

EXPERIMENTAL INVESTIGATION OF THE

PROPERTIES OF

STEEL

AND

WELDED JOINTS

MARCH 1962

WELDED JOINTS OF STEEL

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FEASIBILITY REPORT
ON
PILAYA HYDRO-ELECTRIC
POWER PROJECT

(APPENDIX)

MARCH 1982

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JAPAN INTERNATIONAL COOPERATION AGENCY

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FOR PILAYA HYDRO-ELECTRIC POWER
PROJECT PREPARED BY E.N.D.E.
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HYDROLOGY

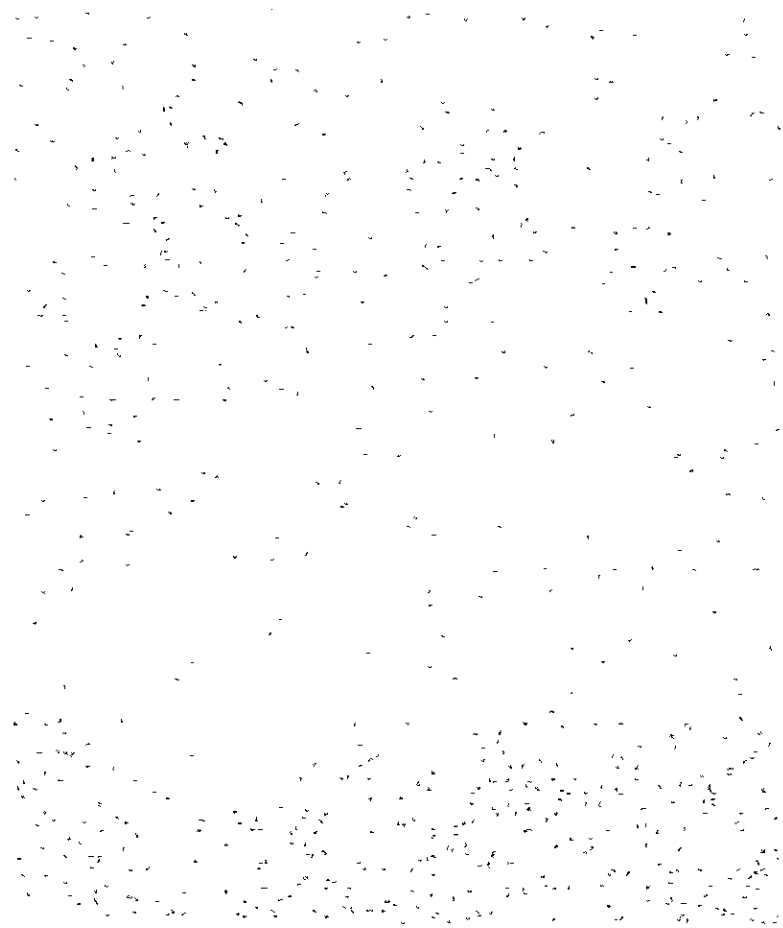


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Table A-I-1-(1) Run-off Data at Chillcara Gauging Station (Original Data)

Year , 1972												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct.	Nov	Dec.
1	-----	-----	-----	-----	-----	-----	-----	12.97	10.34	9.76	18.40	27.40
2	-----	-----	-----	-----	-----	-----	-----	12.78	10.23	9.56	18.40	11.00
3	-----	-----	-----	-----	-----	-----	-----	12.65	10.16	9.17	40.60	9.05
4	-----	-----	-----	-----	-----	-----	-----	12.53	10.16	8.00	22.08	4.20
5	-----	-----	-----	-----	-----	-----	-----	12.65	10.16	4.88	19.00	31.36
6	-----	-----	-----	-----	-----	-----	-----	12.40	9.94	6.70	20.60	33.97
7	-----	-----	-----	-----	-----	-----	-----	12.87	10.07	6.58	49.47	17.60
8	-----	-----	-----	-----	-----	-----	-----	12.98	10.16	6.40	26.40	13.07
9	-----	-----	-----	-----	-----	-----	-----	12.95	10.34	4.18	28.67	12.40
10	-----	-----	-----	-----	-----	-----	-----	12.44	10.11	6.09	17.92	15.68
11	-----	-----	-----	-----	-----	-----	-----	12.63	9.80	3.88	9.60	20.23
12	-----	-----	-----	-----	-----	-----	-----	12.96	9.80	3.48	7.00	31.11
13	-----	-----	-----	-----	-----	-----	-----	12.90	9.80	3.69	7.00	31.11
14	-----	-----	-----	-----	-----	-----	-----	12.20	9.24	3.67	6.36	82.00
15	-----	-----	-----	-----	-----	-----	-----	12.20	9.16	3.78	5.60	40.00
16	-----	-----	-----	-----	-----	-----	-----	12.20	8.75	3.85	36.05	133.07
17	-----	-----	-----	-----	-----	-----	-----	11.86	8.20	3.73	32.99	112.04
18	-----	-----	-----	-----	-----	-----	-----	11.73	8.36	3.68	17.20	86.00
19	-----	-----	-----	-----	-----	-----	-----	11.40	8.20	3.44	6.36	74.00
20	-----	-----	-----	-----	-----	-----	13.45	11.77	8.15	3.70	6.92	41.47
21	-----	-----	-----	-----	-----	-----	13.26	11.91	7.92	3.20	4.10	69.20
22	-----	-----	-----	-----	-----	-----	13.28	11.35	7.36	6.00	3.47	35.39
23	-----	-----	-----	-----	-----	-----	13.20	11.07	7.27	11.24	3.28	25.26
24	-----	-----	-----	-----	-----	-----	13.54	10.74	7.36	21.31	3.15	26.88
25	-----	-----	-----	-----	-----	-----	13.33	10.82	7.20	44.45	12.61	25.86
26	-----	-----	-----	-----	-----	-----	13.33	10.61	6.69	65.72	6.08	19.52
27	-----	-----	-----	-----	-----	-----	13.33	10.28	6.26	39.60	4.36	16.87
28	-----	-----	-----	-----	-----	-----	13.42	9.92	6.20	47.40	3.31	20.12
29	-----	-----	-----	-----	-----	-----	13.20	10.15	6.05	61.83	3.06	13.63
30	-----	-----	-----	-----	-----	-----	13.04	10.16	4.60	29.72	47.28	13.27
31	-----	-----	-----	-----	-----	-----	13.07	10.16	4.60	32.80	-----	16.29
SUM							199.50	365.32	259.09	407.12	543.71	1187.39
MEAN							13.29	11.79	8.66	12.97	14.46	36.14

Table A-I-1-(2) Run-off Data at Chillcara Gauging Station (Original Data)

Year , 1973												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov.	Dec
1	11.15	82.27	194.20	26.25	22.95	161.38	17.28	13.62	9.90	5.02	2.60	2.15
2	17.00	96.32	141.79	27.77	22.42	132.32	17.17	13.62	9.97	4.92	2.60	2.14
3	18.96	110.44	87.40	21.76	21.98	79.96	16.84	13.39	9.90	4.82	2.61	2.85
4	17.94	116.40	31.92	20.46	21.40	41.96	16.59	13.62	9.90	4.56	2.74	2.72
5	49.67	107.68	61.10	24.93	21.93	33.32	16.84	13.62	9.53	4.38	2.66	2.30
6	14.70	119.56	50.46	32.40	21.40	28.72	16.64	13.34	9.13	4.17	2.57	2.65
7	125.89	88.16	72.00	43.17	21.91	25.93	16.21	13.63	8.80	3.85	2.60	2.90
8	110.67	86.00	79.80	32.43	21.83	25.19	16.21	13.63	8.77	3.83	2.71	2.39
9	126.87	242.91	126.93	31.04	21.16	26.93	16.60	13.04	8.59	3.40	4.02	2.33
10	48.05	201.49	112.40	27.47	20.95	26.55	15.91	13.66	8.58	3.20	3.92	2.28
11	101.07	134.92	92.69	27.92	20.90	23.02	15.81	12.92	8.53	3.20	3.92	2.19
12	121.85	176.44	99.15	24.40	20.40	22.65	15.63	12.80	8.38	3.25	4.18	2.17
13	34.63	72.40	46.04	26.72	20.90	21.92	13.28	13.28	8.23	3.22	5.15	18.65
14	67.21	48.43	18.28	24.12	20.95	21.28	13.46	12.18	8.02	19.60	3.86	25.20
15	121.27	51.80	31.92	24.59	20.95	21.07	13.44	11.52	7.69	7.08	3.53	118.30
16	136.13	37.41	66.47	84.28	20.80	20.75	13.30	11.96	7.39	3.11	1.83	132.90
17	132.53	35.88	101.56	111.89	21.00	20.33	13.11	11.36	7.48	6.31	3.83	9.67
18	79.33	16.84	107.08	91.04	21.31	20.16	11.49	11.28	7.45	3.80	3.85	5.67
19	60.27	31.87	126.86	77.00	21.25	20.05	14.60	10.88	6.92	3.48	3.23	3.70
20	93.09	32.85	140.68	74.30	20.80	19.30	14.39	11.52	6.76	3.43	3.13	3.80
21	70.40	37.15	122.77	32.14	20.80	14.25	14.32	12.32	6.63	3.37	2.93	4.52
22	74.79	29.87	94.15	37.08	20.60	18.98	14.32	12.72	6.44	3.20	2.84	17.13
23	115.08	22.20	67.69	29.80	20.20	18.88	14.12	12.76	6.23	3.05	2.82	32.50
24	77.20	24.35	61.74	25.58	20.80	18.30	14.18	12.94	6.36	2.81	2.58	60.35
25	44.05	24.15	61.74	24.64	20.80	17.87	14.27	11.32	6.17	2.81	2.46	77.33
26	64.49	30.75	36.33	23.95	20.80	17.28	14.23	10.81	6.04	2.70	2.32	64.90
27	44.40	24.12	50.43	23.44	20.80	16.91	13.99	10.50	5.93	2.69	2.28	74.18
28	70.94	47.05	122.15	25.32	20.70	17.17	14.03	10.13	5.72	2.68	2.23	18.31
29	160.00	78.43	23.44	23.44	60.73	17.33	14.18	10.00	5.51	2.67	2.18	16.41
30	190.08	62.66	23.44	23.44	60.73	17.64	14.23	9.80	5.24	2.59	2.16	104.60
31	42.46	33.04	-----	-----	60.73	-----	-----	9.83	-----	2.37	-----	36.60
SUM	2572.90	2096.41	2503.63	1106.60	775.48	668.79	659.37	374.80	230.22	124.59	56.74	833.38
MEAN	83.00	74.87	80.76	36.89	25.02	32.29	15.32	12.08	7.67	4.18	3.23	26.88

NOTE

Period	Source
Jul 1972 ~ Sep 1974	Calculated by SNMH
Oct 1974 ~ Sep 1976	Calculated by ENDE (Received in 1980)
Jun 1977 ~ Mar 1981	Calculated by ENDE (Received in 1981)

Table A-I-1-(3) Run-off Data at Chillcara Gauging Station (Original Data)

Year, 1974												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	66.43	707.48	77.48	25.75	20.15	19.90	19.00	19.00	6.07	5.74	3.52	-----
2	11.27	701.58	40.94	17.94	21.98	19.80	19.00	13.00	5.53	5.56	3.86	-----
3	66.23	701.04	710.70	39.44	22.60	20.20	19.00	13.00	5.53	5.34	3.63	-----
4	76.87	198.00	709.00	39.88	22.60	20.20	19.00	13.00	5.17	5.11	3.86	-----
5	76.80	197.00	198.70	61.70	22.60	20.20	19.00	12.00	6.03	6.09	3.75	-----
6	31.79	194.00	114.10	113.63	21.60	20.20	17.75	11.00	6.40	6.89	3.41	-----
7	26.70	194.00	106.73	112.54	21.60	19.76	17.75	10.92	6.40	6.83	3.18	-----
8	26.67	206.07	117.04	126.75	21.54	19.32	18.00	11.00	6.08	6.43	3.41	-----
9	66.71	261.11	107.22	117.77	21.80	18.88	18.00	11.00	3.80	6.43	3.74	-----
10	156.06	290.75	93.76	111.77	21.40	18.44	17.75	11.29	6.08	6.43	13.83	7.83
11	67.67	298.18	107.17	94.00	21.00	18.00	17.00	11.38	3.56	6.43	11.21	12.69
12	62.00	610.70	112.97	74.93	20.50	18.66	17.00	11.42	3.20	6.20	7.74	61.02
13	56.87	647.70	90.73	62.20	20.80	18.66	17.00	11.00	3.20	6.43	6.57	90.80
14	59.00	614.00	109.11	91.46	21.27	19.00	17.00	10.90	3.20	6.43	3.35	29.62
15	116.34	605.67	66.73	66.10	21.40	19.80	16.33	10.56	3.20	6.20	3.01	35.68
16	152.97	561.64	56.73	67.20	21.40	19.00	16.00	10.04	3.20	3.98	6.66	106.18
17	151.30	410.44	56.60	38.40	21.40	19.00	16.00	9.54	2.88	3.75	6.09	96.41
18	149.94	410.44	71.74	35.46	21.40	18.75	13.39	2.17	2.80	3.75	3.86	90.66
19	167.93	410.44	94.79	36.00	22.00	18.00	15.66	9.58	2.73	3.52	3.63	103.68
20	22.90	257.76	63.89	10.27	21.40	18.00	16.00	9.58	2.50	3.29	3.63	95.17
21	19.73	250.75	43.92	30.40	21.40	18.00	15.50	9.00	2.00	3.20	3.20	-----
22	17.79	273.44	18.89	26.80	21.40	18.00	15.00	19.05	1.87	3.06	3.29	-----
23	151.66	196.00	46.91	26.00	21.40	18.00	15.00	18.88	6.83	3.06	6.89	-----
24	253.53	149.80	40.89	24.40	21.40	17.75	14.50	17.72	1.80	2.83	3.29	31.05
25	278.87	137.80	15.00	24.40	21.06	18.00	14.00	16.17	1.40	2.60	6.09	27.63
26	270.75	116.40	13.00	23.43	20.20	17.75	14.00	12.83	1.20	2.83	6.00	23.58
27	226.18	92.50	11.00	23.50	20.50	17.43	14.00	10.79	1.20	2.60	20.15	19.71
28	222.50	81.60	7.70	22.80	20.20	18.00	14.00	9.17	1.10	2.83	18.99	18.66
29	218.81	75.40	7.70	21.40	20.20	17.00	14.00	7.93	0.95	2.83	17.77	19.30
30	214.67	74.00	22.00	20.20	20.20	17.00	13.75	7.40	0.80	3.06	16.63	130.18
31	270.14	73.00	-----	20.80	-----	-----	13.00	6.77	-----	3.29	-----	16.94
SUM	1572.34	9018.44	2645.06	1510.71	660.76	560.60	496.49	168.03	91.74	121.33	152.12	1016.95
MEAN	114.50	286.41	196.20	51.02	21.30	18.69	16.08	11.87	3.11	3.91	6.41	53.52

Table A-I-1-(4) Run-off Data at Chillcara Gauging Station (Original Data)

Year, 1975												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	63.45	577.89	-----	-----	-----	21.40	19.73	16.54	17.38	10.77	10.67	6.32
2	32.07	484.17	-----	-----	-----	21.27	19.77	16.79	17.74	10.56	10.00	6.47
3	33.95	590.17	-----	-----	-----	20.47	18.00	17.16	16.56	10.24	6.67	6.37
4	11.69	677.71	-----	-----	-----	20.94	17.04	15.96	15.40	9.83	6.43	6.37
5	12.17	599.61	-----	-----	-----	20.74	18.75	15.63	15.67	9.67	6.71	20.46
6	23.06	568.21	-----	-----	-----	20.44	17.75	15.49	13.58	9.44	6.51	20.31
7	12.42	409.06	-----	-----	-----	20.41	17.94	15.56	13.67	9.47	6.67	21.10
8	9.63	376.69	-----	-----	-----	20.75	17.74	15.63	13.06	9.08	6.76	25.17
9	7.79	227.74	-----	-----	-----	20.41	17.74	15.48	12.84	9.53	6.18	13.99
10	6.73	158.15	-----	-----	-----	20.47	17.71	15.87	12.72	9.07	6.67	21.10
11	95.17	130.14	-----	-----	-----	20.14	17.41	15.40	11.44	8.77	6.77	56.17
12	111.99	152.73	-----	-----	-----	20.70	17.73	15.49	11.77	8.77	6.66	71.10
13	101.04	370.74	-----	-----	-----	20.13	17.43	15.40	11.45	8.64	6.71	92.51
14	116.63	196.44	-----	-----	-----	20.19	17.43	15.76	11.63	8.78	6.07	81.64
15	166.04	145.50	-----	-----	-----	19.40	17.48	15.36	11.74	8.16	7.74	51.10
16	217.09	175.76	-----	-----	-----	19.75	17.43	15.22	11.77	8.07	7.44	49.82
17	450.26	357.91	-----	-----	-----	19.91	16.91	15.27	11.55	8.07	7.50	69.66
18	578.99	296.41	-----	-----	-----	19.44	17.04	15.33	11.47	7.98	7.97	47.33
19	355.89	251.16	-----	-----	-----	19.46	17.03	15.49	11.46	7.70	7.37	47.03
20	149.20	220.97	-----	-----	-----	19.49	16.44	15.12	11.41	7.94	7.44	66.42
21	126.27	205.93	-----	-----	-----	19.09	16.73	15.09	11.36	11.40	13.46	24.46
22	252.21	1172.41	-----	-----	-----	19.09	16.48	14.72	11.03	10.31	17.08	24.09
23	115.66	845.75	-----	-----	-----	18.67	16.54	14.65	11.28	11.41	16.63	27.22
24	415.35	673.19	-----	-----	-----	19.08	16.93	14.14	10.71	14.06	20.02	61.19
25	-----	528.80	-----	-----	-----	19.09	16.64	14.14	10.77	12.04	12.48	92.74
26	975.66	569.79	-----	-----	-----	19.09	16.93	14.19	14.76	11.45	12.77	37.72
27	827.66	463.91	-----	-----	-----	18.99	16.53	14.01	14.83	11.40	12.40	27.44
28	504.83	510.91	-----	-----	-----	18.88	16.48	13.97	13.56	11.03	9.70	23.18
29	396.04	-----	-----	-----	-----	-----	16.74	13.93	11.62	10.77	6.89	23.12
30	205.96	-----	-----	-----	-----	-----	16.73	13.62	10.83	10.77	6.76	26.41
31	342.19	-----	-----	-----	-----	-----	-----	11.75	-----	-----	-----	-----
SUM	6737.93	11531.80	-----	-----	-----	455.17	471.34	463.39	372.61	295.17	107.10	1046.29
MEAN	217.38	372.03	-----	-----	-----	14.68	14.72	14.95	11.99	9.52	10.23	33.75

NOTE

Period	Source
Jul. 1972 ~ Sep 1974	Calculated by SNMH
Oct 1974 ~ Sep 1976	Calculated by ENDE (Received in 1980)
Jun 1977 ~ Mar 1981	Calculated by ENDE (Received in 1981)

Table A-I-1-(5) Run-off Data at Chillcara Gauging Station (Original Data)

Year, 1975												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	20.00	91.65	24.42	26.35	24.57	14.46	14.44	11.44	10.00	-----	-----	-----
2	32.84	91.70	47.03	27.51	24.64	10.15	14.63	11.44	9.97	-----	-----	-----
3	14.04	97.67	60.52	29.31	24.64	10.20	14.17	11.40	10.11	-----	-----	-----
4	10.40	80.49	16.44	12.22	23.93	14.41	14.90	11.40	10.07	-----	-----	-----
5	100.92	57.77	42.07	24.57	23.93	14.56	14.76	11.40	10.11	-----	-----	-----
6	269.02	51.53	140.58	19.67	23.76	14.51	-----	11.04	10.24	-----	-----	-----
7	121.42	44.14	373.35	17.64	23.49	17.85	-----	11.09	10.24	-----	-----	-----
8	24.55	16.44	419.02	33.22	23.91	17.64	-----	11.12	9.97	-----	-----	-----
9	85.69	32.29	481.01	31.52	23.37	17.43	-----	11.24	9.90	-----	-----	-----
10	54.29	51.86	171.46	20.42	23.24	17.50	-----	11.17	10.11	-----	-----	-----
11	111.26	114.14	70.20	27.93	22.17	17.47	14.40	10.99	10.14	-----	-----	-----
12	100.97	461.01	44.44	21.48	22.20	17.53	14.54	11.14	10.07	-----	-----	-----
13	213.40	432.93	15.11	27.50	22.15	17.23	14.50	11.04	10.14	-----	-----	-----
14	40.26	174.65	10.91	31.48	21.92	17.13	14.43	10.48	10.71	-----	-----	-----
15	145.19	111.89	10.14	23.41	21.50	14.48	14.34	10.70	10.14	-----	-----	-----
16	92.25	111.44	52.44	21.90	21.92	14.54	14.67	10.47	9.97	-----	-----	-----
17	174.54	112.25	14.48	24.44	21.39	14.43	-----	10.43	9.94	-----	-----	-----
18	124.21	113.44	14.44	27.09	21.39	14.54	-----	10.43	10.00	-----	-----	-----
19	115.97	47.31	14.99	24.44	21.10	14.44	-----	10.45	10.52	-----	-----	-----
20	114.47	59.94	14.45	24.45	21.54	14.74	-----	10.33	10.47	-----	-----	-----
21	44.00	48.43	14.01	24.41	20.47	14.34	-----	10.24	10.04	-----	-----	-----
22	143.02	47.44	14.48	24.44	20.53	14.54	-----	10.12	9.73	-----	-----	-----
23	212.45	48.12	14.82	27.03	19.44	24.43	12.46	10.31	9.77	-----	-----	-----
24	44.44	46.47	14.22	24.15	19.46	17.44	14.44	10.42	9.67	-----	-----	-----
24	144.90	43.57	14.17	24.41	19.44	17.04	13.08	10.45	9.63	-----	-----	-----
26	154.24	10.44	27.23	24.20	19.25	14.54	12.44	10.31	9.72	-----	-----	-----
27	124.41	27.27	27.20	24.74	14.25	14.20	12.42	10.30	9.77	-----	-----	-----
28	114.45	27.23	27.09	24.34	14.15	14.27	12.40	10.00	10.07	-----	-----	-----
29	104.44	-----	10.44	24.37	14.44	14.27	12.14	9.97	-----	-----	-----	-----
30	104.45	-----	10.07	23.41	14.44	14.54	12.16	10.11	-----	-----	-----	-----
31	97.24	-----	10.74	-----	14.44	-----	11.44	-----	-----	-----	-----	-----
SUM	1444.45	2744.32	2414.14	432.54	474.24	424.46	287.52	374.44	240.00	-----	-----	-----
WPM	114.12	94.43	14.04	27.23	21.72	17.53	14.44	10.24	10.23	-----	-----	-----

Table A-I-1-(6) Run-off Data at Chillcara Gauging Station (Original Data)

Year, 1977												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	-----	-----	-----	-----	-----	17.63	14.20	12.14	9.41	4.40	4.20	4.15
2	-----	-----	-----	-----	-----	14.74	14.32	12.14	9.41	4.44	4.10	14.41
3	-----	-----	-----	-----	-----	17.63	14.11	12.42	9.74	4.34	4.20	4.57
4	-----	-----	-----	-----	-----	17.63	14.47	12.42	9.34	4.24	4.21	4.00
5	-----	-----	-----	-----	-----	17.63	14.47	12.24	9.02	4.04	4.11	7.35
6	-----	-----	-----	-----	-----	17.63	14.24	11.91	9.34	4.42	4.04	4.17
7	-----	-----	-----	-----	-----	17.63	14.04	11.91	9.44	4.42	13.50	19.34
8	-----	-----	-----	-----	-----	17.63	14.40	12.11	9.91	4.43	19.11	19.34
9	-----	-----	-----	-----	-----	17.63	14.44	12.11	9.44	4.37	21.40	13.34
10	-----	-----	-----	-----	-----	17.63	14.44	11.74	8.49	4.24	11.53	4.24
11	-----	-----	-----	-----	-----	17.63	14.44	11.74	8.49	13.50	4.15	7.04
12	-----	-----	-----	-----	-----	14.44	14.24	11.42	9.24	4.24	4.42	4.47
13	-----	-----	-----	-----	-----	17.63	14.40	10.44	8.03	4.24	4.44	24.44
14	-----	-----	-----	-----	-----	17.63	13.12	10.40	7.97	4.44	23.02	27.44
15	-----	-----	-----	-----	-----	17.63	14.44	10.44	7.59	4.47	140.20	40.44
16	-----	-----	-----	-----	-----	17.63	13.44	10.44	7.49	4.44	113.44	144.01
17	-----	-----	-----	-----	-----	17.63	13.44	11.22	7.33	4.11	100.13	145.10
18	-----	-----	-----	-----	-----	17.63	13.44	10.44	6.90	12.10	237.44	42.23
19	-----	-----	-----	-----	-----	17.63	13.44	10.40	6.40	11.40	43.70	34.44
20	-----	-----	-----	-----	-----	17.63	13.44	10.35	6.40	4.71	35.54	24.12
21	-----	-----	-----	-----	-----	14.44	13.44	10.35	6.44	4.44	24.25	45.50
22	-----	-----	-----	-----	-----	14.44	13.44	10.35	6.44	40.31	11.42	104.39
23	-----	-----	-----	-----	-----	14.44	13.44	10.40	7.23	35.25	36.40	144.20
24	-----	-----	-----	-----	-----	14.44	13.14	10.35	6.40	22.04	24.40	334.47
25	-----	-----	-----	-----	-----	14.44	13.44	9.41	6.27	21.54	20.44	140.00
26	-----	-----	-----	-----	-----	14.11	13.33	9.41	6.14	14.44	19.24	124.09
27	-----	-----	-----	-----	-----	14.30	13.33	10.04	5.94	17.44	13.45	120.03
28	-----	-----	-----	-----	-----	14.30	13.33	9.41	5.80	11.44	11.41	83.33
29	-----	-----	-----	-----	-----	14.30	13.14	10.04	5.44	9.15	10.24	52.40
30	-----	-----	-----	-----	-----	14.30	12.44	9.41	5.41	7.30	9.15	44.18
31	-----	-----	-----	-----	-----	-----	12.44	9.44	-----	6.47	-----	204.40
SUM	-----	-----	-----	-----	-----	514.45	434.44	341.22	233.33	147.99	224.54	3412.37
WPM	-----	-----	-----	-----	-----	17.20	14.14	11.09	7.74	12.52	14.45	122.44

NOTE

Period	Source
Jul. 1972 ~ Sep 1974	Calculated by SNMH
Oct 1974 ~ Sep 1976	Calculated by ENDE (Received in 1981)
Jun 1977 ~ Mar 1981	Calculated by ENDE (Received in 1981)

Table A-I-1-(7) Run-off Data at Chillcara Gauging Station (Original Data)
Year, 1978

DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	455.51	347.41	41.40	40.07	74.49	71.05	14.90	14.39	11.37	6.41	14.75	5.03
2	793.50	291.21	44.43	56.78	74.49	71.00	18.15	14.39	10.44	6.41	14.75	95.47
3	190.41	647.09	45.01	44.00	14.40	71.70	18.15	15.19	10.44	6.44	21.10	173.22
4	250.43	774.41	39.44	40.04	73.95	21.40	14.15	14.75	10.44	6.44	34.74	241.11
5	649.14	647.47	37.47	14.27	14.95	75.44	14.15	14.75	10.44	6.24	44.73	103.47
6	454.64	1447.24	44.40	74.94	73.95	70.44	14.15	14.75	10.44	12.47	14.37	37.74
7	141.74	2144.47	74.17	14.27	73.94	70.44	14.15	14.75	10.40	10.44	11.37	29.15
8	170.74	1405.74	49.00	44.44	74.04	70.44	14.15	14.77	10.40	13.14	11.02	23.74
9	140.24	406.74	44.41	44.44	44.44	70.44	14.14	14.14	10.40	4.47	14.24	14.14
10	244.47	321.44	72.13	14.47	71.04	14.91	17.44	17.44	10.40	8.44	10.07	14.74
11	144.24	231.44	44.44	14.34	71.04	70.44	17.42	13.44	4.44	7.41	9.40	27.44
12	344.44	154.44	44.44	31.44	74.04	70.77	17.47	13.14	4.44	7.34	4.34	14.44
13	244.24	141.74	44.01	33.44	72.14	70.44	17.47	17.47	4.44	7.40	4.44	14.44
14	142.74	101.44	42.44	31.44	72.14	14.91	14.74	17.47	17.47	4.44	4.44	14.44
15	41.44	41.41	74.44	35.14	72.14	14.44	14.74	17.47	17.47	4.04	4.44	14.44
16	43.44	71.20	34.34	32.33	27.14	14.44	14.74	17.47	17.47	4.04	4.17	4.17
17	44.44	71.20	41.41	32.33	27.14	14.44	14.74	17.47	17.47	4.04	4.17	4.17
18	14.44	44.44	14.44	33.17	27.14	14.44	14.74	17.47	17.47	4.44	4.44	10.71
19	14.44	44.44	14.44	33.17	27.14	14.44	14.74	17.47	17.47	4.44	4.44	10.71
20	71.17	73.44	110.44	33.44	27.42	14.44	14.74	17.47	17.47	4.44	4.44	143.05
21	74.44	101.44	144.41	37.33	37.42	14.13	14.44	12.42	4.37	4.30	4.44	244.22
22	112.14	101.02	470.41	24.44	22.47	14.44	14.44	17.47	4.24	4.30	4.44	244.04
23	104.44	104.10	143.41	24.44	21.44	14.44	14.44	12.42	4.24	4.44	24.24	141.41
24	124.14	331.47	41.44	27.47	21.44	14.44	14.44	11.44	7.47	4.44	173.44	124.44
25	47.44	211.44	44.44	24.14	21.04	14.44	14.44	11.44	7.47	4.44	40.44	124.71
26	44.17	153.11	41.44	27.47	21.30	14.44	14.44	11.44	7.40	4.30	24.44	141.74
27	12.44	71.40	44.74	24.44	21.30	14.44	14.44	17.47	7.40	10.44	12.12	141.44
28	74.44	44.22	44.44	24.44	21.30	14.44	14.44	17.47	7.40	7.41	9.40	134.44
29	44.44	117.22	24.14	21.30	21.30	14.44	14.44	17.47	7.15	4.44	7.44	12.44
30	44.44	104.44	104.44	24.14	21.30	14.44	14.44	17.47	7.44	4.44	4.44	44.44
31	44.44	74.44	74.44	24.44	24.44	14.44	14.44	17.47	7.44	4.44	4.44	44.44
SUM	4070.14	10347.44	2400.44	1042.72	4444.44	470.44	412.44	216.44	244.44	444.44	444.44	444.44
MEAN	144.44	332.44	74.44	34.44	74.44	14.44	14.44	14.44	7.44	7.44	14.44	14.44

Table A-I-1-(8) Run-off Data at Chillcara Gauging Station (Original Data)
Year, 1979

DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	144.44	174.77	134.40	44.33	14.73	74.44	74.44	27.47	14.44	10.44	7.44	4.44
2	70.74	172.44	171.07	74.47	14.03	24.34	74.44	27.47	14.44	10.44	7.44	4.44
3	41.44	44.27	111.14	44.44	14.04	24.34	74.44	27.47	14.44	10.44	7.44	4.44
4	41.44	244.09	47.47	34.24	71.04	74.34	74.44	27.47	14.44	10.44	7.44	4.44
5	41.44	147.47	41.44	42.47	71.04	74.34	74.44	27.47	14.44	10.44	7.44	4.44
6	40.41	104.44	124.04	40.07	13.04	74.44	74.44	27.47	14.44	10.44	7.44	4.44
7	474.57	247.44	244.47	44.44	44.44	74.44	74.44	27.47	14.44	10.44	7.44	4.44
8	744.44	211.14	247.44	44.44	44.44	74.44	74.44	27.47	14.44	10.44	7.44	4.44
9	147.44	171.44	102.44	40.24	17.04	74.44	74.44	27.47	14.44	10.44	7.44	4.44
10	174.47	140.41	47.44	41.14	17.04	74.44	74.44	27.47	14.44	10.44	7.44	4.44
11	370.21	131.77	44.44	47.24	17.24	74.44	74.44	27.47	14.44	10.44	7.44	4.44
12	44.14	144.17	114.34	44.44	17.24	74.44	74.44	27.47	14.44	10.44	7.44	4.44
13	407.31	237.77	114.34	44.44	17.24	74.44	74.44	27.47	14.44	10.44	7.44	4.44
14	404.44	247.44	137.40	44.44	17.24	74.44	74.44	27.47	14.44	10.44	7.44	4.44
15	317.44	177.34	204.44	40.40	11.15	71.40	74.44	14.34	13.44	4.44	4.17	24.44
16	334.44	174.44	140.41	40.40	11.15	27.40	74.44	14.34	11.01	4.44	24.44	44.44
17	204.44	114.71	147.41	40.74	11.15	27.40	74.44	14.34	11.01	4.44	24.44	44.44
18	147.47	94.09	142.34	34.74	11.15	27.40	74.44	14.34	11.01	4.44	24.44	44.44
19	132.04	74.35	114.47	34.94	17.24	27.40	74.44	14.34	11.01	4.44	24.44	44.44
20	141.44	71.34	74.41	14.14	17.24	27.40	74.44	14.34	11.01	4.44	24.44	44.44
21	373.00	74.71	104.44	37.44	10.73	27.40	74.44	14.34	11.01	4.44	24.44	44.44
22	441.44	47.01	90.01	41.70	10.73	27.40	74.44	14.34	11.01	4.44	24.44	44.44
23	527.02	44.24	127.44	40.40	10.73	24.77	74.44	14.34	11.01	4.44	24.44	44.44
24	154.03	40.14	44.24	34.24	10.73	24.77	74.44	14.34	11.01	4.44	24.44	44.44
25	1041.15	44.74	14.24	34.24	24.44	24.77	74.44	14.34	11.01	4.44	24.44	44.44
26	1040.42	41.33	42.44	17.11	24.34	24.77	74.44	14.34	11.01	4.44	24.44	44.44
27	1244.44	40.24	243.44	14.04	24.34	24.77	74.44	14.34	11.01	4.44	24.44	44.44
28	1411.33	174.44	227.17	14.04	24.34	24.77	74.44	14.34	11.01	4.44	24.44	44.44
29	1414.41	174.44	244.40	15.03	24.34	24.77	74.44	14.34	11.01	4.44	24.44	44.44
30	1447.47	201.44	14.03	24.44	24.44	24.77	74.44	14.34	11.01	4.44	24.44	44.44
31	1444.41	114.77	24.44	24.44	24.44	24.77	74.44	14.34	11.01	4.44	24.44	44.44
SUM	14400.71	4141.44	4344.44	1404.40	444.44	437.74	744.44	444.44	402.44	247.44	414.07	2474.40
MEAN	441.44	247.27	144.24	44.44	11.27	24.74	74.44	14.34	13.47	4.17	14.44	41.12

