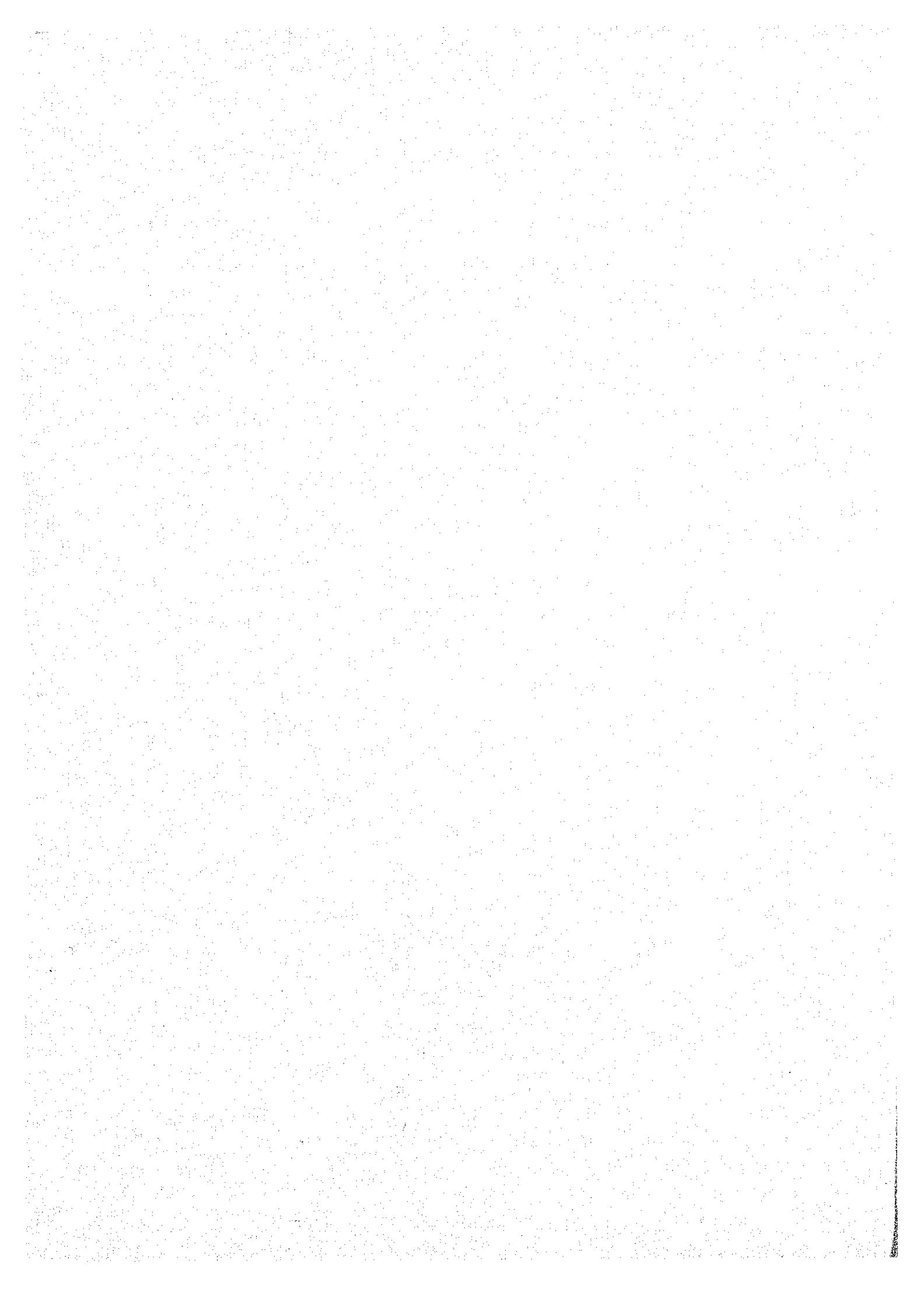


Figure A-17

TIME - DISTANCE CURVE

SEISMIC TRAVERSE

SL - 6



APPENDIX B HYDROLOGIC DATA

Table B-1

DAILY MEAN DISCHARGE AT
GAGING STATION 450
(1963 - 1980)

STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1963

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			1164.	2794.	4041.	4905.	2575.	1262.				
2			1199.	2667.	3893.	5235.	1269.					
3			1339.	2771.	5145.	4890.	1381.					
4			1325.	2851.	6340.	4740.	1283.					
5			1353.	2667.	5460.	4406.	2045.					
6			1339.	2644.	5070.	2196.	1185.					
7			1500.	2702.	4419.	2115.	1164.					
8			1444.	2759.	6748.	2088.	1124.					
9			1510.	3474.	6187.	2011.	1091.					
10			1690.	3879.	6289.	1920.	1064.					
11			1730.	3288.	6442.	1800.	1044.					
12			1550.	3812.	5835.	1800.	1044.					
13			1325.	4830.	6505.	1740.	1031.					
14			1325.	4446.	4545.	3704.	1670.					
15			1940.	3757.	4392.	1650.						
16			2115.	3555.	4935.	1590.						
17			1780.	3339.	5190.	1570.						
18			1700.	3035.	5055.	1520.						
19			674.	1458.	6442.	1486.						
20			700.	3461.	5970.	1472.						
21			810.	4995.	6068.	1451.						
22			860.	4740.	5450.							
23			763.	3501.	4635.							
24			737.	3488.	4433.							
25			742.	4163.	4650.							
26			833.	5055.	4770.							
27			833.	5370.	4473.							
28			794.	5220.	4203.							
29			820.	2667.	4710.							
30			906.	4815.	4311.							
31			978.	4515.	4590.							
MAX			978.	5370.	6748.	5280.	2575.	1581.				
MIN			674.	2644.	3893.	3704.	1227.	1031.				
AVE			808.	1705.	3720.	4699.	1713.	1166.				

STATION NO. 000450

CATCHMENT 31,100, SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1964

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	560.			307.	617.	327.	2265.	5745.	5685.	2725.	1311.	721.
2	585.			321.	612.	380.	2288.	4875.	4605.	2529.	1290.	716.
3				301.	512.	460.	2345.	4446.	4605.	2380.	1262.	700.
4			327.	375.	542.	495.	2380.	6799.	3933.	1960.	1220.	685.
5				314.	586.	506.	2299.	5370.	3717.	1780.	1206.	680.
6				301.	570.	490.	2621.	4419.	3555.	1850.	1171.	674.
7				321.	470.	495.	2725.	6109.	3636.	1590.	1143.	664.
8			307.	355.	444.	512.	2644.	3933.	3461.	1920.	1130.	659.
9			302.	396.	420.	495.	3001.	3731.	3407.	1472.	1117.	659.
10			307.	380.	455.	524.	3704.	3514.	3569.	1297.	1097.	659.
11				390.	455.	591.	3757.	3920.	3420.	1220.	1084.	654.
12		365.		438.	390.	680.	4244.	3879.	3116.	1900.	1064.	648.
13		380.		460.	432.	778.	3690.	3771.	2920.	1890.	1044.	643.
14		375.		485.	548.	873.	3312.	4500.	3001.	1890.	1031.	638.
15		402.		495.	485.	1374.	3771.	5190.	3839.	1820.	1011.	633.
16			295.	475.	420.	1730.	4014.	5775.	4149.	1850.	992.	628.
17			301.	432.	416.	1353.	3987.	5400.	3488.	1960.	972.	617.
18		375.		432.	444.	1071.	3879.	4920.	3461.	1920.	945.	612.
19		375.		396.	438.	1097.	3744.	5160.	3933.	1870.	919.	612.
20			282.	335.	380.	1117.	3704.	4680.	3514.	1780.	906.	612.
21			307.	414.	480.	1206.	3839.	4163.	3488.	1750.	846.	607.
22			307.	390.	465.	1710.	5250.	4082.	3116.	1730.	810.	602.
23		345.		444.	530.	2081.	5310.	4845.	2874.	1710.	794.	596.
24			286.	438.	402.	1750.	6816.	4325.	2920.	1690.	778.	591.
25			301.	396.	360.	1820.	6850.	3933.	3663.	1680.	765.	586.
26			301.	444.	340.	2104.	5655.	3717.	4082.	1680.	747.	581.
27			307.	460.	314.	2368.	4770.	3501.	3380.	1660.	716.	576.
28		321.		470.	282.	2368.	5070.	3352.	3218.	1570.	711.	570.
29			288.	506.	270.	2426.	6510.	3218.	3012.	1510.	721.	565.
30			282.	570.	270.	2403.	6170.	3771.	2874.	1402.	737.	560.
31			282.	282.	282.	2403.	5760.	5625.	2874.	1318.	737.	554.
MAX	565.	402.	336.	570.	612.	2426.	6850.	6799.	5685.	2725.	1311.	771.
MIN	560.	321.	282.	301.	270.	327.	2265.	3218.	2874.	1220.	711.	554.
AVE	563.	367.	302.	410.	439.	1186.	4076.	4468.	3563.	1787.	985.	629.

