

THE REPUBLIC OF TURKEY

**FEASIBILITY STUDY
ON
OLTU RIVER HYDROELECTRIC
POWER DEVELOPMENT PROJECT**

**FINAL REPORT
APPENDIX**

OCTOBER 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

YEN
C.R.S.
62m/60%

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ON
OLTU RIVER HYDROELECTRIC
POWER DEVELOPMENT PROJECT**

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APPENDIX

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A-1 Power Demand Forecast and Supply Program

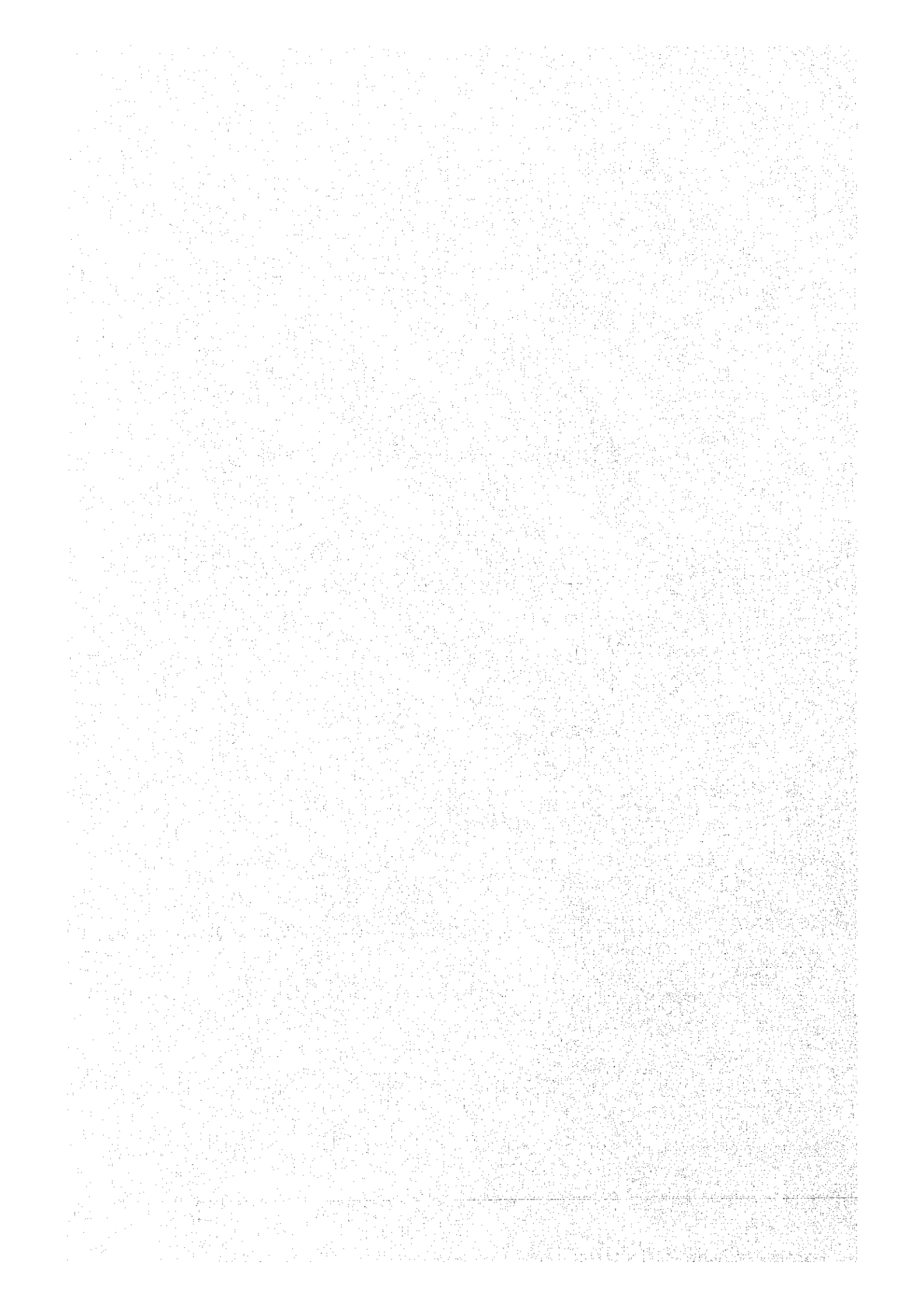
Development Plan of Electric Power of Turkey

Year	Hydroelectric Power Station			Thermal Power Station			Total	
	Project	MW	GWh	Project	MW	GWh	MW	GWh
1995		10,896	38,624		11,013	71,466	21,914	110,090
1996		—	—	Tunobilek A (L)	▲ 129	▲ 900		
				Kangal 3 (L)	0	1,000		
				Dogal (G)	450	3,150		
	Total	0	0	Total	321	3,250	(22,235)	3,250
							321	
1997				Elbistan A56 (L)	2×340	2×2,380		
				Dogal (G)	2×450	2×3,150		
	Total	0	0	Total	1,580	11,060	(23,815)	11,060
							1,580	
1998	Kayraktepe	431	991	Elbistan B1.2 (L)	2×340	2×2,380		
	Berke	510	1,663	Dogal (G)	450	3,150		
	Total	941	2,659	Total	1,130	7,910	(25,886)	11,569
							2,071	
1999	Birecik	672	2,516	Elbistan B3.4 (L)	2×340	2×2,380		
	Boyabat	513	1,468					
	Yedigöze	300	969					
	Alpaslan	160	567					
	Alpaslan	40	238					
	Cindere	27	88					
	Total	1,712	5,846	Total	680	4,760	(28,278)	10,606
							2,392	
2000	Akköprü	115	343	Cayirham 3.4 (L)	2×150	2×1,050		
	Karkamcs	180	652	Dogal (G)	3×450	3×3,150		
	Total	295	995	Total	1,650	11,550	(30,223)	12,545
							1,945	
2001	Ilisu	1,200	3,833	Dogal (G)	2×450	2×3,150		
				Ithal Kömer (T)	2×500	2×3,500		
	Total	1,200	3,833	Total	1,900	13,300	(33,323)	17,133
							3,100	

Year	Hydroelectric Power Station			Thermal Power Station			Total	
	Project	MW	GWh	Project	MW	GWh	MW	GWh
2002	OF Solarli	380	1.000	Elbistan C1.2 (L)	2×340	2×2.380	(35,848)	14,967
	Cizre	240	1.218	Adyaman (L)	150	1.050		
	Torul	103	322	Dogal (G)	2×450	2×3.150		
	Uzunçayir	72	317					
	Total	795	2.857	Total	1.730	12.110	2.525	
2003	Deriner	670	2.118	Elbistan C3.4 (L)	2×340	2×2.380	(38,438)	15,558
				Cayrham B1 (L)	340	2.380		
				Dogal (G)	2×450	2×3.150		
	Total	670	2.118	Total	4.920	13.440	2.590	
2004	Borçka	300	1.039	Cayrham D2 (L)	340	2.380	(41,433)	17,469
	Muratle	115	445	Anasra 1 (T)	300	2.100		
	Yusfeli	540	1.705	Dogal (G)	2×450	2×3.150		
				Ithal Kömer (T)	500	3.500		
	Total	955	3.189	Total	2.040	14.280		
2005	Beskonak	201	660	Soma C1 (L)	165	1.155	(44,131)	18,204
	Artvin	332	989	Amasra (T)	300	2.100		
				Dogal (G)	2×450	2×3.150		
				Ithal Kömer (T)	2×500	2×3.500		
	Total	533	1.649	Total	2.365	16.555		
2006	Dilek-Gorolik	135	511	Dogal (G)	2×450	2×3.150	(47,436)	21,971
	Göktas	270	1.160	Ithal Kömer (T)	4×500	4×4.500		
	Total	405	1.671	Total	2.900	20.300		
2007	Sanliurfa	50	124	Soma C2 (L)	165	1.155	(50,652)	20,535
	Aslancik	90	349	Dogal (G)	450	3.150		
	Konaktepe	210	694	Ithal Kömer (T)	4×500	4×3.500		
	Ulubat-Çinarcik	120	548					
	Camlica 1	131	515					
	Total	601	2.230	Total	2.615	18.305	3.216	