NOTE

Period	Source
Jul 1972 ~ Sep 1974	Calculated by SNMH
Oct 1974 ~ Sep 1976	Calculated by ENDE (Received in 1980)
Jun 1977 ~ Mar 1981	Calculated by ENDE (Received in 1981)

Table A-I-1-(9) Run-off Data at Chillcara Gauging Station (Original Data)

Year : 1980

DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	433.91	35.54	74.21	88.47	16.79	16.39	16.79	11.51	9.51	5.59	17.47	5.84
2	206.91	29.56	74.43	50.47	16.79	16.39	16.79	11.51	9.51	8.89	15.31	5.64
3	118.41	72.54	35.84	32.19	16.79	16.39	16.79	11.51	9.17	5.64	14.12	4.73
4	484.67	29.63	39.38	28.41	15.31	16.39	16.79	11.51	9.17	5.09	17.29	76.51
5	53.74	31.73	119.41	74.94	15.31	16.39	16.79	11.09	9.17	4.66	11.94	13.74
6	62.39	22.74	39.70	23.44	15.31	16.39	16.79	11.09	9.17	4.27	13.14	5.44
7	37.05	19.94	71.44	26.37	15.31	16.39	16.79	11.09	9.41	5.08	9.74	4.91
8	33.25	15.00	87.74	26.94	15.31	16.39	16.79	11.51	8.41	4.91	7.85	17.79
9	27.74	13.65	245.07	31.34	15.31	16.39	16.79	11.51	4.67	6.71	7.13	9.34
10	40.31	17.40	179.44	19.44	15.31	16.39	15.74	11.51	4.67	6.67	6.46	70.45
11	36.44	12.90	175.01	14.44	15.31	15.44	15.74	11.51	4.47	4.73	4.24	17.07
12	14.29	16.44	112.45	14.13	15.31	16.39	15.74	11.09	4.14	4.40	6.04	25.90
13	36.73	13.05	98.45	17.16	15.31	16.39	15.74	11.09	4.14	4.74	5.44	11.94
14	34.65	17.49	134.45	16.54	15.31	15.44	15.39	11.09	7.47	4.09	5.44	13.00
15	31.44	11.44	107.37	16.39	15.44	15.44	15.74	11.09	7.47	4.09	5.44	4.10
16	31.10	38.91	66.45	15.44	15.44	15.44	15.74	12.38	7.51	4.91	4.91	5.44
17	24.44	37.44	54.46	14.39	16.10	15.44	15.74	11.94	7.51	4.24	5.08	4.90
18	41.74	37.37	66.59	16.94	16.39	15.44	15.39	12.94	7.21	4.91	7.60	3.39
19	62.47	33.24	47.36	16.39	16.39	15.44	15.39	11.51	7.21	4.40	4.49	55.71
20	110.47	30.91	42.26	15.44	16.39	15.44	12.41	11.09	6.90	9.74	11.94	6.49
21	141.49	97.44	64.49	15.44	16.39	15.44	17.43	10.44	6.90	5.24	10.09	4.47
22	64.44	48.47	52.05	15.44	16.39	15.44	17.34	10.44	6.43	4.64	4.47	3.74
23	31.00	47.44	45.43	15.44	15.44	15.44	17.34	10.44	6.63	4.16	11.94	7.31
24	49.43	42.40	63.28	15.31	15.44	15.31	11.94	10.79	6.57	11.28	8.34	7.75
25	42.49	44.27	45.70	15.31	15.44	15.31	11.94	10.79	6.17	8.49	7.34	4.67
26	34.74	47.40	51.93	15.31	15.44	15.31	11.51	9.90	6.09	6.90	6.24	5.44
27	29.44	31.14	77.14	15.31	16.39	15.31	11.51	9.90	6.09	10.44	5.44	4.44
28	32.44	41.43	40.28	15.31	16.39	15.31	11.51	9.90	5.49	12.44	5.29	4.40
29	47.47	31.10	44.35	15.31	16.10	15.15	11.51	9.90	5.49	11.11	47.57	7.44
30	40.49	40.03	40.03	15.31	16.39	15.44	11.51	9.51	4.58	21.37	6.90	6.40
31	44.44	41.14	41.14	16.39	16.39	15.31	11.51	9.51	4.58	16.00	6.40	4.40
SUM	1141.44	1340.41	2401.34	464.49	444.11	474.31	494.37	334.07	274.37	274.70	100.45	317.51
MEAN	49.74	53.44	77.44	22.16	18.75	19.74	17.29	14.44	7.45	8.44	10.03	10.40

Table A-I-1-(10) Run-off Data at Chillcara Gauging Station (Original Data)

Year : 1981

DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	4.04	53.51	110.49	-----	-----	-----	-----	-----	-----	-----	-----	-----
2	4.14	44.01	73.74	-----	-----	-----	-----	-----	-----	-----	-----	-----
3	4.64	494.43	634.49	-----	-----	-----	-----	-----	-----	-----	-----	-----
4	4.74	304.40	944.45	-----	-----	-----	-----	-----	-----	-----	-----	-----
5	40.34	374.42	390.44	-----	-----	-----	-----	-----	-----	-----	-----	-----
6	74.74	331.42	720.14	-----	-----	-----	-----	-----	-----	-----	-----	-----
7	31.11	300.44	152.79	-----	-----	-----	-----	-----	-----	-----	-----	-----
8	27.74	200.46	74.44	-----	-----	-----	-----	-----	-----	-----	-----	-----
9	437.40	211.47	201.24	-----	-----	-----	-----	-----	-----	-----	-----	-----
10	441.04	774.49	144.40	-----	-----	-----	-----	-----	-----	-----	-----	-----
11	374.44	744.55	734.01	-----	-----	-----	-----	-----	-----	-----	-----	-----
12	144.43	147.44	40.24	-----	-----	-----	-----	-----	-----	-----	-----	-----
13	44.01	150.34	44.42	-----	-----	-----	-----	-----	-----	-----	-----	-----
14	44.01	144.14	41.38	-----	-----	-----	-----	-----	-----	-----	-----	-----
15	44.74	44.70	41.14	-----	-----	-----	-----	-----	-----	-----	-----	-----
16	144.41	44.44	40.24	-----	-----	-----	-----	-----	-----	-----	-----	-----
17	42.49	74.43	41.44	-----	-----	-----	-----	-----	-----	-----	-----	-----
18	34.44	74.47	42.44	-----	-----	-----	-----	-----	-----	-----	-----	-----
19	34.24	41.05	41.04	-----	-----	-----	-----	-----	-----	-----	-----	-----
20	27.49	51.45	47.44	-----	-----	-----	-----	-----	-----	-----	-----	-----
21	44.55	53.79	140.45	-----	-----	-----	-----	-----	-----	-----	-----	-----
22	70.27	31.24	87.45	-----	-----	-----	-----	-----	-----	-----	-----	-----
23	37.12	35.42	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
24	41.44	40.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
25	47.49	40.00	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
26	132.40	44.41	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
27	240.04	214.77	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
28	44.42	211.44	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
29	70.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
30	44.70	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
31	47.54	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SUM	1144.44	1434.01	5114.00	-----	-----	-----	-----	-----	-----	-----	-----	-----
MEAN	103.02	712.07	232.55	-----	-----	-----	-----	-----	-----	-----	-----	-----

NOTE

Period	Source
Jul 1972 ~ Sep 1974	Calculated by SNMH
Oct 1974 ~ Sep 1976	Calculated by ENDE (Received in 1980)
Jun 1977 ~ Mar 1981	Calculated by ENDE (Received in 1981)

Table A-I-2-(1) Water Level Data at Chillcara Gauging Station (Year 1972)

(Unit : m)

DATE	Jan	Feb	Mar	Apr.	May.	Jun	Jul	Aug	Sep	Oct	Nov.	Dec
1	--	--	--	--	--	--	--	1.69	1.61	1.46	1.80	1.86
2	--	--	--	--	--	--	--	1.69	1.61	1.45	1.80	1.83
3	--	--	--	--	--	--	--	1.68	1.61	1.44	2.08	1.58
4	--	--	--	--	--	--	--	1.68	1.61	1.45	1.86	1.55
5	--	--	--	--	--	--	--	1.68	1.61	1.42	1.83	1.85
6	--	--	--	--	--	--	--	1.68	1.61	1.42	1.87	1.92
7	--	--	--	--	--	--	--	1.70	1.61	1.41	2.52	1.70
8	--	--	--	--	--	--	--	1.70	1.61	1.41	2.40	1.67
9	--	--	--	--	--	--	--	1.70	1.61	1.40	1.95	1.68
10	--	--	--	--	--	--	--	1.67	1.61	1.37	1.79	1.73
11	--	--	--	--	--	--	--	1.62	1.60	1.38	1.72	1.83
12	--	--	--	--	--	--	--	1.68	1.60	1.38	1.65	1.98
13	--	--	--	--	--	--	--	1.68	1.60	1.38	1.65	2.16
14	--	--	--	--	--	--	--	1.67	1.57	1.37	1.63	2.46
15	--	--	--	--	--	--	--	1.67	1.59	1.37	1.60	2.44
16	--	--	--	--	--	--	--	1.67	1.58	1.35	2.02	2.82
17	--	--	--	--	--	--	--	1.66	1.58	1.38	1.89	2.65
18	--	--	--	--	--	--	--	1.66	1.57	1.37	1.84	2.47
19	--	--	--	--	--	--	--	1.66	1.55	1.36	1.62	2.38
20	--	--	--	--	--	--	--	1.66	1.55	1.35	1.58	2.04
21	--	--	--	--	--	--	1.69	1.65	1.54	1.35	1.54	2.22
22	--	--	--	--	--	--	1.69	1.64	1.53	1.47	1.52	2.03
23	--	--	--	--	--	--	1.70	1.65	1.52	1.62	1.50	1.97
24	--	--	--	--	--	--	1.70	1.65	1.52	1.84	1.55	1.91
25	--	--	--	--	--	--	1.70	1.65	1.52	2.15	1.78	1.91
26	--	--	--	--	--	--	1.70	1.65	1.50	2.14	1.61	1.82
27	--	--	--	--	--	--	1.70	1.62	1.57	2.05	1.59	1.82
28	--	--	--	--	--	--	1.70	1.62	1.57	2.11	1.53	1.92
29	--	--	--	--	--	--	1.70	1.61	1.49	1.40	1.49	1.68
30	--	--	--	--	--	--	1.70	1.61	1.47	1.37	1.82	1.75
31	--	--	--	--	--	--	1.70	1.61	1.47	2.06	1.71	1.71

Table A-I-2-(2) Water Level Data at Chillcara Gauging Station (Year 1973)

(Unit : m)

DATE	Jan	Feb	Mar.	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec.
1	1.67	2.12	2.09	2.00	1.88	2.93	1.87	1.81	1.73	1.59	1.47	1.42
2	1.72	2.08	2.25	1.97	1.87	2.82	1.86	1.81	1.72	1.56	1.57	1.42
3	1.83	2.42	2.46	1.92	1.86	2.48	1.86	1.81	1.73	1.57	1.47	1.49
4	1.71	2.22	1.97	1.93	1.85	2.17	1.86	1.81	1.73	1.56	1.47	1.46
5	2.18	2.62	2.07	1.99	1.85	2.06	1.86	1.81	1.72	1.55	1.43	1.44
6	2.07	2.75	2.21	2.08	1.85	2.03	1.86	1.80	1.71	1.55	1.46	1.44
7	2.71	2.50	2.37	2.10	1.86	2.00	1.85	1.81	1.70	1.53	1.47	1.46
8	2.68	2.49	2.43	2.00	1.86	1.99	1.85	1.80	1.70	1.53	1.47	1.45
9	2.78	2.25	2.79	1.98	1.85	1.99	1.85	1.79	1.69	1.51	1.58	1.44
10	2.52	2.30	2.68	1.95	1.84	1.96	1.85	1.78	1.69	1.50	1.54	1.45
11	2.59	2.82	2.53	1.92	1.86	1.95	1.85	1.78	1.69	1.50	1.53	1.43
12	2.75	2.32	2.46	1.90	1.84	1.95	1.84	1.79	1.68	1.50	1.52	1.42
13	2.01	2.37	2.13	1.94	1.84	1.93	1.84	1.79	1.69	1.50	1.55	1.43
14	2.31	2.25	2.06	1.89	1.85	1.93	1.86	1.78	1.68	1.57	1.56	1.43
15	2.92	2.22	1.99	1.89	1.85	1.93	1.84	1.76	1.67	1.45	1.52	2.50
16	2.83	2.05	2.20	2.40	1.85	1.92	1.83	1.76	1.66	1.56	1.52	2.47
17	2.93	2.02	2.57	2.67	1.85	1.92	1.83	1.76	1.66	1.54	1.52	1.76
18	2.42	2.04	2.68	2.52	1.85	1.91	1.83	1.76	1.67	1.53	1.52	1.71
19	2.29	1.99	2.75	2.41	1.85	1.91	1.83	1.75	1.65	1.51	1.50	1.67
20	2.46	2.07	2.81	2.39	1.84	1.90	1.83	1.76	1.64	1.51	1.49	1.68
21	2.30	2.04	2.76	1.96	1.84	1.89	1.82	1.78	1.63	1.51	1.48	1.49
22	2.42	2.07	2.55	1.93	1.84	1.89	1.82	1.79	1.63	1.50	1.47	1.91
23	2.70	1.93	2.40	1.93	1.84	1.89	1.81	1.79	1.62	1.49	1.46	1.94
24	2.41	1.90	2.34	1.91	1.84	1.88	1.82	1.78	1.63	1.47	1.46	2.10
25	2.25	1.89	2.15	1.90	1.84	1.88	1.82	1.77	1.63	1.47	1.45	2.28
26	2.30	1.98	2.11	1.84	1.84	1.87	1.81	1.75	1.62	1.47	1.44	2.11
27	2.13	1.89	2.24	1.88	1.86	1.86	1.81	1.74	1.61	1.47	1.44	2.09
28	2.36	2.09	2.79	1.90	1.84	1.87	1.81	1.73	1.59	1.46	1.42	1.86
29	2.91	2.46	1.88	2.05	1.87	1.81	1.81	1.73	1.61	1.46	1.42	1.79
30	3.06	2.15	1.88	2.32	1.87	1.82	1.73	1.59	1.46	1.42	2.42	2.42
31	2.51	2.68	2.68	2.66	1.81	1.81	1.72	1.67	1.67	1.67	2.01	2.01

Table A-I-2-(3) Water Level Data at Chillcara Gauging Station (Year 1974)

(Unit : m)

DATE	Jan	Feb	Mar.	Apl	May.	Jun	Jul	Aug	Sep	Oct.	Nov	Dec
1	2.13	2.98	2.28	1.86	1.87	1.86	1.84	1.79	1.72	1.59	1.49	1.42
2	2.21	2.96	2.22	1.95	1.86	1.86	1.85	1.79	1.71	1.58	1.50	1.42
3	2.34	2.94	2.08	2.01	1.87	1.87	1.84	1.79	1.71	1.57	1.50	1.42
4	1.97	2.93	2.18	2.01	1.87	1.86	1.84	1.79	1.70	1.56	1.50	1.42
5	1.86	2.92	2.86	2.16	1.87	1.86	1.84	1.78	1.70	1.55	1.50	1.41
6	1.91	2.91	2.67	2.64	1.88	1.86	1.84	1.77	1.70	1.54	1.49	1.41
7	1.96	2.91	2.63	2.39	1.87	1.86	1.84	1.77	1.69	1.53	1.48	1.42
8	1.86	2.93	2.74	2.31	1.87	1.86	1.84	1.77	1.69	1.53	1.48	1.42
9	2.53	3.25	2.64	2.64	1.87	1.86	1.84	1.77	1.68	1.53	1.51	1.41
10	2.72	3.36	2.56	2.37	1.87	1.86	1.84	1.77	1.69	1.53	1.52	1.41
11	2.63	3.23	2.66	2.31	1.87	1.85	1.84	1.77	1.68	1.53	1.54	1.46
12	2.79	3.63	2.68	2.34	1.86	1.85	1.84	1.77	1.67	1.53	1.67	2.00
13	2.42	4.12	2.34	2.29	1.87	1.85	1.83	1.77	1.68	1.53	1.61	2.32
14	2.41	4.75	2.46	2.28	1.87	1.85	1.83	1.77	1.67	1.53	1.58	1.98
15	2.71	4.74	2.19	2.25	1.87	1.86	1.83	1.77	1.67	1.52	1.58	2.04
16	2.23	4.56	2.14	2.20	1.87	1.85	1.82	1.76	1.67	1.51	1.55	2.52
17	2.10	4.29	2.14	2.26	1.87	1.85	1.82	1.76	1.66	1.50	1.52	2.52
18	2.10	3.97	2.25	2.14	1.87	1.85	1.81	1.75	1.66	1.50	1.50	2.35
19	1.97	3.43	2.30	2.13	1.87	1.85	1.82	1.76	1.67	1.47	1.50	2.10
20	1.92	3.24	2.18	1.73	1.87	1.85	1.82	1.76	1.69	1.49	1.47	2.67
21	1.84	3.31	2.07	1.93	1.87	1.84	1.81	1.75	1.63	1.48	1.48	2.57
22	1.78	3.32	2.01	1.92	1.87	1.84	1.81	1.84	1.65	1.48	1.48	2.50
23	2.61	2.86	2.06	1.91	1.87	1.86	1.80	1.95	1.63	1.47	1.54	2.08
24	3.17	2.68	2.03	1.90	1.87	1.84	1.80	1.84	1.62	1.46	1.47	1.97
25	3.16	2.61	1.98	1.89	1.86	1.84	1.80	1.80	1.61	1.46	1.51	1.95
26	3.10	2.47	1.97	1.88	1.86	1.84	1.80	1.79	1.61	1.46	1.60	1.91
27	3.08	2.35	1.95	1.85	1.87	1.84	1.80	1.77	1.60	1.45	1.47	1.84
28	3.06	2.29	1.92	1.88	1.87	1.84	1.80	1.75	1.60	1.44	1.51	1.85
29	3.04	2.22	1.91	1.87	1.86	1.84	1.81	1.74	1.59	1.44	1.44	1.84
30	3.02	2.15	1.89	1.88	1.87	1.84	1.80	1.73	1.59	1.48	1.40	1.85
31	3.05	2.08	1.89	1.87	1.87	1.84	1.79	1.72	1.58	1.48	1.40	2.44

Table A-I-2-(4) Water Level Data at Chillcara Gauging Station (Year 1975)

(Unit : m)

DATE	Jan	Feb	Mar	Apl.	May	Jun	Jul	Aug	Sep	Oct.	Nov	Dec.
1	2.07	4.01	--	--	--	1.87	1.84	1.80	1.73	1.66	1.66	1.53
2	2.00	3.90	--	--	--	1.87	1.84	1.79	1.72	1.66	1.64	1.52
3	1.98	4.15	--	--	--	1.88	1.83	1.79	1.76	1.65	1.63	1.51
4	1.86	4.30	--	--	--	1.87	1.82	1.79	1.74	1.64	1.63	1.51
5	1.72	4.21	--	--	--	1.88	1.85	1.78	1.73	1.63	1.62	1.87
6	2.00	4.13	--	--	--	1.87	1.85	1.78	1.73	1.62	1.62	1.87
7	1.80	3.92	--	--	--	1.88	1.85	1.78	1.72	1.62	1.62	1.90
8	1.72	3.50	--	--	--	1.85	1.82	1.78	1.72	1.62	1.62	1.92
9	1.87	3.09	--	--	--	1.87	1.85	1.78	1.71	1.61	1.61	1.82
10	2.06	2.78	--	--	--	1.87	1.82	1.78	1.70	1.63	1.60	1.87
11	2.50	2.65	--	--	--	1.87	1.81	1.78	1.69	1.61	1.60	2.28
12	2.54	2.72	--	--	--	1.87	1.82	1.78	1.69	1.60	1.59	2.28
13	2.57	2.92	--	--	--	1.87	1.85	1.77	1.69	1.60	1.59	2.27
14	2.57	2.91	--	--	--	1.87	1.83	1.77	1.67	1.60	1.58	2.26
15	2.77	2.90	--	--	--	1.86	1.82	1.78	1.69	1.57	1.57	2.25
16	2.92	2.84	--	--	--	1.86	1.82	1.77	1.69	1.56	1.54	2.24
17	2.77	2.55	--	--	--	1.86	1.80	1.77	1.68	1.58	1.54	2.23
18	4.07	2.54	--	--	--	1.86	1.81	1.77	1.68	1.58	1.56	2.22
19	2.55	2.77	--	--	--	1.86	1.81	1.77	1.68	1.57	1.55	2.22
20	2.74	3.05	--	--	--	1.85	1.83	1.77	1.68	1.56	1.56	2.21
21	2.64	2.97	--	--	--	1.85	1.80	1.77	1.68	1.56	1.69	2.06
22	3.14	3.34	--	--	--	1.85	1.80	1.76	1.67	1.64	1.60	1.98
23	3.44	4.29	--	--	--	1.85	1.80	1.75	1.67	1.65	1.79	1.99
24	3.24	2.81	--	--	--	1.85	1.81	1.75	1.66	1.70	1.66	2.33
25	3.20	3.26	--	--	--	1.85	1.80	1.75	1.66	1.74	1.69	2.65
26	3.03	3.97	--	--	--	1.85	1.80	1.75	1.78	1.70	1.70	1.72
27	2.41	3.22	--	--	--	1.85	1.80	1.74	1.81	1.69	1.70	1.93
28	1.76	4.25	--	--	--	1.85	1.80	1.74	1.74	1.68	1.64	1.98
29	2.65	3.97	--	--	--	1.84	1.80	1.74	1.68	1.67	1.64	1.92
30	2.92	3.97	--	--	--	1.84	1.80	1.73	1.66	1.64	1.57	1.97
31	2.92	3.97	--	--	--	1.84	1.80	1.72	1.66	1.64	1.57	1.90

Table A-1-2-(5) Water Level Data at Chillcara Gauging Station (Year 1976)

(Unit : m)

DATE	Jan.	Feb.	Mar.	Apl.	May.	Jun	Jul.	Aug	Sep.	Oct.	Nov	Dec
1	1.87	2.56	2.01	1.97	1.94	1.86	1.78	1.69	1.64	1.64	--	--
2	2.04	2.55	2.22	1.98	1.94	1.85	1.78	1.68	1.64	1.64	--	--
3	2.07	2.53	2.21	2.03	1.94	1.85	1.77	1.68	1.64	1.64	--	--
4	2.14	2.55	2.07	2.05	1.93	1.84	1.74	1.68	1.64	1.64	--	--
5	2.38	2.33	2.34	2.00	1.93	1.84	1.76	1.68	1.64	1.64	--	--
6	3.25	2.26	2.87	2.13	1.93	1.84	1.76	1.67	1.65	1.64	--	--
7	2.22	2.18	3.51	2.11	1.92	1.82	1.75	1.67	1.65	1.64	--	--
8	2.37	2.84	3.81	2.07	1.93	1.82	1.75	1.67	1.64	1.63	--	--
9	2.43	2.05	3.97	2.04	1.92	1.82	1.74	1.67	1.64	1.63	--	--
10	2.31	2.28	3.12	2.00	1.92	1.82	1.74	1.67	1.64	1.63	--	--
11	2.64	2.71	2.46	1.99	1.91	1.82	1.74	1.67	1.64	1.63	--	--
12	3.00	2.75	2.30	1.89	1.91	1.82	1.73	1.67	1.64	1.63	--	--
13	3.10	3.64	2.10	1.97	1.90	1.81	1.73	1.67	1.64	1.63	--	--
14	2.37	2.96	2.83	2.02	1.90	1.81	1.73	1.66	1.65	1.62	--	--
15	2.91	2.68	1.99	1.95	1.89	1.80	1.73	1.64	1.64	1.63	--	--
16	2.50	2.67	1.89	1.90	1.90	1.80	1.73	1.64	1.64	1.63	--	--
17	2.80	2.48	1.74	1.95	1.89	1.80	1.72	1.64	1.64	1.63	--	--
18	2.77	2.68	1.76	1.98	1.89	1.80	1.72	1.64	1.64	1.62	--	--
19	2.65	2.53	1.76	1.97	1.88	1.80	1.72	1.65	1.65	1.62	--	--
20	2.71	2.34	1.76	1.97	1.89	1.79	1.72	1.65	1.65	1.62	--	--
21	2.46	2.32	1.79	1.97	1.87	1.79	1.72	1.65	1.64	1.62	--	--
22	2.28	2.22	1.80	1.96	1.87	1.80	1.72	1.65	1.63	1.62	--	--
23	3.08	2.23	1.78	1.96	1.86	1.93	1.72	1.65	1.63	1.62	--	--
24	3.83	2.19	1.77	1.95	1.86	1.82	1.72	1.65	1.63	1.62	--	--
25	2.84	2.16	1.77	1.96	1.86	1.81	1.71	1.65	1.63	1.62	--	--
26	2.91	2.04	1.96	1.95	1.85	1.80	1.72	1.65	1.63	1.62	--	--
27	2.25	1.99	1.99	1.94	1.85	1.79	1.70	1.65	1.63	1.62	--	--
28	2.72	1.98	1.98	1.94	1.86	1.78	1.70	1.64	1.64	1.63	--	--
29	2.64		2.01	1.94	1.84	1.78	1.70	1.64	1.64	1.63	--	--
30	2.63		2.02	1.93	1.86	1.78	1.69	1.64	1.64	1.62	--	--
31	2.57		2.02		1.84		1.69	1.64	1.62		--	--

Table A-1-2-(6) Water Level Data at Chillcara Gauging Station (Year 1977)

(Unit : m)

DATE	Jan	Feb.	Mar	Apl.	May	Jun	Jul.	Aug	Sep	Oct.	Nov	Dec.
1	--	--	--	--	--	1.78	1.76	1.70	1.63	1.51	1.49	1.60
2	--	--	--	--	--	1.77	1.76	1.70	1.63	1.52	1.47	1.76
3	--	--	--	--	--	1.78	1.76	1.69	1.64	1.51	1.59	1.64
4	--	--	--	--	--	1.78	1.75	1.69	1.63	1.50	1.49	1.59
5	--	--	--	--	--	1.78	1.75	1.69	1.62	1.50	1.51	1.56
6	--	--	--	--	--	1.78	1.74	1.68	1.63	1.48	1.44	1.60
7	--	--	--	--	--	1.78	1.74	1.68	1.63	1.48	1.70	1.84
8	--	--	--	--	--	1.78	1.74	1.69	1.64	1.47	1.80	1.84
9	--	--	--	--	--	1.78	1.73	1.69	1.63	1.47	1.84	1.72
10	--	--	--	--	--	1.78	1.73	1.68	1.61	1.86	1.66	1.59
11	--	--	--	--	--	1.78	1.73	1.68	1.61	1.70	1.58	1.55
12	--	--	--	--	--	1.77	1.73	1.67	1.60	1.59	1.52	1.51
13	--	--	--	--	--	1.78	1.72	1.67	1.49	1.59	1.48	1.99
14	--	--	--	--	--	1.78	1.72	1.66	1.59	1.53	1.86	1.97
15	--	--	--	--	--	1.78	1.72	1.66	1.58	1.50	3.73	2.11
16	--	--	--	--	--	1.78	1.71	1.66	1.58	1.58	3.14	2.76
17	--	--	--	--	--	1.78	1.72	1.67	1.57	1.79	2.41	2.69
18	--	--	--	--	--	1.79	1.72	1.66	1.56	1.68	2.87	2.19
19	--	--	--	--	--	1.78	1.72	1.66	1.56	1.58	2.38	2.07
20	--	--	--	--	--	1.78	1.72	1.65	1.56	1.49	2.00	1.97
21	--	--	--	--	--	1.77	1.72	1.65	1.55	2.00	1.94	2.30
22	--	--	--	--	--	1.77	1.72	1.65	1.55	2.05	1.96	3.12
23	--	--	--	--	--	1.77	1.71	1.66	1.57	2.00	2.01	4.40
24	--	--	--	--	--	1.76	1.71	1.65	1.56	1.85	1.93	3.17
25	--	--	--	--	--	1.76	1.71	1.64	1.54	1.84	1.82	2.74
26	--	--	--	--	--	1.76	1.71	1.64	1.53	1.76	1.81	2.62
27	--	--	--	--	--	1.76	1.71	1.64	1.53	1.78	1.71	2.59
28	--	--	--	--	--	1.76	1.71	1.64	1.53	1.66	1.67	2.46
29	--	--	--	--	--	1.76	1.71	1.64	1.52	1.60	1.63	2.21
30	--	--	--	--	--	1.76	1.70	1.64	1.52	1.55	1.60	2.49
31	--	--	--	--	--		1.70	1.63	1.52	1.52		2.88

Table A-I-2-(7) Water Level Data at Chillcara Gauging Station (Year 1978)

(Unit : m)

DATE	Jan	Feb.	Mar.	Apl.	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec.
1	3.38	3.47	2.25	2.13	1.88	1.84	1.81	1.76	1.69	1.58	1.45	1.52
2	3.28	3.28	2.09	2.11	1.88	1.84	1.80	1.76	1.68	1.55	1.45	2.42
3	2.83	4.07	2.10	2.04	1.88	1.84	1.80	1.76	1.68	1.51	1.41	2.59
4	2.99	4.22	2.04	2.01	1.87	1.84	1.80	1.75	1.68	1.57	1.41	3.00
5	2.65	4.05	2.01	2.00	1.87	1.83	1.80	1.75	1.68	1.62	1.51	2.46
6	2.51	4.99	2.28	1.99	1.87	1.83	1.80	1.75	1.68	1.72	1.80	2.00
7	2.74	5.54	2.37	2.00	1.87	1.83	1.80	1.75	1.67	1.67	1.73	1.90
8	2.59	4.20	2.31	2.04	1.86	1.83	1.80	1.74	1.67	1.72	1.68	1.82
9	2.67	3.57	2.32	2.01	1.86	1.83	1.80	1.74	1.67	1.65	1.77	1.75
10	2.67	3.16	2.34	1.98	1.86	1.82	1.79	1.73	1.67	1.63	1.66	1.74
11	2.28	3.12	2.15	1.97	1.86	1.83	1.79	1.73	1.66	1.60	1.61	1.81
12	3.22	2.83	2.13	1.95	1.86	1.82	1.79	1.72	1.66	1.65	1.57	1.75
13	3.10	2.74	2.10	1.96	1.85	1.82	1.79	1.72	1.66	1.60	1.54	1.66
14	2.81	2.52	2.07	1.94	1.85	1.82	1.78	1.72	1.65	1.55	1.64	1.66
15	2.46	2.41	2.04	1.97	1.85	1.82	1.78	1.72	1.64	1.57	1.58	1.64
16	2.29	2.22	2.02	1.95	1.85	1.82	1.78	1.72	1.64	1.56	1.53	1.66
17	2.16	2.23	2.01	1.95	1.85	1.82	1.77	1.72	1.64	1.55	1.51	1.59
18	2.09	2.28	2.23	1.86	1.85	1.82	1.77	1.72	1.63	1.55	1.49	1.82
19	2.15	2.27	2.25	1.98	1.85	1.82	1.77	1.72	1.63	1.54	1.47	1.76
20	2.01	2.35	2.59	1.96	1.85	1.81	1.77	1.71	1.63	1.54	1.52	2.62
21	1.98	2.53	2.76	1.95	1.85	1.81	1.76	1.71	1.62	1.52	1.57	3.09
22	1.25	2.61	2.95	1.92	1.85	1.81	1.76	1.72	1.62	1.52	1.57	3.00
23	2.54	2.56	2.47	1.91	1.84	1.81	1.76	1.71	1.62	1.52	1.57	2.90
24	2.21	3.39	2.27	1.91	1.84	1.81	1.76	1.70	1.61	1.52	2.40	1.58
25	2.11	3.04	2.20	1.89	1.84	1.81	1.76	1.70	1.61	1.52	2.01	1.76
26	2.21	2.80	2.14	1.91	1.84	1.81	1.76	1.70	1.60	1.53	1.59	2.60
27	2.35	2.33	2.11	1.90	1.84	1.81	1.76	1.70	1.60	1.52	1.74	3.23
28	2.27	2.20	2.17	1.89	1.84	1.81	1.76	1.70	1.60	1.52	1.66	2.60
29	2.22	2.22	2.35	1.88	1.84	1.81	1.76	1.70	1.59	1.52	1.61	2.28
30	2.10	2.22	2.32	1.88	1.83	1.81	1.76	1.70	1.59	1.52	1.52	2.19
31	2.43	2.20	2.20	1.83	1.83	1.81	1.76	1.69	1.59	1.45	1.45	2.15

