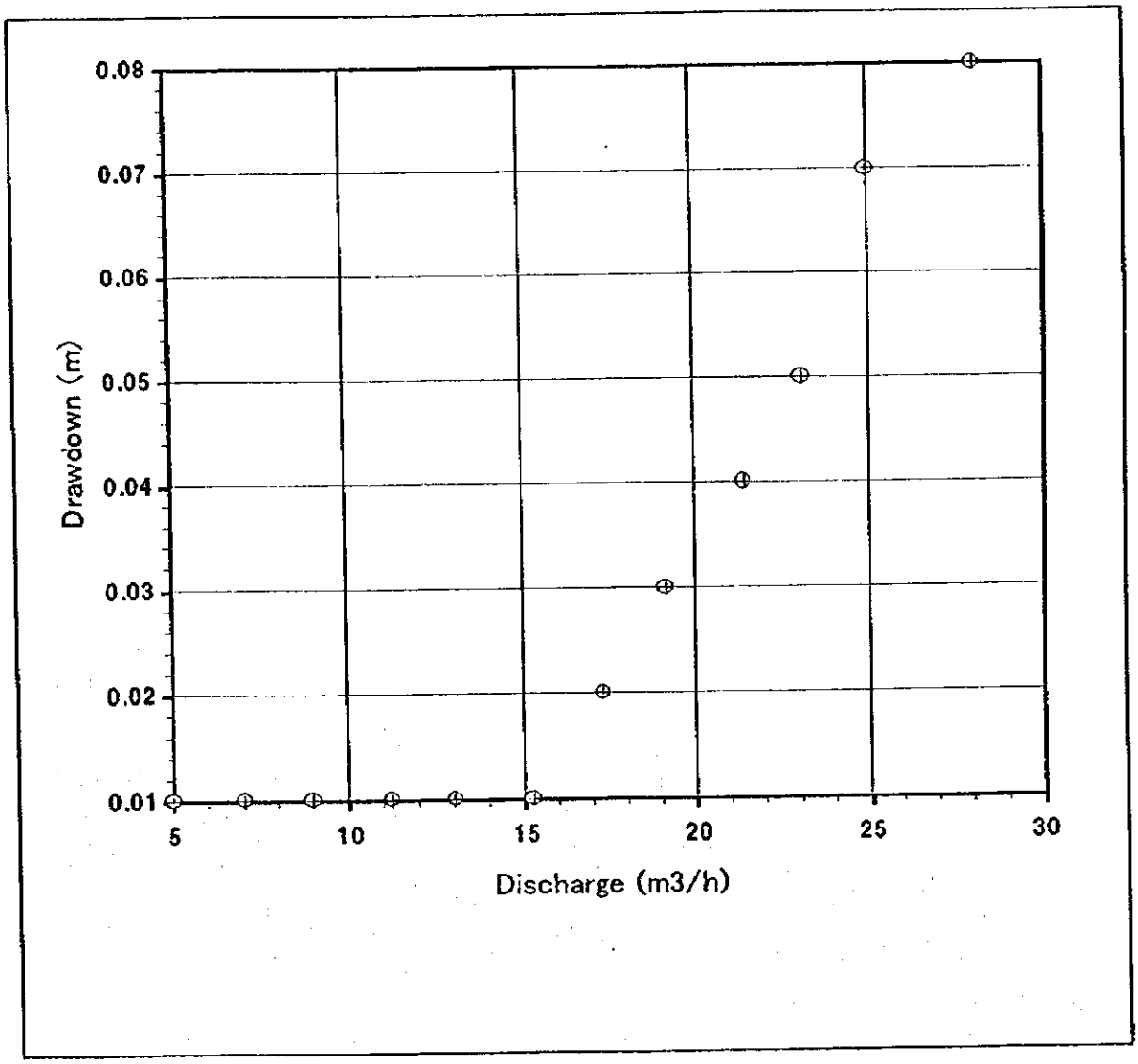


Fig. Result of Preliminary Test

Well No SST-10 S.W.L. (GL-m) 93.60

Step	Water Level (GL-m)	Drawdown (m)	Discharge (m3/h)	SC (m3/h/m)	SW/Q (m/m3/min)
1	93.61	0.01	5.027	502.70	0.12
2	93.61	0.01	7.031	703.10	0.09
3	93.61	0.01	9.000	900.00	0.07
4	93.61	0.01	11.250	1125.00	0.05
5	93.61	0.01	13.043	1304.30	0.05
6	93.61	0.01	15.254	1525.40	0.04
7	93.62	0.02	17.307	865.35	0.07
8	93.63	0.03	19.148	638.27	0.09
9	93.64	0.04	21.428	535.70	0.11
10	93.65	0.05	23.076	461.52	0.13
11	93.67	0.07	25.000	357.14	0.17
12	93.68	0.08	28.125	351.56	0.17



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 30.11.1998

Pumping Test No. STEP-DRAWDOWN	Test conducted on: 24/10/98
SST-10	SST-10 SD
	Distance from the pumping well 0.100 m

Static water level: 93.610 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
1	0.00	93.610	0.000	
2	2.00	93.630	0.020	
3	4.00	93.640	0.030	
4	6.00	93.640	0.030	
5	8.00	93.640	0.030	
6	10.00	93.640	0.030	
7	12.00	93.640	0.030	
8	14.00	93.640	0.030	
9	16.00	93.640	0.030	
10	20.00	93.640	0.030	
11	25.00	93.640	0.030	
12	30.00	93.640	0.030	
13	35.00	93.640	0.030	
14	40.00	93.640	0.030	
15	50.00	93.640	0.030	
16	60.00	93.640	0.030	
17	70.00	93.640	0.030	
18	80.00	93.640	0.030	
19	90.00	93.640	0.030	
20	120.00	93.640	0.030	
21	150.00	93.640	0.030	
22	152.00	93.650	0.040	
23	154.00	93.660	0.050	
24	156.00	93.660	0.050	
25	158.00	93.660	0.050	
26	160.00	93.660	0.050	
27	162.00	93.660	0.050	
28	164.00	93.660	0.050	
29	166.00	93.660	0.050	
30	170.00	93.660	0.050	
31	175.00	93.660	0.050	
32	180.00	93.660	0.050	
33	185.00	93.660	0.050	
34	190.00	93.660	0.050	
35	200.00	93.660	0.050	
36	210.00	93.660	0.050	
37	220.00	93.660	0.050	
38	230.00	93.660	0.050	
39	240.00	93.660	0.050	
40	270.00	93.660	0.050	
41	300.00	93.660	0.050	
42	302.00	93.660	0.050	
43	304.00	93.660	0.050	
44	306.00	93.660	0.050	
45	308.00	93.660	0.050	
46	310.00	93.660	0.050	
47	312.00	93.660	0.050	
48	314.00	93.660	0.050	
49	316.00	93.660	0.050	
50	318.00	93.660	0.050	

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 30.11.1998

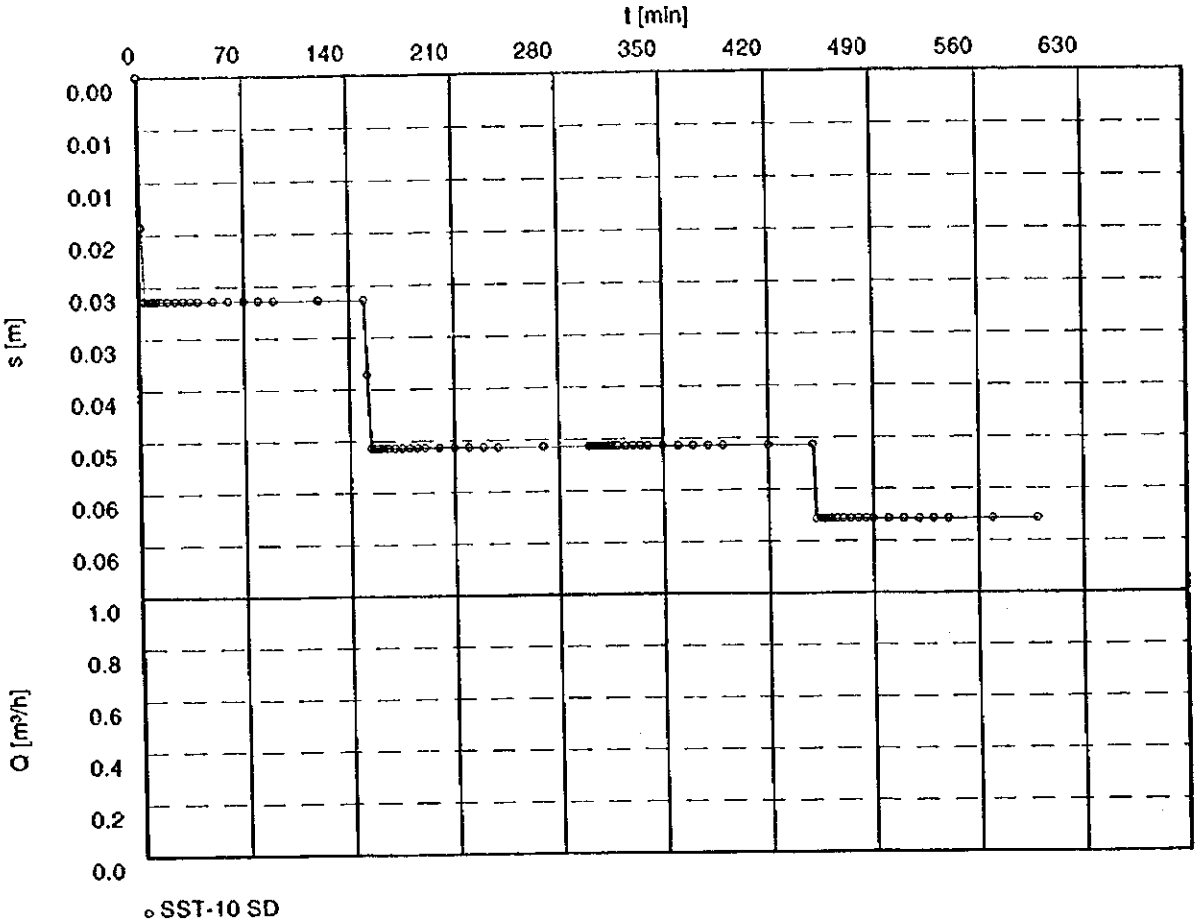
Pumping Test No. STEP-DRAWDOWN	Test conducted on: 24/10/98
SST-10	SST-10 SD
	Distance from the pumping well 0.100 m

Static water level: 93.610 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
51	320.00	93.660	0.050
52	325.00	93.660	0.050
53	330.00	93.660	0.050
54	335.00	93.660	0.050
55	340.00	93.660	0.050
56	350.00	93.660	0.050
57	360.00	93.660	0.050
58	370.00	93.660	0.050
59	380.00	93.660	0.050
60	390.00	93.660	0.050
61	420.00	93.660	0.050
62	450.00	93.660	0.050
63	452.00	93.670	0.060
64	456.00	93.670	0.060
65	458.00	93.670	0.060
66	460.00	93.670	0.060
67	462.00	93.670	0.060
68	464.00	93.670	0.060
69	466.00	93.670	0.060
70	470.00	93.670	0.060
71	475.00	93.670	0.060
72	480.00	93.670	0.060
73	485.00	93.670	0.060
74	490.00	93.670	0.060
75	500.00	93.670	0.060
76	510.00	93.670	0.060
77	520.00	93.670	0.060
78	530.00	93.670	0.060
79	540.00	93.670	0.060
80	570.00	93.670	0.060
81	600.00	93.670	0.060

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1 Project: INGRH-JICA Evaluated by: KI | Date: 30.11.1998

Pumping Test No. STEP-DRAWDOWN	Test conducted on: 24/10/98
SST-10	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2 Project: INGRH-JICA Evaluated by: KI | Date: 30.11.1998

Pumping Test No. CR	Test conducted on: 26/10/98
SST-10	SST-10 CR
Discharge 34.285 m³/h	Distance from the pumping well 0.100 m

Static water level: 93.600 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	93.600	0.000
2	2.00	93.680	0.080
3	4.00	93.680	0.080
4	6.00	93.680	0.080
5	8.00	93.680	0.080
6	10.00	93.680	0.080
7	15.00	93.680	0.080
8	20.00	93.680	0.080
9	25.00	93.680	0.080
10	30.00	93.680	0.080
11	40.00	93.680	0.080
12	50.00	93.680	0.080
13	60.00	93.680	0.080
14	70.00	93.680	0.080
15	80.00	93.690	0.090
16	90.00	93.690	0.090
17	120.00	93.690	0.090
18	150.00	93.690	0.090
19	180.00	93.690	0.090
20	210.00	93.700	0.100
21	240.00	93.700	0.100
22	300.00	93.710	0.110
23	360.00	93.710	0.110
24	420.00	93.720	0.120
25	480.00	93.720	0.120
26	540.00	93.720	0.120
27	600.00	93.720	0.120
28	660.00	93.720	0.120
29	720.00	93.720	0.120
30	780.00	93.720	0.120
31	840.00	93.720	0.120
32	900.00	93.720	0.120
33	990.00	93.720	0.120
34	1080.00	93.730	0.130
35	1170.00	93.740	0.140
36	1260.00	93.740	0.140
37	1350.00	93.740	0.140
38	1440.00	93.740	0.140
39	1441.00	93.650	0.050
40	1442.00	93.650	0.050
41	1444.00	93.650	0.050
42	1446.00	93.640	0.040
43	1448.00	93.640	0.040
44	1450.00	93.640	0.040
45	1452.00	93.640	0.040
46	1454.00	93.640	0.040
47	1456.00	93.640	0.040
48	1458.00	93.640	0.040
49	1460.00	93.640	0.040
50	1465.00	93.630	0.030

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 30.11.1998

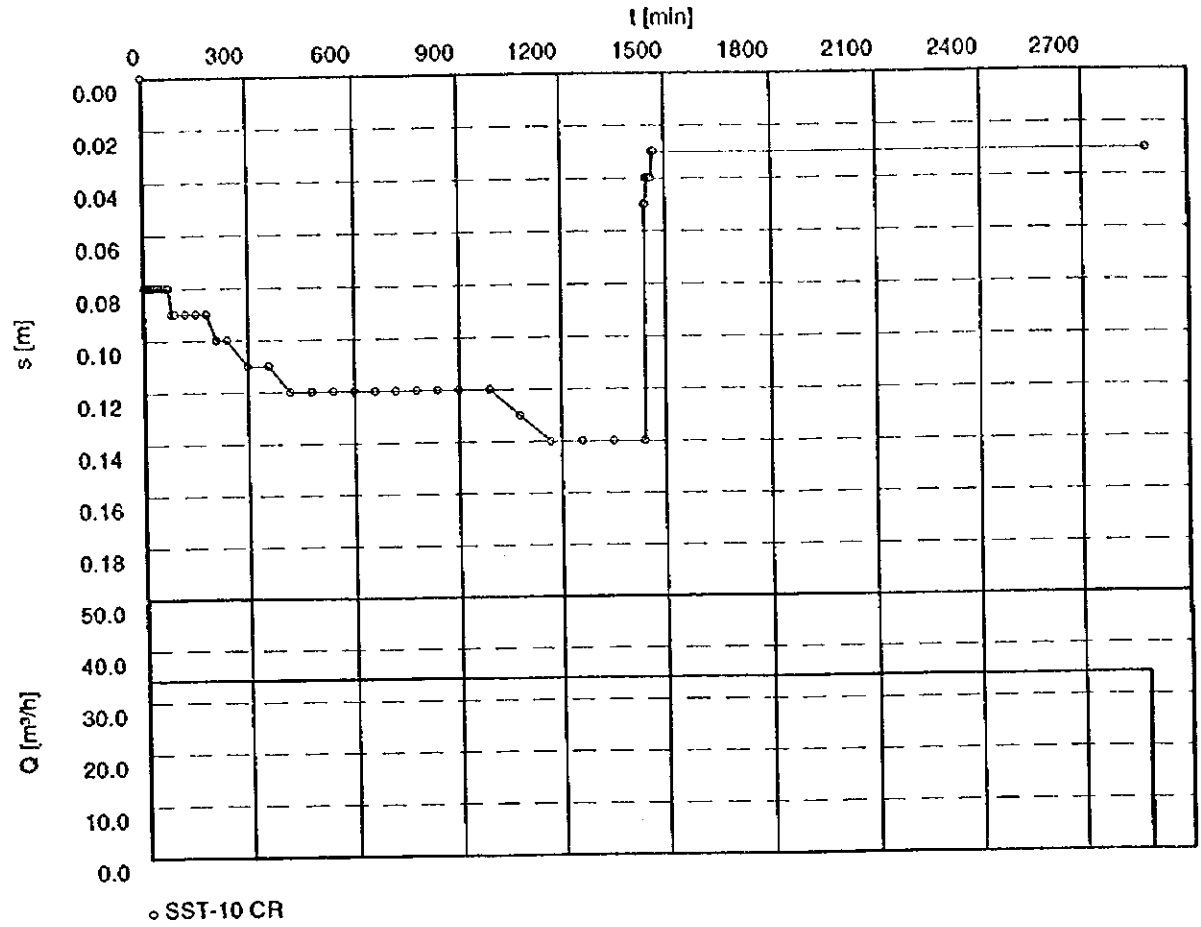
Pumping Test No. CR	Test conducted on: 26/10/98
SST-10	SST-10 CR
Discharge 34.285 m³/h	Distance from the pumping well 0.100 m

Static water level: 93.600 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
51	1470.00	93.630	0.030	
52	2880.00	93.630	0.030	