STATION NO. 000450

CATCHMENT 31/100, SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1965

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	548.		295.	288.	685.	789.	2817.	3447.	3798.	1740.	1451.	690.
2	542.		282.	321.	664.	784.	3047.	3757.	3960.	1660.	1234.	685.
3	548.		265.	365.	633.	810.	2759.	3663.	3663.	1640.	1150.	664.
4	548.		260.	340.	617.	906.	2541.	3785.	3312.	1620.	1143.	659.
5	536.		260.	307.	560.	926.	2460.	3920.	3312.	1630.	1339.	648.
6	524.		250.	321.	506.	912.	2575.	3920.	3190.	1610.	1227.	638.
7	518.		260.	307.	524.	866.	5265.	3582.	3231.	1520.	1157.	628.
8	512.		265.	321.	602.	752.	4620.	3650.	3501.	1493.	1110.	627.
9	506.		265.	360.	570.	752.	4545.	3933.	3650.	1444.	998.	617.
10	493.		255.	420.	512.	815.	3798.	4920.	3488.	1395.	992.	612.
11	485.		250.	450.	465.	985.	2840.	6000.	3407.	1409.	992.	607.
12	480.		235.	485.	480.	998.	2552.	6969.	3258.	1374.	952.	602.
13	473.		230.	685.	518.	1018.	3461.	5640.	3104.	1332.	926.	602.
14	470.		225.	570.	518.	1110.	3204.	5895.	2909.	1283.	912.	591.
15	460.		225.	576.	506.	1206.	3116.	6731.	2690.	1234.	893.	581.
16	450.		230.	530.	607.	1640.	2932.	5700.	2495.	1199.	893.	576.
17	450.		235.	548.	685.	2288.	2782.	4785.	2414.	1185.	893.	570.
18	444.		245.	565.	690.	2242.	2541.	4027.	2472.	1171.	873.	565.
19	446.		245.	643.	700.	2184.	2702.	4041.	2506.	1192.	853.	560.
20	438.		288.	607.	742.	1880.	2725.	4203.	2322.	1465.	840.	554.
21	432.		270.	480.	716.	1850.	2874.	3852.	2322.	1318.	810.	560.
22	432.		265.	426.	654.	1880.	2725.	4419.	2230.	1220.	799.	548.
23	426.		250.	396.	591.	1580.	2667.	4163.	2253.	1157.	784.	548.
24	426.		250.	420.	622.	1540.	3081.	4027.	2219.	1137.	778.	548.
25	426.		255.	485.	695.	1940.	3070.	3757.	2173.	1110.	768.	560.
26	426.		250.	518.	706.	2603.	3104.	3839.	2196.	1097.	747.	548.
27	420.		301.	460.	716.	2437.	3023.	3974.	2138.	1077.	737.	536.
28	414.		288.	414.	721.	2725.	3012.	4950.	1920.	1117.	726.	512.
29	414.		314.	536.	763.	2851.	2840.	7037.	1870.	1044.	716.	500.
30	414.		275.	633.	784.	2667.	3376.	4890.	1800.	1058.	706.	490.
31	414.		275.	633.	794.	4122.	4122.	4338.	1800.	1185.	706.	490.
MAX	548.		340.	685.	794.	2851.	5265.	7037.	3960.	1740.	1451.	690.
MIN	414.		225.	288.	465.	752.	2460.	3447.	1800.	1044.	706.	490.
AVE	472.		262.	465.	630.	1524.	3132.	4579.	2703.	1326.	947.	584.

STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1966

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	485.	301.	275.	220.	426.	784.	2552.	6170.	6442.	1750.	992.	669.
2	485.	295.	260.	225.	444.	833.	2920.	6119.	6034.	1730.	985.	659.
3	490.	295.	255.	210.	490.	827.	3461.	5445.	5490.	1660.	985.	654.
4	480.	288.	270.	205.	524.	926.	3150.	5670.	5145.	1590.	952.	648.
5	524.	288.	282.	205.	536.	804.	2660.	5610.	4740.	1630.	952.	638.
6	470.	295.	265.	235.	565.	799.	2288.	5910.	4338.	1660.	939.	638.
7	438.	288.	250.	260.	643.	799.	2380.	5220.	4217.	1640.	932.	628.
8	420.	282.	230.	235.	648.	827.	2184.	4620.	3974.	1520.	926.	622.
9	408.	301.	225.	215.	596.	952.	2104.	4860.	4379.	1493.	919.	612.
10	390.	307.	225.	205.	560.	972.	2426.	4935.	3974.	1458.	932.	607.
11	390.	275.	230.	195.	628.	959.	2943.	4755.	3690.	1430.	906.	596.
12	385.	265.	230.	190.	536.	1011.	4800.	5325.	3865.	1395.	873.	591.
13	432.	301.	230.	190.	455.	1018.	4800.	5130.	3501.	1374.	853.	586.
14	370.	518.	240.	250.	402.	1178.	4095.	5100.	3258.	1332.	833.	586.
15	365.	602.	240.	334.	426.	1086.	3420.	5205.	3339.	1304.	820.	586.
16	360.	350.	255.	360.	480.	978.	2851.	4446.	3366.	1269.	827.	581.
17	360.	327.	220.	360.	524.	959.	3339.	4271.	3127.	1255.	820.	560.
18	350.	307.	205.	321.	548.	1005.	3150.	4055.	2828.	1248.	799.	548.
19	345.	307.	210.	288.	554.	1374.	2828.	3920.	2667.	1227.	789.	548.
20	340.	307.	225.	260.	554.	1346.	2886.	3798.	2552.	1255.	773.	542.
21	340.	295.	210.	270.	576.	1262.	3218.	3785.	2437.	1248.	763.	542.
22	340.	295.	205.	350.	695.	1248.	3744.	4995.	2391.	1213.	763.	536.
23	334.	282.	205.	360.	711.	1740.	3839.	5505.	2265.	1185.	758.	536.
24	327.	275.	220.	321.	721.	1920.	4041.	7819.	2138.	1164.	742.	542.
25	321.	282.	250.	295.	846.	2092.	4284.	6748.	2035.	1137.	737.	536.
26	314.	288.	288.	321.	804.	2483.	4620.	5220.	1980.	1097.	732.	524.
27	345.	295.	314.	402.	789.	2483.	4284.	5805.	1950.	1071.	721.	506.
28	360.	307.	295.	375.	732.	2380.	4725.	5970.	1880.	1051.	700.	506.
29	334.	307.	240.	390.	784.	2357.	4530.	5670.	1830.	1031.	695.	512.
30	321.	220.	220.	408.	799.	2414.	4740.	7122.	1810.	1018.	680.	512.
31	307.	205.	205.	408.	747.	5160.	5160.	7292.	1810.	998.	680.	500.
MAX	524.	518.	314.	408.	846.	2483.	5160.	7819.	6442.	1750.	992.	669.
MIN	307.	265.	205.	190.	402.	784.	2104.	3785.	1810.	998.	680.	500.
AVE	385.	308.	240.	282.	605.	1327.	3491.	5371.	3388.	1337.	837.	576.

STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1967

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	490.	350.	270.	314.	664.	758.	2000.	3407.	3299.	2023.	965.	668.
2	485.	355.	275.	355.	602.	764.	2161.	3352.	3312.	1970.	952.	633.
3	485.	350.	275.	385.	588.	833.	2276.	3683.	3164.	1910.	939.	617.
4	480.	350.	282.	390.	485.	926.	2943.	3401.	2943.	1850.	932.	612.
5	485.	355.	270.	360.	460.	972.	3441.	3987.	3299.	1820.	906.	607.
6	480.	355.	255.	371.	432.	998.	2920.	3920.	3001.	1740.	886.	596.
7	480.	360.	250.	295.	414.	840.	3012.	3935.	2863.	1650.	866.	591.
8	475.	365.	250.	270.	414.	721.	3528.	4460.	3407.	1640.	866.	586.
9	470.	245.	250.	260.	480.	711.	5265.	3960.	3339.	1630.	853.	576.
10	470.	235.	255.	250.	586.	939.	7105.	4237.	3569.	1600.	833.	570.
11	465.	340.	270.	250.	643.	1290.	5235.	4487.	3595.	1540.	820.	560.
12	470.	334.	240.	250.	617.	1465.	3528.	3960.	3514.	1500.	804.	554.
13	465.	327.	270.	255.	576.	1530.	3058.	4230.	3271.	1486.	804.	542.
14	660.	321.	334.	275.	576.	1620.	2978.	4082.	2955.	1437.	789.	542.
15	455.	321.	345.	334.	530.	1780.	3731.	4735.	3093.	1388.	794.	536.
16	438.	321.	314.	444.	554.	2265.	4740.	4695.	3012.	1339.	773.	524.
17	432.	327.	321.	426.	665.	1590.	4680.	4710.	2886.	1304.	778.	518.
18	426.	334.	321.	500.	444.	1520.	5700.	4379.	2713.	1276.	752.	506.
19	420.	321.	307.	778.	455.	1840.	5475.	4284.	2713.	1248.	747.	500.
20	414.	321.	288.	581.	465.	1660.	4473.	3785.	2759.	1213.	737.	495.
21	390.	314.	288.	475.	500.	1472.	3501.	3690.	3001.	1171.	721.	490.
22	390.	301.	340.	455.	565.	1610.	3501.	3636.	2889.	1150.	706.	485.
23	385.	288.	334.	524.	674.	1600.	3717.	5056.	2966.	1110.	690.	480.
24	370.	288.	265.	565.	747.	1472.	4068.	4590.	2978.	1097.	690.	480.
25	365.	275.	355.	495.	742.	1479.	4392.	4230.	2955.	1077.	690.	506.
26	360.	270.	334.	450.	721.	1750.	3731.	4419.	2794.	1071.	706.	495.
27	355.	270.	396.	460.	643.	2173.	3339.	4590.	2506.	1058.	690.	480.
28	350.	270.	380.	612.	622.	1990.	3474.	3946.	2311.	1038.	674.	475.
29	345.	345.	345.	596.	638.	1850.	3339.	3636.	2184.	1011.	664.	465.
30	340.	321.	321.	570.	695.	1860.	3461.	3447.	2115.	985.	654.	455.
31	345.	301.	301.	340.	732.	3420.	3420.	3285.	2115.	978.	654.	455.
MAX	490.	365.	396.	774.	747.	2265.	7105.	5055.	3595.	2023.	965.	668.
MIN	340.	235.	240.	250.	414.	711.	2000.	3285.	2115.	978.	654.	455.
AVE	427.	316.	300.	416.	570.	1409.	3813.	4073.	2983.	1397.	790.	535.

STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1968

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	450.	402.	288.	275.	554.	853.	3218.	4345.	3299.	4027.	1325.	773.
2	432.	370.	275.	270.	674.	833.	3012.	4466.	3177.	3663.	1325.	763.
3	432.	360.	265.	260.	622.	815.	2966.	4635.	3326.	3744.	1270.	752.
4	426.	350.	260.	255.	680.	743.	3127.	4041.	3352.	4650.	1255.	747.
5	426.	345.	240.	245.	674.	721.	3204.	3785.	3245.	8924.	1748.	737.
6	420.	340.	205.	248.	607.	866.	3366.	3704.	3058.	6884.	1213.	726.
7	420.	340.	225.	334.	565.	919.	3380.	3852.	3001.	4500.	1199.	716.
8	460.	334.	380.	420.	560.	926.	3798.	3906.	2932.	3683.	1199.	706.
9	432.	314.	327.	450.	536.	1130.	3285.	4392.	2886.	3218.	1185.	700.
10	414.	301.	295.	420.	495.	1276.	3528.	4605.	2782.	2966.	1150.	695.
11	420.	307.	301.	385.	490.	1402.	2932.	4068.	2920.	2736.	1130.	690.
12	438.	295.	301.	365.	548.	1451.	3204.	4001.	2667.	2564.	1110.	685.
13	414.	288.	288.	365.	560.	1580.	3476.	3960.	2504.	2414.	1091.	680.
14	402.	282.	288.	365.	530.	1730.	4785.	4298.	2541.	2328.	1064.	669.
15	438.	282.	340.	355.	475.	2011.	4530.	4122.	3731.	2437.	1051.	659.
16	414.	282.	345.	340.	596.	2725.	3825.	3717.	3906.	2334.	1031.	654.
17	396.	282.	370.	334.	586.	2856.	4487.	3650.	4298.	2265.	1011.	638.
18	385.	275.	465.	327.	518.	2702.	5760.	4487.	4500.	2184.	992.	633.
19	380.	275.	426.	314.	612.	3047.	5340.	4650.	4095.	2184.	965.	628.
20	380.	265.	395.	355.	732.	2564.	5550.	4473.	2966.	2046.	945.	622.
21	375.	260.	355.	385.	747.	2219.	4650.	4406.	2886.	1990.	952.	617.
22	365.	275.	345.	414.	726.	2046.	5580.	4905.	2771.	1930.	919.	612.
23	365.	282.	334.	450.	784.	2380.	8405.	4920.	2690.	1890.	886.	612.
24	360.	265.	314.	432.	721.	2322.	7513.	4545.	2702.	1850.	873.	607.
25	355.	265.	307.	385.	685.	2265.	5190.	4001.	3116.	1810.	873.	602.
26	345.	260.	314.	390.	669.	2782.	5340.	3852.	2920.	1750.	853.	596.
27	340.	260.	314.	390.	680.	3218.	5160.	4365.	2803.	1510.	820.	596.
28	345.	295.	307.	370.	695.	2610.	5385.	4379.	2679.	1437.	810.	591.
29	380.	334.	321.	408.	664.	3245.	5225.	4379.	2897.	1409.	794.	581.
30	426.	480.	321.	480.	628.	3461.	4710.	3744.	3771.	1367.	784.	570.
31	460.	460.	301.	480.	737.	4650.	4650.	3299.	3771.	1339.	784.	565.
MAX	460.	402.	465.	480.	784.	3461.	8465.	4920.	4500.	8924.	1325.	773.
MIN	340.	260.	205.	255.	475.	721.	2932.	3299.	2506.	1339.	784.	565.
AVE	403.	303.	316.	362.	624.	1917.	4473.	4192.	3149.	2839.	1044.	659.

STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1969

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	554.	420.	321.	355.	444.	695.	1610.	3393.	3676.	2448.	1051.	648.
2	554.	420.	314.	360.	390.	768.	1416.	3744.	3555.	2368.	1038.	638.
3	542.	414.	307.	350.	414.	1018.	375.	3488.	3825.	2150.	1025.	628.
4	530.	402.	314.	334.	355.	945.	1970.	3058.	4190.	2011.	998.	628.
5	524.	396.	321.	301.	345.	1044.	1870.	3933.	3920.	1950.	998.	617.
6	518.	385.	327.	288.	385.	1304.	2184.	3528.	4446.	1890.	978.	612.
7	512.	380.	327.	275.	420.	1620.	2219.	3825.	4710.	1820.	959.	596.
8	512.	375.	321.	295.	396.	1680.	2345.	5130.	4620.	1760.	959.	591.
9	506.	375.	321.	345.	375.	1620.	2943.	4230.	4136.	1740.	939.	591.
10	506.	375.	321.	355.	380.	1479.	2759.	3893.	3865.	1730.	926.	581.
11	500.	380.	321.	345.	438.	1381.	2863.	4298.	3528.	1660.	912.	570.
12	495.	385.	321.	350.	586.	1255.	3190.	4027.	3488.	1590.	893.	565.
13	490.	380.	334.	490.	643.	1097.	3204.	3474.	3488.	1520.	866.	548.
14	490.	385.	334.	465.	602.	1051.	3150.	3569.	4082.	1486.	853.	536.
15	548.	408.	340.	420.	581.	1077.	3798.	3501.	3987.	1437.	846.	530.
16	560.	390.	350.	490.	596.	1199.	3920.	3771.	3420.	1409.	815.	518.
17	518.	380.	370.	596.	628.	1192.	4365.	4041.	3555.	1381.	794.	512.
18	500.	370.	365.	576.	596.	1290.	3960.	3785.	3623.	1353.	784.	512.
19	495.	360.	518.	460.	524.	1500.	3312.	4845.	4041.	1339.	773.	512.
20	485.	355.	438.	460.	530.	1530.	3001.	5100.	4311.	1304.	758.	512.
21	470.	350.	426.	480.	536.	1610.	2932.	5560.	4095.	1283.	747.	500.
22	460.	345.	385.	475.	554.	1680.	3164.	5250.	4095.	1290.	742.	495.
23	455.	345.	365.	420.	648.	1510.	3299.	4740.	3393.	1353.	726.	485.
24	455.	345.	408.	370.	726.	1680.	3582.	4620.	3704.	1276.	711.	480.
25	450.	345.	375.	350.	799.	1710.	3785.	4406.	3326.	1213.	700.	470.
26	455.	334.	465.	340.	860.	1388.	4875.	4041.	3366.	1185.	690.	460.
27	455.	327.	455.	327.	919.	1248.	4311.	3636.	3116.	1171.	685.	455.
28	450.	327.	390.	321.	879.	1332.	4095.	3704.	2920.	1143.	674.	450.
29	444.	327.	360.	334.	840.	1304.	4095.	3771.	2725.	1117.	669.	444.
30	432.	330.	350.	432.	810.	1360.	3595.	4352.	2621.	1091.	659.	438.
31	426.	327.	350.	432.	747.	1360.	3488.	3960.	1064.	1064.	659.	426.
MAX	560.	420.	518.	596.	919.	1710.	4875.	5580.	6710.	2448.	1051.	648.
MIN	426.	327.	307.	275.	345.	695.	1416.	3058.	2621.	1064.	659.	426.
AVE	493.	373.	362.	392.	578.	1319.	3122.	4087.	3727.	1533.	839.	534.

STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1970

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	426.	377.	282.	220.	536.	444.	2311.	8131.	2963.	2425.	930.	448.
2	420.	321.	282.	205.	560.	570.	2587.	6595.	2725.	2237.	907.	439.
3	414.	301.	255.	195.	524.	804.	2437.	6768.	2400.	2075.	891.	430.
4	408.	295.	245.	190.	485.	1353.	2518.	6595.	2825.	2013.	868.	426.
5	402.	288.	230.	190.	506.	932.	2437.	5559.	2725.	1900.	798.	422.
6	396.	282.	225.	195.	591.	742.	2575.	6791.	2600.	1800.	770.	417.
7	385.	275.	220.	230.	565.	669.	2621.	7802.	2500.	1837.	754.	413.
8	380.	265.	215.	250.	485.	654.	2851.	7895.	2400.	1800.	731.	404.
9	375.	260.	210.	235.	460.	648.	3127.	6502.	2363.	1650.	703.	400.
10	365.	265.	210.	220.	470.	794.	3542.	6576.	2250.	1560.	681.	395.
11	365.	255.	210.	215.	506.	853.	3342.	6280.	2363.	1490.	653.	391.
12	360.	245.	235.	215.	542.	1150.	3900.	6243.	2413.	1430.	625.	386.
13	365.	255.	265.	250.	554.	1185.	6465.	6224.	2475.	1390.	614.	386.
14	365.	250.	235.	301.	607.	1290.	8060.	5503.	2513.	1370.	614.	378.
15	360.	245.	235.	350.	690.	1353.	6539.	4638.	2413.	1340.	625.	373.
16	355.	245.	230.	438.	784.	1740.	10242.	4728.	2400.	1300.	608.	369.
17	350.	250.	220.	680.	873.	3717.	8131.	5059.	2313.	1219.	591.	364.
18	345.	245.	220.	495.	804.	6153.	5355.	4494.	2175.	1180.	580.	364.
19	345.	245.	220.	375.	695.	5055.	4422.	3612.	2313.	1164.	562.	352.
20	334.	321.	225.	307.	648.	2414.	6697.	4080.	2563.	1156.	554.	344.
21	365.	307.	275.	321.	752.	2253.	6632.	3270.	2675.	1110.	532.	340.
22	438.	314.	205.	365.	690.	2161.	5984.	3144.	2625.	1094.	523.	340.
23	380.	375.	195.	426.	602.	2380.	5503.	3450.	3144.	1086.	501.	336.
24	360.	314.	205.	480.	570.	2299.	5799.	4044.	3630.	1071.	492.	332.
25	355.	288.	215.	420.	554.	2092.	4948.	6113.	3396.	1071.	483.	324.
26	350.	265.	215.	574.	565.	2138.	6299.	5596.	3468.	1032.	474.	320.
27	370.	255.	215.	726.	548.	2138.	6595.	4116.	3594.	1000.	474.	312.
28	370.	250.	240.	726.	536.	2426.	5873.	4674.	3432.	985.	474.	308.
29	340.	340.	260.	648.	480.	2472.	6058.	4512.	3000.	961.	470.	304.
30	336.	282.	282.	586.	420.	2552.	6576.	4008.	2700.	946.	461.	300.
31	327.	245.	245.	420.	420.	7872.	7872.	3540.	946.	946.	461.	300.
MAX	438.	375.	282.	726.	873.	6153.	10242.	8131.	3650.	2425.	930.	448.
MIN	327.	245.	195.	190.	420.	444.	2311.	3144.	2175.	946.	461.	300.
AVE	371.	279.	231.	366.	581.	1848.	5106.	5372.	2712.	1408.	631.	368.

STATION NO. 000450

CATCHMENT 31,100. 50 KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1971

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	304.	218.	218.	185.	386.	843.	4966.	3630.	4260.	2050.	1430.	
2	304.	215.	204.	197.	395.		5780.	3720.	4332.	2075.	1430.	
3	292.	218.	197.	197.	413.		6188.	3810.	3900.	2063.	1460.	
4	288.	211.	185.	197.	408.		5633.	4728.	3846.	2000.	527.	
5	288.	215.	185.	218.	426.	1520.	4602.	4584.	4440.	1850.	514.	
6	280.	218.	204.	232.	444.	1720.	4764.	5707.	3864.	1825.	514.	
7	280.	211.	356.	356.			5355.	6002.	3684.	1750.	505.	
8	278.	211.	276.	492.			4440.	8107.	3396.	1750.	505.	
9	266.	204.	197.	268.	466.		4674.	6391.	3900.	1750.	448.	
10	270.	201.	190.	352.			4440.	6132.	3576.	1750.	404.	
11	268.	211.	185.	288.	408.		6095.	5947.	4008.	1750.	395.	
12	266.	211.	185.	284.	536.		5503.	5947.	3126.	1750.	382.	
13	264.	204.	180.	312.	501.		4893.	5833.	2975.	1875.	373.	
14	262.	194.	185.	308.	510.		4332.	5096.	2725.	1788.	360.	
15	262.	194.	185.	280.	658.		3828.	5096.	2600.	1750.	360.	
16	262.	190.	180.	262.	630.		3792.	5263.	2350.	1788.	360.	
17	260.	190.	178.	250.	527.		3684.	5395.	2163.	2938.		
18	260.	194.	175.	288.	540.		3810.	6521.	2100.	2713.		
19	257.	197.	175.	340.	470.		3684.	6169.	2063.	2625.		
20	246.	185.	180.	571.	422.		4530.	6002.	2063.	2213.		
21	242.	190.	175.	461.	470.		4584.	5318.	2013.	1850.		
22	239.	190.	175.	369.	479.		4350.	4855.	2000.	1813.		
23	239.	185.	175.	413.	474.		3684.	4296.	2088.	1750.		
24	239.	185.	175.		496.		4044.	4116.	2100.	1550.		
25	242.	185.	188.		545.		4350.	3990.	2350.	1550.		
26	239.	180.	183.	344.	536.		5450.	4566.	2063.	1550.		
27	232.	180.	194.	316.			3270.	4440.	2063.	1500.		
28	236.	185.	204.	312.	501.		3630.	3270.	2075.	1500.		
29	232.	204.	204.	304.	636.		3900.	3234.	2063.	1450.		
30	225.	190.	190.	391.	658.		3540.	3216.	2075.	1450.		
31	225.	190.	190.		703.		3630.	4026.		1450.		
MAX	304.	218.	218.	571.	703.	1720.	6188.	8107.	4440.	2938.	1460.	
MIN	225.	180.	175.	185.	366.	843.	3270.	3216.	2000.	1450.	360.	
AVE	260.	199.	188.	305.	505.	1361.	4433.	5005.	2875.	1854.	623.	

STATION NO. 000450

CATCHMENT 31,100. SQ. KILOMETERS

AVERAGE DISCHARGE IN CURIC METERS PER SECOND

YEAR 1972

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			218.	264.	262.	810.	1560.	7332.	2900.	1600.	1888.	483.
2			215.	239.	260.	832.	2275.	5207.	2725.	1520.	1950.	474.
3			207.	225.	266.	726.	2975.	5873.	3198.	1460.	765.	466.
4			201.	204.	274.	742.	3360.	5077.	6558.	1390.	709.	452.
5			201.	201.	253.	793.	3414.	4782.	5318.	1300.	737.	444.
6			264.	194.	239.	731.	3252.	4512.	4548.	1260.	726.	439.
7			262.	190.	232.	619.	2813.	4746.	4800.	1310.	714.	426.
8			260.	194.	348.	602.	4476.	4584.	4440.	1570.	692.	422.
9			225.	197.	316.	586.	2463.	5059.	3504.	1330.	692.	413.
10			207.	215.	268.	554.	2375.	6317.	2813.	1227.	670.	413.
11			204.	280.	348.	580.	2150.	6428.	3378.	1188.	658.	413.
12			201.	246.	404.	619.	2088.	5022.	2825.	1149.	647.	408.
13		242.	197.	215.	360.	625.	1850.	4476.	3770.	1117.	658.	395.
14		332.	194.	207.	532.	849.	1813.	4296.	2700.	1094.	647.	
15		300.	207.	211.	523.	883.	1863.	3810.	3612.	1078.	625.	
16		250.	204.	229.	492.	883.		3288.	2950.	1055.	625.	
17		242.	201.	229.	597.	1775.		3288.	2650.	1000.	614.	
18		246.	197.	276.	558.	1340.		4008.	2525.	977.	619.	
19		242.	197.	260.	558.	2613.		2900.	2275.	938.	571.	
20		242.	197.	230.	670.	5429.		2775.	2138.	883.	562.	
21		236.	222.	215.	636.	2088.	5633.	2538.	2125.	868.	545.	
22		229.	218.	204.	616.	1975.	2026.	2775.	1950.	843.	536.	
23		225.	218.	204.	843.	2125.	5207.	2688.	1740.	838.	527.	
24		222.	218.	204.	840.	1875.	4044.	4062.	1900.	832.	514.	
25		218.	207.	225.	1117.	1480.	5355.	3216.	1975.	759.	505.	
26		218.	218.	222.	1219.	1570.	5503.	4386.	1950.	776.	501.	
27		218.	232.	270.	1133.	1450.	6697.	3846.	2163.	754.	562.	
28		218.	278.	246.	883.	1380.	10134.	4404.	2150.	748.	518.	
29		218.	260.	253.	868.	2163.	7943.	3414.	1837.	1650.	496.	
30		264.	264.	264.	843.	1775.	10026.	3108.	1670.	2950.	483.	
31		266.	266.		765.	8013.		5018.		2862.		
MAX		337.	278.	280.	1219.	5429.	10134.	7332.	6558.	2950.	1950.	483.
MIN		218.	194.	190.	232.	554.	1560.	2538.	1670.	748.	483.	395.
AVE		241.	221.	228.	365.	1349.	4396.	4233.	2953.	1236.	699.	434.