Table A-I-2-(8) Water Level Data at Chillcara Gauging Station (Year 1979)

(Unit : m)

DATE	Jan	Feb	Mar	Apl.	May	Jun	Jul	Aug	Sep	Oct.	Nov	Dec.
1	2.22	2.20	2.57	2.14	1.74	1.80	1.85	1.81	1.72	1.61	1.70	1.62
2	2.22	2.24	2.24	2.24	1.74	1.80	1.85	1.81	1.72	1.61	1.70	1.71
3	2.01	2.22	2.24	2.18	1.73	1.80	1.85	1.81	1.72	1.61	1.69	1.65
4	1.98	2.22	2.24	2.12	1.73	1.80	1.84	1.80	1.71	1.61	1.68	1.65
5	1.87	2.22	2.22	2.10	1.73	1.80	1.84	1.80	1.71	1.61	1.72	1.61
6	1.80	2.22	2.22	2.06	1.73	1.80	1.84	1.80	1.71	1.60	1.71	1.59
7	1.82	2.22	2.14	2.04	1.73	1.80	1.84	1.80	1.71	1.60	1.68	1.58
8	1.72	2.22	2.05	2.04	1.73	1.80	1.84	1.80	1.70	1.60	1.65	1.58
9	1.72	2.22	2.15	2.15	1.73	1.80	1.84	1.70	1.60	1.57	1.60	1.52
10	2.22	2.12	2.20	2.15	1.72	1.80	1.84	1.72	1.70	1.61	1.64	1.72
11	2.21	2.25	2.22	2.12	1.72	1.80	1.84	1.72	1.70	1.62	1.61	2.11
12	2.12	2.22	2.22	2.07	1.72	1.80	1.84	1.72	1.67	1.62	1.62	2.06
13	2.12	2.22	2.22	2.02	1.72	1.80	1.84	1.70	1.67	1.62	1.72	2.06
14	1.82	2.22	2.22	2.01	1.72	1.80	1.84	1.70	1.62	1.62	2.02	2.22
15	1.82	2.22	2.22	2.00	1.72	1.80	1.84	1.72	1.62	1.62	1.72	2.11
16	1.82	2.22	2.22	2.00	1.72	1.80	1.84	1.72	1.62	1.62	2.02	2.42
17	1.82	2.22	2.22	2.00	1.72	1.80	1.84	1.72	1.62	1.62	2.02	2.10
18	2.22	2.22	2.20	2.22	1.72	1.80	1.84	1.72	1.62	1.62	1.90	2.04
19	2.22	2.22	2.22	1.98	1.70	1.80	1.84	1.72	1.62	1.62	1.82	2.17
20	2.22	2.20	2.21	1.98	1.70	1.80	1.84	1.72	1.62	1.62	1.72	2.21
21	2.22	2.12	2.21	1.98	1.70	1.80	1.84	1.72	1.62	1.62	1.72	2.10
22	2.02	2.12	2.21	2.01	1.70	1.80	1.84	1.72	1.62	1.62	1.70	2.40
23	2.22	2.12	2.22	2.00	1.70	1.80	1.84	1.72	1.62	1.62	1.70	2.22
24	2.02	2.02	2.22	1.72	1.70	1.80	1.84	1.72	1.62	1.62	1.72	2.12
25	2.02	2.02	2.20	1.98	1.70	1.80	1.84	1.72	1.62	1.62	1.72	2.10
26	2.02	2.12	2.11	1.72	1.70	1.80	1.84	1.72	1.62	1.62	2.00	2.02
27	2.02	2.04	2.02	1.72	1.70	1.80	1.84	1.72	1.62	1.62	1.82	2.02
28	2.02	2.02	2.02	1.72	1.70	1.80	1.84	1.72	1.62	1.62	1.72	2.18
29	2.02	2.02	2.12	1.72	1.70	1.80	1.84	1.72	1.62	1.62	1.72	2.10
30	2.02	2.02	2.12	1.72	1.70	1.80	1.84	1.72	1.62	1.62	1.72	2.12
31	2.02	2.02	2.02	1.72	1.70	1.80	1.84	1.72	1.62	1.62	1.72	2.12

Table A-I-2-(9) Water Level Data at Chillcara Gauging Station (Year 1980)

(Unit m)

DATE	Jan	Feb	Mar.	Apl	May.	Jun	Jul	Aug	Sep	Oct	Nov	Dec.
1	2.47	1.91	1.83	2.36	1.73	1.76	1.73	1.66	1.61	1.85	2.04	1.67
2	2.81	1.83	1.77	2.14	1.73	1.76	1.72	1.66	1.61	1.80	1.97	1.66
3	2.51	1.80	1.71	1.78	1.73	1.75	1.73	1.66	1.60	1.66	1.76	1.61
4	2.21	1.83	1.85	1.94	1.74	1.76	1.73	1.66	1.60	1.63	1.71	2.21
5	2.09	1.86	2.51	1.87	1.74	1.76	1.72	1.65	1.60	1.70	1.70	1.75
6	1.88	1.73	2.41	1.87	1.74	1.76	1.72	1.65	1.60	1.64	1.75	1.67
7	1.72	1.68	2.23	1.91	1.74	1.76	1.72	1.65	1.59	1.63	1.83	1.62
8	1.80	1.87	2.34	1.72	1.74	1.76	1.72	1.66	1.57	1.67	1.76	1.91
9	1.81	1.56	2.97	1.84	1.74	1.76	1.72	1.66	1.58	1.61	1.73	1.78
10	1.76	1.54	2.77	1.82	1.74	1.76	1.71	1.66	1.58	1.60	1.70	2.11
11	1.52	1.54	2.76	1.80	1.74	1.76	1.71	1.66	1.58	1.61	1.69	2.03
12	1.84	1.62	2.48	1.77	1.74	1.76	1.71	1.65	1.57	1.57	1.68	2.20
13	1.92	1.54	2.40	1.78	1.74	1.76	1.70	1.65	1.57	1.58	1.66	1.90
14	1.84	1.63	2.57	1.76	1.74	1.76	1.70	1.65	1.56	1.57	1.66	1.93
15	1.53	1.52	2.42	1.76	1.75	1.76	1.70	1.64	1.56	1.57	1.65	1.77
16	1.85	1.54	2.20	1.75	1.75	1.76	1.71	1.66	1.55	1.62	1.62	1.66
17	1.82	1.53	2.10	1.76	1.76	1.76	1.71	1.67	1.55	1.58	1.64	1.57
18	1.87	1.51	2.02	1.72	1.76	1.76	1.70	1.62	1.54	1.62	1.75	1.52
19	1.88	1.52	1.97	1.76	1.76	1.76	1.70	1.66	1.54	1.59	1.80	2.50
20	2.47	2.07	1.98	1.75	1.76	1.76	1.67	1.66	1.53	1.63	1.70	1.71
21	2.62	2.37	2.05	1.75	1.76	1.76	1.63	1.64	1.53	1.67	1.85	1.60
22	2.18	2.11	2.07	1.75	1.76	1.76	1.68	1.64	1.52	1.71	1.77	1.65
23	2.23	2.03	2.17	1.75	1.75	1.76	1.68	1.63	1.55	1.61	1.70	1.53
24	2.14	2.08	2.17	1.74	1.75	1.76	1.67	1.63	1.57	1.66	1.78	1.51
25	1.78	2.21	2.11	1.74	1.76	1.76	1.67	1.63	1.51	1.60	1.74	1.77
26	1.92	2.20	2.07	1.74	1.75	1.76	1.66	1.62	1.50	1.72	1.67	1.67
27	1.82	2.07	2.27	1.74	1.76	1.76	1.66	1.62	1.50	1.66	1.66	1.66
28	1.87	1.97	2.06	1.74	1.76	1.76	1.64	1.62	1.47	2.14	1.64	1.59
29	1.88	1.85	2.00	1.74	1.76	1.76	1.66	1.62	1.47	2.08	2.08	1.56
30	2.36	1.96	1.74	1.76	1.76	1.76	1.66	1.61	1.48	2.12	1.72	1.57
31	2.02	1.97	1.76	1.76	1.76	1.76	1.66	1.61	1.48	2.32	1.72	1.57

Table A-I-2-(10) Water Level Data at Chillcara Gauging Station (Year 1981)

(Unit m)

DATE	Jan	Feb	Mar	Apl	May.	Jun	Jul	Aug.	Sep	Oct	Nov	Dec.
1	1.68	2.12	2.60									
2	1.81	2.27	4.00									
3	1.70	1.11	2.85									
4	1.83	1.21	4.31									
5	2.40	1.16	2.76									
6	2.26	1.22	2.95									
7	2.28	1.17	2.70									
8	2.23	2.88	2.09									
9	2.50	2.89	2.90									
10	2.55	4.02	2.75									
11	2.22	4.02	3.01									
12	2.77	1.10	2.22									
13	2.77	2.12	2.24									
14	2.27	2.76	2.18									
15	2.16	2.44	2.18									
16	2.77	2.27	2.02									
17	2.11	2.32	2.10									
18	1.92	2.24	2.11									
19	1.94	2.60	2.04									
20	1.83	2.12	2.37									
21	2.05	2.11	2.68									
22	2.25	2.11										
23	1.95	2.17										
24	2.00	2.17										
25	2.43	2.08										
26	2.50	2.07										
27	1.13	2.93										
28	2.26	2.94										
29	2.26											
30	2.44											
31	2.23											

Table A-I-3-(1) Run-off Data at Chillcara Gauging Station (Modification Data)

Year, 1972												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	-----	-----	-----	-----	-----	-----	-----	12.97	10.14	4.34	14.40	27.40
2	-----	-----	-----	-----	-----	-----	-----	12.79	10.23	4.54	14.40	11.00
3	-----	-----	-----	-----	-----	-----	-----	12.64	10.16	4.13	40.60	9.04
4	-----	-----	-----	-----	-----	-----	-----	12.53	10.14	4.03	22.39	4.70
5	-----	-----	-----	-----	-----	-----	-----	12.65	10.14	4.44	12.70	31.36
6	-----	-----	-----	-----	-----	-----	-----	12.40	9.94	4.70	20.40	13.57
7	-----	-----	-----	-----	-----	-----	-----	12.87	10.07	4.54	49.47	13.60
8	-----	-----	-----	-----	-----	-----	-----	12.58	10.19	4.40	24.49	13.07
9	-----	-----	-----	-----	-----	-----	-----	12.95	10.14	4.16	24.67	12.40
10	-----	-----	-----	-----	-----	-----	-----	12.44	10.11	4.09	17.92	15.68
11	-----	-----	-----	-----	-----	-----	-----	12.43	9.40	3.89	9.40	20.21
12	-----	-----	-----	-----	-----	-----	-----	12.54	9.40	3.64	7.00	51.11
13	-----	-----	-----	-----	-----	-----	-----	12.40	9.40	3.49	7.00	51.11
14	-----	-----	-----	-----	-----	-----	-----	12.20	9.24	3.67	6.74	42.00
15	-----	-----	-----	-----	-----	-----	-----	12.70	9.18	3.74	5.40	40.00
16	-----	-----	-----	-----	-----	-----	-----	12.20	8.75	3.45	16.05	114.07
17	-----	-----	-----	-----	-----	-----	-----	11.46	8.20	3.73	12.99	112.04
18	-----	-----	-----	-----	-----	-----	-----	11.73	8.34	3.64	15.20	84.00
19	-----	-----	-----	-----	-----	-----	-----	11.40	8.20	3.44	6.74	74.00
20	-----	-----	-----	-----	-----	-----	11.44	8.15	3.20	4.92	41.47	
21	-----	-----	-----	-----	-----	-----	11.26	11.51	7.92	3.20	4.10	69.20
22	-----	-----	-----	-----	-----	-----	11.24	11.35	7.36	6.00	3.47	55.19
23	-----	-----	-----	-----	-----	-----	11.20	11.03	7.37	11.24	5.24	25.74
24	-----	-----	-----	-----	-----	-----	11.54	10.34	7.34	21.31	3.15	26.44
25	-----	-----	-----	-----	-----	-----	11.33	10.42	7.20	44.55	12.61	25.44
26	-----	-----	-----	-----	-----	-----	11.33	10.61	6.44	44.77	4.08	19.57
27	-----	-----	-----	-----	-----	-----	11.33	10.24	6.24	14.60	4.34	14.87
28	-----	-----	-----	-----	-----	-----	-----	11.62	9.97	6.20	47.00	3.53
29	-----	-----	-----	-----	-----	-----	-----	11.20	10.15	6.02	41.41	3.04
30	-----	-----	-----	-----	-----	-----	-----	11.04	10.16	5.60	29.72	47274
31	-----	-----	-----	-----	-----	-----	11.04	10.14	5.40	37.80		14.25
SUM							149.40	165.52	259.09	402.12	543.71	1147.39
MEAN							11.29	11.79	8.64	12.97	14.46	14.14

Table A-I-3-(2) Run-off Data at Chillcara Gauging Station (Modification Data)

Year, 1973												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	11.15	47.27	174.22	24.25	24.70	491.70	21.05	14.75	11.24	6.94	1.40	2.43
2	19.00	46.72	143.74	21.97	21.97	104.87	14.22	14.75	11.14	6.91	1.04	2.44
3	14.44	110.44	43.40	21.24	22.42	144.20	21.11	14.90	13.24	4.44	3.44	4.12
4	11.94	114.40	11.92	20.44	22.14	49.10	22.44	14.75	13.24	6.20	3.44	3.47
5	49.97	107.44	41.10	24.44	21.71	51.44	21.27	14.40	12.97	4.44	1.09	3.70
6	14.70	114.44	40.44	32.40	22.31	47.44	21.04	14.70	12.31	5.78	4.65	3.37
7	124.44	44.14	22.00	47.12	14.04	14.44	22.47	14.52	11.44	4.34	3.44	3.63
8	110.67	44.00	24.40	32.43	22.77	17.33	22.14	14.15	11.74	5.17	13.24	3.42
9	124.87	242.51	124.43	31.04	21.81	14.44	22.14	17.07	11.44	4.78	6.44	4.25
10	49.05	201.44	112.40	27.92	21.30	33.17	21.44	14.52	11.37	4.44	5.52	3.34
11	101.07	134.42	42.44	27.42	21.30	11.17	21.40	17.00	11.37	4.47	5.27	3.00
12	121.44	114.44	44.55	24.40	21.44	11.75	21.44	17.14	11.07	4.41	5.41	2.92
13	14.43	22.40	44.04	24.72	21.44	10.04	21.44	17.21	11.12	4.54	5.72	20.44
14	47.21	44.43	14.24	24.12	22.14	24.44	21.39	14.93	11.07	23.77	3.44	20.44
15	121.27	44.40	31.42	24.34	22.14	24.44	21.30	15.52	10.31	4.45	4.43	17.45
16	134.13	37.41	44.42	44.24	21.71	24.44	20.41	15.44	9.44	6.14	4.44	144.30
17	132.53	14.44	101.54	114.44	21.71	24.44	20.72	15.42	10.03	4.41	4.44	15.34
18	74.33	34.44	107.04	41.04	22.31	27.37	20.32	15.39	10.11	4.34	5.11	17.42
19	40.27	31.42	114.44	22.14	22.14	27.37	20.07	14.75	9.41	4.44	4.44	10.44
20	41.04	32.44	140.44	24.10	21.54	24.35	20.44	15.44	9.14	4.44	4.70	10.44
21	70.40	37.15	122.77	32.14	21.30	25.44	19.41	16.44	8.44	4.44	4.10	11.27
22	74.79	24.87	44.13	27.04	25.14	25.44	19.52	17.35	8.44	4.42	1.40	27.47
23	114.04	22.20	44.44	24.40	21.14	21.37	19.21	17.44	4.37	4.25	3.71	10.44
24	17.20	24.15	41.74	25.34	21.22	24.44	19.44	16.44	8.73	3.97	3.44	54.37
25	44.44	24.13	41.74	24.44	21.14	24.70	19.52	15.71	8.44	3.44	3.44	44.34
26	44.44	10.75	34.33	21.45	21.10	24.21	19.44	14.75	8.04	3.44	3.29	54.44
27	44.40	24.12	50.43	23.44	21.70	21.71	18.43	14.74	7.44	3.42	3.20	42.41
28	70.44	42.04	122.15	24.37	21.70	23.44	19.05	14.74	7.29	3.47	2.97	27.04
29	140.00		74.43	23.44	44.00	24.14	19.21	13.66	7.44	3.44	2.97	17.44
30	140.04		41.44	23.44	107.41	25.47	19.29	14.44	7.19	3.44	2.43	141.44
31	44.44		33.04		24.44	19.21	19.17	14.17	7.14	3.74		34.74
SUM	2572.40	2046.41	2503.45	1104.40	1034.34	1404.44	451.43	510.38	304.12	174.44	114.43	1074.12
MEAN	83.00	74.41	40.74	34.44	33.37	43.50	21.02	16.44	10.30	5.47	4.44	33.00

Table A-I-3-(5) Run-off Data at Chillcara Gauging Station (Modification Data)

Year, 1976												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	25.08	81.45	26.42	26.75	24.57	19.44	16.58	11.45	10.00	-----	-----	-----
2	32.84	81.39	47.03	27.51	24.44	19.15	15.63	11.45	9.47	-----	-----	-----
3	34.04	87.42	46.32	30.31	24.44	19.20	15.17	11.40	10.11	-----	-----	-----
4	34.60	89.68	34.64	32.22	23.93	18.61	14.99	11.40	10.07	-----	-----	-----
5	140.92	57.77	42.07	24.57	23.93	18.56	14.76	11.40	10.11	-----	-----	-----
6	249.07	51.41	140.58	19.62	23.74	18.51	-----	11.06	10.28	-----	-----	-----
7	121.42	44.35	135.75	17.64	23.49	17.85	-----	11.03	10.28	-----	-----	-----
8	64.54	36.44	819.02	33.72	23.91	17.61	-----	11.17	9.47	-----	-----	-----
9	65.69	32.29	501.61	31.52	23.17	17.53	-----	11.25	9.90	-----	-----	-----
10	44.79	51.46	171.66	24.42	23.25	17.58	17.93	11.17	10.11	-----	-----	-----
11	111.26	114.14	70.70	27.93	22.57	17.63	13.80	10.99	10.14	-----	-----	-----
12	140.92	461.03	44.44	21.68	22.70	17.53	13.54	11.14	10.07	-----	-----	-----
13	213.40	432.43	35.18	27.54	22.15	17.21	13.50	11.06	10.14	-----	-----	-----
14	48.26	174.45	30.91	31.64	21.92	17.13	13.63	10.44	10.31	-----	-----	-----
15	145.19	113.69	38.14	25.81	21.50	16.88	13.38	10.70	10.14	-----	-----	-----
16	42.24	111.44	32.47	21.98	21.92	16.54	13.67	10.67	9.47	-----	-----	-----
17	134.54	112.75	14.48	26.55	21.39	16.93	-----	10.85	9.94	-----	-----	-----
18	124.71	113.48	14.48	27.09	21.39	16.54	-----	10.63	10.00	-----	-----	-----
19	115.93	47.31	14.90	26.68	21.10	16.44	-----	10.45	10.52	-----	-----	-----
20	114.47	49.08	14.45	26.35	21.54	16.34	-----	10.31	10.42	-----	-----	-----
21	46.60	111.44	16.01	26.41	20.47	14.14	-----	10.24	10.04	-----	-----	-----
22	143.02	47.43	14.94	25.88	20.33	14.54	-----	10.31	9.73	-----	-----	-----
23	217.85	48.17	15.82	27.03	19.64	24.83	12.96	10.31	9.77	-----	-----	-----
24	46.84	46.42	15.22	25.15	19.66	17.44	14.54	10.42	9.47	-----	-----	-----
25	143.90	43.99	15.17	24.61	19.64	17.09	13.04	10.45	9.63	-----	-----	-----
26	146.29	30.48	21.23	25.24	19.25	16.54	12.68	10.31	9.77	-----	-----	-----
27	124.41	21.39	21.34	24.74	19.25	14.29	12.92	10.38	9.77	-----	-----	-----
28	119.44	27.21	21.09	24.34	19.25	15.77	12.40	10.00	10.07	-----	-----	-----
29	104.64	-----	20.61	24.17	19.69	15.77	12.14	9.97	-----	-----	-----	-----
30	104.34	-----	20.07	23.91	19.64	15.58	12.16	10.11	-----	-----	-----	-----
31	97.24	-----	20.76	-----	19.46	-----	11.45	-----	-----	-----	-----	-----
SUM	5589.65	2756.07	7419.15	437.54	434.75	425.46	247.57	373.46	290.40	-----	-----	-----
WFAN	114.17	99.63	78.04	27.75	21.77	17.51	13.69	10.78	10.03	-----	-----	-----

Table A-I-3-(6) Run-off Data at Chillcara Gauging Station (Modification Data)

Year, 1977												
DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	-----	-----	-----	-----	-----	17.63	16.79	12.77	9.41	5.50	5.79	9.15
2	-----	-----	-----	-----	-----	16.76	16.30	12.79	9.61	5.69	5.30	14.61
3	-----	-----	-----	-----	-----	17.43	16.11	12.47	9.79	5.74	4.79	8.57
4	-----	-----	-----	-----	-----	17.63	16.67	12.29	9.07	5.08	4.71	8.00
5	-----	-----	-----	-----	-----	17.63	16.67	12.29	9.07	5.08	4.71	8.00
6	-----	-----	-----	-----	-----	17.63	15.24	11.91	9.36	4.67	5.06	8.37
7	-----	-----	-----	-----	-----	17.63	15.06	11.91	9.48	4.67	13.50	14.34
8	-----	-----	-----	-----	-----	17.63	14.99	12.11	9.81	4.63	15.11	15.24
9	-----	-----	-----	-----	-----	17.63	14.44	12.11	9.44	4.37	21.40	11.13
10	-----	-----	-----	-----	-----	17.63	14.44	11.74	8.69	23.24	11.51	4.24
11	-----	-----	-----	-----	-----	17.63	14.44	11.74	8.89	13.50	4.35	7.04
12	-----	-----	-----	-----	-----	16.96	14.29	11.42	8.29	4.67	4.47	-----
13	-----	-----	-----	-----	-----	17.63	13.44	10.44	4.03	4.74	3.24	24.59
14	-----	-----	-----	-----	-----	17.63	13.12	10.00	7.47	6.88	21.02	27.88
15	-----	-----	-----	-----	-----	17.63	13.44	10.44	7.59	5.97	140.26	40.44
16	-----	-----	-----	-----	-----	17.63	13.44	10.44	7.94	8.55	413.45	144.01
17	-----	-----	-----	-----	-----	17.63	13.44	11.27	7.53	14.11	100.13	145.70
18	-----	-----	-----	-----	-----	17.63	13.44	10.94	6.90	27.12	232.44	55.73
19	-----	-----	-----	-----	-----	17.63	13.44	10.40	6.99	7.89	43.70	34.44
20	-----	-----	-----	-----	-----	17.63	13.44	10.35	6.90	5.71	35.56	24.12
21	-----	-----	-----	-----	-----	16.96	13.44	10.35	6.48	36.95	29.25	45.50
22	-----	-----	-----	-----	-----	16.96	13.44	10.35	6.44	40.31	31.42	304.39
23	-----	-----	-----	-----	-----	16.96	13.44	10.40	7.23	35.22	34.52	1544.20
24	-----	-----	-----	-----	-----	16.96	13.16	10.35	6.90	22.09	23.50	334.47
25	-----	-----	-----	-----	-----	16.30	13.44	9.41	6.27	21.59	20.69	140.00
26	-----	-----	-----	-----	-----	16.11	13.33	9.41	4.14	16.69	14.74	124.09
27	-----	-----	-----	-----	-----	16.30	13.33	10.04	5.44	17.89	13.85	120.03
28	-----	-----	-----	-----	-----	16.30	13.33	9.41	4.89	11.64	11.93	15.53
29	-----	-----	-----	-----	-----	16.30	13.16	10.04	5.69	9.15	10.26	57.40
30	-----	-----	-----	-----	-----	16.30	12.95	9.41	5.61	7.19	4.15	99.18
31	-----	-----	-----	-----	-----	12.79	-----	4.44	4.67	-----	-----	204.40
SUM	-----	-----	-----	-----	-----	515.45	410.44	343.72	233.33	187.44	2210.54	3812.37
WFAN	-----	-----	-----	-----	-----	17.20	14.14	11.09	7.74	12.57	74.65	127.44

Table-A-I-3-(9) Run-off Data at Chillcara Gauging Station (Modification Data)

Year, 1950

DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	411.91	35.54	29.21	86.87	14.79	14.39	14.79	11.51	9.51	5.57	17.47	5.84
2	201.91	29.36	24.41	50.67	14.79	14.39	14.79	11.51	9.51	8.89	15.31	5.44
3	117.41	27.56	15.44	32.14	14.79	14.39	14.79	11.51	9.17	5.84	14.12	4.73
4	88.67	29.43	39.18	28.61	15.11	14.39	14.79	11.51	9.17	5.08	12.29	24.51
5	51.74	31.11	119.41	24.96	15.11	14.39	14.79	11.09	9.17	6.44	11.94	13.74
6	47.39	27.74	99.70	23.46	15.11	14.39	14.74	11.09	9.17	5.77	11.14	5.44
7	37.05	19.74	71.48	24.37	15.11	14.39	14.74	11.09	8.91	5.08	9.74	4.91
8	31.25	15.00	87.75	26.94	15.11	14.39	14.24	11.51	8.81	4.91	7.85	12.29
9	27.75	13.85	245.02	21.34	15.11	14.39	14.74	11.51	9.47	4.73	7.13	8.34
10	40.31	17.40	175.49	14.48	15.11	14.39	14.74	11.51	8.47	4.57	6.44	20.85
11	34.44	12.40	175.01	18.44	15.11	14.39	14.74	11.51	8.47	4.73	6.25	17.07
12	28.20	24.64	122.45	18.33	15.11	14.39	14.74	11.09	8.14	4.40	6.04	25.90
13	16.70	13.05	48.45	17.34	15.11	14.39	14.40	11.09	8.14	4.74	5.84	11.84
14	39.45	17.89	134.45	16.56	15.11	14.39	14.40	11.09	7.82	4.04	5.44	13.00
15	17.40	11.48	102.37	14.39	15.44	14.84	14.70	10.88	7.42	4.09	5.44	4.10
16	31.10	14.93	66.93	15.84	15.84	14.84	14.74	12.34	7.51	4.91	4.91	5.44
17	24.84	17.94	55.44	16.39	14.39	14.84	14.74	11.44	7.51	4.24	5.08	4.09
18	41.24	37.32	44.58	14.96	14.39	14.84	13.70	11.44	7.71	4.91	7.40	3.74
19	47.87	171.25	43.36	16.39	14.39	14.84	13.30	11.51	7.21	4.40	4.89	55.21
20	110.47	204.91	47.24	14.84	14.39	14.84	12.83	11.09	6.90	9.74	11.94	4.44
21	141.40	97.84	48.49	14.84	14.39	14.84	12.43	10.88	6.90	4.74	10.03	4.47
22	44.79	48.47	42.04	14.84	14.39	14.84	12.34	10.88	6.43	4.47	8.47	3.79
23	71.00	47.67	43.41	14.84	14.84	14.44	12.34	12.74	6.43	4.16	11.94	3.51
24	74.51	47.60	41.24	14.11	14.84	14.31	11.94	10.74	4.12	11.74	8.34	3.73
25	47.94	44.77	55.10	14.31	14.84	14.31	11.44	10.24	4.12	4.89	7.34	4.47
26	34.74	47.40	41.93	14.31	14.44	14.31	11.51	9.90	4.09	4.20	4.74	4.44
27	28.44	51.16	31.14	14.31	14.39	14.31	11.51	9.90	4.09	10.44	5.44	4.44
28	32.44	41.43	40.24	14.31	14.39	14.31	11.51	9.90	4.89	27.45	3.79	4.40
29	47.87	31.10	44.34	14.31	14.39	14.14	11.51	9.40	4.49	31.11	47.57	3.94
30	40.44	40.03	40.03	14.31	14.39	14.94	11.51	9.51	4.54	21.37	6.90	4.40
31	44.54	41.14	41.14	14.39	14.39	14.31	11.51	9.51	4.54	34.00	4.40	4.40
SUM	2143.44	1240.41	2401.34	444.44	444.11	474.11	494.37	344.07	224.37	274.70	100.45	317.53
MEAN	69.79	41.44	77.44	27.16	14.75	14.94	14.79	10.94	7.45	8.44	10.03	10.03

Table-A-I-3-(10) Run-off Data at Chillcara Gauging Station (Modification Data)

Year, 1951

DAY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	6.04	47.41	130.49	-----	-----	-----	-----	-----	-----	-----	-----	-----
2	9.16	71.03	73.74	-----	-----	-----	-----	-----	-----	-----	-----	-----
3	6.44	43.43	414.44	-----	-----	-----	-----	-----	-----	-----	-----	-----
4	9.74	104.10	94.35	-----	-----	-----	-----	-----	-----	-----	-----	-----
5	40.36	571.92	140.43	-----	-----	-----	-----	-----	-----	-----	-----	-----
6	29.74	331.92	220.14	-----	-----	-----	-----	-----	-----	-----	-----	-----
7	31.11	300.44	142.79	-----	-----	-----	-----	-----	-----	-----	-----	-----
8	27.74	200.96	264.86	-----	-----	-----	-----	-----	-----	-----	-----	-----
9	477.80	231.97	204.78	-----	-----	-----	-----	-----	-----	-----	-----	-----
10	463.06	774.89	164.90	-----	-----	-----	-----	-----	-----	-----	-----	-----
11	374.64	749.55	234.01	-----	-----	-----	-----	-----	-----	-----	-----	-----
12	164.93	347.64	40.29	-----	-----	-----	-----	-----	-----	-----	-----	-----
13	84.01	134.34	44.92	-----	-----	-----	-----	-----	-----	-----	-----	-----
14	44.01	144.16	41.78	-----	-----	-----	-----	-----	-----	-----	-----	-----
15	34.74	44.10	41.74	-----	-----	-----	-----	-----	-----	-----	-----	-----
16	144.93	84.49	50.74	-----	-----	-----	-----	-----	-----	-----	-----	-----
17	47.45	74.53	41.84	-----	-----	-----	-----	-----	-----	-----	-----	-----
18	34.59	34.87	47.94	-----	-----	-----	-----	-----	-----	-----	-----	-----
19	34.24	41.05	47.04	-----	-----	-----	-----	-----	-----	-----	-----	-----
20	27.44	31.85	47.64	-----	-----	-----	-----	-----	-----	-----	-----	-----
21	44.55	53.29	140.45	-----	-----	-----	-----	-----	-----	-----	-----	-----
22	70.27	53.29	84.95	-----	-----	-----	-----	-----	-----	-----	-----	-----
23	31.12	39.83	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
24	41.44	40.32	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
25	47.49	30.00	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
26	132.60	44.41	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
27	140.04	214.72	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
28	84.12	214.04	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
29	70.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
30	44.70	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
31	47.54	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SUM	3147.44	5934.61	5114.00	-----	-----	-----	-----	-----	-----	-----	-----	-----
MEAN	101.02	217.07	232.55	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table A-I-4-(1) Precipitation Data for Calculating Average Precipitation in the Project Catchment Area

(Unit : mm)

Station	Jan	Feb	Mar.	Apr	May	Jun	Jul.	Aug	Sep	Oct.	Nov	Dec
Year - 1966												
Punuilma	47.4	38.6	25.8	32.2	0	0	0	0	0	2.0	11.5	65.9
El Puente	1.0	20.0	5.0	0	0	0	0	0	2.0	14.0	7.0	13.0
Oplaca	33.5	23.0	13.0	6.0	0	0	0	0	0	4.0	69.0	117.0
La Quiaca	40.0	48.0	17.0	13.0	0	0	0	0	0	45.0	69.0	86.0
Year - 1967												
Punuilma	86.0	92.3	40.2	12.5	3.5	0	0	0	0	0	0	86.5
El Puente	2.0	15.0	26.0	0	0	0	0	0	2.0	14.0	7.0	13.0
Oplaca	25.5	57.5	44.0	19.5	0	0	0	0	0	0	0	147.5
La Quiaca	10.0	26.0	30.0	14.0	0	0	0	0	28.0	7.0	6.0	91.0
Year - 1968												
Chaguilla	73.0	214.0	22.0	0	16.0	0	0	0	2.0	3.0	53.0	18.0
El Puente	39.0	25.0	0	0	0	0	0	0	0	16.0	17.0	43.0
Oplaca	99.0	121.0	67.0	3.0	1.0	0	0	0.5	0	1.5	58.0	34.0
Villazon	111.0	17.0	88.0	3.0	0	0	0	0	0	0	62.0	19.0
Year - 1969												
Chaguilla	247.0	90.0	26.0	0	0	11.0	0	0	2.0	0	7.0	53.0
El Puente	28.0	27.0	5.0	5.0	0	0	0	0	0	4.0	35.0	83.0
Oplaca	41.0	27.0	1.0	1.5	0	0.5	0	0	0	0	9.0	60.0
Villazon	118.0	53.0	5.0	4.0	0	0	0	0	0	0	4.0	296.0
Year - 1970												
Chaguilla	102.0	134.0	117.0	61.0	0	0	0	0	0	5.0	36.0	113.0
El Puente	89.0	4.0	26.0	16.0	0	0	0	0	0	30.0	0	124.0
Oplaca	109.8	35.2	50.0	4.5	0	0	0	0	0	0	4.0	64.5
Maja	113.0	35.0	53.0	20.0	0	0	0	0	0	7.0	0	19.0