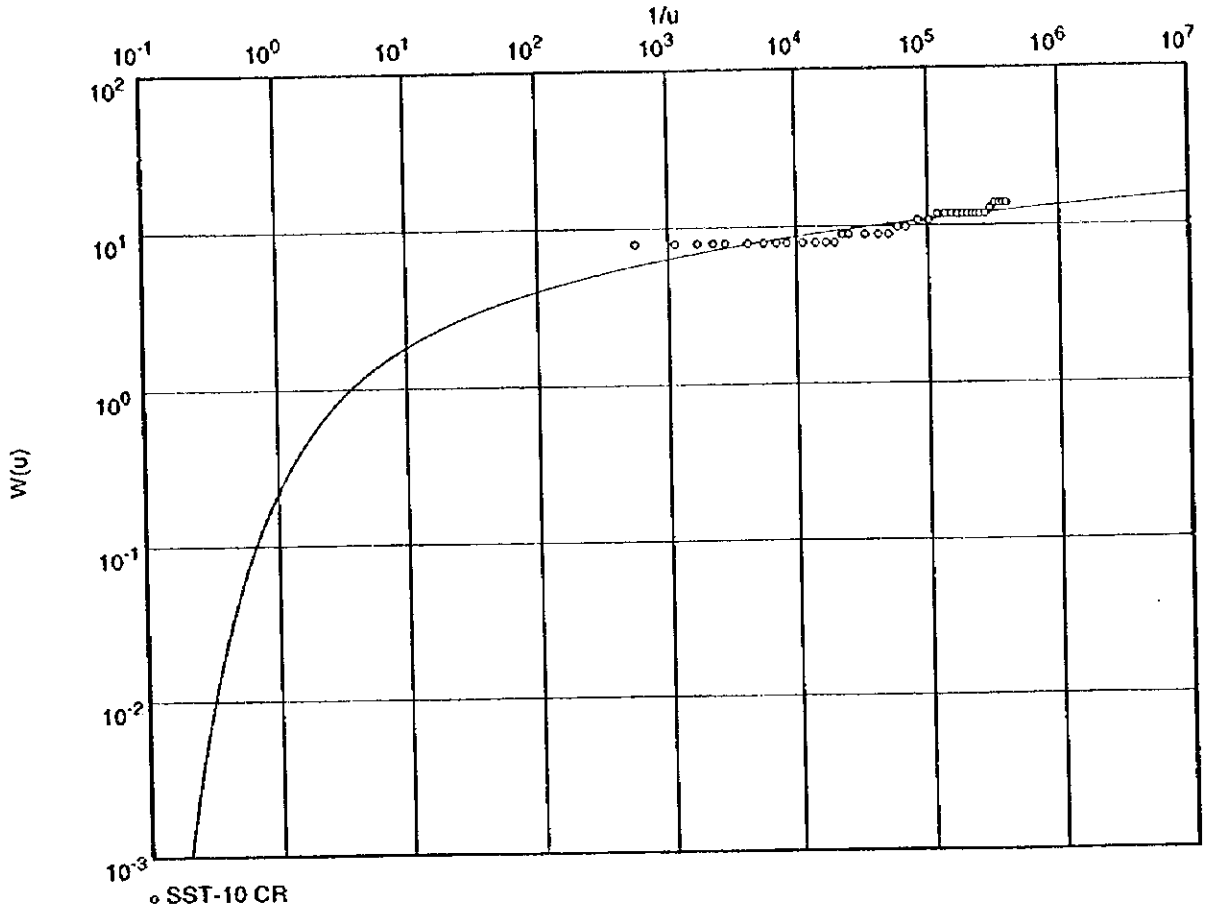
INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1 Project: INGRH-JICA Evaluated by: KI | Date: 30.11.1998

Pumping Test No. CR	Test conducted on: 26/10/98
SST-10	
Discharge 34.285 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Theis analysis method Confined aquifer	ANNEX, Page 1 Project: INGRH-JICA Evaluated by: KI | Date: 30.11.1998

Pumping Test No. CR	Test conducted on: 26/10/98
SST-10	
Dischargo 34.285 m³/h	

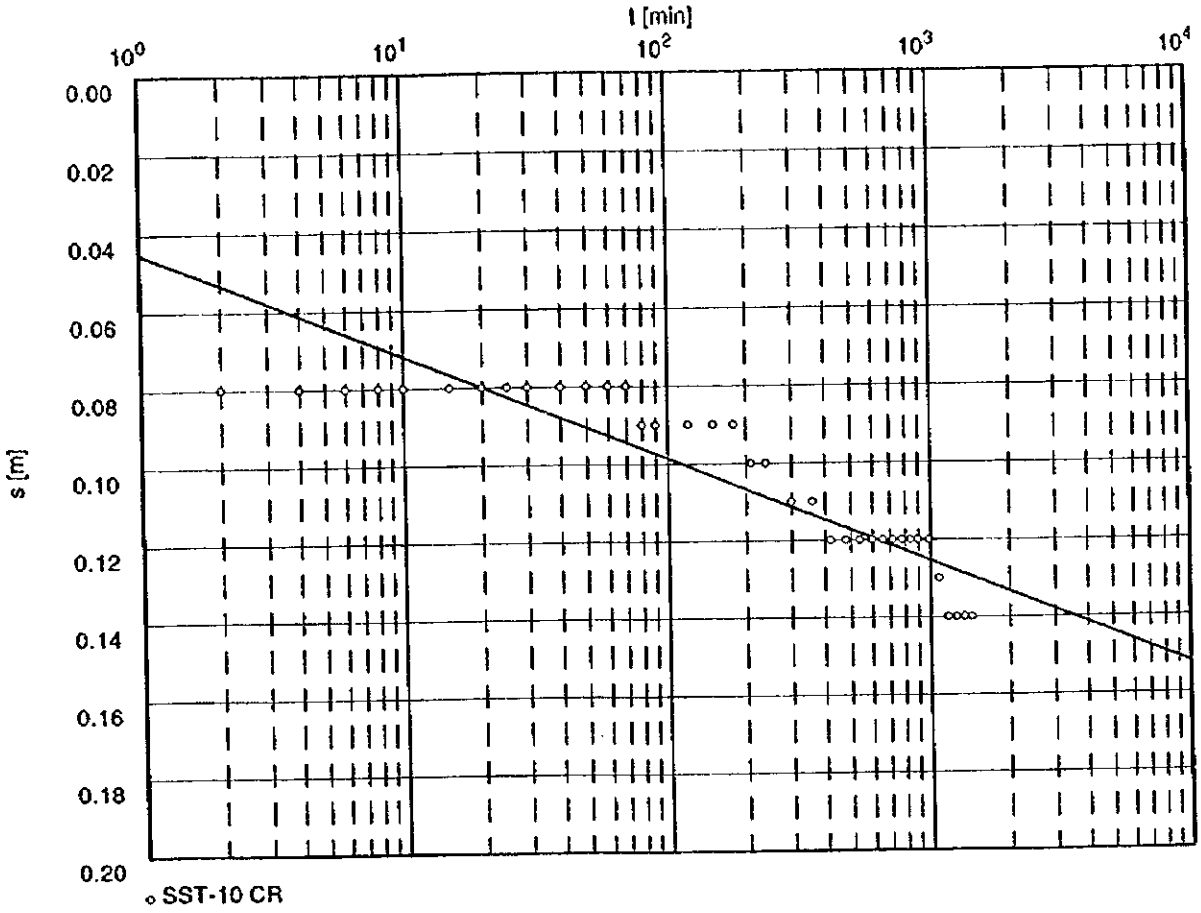


Transmissivity [m²/min]: 4.45×10^{0}

Storativity: 6.27×10^{0}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Confined aquifer	ANNEX, Page 1	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 30.11.1998

Pumping Test No. CR	Test conducted on: 26/10/98
SST-10	
Discharge 34.285 m³/h	



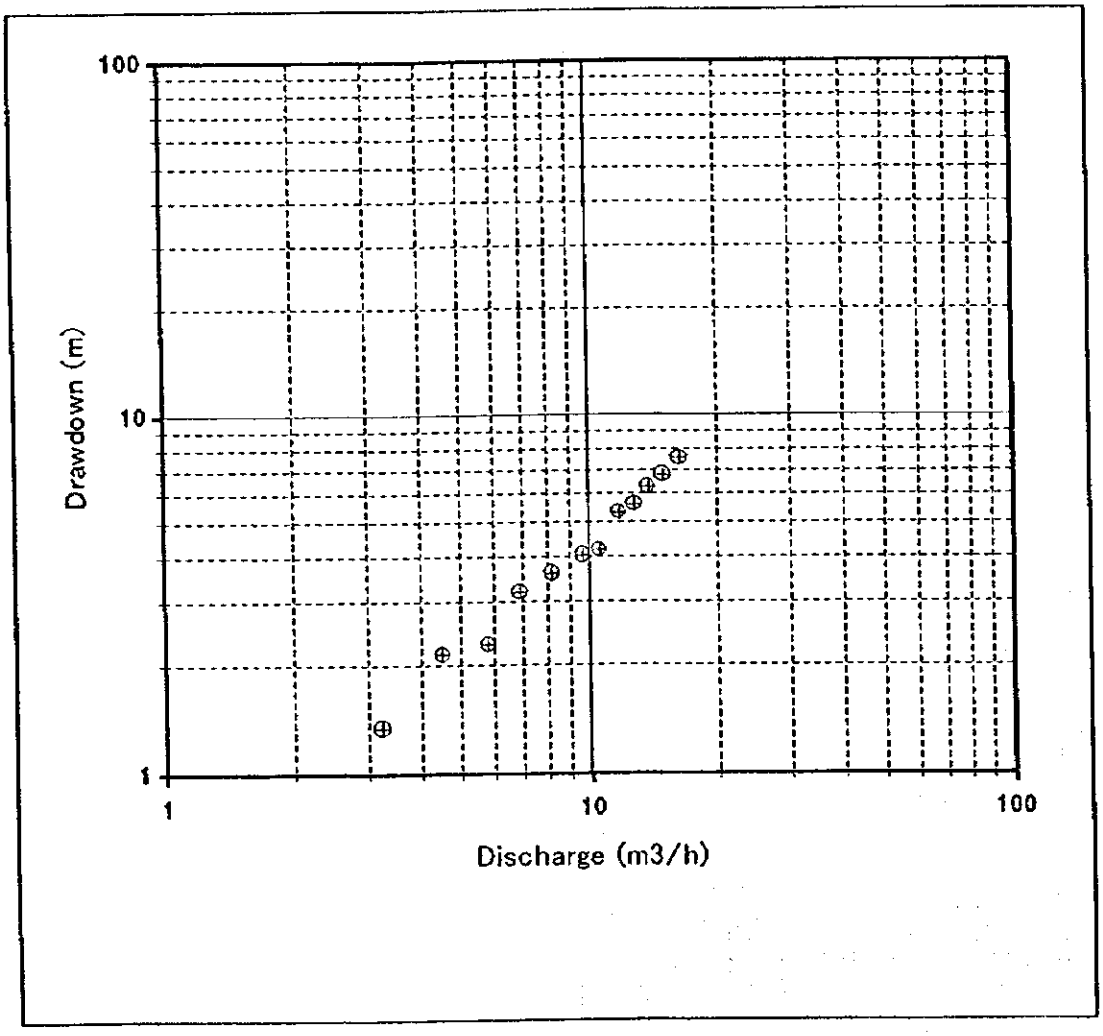
Transmissivity [m²/min]: 3.91×10^{0}

Storativity: 1.81×10^{1}

Fig. Result of Preliminary Test

Well No FBE-116 S.W.L. (GL-m) 121.26

Step	Water Level (GL-m)	Drawdown (m)	Discharge (m3/h)	SC (m3/h/m)	SW/Q (m/m3/min)
1	122.60	1.34	3.214	2.40	25.02
2	123.40	2.14	4.500	2.10	28.53
3	123.54	2.28	5.806	2.55	23.56
4	124.45	3.19	6.923	2.17	27.65
5	124.85	3.59	8.181	2.28	26.33
6	125.30	4.04	9.677	2.40	25.05
7	125.44	4.18	10.588	2.53	23.69
8	126.56	5.30	11.842	2.23	26.85
9	126.86	5.60	12.857	2.30	26.13
10	127.50	6.24	13.846	2.22	27.04
11	128.02	6.76	15.000	2.22	27.04
12	128.82	7.56	16.363	2.16	27.72



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. SD	Test conducted on: 9/OCT/1998
FBE-116	FBE-116 SD
Discharge 16.392 m³/h	Distance from the pumping well 0.100 m

Static water level: 121.300 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	121.300	0.000
2	2.00	124.000	2.700
3	4.00	124.700	3.400
4	6.00	124.910	3.610
5	8.00	125.070	3.770
6	10.00	125.150	3.850
7	12.00	125.220	3.920
8	14.00	125.310	4.010
9	16.00	125.400	4.100
10	20.00	125.620	4.320
11	25.00	125.900	4.600
12	30.00	126.300	5.000
13	35.00	126.720	5.420
14	40.00	127.050	5.750
15	50.00	127.090	5.790
16	60.00	127.150	5.850
17	70.00	127.200	5.900
18	80.00	126.260	4.960
19	90.00	127.330	6.030
20	120.00	127.400	6.100
21	150.00	127.490	6.190
22	152.00	130.160	8.860
23	154.00	130.400	9.100
24	156.00	130.630	9.330
25	158.00	130.800	9.500
26	160.00	130.800	9.500
27	162.00	130.800	9.500
28	164.00	130.800	9.500
29	166.00	130.800	9.500
30	170.00	130.800	9.500
31	175.00	130.910	9.610
32	180.00	131.120	9.820
33	185.00	131.170	9.870
34	190.00	131.300	10.000
35	200.00	131.320	10.020
36	210.00	131.360	10.060
37	220.00	131.400	10.100
38	230.00	131.440	10.140
39	240.00	131.480	10.180
40	270.00	131.560	10.260
41	300.00	131.670	10.370
42	302.00	140.100	18.800
43	304.00	140.820	19.520
44	306.00	141.000	19.700
45	308.00	141.190	19.890
46	310.00	141.300	20.000
47	312.00	141.430	20.130
48	314.00	141.560	20.260
49	316.00	141.700	20.400
50	320.00	141.980	20.680

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

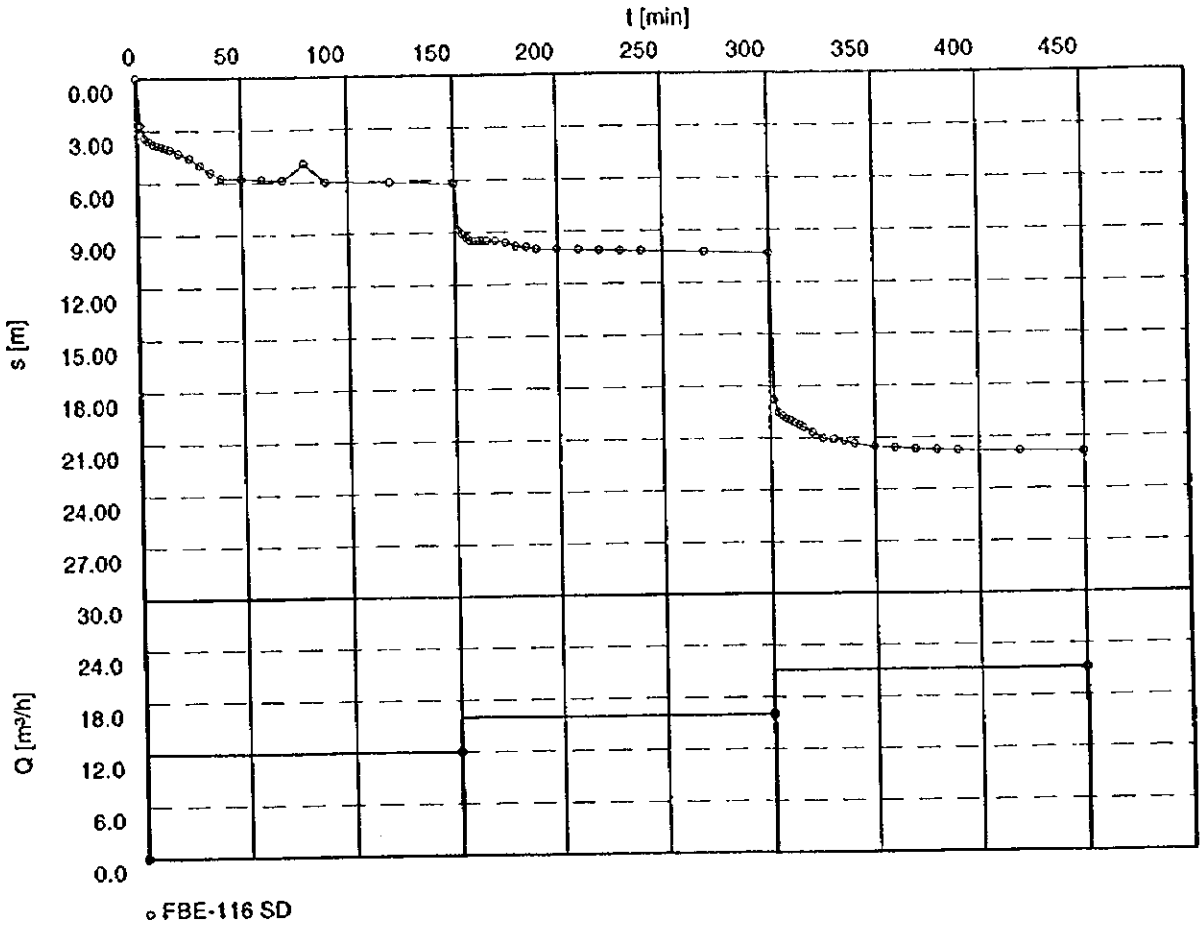
Pumping Test No. SD	Test conducted on: 9/OCT/1998
FBE-116	FBE-116 SD
Discharge 16.392 m³/h	Distance from the pumping well 0.100 m

Static water level: 121.300 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
51	325.00	142.330	21.030	
52	330.00	142.410	21.110	
53	335.00	142.520	21.220	
54	340.00	142.650	21.350	
55	350.00	142.830	21.530	
56	360.00	142.910	21.610	
57	370.00	142.990	21.690	
58	380.00	143.040	21.740	
59	390.00	143.070	21.770	
60	420.00	143.130	21.830	
61	450.00	143.200	21.900	

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1 Project: JICA-INGRH Evaluated by: KI | Date: 06.11.1998

Pumping Test No. SD	Test conducted on: 9/OCT/1998
FBE-116	
Discharge 16.392 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 13/OCT/1998
FBE-116	FBE-116 CR
Discharge 20.000 m³/h	Distance from the pumping well 0.100 m

Static water level: 121.300 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	121.300	0.000
2	2.00	126.600	5.300
3	4.00	132.880	11.580
4	6.00	133.950	12.650
5	8.00	134.250	12.950
6	10.00	134.650	13.350
7	15.00	134.900	13.600
8	20.00	135.900	14.600
9	25.00	136.910	15.610
10	30.00	137.200	15.900
11	40.00	137.790	16.490
12	50.00	137.790	16.490
13	60.00	137.790	16.490
14	70.00	137.820	16.520
15	80.00	137.820	16.520
16	90.00	137.820	16.520
17	120.00	137.830	16.530
18	150.00	137.900	16.600
19	180.00	138.000	16.700
20	210.00	138.040	16.740
21	240.00	138.090	16.790
22	300.00	138.340	17.040
23	360.00	138.400	17.100
24	420.00	138.500	17.200
25	480.00	138.500	17.200
26	540.00	138.500	17.200
27	600.00	138.520	17.220
28	660.00	138.680	17.380
29	720.00	138.680	17.380
30	780.00	138.700	17.400
31	840.00	138.720	17.420
32	900.00	138.800	17.500
33	990.00	138.860	17.560
34	1080.00	138.900	17.600
35	1170.00	138.960	17.660
36	1260.00	139.000	17.700
37	1350.00	139.030	17.730
38	1440.00	139.050	17.750
39	1441.00	123.240	1.940
40	1442.00	122.300	1.000
41	1444.00	121.740	0.440
42	1446.00	121.660	0.360
43	1448.00	121.640	0.340
44	1450.00	121.630	0.330
45	1452.00	121.620	0.320
46	1454.00	121.610	0.310
47	1456.00	121.600	0.300
48	1458.00	121.600	0.300
49	1460.00	121.600	0.300
50	1465.00	121.590	0.290