Year	Hydroelectric Power Station			Thermal Power Station			Total	
	Project	MW	GWh	Project	MW	GWh	MW	GWh
2008	Ermenek	320	742	Seyitomer B1,2 (L)	2×150	2×1,050	(54,594)	24,885
	Hakkari	322	1,043	Bolu (L)	150	1,050		
				Dogal (G)	3×450	3×3,150		
				Ithal Kömer (T)	3×500	3×3,500		
	Total	642	1,785	Total	3,300	23,100	3,942	
2009	Alkumru	176	807	Beysehir (L)	340	2,380	(58,470)	25,565
	Çetin	244	1,100	Dogal (G)	2×450	2×3,150		
	Penbelik	100	313	Ithal Kömer (T)	2×500	2×3,500		
	Dalaman-Bezkeke	50	205	Nuclear (N)	1,066	7,460		
	Total	570	2,425	Total	3,306	23,140		
2010	Özköy	156	182	Bolu Göynük 2 (L)	150	1,050	(63,286)	29,138
	Gürsögot	242	276	Dogal	2×450	2×3,150		
	other 21	762	3,370	Ithal Kömer	3×500	3×3,500		
				Nuclear	1,066	7,460		
	Total	1,200	3,828	Total	3,616	25,310		

A-2 Meteorological and Hydrological Data



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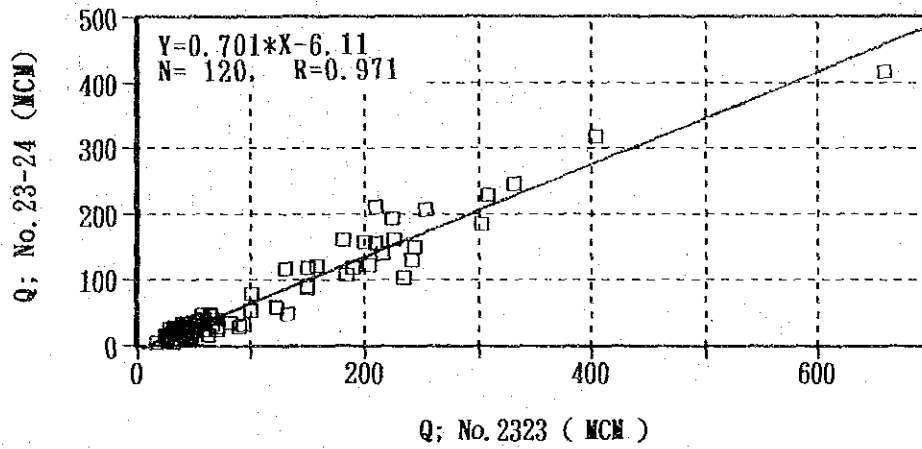