STATION NO. 000650

CATCHMENT 51,100, 50 KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1973

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	316.	266.	288.	306.	483.	636.	2288.	5651.	4152.	2500.	1410.	720.
2	308.	263.	280.	280.	444.	620.	2250.	5762.	5077.	3072.	1470.	703.
3	304.	257.	276.	276.	430.	597.	2375.	5780.	3900.	5614.	1410.	686.
4	304.	246.	236.	244.	483.	571.	2250.	6058.	3396.	9216.	1320.	675.
5	300.	250.	213.	278.	461.	647.	4044.	6932.	3216.	9513.	1280.	658.
6	300.	250.	194.	280.	501.	709.	4008.	6077.	3576.	5984.	1219.	653.
7	300.	246.	229.	278.	543.	985.	3972.	6224.	3936.	4512.	1172.	642.
8	304.	242.	229.	274.	874.	1320.	2413.	6132.	3736.	3630.	1219.	636.
9	316.	225.	246.	274.	1125.	1550.	2788.	6335.	3360.	3450.	1164.	625.
10	320.	242.	232.	264.	883.	1250.	2063.	5929.	3540.	3378.	1133.	614.
11	304.	242.	242.	266.	782.	1360.	1950.	6932.	3756.	2838.	1110.	602.
12	296.	236.	239.	288.	681.	1730.	2050.	6484.	6447.	2688.	1086.	591.
13	300.	242.	242.	280.	545.	2288.	2188.	5540.	8436.	8036.	1078.	586.
14	308.	225.	239.	373.	510.	2550.	2283.	4784.	5507.	6373.	1063.	580.
15	296.	225.	246.	366.	510.	2313.	2550.	4476.	5651.	4692.	1008.	562.
16	292.	222.	246.	316.	532.	4368.	2888.	3900.	5429.	3504.	1047.	562.
17	284.	218.	246.	316.	567.	5614.	2800.	3810.	6317.	2800.	1047.	554.
18	280.	215.	246.	286.	540.	5115.	3054.	5263.	5355.	2375.	1000.	545.
19	278.	207.	230.	278.	518.	2713.	2688.	5096.	5096.	2075.	946.	536.
20	276.	201.	242.	364.	470.	2663.	2675.	4242.	3702.	1962.	907.	532.
21	278.	229.	242.	386.	413.	2475.	2735.	3810.	3414.	1913.	883.	527.
22	288.	215.	236.	408.	413.	2575.	2450.	4044.	3396.	1900.	860.	518.
23	280.	222.	222.	435.	523.	2013.	2225.	3504.	2925.	1875.	843.	510.
24	274.	207.	232.	404.	483.	1848.	2688.	5144.	3144.	1800.	843.	501.
25	274.	211.	250.	417.	571.	1975.	4911.	2975.	3180.	1740.	815.	496.
26	270.	211.	272.	483.	765.	2250.	6169.	3324.	4170.	1710.	793.	492.
27	264.	232.	288.	532.	969.	2813.	5984.	3468.	3468.	1670.	782.	483.
28	264.	324.	280.	591.	961.	3270.	4152.	3162.	2925.	1620.	770.	479.
29	278.	300.	300.	496.	1008.	4350.	3648.	3432.	2750.	1470.	748.	474.
30	278.	304.	304.	452.	868.	5072.	4044.	3664.	2558.	1470.	737.	474.
31	272.	312.	312.	4674.	838.	4674.	4674.	3774.	2558.	1450.	717.	470.
MAX	320.	324.	312.	591.	1125.	5614.	6169.	6932.	8436.	9513.	1470.	720.
MIN	264.	201.	194.	264.	413.	571.	1950.	2975.	2538.	1450.	737.	470.
AVE	291.	235.	240.	355.	635.	2209.	3120.	4822.	4184.	3446.	1039.	571.

STATION NO. 000450

CATCHMENT 31/100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1974

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	470.	356.	316.	300.	430.	765.	2563.	8131.			1110.	576.
2	470.	348.	316.	300.	439.	793.	3882.	9189.			1086.	567.
3	461.	344.	276.	300.	474.	930.	3864.	7778.			1047.	576.
4	461.	324.	272.	300.	661.	737.	3000.	7637.			1024.	614.
5	444.	316.	270.	340.	479.	720.	2475.	16050.			1024.	625.
6	444.	308.	266.	336.	510.	798.	2663.				1008.	614.
7	444.	312.	260.	304.	474.	1055.	2288.				985.	636.
8	444.	316.	253.	288.	479.	776.	2288.				961.	630.
9	435.	316.	250.	292.	576.	642.	2150.				954.	619.
10	426.	320.	260.	300.	675.	567.	2300.				938.	597.
11	430.	324.	276.	288.	636.	575.	2538.				938.	580.
12	426.	336.	278.	288.	602.	488.	2825.				907.	567.
13	426.	340.	272.	284.	576.	602.	2813.				868.	536.
14	422.	332.	270.	308.	586.	686.	4512.				843.	527.
15	470.	328.	277.	320.	608.	1219.	3918.				832.	523.
16	444.	316.	268.	328.	549.	1195.	4134.				810.	510.
17	426.	320.	268.	356.	501.	1242.	4116.				793.	532.
18	417.	316.	268.	400.	483.	1390.	3828.				782.	571.
19	413.	312.	264.	483.	554.	1660.	3414.				759.	569.
20	413.	300.	262.	466.	457.	1690.	3180.		1560.		731.	536.
21	408.	304.	260.	461.	562.	1850.	3540.				714.	492.
22	404.	300.	264.	483.	523.	3162.	4728.				698.	479.
23	400.	300.	274.	532.	505.	1730.	5707.				686.	470.
24	400.	300.	292.	492.	435.	1510.	3756.				686.	470.
25	395.	288.	300.	461.	422.	1290.	7563.				670.	514.
26	382.	292.	300.	444.	417.	1149.	6224.				658.	510.
27	373.	348.	300.	435.	422.	1133.	5614.				630.	505.
28	378.	324.	300.	444.	413.	1219.	4602.				619.	501.
29	378.	296.	296.	444.	510.	1630.	8107.				614.	496.
30	373.	300.	296.	488.	597.	1110.	8201.				737.	488.
31	364.	300.	300.	488.	647.	1110.	8295.				737.	488.
MAX	470.	356.	316.	532.	647.	3162.	8295.	16050.	1560.	1110.	1110.	636.
MIN	364.	288.	250.	284.	413.	488.	2150.	7637.	1110.	614.	614.	470.
AVE	421.	319.	278.	375.	515.	1142.	4163.	9257.	1365.	837.	837.	565.

STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1975

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	483.	448.	382.	320.	625.	580.		7755.				
2	479.	461.	369.	328.	597.	549.	360.	7238.				
3	692.	437.	352.	360.	545.	554.		2150.				
4	545.	430.	348.	348.	523.	798.		4278.				
5	510.	426.	340.	413.	501.	776.		6317.				
6	488.	422.	340.	408.	457.	765.		6447.				
7	483.	430.	348.	496.	492.	798.		7895.				
8	479.	426.	400.		505.	804.		8648.				
9	474.	422.	404.		562.	832.		9189.				
10	474.	430.	364.		562.	930.	360.	9594.				
11	483.	404.	348.		664.	580.		9486.				
12	457.	422.	320.	324.	647.	810.		8906.				
13	448.	382.	324.	316.	692.	1063.		9837.				
14	457.	408.	312.	369.	804.	1340.		9729.				
15	457.	413.	308.	328.	737.	1762.		9999.				
16	448.	400.	304.	304.	810.	3216.		10026.				
17	439.	391.	292.	320.	514.	2775.						
18	382.	382.	288.	312.	9054.	2325.	360.	9810.				
19	435.	360.	292.	328.	793.	3540.		9891.				
20	439.	373.	300.	320.	675.	3756.	576.	9702.				
21	426.	348.	320.	340.	658.	5780.	642.	10080.				
22	435.	404.	316.	457.	614.		647.	10269.				
23	448.	369.	324.	470.	653.		636.	9729.				
24	426.	360.	300.	545.	726.		3090.	9081.				
25	435.	369.	332.	580.	899.	2538.	7238.	4152.				
26	430.	360.	324.	536.	946.	2525.	5559.	6956.				
27	426.	344.	304.	647.	720.	8742.	4782.	8671.				
28	422.	364.	300.	558.	586.	11430.	4584.	9756.				
29	417.	417.	288.	653.	549.	8107.	5392.	10134.				
30	422.	422.	320.	642.	619.	9945.	6791.	10674.				
31	448.	448.	344.		681.		7120.	10161.				
MAX	692.	461.	404.	653.	9054.	11430.	7238.	10674.				
MIN	417.	344.	288.	304.	457.	549.	360.	2150.				
AVE	463.	400.	329.	424.	916.	2875.	3209.	8552.				

CATCHMENT 31,100. SQ. KILOMETERS

STATION NO. 000450

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1976

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	502.	369.	360.	408.	239.	653.	3072.	3792.	4948.	1900.		
2	518.	344.	344.	408.	280.	1016.	2425.	3882.	4332.	1800.		
3	514.	344.	344.	408.	320.	1016.	3072.	3774.	4458.	1782.		
4	514.	369.	344.	408.	320.	1016.	3072.	3072.	4620.	2938.		
5	510.	352.	352.	408.	280.	860.	3072.	3036.	5244.	2913.		
6	505.	352.	344.	408.	554.	1470.	2425.	3054.	5429.	2788.		
7	505.	366.	344.	408.	320.	1580.	2425.	3054.	4966.	2763.		
8	501.	369.	344.	408.	280.	1390.	2000.	3972.	5577.	2850.		
9	501.	360.	340.	408.	280.	1825.	969.	3972.	3702.	2775.		
10	501.	360.	340.	408.	280.	3144.	954.	3972.	3648.	2800.		
11	490.	360.	344.	408.	280.	5152.	1550.	3972.	2813.	2550.		
12		360.	340.	408.	232.	5022.	969.	3972.	3072.	2713.		
13		360.	340.	408.	232.	5022.	969.	3972.	3414.	2450.		
14		360.	340.	408.	239.	5022.	1800.	3972.	3468.	2350.		
15		360.	340.	408.	239.	5022.	4512.	3972.	3486.	2350.		140.
16		356.	340.	413.	239.	1410.	2425.	3972.	2925.	2350.		143.
17		356.	352.	413.	239.	1440.	5762.	4278.	2850.			278.
18		352.	352.	413.	239.	1450.	3702.	5096.	2788.			276.
19		352.	417.	413.	239.	1450.	3486.	4008.	2713.			270.
20		352.	413.	413.	239.	2675.			2688.			280.
21		352.	413.	356.	278.	1490.	3396.	4062.	2425.			278.
22		348.	408.	364.	257.	1450.	3198.	4026.	2650.			274.
23		344.	408.	364.	239.	1490.	3378.	4026.	2200.			270.
24		348.	408.	364.	257.	2425.	3360.	7167.	2113.			197.
25		348.	408.	369.	602.	1650.	3360.	5485.	2013.			178.
26		352.	408.	369.	602.	1650.	7594.	4656.	1975.			262.
27		344.	408.	369.	602.	2425.	3792.	4638.	2100.			131.
28		344.	408.	364.	400.		3792.	4874.	2013.			194.
29		344.	408.	270.	602.	3216.	3792.	4782.	1875.			197.
30	378.	408.	408.	554.	642.	2425.	3792.	3342.	1775.			168.
31	378.	408.	408.	554.	642.	2988.	3792.	2988.				170.
MAX	562.	369.	413.	554.	642.	5152.	6502.	7167.	5577.	2938.		280.
MIN	378.	344.	340.	270.	232.	653.	954.	2988.	1775.	1762.		131.
AVE	491.	355.	372.	398.	344.	2265.	3054.	4432.	3276.	2503.		218.