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3 Project: JICA-INGRH Evaluated by: KI | Date: 06.11.1998

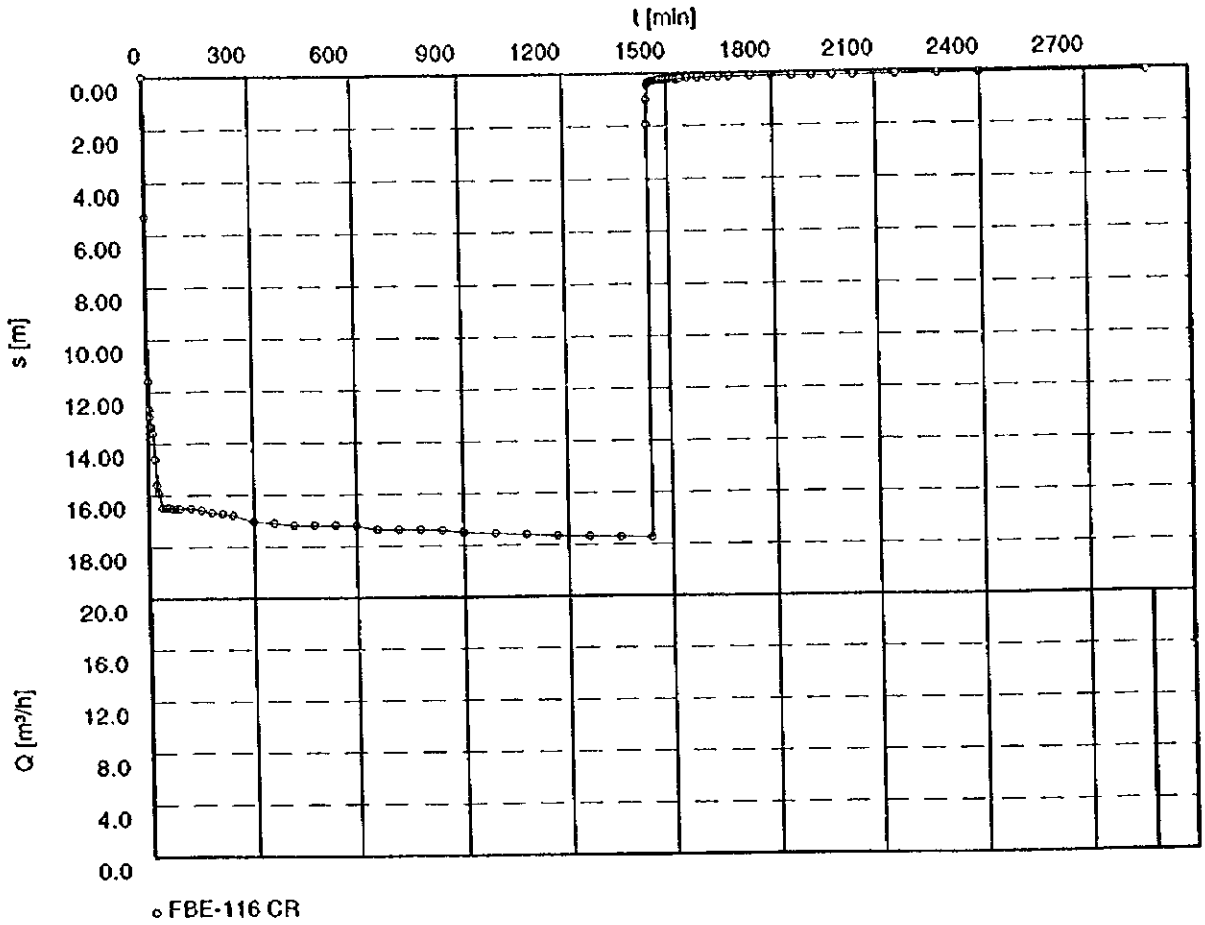
Pumping Test No. CR	Test conducted on: 13/OCT/1998
FBE-116	FBE-116 CR
Discharge 20.000 m³/h	Distance from the pumping well 0.100 m

Static water level: 121.300 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
51	1470.00	121.580	0.280
52	1475.00	121.580	0.280
53	1480.00	121.570	0.270
54	1490.00	121.560	0.260
55	1500.00	121.550	0.250
56	1510.00	121.540	0.240
57	1520.00	121.540	0.240
58	1530.00	121.530	0.230
59	1540.00	121.510	0.210
60	1560.00	121.490	0.190
61	1590.00	121.490	0.190
62	1620.00	121.460	0.160
63	1650.00	121.460	0.160
64	1680.00	121.450	0.150
65	1740.00	121.450	0.150
66	1800.00	121.440	0.140
67	1860.00	121.440	0.140
68	1920.00	121.440	0.140
69	1980.00	121.440	0.140
70	2040.00	121.440	0.140
71	2160.00	121.430	0.130
72	2280.00	121.420	0.120
73	2400.00	121.410	0.110
74	2880.00	121.410	0.110

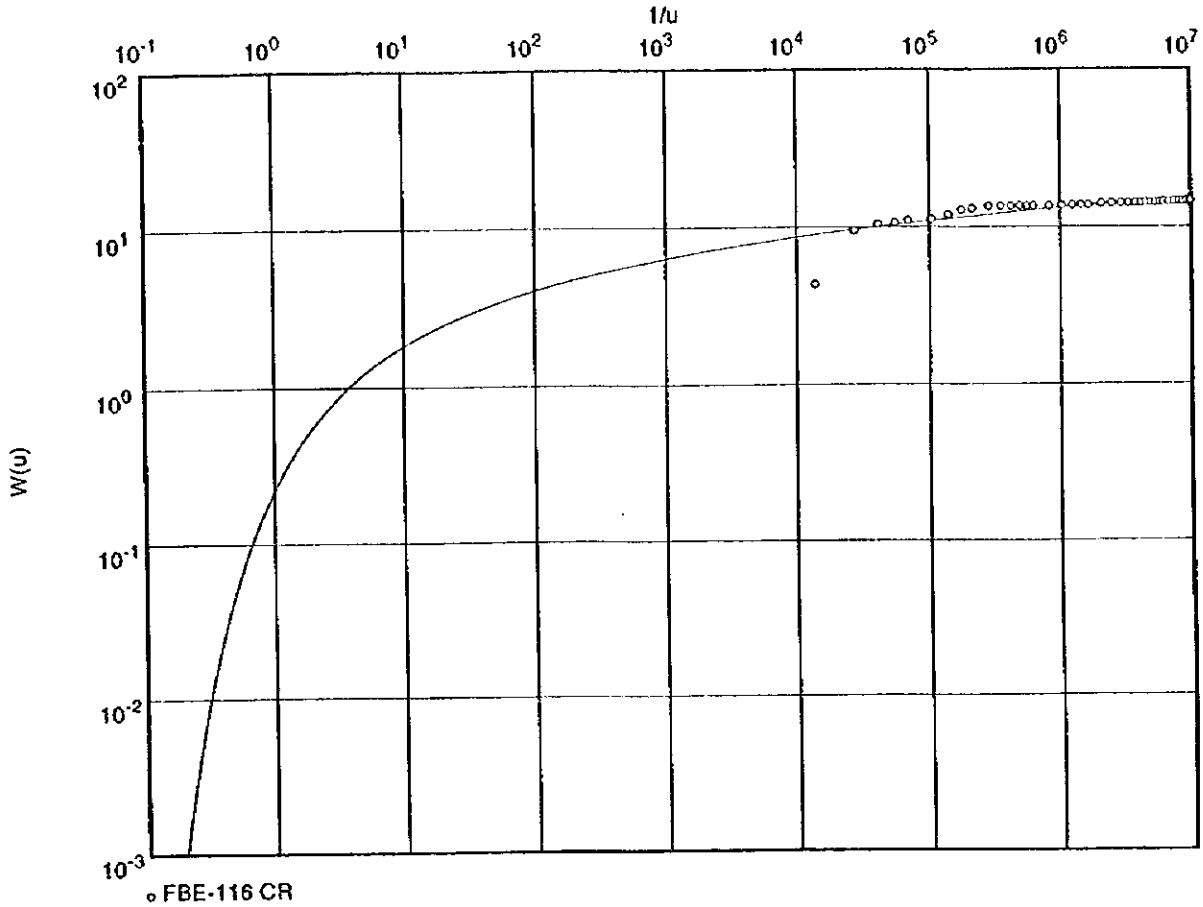
INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1 Project: JICA-INGRH Evaluated by: KI | Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 13/OCT/1998
FBE-116	
Discharge 20.000 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Theis analysis method Confined aquifer	ANNEX, Page 1 Project: JICA-INGRH Evaluated by: KI | Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 13/OCT/1998
FBE-116	
Discharge 20.000 m³/h	

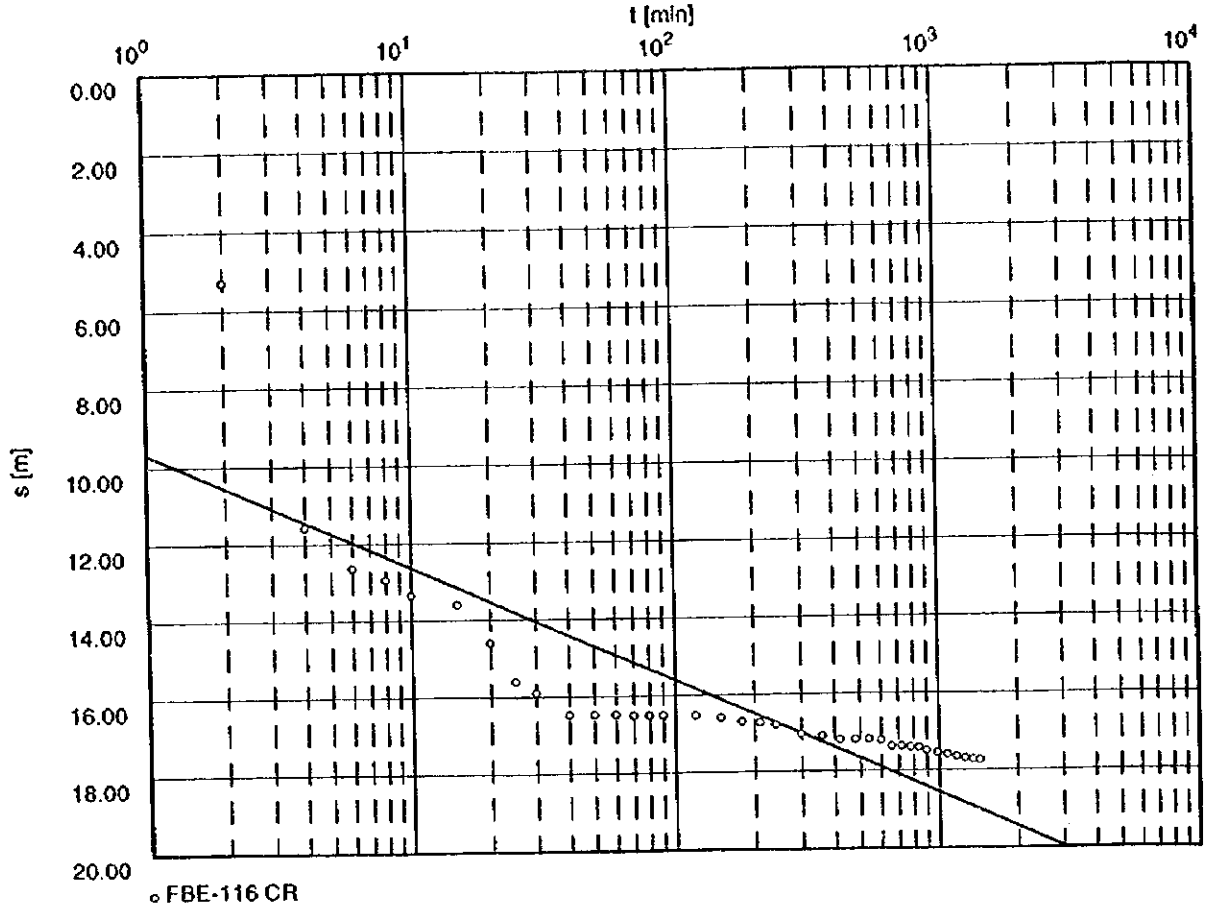


Transmissivity [m²/min]: 2.17×10^{-2}

Storativity: 1.25×10^{-3}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Confined aquifer	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 13/OCT/1998
FBE-116	
Discharge 20.000 m³/h	

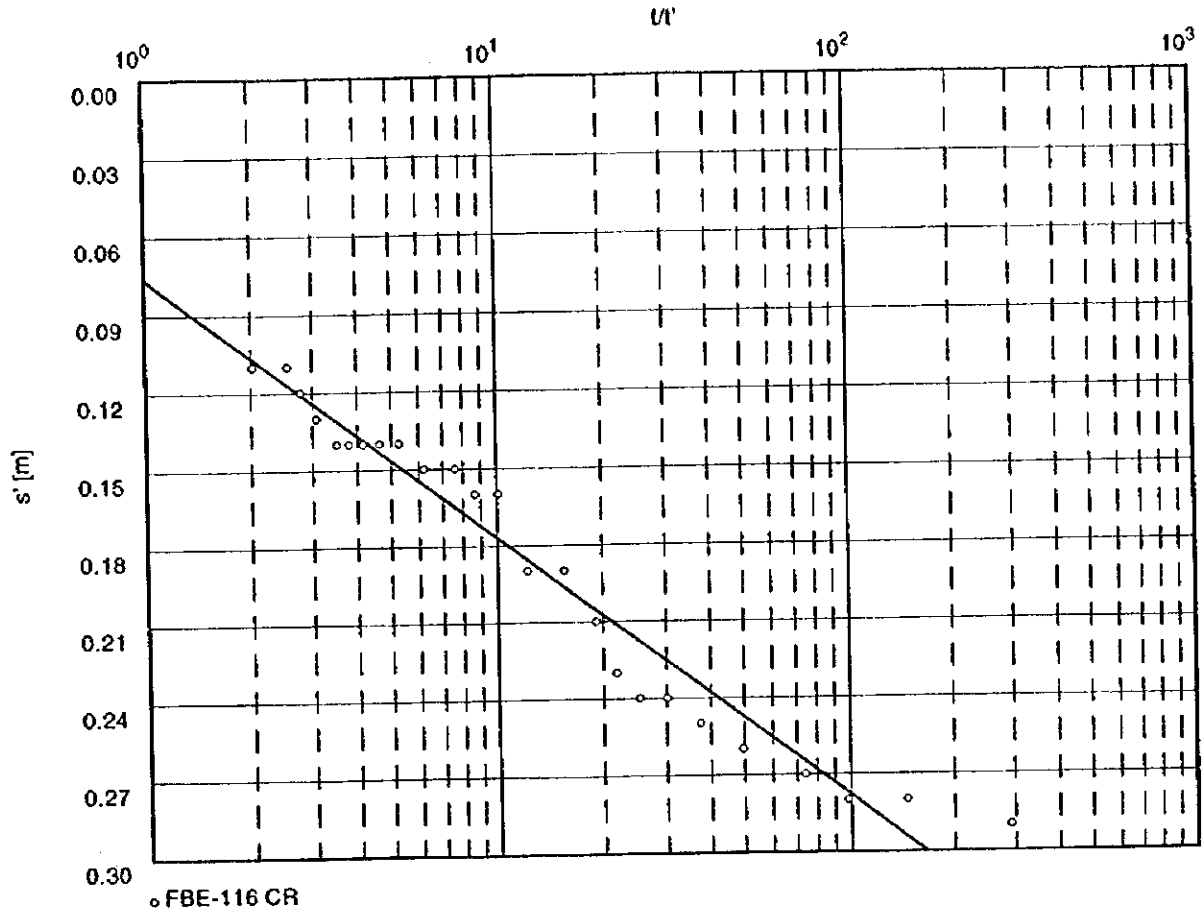


Transmissivity [m²/min]: 2.05×10^{-2}

Storativity: 2.53×10^{-3}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 13/OCT/1998
FBE-116	
Discharge 20.000 m³/h	
	Pumping test duration: 1460.00 min

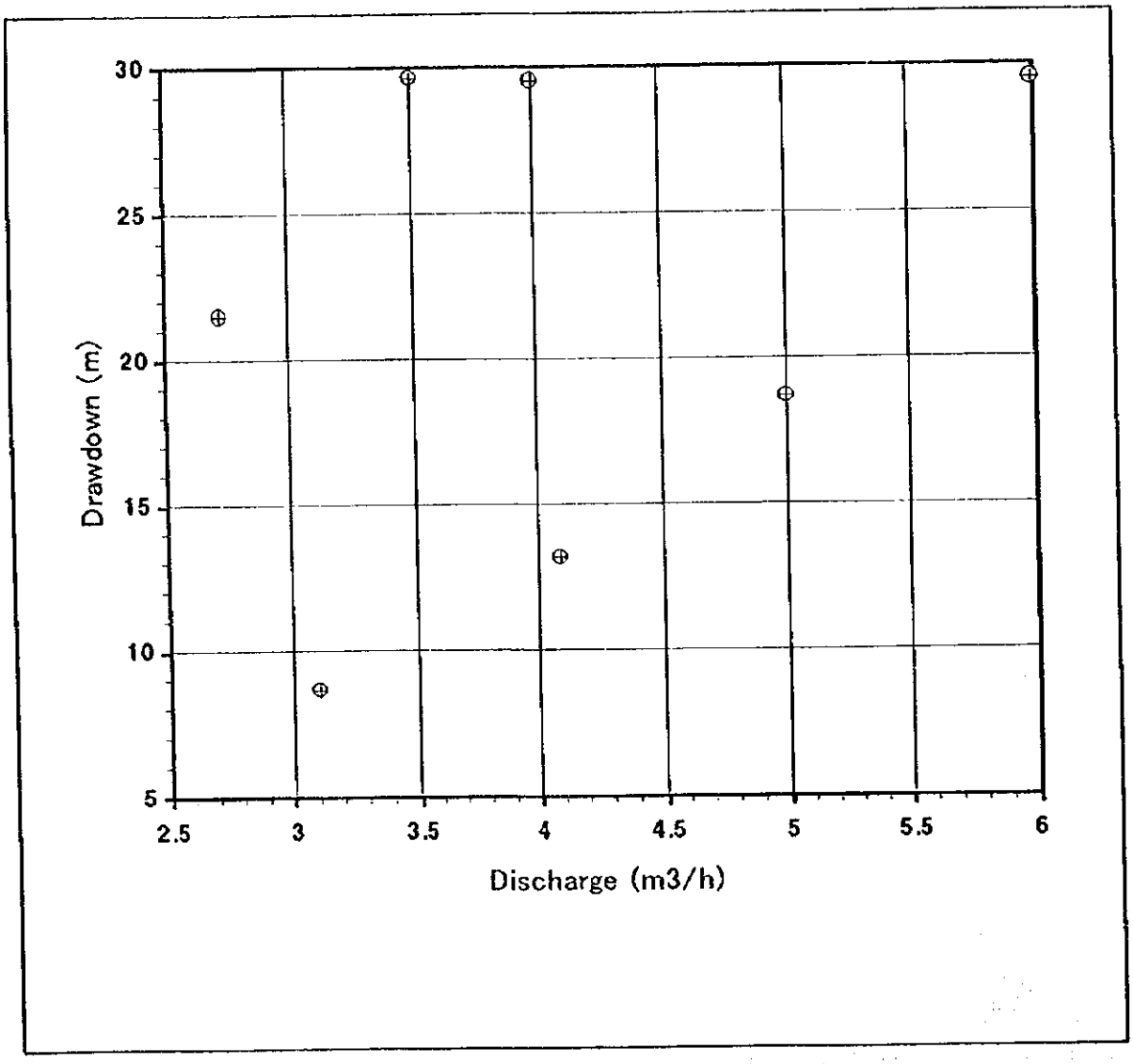


Transmissivity [m²/min]: 6.04×10^{-1}

Fig. Result of Preliminary Test

Well No FT-117 S.W.L. (GL-m) 33.50

Step	Water Level (GL-m)	Drawdown (m)	Discharge (m3/h)	SC (m3/h/m)	SW/Q (m/m3/min)
1	42.14	8.64	3.103	0.36	167.06
2	46.68	13.18	4.090	0.31	193.35
3	52.19	18.69	5.000	0.27	224.28
4	63.00	29.50	6.000	0.20	295.00
5	63.00	29.50	4.000	0.14	442.50
6	63.10	29.60	3.501	0.12	507.28
7	54.99	21.49	2.727	0.13	472.83