Fig. A-2-1(a) Correlation Analysis between Nos.23-24 and 2323 Gauging Station

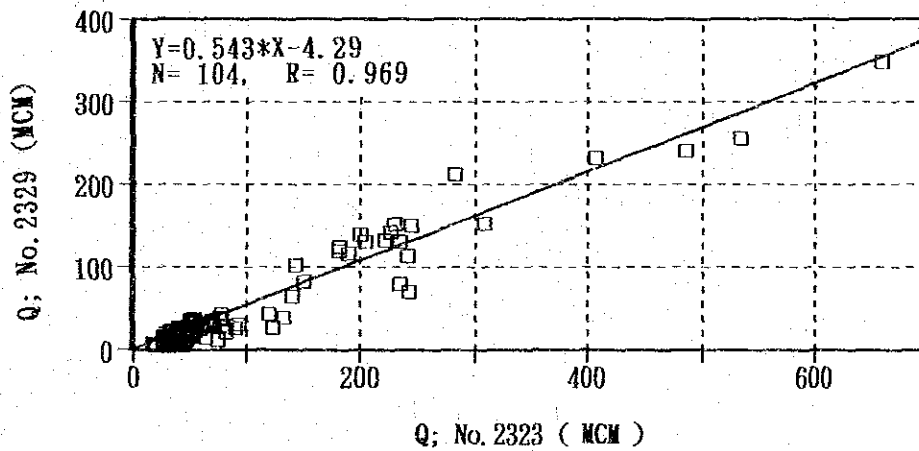


Fig. A-2-1(b) Correlation Analysis between Nos.2329 and 2323 Gauging Station

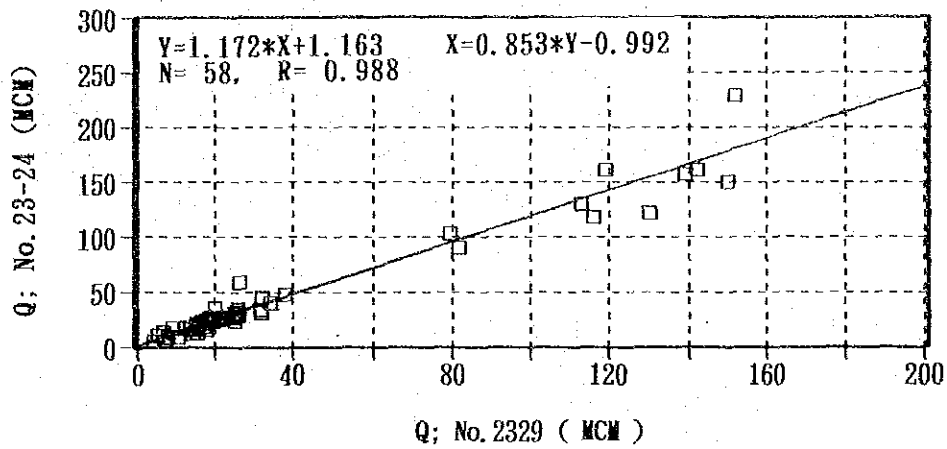


Fig. A-2-2(a) Correlation Analysis between Nos.23-24 and 2329 Gauging Station

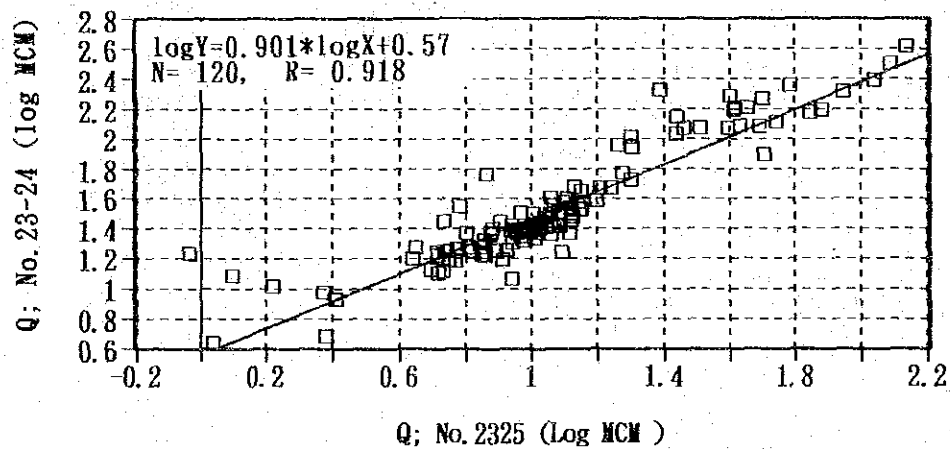


Fig. A-2-2(b) Correlation Analysis between Nos.23-24 and 2325 Gauging Station

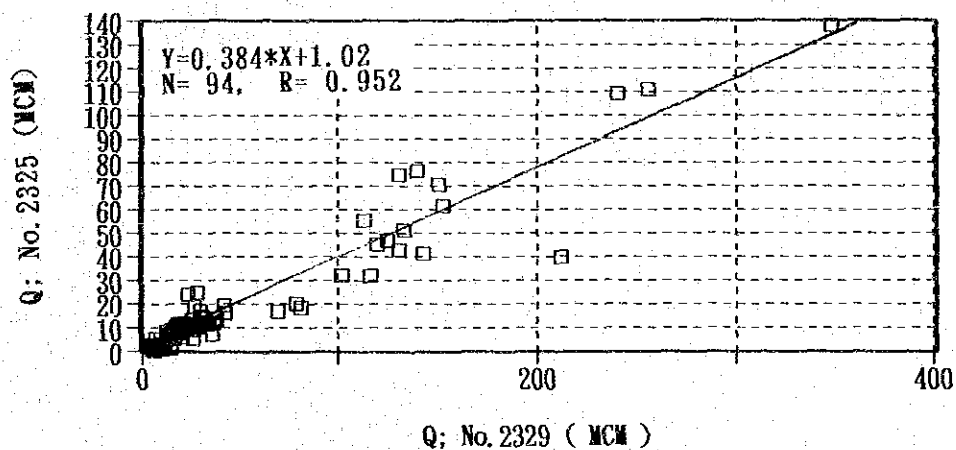


Fig. A-2-2(c) Correlation Analysis between Nos.2325 and 2329 Gauging Station

Table A-2-6 Estimated Monthly Temperatures at Tortum Power Station

Year	(unit ; °C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
1977	-4.9	3.0	2.9	10.4	14.7	18.2	22.5	23.3	18.9	8.1	7.0	-1.8	10.2
1978	-2.5	1.2	4.5	7.8	14.2	17.9	25.3	22.2	19.6	12.9	1.3	2.1	10.5
1979	0.3	3.0	5.0	10.0	14.9	17.6	21.5	25.4	20.1	11.4	6.6	0.3	11.3
1980	-0.7	2.0	4.0	9.0	15.7	20.7	25.4	22.1	17.5	10.6	6.9	2.5	11.3
1981	0.9	1.9	5.1	8.2	12.2	18.7	24.6	22.4	19.7	13.2	4.2	3.8	11.2
1982	-1.1	-2.6	1.7	10.5	14.8	20.0	22.2	22.3	18.4	11.1	2.6	0.4	10.0
1983	-1.3	-0.8	3.4	10.4	14.6	18.6	24.3	22.8	17.6	11.1	6.9	0.8	10.7
1984	0.8	0.3	5.0	8.8	12.9	18.8	22.2	20.1	17.1	10.9	5.9	2.8	10.5
1985	0.3	-0.1	-0.1	10.7	17.1	20.7	22.1	24.7	17.2	9.6	7.2	-0.1	10.8
1986	-0.8	-0.6	2.6	11.6	11.3	18.3	25.4	25.3	20.1	11.8	2.4	-1.9	10.5
1987	0.4	0.7	-0.9	6.7	16.5	19.8	23.3	21.6	17.1	9.7	3.2	-0.7	9.8
1988	-3.6	-1.0	2.1	9.4	13.7	18.0	22.5	21.6	17.0	11.3	1.9	0.4	9.4
1989	-5.7	-3.5	5.1	13.3	15.4	20.6	24.2	24.6	17.4	10.7	4.7	-2.8	10.3
1990													
Ave	-1.4	0.3	3.1	9.8	14.5	19.1	23.5	23.0	18.3	11.0	4.7	0.4	10.5

Note: $X > 0$ $Y(\text{Tortum p/s}) = 1.136(\text{Tortum}) + 0.83$
 $X < 0$ $Y(\text{Tortum p/s}) = 0.8803(\text{Tortum}) + 0.83$

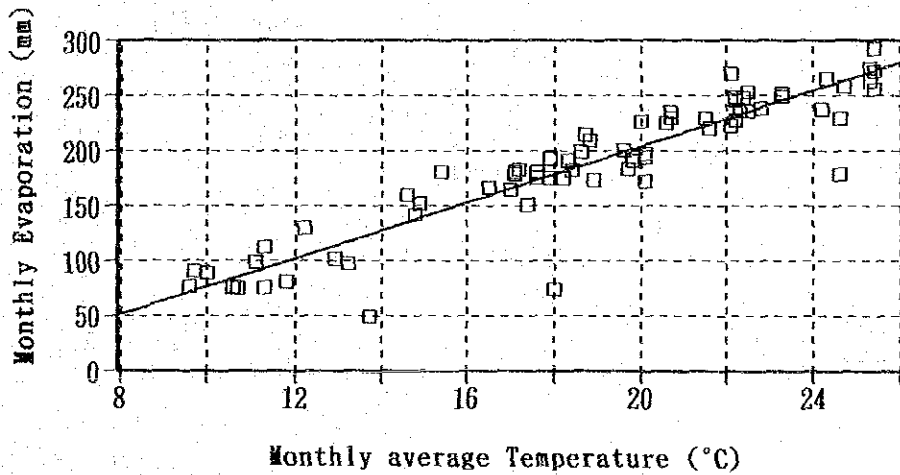


Fig. A-2-3 Relation between Monthly Average Temperatures and Monthly Evaporation of Tortum Power station

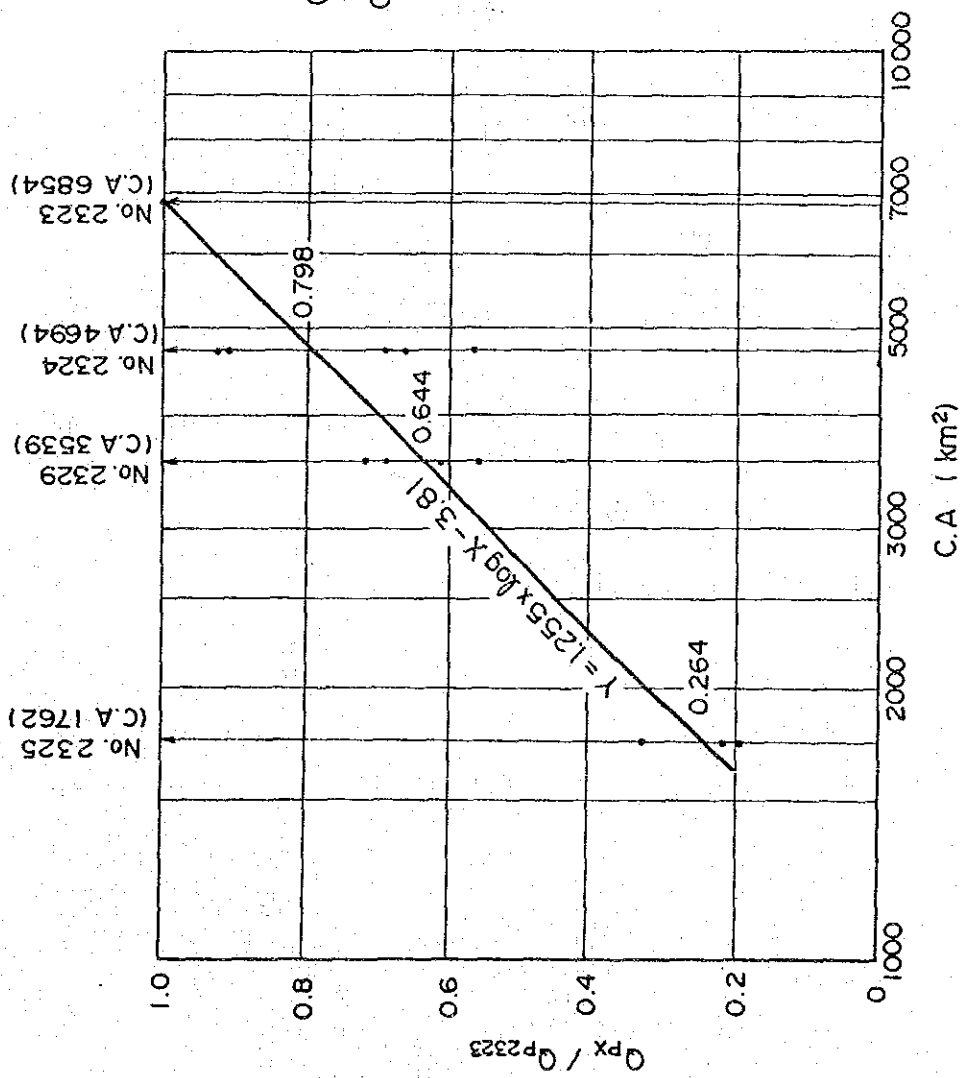


Fig. A-2-4 Relation between Coefficient for Peak Discharges and Catchment Area of any site