Table A-I-4-(2) Precipitation Data for Calculating Average Precipitation in the Project Catchment Area

(Unit : mm)

Station	Jan	Feb	Mar	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov	Dec
Year 1971												
Chaguilla	85.0	167.0	36.0	1.0	0	0	0	0	0	2.0	34.0	89.0
El Puente	100.0	145.0	0	0	0	0	0	0	0	7.0	44.0	36.0
Oplaca	124.5	133.0	7.0	0	0	0	0	0	0	1.5	43.0	31.5
Maja	66.0	93.0	22.0	0	0	0	0	0	0	11.0	43.0	67.0
Year: 1972												
Chaguilla	146.0	91.0	37.0	7.0	1.0	0	0	0	1.0	1.0	20.0	101.0
Camargo	-	-	-	-	-	3.0	0	0	2.0	27.5	12.2	70.3
El Puente	37.0	13.0	57.0	3.0	2.0	1.3	0	0	5.0	44.0	37.0	115.0
Oplaca	93.0	116.0	32.0	5.5	0	0	0	0	0	6.5	1.5	50.0
Maja	100.0	64.0	54.0	16.0	0	0	0	0	0	12.0	0	68.0
Year 1973												
Chaguilla	131.0	51.0	46.0	16.0	36.0	1.0	0	7.0	0	4.0	18.0	12.0
Camargo	109.8	25.6	51.3	22.7	23.5	19.7	0	0	0	2.2	0.2	30.3
El Puente	81.0	15.0	27.0	0	0	0	0	0	0	0	8.0	16.0
Oplaca	104.0	46.0	52.5	5.0	6.5	20.5	0	0	0	0	0	19.0
Maja	91.0	48.0	62.0	7.0	22.0	0	0	0	0	0	8.0	31.0
Year 1974												
Bintumani	120.0	112.0	46.0	33.0	0	0	0	59.0	0	0	3.0	18.0
Camargo	66.5	113.5	31.0	33.5	0	0	0	1.5	2.5	2.5	5.3	31.1
El Puente	55.0	75.0	24.0	32.0	0	0	0	0	0	2.0	10.0	26.0
Oplaca	65.5	63.5	20.0	30.0	0	0	0	0	0	0	23.0	44.0
Maja	43.0	68.0	66.0	12.0	0	0	0	0	0	0	15.0	63.0
Year: 1975												
Salto Leon	102.3	74.4	3.4	4.5	3.3	0	0	0	5.0	15.6	0	47.5
Camargo	161.7	72.2	59.4	3.0	0.2	0	0	0.5	2.5	16.5	7.0	37.2
El Puente	97.0	100.0	75.0	8.0	4.0	0	0	0	4.0	12.0	33.0	31.0
Oplaca	125.0	144.0	35.5	1.5	0	0	0	0	0	3.5	0	113.4
Maja	93.0	38.0	20.0	2.0	0	0	0	0	0	31.0	0	75.0

Table A-I-4-(3) Precipitation Data for Calculating Average Precipitation in the Project Catchment Area

(Unit : mm)

Station	Jan	Feb.	Mar.	Apr.	May	Jun.	Jul	Aug	Sep	Oct.	Nov	Dec
Year 1976												
Salto Leon	96.0	51.0	40.0	0	0	1.0	0	0	2.5	0	0.4	47.0
Camargo	116.0	21.0	41.0	10.2	0	0	0	0	15.0	1.5	20.2	19.5
El Puente	50.0	15.0	46.0	0	16.0	0	0	17.0	11.0	2.0	45.0	28.0
Oplaca	88.5	52.0	30.5	0.5	0	1.5	0	2.5	9.0	0	10.5	20.0
Maja	242.0	36.0	0	12.0	0	0	0	12.0	6.0	0	17.7	28.5
Year 1977												
Salto Leon	113.8	114.7	123.2	0	0	0	0	0	6.9	7.9	34.5	245.4
Camargo	62.5	46.0	64.5	0	0	0	0	0	0	26.2	80.0	117.5
El Puente	61.0	84.0	42.0	0	0	0	0	0	0	54.0	59.4	62.8
Oplaca	75.5	70.0	54.8	1.4	0	0	0	0	3.0	32.1	107.5	79.0
Maja	66.0	46.0	32.1	0	0	0	0	0	13.5	22.5	83.0	115.5
Year 1978												
Chaguilla	51.4	34.7	24.0	2.9	0	0	0	0	0	2.7	17.8	60.6
Camargo	93.5	97.0	54.0	0	0	0	0	3.5	2.0	5.5	16.5	129.0
El Puente	118.0	69.0	37.0	1.0	0	0	0	0	2.0	15.0	26.0	51.0
Oplaca	112.0	133.5	27.5	7.0	0	0	0	0	0	0	32.6	211.0
Maja	88.0	62.0	69.0	4.0	0	0	0	0	0	44.5	55.6	102.5
Year 1979												
Chaguilla	178.1	23.4	29.2	20.2	0	0	0	0	0	43.5	7.0	139.0
Camargo	54.0	23.0	69.5	4.5	0	2.0	4.5	0	0	0	0	0
El Puente	98.0	21.0	64.0	0	0	0	4.0	0	0	12.3	46.3	132.7
Oplaca	159.0	31.0	63.0	0	0	0.5	0	0	0	6.9	13.9	56.6
Maja	143.5	30.0	130.5	0	0	0	3.5	0	0	6.5	27.0	23.5
Year 1980												
Chaguilla	47.0	39.0	45.0	0	0	--	--	--	--	--	--	--
Camargo	7.7	46.4	89.5	4.5	0	--	--	--	--	--	--	--
El Puente	31.0	32.6	17.2	6.1	0	--	--	--	--	--	--	--
Oplaca	43.7	37.9	68.2	0	0	--	--	--	--	--	--	--
Maja	75.0	50.5	49.0	0	3.0	--	--	--	--	--	--	--

Table A-1-5 Observed Discharges ($H \geq 2.0$ m)

Date	Water Level (m)	Run - off (m^3/s)	Date	Water Level (m)	Run - off (m^3/s)	Date	Water Level (m)	Run - off (m^3/s)
1 Mar. 1981	2.63	152.6	29 Mar. 1978	2.385	85.1	15 Mar. 1978	2.04	32.1
3 Mar. 1981	3.785	530.2	31 Mar. 1978	2.205	77.5	17 Mar. 1978	2.47	72.2
7 Mar. 1981	2.74	188.6	2 Apr. 1978	2.12	61.4	3 Jan. 1978	2.895	200.4
9 Mar. 1981	3.00	260.1	4 Mar. 1978	2.065	46.6	4 Jan. 1978	2.985	253.1
11 Mar. 1981	2.57	142.3	8 Mar. 1978	2.03	45.2	7 Jan. 1978	2.73	138.0
13 Mar. 1981	2.26	93.0	13 Mar. 1978	2.705	153.5	8 Jan. 1978	2.66	135.8
15 Mar. 1981	2.19	79.8	15 Mar. 1978	2.425	99.4	10 Jan. 1978	3.21	260.2
17 Mar. 1981	2.125	64.3	17 Mar. 1978	2.355	88.7	12 Jan. 1978	3.145	228.4
19 Mar. 1981	2.04	55.3	19 Mar. 1978	2.32	84.0	14 Jan. 1978	2.85	157.4
21 Mar. 1981	2.89	212.9	21 Mar. 1978	2.44	98.1	16 Jan. 1978	2.29	74.8
20 Dec. 1978	2.61	122.3	23 Mar. 1978	2.725	145.4	18 Jan. 1978	2.09	50.3
22 Dec. 1978	2.975	234.6	25 Mar. 1978	2.85	168.4	20 Jan. 1978	2.01	36.5
24 Dec. 1978	2.405	105.3	27 Mar. 1978	2.34	91.0	22 Jan. 1978	2.335	103.6
27 Dec. 1978	3.02	238.9	1 Mar. 1978	2.22	102.3	24 Jan. 1978	2.705	144.1
30 Dec. 1978	2.185	77.7	3 Mar. 1978	2.08	50.9	26 Jan. 1978	2.22	72.1
19 Mar. 1978	2.469	91.8	5 Mar. 1978	2.02	42.7	28 Jan. 1978	2.37	88.8
21 Mar. 1978	2.715	131.0	7 Mar. 1978	2.39	59.0	30 Jan. 1978	2.32	88.3
23 Mar. 1978	2.509	120.0	9 Mar. 1978	2.35	64.4	9 Feb. 1978	3.57	352.3
25 Mar. 1978	2.18	68.8	11 Mar. 1978	2.225	48.7	11 Feb. 1978	3.11	345.1
27 Mar. 1978	2.115	59.7	13 Mar. 1978	2.095	35.5			

Note: $Q = 87.02H^2 - 233.90H + 157.18$

$r = 0.973$

Fig. A-I-1 Evaporation at Chillcara Gauging Station (Jun. 1977 ~ Feb. '81)

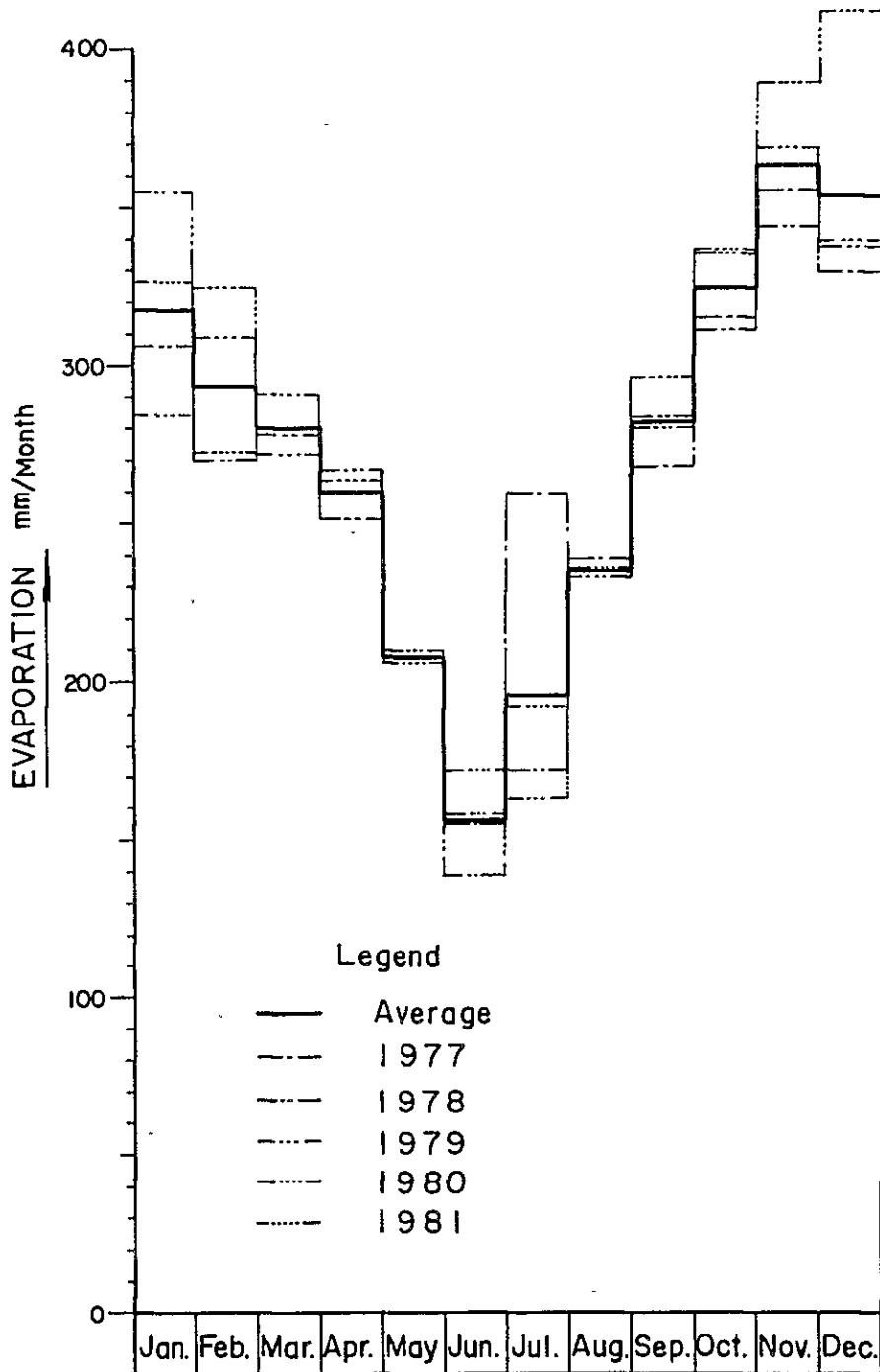


Fig. A-1-2-(1) Sedimentation Curve at Chillcara G.S. (Dec. 1980 ~ May '81)

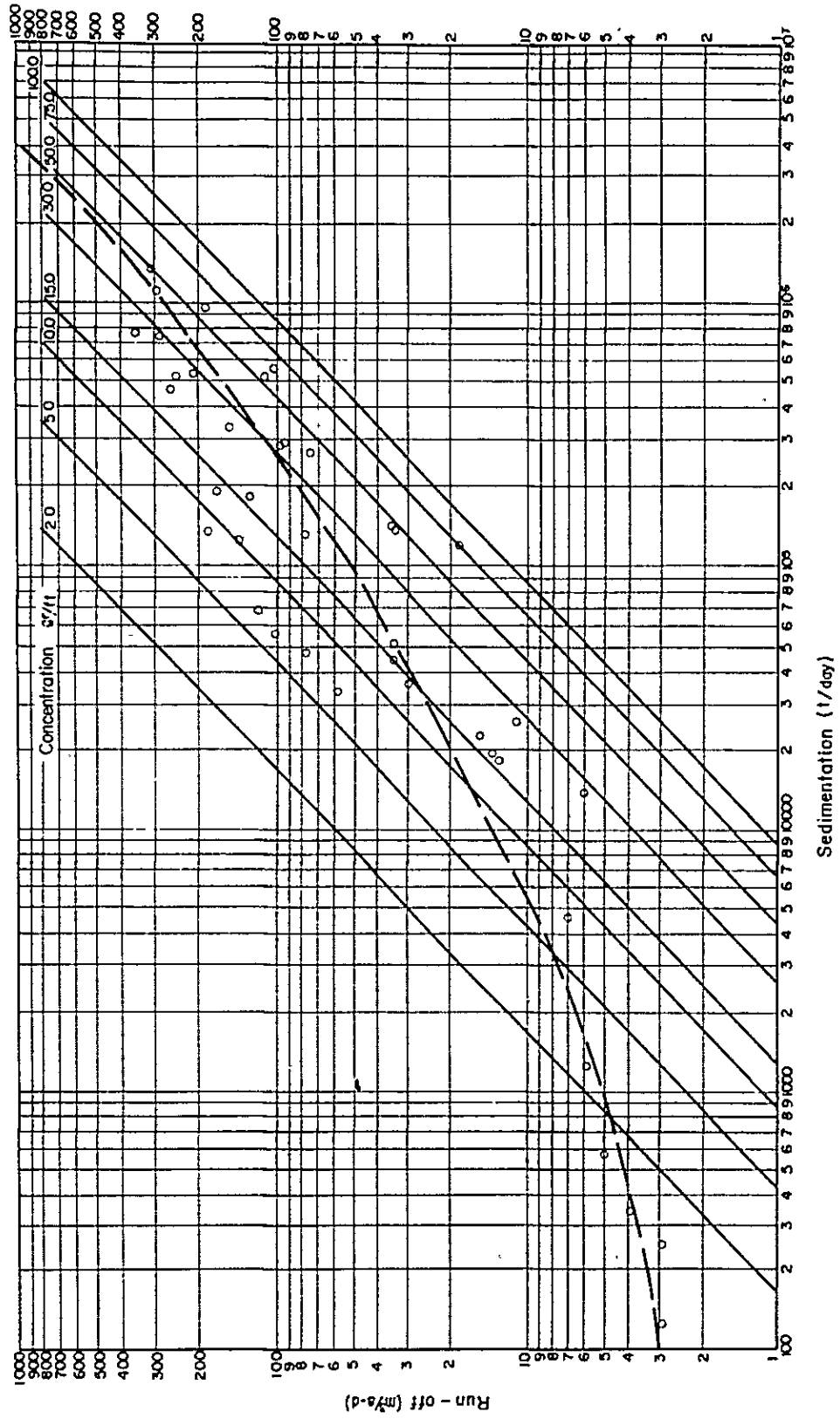


Fig. A-1-2-(2) Sedimentation Curve at Chillcara G.S. (Feb. 1980 ~ Apr. '80)

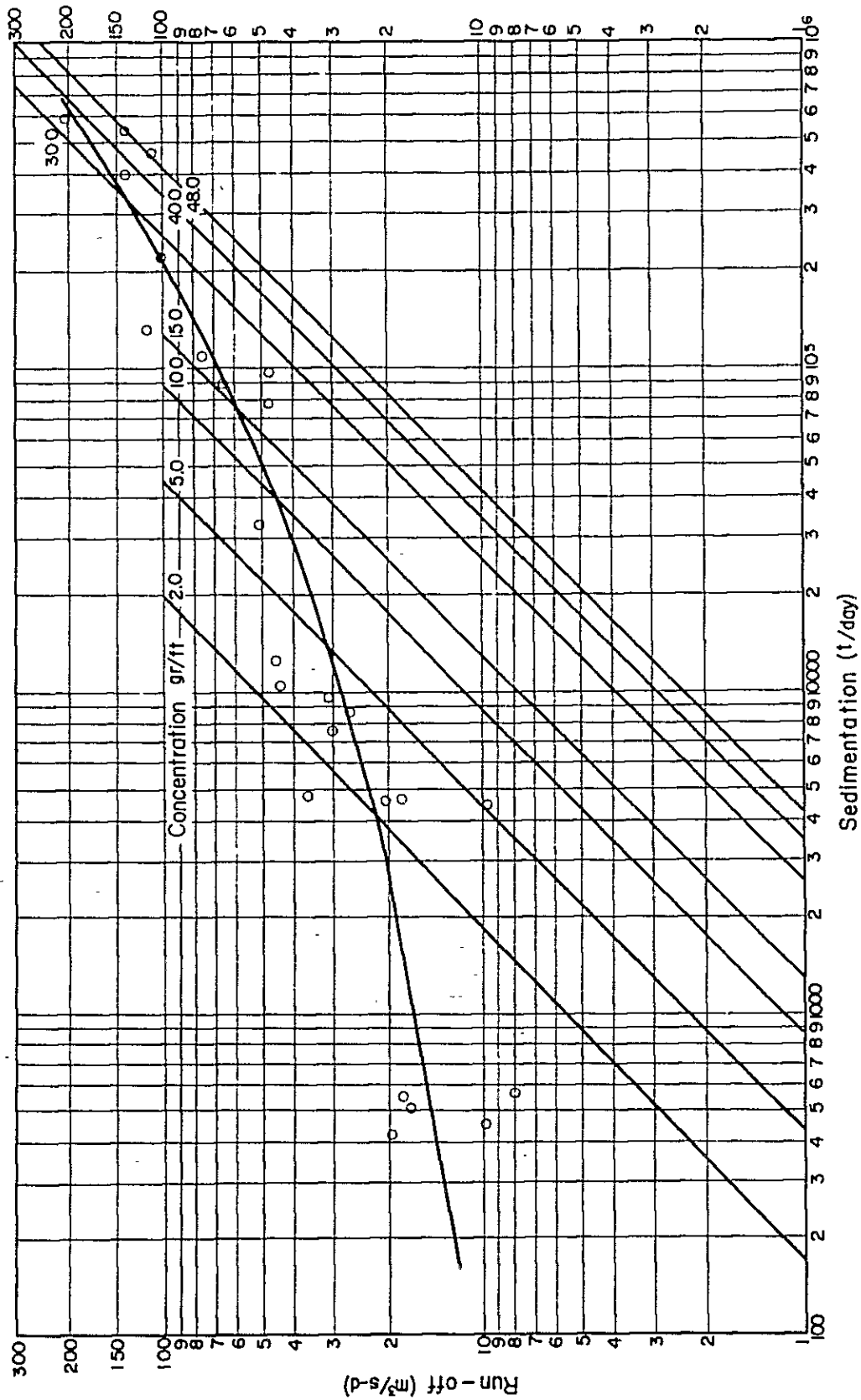
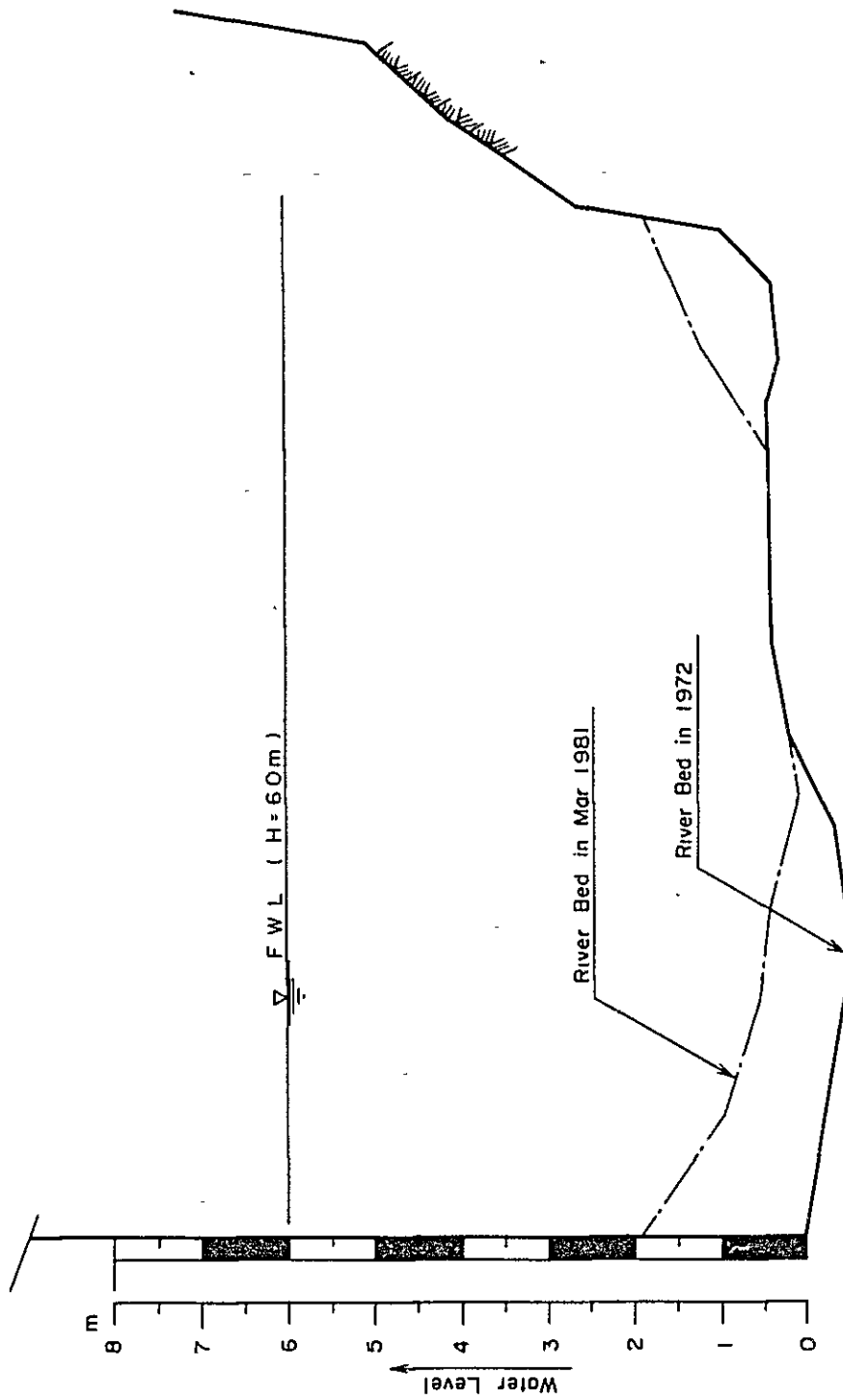


Fig. A-I-3 Cross Section at Chillcara Gauging Station



APPENPIX—II

GEOLOGY



TABLE LIST

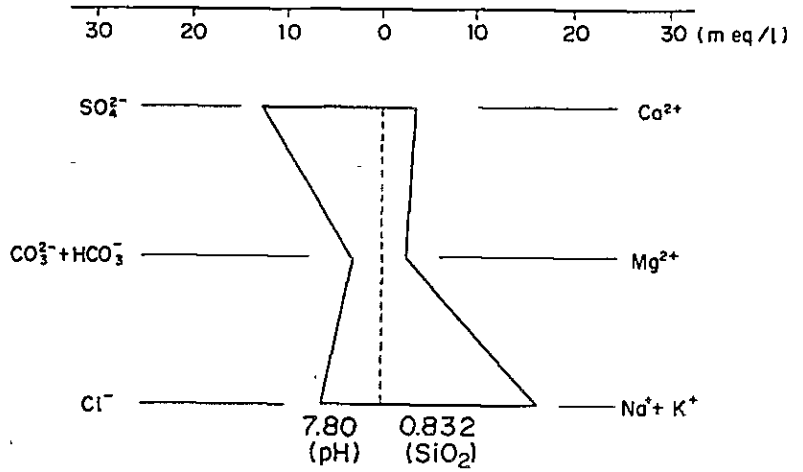
Table A-II-1.	Chemical Analysis of Thermal Water
Table A-II-2.	Chemical Analysis of River Water
Table A-II-3.	Standard of Rock Evaluation
Table A-II-4.	Classification of Core Character in Drill Hole
Table A-II-5.	Water Pressure Test in Drill Hole

FIGURE LIST

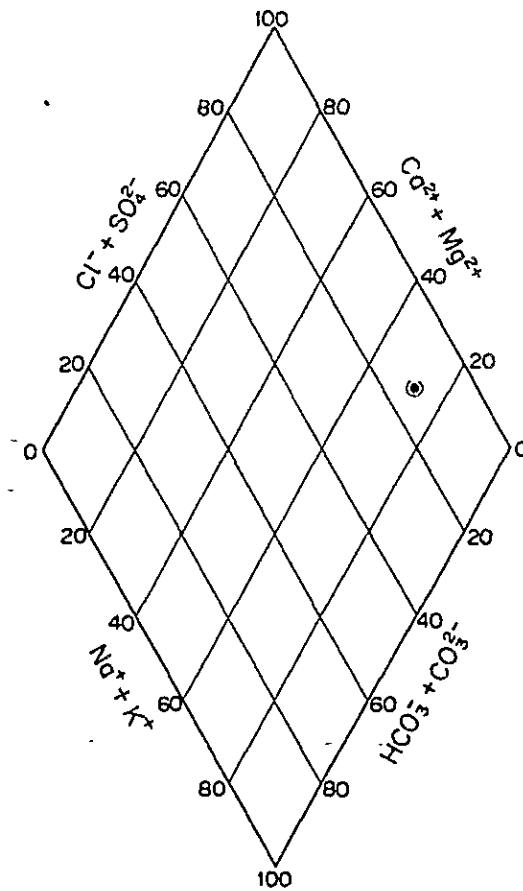
Fig. A-II-1.	Logs of Exploratory Adit
Fig. A-II-2.	Geologic Log of Drill Hole
Fig. A-II-3.	Photomicrograph and Petrographic Description of Rock

Table A-II-1. Chemical Analysis of Thermal Water

	mg/l	m·eq/l
Na	380.0	16.529
K	21.5	0.550
Ca	69.2	3.453
Mg	35.4	2.913
Cl	210.0	5.923
SO ₄	610.0	12.701
HCO ₃ ⁻	182.4	2.989
CO ₃	1.9	0.063
H ₂ CO ₃	5.7	0.092
SiO ₂	50.0	0.832
Na/K	30.058	
Ca/Na	0.104	
Mg/Ca	0.844	
HCO ₃ ⁻ + CO ₃ /Cl	0.510	
T.S.M.	1,566.1 mg/l	
pH	7.80	



Hexadiagram



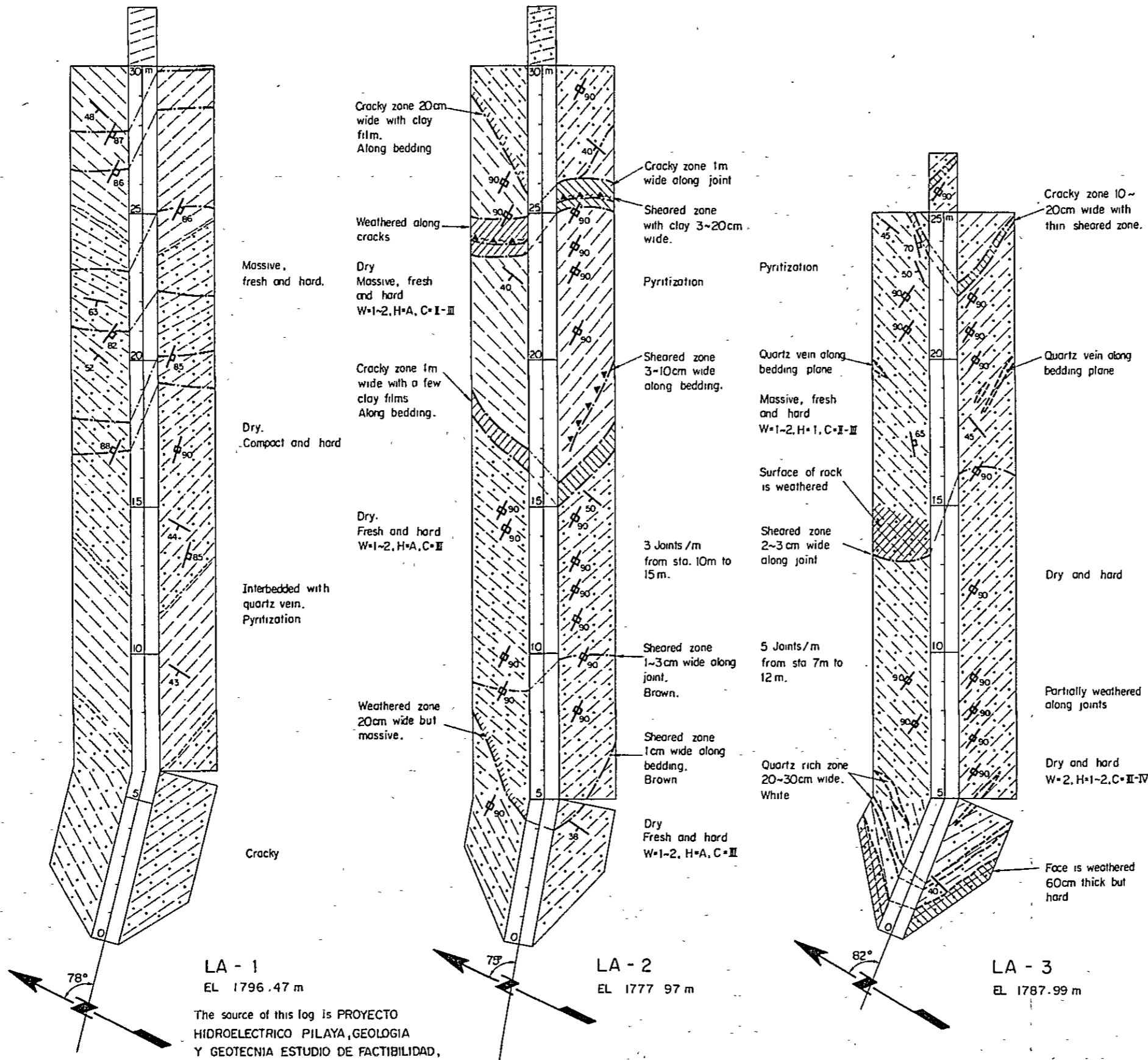
Keydiagram

Table A-II-2. Chemical Analysis of River Water

		the Rio Pilaya	the Rio Agua Caliente
pH		7.52	6.67
Conductivity	($\mu\text{s}/\text{cm}$)	1,400	135
Total Alkalinity as CaCO_3	(ppm)	121.0	49.7
Total Hardness as CaCO_3	(ppm)	660	56.7
Calcium Hardness as CaCO_3	(ppm)	320	36.0
Magnesium Hardness as CaCO_3	(ppm)	340	20.7
CO_3^{2-}	(ppm)	0.11	0.06
HCO_3^-	(ppm)	74.1	35.1
SO_4^{2-}	(ppm)	62.0	14.0
Cl^-	(ppm)	44.0	2.4
Ca^{2+}	(ppm)	128.0	14.4
Mg^{2+}	(ppm)	82.6	5.0
Na^+	(ppm)	70.4	2.8
OH^-	(ppm)	5.63×10^{-3}	7.97×10^{-3}
Turbidity	(ppm)	17,800	72
Suspended Solid	(ppm)	13,020	80
Particle Size	(μm)	2 ~ 7	2 ~ 5

Table A-II-3. Standard of Rock Evaluation

	Weathering	Hardness		Interval of cracks	
		A	B	I	II
1	Very fresh. No weathering of mineral component.			I	Over 100 cm
2	Fresh. Some minerals are weathered slightly. Usually no brown cracks.	B	Hard. Broken into pieces by strong hammer blow.	II	40 - 100 cm
3	Fairly fresh. Some minerals are weathered. Cracks are stained and sometimes with weathered material.	C	Brittle. Broken into pieces by medium hammer blow.	III	20 - 40 cm
4	Weathered. Fresh portions still remain partially.	D	Very brittle. Easy broken into pieces by medium hammer blow.	IV	5 - 20 cm
5	Strongly weathered. Most minerals are weathered and altered to second minerals.	E	Soft. Able to dig with hammer.	V	Under 5 cm



LEGEND

- Sandstone
- Quartzite
- Geologic boundary
- Sheared breccia weak line
- Strike and dip of stratum
- Strike and dip of joint
- Weathered or cracky zone

Note: W, H and C show the degree of weathering, hardness and cracking, respectively. See Table A-II-3.