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 01.12.1998

Pumping Test No. PRE	Test conducted on: 5/11/98
FT-117	FT-117
Discharge 3.774 m³/h	Distance from the pumping well 0.100 m

Static water level: 33.500 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	33.500	0.000
2	5.00	37.470	3.970
3	10.00	38.800	5.300
4	20.00	39.610	6.110
5	30.00	40.520	7.020
6	40.00	40.700	7.200
7	50.00	41.770	8.270
8	60.00	42.140	8.640
9	65.00	44.820	11.320
10	70.00	44.930	11.430
11	80.00	45.500	12.000
12	90.00	45.850	12.350
13	100.00	46.260	12.760
14	110.00	46.540	13.040
15	120.00	46.680	13.180
16	125.00	48.900	15.400
17	130.00	49.280	15.780
18	140.00	50.020	16.520
19	150.00	50.640	17.140
20	160.00	51.250	17.750
21	170.00	51.680	18.180
22	180.00	52.190	18.690
23	185.00	53.870	20.370
24	190.00	54.910	21.410
25	200.00	55.820	22.320
26	210.00	57.330	23.830
27	220.00	60.330	26.830
28	230.00	63.000	29.500
29	240.00	55.390	21.890
30	250.00	54.960	21.460
31	260.00	54.520	21.020
32	270.00	54.420	20.920
33	290.00	54.570	21.070
34	300.00	54.700	21.200
35	310.00	54.920	21.420
36	320.00	55.010	21.510
37	330.00	55.150	21.650
38	340.00	55.380	21.880
39	350.00	55.550	22.050
40	360.00	55.700	22.200
41	370.00	55.890	22.390
42	380.00	56.300	22.800
43	390.00	56.440	22.940
44	400.00	56.570	23.070
45	410.00	56.650	23.150
46	420.00	58.820	25.320
47	430.00	60.580	27.080
48	440.00	61.310	27.810
49	450.00	63.000	29.500
50	460.00	55.470	21.970

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 01.12.1998

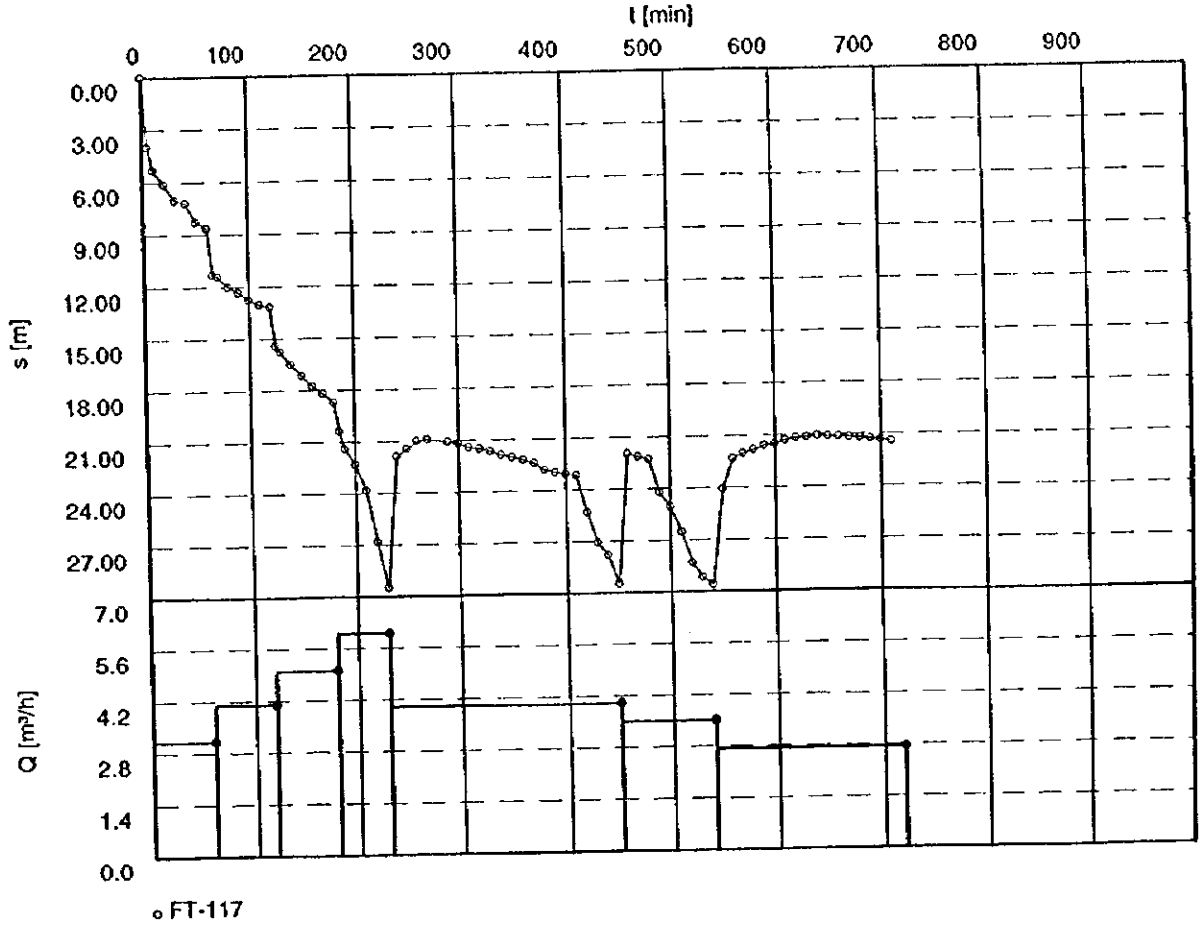
Pumping Test No. PRE	Test conducted on: 5/11/98
FT-117	FT-117
Dischargo 3.774 m³/h	Distance from the pumping well 0.100 m

Static water level: 33.500 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
51	470.00	55.630	22.130
52	480.00	55.790	22.290
53	490.00	57.730	24.230
54	500.00	58.550	25.050
55	510.00	60.040	26.540
56	520.00	61.830	28.330
57	530.00	62.670	29.170
58	540.00	63.100	29.600
59	550.00	57.580	24.080
60	560.00	55.840	22.340
61	570.00	55.540	22.040
62	580.00	55.330	21.830
63	590.00	55.100	21.600
64	600.00	55.020	21.520
65	610.00	54.800	21.300
66	620.00	54.680	21.180
67	630.00	54.670	21.170
68	640.00	54.600	21.100
69	650.00	54.620	21.120
70	660.00	54.650	21.150
71	670.00	54.690	21.190
72	680.00	54.740	21.240
73	690.00	54.790	21.290
74	700.00	54.860	21.360
75	710.00	54.930	21.430

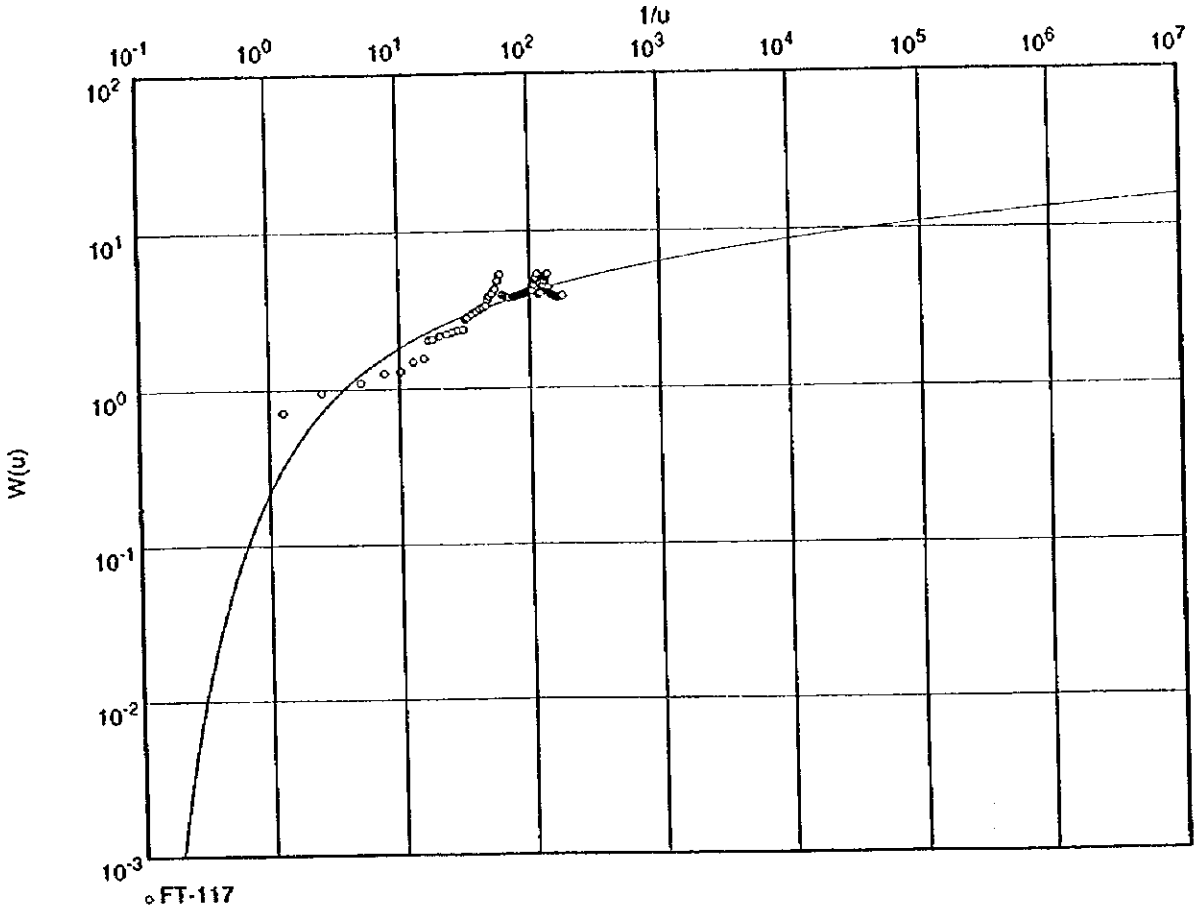
INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1 Project: INGRH-JICA Evaluated by: KI | Date: 01.12.1998

Pumping Test No. PRE	Test conducted on: 5/11/98
FT-117	
Discharge 3.774 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Theis analysis method Confined aquifer	ANNEX, Page 1	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 01.12.1998

Pumping Test No. PRE	Test conducted on: 5/11/98
FT-117	
Discharge 3.774 m³/h	

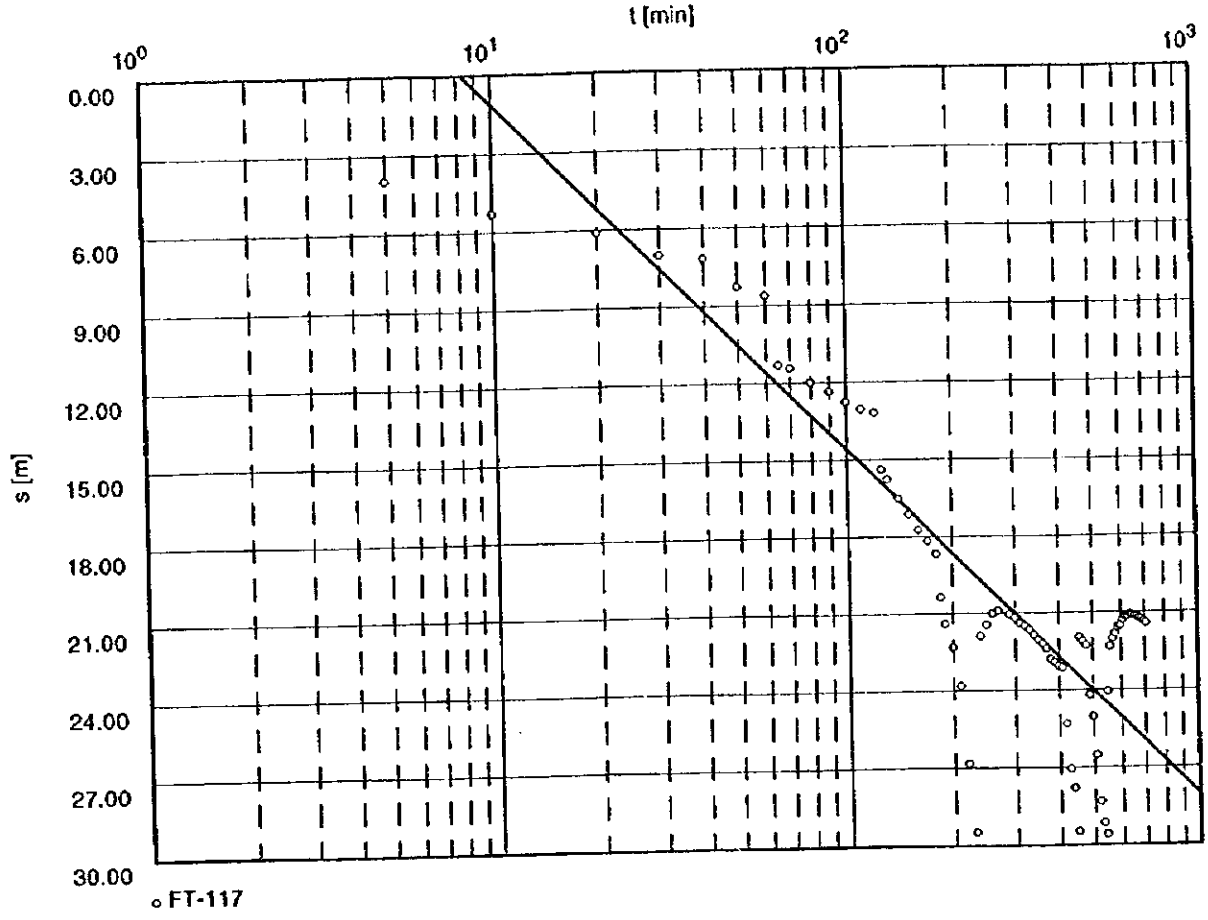


Transmissivity [m²/min]: 8.97×10^{-4}

Storativity: 1.38×10^{0}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Confined aquifer	ANNEX, Page 1 Project: INGRH-JICA Evaluated by: KI | Date: 01.12.1998

Pumping Test No. PRE	Test conducted on: 5/11/98
FT-117	
Discharge 3.774 m³/h	



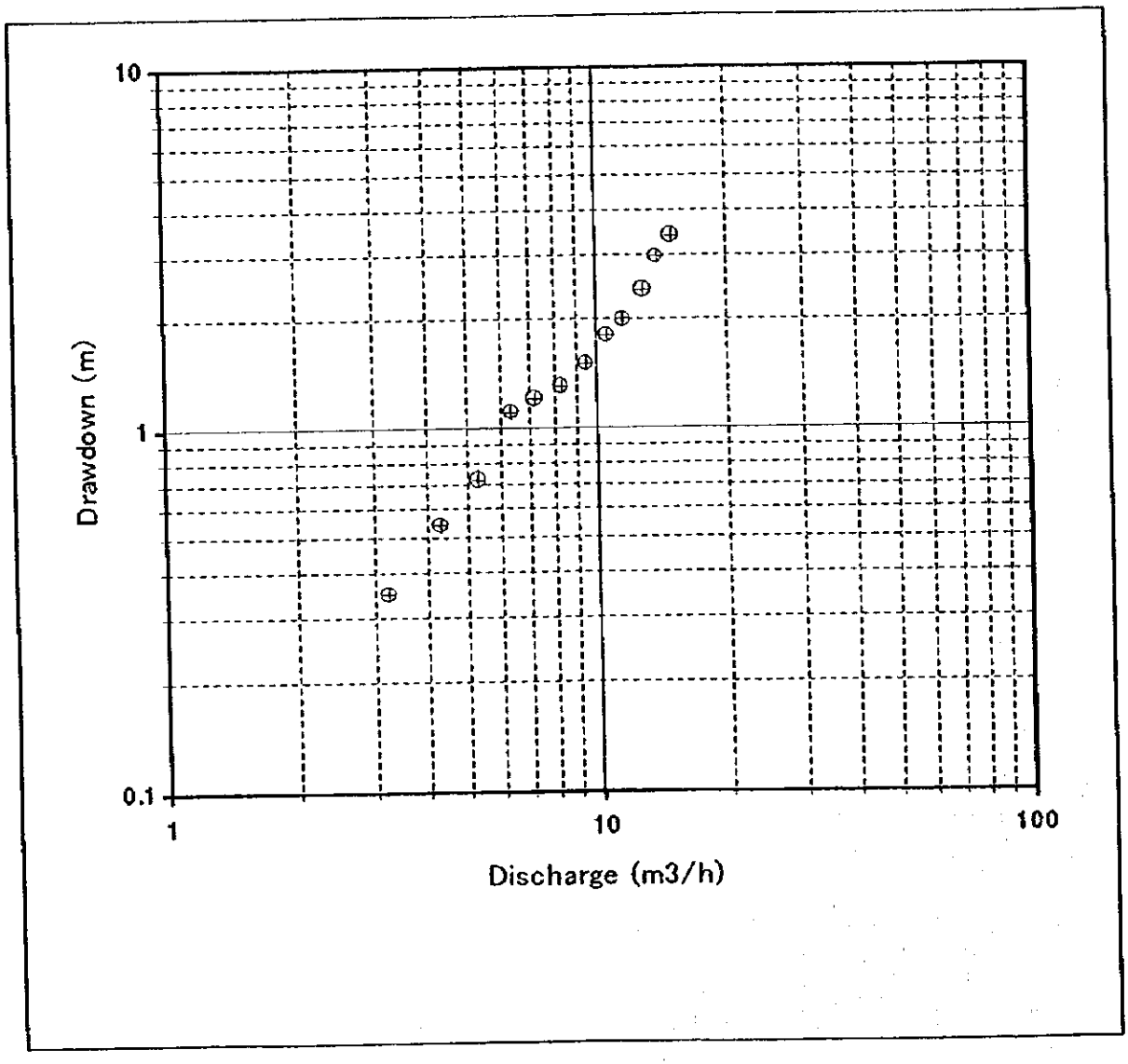
Transmissivity [m²/min]: 8.54×10^{-4}

Storativity: 1.58×10^{0}

Fig. Result of Preliminary Test

Well No FBE-120 S.W.L. (Gl.-m) 114.60

Step	Water Level (GL-m)	Drawdown (m)	Discharge (m3/h)	SC (m3/h/m)	SW/Q (m/m3/min)
1	114.95	0.35	3.214	9.18	6.53
2	115.14	0.54	4.285	7.94	7.56
3	115.32	0.72	5.294	7.35	8.16
4	115.70	1.10	6.338	5.76	10.41
5	115.80	1.20	7.200	6.00	10.00
6	115.90	1.30	8.333	6.41	9.36
7	116.10	1.50	9.473	6.32	9.50
8	116.40	1.80	10.588	5.88	10.20
9	116.60	2.00	11.538	5.77	10.40
10	117.00	2.40	12.857	5.36	11.20
11	117.58	2.98	13.846	4.65	12.91
12	117.99	3.39	15.000	4.42	13.56