Table A-2-1(a) Natural Flow at No.2323 Gauging Station
(C. A = 6,854.0 km²)

(Unit: MCM)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total (m ³ /s/100km ²)
1941	71.6	67.4	59.8	54.9	53.6	78.9	249.0	499.0	179.0	98.5	60.8	46.4	1518.9
1942	65.9	39.1	67.0	59.7	59.1	88.8	198.0	639.0	322.0	128.0	70.4	58.3	1855.3
1943	68.3	66.0	61.9	55.0	49.5	57.1	125.0	310.0	151.0	86.7	55.1	39.8	1123.4
1944	50.2	56.0	51.7	48.8	48.5	85.3	181.0	531.0	224.0	121.0	70.5	58.1	1526.1
1945	62.2	64.4	53.5	51.4	45.1	53.6	102.0	303.0	287.0	102.0	56.3	44.2	1224.7
1946	50.5	52.7	50.0	48.3	44.5	55.9	124.0	378.0	417.0	157.0	114.0	76.2	1568.1
1947	100.0	83.3	70.5	67.0	60.5	104.0	177.0	175.0	143.0	87.8	46.4	48.4	1162.9
1948	53.2	71.8	57.0	51.6	47.1	49.7	140.0	368.0	388.0	109.0	69.0	69.7	1474.1
1949	63.4	59.0	55.8	49.1	44.3	55.5	88.8	396.0	192.0	66.2	49.0	46.2	1165.3
1950	55.6	50.9	47.8	45.3	43.7	67.4	180.0	393.0	221.0	97.4	57.2	45.2	1304.5
1951	74.0	68.2	57.5	55.1	48.4	74.7	155.0	336.0	257.0	105.0	61.7	68.1	1355.7
1952	108.0	80.5	69.7	63.2	63.1	70.3	246.0	407.0	282.0	140.0	77.8	62.6	1670.2
1953	59.9	59.4	60.8	56.7	52.7	62.3	147.0	388.0	277.0	126.0	78.4	58.5	1426.7
1954	57.7	59.3	56.2	54.0	51.2	73.4	147.0	438.0	397.0	237.0	103.0	74.3	1768.1
1955	73.9	65.5	61.6	54.6	47.5	58.4	106.0	282.0	145.0	43.6	28.8	28.4	995.6
1956	41.4	42.7	47.6	44.4	49.8	59.6	126.0	225.0	235.0	115.0	66.1	56.2	1108.8
1957	64.4	56.0	55.7	52.4	51.7	82.7	167.0	277.0	215.0	105.0	54.3	52.8	1234.0
1958	61.0	65.2	58.5	54.4	48.8	61.4	103.0	207.0	203.0	92.1	53.9	53.6	1061.9
1959	56.2	52.2	50.6	51.2	43.6	61.3	146.0	331.0	216.0	90.1	73.9	64.0	1236.1
1960	75.4	75.7	63.9	59.8	59.9	74.4	195.0	340.0	191.0	129.0	86.1	64.8	1415.0
1961	47.4	43.5	43.8	39.1	35.3	39.5	69.3	136.0	76.7	27.9	20.1	17.7	586.3
1962	27.8	32.0	36.5	32.3	30.8	52.7	118.0	225.0	124.0	64.5	34.6	29.8	808.0
1963	30.2	33.5	31.6	34.1	31.2	39.8	223.0	537.0	377.0	210.0	145.0	57.7	1750.1
1964	36.2	75.7	57.6	47.9	41.5	62.4	215.0	444.0	312.0	99.1	46.0	42.3	1529.7
1965	44.2	42.5	43.4	36.2	33.3	73.1	178.0	238.0	154.0	90.6	52.0	40.3	1025.6
1966	66.7	50.6	48.6	49.3	46.4	57.1	181.0	324.0	109.0	46.1	32.8	37.3	1048.9
1967	44.7	41.2	37.5	35.9	30.2	38.4	79.7	373.0	148.0	163.0	80.9	50.7	1123.2
1968	54.9	53.6	52.7	47.7	43.1	76.1	536.0	601.0	329.0	119.0	65.5	55.3	2033.9
1969	58.9	64.0	50.5	41.2	36.2	67.0	240.0	454.0	113.0	44.1	42.9	40.3	1252.1
1970	60.8	47.1	48.0	41.7	37.2	52.4	192.0	160.0	61.7	51.3	32.2	36.0	820.4
1971	40.6	37.3	32.3	31.8	26.5	44.5	97.2	290.0	142.0	36.8	72.1	30.1	881.2
1972	39.2	41.0	40.9	36.3	37.1	45.4	185.0	250.0	192.0	74.9	41.0	52.8	1035.6
1973	57.1	53.6	46.1	44.5	46.8	53.1	132.0	262.0	191.0	75.6	30.7	35.4	1027.9
1974	52.8	50.1	38.7	38.1	31.3	48.8	79.5	268.0	90.8	35.0	33.3	52.9	814.3
1975	33.2	34.1	39.2	37.5	30.5	42.7	126.0	151.0	97.5	44.1	26.5	32.7	695.0
1976	43.6	41.3	29.1	32.0	31.2	61.4	182.0	428.0	220.0	102.0	51.0	49.6	1271.2
1977	56.8	47.0	42.0	35.5	32.3	53.1	151.0	331.0	151.0	66.9	46.1	41.4	1054.1

Table A-2-1(b) Natural Flow at No.2323 Gauging Station

(Unit: MCM)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total (m ³ /s/100km ²)	
1978	44.9	40.2	35.1	35.3	40.7	56.4	159.0	404.0	185.0	70.8	41.9	31.3	1144.6	0.53
1979	43.8	41.1	43.8	38.6	38.2	44.4	131.0	224.0	216.0	123.0	39.4	32.5	1015.8	0.47
1980	57.2	100.0	55.5	45.7	41.2	63.8	233.0	302.0	93.6	47.0	32.8	24.1	1115.9	0.52
1981	42.0	37.4	37.2	40.1	32.4	40.4	101.0	210.0	210.0	71.2	41.0	46.1	908.8	0.42
1982	47.9	45.1	48.6	49.6	34.6	39.0	182.0	308.0	123.0	40.1	25.6	37.9	981.4	0.45
1983	39.6	38.8	38.1	31.8	29.7	34.6	64.2	151.0	133.0	43.3	30.7	43.8	678.6	0.31
1984	42.2	51.1	45.5	44.3	39.9	51.1	182.0	533.0	242.0	93.1	49.8	43.0	1417.0	0.66
1985	37.6	39.8	31.0	32.0	28.1	38.8	200.0	190.0	90.0	41.8	16.5	25.3	770.9	0.36
1986	38.8	38.0	39.3	38.7	41.9	68.2	226.0	244.0	241.0	57.9	43.1	42.9	1120.8	0.52
1987	59.7	53.5	44.4	38.6	44.1	55.1	204.0	660.0	234.0	61.5	62.7	37.6	1575.2	0.73
1988	44.5	53.2	47.6	41.8	45.6	67.1	234.0	485.0	282.0	144.0	68.3	55.8	1569.1	0.73
1989	53.1	70.1	53.5	46.9	41.9	77.5	221.0	120.0	74.2	34.8	19.1	27.6	839.7	0.39
1990	41.6	32.4	50.7	41.5	36.6	76.1	230.0	407.0	141.0	80.7	46.3	45.3	1229.2	0.57
Ave	55.0	54.4	48.9	45.2	42.2	59.9	169.5	338.7	201.9	90.7	54.1	46.2	1206.6	0.56