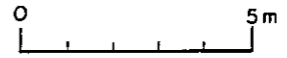
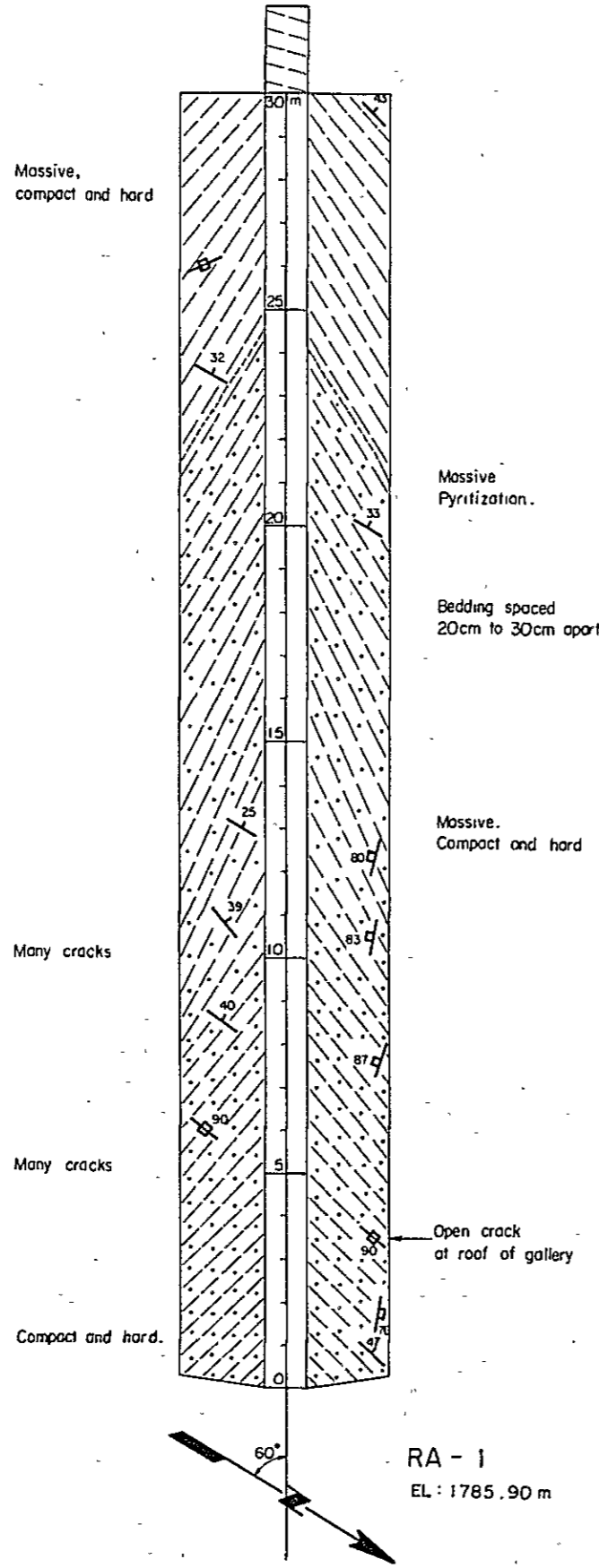


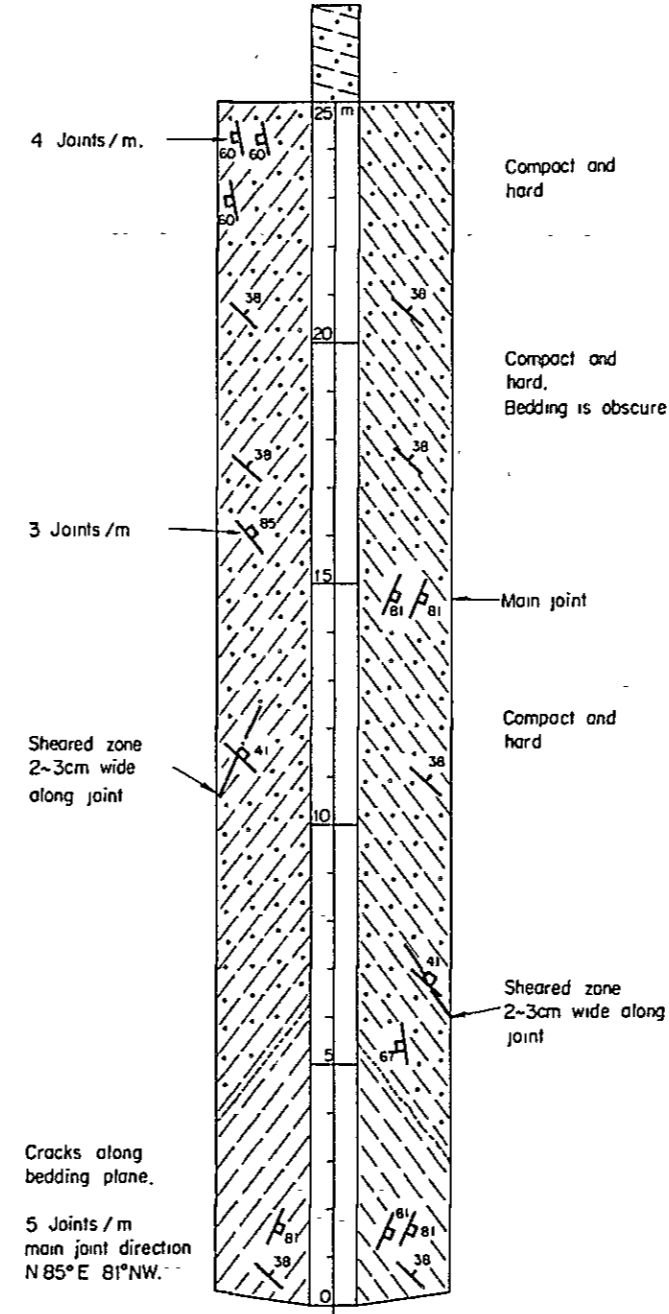
Fig. A - I - 1 (1)

LOGS OF EXPLORATORY ADIT

(1 - 3)



RA - 1
EL: 1785.90 m



RA - 2
EL: 1785.22 m

The Sources of these logs are PROYECTO HIDROELECTRICO PILAYA, GEOLOGIA Y GEOTECNIA ESTUDIO DE FACTIBILIDAD, FEBRERO 1981, by ENDE.

LEGEND

- Sandstone
- Quartzite
- Geologic boundary
- Strike and dip of stratum
- Strike and dip of joint

Note : W, H and C show the degree of weathering, hardness and cracking, respectively. See Table A-II-3

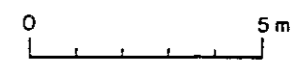
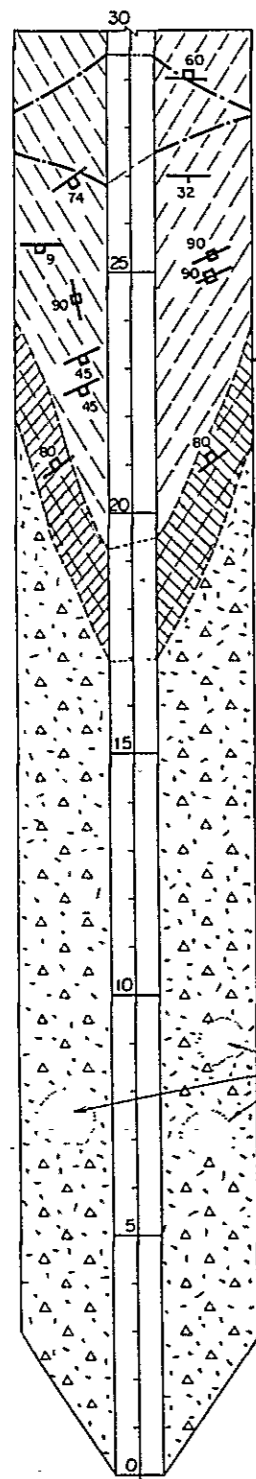


Fig. A - I - 1 (2)

LOGS OF EXPLORATORY ADIT
(2 - 3)

Massive in general but sheared along joint planes with clay film. Dry.



W=2, H=B, C=II

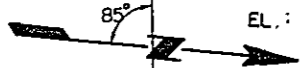
Weathered zone 2-3m thick. W=3, H=B-C, C=IV

Overburden, brownish gray. Mainly consists of soil and fragments (φ 10 ~20cm)

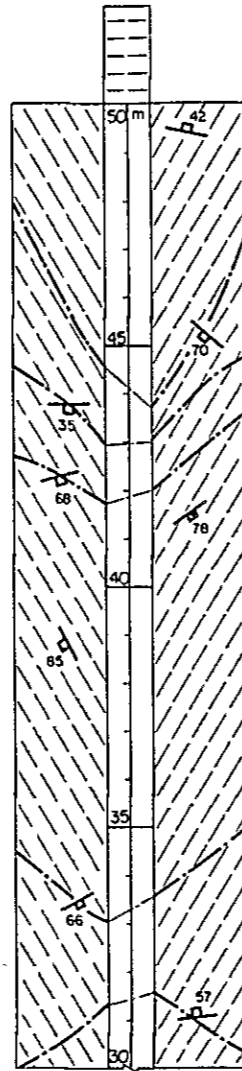
Boulders, φ 0.8-1.2m.

Overburden, reddish brown

S - 1
EL.: 1788.97 m



Massive, fresh and hard W=2, H=A-B, C=II



S - 1

Many cracks weathered along cracks. W=3, H=C, C=IV-V

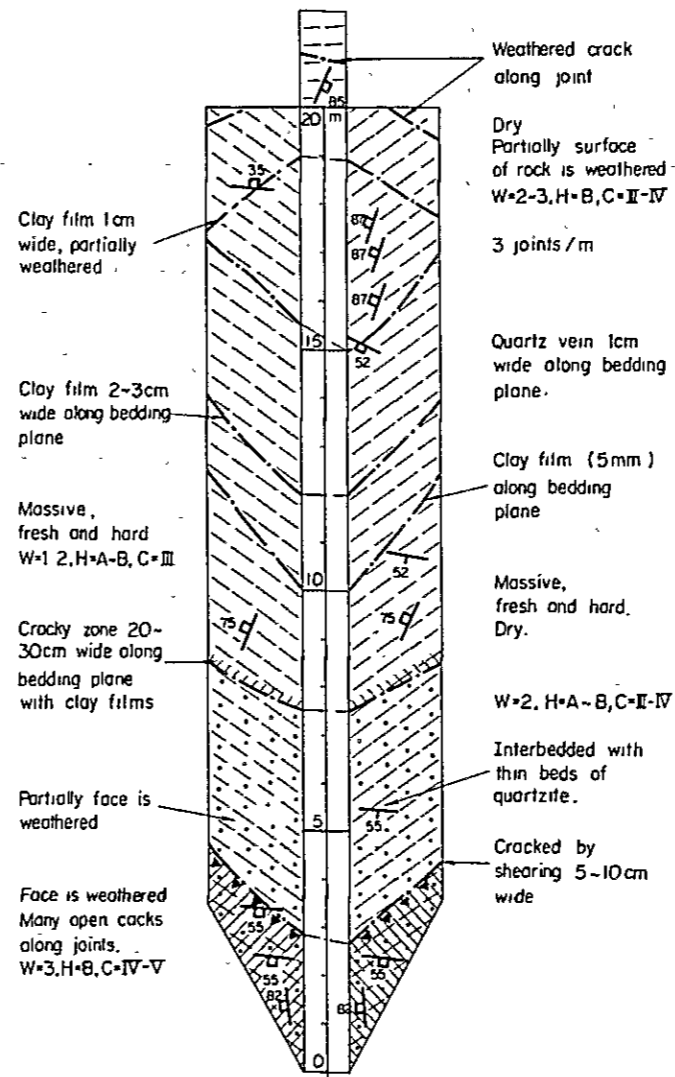
Fresh and hard W=2, H=B, C=III-IV

Overburden Soil with fragments (φ 5-20 cm)

P - 1
EL.: 1390.61 m



Dry Massive, fresh and hard W=2, H=A-B, C=II



P - 2
EL.: 1598.13 m



LEGEND

- Quaternary
 - Topsoil
 - Slope wash
- Ordovician
 - Sandstone
 - Quartzite
- Geologic boundary
- Sheared breccia weak line
- Strike and dip of stratum
- Strike and dip of joint
- Weathered or cracky zone

Note: W H and C show the degree of weathering, hardness and cracking, respectively See Table A-II-3

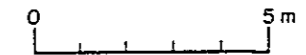


Fig. A - I - 1 (3)

LOGS OF EXPLORATORY ADIT

(3 - 3)



Table A-II-4. Classification of Core Character in Drill Hole

WEATHERING		HARDNESS		CRACK INTERVAL	
1	The rock is very fresh, and the rock forming minerals and grains are neither weathered nor deteriorated.	A	The rock is broken by strong blow of hammer into sharp edged pieces or fragments with sharp fractures.	I	Cracks and joints spaced more than 30 cm apart
2	The rock forming minerals and grains are partially sustained with slight weathering and deterioration. Some of cracks are slightly stained but lacked clayey materials.	B	The rock is broken by strong blow of hammer into pieces to fragments with some amount of rock powder.	II	Cracks and joints are spaced 10 to 30 cm apart
3	The rock forming minerals and grains are slightly softend and altered. Most of cracks, sometimes rock itself are stained by limonites etc. and some cracks are filled by clay materials.	C	The rock is broken by blow of hammer into small pieces to fragment with some amount of rock dust and powder.	III	Cracks and joints are spaced 5 to 10 cm apart
4	Almost rock forming minerals and grains excluding quartz are slightly softend and altered. Somewhere, unweathered parts are remained as block or gravelin weathered parts.	D	The rock is easily broken by blow of hammer. Sometimes snapped off by hands or can be whittled with a knife.	IV	Cracks and joints are spaced 1 to 5 cm apart
5	The rock forming minerals and grains are completely deteriorated and discolored, and rock is remarkably weathered and loosened.	E	The rock can be easily excavated with a hammer tip and easily broken with fingers and can be scratched by fingernail.	V	Cracks and joints are spaced less than 1 cm apart

Fig. A-II-2-(1) Geologic Log of Drill Hole

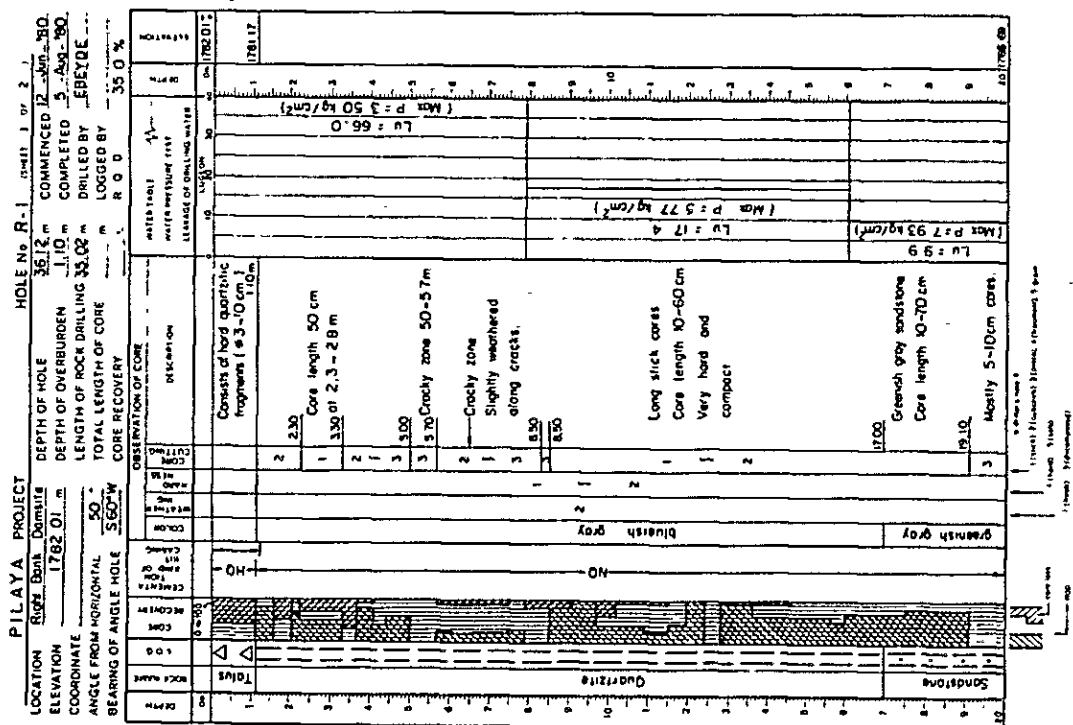


Fig. A-II-2-(1') Geologic Log of Drill Hole

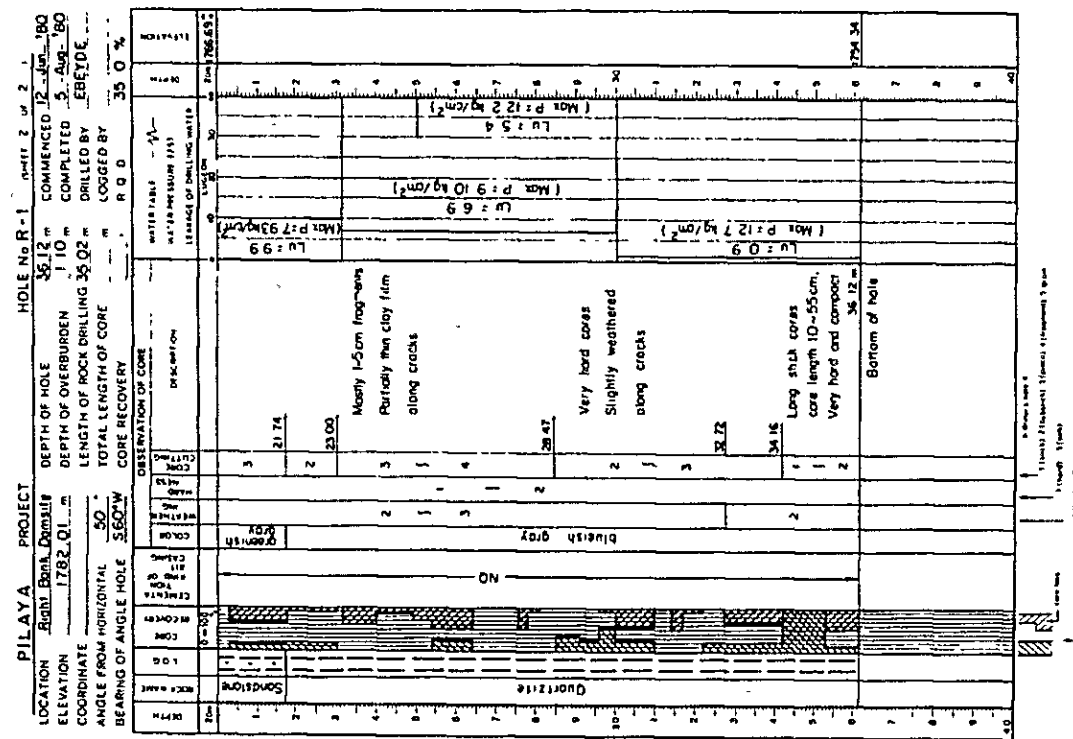


Fig. A-II-2-(2) Geologic Log of Drill Hole

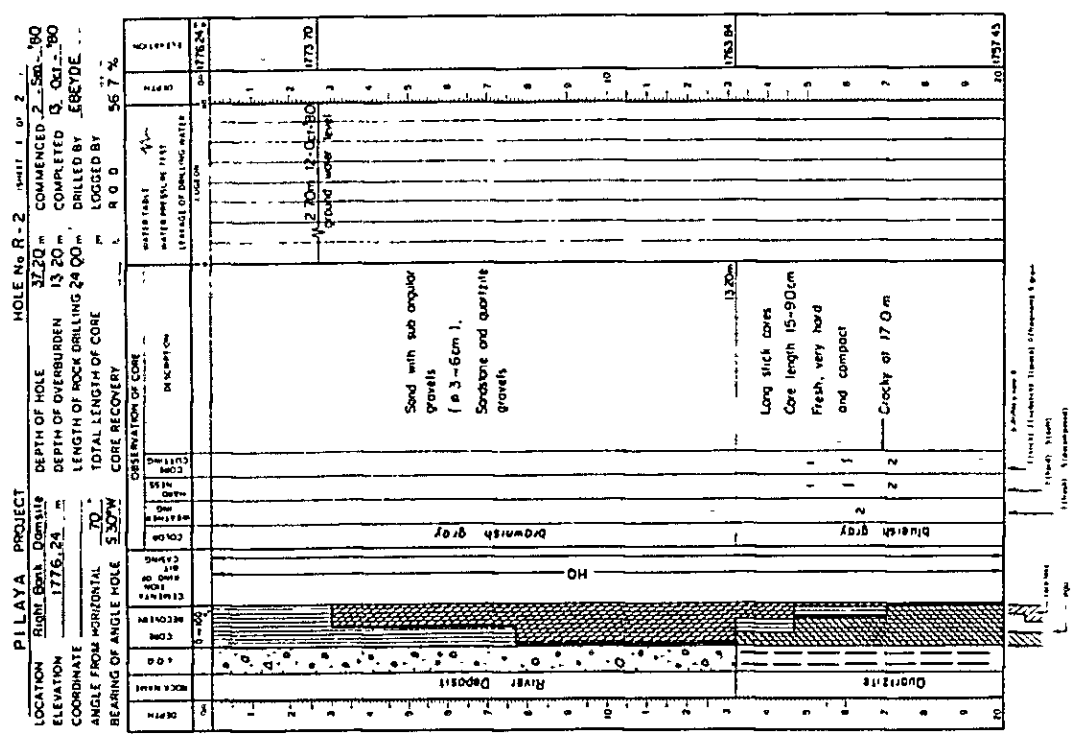


Fig. A-II-2-(2') Geologic Log of Drill Hole

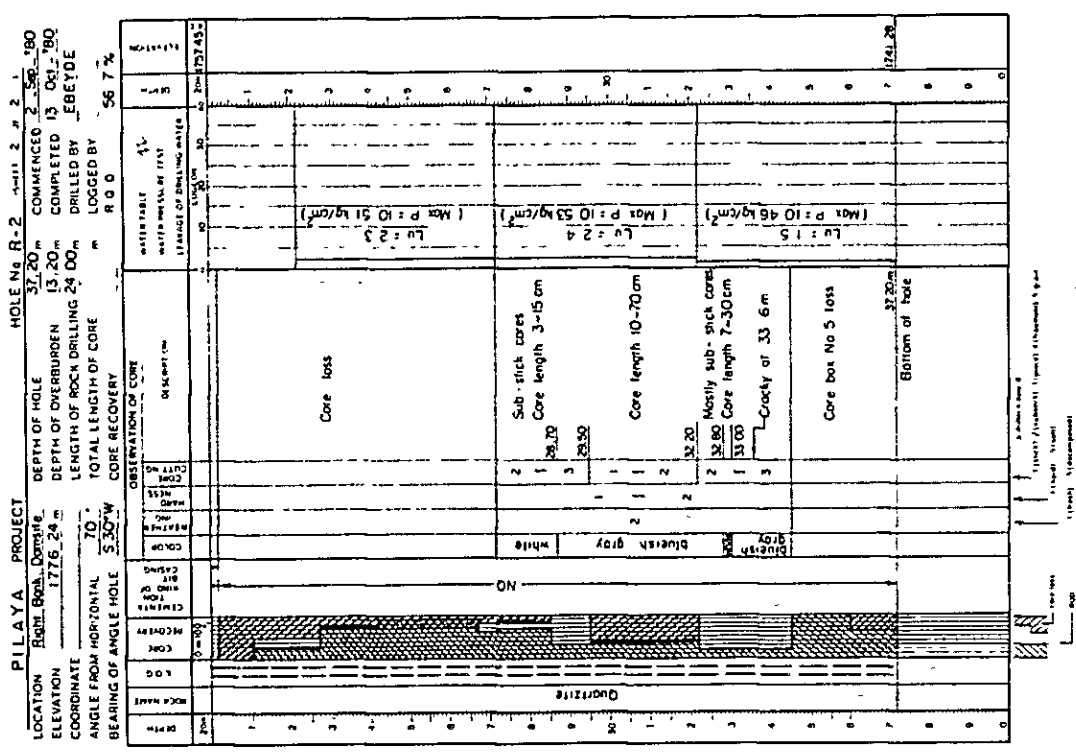


Fig. A-II-2-(3) Geologic Log of Drill Hole

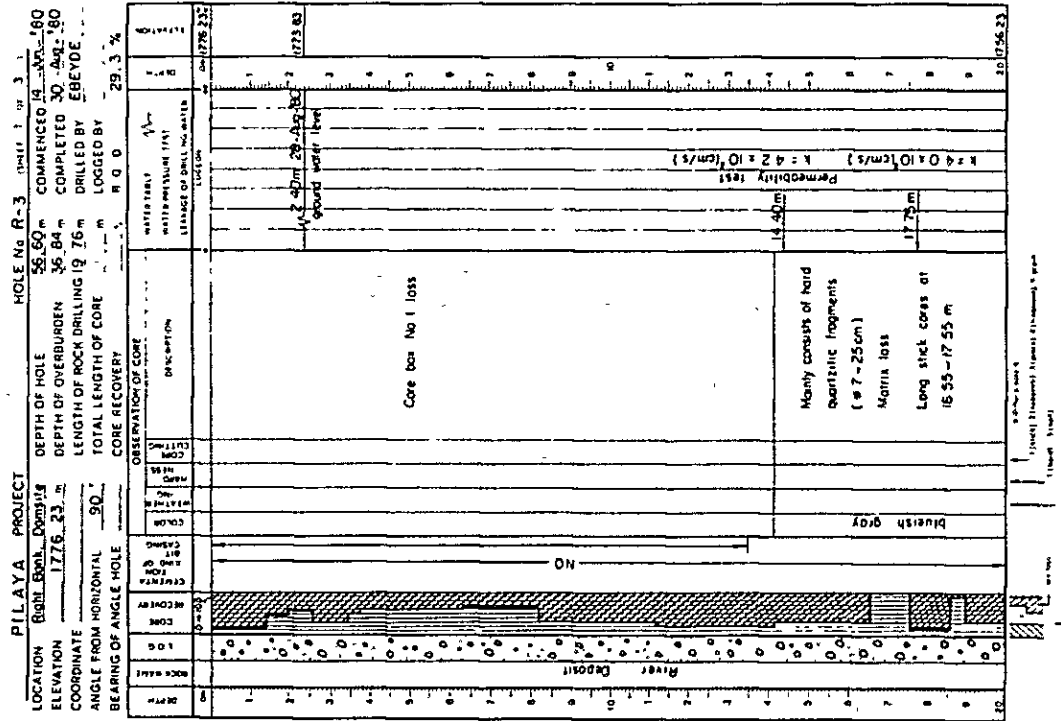


Fig. A-II-2-(3') Geologic Log of Drill Hole

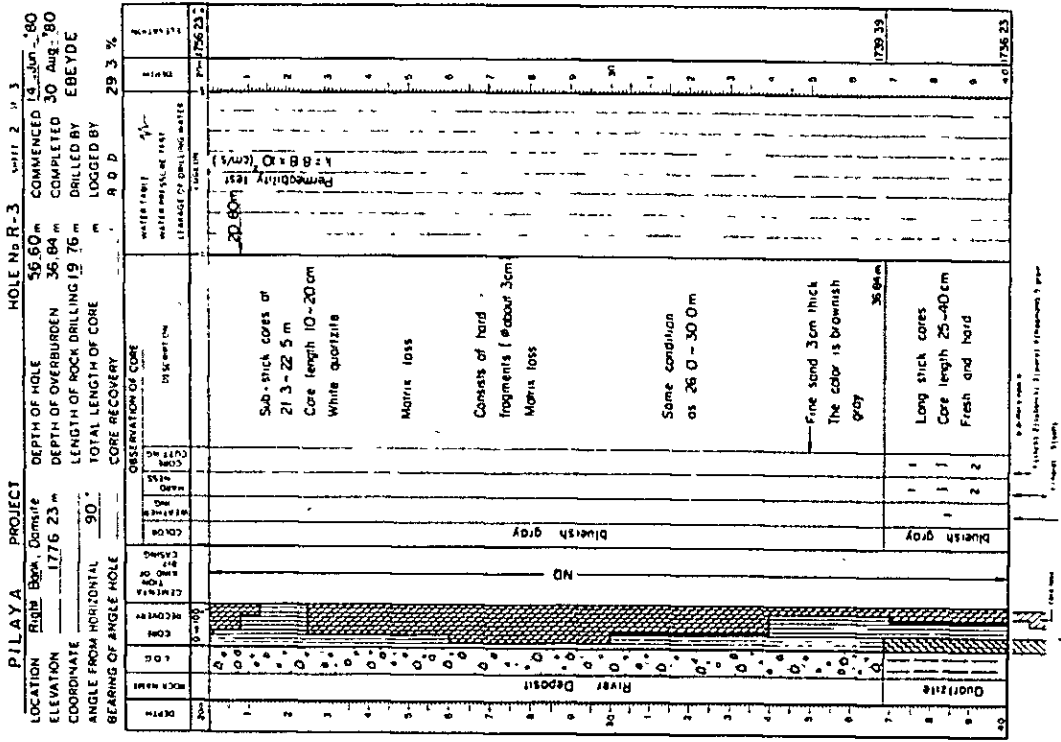
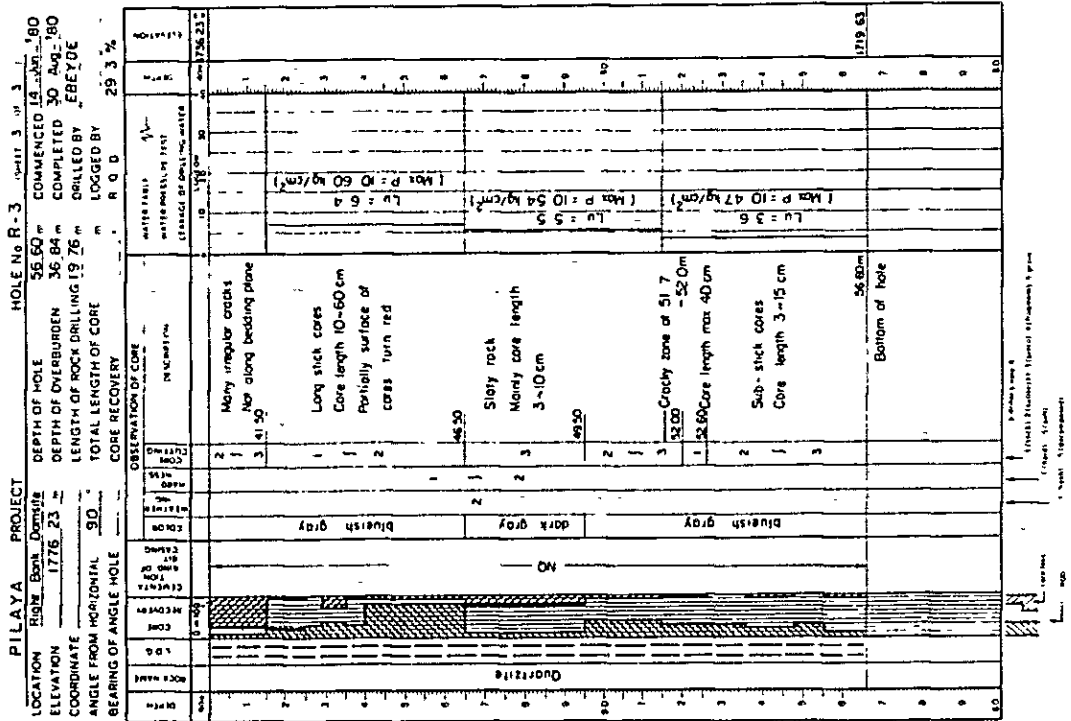


Fig. A-II-2-(3'') Geologic Log of Drill Hole



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Fig. A-II-2-(4) Geologic Log of Drill Hole