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2 Project: JICA-INGRH Evaluated by: KI | Date: 06.11.1998

Pumping Test No. SD	Test conducted on: 2/OCT/1998
FBE-120	FBE-120 SD
Discharge 20.313 m³/h	Distance from the pumping well 0.100 m

Static water level: 114.400 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	114.400	0.000
2	2.00	116.500	2.100
3	4.00	116.520	2.120
4	6.00	116.660	2.260
5	8.00	116.720	2.320
6	10.00	116.870	2.470
7	12.00	116.950	2.550
8	14.00	117.000	2.600
9	16.00	117.050	2.650
10	20.00	117.300	2.900
11	25.00	117.440	3.040
12	30.00	117.500	3.100
13	35.00	117.530	3.130
14	40.00	117.560	3.160
15	50.00	117.620	3.220
16	60.00	117.660	3.260
17	70.00	117.770	3.370
18	80.00	117.800	3.400
19	90.00	117.850	3.450
20	120.00	117.900	3.500
21	150.00	117.900	3.500
22	152.00	118.980	4.580
23	154.00	119.060	4.660
24	156.00	119.160	4.760
25	158.00	119.220	4.820
26	160.00	119.300	4.900
27	162.00	119.350	4.950
28	164.00	119.370	4.970
29	166.00	119.390	4.990
30	170.00	119.500	5.100
31	175.00	119.550	5.150
32	180.00	119.570	5.170
33	185.00	119.600	5.200
34	190.00	119.620	5.220
35	200.00	119.650	5.250
36	210.00	119.670	5.270
37	220.00	119.700	5.300
38	230.00	119.730	5.330
39	240.00	119.730	5.330
40	270.00	119.770	5.370
41	300.00	119.780	5.380
42	302.00	120.250	5.850
43	304.00	120.340	5.940
44	306.00	120.390	5.990
45	308.00	120.420	6.020
46	310.00	120.440	6.040
47	312.00	120.480	6.080
48	314.00	120.480	6.080
49	316.00	120.480	6.080
50	320.00	120.490	6.090

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

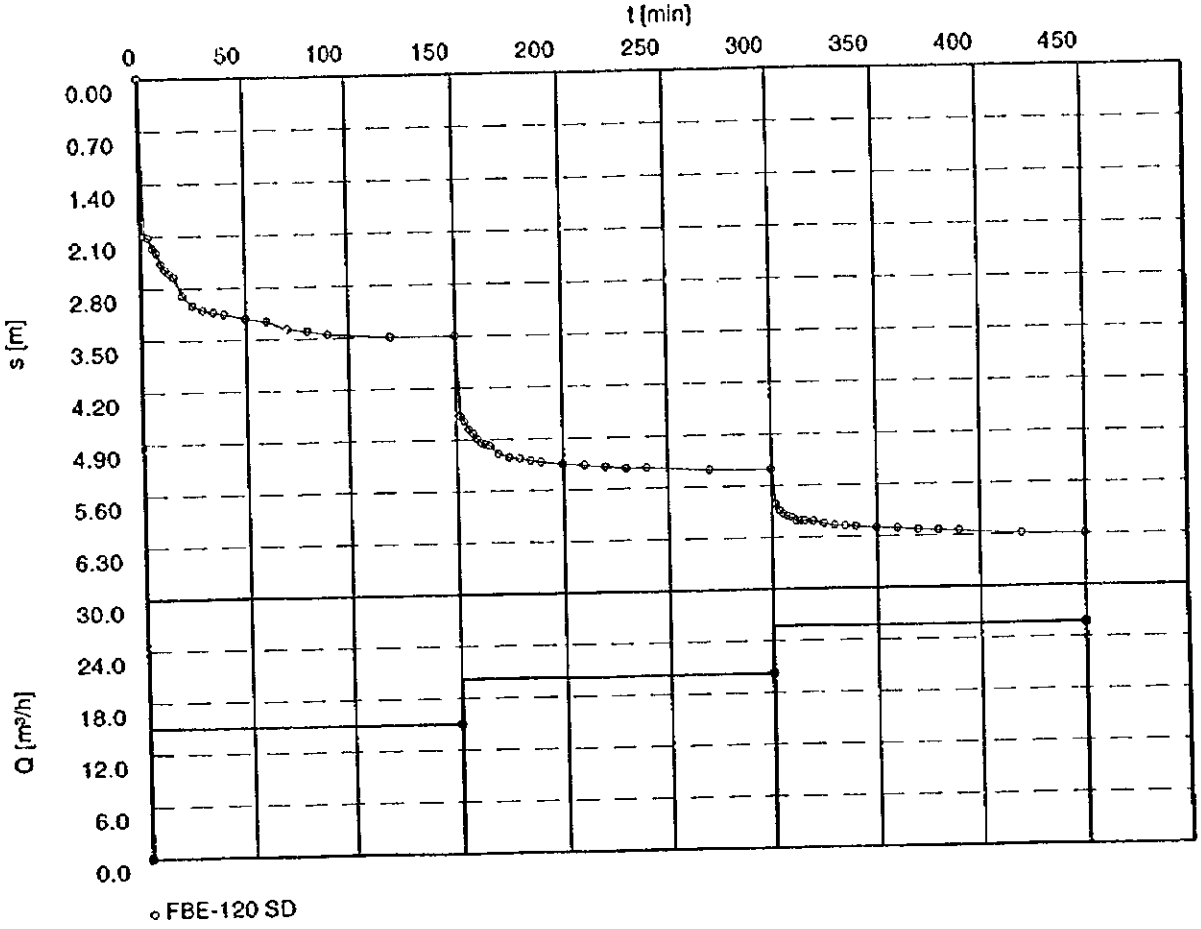
Pumping Test No. SD	Test conducted on: 2/OCT/1998
FBE-120	FBE-120 SD
Discharge 20.313 m³/h	Distance from the pumping well 0.100 m

Static water level: 114.400 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
51	325.00	120.520	6.120
52	330.00	120.550	6.150
53	335.00	120.560	6.160
54	340.00	120.570	6.170
55	350.00	120.590	6.190
56	360.00	120.600	6.200
57	370.00	120.620	6.220
58	380.00	120.630	6.230
59	390.00	120.640	6.240
60	420.00	120.690	6.290
61	450.00	120.700	6.300

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. SD	Test conducted on: 2/OCT/1998
FBE-120	
Discharge 20.313 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 5/OCT/1998
FBE-120	FBE-120 CR
Discharge 25.714 m³/h	Distance from the pumping well 0.100 m

Static water level: 114.400 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	114.400	0.000
2	2.00	118.350	3.950
3	4.00	118.800	4.400
4	6.00	119.020	4.620
5	8.00	119.320	4.920
6	10.00	119.450	5.050
7	15.00	119.640	5.240
8	20.00	119.750	5.350
9	25.00	119.850	5.450
10	30.00	119.900	5.500
11	35.00	120.000	5.600
12	40.00	120.070	5.670
13	50.00	120.150	5.750
14	60.00	120.220	5.820
15	70.00	120.280	5.880
16	80.00	120.320	5.920
17	90.00	120.360	5.960
18	120.00	120.440	6.040
19	150.00	120.500	6.100
20	180.00	120.540	6.140
21	210.00	120.570	6.170
22	240.00	120.600	6.200
23	300.00	120.650	6.250
24	360.00	120.750	6.350
25	420.00	120.750	6.350
26	480.00	120.750	6.350
27	540.00	120.760	6.360
28	600.00	120.780	6.380
29	660.00	120.800	6.400
30	720.00	120.820	6.420
31	721.00	117.360	2.960
32	722.00	116.930	2.530
33	724.00	116.470	2.070
34	726.00	116.240	1.840
35	728.00	116.090	1.690
36	730.00	115.980	1.580
37	732.00	115.860	1.460
38	734.00	115.780	1.380
39	736.00	115.690	1.290
40	738.00	115.640	1.240
41	740.00	115.590	1.190
42	745.00	115.460	1.060
43	750.00	115.400	1.000
44	760.00	115.260	0.860
45	770.00	115.170	0.770
46	780.00	115.080	0.680
47	790.00	115.020	0.620
48	800.00	114.980	0.580
49	810.00	114.950	0.550
50	820.00	114.910	0.510

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

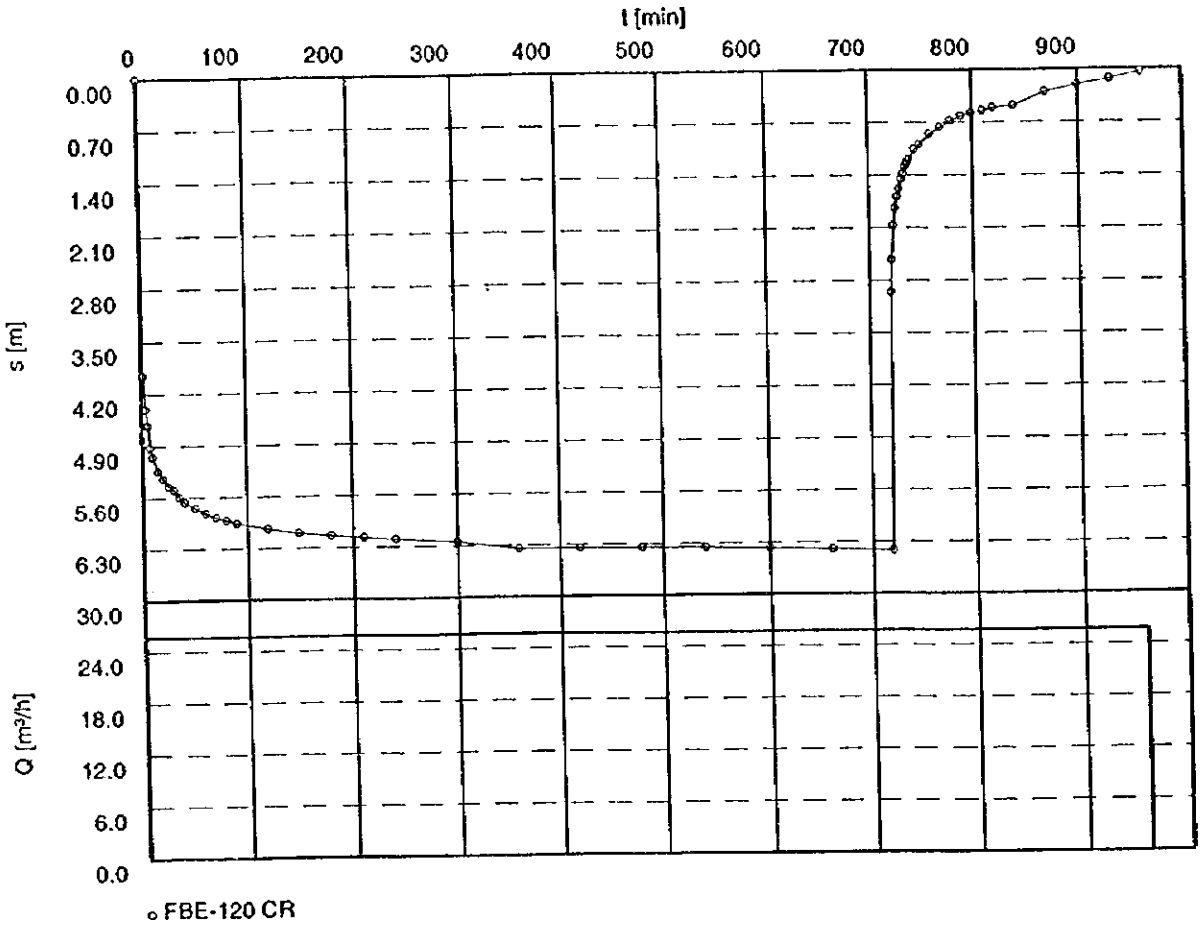
Pumping Test No. CR	Test conducted on: 5/OCT/1998
FBE-120	FBE-120 CR
Discharge 25.714 m³/h	Distance from the pumping well 0.100 m

Static water level: 114.400 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
51	840.00	114.880	0.480
52	870.00	114.700	0.300
53	900.00	114.610	0.210
54	930.00	114.530	0.130
55	960.00	114.440	0.040

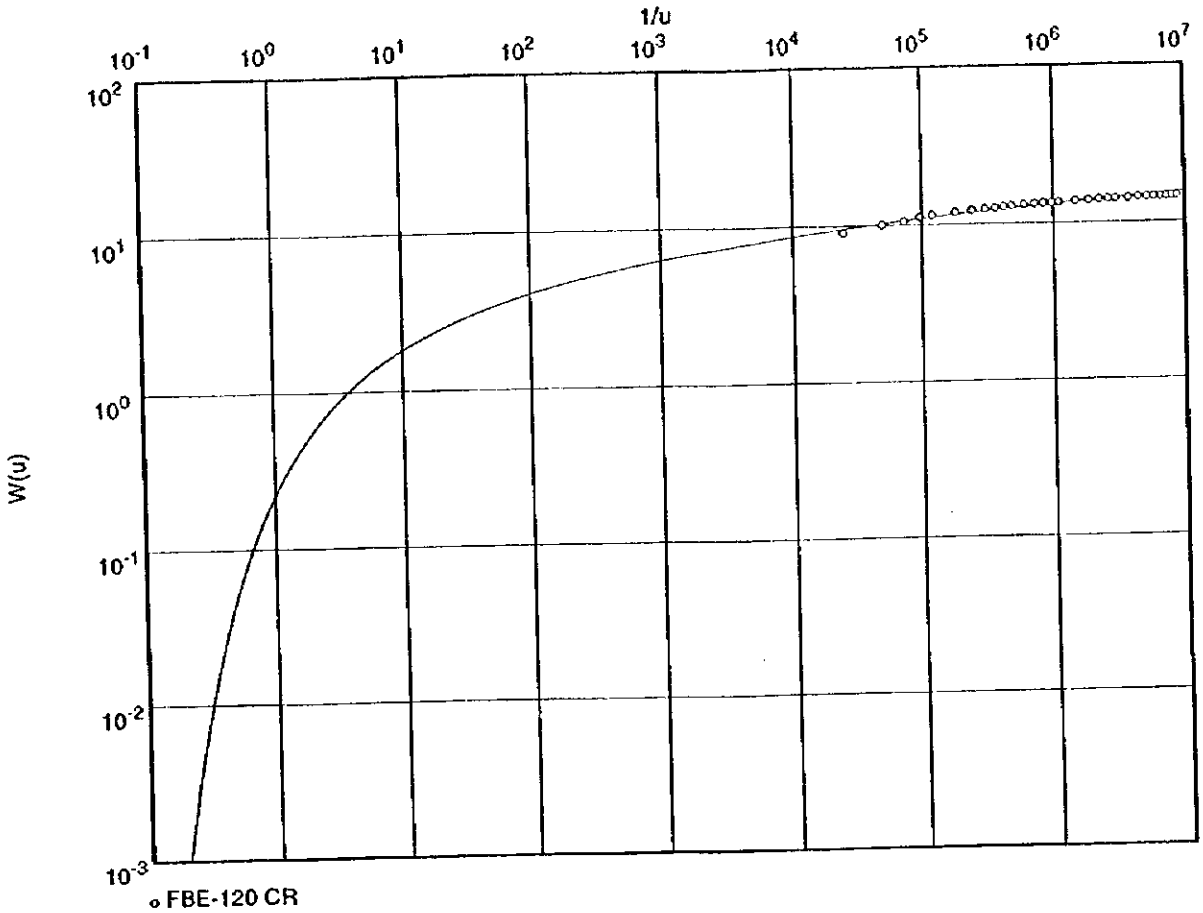
INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 5/OCT/1998
FBE-120	
Discharge 25.714 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Theis analysis method Confined aquifer	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 5/OCT/1998
FBE-120	
Discharge 25.714 m³/h	