Note : (1) 1940/10---1963/9 : $\log Y = 0.088 * X(\text{No.2302}) + 0.704$

Table A-2-2 Natural Flow at No.23-24 Gauging Station
(C.A = 4,693.6 km²)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	(Unit: MCM)	
													Total	(m ³ /s/100km ²)
1977	39.9	35.7	34.0	25.2	26.5	37.6	118.0	246.0	87.9	32.2	17.5	24.6	725.1	0.49
1978	29.6	27.0	23.9	23.7	28.5	46.8	121.0	318.0	108.0	23.4	13.4	16.6	779.9	0.53
1979	23.4	24.8	24.4	23.4	24.1	32.3	117.0	193.0	140.0	57.9	17.2	15.9	693.4	0.47
1980	38.6	53.2	38.0	31.3	27.5	47.2	207.0	185.0	31.7	11.6	17.8	15.4	704.3	0.48
1981	21.8	20.8	20.2	18.9	17.5	24.8	78.3	156.0	211.0	27.9	18.9	17.9	634.0	0.43
1982	22.3	26.3	23.0	21.0	18.0	23.8	161.0	229.0	59.1	17.5	9.4	18.4	628.8	0.42
1983	21.0	18.8	17.8	16.8	16.7	22.8	44.8	90.4	47.8	8.5	4.8	13.1	323.3	0.22
1984														
1985	27.1	30.2	25.5	26.7	24.5	33.7	157.0	118.0	28.2	12.2	4.3	12.7	500.1	0.34
1986	26.7	24.2	24.5	23.0	25.0	40.1	161.0	150.0	130.0	23.5	10.4	18.0	656.4	0.44
1987	33.7	31.2	26.0	26.2	31.6	34.5	122.0	416.0	103.0	35.3	15.5	15.6	890.6	0.50
1988														
1989														
1990														
Ave	28.4	28.2	25.7	23.6	24.0	34.4	128.7	210.1	94.7	25.0	12.9	16.8	653.6	0.44

Table A-2-3 Natural Flow at No. 2329 Gauging Station
(C.A. = 3,538.8 km²)

(Unit: MCM)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total (m ³ /s/100km ²)
1977			19.5	15.2	12.4	17.6	119.0	152.0	26.5	9.0	10.6	13.7	
1978		15.1	14.8	13.4	12.1	16.5	32.3	81.7	38.2	7.7	4.0	6.5	258.7
1979		34.2	22.1	19.2	16.0	28.5	124.0	256.0	70.0	30.0	35.9	24.5	680.5
1980		25.1	22.0	19.1	19.0	26.1	139.0	116.0	26.0	14.3	7.0	15.4	452.0
1981		18.9	20.8	18.0	18.8	34.5	142.0	150.0	113.0	25.2	5.2	17.1	588.2
1982		31.9	21.5	18.5	25.8	26.1	130.0	349.0	79.3	20.1	15.0	17.7	766.7
1983		23.3	18.6	17.3	19.6	30.6	130.3	240.6	212.2	102.0	29.9	28.2	873.1
1984		27.9	23.1	19.0	15.2	42.2	132.5	42.6	11.2	5.9	5.1	9.2	370.7
1985		22.0	22.9	14.6	13.3	37.5	151.5	232.1	64.0	28.5	11.7	13.4	635.1
1986		24.8	20.6	17.1	16.9	28.8	122.3	180.0	71.2	27.0	13.8	16.2	578.1
Ave	24.6	24.8	20.6	17.1	16.9	28.8	122.3	180.0	71.2	27.0	13.8	16.2	578.1
													0.52

Table A-2-4 Natural Flow at No.2325 Gauging Station
(C.A = 1,762 km²)

(unit : MCM)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total (m ³ /s/100km ²)	
1974	14.00	13.70	11.00	9.19	8.40	20.90	26.70	44.30	12.50	2.36	5.85	12.30	181.20	0.33
1975	7.89	6.83	7.79	7.04	6.12	13.50	25.20	41.60	17.80	3.51	1.51	7.06	145.85	0.26
1976	16.30	8.90	9.30	12.00	7.64	14.70	73.50	94.40	38.20	14.10	5.37	9.36	303.77	0.55
1977	12.90	11.70	14.20	10.50	8.73	12.60	39.30	110.00	20.20	9.32	12.40	9.22	271.07	0.49
1978	11.00	10.40	9.20	7.55	13.20	16.20	49.20	123.00	27.30	6.34	4.95	7.21	285.55	0.51
1979	10.30	9.71	9.60	9.07	9.12	12.10	28.80	40.00	27.40	7.31	0.92	4.34	168.67	0.30
1980	15.80	20.10	13.90	11.40	10.70	17.50	89.00	50.40	13.20	8.73	5.42	5.85	262.00	0.47
1981	10.30	9.61	8.79	7.01	7.24	10.60	50.30	40.90	24.50	8.04	4.45	5.53	187.77	0.34
1982	9.34	12.20	11.50	9.45	8.43	9.88	45.20	61.50	18.90	5.17	2.37	5.96	199.90	0.36
1983	7.19	6.43	6.57	7.06	5.17	7.51	14.20	18.40	13.50	2.57	2.41	5.38	96.39	0.17
1984	8.82	11.90	9.36	8.19	7.81	11.00	47.00	111.00	16.80	12.40	7.25	8.86	250.39	0.47
1985	10.50	13.30	11.10	10.30	8.70	13.20	76.30	32.20	5.41	1.25	1.09	5.20	188.55	0.34
1986	10.10	8.94	10.00	7.51	7.60	11.50	41.30	70.50	55.40	13.10	1.67	7.84	245.46	0.44
1987	14.00	12.20	11.70	11.50	10.10	13.20	42.90	138.00	20.10	6.03	5.58	8.17	293.48	0.53
1988	9.85	10.96	10.26	10.37	9.69	14.70	74.80	109.00	39.80	32.10	17.20	10.20	348.93	0.63
1989	12.00	24.90	24.00	9.02	7.14	19.44	51.40	16.10	1.76	0.20	0.55	3.20	163.71	0.31
Ave	11.27	11.99	11.14	9.20	8.49	13.66	48.48	68.83	22.05	8.28	4.94	7.23	225.54	0.41