STATION NO. 000450

CATCHMENT 51/100, SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1977

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	194.	150.	304.	306.	720.	1650.	2813.	6095.			860.	518.
2	168.	145.	270.	312.	369.	714.	2575.	5355.			849.	510.
3	153.	131.	262.	316.	404.	1450.	2288.	7255.			922.	514.
4	197.	145.	264.	312.	776.	1670.	2852.	9675.			1250.	510.
5	242.	145.	270.	352.	591.	1390.	3864.	6840.			1094.	514.
6	262.	145.	270.	312.	804.	1234.	3864.	5725.			843.	514.
7	274.	143.	268.	304.	804.	1360.	3792.	5170.		1520.	826.	536.
8	264.	160.	272.	300.	776.	1260.	3918.	6188.		1370.	571.	492.
9	229.	143.	274.	340.	591.	1110.	4864.	5374.		1360.	625.	505.
10	201.	145.	276.	352.	404.	1172.	5392.	5448.		1211.	776.	474.
11	257.	153.	276.	352.	767.	1156.	5188.	6373.		1420.	804.	466.
12	222.	270.	276.	352.	720.	1047.	3922.	5170.		1400.	782.	457.
13	222.	270.	276.	720.	776.	907.	4693.	8225.		1260.	720.	470.
14	264.	352.	340.	692.	748.	532.	5022.	11214.		1071.	726.	470.
15	266.	352.	340.	731.	804.	1188.	5022.	10755.		1094.	709.	461.
16	264.	352.	356.	720.	793.	1078.	4368.	7225.		1300.	658.	452.
17	229.	348.	296.	748.	731.	1032.	4368.	5170.		1125.	653.	448.
18	222.	348.	316.	625.	737.	1071.	4602.	8225.		1078.	658.	430.
19	222.	348.	316.	714.	312.	1039.	5188.	1094.		1094.	636.	448.
20	222.	348.	312.	726.	737.	1130.	5910.	10755.		1047.	602.	413.
21	215.	344.	336.	483.	703.	1370.	6188.	7225.		1032.	591.	395.
22	218.	344.	352.	737.	748.	2200.	5188.	5170.		1016.	591.	373.
23	211.	344.	340.	479.	793.	2425.	5281.	6188.		961.	580.	395.
24	211.	300.	336.	204.	815.	2300.	5577.	8225.		922.	580.	395.
25	218.	296.	344.	264.	793.	2300.	5485.	876.		876.	580.	395.
26	190.	274.	348.	748.	404.	2500.	5688.	860.		860.	580.	395.
27	207.	276.	348.	804.	404.	2600.	6151.	860.		860.	580.	408.
28	180.	274.	352.	776.	404.	2400.	5448.	876.		876.	576.	404.
29	178.	352.	352.	776.	426.	2275.	4930.	876.		876.	554.	448.
30	168.	312.	312.	681.	1400.	2638.	5818.	843.		843.	514.	426.
31	163.	312.	312.	1500.	1500.	3990.	3990.	474.		474.	422.	422.
MAX	274.	352.	352.	806.	1500.	2638.	6188.	11214.		1570.	1250.	536.
MIN	153.	131.	262.	204.	332.	532.	2575.	5170.		474.	514.	373.
AVE	217.	250.	308.	518.	703.	1548.	4657.	6971.		1078.	710.	454.

STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1978

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	408.	292.	276.	332.	647.	1650.	4620.	8177.	2825.	2500.	1032.	518.
2	391.	276.	274.	292.	664.	1490.	4116.	8177.	2700.	2250.	1008.	545.
3	413.	280.	278.	292.	726.	1430.	4170.	7120.	2587.	2125.	1047.	602.
4	404.	278.	274.	296.	891.	1340.	3810.	6979.	2975.	2000.	1016.	562.
5	404.	270.	280.	288.	698.	1350.	4170.	7684.	3108.	2175.	1016.	466.
6	400.	277.	276.	296.	815.	1570.	6058.	6697.	2975.	3072.	985.	523.
7	400.	274.	268.	296.	826.	1700.	5392.	5836.	3252.	2613.	938.	501.
8	386.	312.	264.	296.	793.	2138.	7590.	6838.	3432.	2250.	922.	492.
9	382.	320.	262.	316.	860.	2475.	6354.	8953.	3468.	2100.	891.	496.
10	369.	292.	266.	340.	577.	2438.	6002.	6450.	3540.	1975.	891.	510.
11	364.	280.	276.	356.	891.	2275.	5263.	8812.	3936.	1850.	907.	448.
12	356.	250.	332.	352.	815.	1800.	5947.	9162.	3000.	1775.	726.	426.
13	356.	280.	417.	360.	838.	1800.	3396.	7543.	3396.	1720.	709.	408.
14	378.	288.	328.	527.	961.	1863.	5818.	5818.	5059.	1660.	703.	435.
15	364.	280.	304.	608.	1320.	1825.	5855.	4966.	4224.	1620.	703.	448.
16	849.	280.	296.	562.	1640.	2150.	9864.	4422.	3666.	1540.	653.	435.
17	344.	288.	288.	571.	1530.	2100.	6502.	4819.	3288.	1530.	647.	422.
18	336.	320.	360.	647.	1390.	2500.	5984.	5318.	2975.	1480.	636.	422.
19	328.	364.	417.	608.	1270.	3180.	5133.	5170.	4260.	1450.	614.	408.
20	320.	344.	352.	554.	1234.	2875.	5540.	4512.	3378.	1400.	501.	404.
21	312.	312.	296.	466.	1300.	2463.	5725.	4116.	2825.	1350.	554.	404.
22	308.	280.	288.	439.	1480.	3162.	5244.	4332.	2663.	1430.	625.	404.
23	360.	280.	304.	430.	1370.	3162.	6040.	4893.	2275.	1330.	602.	400.
24	348.	280.	312.	439.	1234.	3360.	5873.	4584.	2488.	1227.	614.	382.
25	328.	280.	288.	474.	1024.	3720.	6354.	4350.	2550.	1211.	571.	395.
26	324.	276.	292.	479.	1133.	4080.	5004.	4278.	2550.	1260.	571.	386.
27	320.	278.	284.	457.	1300.	3486.	4584.	3792.	3036.	1141.	602.	378.
28	312.	276.	280.	492.	1330.	4080.	6650.	3306.	3108.	1172.	554.	360.
29	296.	280.	280.	608.	1300.	4728.	7261.	3054.	2700.	1156.	540.	360.
30	312.	300.	300.	536.	1172.	5633.	6113.	2850.	2600.	1188.	540.	360.
31	332.	336.	336.	536.	1380.	5947.	5947.	2988.	2600.	1078.	540.	356.
MAX	849.	364.	417.	647.	1640.	5633.	9864.	9162.	5059.	3072.	1047.	602.
MIN	296.	270.	262.	288.	647.	1340.	3810.	2850.	2275.	1078.	501.	356.
AVE	371.	290.	302.	434.	1091.	2594.	5764.	5684.	3161.	1698.	744.	441.