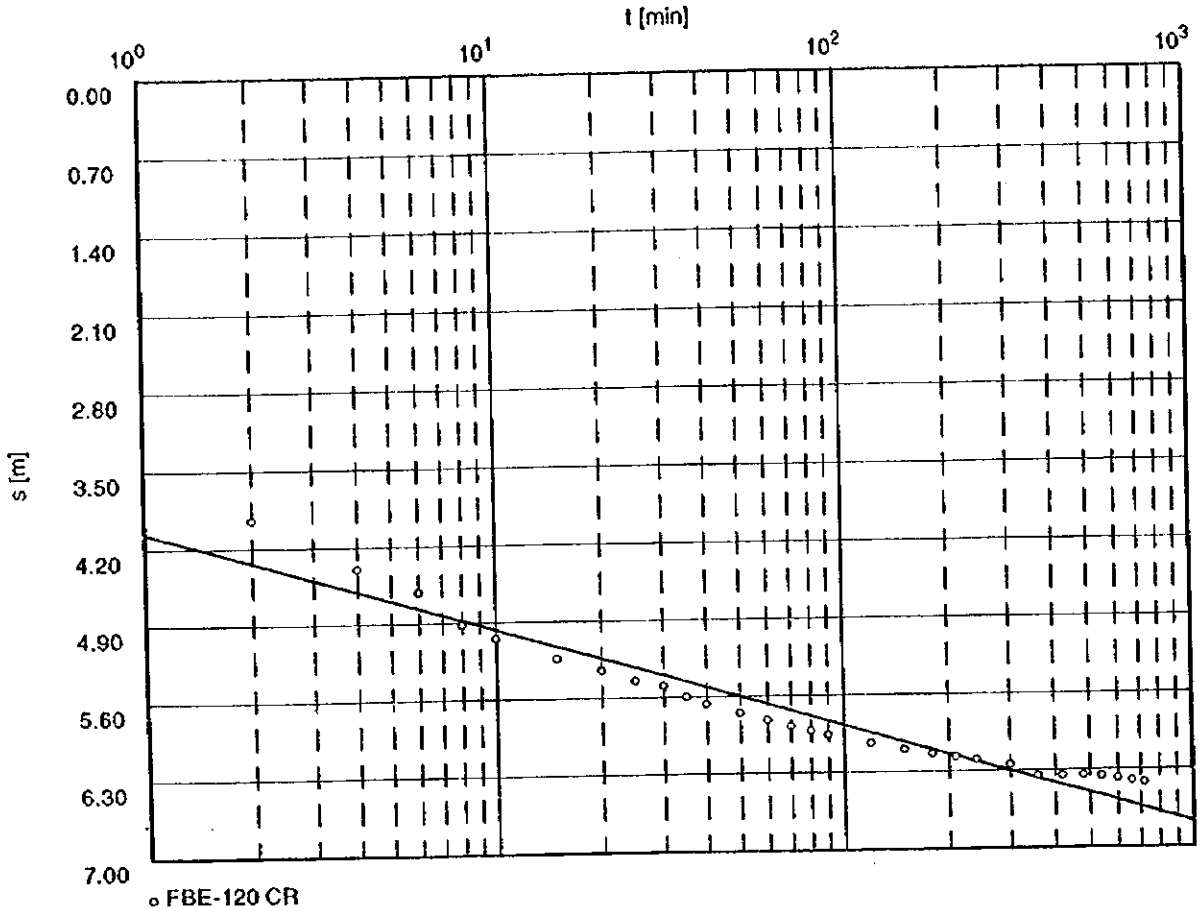


Transmissivity [m²/min]: 7.74×10^{-2}

Storativity: 2.52×10^{-3}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Confined aquifer	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 5/OCT/1998
FBE-120	
Discharge 25.714 m³/h	

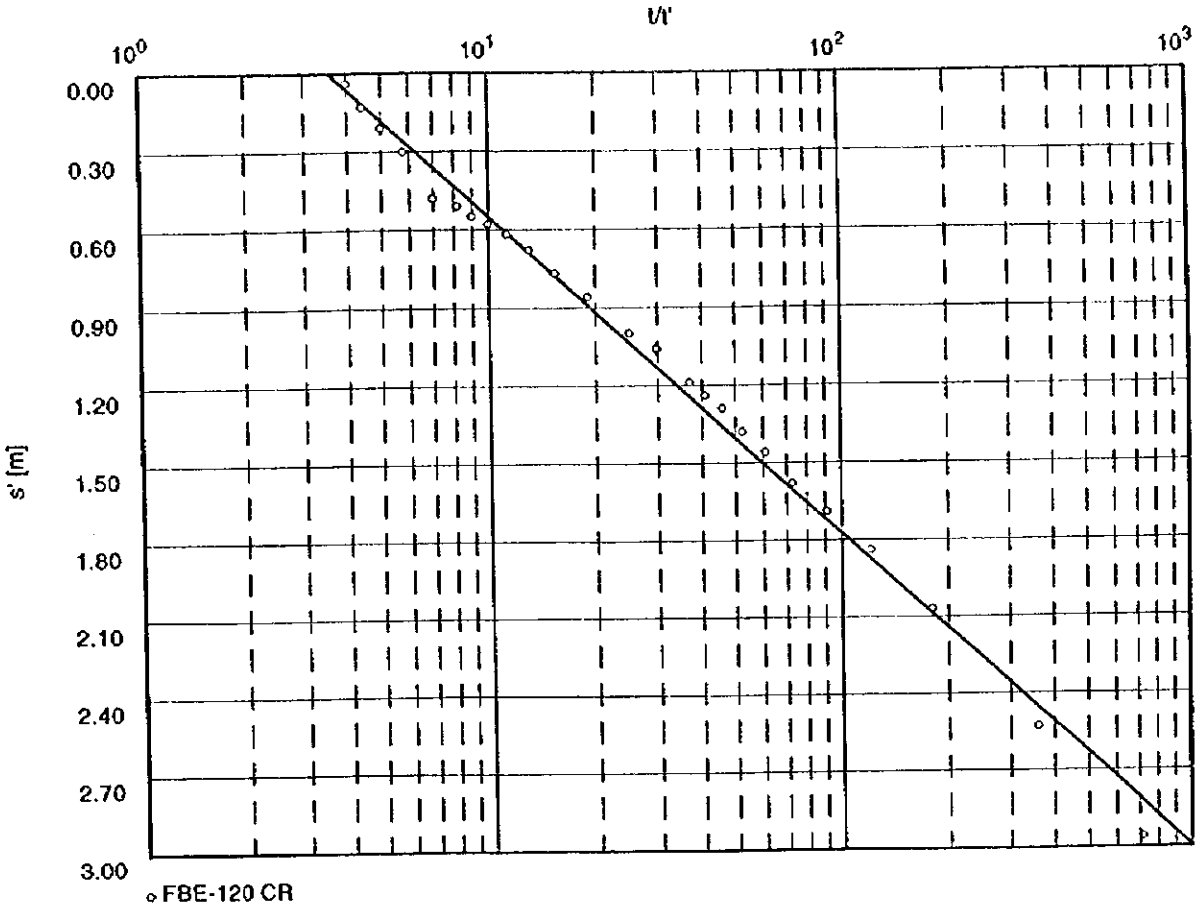


Transmissivity [m²/min]: 8.68×10^{-2}

Storativity: 6.19×10^{-4}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	ANNEX, Page 1 Project: JICA-INGRH Evaluated by: KI | Date: 06.11.1998

Pumping Test No. CR	Test conducted on: 5/OCT/1998
FBE-120	
Discharge 25.714 m³/h	
	Pumping test duration: 720.00 min

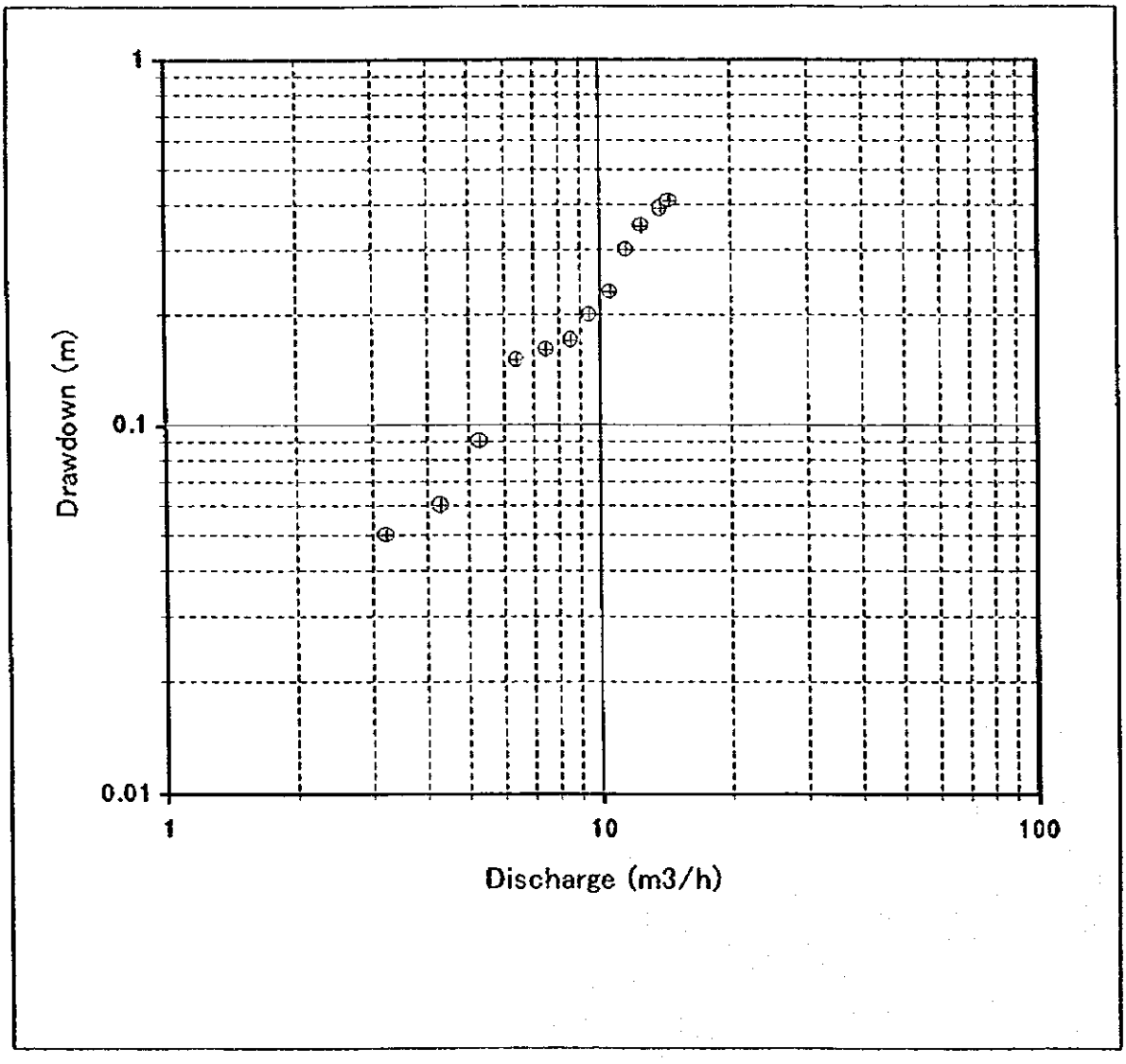


Transmissivity [m²/min]: 6.41×10^{-2}

Fig. Result of Preliminary Test

Well No FBE-143 S.W.L. (GL-m) 7.80

Step	Water Level (GL-m)	Drawdown (m)	Discharge (m3/h)	SC (m3/h/m)	SW/Q (m/m3/min)
1	7.85	0.05	3.214	64.28	0.93
2	7.86	0.06	4.285	71.42	0.84
3	7.89	0.09	5.294	58.82	1.02
4	7.95	0.15	6.428	42.85	1.40
5	7.96	0.16	7.500	46.88	1.28
6	7.97	0.17	8.571	50.42	1.19
7	8.00	0.20	9.473	47.37	1.27
8	8.03	0.23	10.588	46.03	1.30
9	8.10	0.30	11.538	38.46	1.56
10	8.15	0.35	12.500	35.71	1.68
11	8.19	0.39	13.846	35.50	1.69
12	8.21	0.41	14.516	35.40	1.69



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 03.11.1998

Pumping Test No. SD	Test conducted on: 10/SEP/1998
FBE-143	STEP
Discharge 24.327 m³/h	Distance from the pumping well 0.100 m

Static water level: 7.050 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	7.800	0.750
2	2.00	8.050	1.000
3	4.00	8.070	1.020
4	6.00	8.100	1.050
5	8.00	8.120	1.070
6	10.00	8.120	1.070
7	12.00	8.120	1.070
8	14.00	8.120	1.070
9	16.00	8.120	1.070
10	20.00	8.120	1.070
11	25.00	8.120	1.070
12	30.00	8.120	1.070
13	35.00	8.120	1.070
14	40.00	8.120	1.070
15	50.00	8.120	1.070
16	60.00	8.120	1.070
17	70.00	8.120	1.070
18	80.00	8.120	1.070
19	90.00	8.120	1.070
20	120.00	8.120	1.070
21	150.00	8.120	1.070
22	152.00	8.220	1.170
23	154.00	8.220	1.170
24	156.00	8.220	1.170
25	158.00	8.230	1.180
26	160.00	8.230	1.180
27	162.00	8.230	1.180
28	164.00	8.230	1.180
29	166.00	8.230	1.180
30	170.00	8.230	1.180
31	175.00	8.230	1.180
32	180.00	8.230	1.180
33	185.00	8.240	1.190
34	190.00	8.240	1.190
35	200.00	8.240	1.190
36	210.00	8.240	1.190
37	220.00	8.240	1.190
38	230.00	8.240	1.190
39	240.00	8.240	1.190
40	270.00	8.240	1.190
41	300.00	8.240	1.190
42	302.00	8.440	1.390
43	304.00	8.560	1.510
44	306.00	8.570	1.520
45	308.00	8.580	1.530
46	310.00	8.580	1.530
47	312.00	8.580	1.530
48	314.00	8.580	1.530
49	316.00	8.580	1.530
50	320.00	8.590	1.540

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 03.11.1998

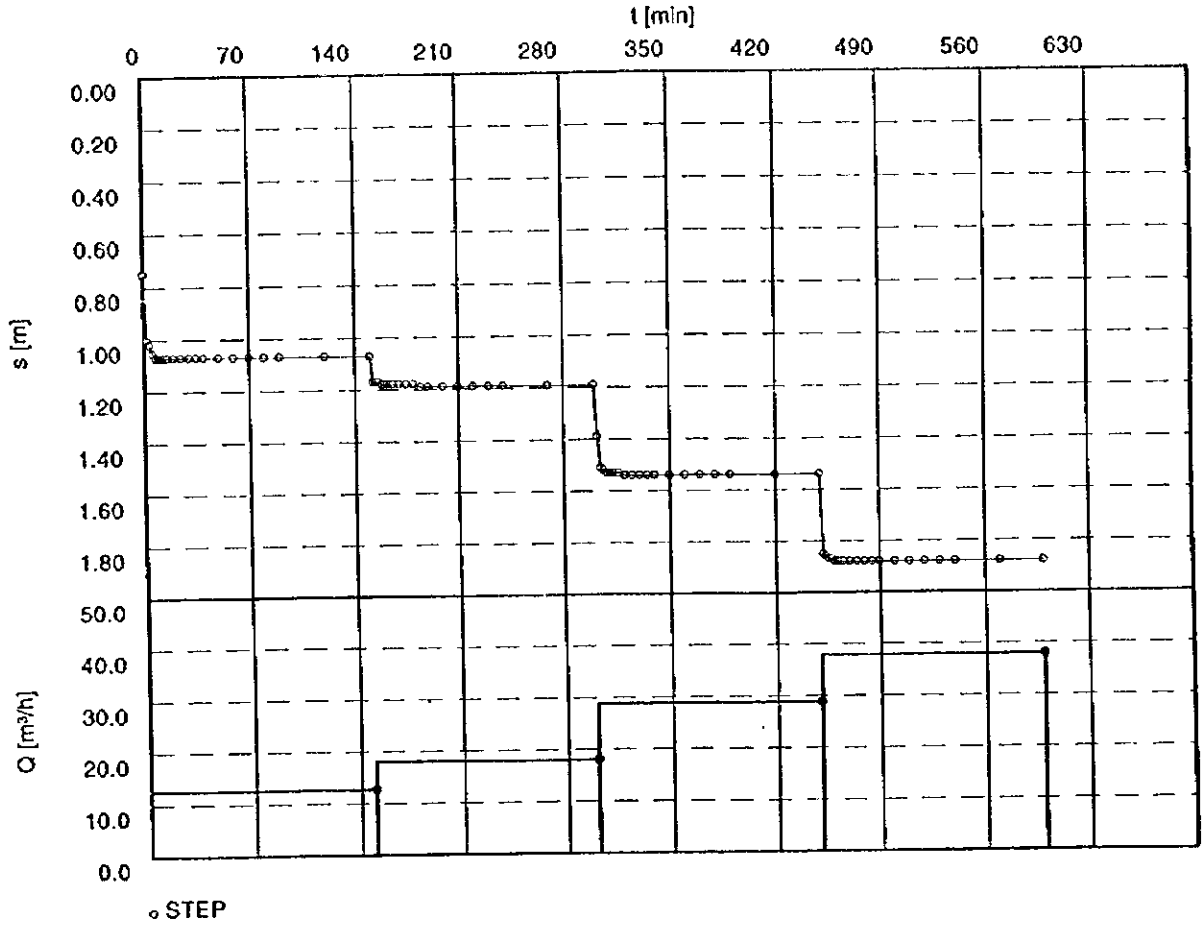
Pumping Test No. SD	Test conducted on: 10/SEP/1998
FBE-143	STEP
Discharge 24.327 m³/h	Distance from the pumping well 0.100 m

Static water level: 7.050 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
51	325.00	8.590	1.540
52	330.00	8.590	1.540
53	335.00	8.590	1.540
54	340.00	8.590	1.540
55	350.00	8.590	1.540
56	360.00	8.590	1.540
57	370.00	8.590	1.540
58	380.00	8.590	1.540
59	390.00	8.590	1.540
60	420.00	8.590	1.540
61	450.00	8.590	1.540
62	452.00	8.900	1.850
63	454.00	8.910	1.860
64	456.00	8.920	1.870
65	458.00	8.920	1.870
66	460.00	8.930	1.880
67	462.00	8.930	1.880
68	464.00	8.930	1.880
69	466.00	8.930	1.880
70	470.00	8.930	1.880
71	475.00	8.930	1.880
72	480.00	8.930	1.880
73	485.00	8.930	1.880
74	490.00	8.930	1.880
75	500.00	8.930	1.880
76	510.00	8.930	1.880
77	520.00	8.930	1.880
78	530.00	8.930	1.880
79	540.00	8.930	1.880
80	570.00	8.930	1.880
81	600.00	8.930	1.880

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Pago 1 Project: JICA-INGRH Evaluated by: KI | Date: 03.11.1998

Pumping Test No. SD	Test conducted on: 10/SEP/1998
FBE-143	
Discharge 24.327 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