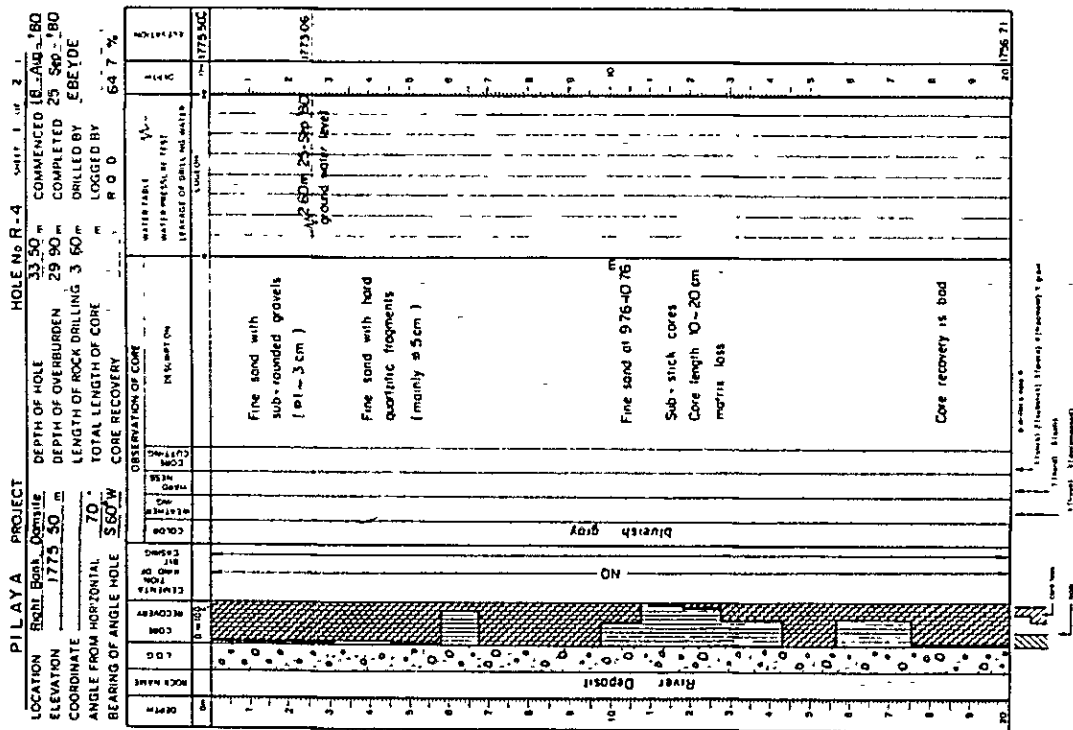


Fig. A-II-2-(4) Geologic Log of Drill Hole

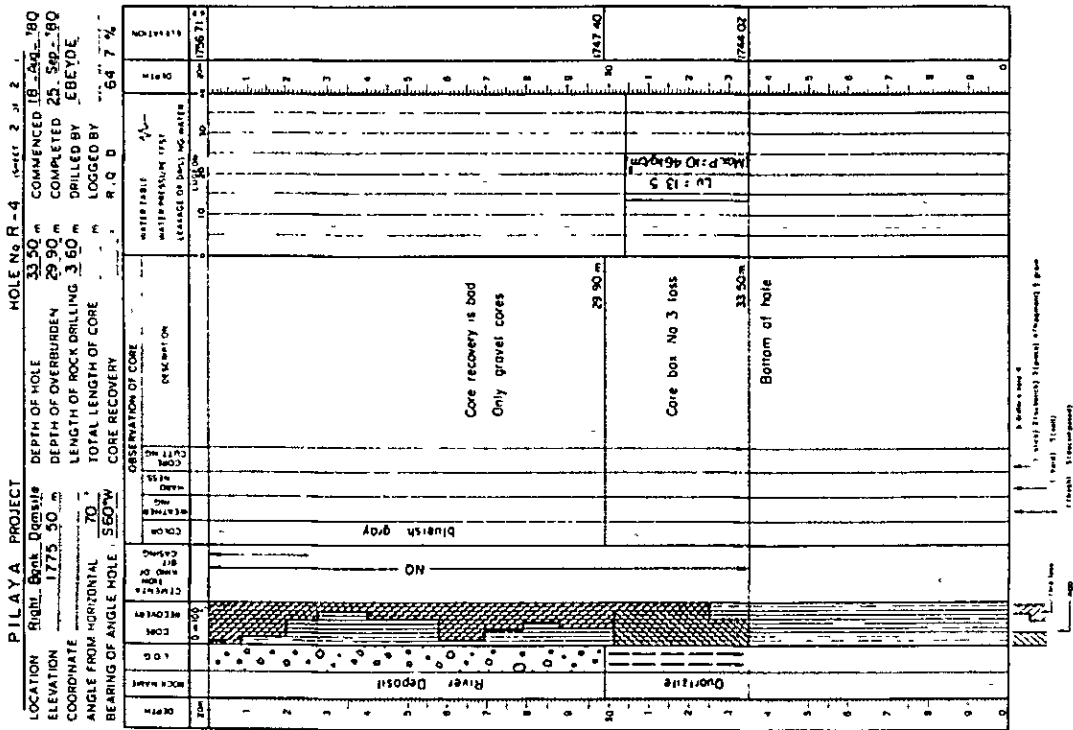
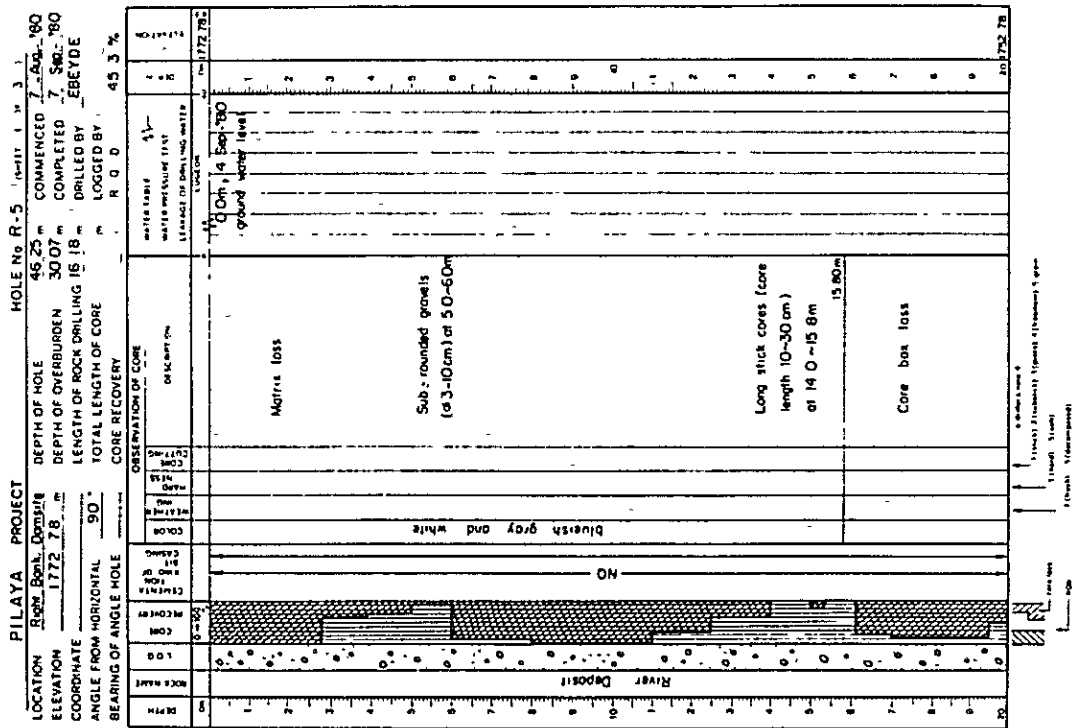
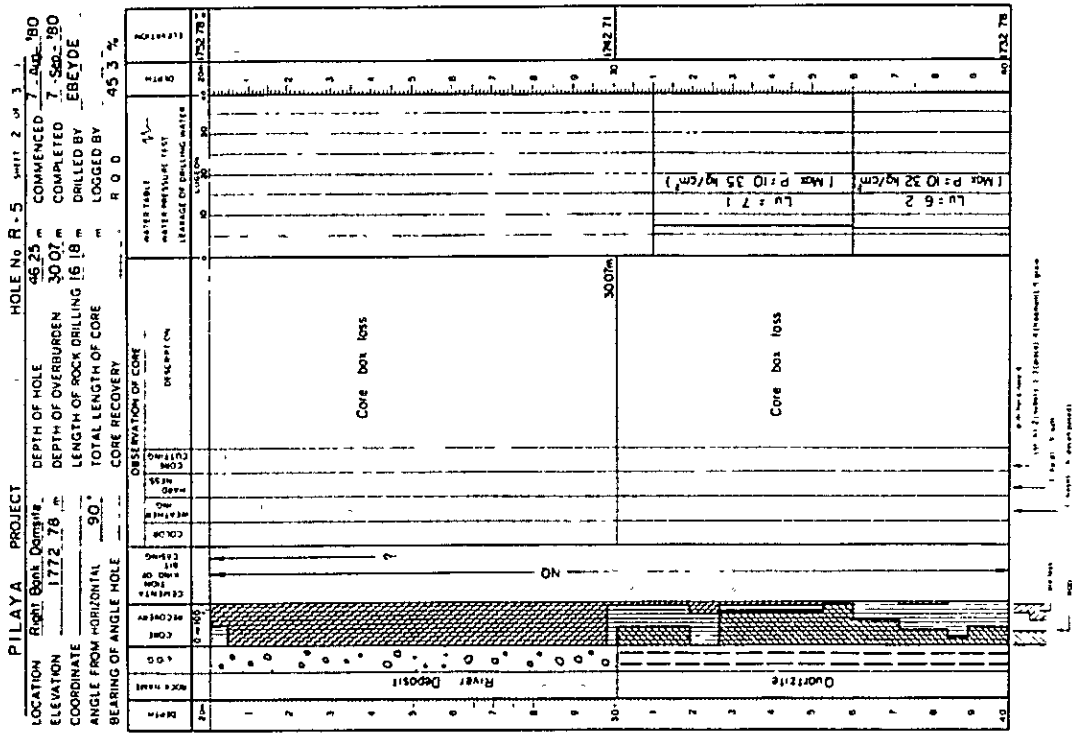


Fig. A-II-2-(5) Geologic Log of Drill Hole



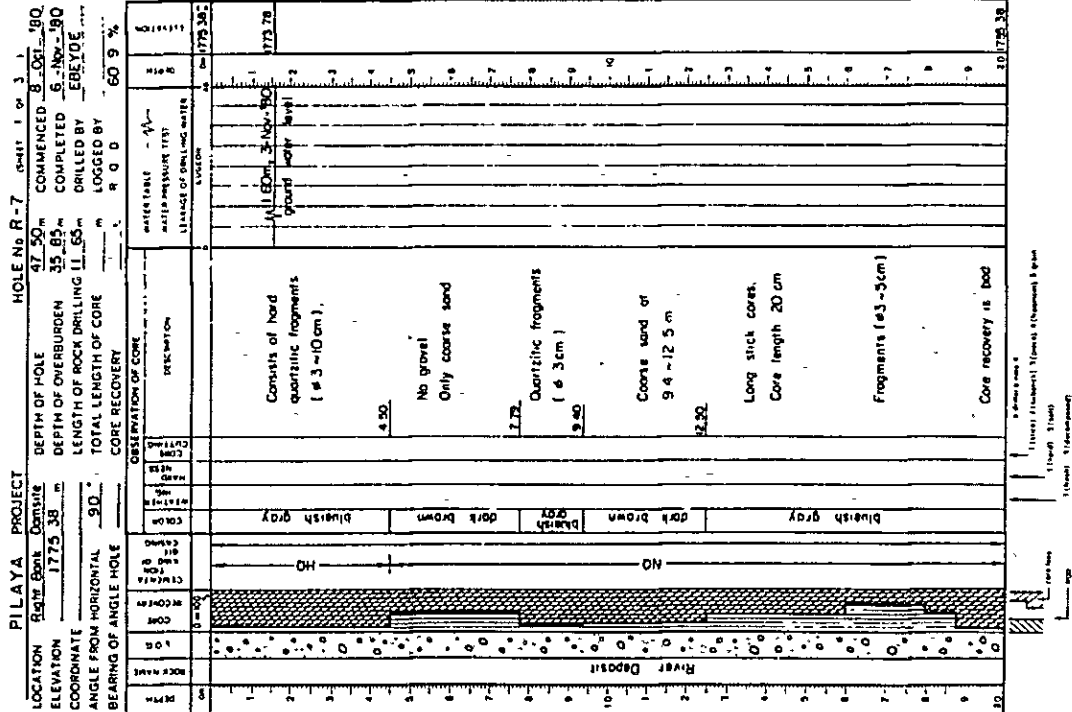
DAIICHI KAWAII INSTRUMENT CO. LTD.
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Fig. A-II-2-(5') Geologic Log of Drill Hole



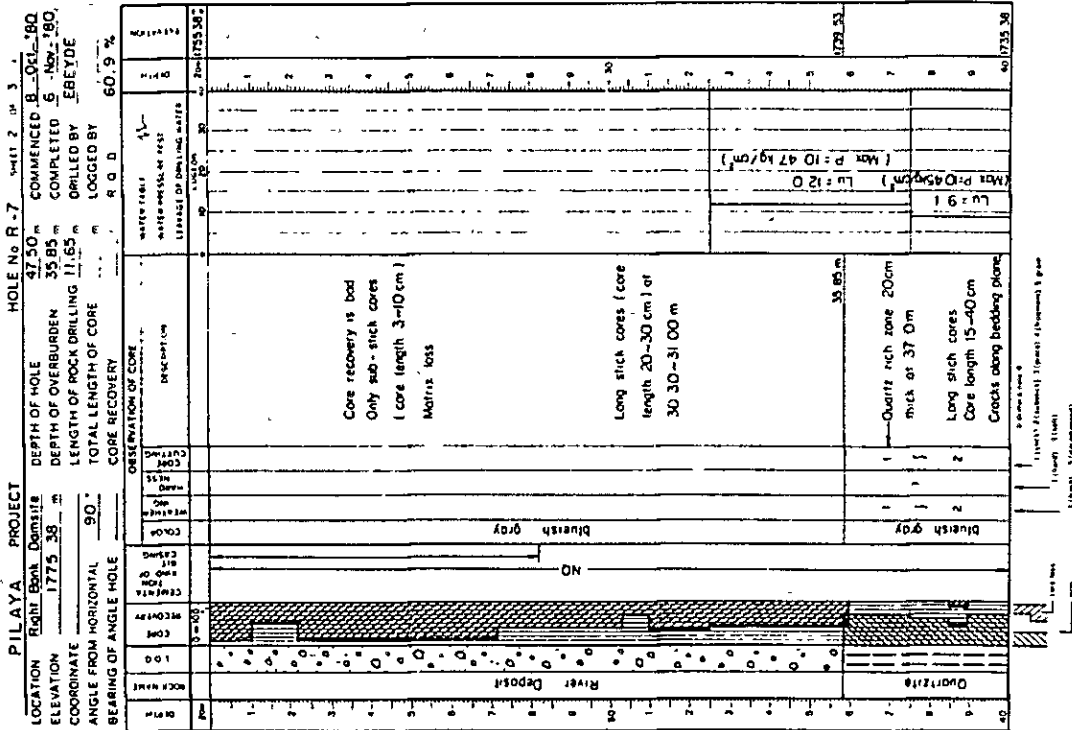
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Fig. A-II-2-(6) Geologic Log of Drill Hole



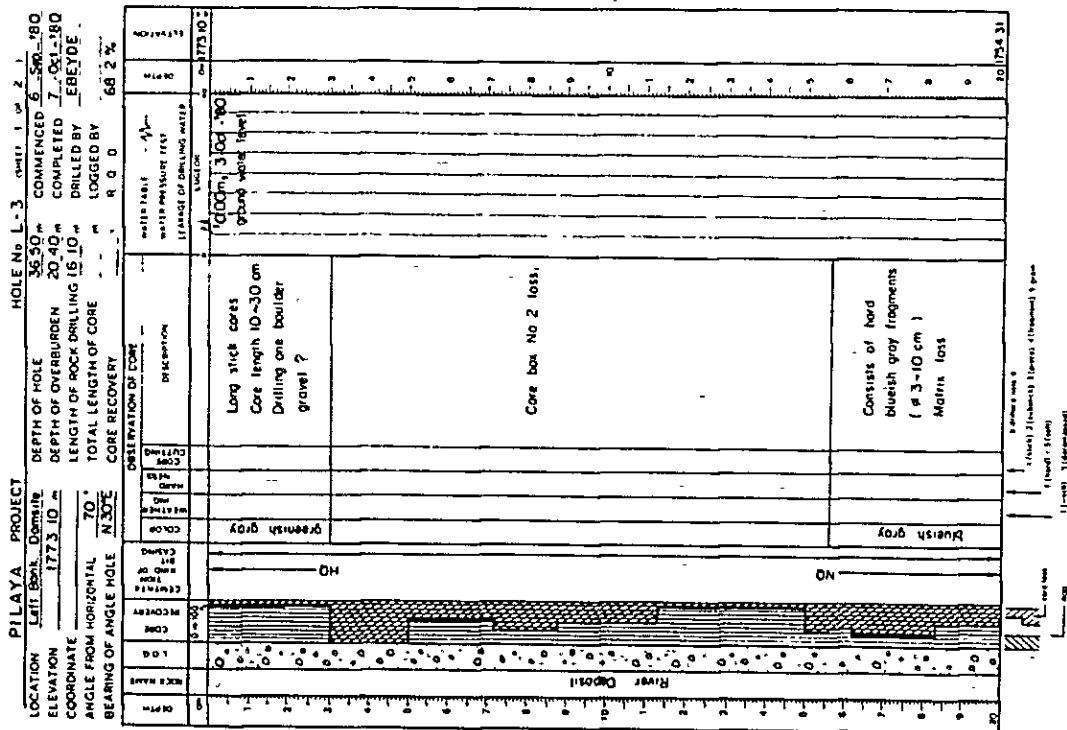
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Fig. A-II-2-(6') Geologic Log of Drill Hole



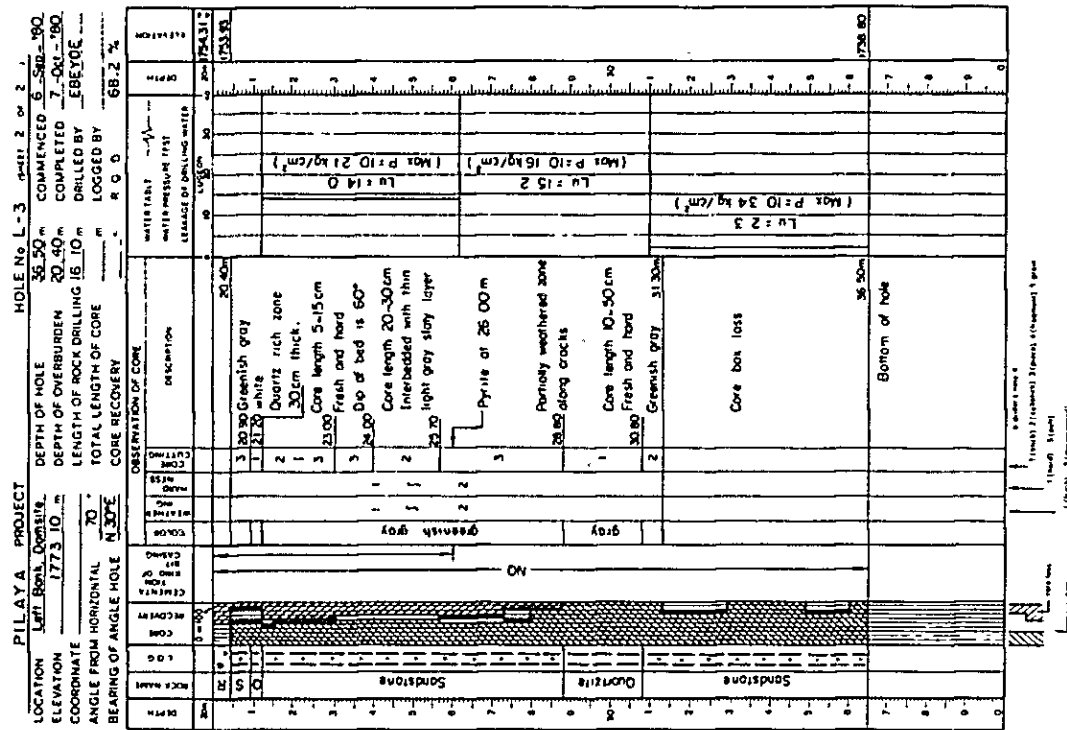
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Fig. A-II-2-(7) Geologic Log of Drill Hole



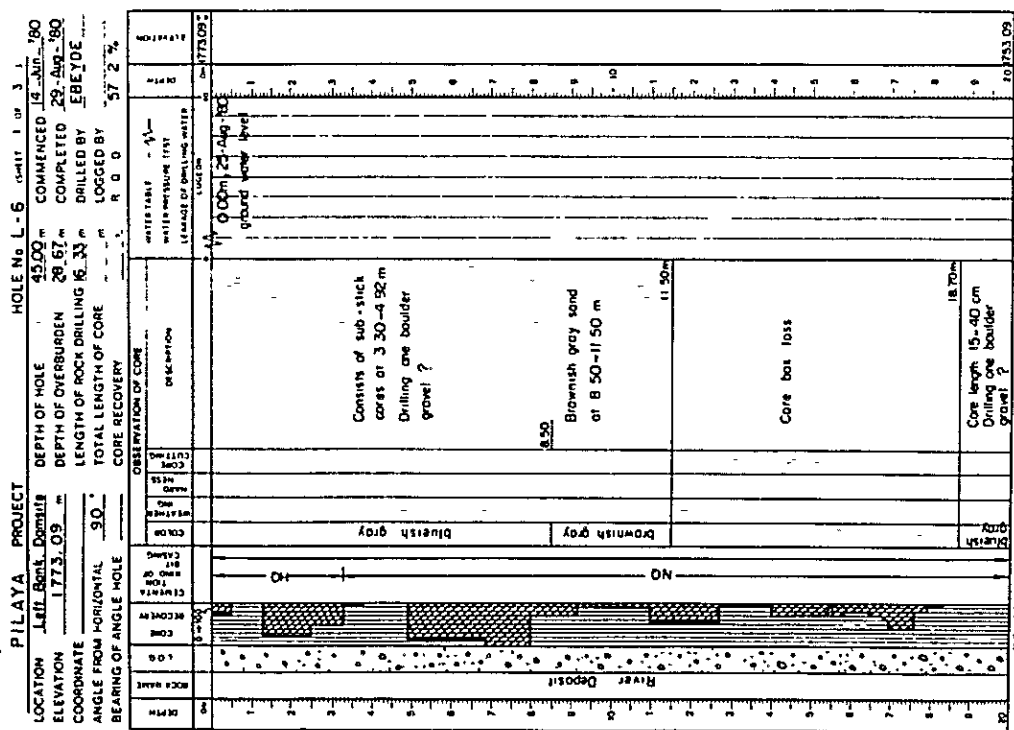
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Fig. A-II-2-(7') Geologic Log of Drill Hole



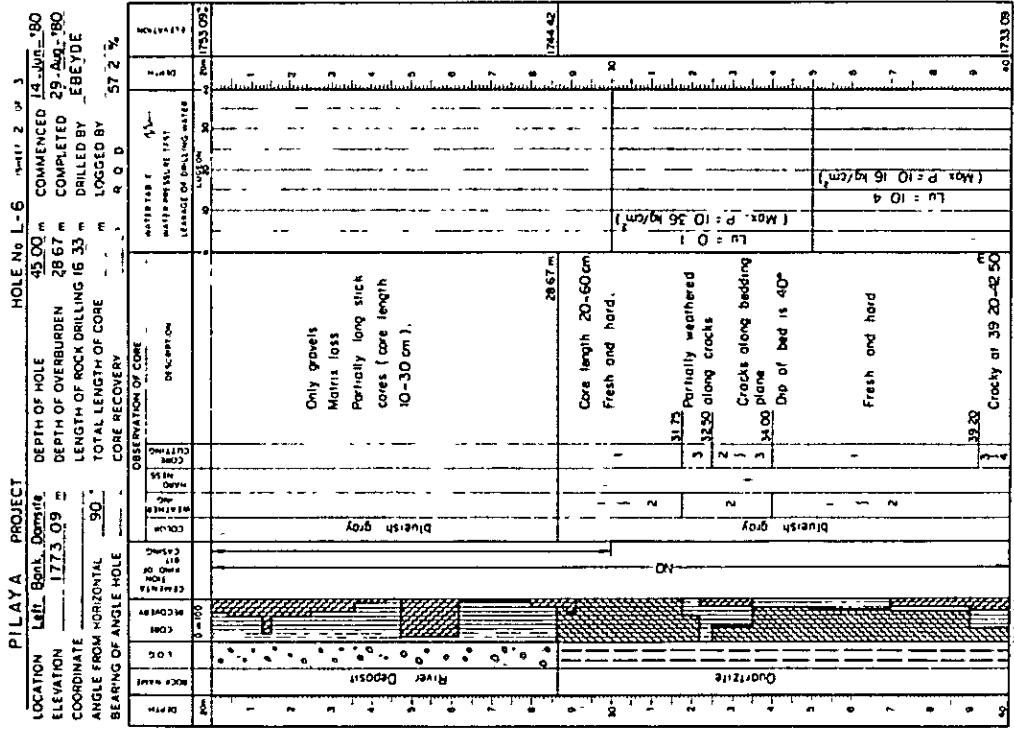
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Fig. A-II-2-(9) Geologic Log of Drill Hole



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Fig. A-II-2-(9') Geologic Log of Drill Hole



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Fig. A-II-2-(9') Geologic Log of Drill Hole

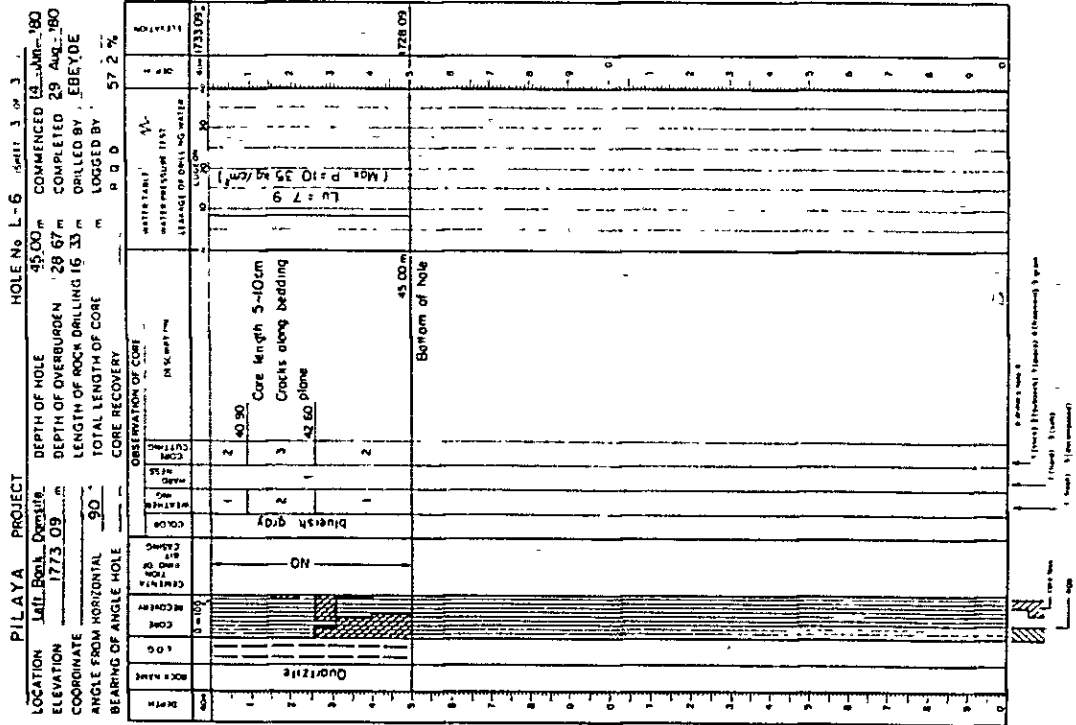


Fig. A-II-2-(10) Geologic Log of Drill Hole

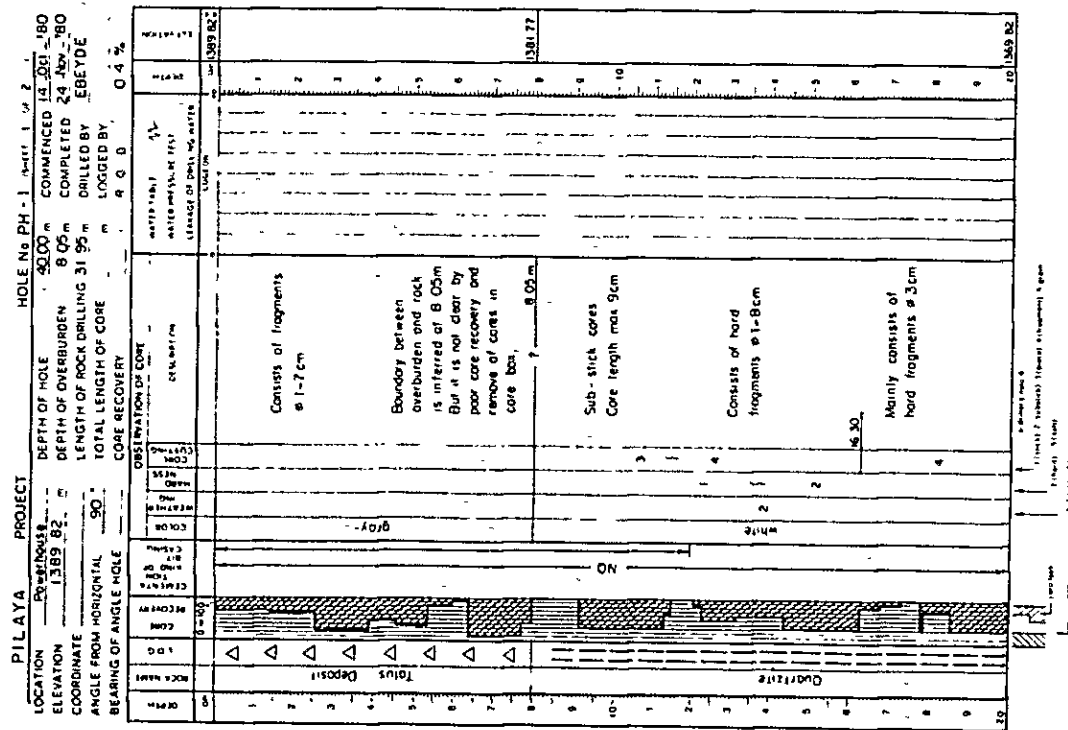


Fig. A-II-2-(10') Geologic Log of Drill Hole

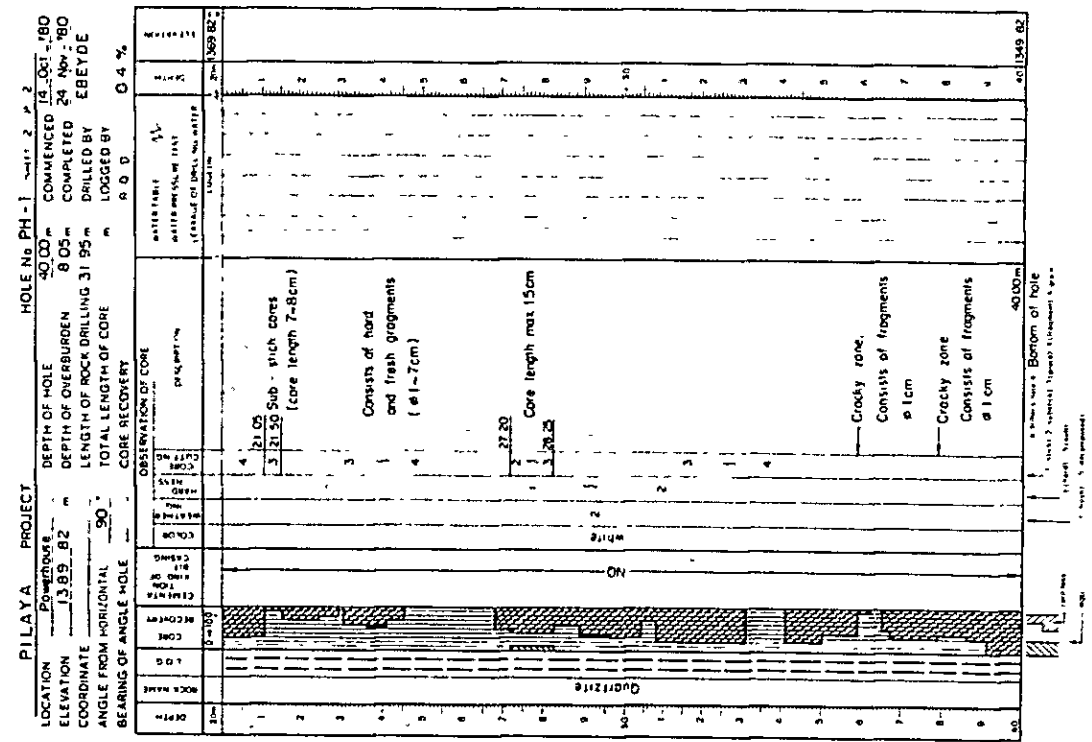
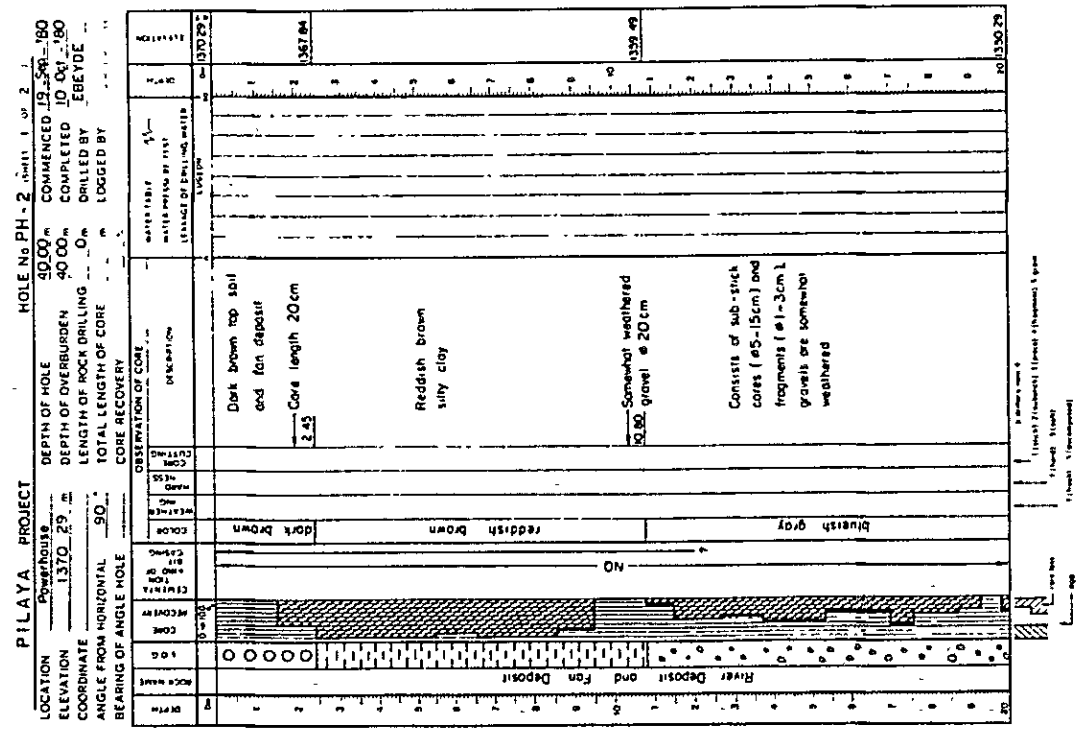
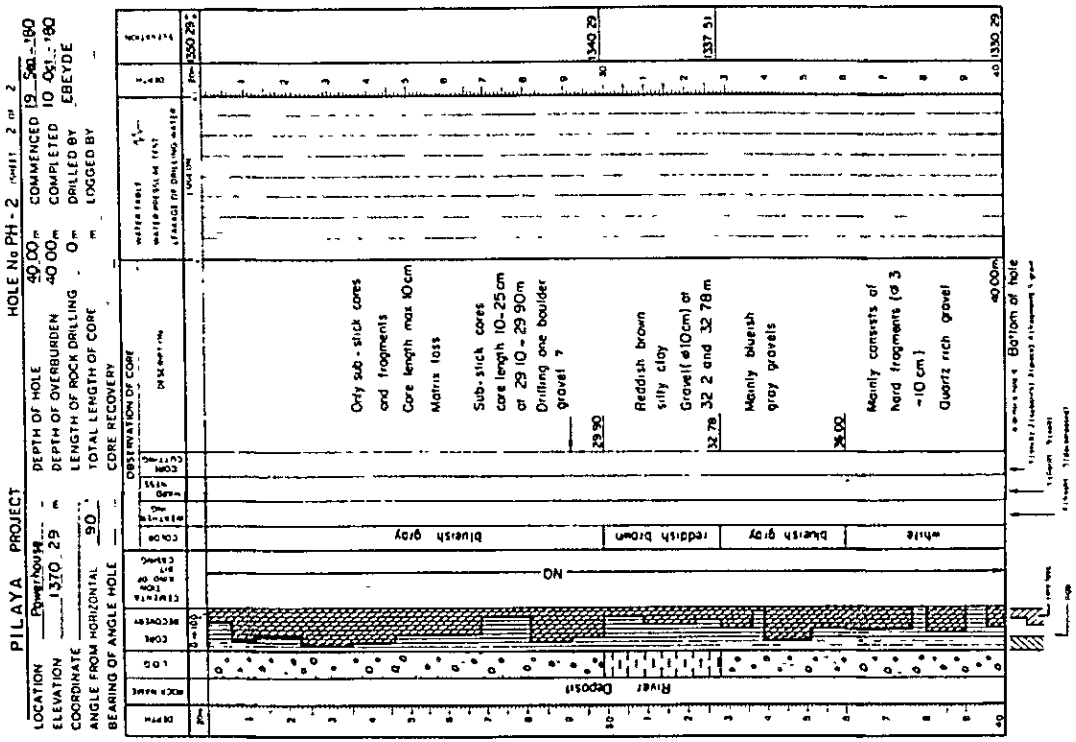