Table A-2-5 Observed Monthly Temperatures at Oltu Station

Year	(unit ; °C)												Ave
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1968	-4.9	-3.5	2.0	11.6	15.3	16.6	22.5	20.7	18.3	12.5	6.8	-1.3	9.7
1969	-4.4	-4.3	4.1	7.7	15.9	20.4	21.2	23.4	16.5	9.9	5.0	1.4	9.7
1970	0.4	2.4	6.1	13.0	14.6	18.8	22.3	20.7	16.9	10.3	7.4	-3.5	10.8
1971	-2.1	-0.9	5.0	9.6	14.9	16.9	24.5	19.9	20.5	9.7	4.5	-3.2	9.9
1972	-9.4	-5.0	2.1	11.5	12.5	17.4	22.8	23.0	17.6	13.7	3.3	-3.4	8.8
1973	-6.4	-0.1	2.5	8.9	14.4	16.1	21.8	22.6	18.4	12.2	0.6	-1.8	9.1
1974	-7.8	-3.5	3.7	6.3	15.7	20.7	22.2	20.9	15.8	15.5	5.4	-0.2	9.6
1975	-2.5	-2.7	1.9	12.6	14.1	20.0	23.7	23.4	17.2	10.1	4.0	-5.0	9.7
1976	-5.6	-9.5	0.9	8.7	13.7	18.0	20.9	23.3	16.8	11.6	6.1	0.5	8.8
1977	-5.7	1.2	4.1	10.0	14.1	16.5	21.0	22.0	18.1	7.8	6.2	-2.5	9.4
1978	-4.9	0.4	5.9	8.4	13.8	16.9	24.0	21.5	19.5	12.5	1.8	0.7	10.0
1979	0.3	2.9	4.9	9.7	14.4	17.1	20.8	24.5	19.5	11.0	6.4	0.3	11.0
1980	-0.7	1.9	3.9	8.7	15.2	20.0	24.5	21.3	16.9	10.3	6.6	2.5	10.9
1981	-0.2	2.2	5.3	8.1	11.5	18.1	23.4	22.2	19.1	12.9	3.9	3.5	10.8
1982	-0.3	-1.2	2.9	10.8	14.6	18.6	20.7	21.3	17.5	10.4	2.5	-0.5	9.8
1983	-3.2	0.1	4.5	10.6	14.5	17.6	22.8	21.9	16.9	10.4	6.1	1.4	10.3
1984	0.9	0.4	5.4	9.1	12.3	18.5	22.4	19.4	19.0	10.8	5.0	-0.8	10.2
1985	-0.5	-2.9	1.8	11.0	16.5	19.7	21.0	24.3	17.9	9.5	6.5	-1.7	10.3
1986	-3.0	-1.7	3.3	11.5	11.3	17.0	23.8	24.4	19.1	11.0	3.2	-2.3	9.8
1987	-0.7	0.8	0.5	7.8	16.0	18.3	22.7	20.9	16.2	9.6	3.1	-1.3	9.5
1988	-6.4	-1.6	3.0	10.0	13.5	17.1	21.5	20.5	16.6	10.5	2.1	-0.6	8.9
1989	-8.2	-4.9	6.0	13.2	15.1	19.4	23.3	24.5	18.1	10.7	5.2	-4.0	9.9
1990													
Ave	-3.4	-1.3	3.6	9.9	14.3	18.2	22.4	22.1	17.8	11.0	4.6	-1.0	9.9

Deficit data 1973/6--12, 1974/3--9, 11, 12, 1975/1--10, 1977/10, 1979/1--1980/12,
; X>0 Y(Oltu) = 1.096 * X(Tortum) + 0.83
; X<0 Y(Oltu) = 0.912 * X(Tortum) + 0.83

Table A-2-7 Sediment Yield from Calculation for 16 years
(No.2325; C.A = 1,762 km²)

Year	(unit : ton)													
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	ton/km ²
1974	7,015	6,777	4,357	3,011	2,787	16,776	28,244	74,809	13,717	308	4,659	6,141	168,601	95.69
1975	2,266	1,776	2,339	1,821	1,524	7,205	23,107	66,418	26,952	920	472	2,763	137,563	78.07
1976	12,119	2,935	3,145	5,178	2,326	8,629	266,326	307,466	57,488	7,189	1,100	3,622	677,523	384.52
1977	5,790	4,998	7,009	4,002	3,002	5,746	52,977	556,295	15,136	3,826	16,973	3,175	678,929	385.32
1978	4,303	3,811	3,034	2,116	7,242	9,180	88,328	588,747	28,812	1,712	923	1,966	740,174	420.08
1979	3,958	3,522	3,269	2,930	3,287	5,138	29,566	54,248	26,294	5,933	36	951	139,132	78.96
1980	8,709	14,780	6,730	4,678	4,350	11,270	393,102	82,480	8,013	2,801	2,115	1,819	540,847	306.95
1981	3,843	3,383	2,772	1,776	2,084	4,092	96,345	55,099	21,536	3,189	823	1,350	196,292	111.40
1982	3,143	5,541	4,645	3,208	2,795	3,488	85,360	120,676	21,600	1,675	219	1,454	253,804	144.04
1983	1,897	1,554	1,569	1,818	1,089	2,049	7,918	11,866	12,046	254	269	1,413	43,742	24.83
1984	2,779	5,142	3,151	2,399	2,328	4,279	84,360	578,234	14,306	6,957	2,103	3,084	709,122	402.45
1985	3,986	6,347	4,319	3,783	2,980	7,248	230,785	55,938	1,748	65	48	1,597	318,924	181.00
1986	3,704	2,948	3,592	2,049	2,360	4,652	65,355	158,814	103,700	10,224	110	2,622	360,130	204.39
1987	6,852	5,395	4,882	4,667	3,965	6,116	68,246	894,502	15,687	1,469	1,163	2,519	1,015,463	576.31
1988	3,456	4,364	3,737	3,798	3,573	7,799	233,059	379,230	56,889	35,614	10,937	3,777	746,233	423.51
1989	5,088	22,541	19,379	3,332	2,091	13,136	94,839	15,779	233	2	15	663	177,164	100.55
Ave	4,932	5,988	4,871	3,160	2,987	7,300	115,497	250,038	26,510	5,134	2,623	2,439	431,478	244.88

**Table A-2-8(a) Sediment Yield from Calculation for 50 years
(No.2325; C.A = 1,762 km²)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	(unit : ton)		Total	(ton/km ²)	Q (MCM)
												Sep	Q			
1941	9,362	8,198	6,281	5,179	4,902	11,557	123,293	487,066	63,533	18,544	6,519	3,505	747,939	424.5	413.5	
1942	7,797	18,785	8,092	6,258	6,116	14,893	77,879	790,324	205,506	32,027	9,019	5,932	1,182,628	671.2	515.0	
1943	8,439	7,827	6,786	5,200	4,082	5,658	30,499	190,624	44,967	14,151	5,220	2,426	325,879	185.0	294.8	
1944	4,217	5,418	4,510	3,949	3,889	13,666	64,982	550,186	99,784	28,515	9,046	5,889	794,051	450.7	415.7	
1945	6,860	7,411	4,882	4,453	3,279	4,902	19,960	182,196	163,595	19,960	5,484	3,127	426,109	241.8	324.7	
1946	4,273	4,714	4,177	3,853	3,175	5,393	29,995	282,114	342,338	48,688	25,192	10,716	764,628	434.0	428.4	
1947	19,149	12,987	9,048	8,092	6,447	20,793	62,112	60,694	40,232	14,531	3,505	3,871	261,459	148.4	306.1	
1948	4,819	9,417	5,640	4,494	3,631	4,119	38,516	267,581	297,016	22,942	8,630	8,824	675,629	383.4	400.0	
1949	7,157	6,094	5,372	4,003	3,143	5,306	14,893	309,219	73,194	7,877	3,985	3,471	443,714	251.8	306.8	
1950	5,331	4,385	3,759	3,315	3,042	8,198	64,256	304,630	97,129	18,117	5,683	3,295	521,110	295.8	348.8	
1951	10,056	7,109	5,751	5,220	3,871	10,265	47,429	223,580	131,329	21,216	6,735	3,387	480,948	273.0	364.3	
1952	22,503	12,066	8,824	7,109	7,081	8,993	120,352	326,367	157,963	38,516	11,207	6,958	727,939	413.1	459.2	
1953	6,303	6,187	6,519	5,573	4,714	6,887	42,568	297,016	152,461	31,007	11,397	5,976	576,608	327.3	385.7	
1954	5,794	6,165	5,460	4,986	4,411	9,878	42,568	377,049	310,764	131,329	20,381	10,146	928,931	527.2	488.7	
1955	10,028	7,694	6,786	5,114	3,706	5,954	21,643	157,963	41,388	3,026	1,056	1,015	265,373	150.6	255.6	
1956	2,672	2,877	3,724	3,159	4,137	6,236	31,007	100,681	109,836	25,655	7,852	5,460	303,296	172.1	289.8	
1957	7,411	5,418	5,348	4,652	4,510	12,785	55,204	152,461	91,910	21,216	5,050	4,737	370,702	210.4	327.5	
1958	6,569	7,615	5,976	5,070	3,949	6,665	20,381	85,176	81,901	15,092	4,966	4,902	249,262	141.5	275.6	
1959	5,460	4,613	4,282	4,411	3,026	6,638	41,976	217,047	92,772	15,357	10,028	7,309	412,929	234.4	328.2	
1960	10,475	10,562	7,285	6,281	6,303	10,175	75,526	228,869	72,437	32,547	13,941	7,513	481,914	273.5	382.2	
1961	3,689	3,010	3,057	2,323	1,801	2,384	8,714	36,292	10,872	967	360	231	73,700	41.8	135.1	
1962	957	1,398	1,959	1,434	1,264	4,714	27,063	100,681	29,995	7,435	1,712	1,157	179,769	102.0	199.0	
1963	1,201	1,576	1,354	1,648	1,308	2,426	98,904	562,437	280,663	87,669	41,388	5,794	1,086,368	616.6	483.3	
1964	13,974	10,562	5,773	3,779	2,687	6,907	91,910	387,214	193,057	16,785	3,437	2,815	740,960	420.5	416.8	
1965	3,127	2,845	2,991	1,918	1,551	9,790	62,815	112,651	46,805	15,536	4,571	2,503	267,104	151.6	264.7	
1966	8,011	4,292	3,910	4,042	3,505	5,658	64,982	208,049	22,942	3,454	1,492	2,067	332,404	188.7	271.7	
1967	3,211	2,639	2,098	1,878	1,201	2,221	11,810	274,824	43,154	53,552	12,200	4,314	412,100	233.9	294.1	
1968	5,179	4,902	4,714	3,741	2,942	10,687	560,381	701,083	214,452	27,543	7,694	5,265	1,548,583	878.9	568.9	
1969	6,072	7,309	4,273	2,639	1,918	8,092	114,557	404,599	24,739	3,108	2,911	2,503	582,720	330.7	333.0	
1970	6,519	3,631	3,797	2,717	2,054	4,652	73,194	50,598	6,735	4,430	1,421	1,893	161,641	91.7	202.7	
1971	2,546	2,067	1,434	1,376	838	3,175	18,035	167,001	39,647	1,999	9,504	1,189	248,811	141.2	221.1	
1972	2,337	2,610	2,595	1,933	2,039	3,331	67,915	124,236	73,194	10,327	2,610	4,737	297,914	169.1	267.7	
1973	5,658	4,902	3,454	3,175	3,579	4,796	34,123	136,454	72,437	10,537	1,254	1,813	282,182	160.2	265.3	
1974	7,015	6,777	4,857	3,011	2,787	16,776	28,244	74,809	13,717	308	4,659	6,141	168,601	95.7	181.2	
1975	2,266	1,776	2,339	1,821	1,524	7,205	23,107	66,418	26,952	920	4,472	2,763	137,563	78.1	145.9	