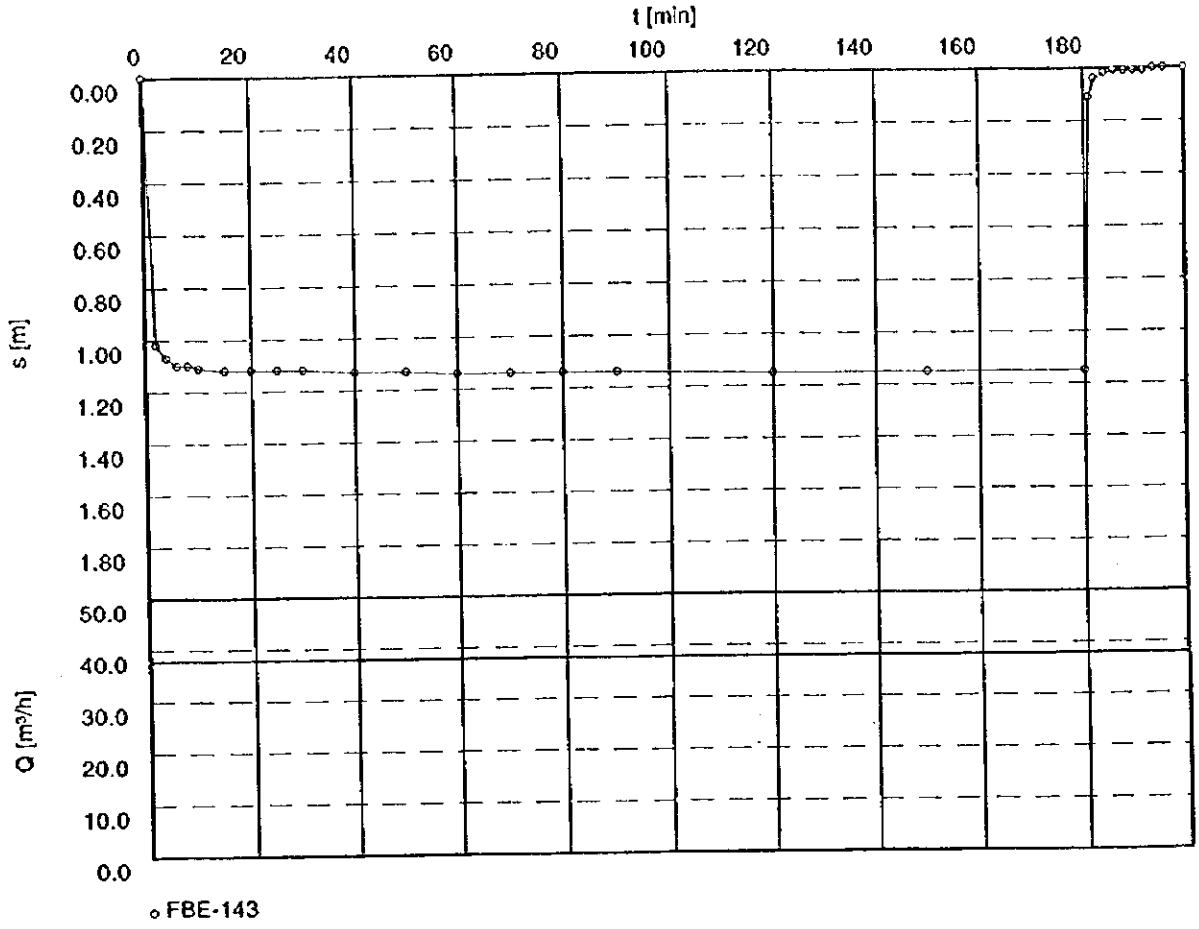
Pumping Test No. CR	Test conducted on: 14/SEP/1998
FBE-143	FBE-143
Discharge 37.894 m³/h	Distance from the pumping well 0.100 m

Static water level: 7.800 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	7.800	0.000
2	2.00	8.820	1.020
3	4.00	8.870	1.070
4	6.00	8.900	1.100
5	8.00	8.900	1.100
6	10.00	8.910	1.110
7	15.00	8.920	1.120
8	20.00	8.920	1.120
9	25.00	8.920	1.120
10	30.00	8.920	1.120
11	40.00	8.930	1.130
12	50.00	8.930	1.130
13	60.00	8.940	1.140
14	70.00	8.940	1.140
15	80.00	8.940	1.140
16	90.00	8.940	1.140
17	120.00	8.950	1.150
18	150.00	8.950	1.150
19	180.00	8.950	1.150
20	181.00	7.910	0.110
21	182.00	7.840	0.040
22	184.00	7.820	0.020
23	186.00	7.810	0.010
24	188.00	7.810	0.010
25	190.00	7.810	0.010
26	192.00	7.810	0.010
27	194.00	7.800	0.000
28	196.00	7.800	0.000
29	200.00	7.800	0.000

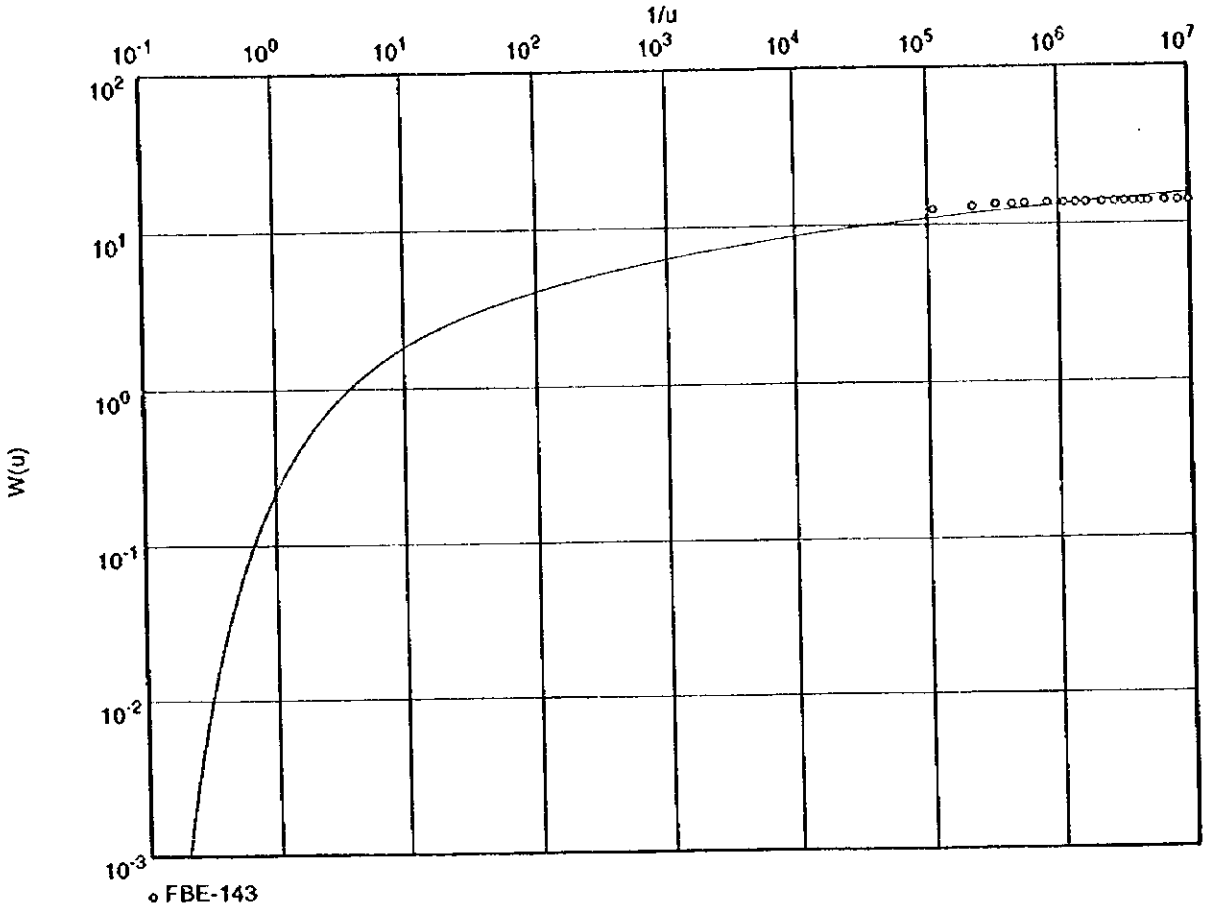
INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

Pumping Test No. CR	Test conducted on: 14/SEP/1998
FBE-143	
Discharge 37.894 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Theis analysis method Confined aquifer	ANNEX, Page 1 Project: JICA-INGRH Evaluated by: KI | Date: 07.11.1998

Pumping Test No. CR	Test conducted on: 14/SEP/1998
FBE-143	
Discharge 37.894 m³/h	

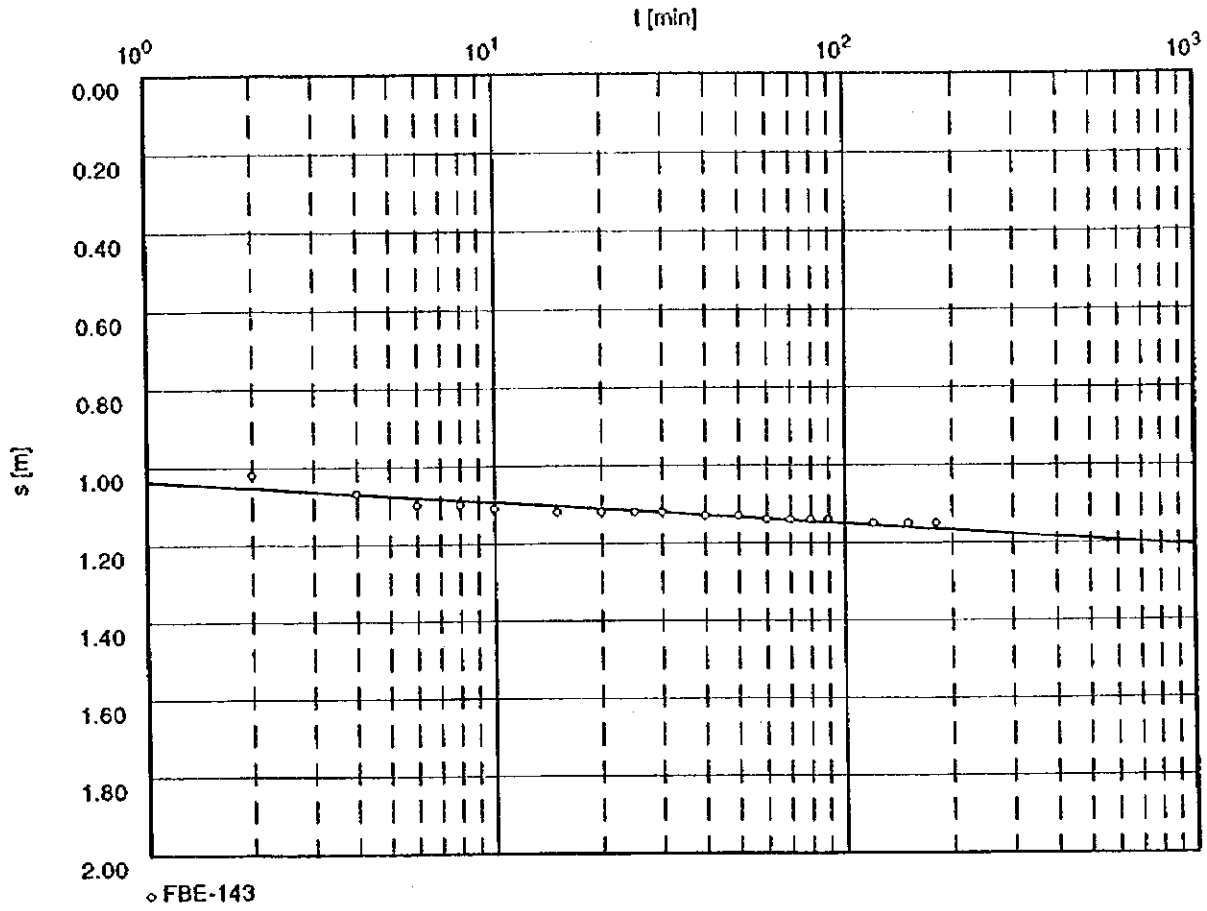


Transmissivity [m²/min]: 6.08×10^{-1}

Storativity: 4.38×10^{-3}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Confined aquifer	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

Pumping Test No. CR	Test conducted on: 14/SEP/1998
FBE-143	
Discharge 37.894 m³/h	

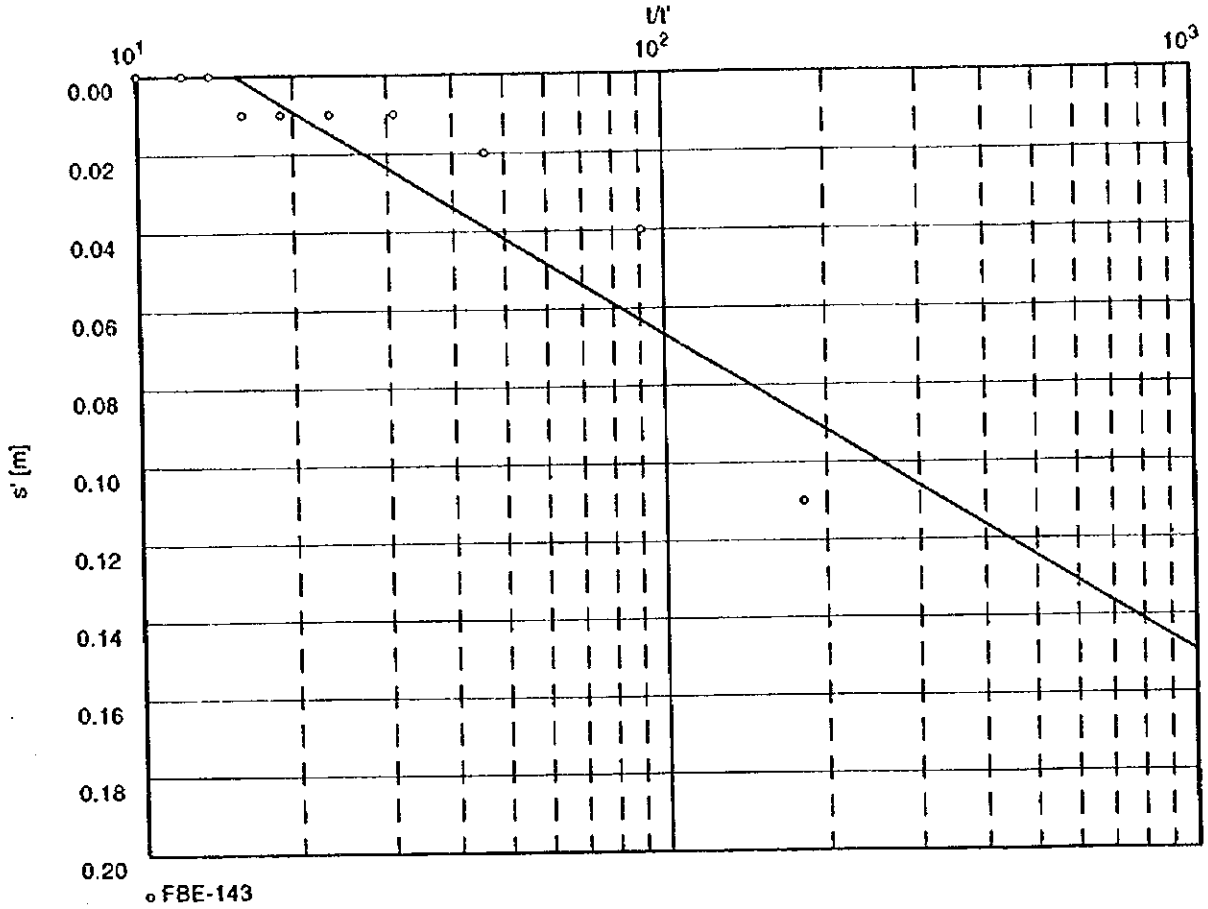


Transmissivity [m²/min]: 2.02×10^{0}

Storativity: 3.46×10^{-16}

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	ANNEX, Page 1	
		Project: JICA-INGRH	
		Evaluated by: KI	Date: 07.11.1998

Pumping Test No. CR	Test conducted on: 14/SEP/1998
FBE-143	
Discharge 37.894 m³/h	
	Pumping test duration: 180.00 min

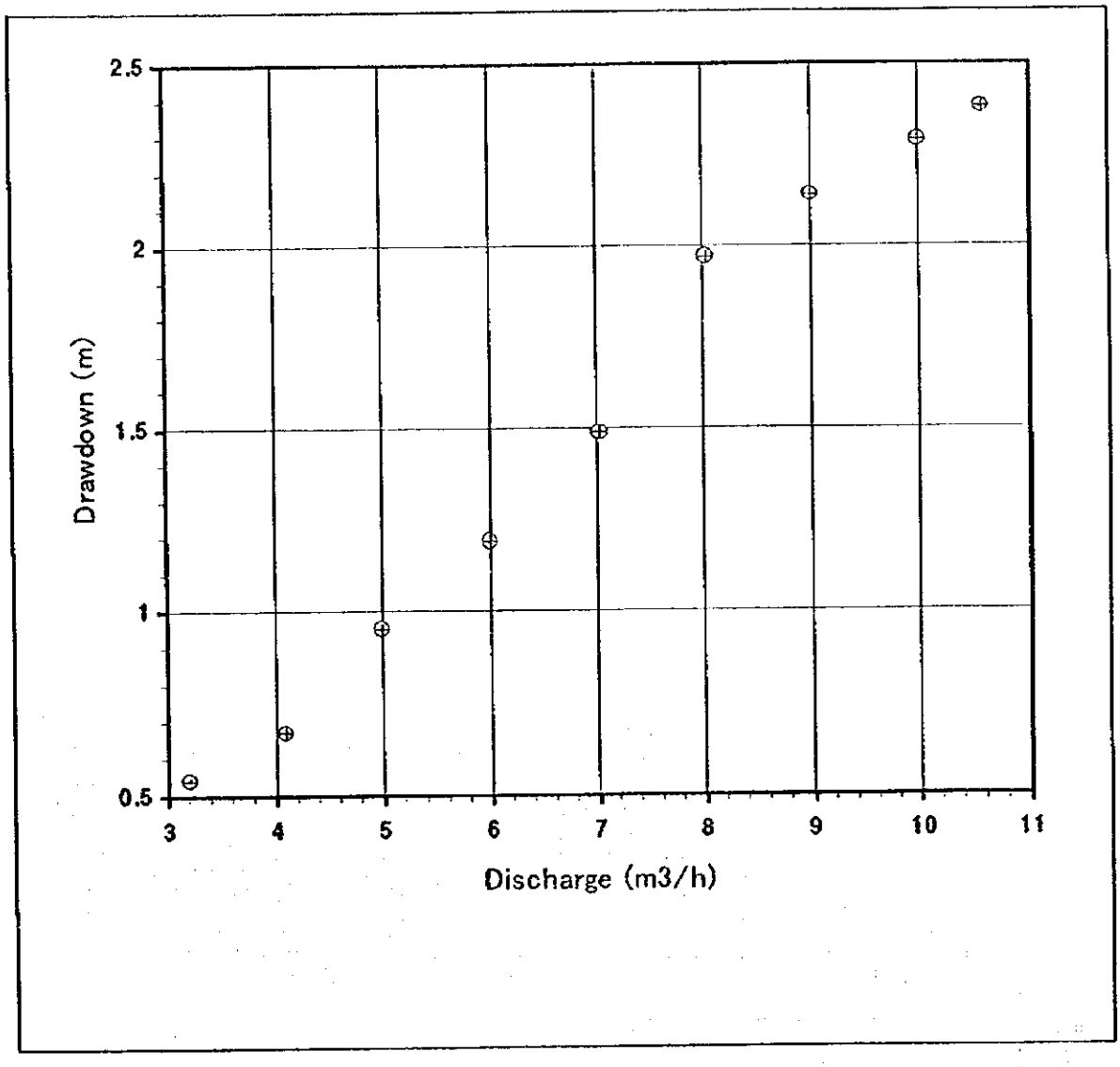


Transmissivity [m²/min]: 1.40×10^{0}

Fig. Result of Preliminary Test

Well No FBE-156 S.W.L. (GL-m) 111.69

Step	Water Level (GL-m)	Drawdown (m)	Discharge (m3/h)	SC (m3/h/m)	SW/Q (m/m3/min)
1	112.23	0.54	3.214	5.95	10.08
2	112.36	0.67	4.090	6.10	9.83
3	112.64	0.95	5.000	5.26	11.40
4	112.88	1.19	6.000	5.04	11.90
5	113.18	1.49	7.031	4.72	12.72
6	113.66	1.97	8.035	4.08	14.71
7	113.83	2.14	9.000	4.21	14.27
8	113.98	2.29	10.000	4.37	13.74
9	114.07	2.38	10.588	4.45	13.49