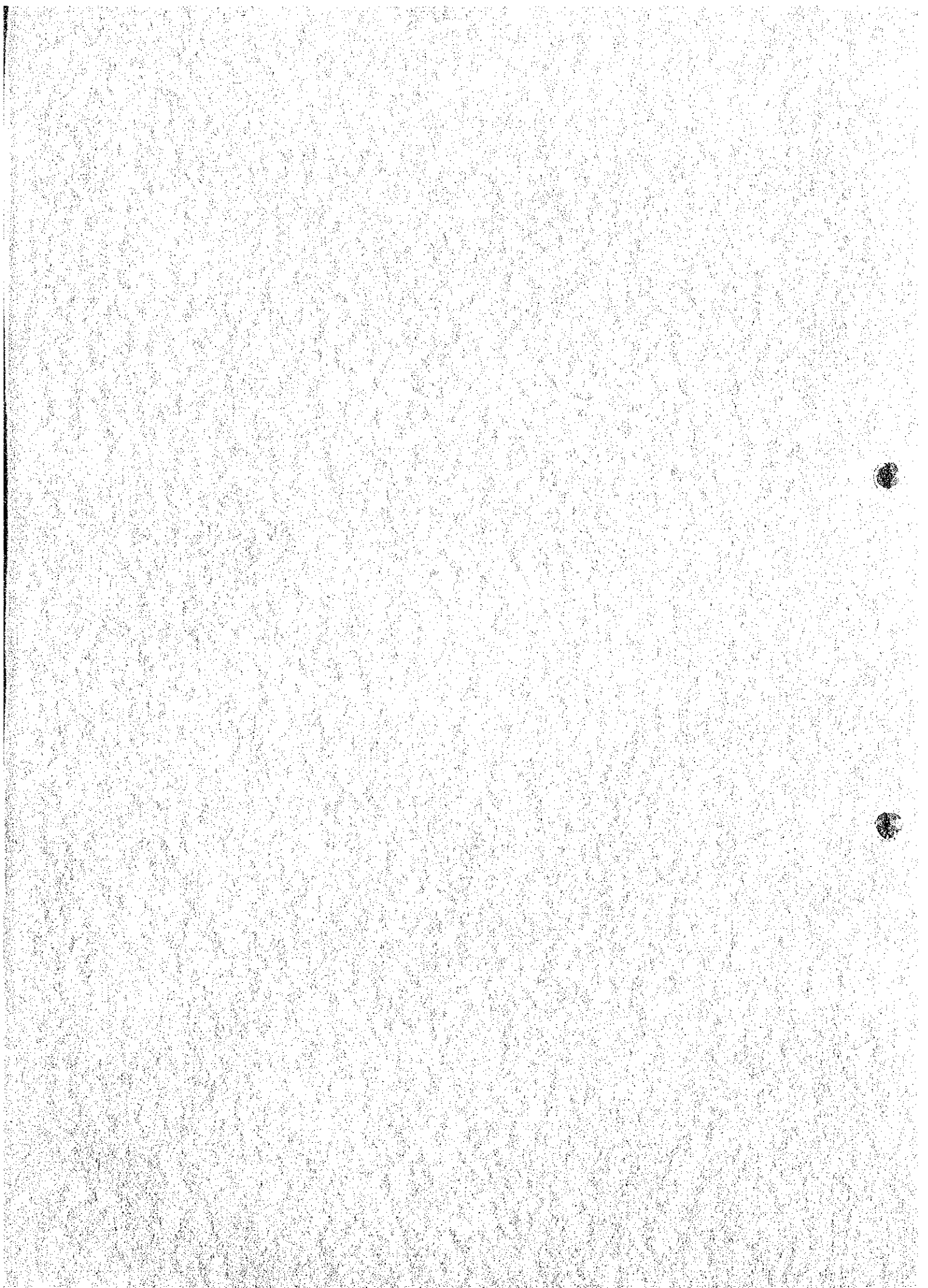
STATION NO. 000450

CATCHMENT 31,100. SQ KILOMETERS

AVERAGE DISCHARGE IN CUBIC METERS PER SECOND

YEAR 1979

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	348.	264.	225.	211.	650.	316.	3450.	5226.	4350.	1254.	793.	737.
2	344.	264.	218.	218.	439.	344.	3650.	5207.	3342.	1380.	787.	562.
3	320.	260.	218.	218.	505.	320.	3668.	6815.	4728.	1380.	737.	540.
4	328.	253.	215.	253.	518.	225.	2200.	5485.	5226.	1640.	703.	536.
5	328.	246.	218.	260.	479.	408.	2000.	5651.	5133.	1620.	675.	536.
6	312.	250.	211.	239.	408.	391.	2862.	4278.	3972.	1380.	653.	448.
7	324.	260.	225.	225.	378.	400.	1610.	3846.	3124.	1680.	642.	448.
8	312.	268.	218.	218.	312.	1590.	1590.	8483.	3126.	1640.	647.	439.
9	308.	312.	211.	229.	369.	554.	876.	4637.	2963.	1320.	642.	430.
10	296.	274.	215.	260.	417.	501.	1975.	4911.	3216.	1660.	630.	426.
11	304.	268.	207.	272.	639.	505.	2888.	6656.	3450.	1470.	614.	413.
12	304.	264.	211.	278.	439.	586.	3000.	5707.	2963.	1750.	614.	404.
13	304.	272.	204.	304.	527.	843.	3144.	4584.	2488.	1550.	580.	395.
14	296.	268.	197.	272.	501.	748.	3342.	5818.	2375.	1400.	576.	382.
15	296.	260.	218.	274.	501.	1063.	3918.	5780.	2150.	1420.	571.	391.
16	300.	246.	197.	344.	1133.	798.	4116.	4332.	2057.	1188.	562.	386.
17	304.	246.	197.	304.	709.	647.	3018.	3972.	2075.	1149.	562.	378.
18	304.	239.	211.	288.	562.	653.	3684.	3936.	2475.	1102.	562.	369.
19	296.	242.	204.	272.	470.	770.	2925.	3774.	1730.	1110.	554.	369.
20	296.	246.	190.	274.	435.	1172.	2450.	5410.	1630.	1000.	554.	360.
21	296.	276.	190.	308.	488.	1620.	3270.	9945.	1670.	946.	545.	344.
22	296.	292.	197.	280.	576.	1242.	3864.	7332.	1540.	876.	536.	344.
23	280.	266.	190.	292.	426.	1270.	4278.	5374.	1500.	907.	527.	340.
24	288.	260.	197.	288.	356.	1690.	9270.	6782.	1440.	876.	510.	336.
25	272.	256.	180.	250.	320.	1710.	6335.	3954.	1490.	891.	505.	332.
26	270.	225.	180.	280.	296.	1875.	5022.	3972.	1350.	907.	492.	328.
27	280.	225.	185.	300.	292.	2217.	4800.	4966.	1300.	891.	492.	312.
28	264.	239.	180.	340.	304.	2463.	4893.	4260.	1280.	826.	293.	312.
29	266.	183.	204.	360.	284.	2688.	6169.	4116.	1270.	821.	488.	304.
30	268.	439.	190.	439.	274.	2587.	5966.	3960.	1290.	804.	670.	312.
31	260.	225.	225.	284.	284.	5115.	4008.	4008.	1290.	798.	670.	360.
MAX	348.	312.	225.	459.	1135.	2688.	9270.	9945.	5226.	1750.	793.	737.
MIN	260.	225.	180.	211.	274.	225.	876.	3774.	1270.	798.	488.	304.
AVG	299.	254.	205.	278.	447.	1027.	3714.	5139.	2559.	1200.	607.	406.



Sapt Gandaki Hydroelectric Power Development Project

Minutes of Meeting

DATE:

August 20 and 21, 1981

SUBJECT:

Explanation and comments on Interim Report I prepared for Stage I study in the Feasibility Study of the Sapt Gandaki Hydroelectric Power Development Project

ATTENDANTS:

Mission of Electricity Department (ED), His Majesty's Government of Nepal (HMG):

- Mr. R.C. Chaudhary, Chief of Investigation Division, ED, HMG
- Mr. H. O. Shrestha, Chief of Planning and Evaluation Division, ED, HMG

JICA team (Japan International Cooperation Agency):

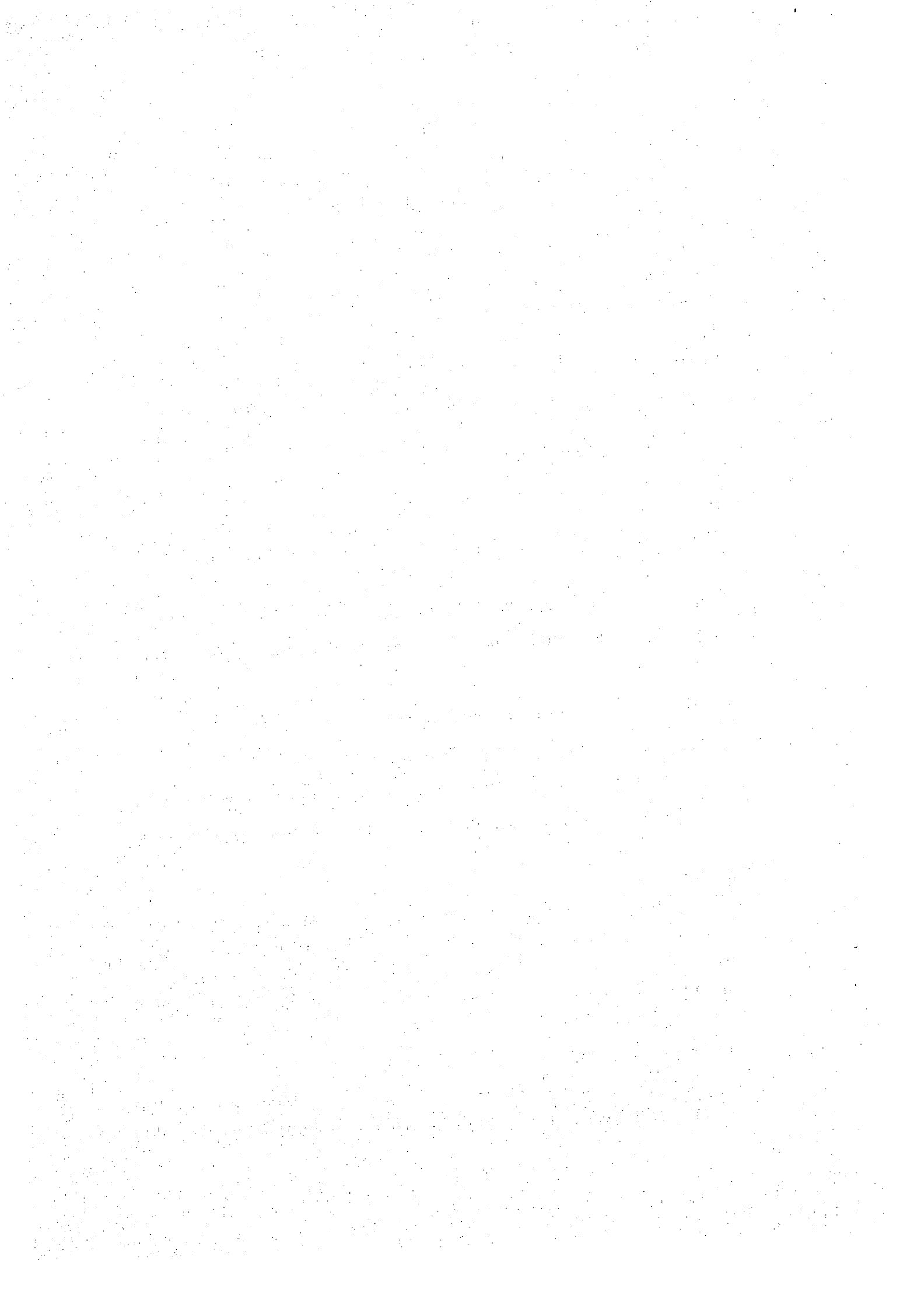
- Mr. M. Yamaguchi, Chief of JICA Investigation Team
- Mr. N. Fujita, Deputy Chief of JICA Investigation Team
- Mr. S. Kumazawa, Geological Engineer of JICA Investigation Team

MINUTES:

The explanation by JICA team and comments by ED mission on the Interim Report I were made in the meeting, and it was mutually agreed that the items commented by ED mission will be examined and be duly incorporated in the succeeding stages of the Feasibility Study, Stage II and III studies.