Table A-2-8(b) Sediment Yield from Calculation for 50 years

Year	(unit : ton)												Total	Q (ton/km ²)	Q (MCM)
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
1976	12,119	2,935	3,145	5,178	2,326	8,629	255,326	307,456	57,488	7,189	1,100	3,522	677,523	384.5	303.8
1977	5,790	4,998	7,009	4,002	3,002	5,746	52,977	556,295	15,136	3,826	16,973	3,175	678,929	385.3	271.1
1978	4,303	3,811	3,034	2,116	7,242	9,130	88,328	588,747	28,812	1,712	923	1,966	740,174	420.1	285.6
1979	3,958	3,522	3,269	2,930	3,287	5,138	29,566	54,248	26,294	5,933	36	951	139,132	79.0	168.7
1980	8,709	14,780	6,730	4,673	4,350	11,270	393,102	82,480	8,013	2,801	2,115	1,819	540,847	307.0	262.0
1981	3,843	3,583	2,772	1,776	2,084	4,092	96,345	55,099	21,536	3,189	823	1,350	196,292	111.4	187.8
1982	3,143	5,541	4,645	3,208	2,795	3,488	85,360	120,676	21,600	1,675	219	1,454	253,804	144.0	199.9
1983	1,897	1,554	1,569	1,318	1,039	2,049	7,918	11,866	12,046	254	269	1,413	48,742	24.8	96.4
1984	2,779	5,142	3,151	2,399	2,328	4,279	84,360	578,234	14,306	6,957	2,103	3,084	709,122	402.5	260.4
1985	3,986	6,347	4,319	3,783	2,960	7,248	230,765	55,938	1,748	65	48	1,697	318,924	181.0	188.6
1986	3,704	2,948	3,592	2,049	2,360	4,652	65,355	158,814	103,700	10,224	110	2,622	360,130	204.4	245.5
1987	6,852	5,395	4,832	4,667	3,965	6,116	68,246	894,502	15,687	1,469	1,163	2,519	1,015,463	576.3	293.5
1988	3,456	4,364	3,737	3,798	3,573	7,799	233,059	379,230	56,889	35,614	10,937	3,777	746,233	423.5	348.9
1989	5,088	22,541	19,379	3,332	2,097	13,136	94,899	15,779	233	2	15	563	177,164	100.6	169.7
1990															
Ave	6,246	6,185	4,854	3,746	3,304	7,441	83,824	262,401	84,753	18,118	6,274	3,852	490,998	278.7	302.9

(1) RivNote : (1) River Discharge 1940/10---1973/ 9 : $Q=0.3844 \times X(\text{No. 2329})+1.02$
 1973/10---1989/ 9 : No.2325

(2) Suspended S(2) Suspended Sediments Discharge
 1940/10---1973/ 9 : $\text{Log}S=1.928 \times \text{Log}X(\text{No. 2325})+1.69$
 1973/10---1989/ 9 : Sediment Yield from Calculation for 16 Years

Table A-2-9(a) Flood Peak Discharges

(unit ; m³/sec)

No. 2323			No. 23-24		
Date	Discharge		Date	Discharge	
	Peak	Maximum		Peak	Maximum
18 Apr 1965	154		1965	(123)	
2 May 1966	191		1966	(152)	
13 May 1967	249		1967	(199)	
18 Apr 1968	472		1968	(377)	
30 Apr 1969	378		1969	(302)	
15 Apr 1970	146		1970	(117)	
17 May 1971	165		1971	(132)	
1 May 1972	174		1972	(139)	
12 May 1973	205		1973	(164)	
13 Apr 1974	231		1974	(184)	
15 May 1975	99.8		1975	(79.6)	
21 May 1976	227		1976	(181)	
14 May 1977	220		7 May 1977	210	
18 May 1978	295		18 May 1978	270	
14 Jun 1979	230		14 Jun 1979	210	
11 Apr 1980	263		11 Apr 1980	290	
5 Jun 1981	196		5 Jun 1981	110	
19 May 1982	224	191	2 May 1982	170	
18 May 1983	97.8	89.7	18 May 1983	68.0	
20 May 1984	504	476	12 May 1984	112	
23 Apr 1985	250	189	23 Apr 1985	150	135
16 Apr 1986	233	179	16 Apr 1986	155	125
21 May 1987	377	356	10 May 1987	270	260
19 May 1988	* 320	286	1988	(255)	
15 Apr 1989	* 186	150	1989	(148)	
28 Apr 1990	* 374	341	1990	(299)	

Note ; 1) Figurs with * are calculated by correlation analysis between daily maximum discharge and peak discharge.

$$Q_p = 0.984 * Q_{max} + 38.1$$

2) Figurs is () are calculated by relation between peak discharge rate and catchment area.

$$Q_p(\text{No. 23-24}) = 0.798 * Q_p(\text{No. 2323})$$

Table A-2-9(b) Flood Peak Discharges

(unit : m³/sec)

No. 2329			No. 2325		
Date	Discharge		Date	Discharge	
	Peak	Maximum		Peak	Maximum
1965	(99.2)				
1966	(123)				
1967	(160)				
1968	(304)				
1969	(243)				
1970	(94.0)				
1971	(106)				
1972	(112)				
1973	(132)				
1974	(149)		22 Aug 1974	94.5	36.5
1975	(64.3)		19 Jun 1975	130	45.8
1976	(146)		29 Apr 1976	146	110
1977	(142)		1 May 1977	157	114
1978	(190)		6 May 1978	140	105
1979	(148)		4 Jul 1979	134	23.1
1980	(169)		11 Apr 1980	148	123
1981	(126)		10 Apr 1981	27.7	27.1
27 Apr 1982	* 129	104	23 Apr 1982	31.2	28.1
16 May 1983	70.6	62.0	12 Jun 1983	37.3	19.1
20 May 1984	309	259	20 May 1984	162	143
23 Apr 1985	174	136	15 Apr 1985	69.1	60.2
16 Apr 1986	149	113	15 Apr 1986	45.1	34.0
1 May 1987	250	223	7 May 1987	196	172
21 May 1988	* 268	227	19 May 1988	* 68.8	53.7
15 Apr 1989	* 104	82.5	13 Apr 1989	* 42.0	30.8
28 Apr 1990	* 268	227			

Note ; 1) Figurs with * are calculated by correlation analysis between daily maximum discharge and peak discharge.