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 01.12.1998

Pumping Test No. SD	Test conducted on: 31/10/98
FBE-156	FBE-156 SD
Discharge 6.696 m³/h	Distance from the pumping well 0.100 m

Static water level: 111.700 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
1	0.00	111.700	0.000	
2	2.00	111.910	0.210	
3	4.00	111.980	0.280	
4	6.00	112.070	0.370	
5	8.00	112.100	0.400	
6	10.00	112.130	0.430	
7	12.00	112.150	0.450	
8	14.00	112.150	0.450	
9	16.00	112.150	0.450	
10	20.00	112.150	0.450	
11	25.00	112.150	0.450	
12	30.00	112.150	0.450	
13	35.00	112.150	0.450	
14	40.00	112.150	0.450	
15	50.00	112.150	0.450	
16	60.00	112.150	0.450	
17	70.00	112.150	0.450	
18	80.00	112.150	0.450	
19	90.00	112.150	0.450	
20	120.00	112.150	0.450	
21	150.00	112.150	0.450	
22	152.00	112.420	0.720	
23	154.00	112.520	0.820	
24	156.00	112.600	0.900	
25	158.00	112.660	0.960	
26	160.00	112.660	0.960	
27	162.00	112.660	0.960	
28	164.00	112.660	0.960	
29	166.00	112.660	0.960	
30	170.00	112.660	0.960	
31	175.00	112.660	0.960	
32	180.00	112.660	0.960	
33	185.00	112.660	0.960	
34	190.00	112.660	0.960	
35	200.00	112.660	0.960	
36	210.00	112.660	0.960	
37	220.00	112.660	0.960	
38	230.00	112.660	0.960	
39	240.00	112.660	0.960	
40	270.00	112.670	0.970	
41	300.00	112.670	0.970	
42	302.00	113.290	1.590	
43	304.00	113.310	1.610	
44	306.00	113.320	1.620	
45	308.00	113.320	1.620	
46	310.00	113.320	1.620	
47	312.00	113.320	1.620	
48	314.00	113.320	1.620	
49	316.00	113.320	1.620	
50	320.00	113.320	1.620	

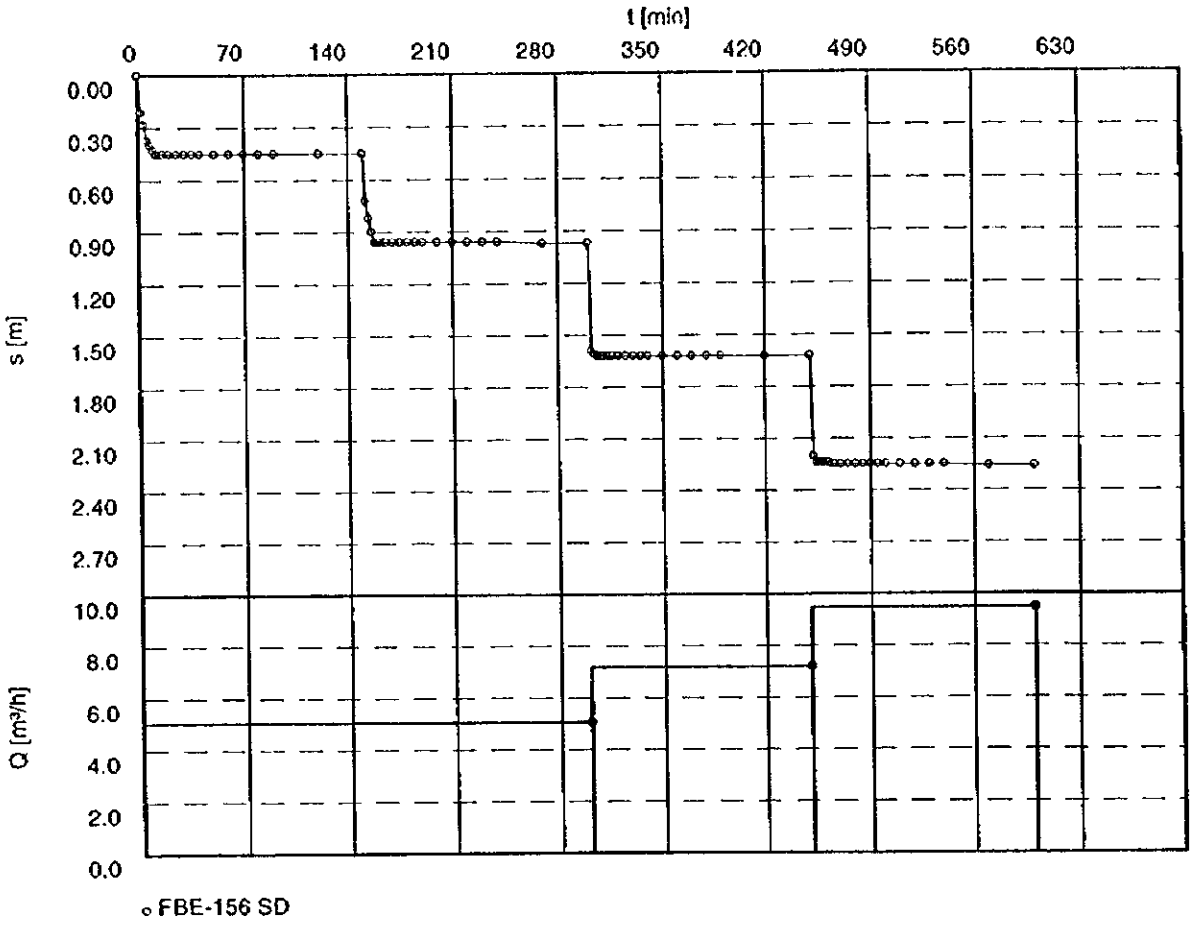
INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3 Project: INGRH-JICA Evaluated by: KI | Date: 01.12.1998

Pumping Test No. SD	Test conducted on: 31/10/98
FBE-156	FBE-156 SD
Discharge 6.696 m³/h	Distance from the pumping well 0.100 m
Static water level: 111.700 m below datum	

	Pumping test duration [min]	Water level [m]	Drawdown [m]
51	325.00	113.320	1.620
52	330.00	113.320	1.620
53	335.00	113.320	1.620
54	340.00	113.320	1.620
55	350.00	113.320	1.620
56	360.00	113.320	1.620
57	370.00	113.320	1.620
58	380.00	113.320	1.620
59	390.00	113.320	1.620
60	420.00	113.320	1.620
61	450.00	113.320	1.620
62	452.00	113.900	2.200
63	454.00	113.940	2.240
64	456.00	113.940	2.240
65	458.00	113.940	2.240
66	460.00	113.940	2.240
67	462.00	113.940	2.240
68	464.00	113.950	2.250
69	466.00	113.950	2.250
70	470.00	113.950	2.250
71	475.00	113.950	2.250
72	480.00	113.950	2.250
73	485.00	113.950	2.250
74	490.00	113.950	2.250
75	495.00	113.950	2.250
76	500.00	113.950	2.250
77	510.00	113.950	2.250
78	520.00	113.950	2.250
79	530.00	113.950	2.250
80	540.00	113.950	2.250
81	570.00	113.960	2.260
82	600.00	113.960	2.260

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 01.12.1998

Pumping Test No. SD	Test conducted on: 31/10/98
FBE-156	
Discharge 6.696 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 2	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 01.12.1998

Pumping Test No. SREP-DRAWDOWN	Test conducted on: 8/11/98
FBE-156	FBE-156 CR
Discharge 9.000 m³/h	Distance from the pumping well 0.100 m

Static water level: 111.700 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]
1	0.00	111.700	0.000
2	2.00	112.670	0.970
3	4.00	113.810	2.110
4	6.00	113.860	2.160
5	8.00	113.870	2.170
6	10.00	113.870	2.170
7	15.00	113.870	2.170
8	20.00	113.870	2.170
9	25.00	113.870	2.170
10	30.00	113.870	2.170
11	40.00	113.870	2.170
12	50.00	113.870	2.170
13	60.00	113.870	2.170
14	70.00	113.870	2.170
15	80.00	113.870	2.170
16	90.00	113.870	2.170
17	120.00	113.870	2.170
18	150.00	113.870	2.170
19	180.00	113.870	2.170
20	210.00	113.870	2.170
21	240.00	113.870	2.170
22	300.00	113.870	2.170
23	360.00	113.870	2.170
24	420.00	113.870	2.170
25	480.00	113.870	2.170
26	540.00	113.870	2.170
27	600.00	113.870	2.170
28	660.00	113.870	2.170
29	720.00	113.870	2.170
30	780.00	113.870	2.170
31	840.00	113.870	2.170
32	900.00	113.870	2.170
33	990.00	113.870	2.170
34	1080.00	113.870	2.170
35	1170.00	113.870	2.170
36	1260.00	113.870	2.170
37	1350.00	113.870	2.170
38	1440.00	113.870	2.170
39	1441.00	111.770	0.070
40	1442.00	111.730	0.030
41	1444.00	111.730	0.030
42	1446.00	111.720	0.020
43	1448.00	111.720	0.020
44	1450.00	111.720	0.020
45	1452.00	111.710	0.010
46	1454.00	111.710	0.010
47	1456.00	111.710	0.010
48	1458.00	111.710	0.010
49	1460.00	111.710	0.010
50	1465.00	111.710	0.010

INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 3	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 01.12.1998

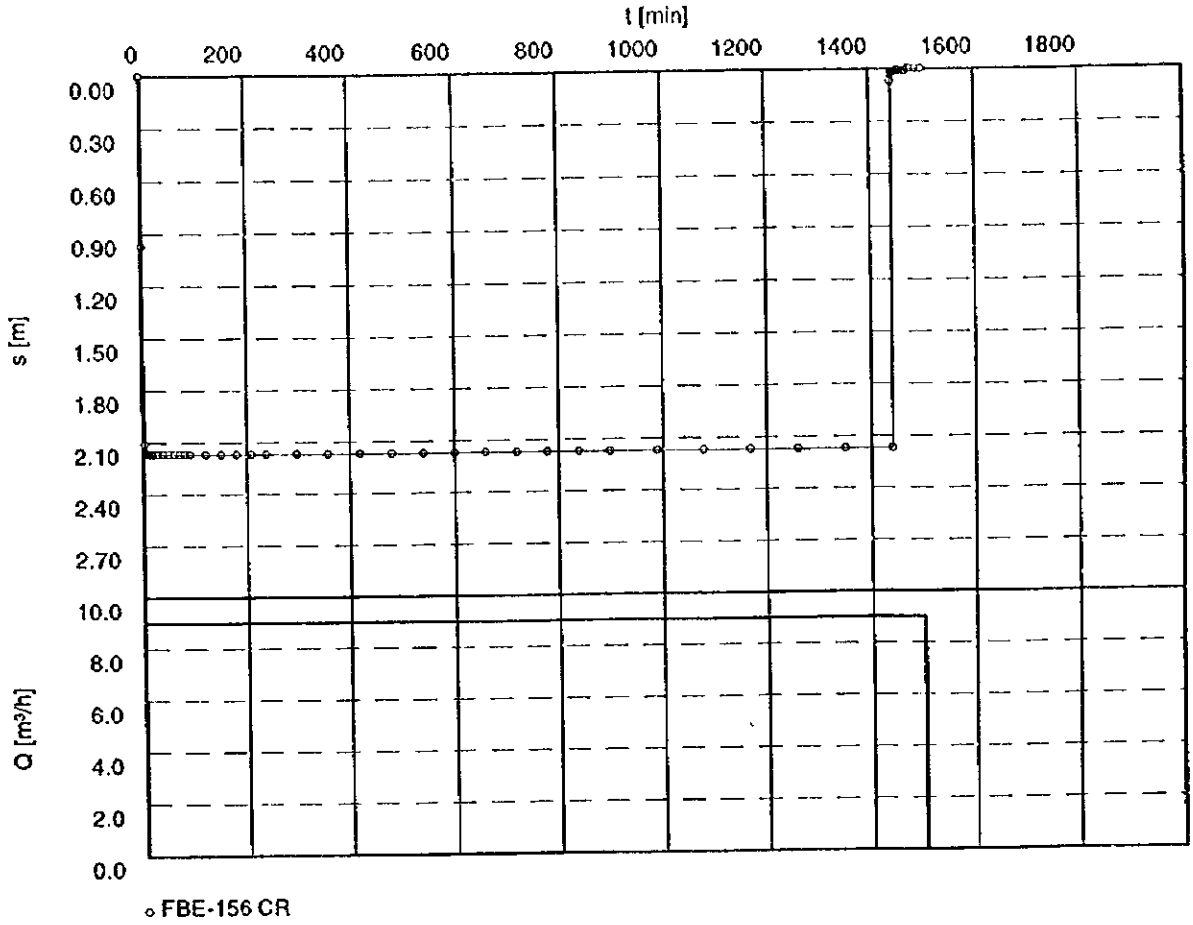
Pumping Test No. SREP-DRAWDOWN	Test conducted on: 8/11/98
FBE-156	FBE-156 CR
Discharge 9.000 m³/h	Distance from the pumping well 0.100 m

Static water level: 111.700 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
51	1470.00	111.710	0.010	
52	1475.00	111.700	0.000	
53	1480.00	111.700	0.000	
54	1490.00	111.700	0.000	
55	1500.00	111.700	0.000	

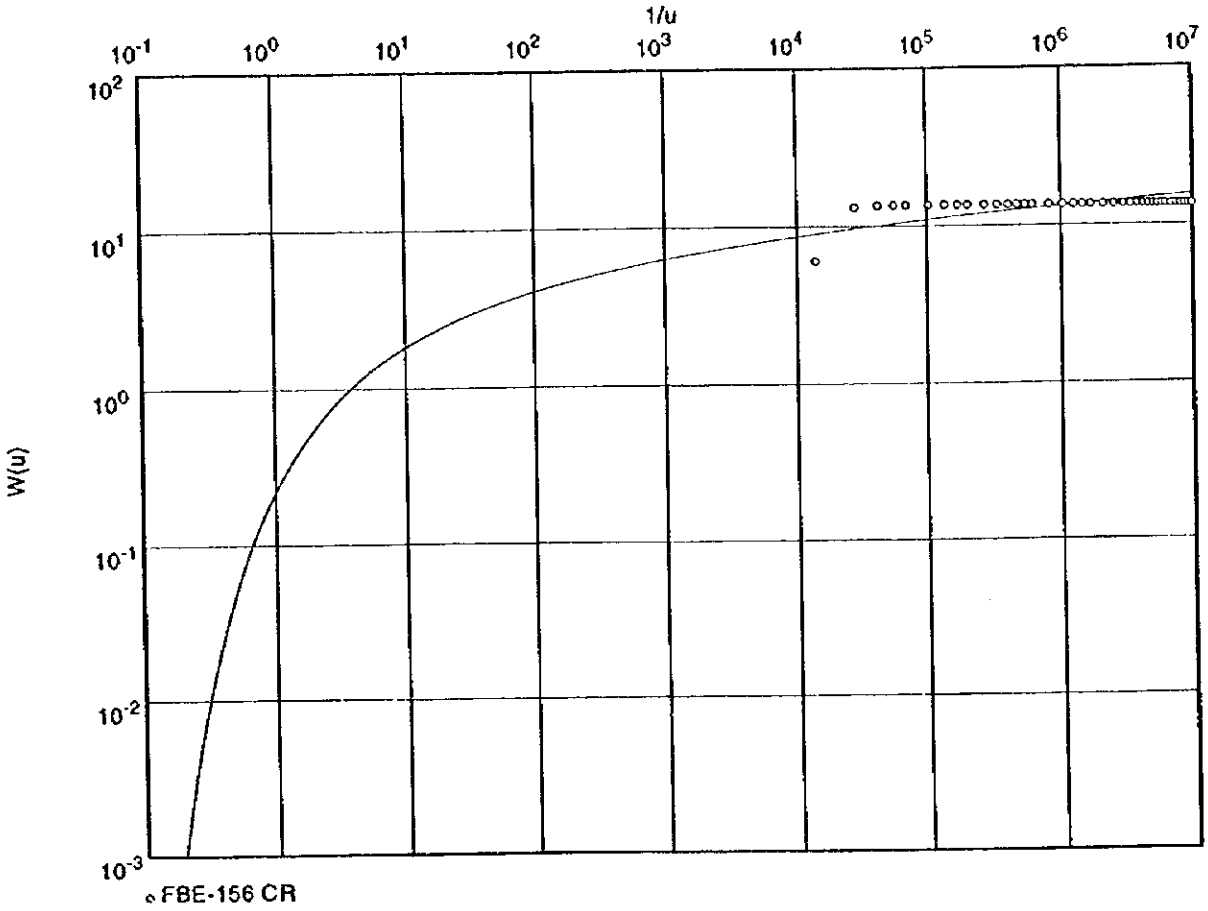
INGRH-JICA Groundwater Dev. Project	Pumping test analysis Time-Drawdown plot with discharge	ANNEX, Page 1	
		Project: INGRH-JICA	
		Evaluated by: KI	Date: 01.12.1998

Pumping Test No. SREP-DRAWDOWN	Test conducted on: 8/11/98
FBE-156	
Discharge 9.000 m³/h	



INGRH-JICA Groundwater Dev. Project	Pumping test analysis Theis analysis method Confined aquifer	ANNEX, Page 1 Project: INGRH-JICA Evaluated by: KI | Date: 01.12.1998

Pumping Test No. SREP-DRAWDOWN	Test conducted on: 8/11/98
FBE-156	
Discharge 9.000 m³/h	



Transmissivity [m²/min]: 7.40×10^{-2}

Storativity: 4.26×10^{-3}