Explanation by JICA Team

The explanation by JICA team was made in accordance with SUMMARY AND CONCLUSION of the Interim Report I with emphasis on the major



items of damsite geology, hydrology, plan formulation, optimization of the installed capacity, preliminary design, construction schedule, project cost and project feasibility. The team expressed the conclusion that the project is expected to be technically and economically feasible, and that the proceeding with the successive studies, Stage II and III studies, is fully justifiable.

Comments by ED Mission

- The actual power consumption figures as shown in Table 3-3 and 3-4 should duly be checked and revised.
- In Paragraph 2 of SUMMARY AND CONCLUSION, it is stated that the electric power demand in Nepal has almost reached the supply capacity in Nepal. Actually, the power demand exceeded the supply capacity and therefore, the statement should duly be revised.
- In Paragraph 7 of SUMMARY AND CONCLUSION, it is stated that the power supply condition is unsatisfactory and deficient state in the whole of Nepal.

Especially, there is a substantial amount of gap in demand and supply in Central Power System. Thus, it is better to address the state of power condition specifically.

- In Paragraph 8 of SUMMARY AND CONCLUSION, the annual growth rate of peak demand is projected at 17.9% during 5 years from 1980/81 to 1985/86 and 10.5% during 5 years from 1985/86 to 1990/91.

The above assumption of growth rate from 17.9% to 10.5% looks drastic, and should be further examined.

The assumption of load factor from 45% to 50% in the demand projection seems to be high, since the actual load factor is around 40%. Further examination for the assumption of the load factor is considered necessary in the succeeding studies.

- In Fig. 3-8, the Seti and Mulghat power plants are scheduled to be constructed in 1982/83 and 1987/88 respectively.

However, the Seti power plant is of the capacity of only 1 MW which is negligibly small.

Realization of the Mulghat power plant before the Sapt Gandaki project will be difficult. Then, the construction schedule of the future power plants should be considered without the above two power plants.

- The construction of the Sapt Gandaki project of which completion is scheduled in 1990 should be expedited as early as possible. It is considered possible to expedite its completion by one year by making the following rearrangement of the construction time schedule shown in Fig. 6-4.

- (i) To submit the draft feasibility report by mid September 1982 so that financing for further detail engineering study could be arranged by end of 1982.
- (ii) To start preparation of the tender design and detail design from the beginning of 1983.

JICA team assured to complete the preparation of the draft feasibility report as early as possible.

- It is recommended in the Interim Report I that the other two units (2 units x 50 MW) should be commissioned by 1994/95 in consideration of the power demand prediction and reduction of initial investment.

However, ED mission proposed to carry out the installation of the other two units successively after the installation of the initial two units, taking into consideration that the same finance will also be applicable for the other two units and that the surplus power could be exported to India.

- In the plan formulation, the high water level of the reservoir is set at the tailwater level of the Kali Gandaki No.2 project given in the master plan of the Gandaki River Basin.

However, there is no definite plan at present to implement the Kali Gandaki No.2 project. It will be reasonable to determine the development scale of the Sapt Gandaki project independently and the further optimization study on the project itself is considered necessary in the successive studies.

- The Interim Report I describes the possibility of the future expansion of the installed capacity. More detailed presentation of the expansion scheme is needed in the successive stages of the study.
- ED mission required the study of the ranking of the Sapt Gandaki project among the future hydropower projects in Nepal to meet the power demand of 1980/90 onwards.

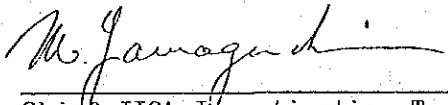
All the data required for this study (construction cost of other hydropower projects estimated under the same base, etc.) will be provided by ED to JICA team.

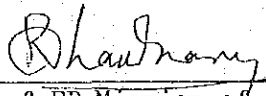
- ED mission proposed to include the study of rearrangement of the transmission line system as follow;
 - (i) One circuit of about 100 km from the power station to Butwal (with tower of double circuits)
 - (ii) One circuit of about 70 km from the power station to Hetauda (with tower of double circuits)
 - (iii) Two circuit of about 5 km between the power station and Bharatpur substation

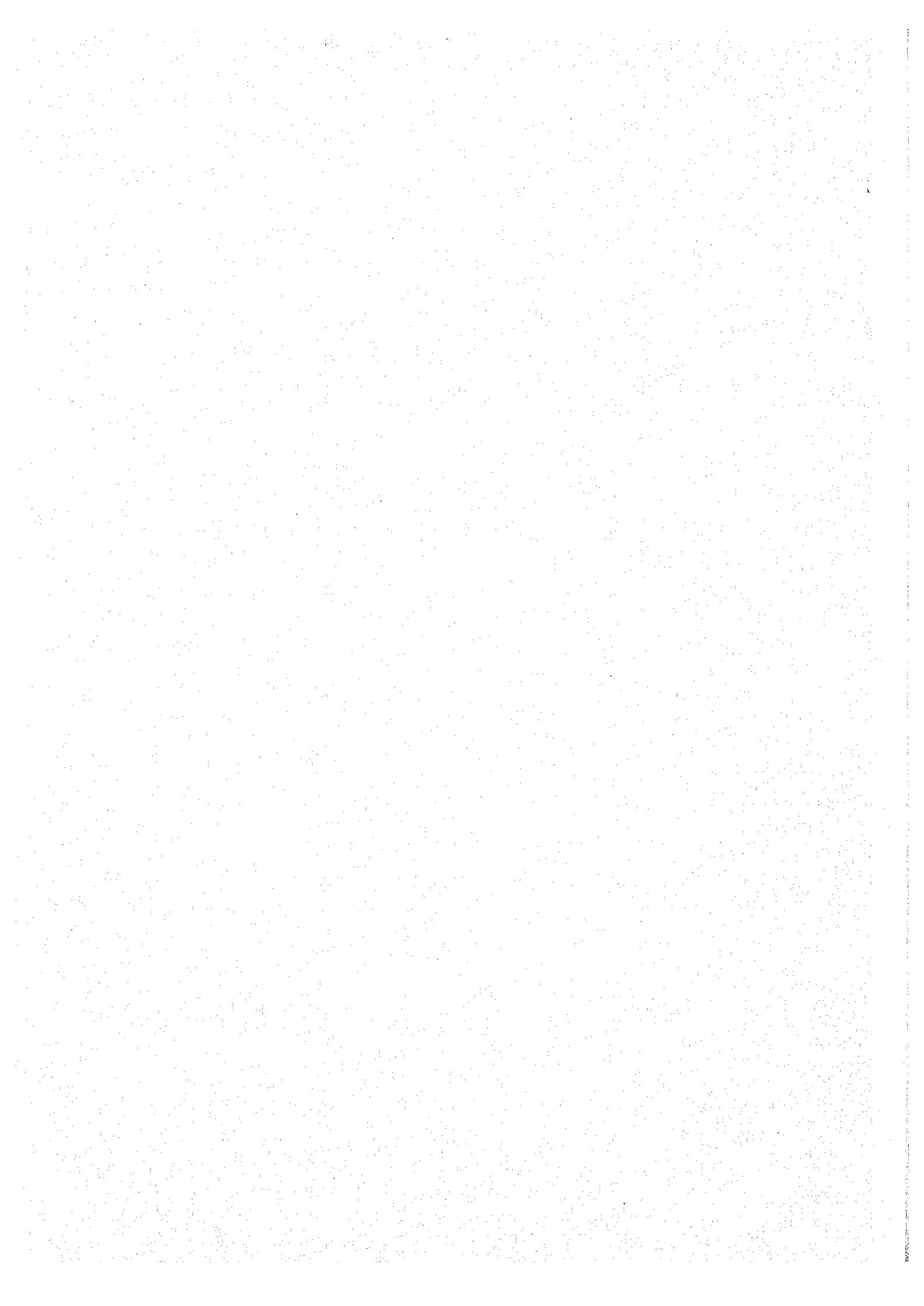
The construction cost required for the above arrangement should duly be incorporated in the succeeding studies.

- The irrigation water requirement and effect on power generation should be examined in more detail and be presented in the succeeding stage of the study.

- Map showing the area to be submerged by the reservoir for the land acquisition and relocation of roads, etc. should also be presented in the succeeding stage of the study.
- More information about the effect on fishery and other environments should also be incorporated in the succeeding stage of the study.


Chief JICA Investigation Team


Chief ED Mission of HMG



JICA