Fig. A-II-2-(11) Geologic Log of Drill Hole



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Fig. A-II-2-(11') Geologic Log of Drill Hole



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Fig. A-II-2-(12'') Geologic Log of Drill Hole

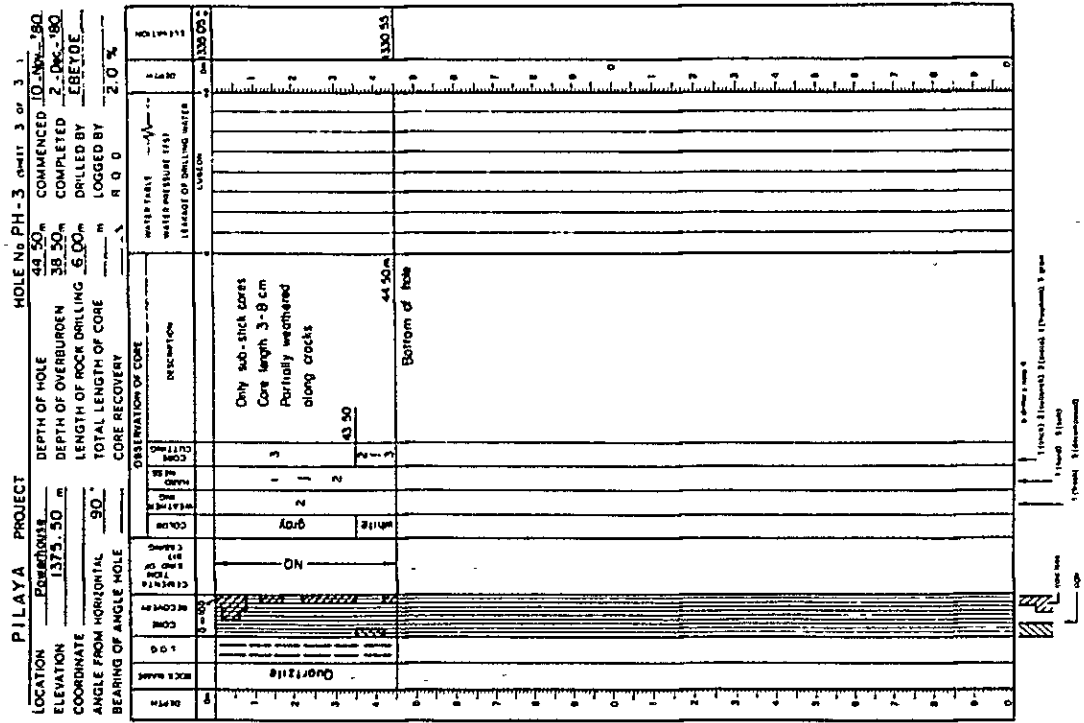
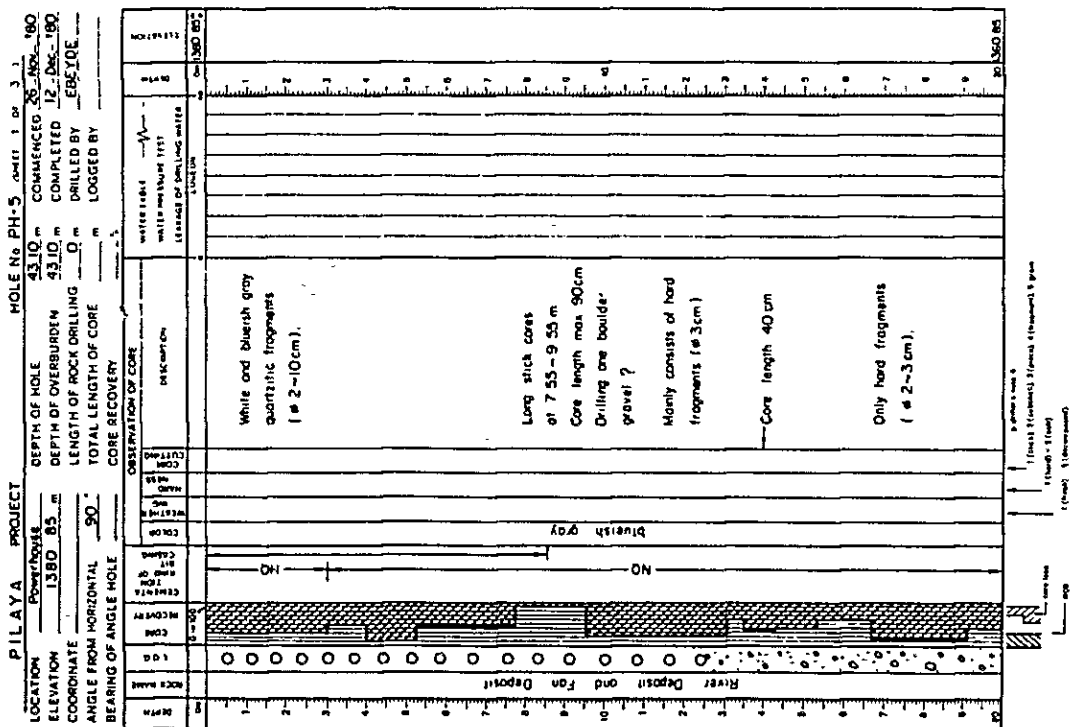
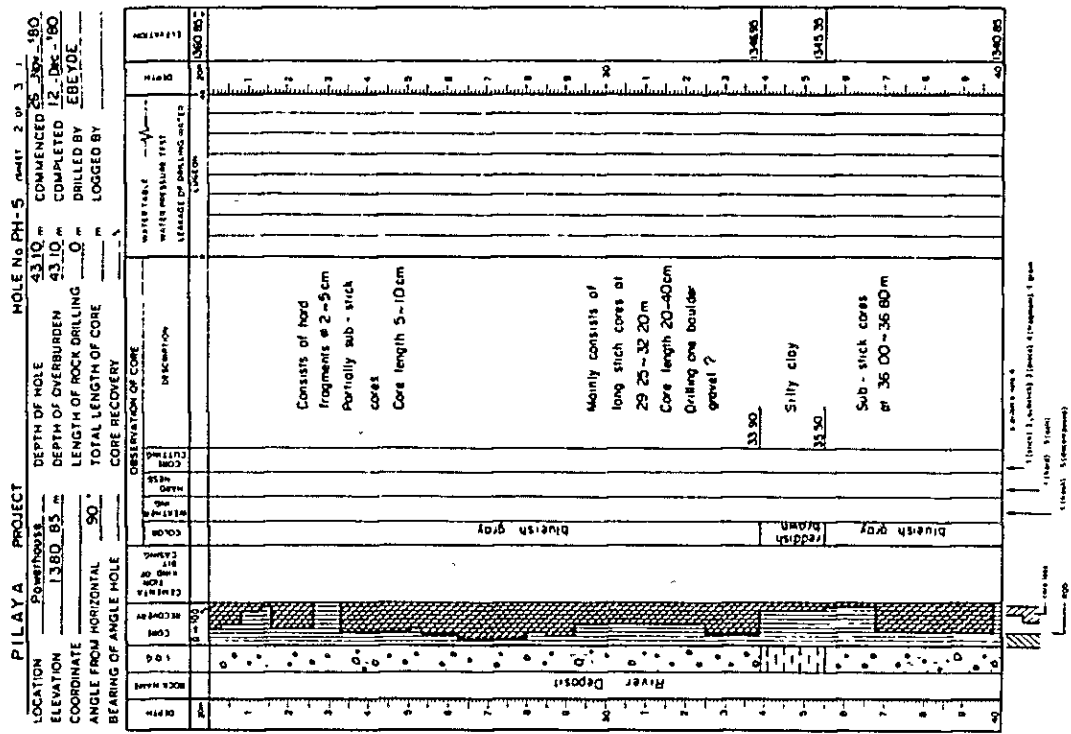


Fig. A-II-2-(13) Geologic Log of Drill Hole



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Fig. A-II-2-(13') Geologic Log of Drill Hole



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Fig. A-II-2-(13') Geologic Log of Drill Hole

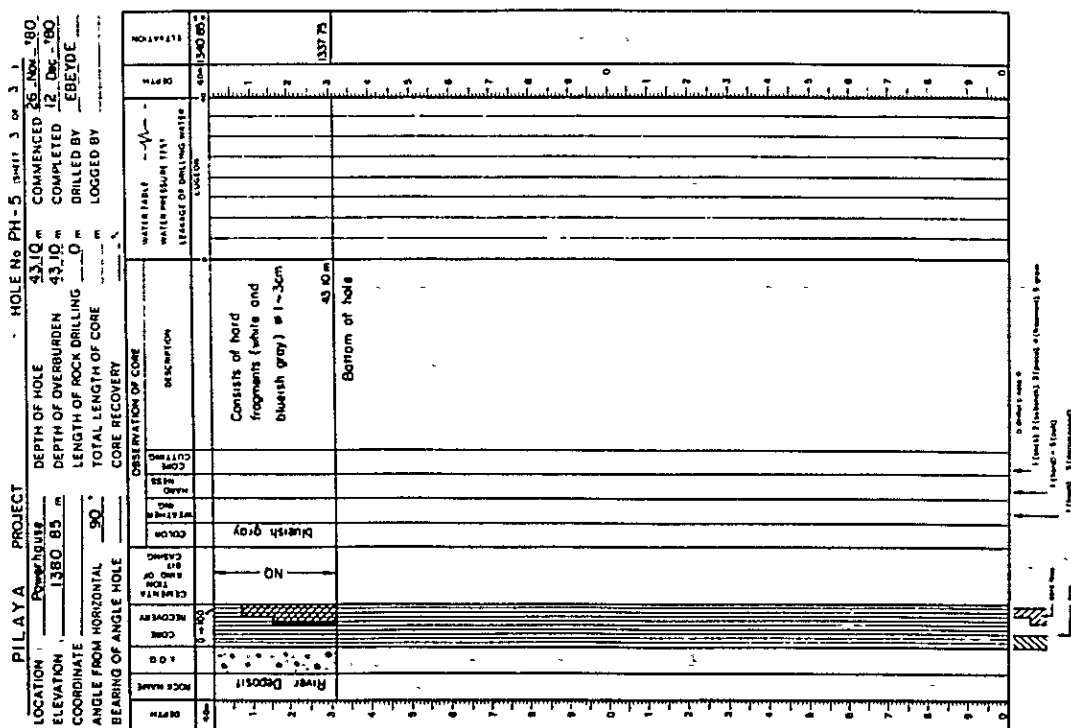


Table A-II-5-(1) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-1 SHEET NO. 1 of 6

Feature Location: Dam site Coordinates: 17° 7' -19° 0' Country: Project: Plans Date of test: 21-7-1980 Reporter: Firm name: 1

Elevation of top: 1782.01 m Diameter (ø) 75.7 mm Size: HQ Unsat. strata

Bore hole Dia: 30 * Bearing: S 60° W

Stage No: 1

Height of water gauge (m): 2.68

Test section: Top of packer: 0.00 m - 7.90 m

Length (L): 7.90 m

Temperature of injected water: °C

Flow rate: 150 l/min

Discharge: 30 kg/cm²

Effective pressure (kg/cm²): 30

Lugeon value (Lu): 65

Remarks: Unsat. strata

Time (hr:min)	Gauge Effective pressure (kg/cm ²)	Water pumped-in (l)	Lugeon value (Lu)
8:00	1 1.5	7.8	6.5
12:00	2 2.5	11.8	5.9
	3 3.5	18.6	66.0
	2 2.5	16.9	63.0
	1 1.5	10.6	89.0

Form A

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Table A-II-5-(1') Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-1 SHEET NO. 2 of 6

Feature Location: Dam site Coordinates: 21° 7' -19° 0' Country: Project: Plans Date of test: 21-7-1980 Reporter: Firm name: 1

Elevation of top: 1778.201 m Diameter (ø) 75.7 mm Size: HQ Unsat. strata

Bore hole Dia: 30 * Bearing: S 60° W

Stage No: 2

Height of water gauge (m): 2.15

Test section: Top of packer: 7.80 m - 16.04 m

Length (L): 8.14 m

Temperature of injected water: °C

Flow rate: 150 l/min

Discharge: 30 kg/cm²

Effective pressure (kg/cm²): 30

Lugeon value (Lu): 22.2

Remarks: Unsat. strata

Time (hr:min)	Gauge Effective pressure (kg/cm ²)	Water pumped-in (l)	Lugeon value (Lu)
8:00	5 2.45	3.32	3.00
	5 4.90	5.77	3.53
	5 2.45	3.32	3.06
	5 4.90	5.77	4.10

Form A

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Table A-II-5-(2) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO R-1 Sheet NO. 3 of 6

Feature			Project Pileys		Country	
Location Dam site			Coordinates		Reporter	
Date of test			Date of test		Firm name	
Elevation of top Dip			Diameter (ø) 75.7 mm		Size NO	
Bore hole			50°		Bearing S60°W	
Slope NO			3		Geometry	
Center of bottom			16.04 m		23.14 m	
Edge of packer			m		m	
Length (L)			7.1		m	
Height of water (H ₀)			1.70		m	
Temperature of injected water			°C		°C	
Tone Boring MAS-3C			Type		Type	
Discharge			150 L/min		1	
Pressure			50 kg/cm²		0.035 kg/cm²	
Type of packer			Single		Max 50 kg/cm²	
Effective pressure (kg/cm²)			P ₁ P ₀ = 1/10 (kg·ha)		n _s = head loss	
Luppon value (Lu) to be calculated by following equation			Luppon value (L ₀) to be calculated by following equation		L _u = 10 Q/P L	

Time (Elapsed) min	Charge μg/cm³ (Pr/g/cm³)	Effective pressure μg/cm³ (Pr/g/cm³)	Water pumped in (L/min) (L/min) (Total/L/min)	Luppon value (L _u)	Remarks	
13:30	5	3.15	4.78	200	4.0	
	5	6.30	7.93	275	5.5	
	5	3.15	4.78	200	4.0	
	5	6.30	7.93	280	5.6	

Table A-II-5-(2') Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO R-1 Sheet NO. 4 of 6

Feature			Project Pileys		Country	
Location Dam site			Coordinates		Reporter	
Date of test			Date of test		Firm name	
Elevation of top Dip			Diameter (ø) 75.7 mm		Size NO	
Bore hole			50°		Bearing S60°W	
Slope NO			4		Geometry	
Center of bottom			23.14 m		30.00 m	
Edge of packer			m		m	
Length (L)			6.85		m	
Height of water (H ₀)			1.45		m	
Temperature of injected water			°C		°C	
Tone Boring MAS-3C			Type		Type	
Discharge			150 L/min		1	
Pressure			50 kg/cm²		0.035 kg/cm²	
Type of packer			Single		Max 50 kg/cm²	
Effective pressure (kg/cm²)			P ₁ P ₀ = 1/10 (kg·ha)		n _s = head loss	
Luppon value (Lu) to be calculated by following equation			Luppon value (L ₀) to be calculated by following equation		L _u = 10 Q/P L	

Time (Elapsed) min	Charge μg/cm³ (Pr/g/cm³)	Effective pressure μg/cm³ (Pr/g/cm³)	Water pumped in (L/min) (L/min) (Total/L/min)	Luppon value (L _u)	Remarks	
8:00	5	3.5	5.6	126	25.2	6.5
	5	7	9.1	216	43.2	6.9
	5	3.5	5.6	135	27	6.2
	5	7	9.1	216	43.2	6.9

Table A-II-5-(3) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-1 Sheet No. 5 of 6

Feature Location	Dem site	Coordinates	Date of test	Project	Country
		50° 5' 30" N 172° 01' 00" E		Pitaya Unaturated strata	
Bore hole	Elevation of top	Dia	50"	Drilling	560' W
Test section		Depth of packer	25.00 m	30.00 m	Geology
		Length (L)	5.00 m		
Height of water table (H ₀)	17.2	Temperature of mixing water			
Water table (H ₀)	17.2	Temperature of mixing water			
Drill	3000 m	Type	Tone Boring MAS-XC		
Discharge	150	Flow rate	27/min		
Type of packer	Single	Effective pressure (kg/cm ²)	30		
		Lugeon value (Lu)	50		
		Effective pressure (kg/cm ²)	Pa = 1/10 (H ₀ - H ₁)		
		Lugeon value (Lu)	Lu = 10 Q/P L		

Time (hr:min)	Gauge Effective pressure (kg/cm ²)	Effective pressure (kg/cm ²)	Integrated (Sectional) (mm ³ /min)	water pumped (m ³)	Lugeon value (Lu)	Remarks
8:00	1	3.2	10	10	6.2	
1	1	5	7.2	24	6.6	
1	1	10	12.2	33	5.4	
1	1	5	7.2	17	4.7	
1	1	3.2	0	0	0	

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Table A-II-5-(3') Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-1 Sheet No. 6 of 6

Feature Location	Dem site	Coordinates	Date of test	Project	Country
		50° 5' 30" N 172° 01' 00" E		Pitaya Unaturated strata	
Bore hole	Elevation of top	Dia	50"	Drilling	560' W
Test section		Depth of packer	30.00 m	36.12 m	Geology
		Length (L)	6.12 m		
Height of water table (H ₀)	24.1	Temperature of mixing water			
Water table (H ₀)	24.1	Temperature of mixing water			
Drill	3000 m	Type	Tone Boring MAS-XC		
Discharge	150	Flow rate	27/min		
Type of packer	Single	Effective pressure (kg/cm ²)	30		
		Lugeon value (Lu)	50		
		Effective pressure (kg/cm ²)	Pa = 1/10 (H ₀ - H ₁)		
		Lugeon value (Lu)	Lu = 10 Q/P L		

Time (hr:min)	Gauge Effective pressure (kg/cm ²)	Effective pressure (kg/cm ²)	Integrated (Sectional) (mm ³ /min)	water pumped (m ³)	Lugeon value (Lu)	Remarks
8:00	1	3.7	0	6	0	
1	1	5	7.7	4	0.8	
1	1	10	12.7	7	0.9	
1	1	5	7.7	3.5	0.7	
1	1	3.7	0	0	0	

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Table A-II-5-(4) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-2 SHEET NO. 1 of 3

Feature	Project		Country			
Location	Date of test		Reporter			
Drill site	Date of test		Firm name			
Bore hole	Element of top	1,776.24 m	Diameter (ø)	75.7 mm	Size	HQ
	Dip	70°	Beating	530°W	Unstagnated strata	
Test section	Stage HQ	2	Geology			
	Depth of water	2,720 m	32.20 m			
Length of	Depth of water	2,720 m				
	Length (L)	5.00 m				
Temp. of	Temp. of water	2.70	Temperature of injected water			
	Temp. of air	2.70				
Time	Time	150	Time	30	Time	30
	Time	150	Time	30	Time	30
Type	Single	50	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²
	Single	50	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²
e.e. Effective pressure (kg/cm ²): $P = P_0 + 1/10 (P_1 - P_2)$ $h_0 =$ head loss Lugeon value (Lu) to be calculated by following equation Lugeon value (Lu) = $10 \times Q / P \cdot L$						

Time hr. min.	Gauge pressure mm Hg/cm ²	Effective pressure kg/cm ²	Water pumped in		Lugeon value (Lu)	Remarks
			Integrated	Sectional		
7:00	1	1.51	3	3	3.9	
11:30	1	5.51	7	7	2.9	
	1	10	12	12	2.3	
	1	5	6	6	2.2	
	1	1.51	3	3	3.9	

Form A

ELECTRIC POWER DEVELOPMENT CO. TOKYO, JAPAN

Table A-II-5-(4) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-2 SHEET NO. 2 of 3

Feature	Project		Country			
Location	Date of test		Reporter			
Drill site	Date of test		Firm name			
Bore hole	Element of top	1,776.24 m	Diameter (ø)	75.7 mm	Size	HQ
	Dip	70°	Beating	530°W	Unstagnated strata	
Test section	Stage HQ	2	Geology			
	Depth of water	2,720 m	32.20 m			
Length of	Depth of water	2,720 m				
	Length (L)	5.00 m				
Temp. of	Temp. of water	2.70	Temperature of injected water			
	Temp. of air	2.70				
Time	Time	150	Time	30	Time	30
	Time	150	Time	30	Time	30
Type	Single	50	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²
	Single	50	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²
e.e. Effective pressure (kg/cm ²): $P = P_0 + 1/10 (P_1 - P_2)$ $h_0 =$ head loss Lugeon value (Lu) to be calculated by following equation Lugeon value (Lu) = $10 \times Q / P \cdot L$						

Time hr. min.	Gauge pressure mm Hg/cm ²	Effective pressure kg/cm ²	Water pumped in		Lugeon value (Lu)	Remarks
			Integrated	Sectional		
18:00	1	1.53	4.7	4.7	6.1	
22:00	1	5.53	7.7	7.7	2.8	
	1	10	12.6	12.6	2.4	
	1	5	7.6	7.6	2.7	
	1	1.53	4.8	4.8	6.3	

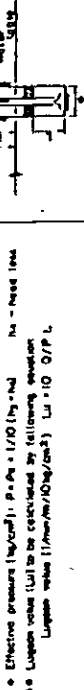
Form A

ELECTRIC POWER DEVELOPMENT CO. TOKYO, JAPAN

Table A-II-5-(5) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-2 Sheet No. 3 of 3
 Feature Location: Dain site
 Project: Pilayo
 Country: Rep. of Japan
 Coordinates: 12° 10' - 1980
 Firm name: Unpublished state

Well No.	019	70°	5.307 m
Elevation of O.B.	1,776.24 m	Diameter (ø)	75.7 mm 3.34 in
Stage No.	3	Casing	5.307 m
Depth of water in test section	3.20 m - 37.20 m	Concept	
Length (L)	5.00 m		
Water head (H)	2.35	Temperature of water	°C
Water depth	2.70	Type	
Time bearing H ₄₅₋₃₀			
Flow rate	1.90 m ³ /min	Flow rate	l/min
Pressure	5.0 kg/cm ²	Flow rate	0.033 m ³ /cm ³
Flow rate	5.0 m ³ /cm ³	Flow rate	50 m ³ /cm ³



Time	Group pressure (kg/cm ²)	Effective pressure (kg/cm ²)	Water pumped in (liters)	Water pumped in (m ³)	Water pumped in (cm ³)	Remarks
hr : min	(Excess)	(Permeation)	(Total)	(Total)	(Total)	
7:00	1	1.46	2	2	2.7	
17:00	1	5.46	4	4	1.5	
	1	10.46	8	8	1.5	
	1	5.46	4	9	1.5	
	1	1.46	0	0	0	

Table A-II-5-(6) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-3 Sheet No. 1 of 3

Feature Location	Project Name	Coordinates	Country
Dam site	Date of test	28 - 8 - 1980	Reporter
			Firm name

Bore hole	Elevation of top	1,776.23 m	Diameter (ø)	73.7 mm	Size NO
	Dip	90 °	Bearing		
Test section	Slope NO	1	Geology		
	Depth of center of test section	41.50 m			
	Length (L)	5.00 m			
Height of water gauge (h)	3.66		Temperature of collected water	°C	
Water gauge (No.)	2.40		Type		
Time Boring MAS-3C	150	27 min	Discharge	1	
Max. pressure	50	kg/cm ²	Min.	0.035	kg/cm ²
Type of packer	Single		Max.	50	kg/cm ²

• Effective pressure (kg/cm²): $P = P_0 + 1/10 (h_0 - h_d)$ h_0 - head loss
 • Luggon value (Lu) to be calculated by following equation
 Luggon value (Lu) = $(1.1 \times \text{min. discharge}) / (L \times 10 \text{ O/P.L.})$

Time (hr)	Effective pressure (kg/cm ²)	Water pumped in (m ³)	Sectional flow (l/min)	Flow (l/min)	Luggon value (Lu)	Remarks
8:00	1	1.60	6	0	0	
	1	5	3.60	19	1.9	6.7
	1	10	10.60	34	3.4	6.4
	1	5	3.60	20	2.0	7.1
	1	1	1.60	0	0	0

Form A

ELECTRIC POWER DEVELOPMENT CO. TOKYO, JAPAN

Table A-II-5-(6) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-3 Sheet No. 2 of 3

Feature Location	Project Name	Coordinates	Country
Dam site	Date of test	29 - 8 - 1980	Reporter
			Firm name

Bore hole	Elevation of top	1,776.23 m	Diameter (ø)	73.7 mm	Size NO
	Dip	90 °	Bearing		
Test section	Slope NO	2	Geology		
	Depth of center of test section	46.30 m			
	Length (L)	5.00 m			
Height of water gauge (h)	3.05		Temperature of collected water	°C	
Water gauge (No.)	2.40		Type		
Time Boring MAS-3C	150	27 min	Discharge	1	
Max. pressure	50	kg/cm ²	Min.	0.035	kg/cm ²
Type of packer	Single		Max.	50	kg/cm ²

• Effective pressure (kg/cm²): $P = P_0 + 1/10 (h_0 - h_d)$ h_0 - head loss
 • Luggon value (Lu) to be calculated by following equation
 Luggon value (Lu) = $(1.1 \times \text{min. discharge}) / (L \times 10 \text{ O/P.L.})$

Time (hr)	Effective pressure (kg/cm ²)	Water pumped in (m ³)	Sectional flow (l/min)	Flow (l/min)	Luggon value (Lu)	Remarks
14:00	1	1	1.54	0	0	
	1	5	5.54	16	16	5.7
	1	10	10.54	29	29	5.3
	1	5	5.54	17	17	6.1
	1	1	1.54	0	0	0

Form B

ELECTRIC POWER DEVELOPMENT CO. TOKYO, JAPAN

Table A-II-5-(7) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE		MOLE NO. R-3	Sheet NO. 3 of 3
Feature Location	Project Name	Country	Reporter Firm name
Dam site	Coordinates Date of test 30 - 8 - 1980		
Elevation of top Of hole	1,776.23 m	Diameter(s) 75 mm	516 mm
Slope NO	3	Bearing	Unsubstantiated
Depth of packer to hole bottom	55.50 m	Temperature of water at depth	26.0 °C
Length (L)	5.00 m	Type	J
Temperature of water at surface	21.0 °C	Time bearing MAS-3C	1
Rotation speed	150 r/min	Production	0.035 kg/cm ²
Flow rate	50 kg/cm ²	Max 50 kg/cm ²	50 kg/cm ²
Pressure at packer	50 kg/cm ²	e Effective pressure (kg/cm ²): P = Pa + 1/10 (hs-hu) e.s. Lugeron value (kg) to be calculated by following situation Lugeron value (l/min/m/10kg/cm ²): Lu = 10 Q/P.L	

Time hr. min	Gauge Effective pressure mm Hg/cm ²	Effective pressure (kg/cm ²)	Water pumped in (liters)	Sectional flow (l/min)	Remarks
19:00	1	1.47	0	0	0
1	5	5.47	12	12	4.3
1	10	10.47	19	19	3.6
1	5	5.47	13	13	4.7
1	1	1.47	0	0	0

Table A-II-5-(8) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-4 SHEET NO. 1 of 1											
Feature Location		Date of test		Project Name		Country		Reporter Firm name			
Bore hole		Elevation of top		Dip		Blowing		Unaturated state			
Test section		Depth of section		Diameter (ø)		Blowing		Unaturated state			
Type of section		Length (L)		Diameter (ø)		Blowing		Saturated state			
Temperature of water		Temperature of injection water		Type of injection		Type of injection		Type of injection			
Max. pressure		Min. pressure		Max. pressure		Min. pressure		Max. pressure			
Type of section		Length (L)		Diameter (ø)		Blowing		Saturated state			
Effective pressure (kg/cm ²): P ₁ Pa = 1/10 (kg - H ₂ O)		Lugeon value (Lu) to be calculated by following equation		Lugeon value (Lu) to be calculated by following equation		Lugeon value (Lu) to be calculated by following equation		Lugeon value (Lu) to be calculated by following equation			
Time		Effective pressure (kg/cm ²)		Water pumped (m ³)		Lugeon value (Lu)		Remarks			
10.00	1	1	1.46	0	0	0	0				
	1	5	3.46	2.82	20.2		16.9				
	1	10	10.46	4.31	43.1		13.5				
	1	5	3.46	23.5	23.6		14.1				
	1	1	1.46	0	0		0				

Table A-II-5-(9) Water Pressure Test in Drill Hole

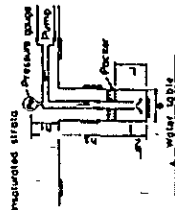
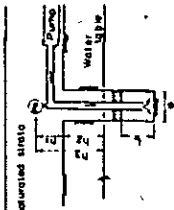
WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-5 Sheet NO. 1 of 3

Feature		Project		Country	
Location		Coordinates		Reporter	
Dam site		Date of test		Firm name	
		4 - 9 - 1980			

Bore hole	Elevation	Ø	90°	Diap	1,772.78 m	Diameter (ø)	75 mm	Size	NO	Geology	Unsat. strata
Test section	Slope NO	3100 m - 3600 m									
	Depth of bore	3.55									
	Length (L)	3.00 m									

Head of water (h ₀)	0	Temperature of injected water	°C
Min. depth	150	Time Boring	NAS-3C
Max. depth	150	Rate of production	1
Discharge	50	Pressure	0.5 kg/cm ²
Type of bore	Single	Max. depth	50

• Effective pressure (kg/cm²): P = P₀ + 1/10 (h₀ - h₁) h₀ = head test
 •• Lugeon value (Lu) to be calculated by following equation
 Lugeon value (Lu) = (10000/h₀)(Q/h₀) Lu = 10 Q/P L

Time (hr)	Gauge pressure (kg/cm ²)	Effective pressure (kg/cm ²)	Water pumped in		Lugeon value (Lu)	Remarks
			Integrated (cm ³)	Sectional (cm ³ /min)		
1	1	1.35	0	0	0	
5	5	5.35	23	23	8.6	
10	10	10.35	37	37	7.1	
5	5	5.35	25	25	9.3	
1	1	1.35	10	10	14.8	

Form A

Table A-II-5-(9') Water Pressure Test in Drill Hole

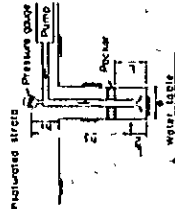
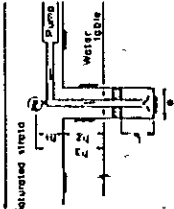
WATER PRESSURE TEST IN DRILL HOLE HOLE NO. R-5 Sheet NO. 2 of 3

Feature		Project		Country	
Location		Coordinates		Reporter	
Dam site		Date of test		Firm name	
		5 - 9 - 1980			

Bore hole	Elevation	Ø	90°	Diap	1,772.78 m	Diameter (ø)	75 mm	Size	NO	Geology	Unsat. strata
Test section	Slope NO	3600 m - 4100 m									
	Depth of bore	3.20									
	Length (L)	3.00 m									

Head of water (h ₀)	0	Temperature of injected water	°C
Min. depth	150	Time Boring	NAS-3C
Max. depth	150	Rate of production	1
Discharge	50	Pressure	0.5 kg/cm ²
Type of bore	Single	Max. depth	50

• Effective pressure (kg/cm²): P = P₀ + 1/10 (h₀ - h₁) h₀ = head test
 •• Lugeon value (Lu) to be calculated by following equation
 Lugeon value (Lu) = (10000/h₀)(Q/h₀) Lu = 10 Q/P L

Time (hr)	Gauge pressure (kg/cm ²)	Effective pressure (kg/cm ²)	Water pumped in		Lugeon value (Lu)	Remarks
			Integrated (cm ³)	Sectional (cm ³ /min)		
1	1	1.32	0	0	0	
5	5	5.32	22	22	8.2	
10	10	10.32	32	32	6.2	
5	5	5.32	21	21	8.0	
1	1	1.32	0	0	0	

Form A

Table A-II-5-(11) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO R-7 Sheet NO. 1 of 3

Feature		Project Pilaya		Country	
Location		Coordinates		Reporter	
Date of test		Date of test		Firm name	
Elevation of top		Diameter (ø)		Size NO	
Dip		Bearing		Unconsolidated strata	
Stage NO		Geology		Pressure gauge	
Dip of packer		Diameter (ø)		Packer	
Dip of bottom		Length (L)		Pump	
Dip of top		Temperature of collected water		Water table	
Length (L)		Type		Saturated strata	
Temperature		Flow rate		Remarks	
Effective pressure (kg/cm ²)		P.P.P. = 1/10 (h ₀ - h ₁)		h ₀ = head loss	
Lugeon value (Lu) to be calculated by following equation		Lu = 10 Q/P.L			

Time (hr:min)	Coarse pressure (kg/cm ²)	Effective pressure (kg/cm ²)	Water pumped in (liters)	Lugeon value (Lu)	Remarks
8:00	10	1.47	6.4	8.7	
13:00	10	5.47	31.3	11.4	
10	5	5.47	6.30	12.0	
10	5	5.47	31.2	11.4	
10	1	1.47	6.4	8.8	

Table A-II-5-(11') Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO R-7 Sheet NO. 2 of 3

Feature		Project Pilaya		Country	
Location		Coordinates		Reporter	
Date of test		Date of test		Firm name	
Elevation of top		Diameter (ø)		Size NO	
Dip		Bearing		Unconsolidated strata	
Stage NO		Geology		Pressure gauge	
Dip of packer		Diameter (ø)		Packer	
Dip of bottom		Length (L)		Pump	
Dip of top		Temperature of collected water		Water table	
Length (L)		Type		Saturated strata	
Temperature		Flow rate		Remarks	
Effective pressure (kg/cm ²)		P.P.P. = 1/10 (h ₀ - h ₁)		h ₀ = head loss	
Lugeon value (Lu) to be calculated by following equation		Lu = 10 Q/P.L			

Time (hr:min)	Coarse pressure (kg/cm ²)	Effective pressure (kg/cm ²)	Water pumped in (liters)	Lugeon value (Lu)	Remarks
17:00	10	1.45	1.9	2.6	
20:30	10	5.45	18.0	8.6	
10	10	10.45	47.4	9.1	
10	5	5.45	17.0	6.2	
10	1	1.45	2.0	2.7	

Table A-II-5-(12) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO R-7 SHEET NO. 3 OF 3

Feature	Project	County	Reporter
Location	Dem site	Coordinates	Firm name
Date of test	Date of test		
1	1		

Bore hole	Elevation of top	Diameter (ø)	Size	No	Remarks
Ø10	1,775.38 m	75.7 mm			Unaturated strata
3	General				
Depth of packer	4.250 m	47.50 m			
Height of water column					
Length (L)	5.000 m				

Water gauge (No.)	1 60	Temperature	°C	Type	Water
Water gauge (No.)	1 60	Temperature	°C	Type	Water
Flow rate	150 l/min	Flow rate	l/min	Type	Water
Pressure	50 kg/cm ²	Pressure	kg/cm ²	Type	Water
Pressure	50 kg/cm ²	Pressure	kg/cm ²	Type	Water
Pressure	50 kg/cm ²	Pressure	kg/cm ²	Type	Water
Pressure	50 kg/cm ²	Pressure	kg/cm ²	Type	Water
Pressure	50 kg/cm ²	Pressure	kg/cm ²	Type	Water

Time	Gauge	Effective pressure	Water pumped in	Lugon	Remarks
17:00	10	1.47	0	0	
21:30	10	5.47	20	0.7	
	10	10.47	40	0.8	
	10	5.47	20	0.7	
	10	1.47	0	0	

Form 4

ELECTRIC POWER DEVELOPMENT CO. TOKYO JAPAN

Table A-II-5-(13) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L-3 Sheet NO. 1 of 3

Feature	Project	Pilajo	Country
Location	Coordinates	Date of test	3 - 10 - 1980
Dom site	Reporter	Firm name	
Bore hole	Elevation	1,773.10 m	Diameter(s) 75.7 mm
	Dip	70°	Bearing N 30° E
	Depth of packer	26.20 m	Geology
	Depth of packer to base of hole		
	Length (L)	5.00 m	
Weight of water gauge (W)	1.80		
Water gauge (W)	0.00	Temperature of injected water	°C
Flow rate (Q)	150 J/min	Flow rate (Q)	J/min
Pressure (P)	50 kg/cm ²	Pressure (P)	kg/cm ²
Effective pressure (P _e)	50 kg/cm ²	Effective pressure (P _e)	kg/cm ²
Lugeon value (Lu)	38	Lugeon value (Lu)	

Time	Gauge pressure (P)	Effective pressure (P _e)	Water pumped in (Q)	Lugeon value (Lu)	Remarks
hr	min	mm (kg/cm ²)	mm ³ (liters)	(Lu)	
16:00	1	1	1.21	2.3	38
21:00	1	5	6.21	4.0	15
	1	10	10.21	7.3	1.4
	1	5	5.21	3.8	4.4
	1	1	1.21	2.0	4.3

Table A-II-5-(13') Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L-3 Sheet NO. 2 of 3

Feature	Project	Pilajo	Country
Location	Coordinates	Date of test	6 - 10 - 1980
Dom site	Reporter	Firm name	
Bore hole	Elevation	1,773.10 m	Diameter(s) 75.7 mm
	Dip	70°	Bearing N 30° E
	Depth of packer	26.20 m	Geology
	Depth of packer to base of hole		
	Length (L)	5.10 m	
Weight of water gauge (W)	1.80		
Water gauge (W)	0.00	Temperature of injected water	°C
Flow rate (Q)	150 J/min	Flow rate (Q)	J/min
Pressure (P)	50 kg/cm ²	Pressure (P)	kg/cm ²
Effective pressure (P _e)	50 kg/cm ²	Effective pressure (P _e)	kg/cm ²
Lugeon value (Lu)	47	Lugeon value (Lu)	

Time	Gauge pressure (P)	Effective pressure (P _e)	Water pumped in (Q)	Lugeon value (Lu)	Remarks
hr	min	mm (kg/cm ²)	mm ³ (liters)	(Lu)	
16:00	1	1	1.16	2.9	4.9
21:00	1	5	5.16	5.9	2.2
	1	10	10.16	7.9	1.5
	1	5	5.16	5.7	2.2
	1	1	1.16	2.8	4.7

Table A-II-5-(15) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L-5 SHEET NO. 1 OF 6

Feature Location Dam site Coordinates Date of test 16-7-1980 Country Project Pilaya Reporters Firm name [] Unaturated strata

Bore hole Elevation of top 1,772.95 m Diameter(s) 75.7 mm Size NO. 1

Slope NO. 1 Dip 90° Bearing Geology

Depth of packer 5.00 m - 11.00 m
 Depth of packer at top bottom m
 Length (L) 6.00 m

Water gauge (No.) 1 24
 Water gauge (L) 0.00
 Temperature of water °C

Time of test 150 min
 Rate of flow 30 kg/cm²
 Type of packer Single
 Permeability (k) 0.035 kg/cm²
 Effective pressure (kg/cm²) Pa Po = 1/10 (kg - ha) ha = head (m)
 Lugeon value (Lu) to be calculated by following equation
 Lu = 10 Q/P.L

Time hr min	Gauge pressure mm Hg/cm²	Effective pressure kg/cm²	Water pumped in (Integrated) cm³	Sectional flow (cm³/min)	Lugeon	Remarks
					value (Lu)	
8:00	1	1	12	707	1052	
	1	2	212	964	679	
	1	3	312	1394	748	
	1	2	212	1178	926	
	1	1	112	982	1461	

Form A

ELECTRIC POWER DEVELOPMENT CO. TOKYO JAPAN

Table A-II-5-(15') Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L-5 SHEET NO. 2 OF 6

Feature Location Dam site Coordinates Date of test 17-7-1980 Country Project Pilaya Reporters Firm name [] Unaturated strata

Bore hole Elevation of top 1,772.95 m Diameter(s) 75.7 mm Size NO. 2

Slope NO. 2 Dip 90° Bearing Geology

Depth of packer 11.00 m - 16.00 m
 Depth of packer at top bottom m
 Length (L) 5.00 m

Water gauge (No.) 1 52
 Water gauge (L) 0.00
 Temperature of water °C

Time of test 150 min
 Rate of flow 30 kg/cm²
 Type of packer Single
 Permeability (k) 0.035 kg/cm²
 Effective pressure (kg/cm²) Pa Po = 1/10 (kg - ha) ha = head (m)
 Lugeon value (Lu) to be calculated by following equation
 Lu = 10 Q/P.L

Time hr min	Gauge pressure mm Hg/cm²	Effective pressure kg/cm²	Water pumped in (Integrated) cm³	Sectional flow (cm³/min)	Lugeon	Remarks
					value (Lu)	
8:00	1	1	115	471	818	
	1	5	515	628	243	
	1	10	1015	726	138	
	1	5	515	707	274	
	1	1	115	412	716	

Form A

ELECTRIC POWER DEVELOPMENT CO. TOKYO JAPAN

Table A-II-5-(16) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L-5 SHEET NO. 3 OF 5									
Feature		Project		Country		Coordinates		Reporter	
Location		Dam site		Date of test		18 - 7 - 1980		Firm name	
Bore hole	Elevation of top	1,772.95 m	Diameter (ø)	75.7 mm	Size	NO	Unsat. strata		
	Dip	90°	Bearing						
Test section	Stage NO	3	Geology						
	Top of rock	1600 m - 2100 m							
	Bottom of rock	300 m							
Height (m)	3.54								
Temperature of water (°C)	0.00								
Temperature of injected water (°C)									
Flow rate (l/min)	150	Flow rate (m³/day)	0.035						
Pressure (kg/cm²)	50	Pressure (kg/cm²)	50						
Type of device	Single								
* Effective pressure (kg/cm²): $P = P_0 + 1/10 (W - W_0)$ $W_0 = \text{head loss}$ ** Lugeon value (Lu) to be calculated by following equation Lugeon value (Lu) = $10 \cdot Q / P \cdot L$									
Time (hr:min)	Course	Effective pressure (kg/cm²)	Integrated (l/min)	Water pumped-in (l)	Lugeon value (Lu)				
	Elapsed time (min)	Pressure (kg/cm²)	Integrated (l/min)	Sectional (l/min)	Remarks				
8:00	1	1.35	60.8	60.8	90				
	5	5.35	113.9	113.9	42.3				
	10	10.35	157.0	157.0	299				
	5	5.35	121.7	121.7	45.4				
	1	1.35	62.8	62.8	93				
Form A									
ELECTRIC POWER DEVELOPMENT CO. TOKYO JAPAN									

Table A-II-5-(16') Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L-5 SHEET NO. 4 OF 6									
Feature		Project		Country		Coordinates		Reporter	
Location		Dam site		Date of test		19 - 7 - 1980		Firm name	
Bore hole	Elevation of top	1,772.95 m	Diameter (ø)	75.7 mm	Size	NO	Unsat. strata		
	Dip	90°	Bearing						
Test section	Stage NO	4	Geology						
	Top of rock	2600 m - 3100 m							
	Bottom of rock	300 m							
Height (m)	2.35								
Temperature of water (°C)	0.00								
Temperature of injected water (°C)									
Flow rate (l/min)	150	Flow rate (m³/day)	0.035						
Pressure (kg/cm²)	50	Pressure (kg/cm²)	50						
Type of device	Single								
* Effective pressure (kg/cm²): $P = P_0 + 1/10 (W - W_0)$ $W_0 = \text{head loss}$ ** Lugeon value (Lu) to be calculated by following equation Lugeon value (Lu) = $10 \cdot Q / P \cdot L$									
Time (hr:min)	Course	Effective pressure (kg/cm²)	Integrated (l/min)	Water pumped-in (l)	Lugeon value (Lu)				
	Elapsed time (min)	Pressure (kg/cm²)	Integrated (l/min)	Sectional (l/min)	Remarks				
8:00	5	7	7.23	350	70	19.3			
	5	3.5	3.73	2.45	49	262			
	5	7	7.23	3.46	69.2	19.1			
Form A									
ELECTRIC POWER DEVELOPMENT CO. TOKYO JAPAN									

Table A-II-5-(18) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L - 6 Sheet NO. 1 of 3

Feature Location	Dum site	Project Name	Country	Reporter Firm name	Sheet NO. 1 of 3
Location	Date of test	25 - 8 - 1980			
Base hole	Elevation of top	1,773.09 m	Diameter (ø)	73 mm	Size NO
	Dip	90°	Bearing		
Test section	Stage NO	1	Geology		
	Depth of packer & base section	30.00 m - 35.00 m			
	Length (L)	5.00 m			
Water gauge (h)	Height (h)	3.60	Temperature of injected water	°C	
	Water level	0.00			
Pump	Flow rate	150 l/min	Type	I	
	Pressure	30 kg/cm ²			
Type of packer	Single	kg/cm ²	Max	50	

* Effective pressure (kg/cm²): P = P₀ + 1/10 (h₀ - h₁) h₀ = head loss
 ** Lugeon value (Lu) to be calculated by following equation
 Lugeon value (Lu) = (1000m³/10kg/cm²) L₀ = 10 G/P L

Unactuated strata

Saturated strata

Form 4

ELECTRIC POWER DEVELOPMENT CO. TOKYO, JAPAN

Table A-II-5-(18') Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L - 6 Sheet NO. 2 of 3

Feature Location	Dum site	Project Name	Country	Reporter Firm name	Sheet NO. 2 of 3
Location	Date of test	26 - 8 - 1980			
Base hole	Elevation of top	1,773.09 m	Diameter (ø)	73 mm	Size NO
	Dip	90°	Bearing		
Test section	Stage NO	2	Geology		
	Depth of packer & base section	35.00 m - 40.00 m			
	Length (L)	5.00 m			
Water gauge (h)	Height (h)	1.60	Temperature of injected water	°C	
	Water level	0.00			
Pump	Flow rate	150 l/min	Type	I	
	Pressure	30 kg/cm ²			
Type of packer	Single	kg/cm ²	Max	50	

* Effective pressure (kg/cm²): P = P₀ + 1/10 (h₀ - h₁) h₀ = head loss
 ** Lugeon value (Lu) to be calculated by following equation
 Lugeon value (Lu) = (1000m³/10kg/cm²) L₀ = 10 G/P L

Unactuated strata

Saturated strata

Form 4

ELECTRIC POWER DEVELOPMENT CO. TOKYO, JAPAN

Table A-II-5-(19) Water Pressure Test in Drill Hole

WATER PRESSURE TEST IN DRILL HOLE HOLE NO. L - 6 Sheet NO. 3 of 3

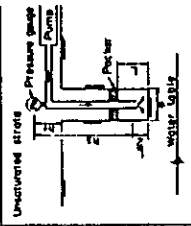
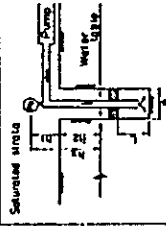
Features Location Dam site Project Plans Coordinates Date of test: 29 - 8 - 1960		County Reporter Firm name ()	
Bore hole Elevation of top Dip Slope no. Depth of packer Elevation of packer Length (L) Diameter (D) Temperature of circulating water Type of casing Time bearing Max. pressure Type of packer Effective pressure (kg/cm ²): Pa = P ₀ + (P ₁ - P ₀) h _a - head loss Luption value (Lu) to be calculated by following equation Luption value (L/min/m ² /kg/cm ²): Lu = 10 Q/P L	1,773.03 m 90° 3 40.00 m - 45.00 m m - 300 m 3.30 0.00 150 r/min 50 kg/cm ² Single 1 0.035 kg/cm ² 50	Unconsolidated strata 	Consolidated strata 
Time 19:30	Core Effective pressure (kg/cm ²) 1 1 5 10 15 20 25 30 35 40 45 50	Water pumped in (m ³ /min) (cm ³ /min) 0 0 21 41 21 0	Luption value (Lu) 0 7.8 7.9 7.8 0

Fig. A-II-3-(1) Photomicrograph and Petrographic Description of Rock (Plate 1 of 6)

Locality:

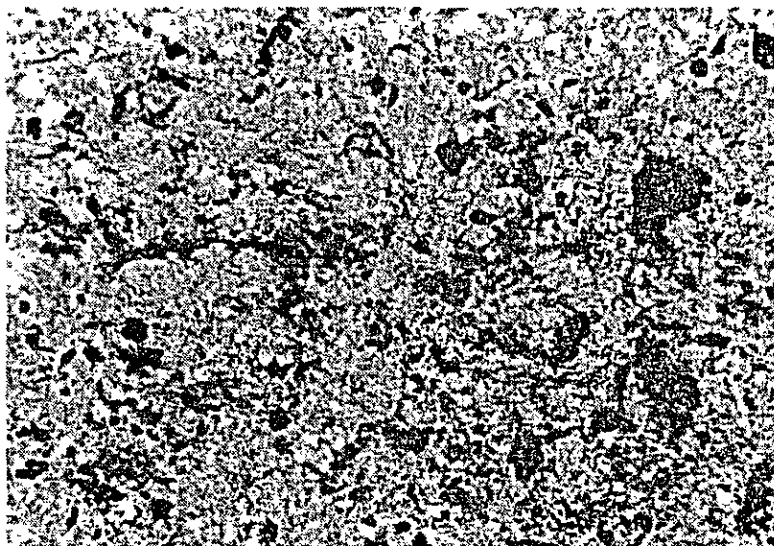
Dam site

Left bank

Rock name:

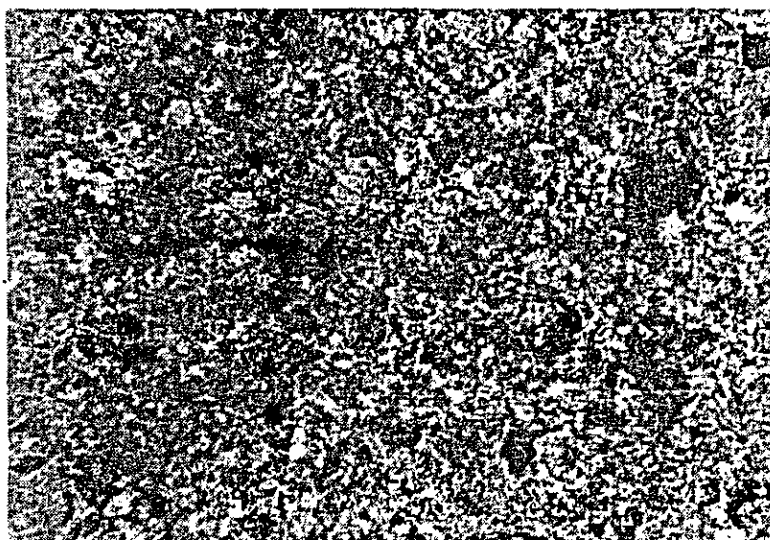
Greenish grey

medium-grained sandstone



0 0.5mm

(open nicols)



(crossed nicols)

Rock forming mineral:

Quartz > Sericite > Feldspar > Chlorite > Magnetite, Leucosene.

Description:

Massive and weakly re-crystallized sandstone in which quartz grains are predominated. Sericite is major mineral to fill the interstitial between clastic grains. Microscopic observation indicate no presence of swelling clay like montmorillonite.

Fig. A-II-3-(2) Photomicrograph and Petrographic Description of Rock (Plate 2 of 6)

Locality:

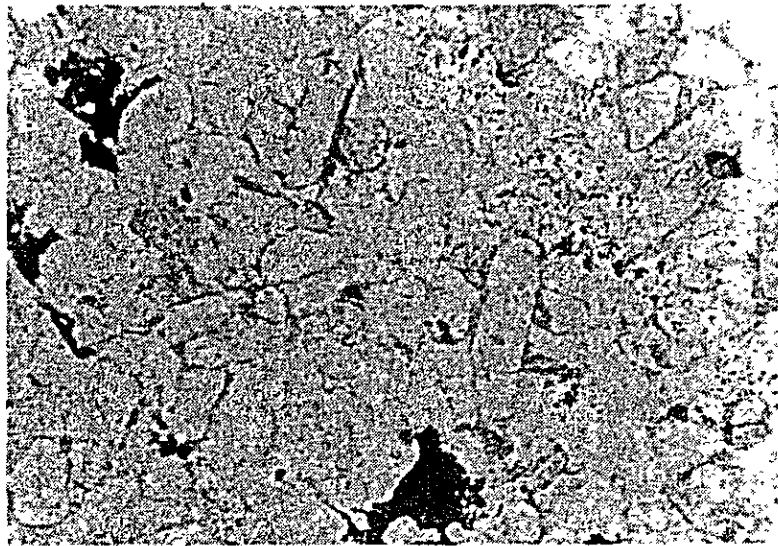
Dam site

Adit LA-2; T. D. 17 m

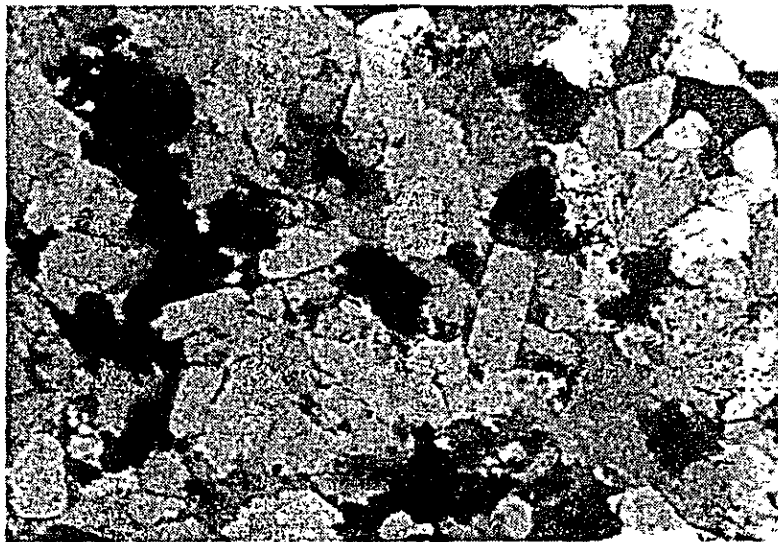
Rock name:

Greenish grey

Coarse-grained quartzite



(open nicols)



(crossed nicols)

Rock forming mineral:

Quartz \gg Feldspar \gg Sericite $>$ Chlorite $>$ Leucoxene $>$ Biotite.

Description:

Completely re-crystallized siliceous sediment chiefly composed of coarse-grained quartz. Strong wavy extinction of quartz is observed. Some of feldspar grains have been albitized. Biotite is a clastic grain.

Fig. A-II-3-(3) Photomicrograph and Petrographic Description of Rock (Plate 3 of 6)

Locality:

Penstock

Adit P-2; T.D. 15 m

Rock name:

Grey gneissose

coarse-grained quartzite



(open nicols)



(crossed nicols)

Rock forming mineral:

Quartz >> Feldspar >> Sericite > Chlorite > Leucoxene, Zircon.

Description: Completely re-crystallized siliceous sediment under deformation process. Lenticular form of quartz and feldspar, mortar texture and strong wavy extinction of quartz indicate that this specimen is a kind of siliceous gneiss. Metamorphic grade is of the chlorite zone.

Fig. A-II-3-(4) Photomicrograph and Petrographic Description of Rock (Plate 4 of 6)

Locality:

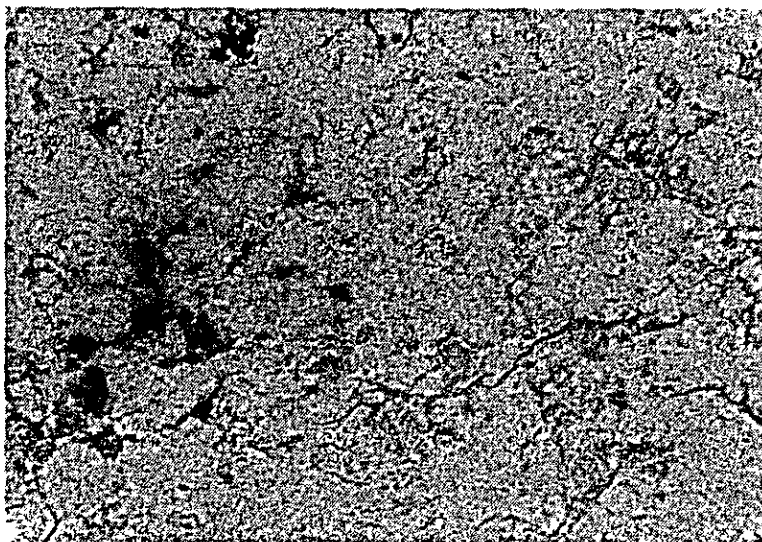
Penstock

Adit P-2; T.D. 10 m

Rock name:

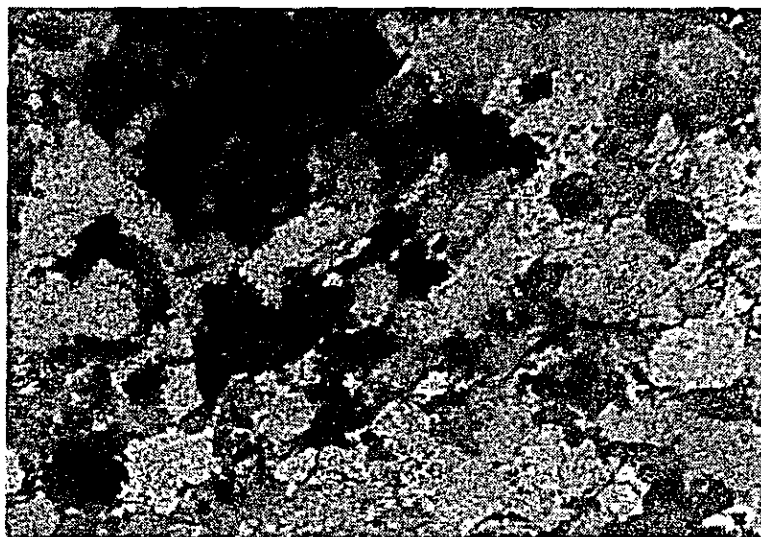
Grey calcareous

coarse-grained quartzite



0 0.5mm

(open nicols)



(crossed nicols)

Rock forming mineral:

Quartz \gg Feldspar > Calcite > Sericite > Chlorite \gg Leucoxene.

Description:

Well re-crystallized coarse-grained granular quartzite. Wavy extinction of quartz is common, but foliation is weak.

Fig. A-II-3-(5) Photomicrograph and Petrographic Description of Rock (Plate 5 of 6)

Locality:

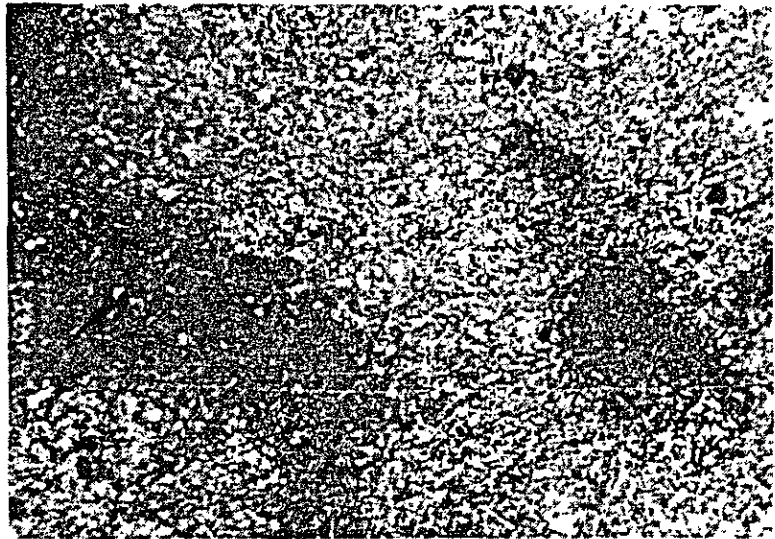
7 km downstream from
powerhouse
(Hot spring)

Rock name:

Dark reddish
fine-grained sandy slate



(open nicols)



(crossed nicols)

Rock forming mineral:

Quartz \gg Feldspar, Sericite $>$ Biotite, Hematite, chlorite $>$ Lizardite.

Description:

Deformed slaty rock in which S_2 foliation perpendicularly cutting the bedding plane is well developed. X-ray diffraction of clay fraction indicate sericite is a major clay mineral with small amount of chlorite and lizardite. No swelling clay is observed.

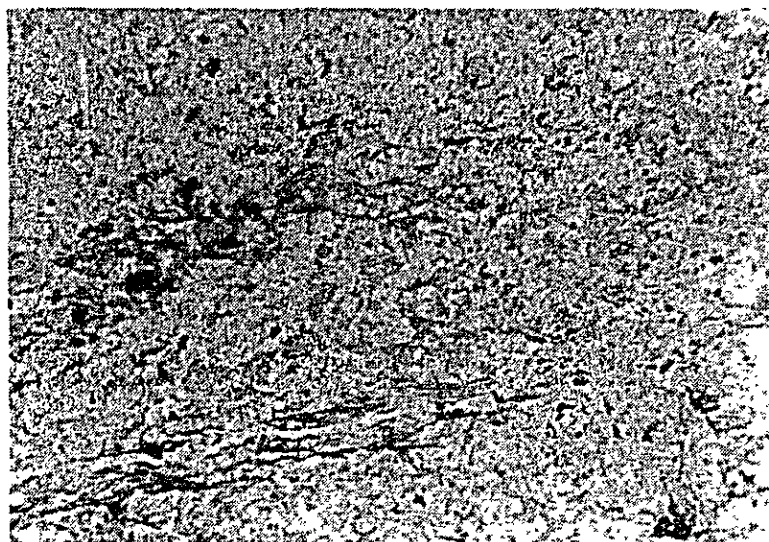
Fig. A-II-3-(6) Photomicrograph and Petrographic Description of Rock (Plate 6 of 6)

Locality:

7 km downstream from
powerhouse
(Hot spring)

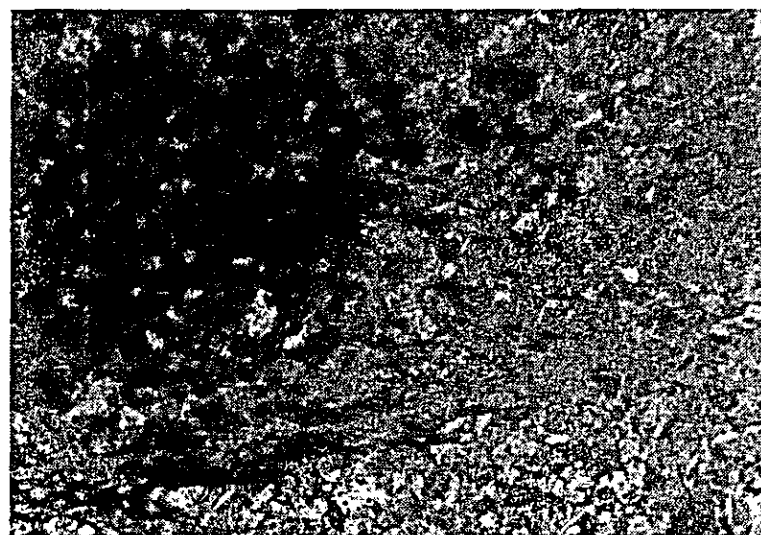
Rock name:

Reddish grey
medium-grained sandstone



(open nicols)

0 0.5mm



(crossed nicols)

Rock forming mineral:

Quartz > Feldspar > Sericite > Chlorite, Lizardite > Hematite >> Tourmaline.

Description:

Weakly deformed and re-crystallized sandstone. Thin (0.08 mm) veins composed of chlorite, sericite and hematite are formed along sheared planes. X-ray diffraction data indicates the presence of sericite, lizardite and chlorite. No swelling of these two clay mineral are observed.