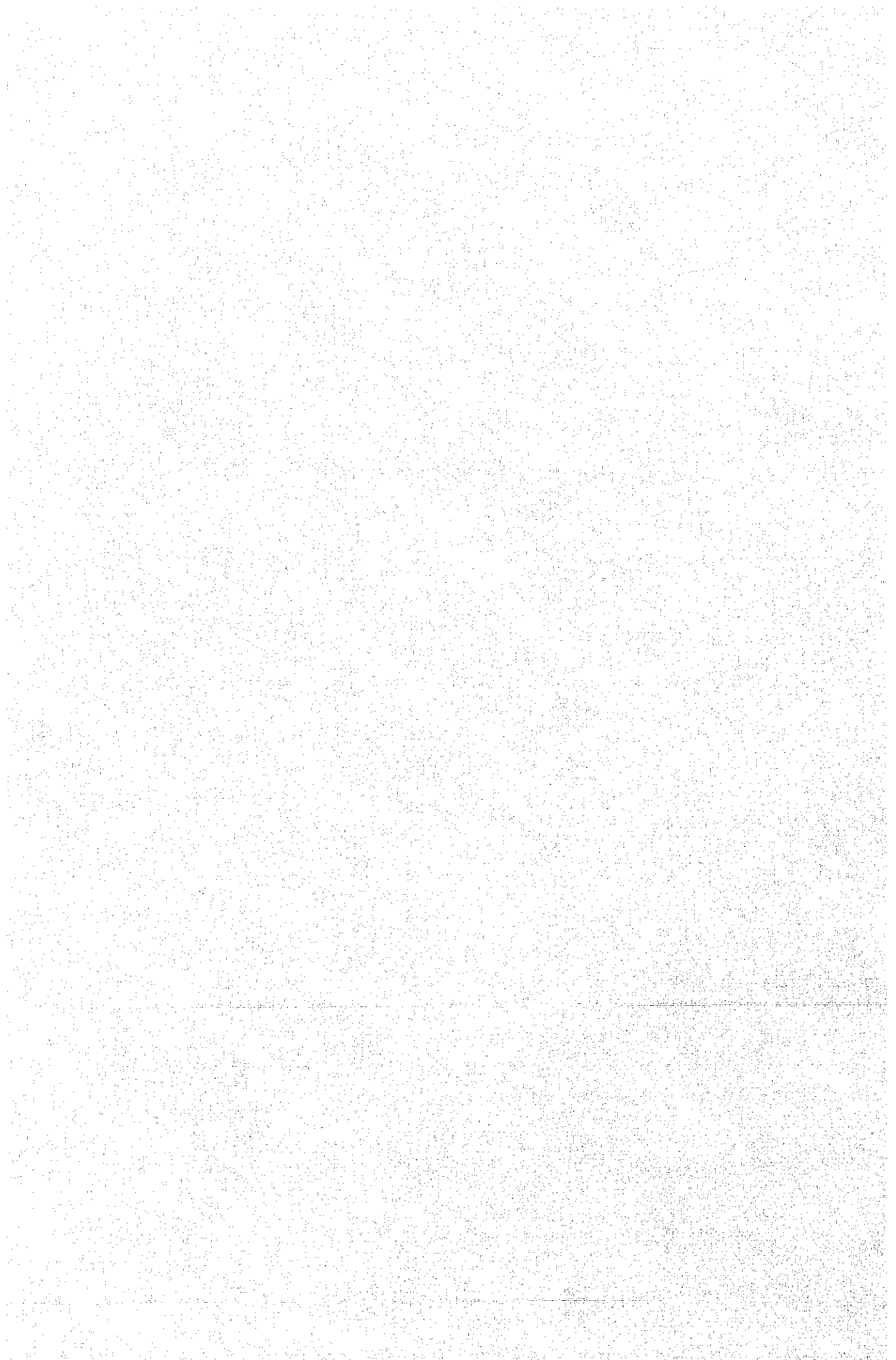
(No. 2329) $Q_p = 1.131 * Q_{max} + 11.13$

(No. 2325) $Q_p = 1.168 * Q_{max} + 6.04$

2) Figurs is () are calculated by relation between peak discharge rate and catchment area.

$Q_p(\text{No. 2329}) = 0.644 * Q_p(\text{No. 2323})$

A-3 Geology and Construction Materials



APPENDIX-3 GEOLOGY

Contents

	<u>Page</u>
A-3-1 Geologic Log of Drill Hole	AP-3-1
A-3-2 Photograph of Drilled Core	AP-3-122
A-3-3 Micrograph and Petrographic Description of Rock	AP-3-141
A-3-4 Geophysical Prospecting Data	AP-3-144

GEOLOGIC LOG OF DRILL HOLE

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OLUR PROJECT

HOLE No. SK-214

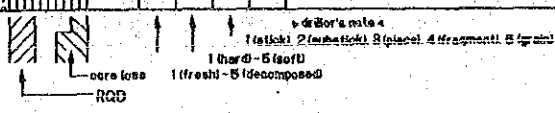
(SHEET 1 of 5)

LOCATION	DAM SITE(RIVER BED)	DEPTH OF HOLE	99.50	m	COMMENCED	90-08-21
ELEVATION	1025.08	DIRECTION OF HOLE	90°		COMPLETED	90-10-24
COORDINATE	X:4511918.62	CORE RECOVERY	%		DRILLED BY	Kaya-Cellik
	Y:515742.32	DRILLING MACHINE			LOGGED BY	J.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE						TESTING				DEPTH				
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LOGEON	P _{max}	P _c	DEPTH RESULT		BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN
1025.08	0m			0 → 100%															0m
	1									Open Excavation: silty, fine sand with plant roots									1
	2																		2
	3									Cobbles and gravels:									3
	4									Gravel : 80%									4
	5									Cobble : 20%									5
	6									Max. cobble size: 13cm									6
	7									Cobbles and gravels are originated from granite, dacite, gneiss, basalt, diabase, and limestone. Gravels are rounded and subrounded; pinkish brown, grey, greenish grey. Grey is predominant among the other colours.									7
	8																		8
	9																		9
	10																		10
	11																		11
	12									Silty, sandy gravel with cobbles:									12
	13									Silty sand : 20%									13
	14									Cobble : 15%									14
	15									Gravel : 65%									15
	16									Max. cobble size : 14cm									16
	17																		17
	18																		18
	19																		19
1005.08	20																		20

Alluvial Deposit

2.00m
G
(Final)

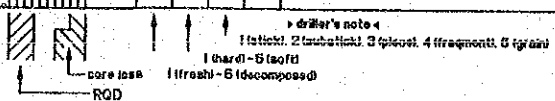


GEOLOGIC LOG OF DRILL HOLE

Page _____

OLLR PROJECT			HOLE No.	SK-214	(SHEET 2 of 5)
LOCATION	DAM SITE(RIVER BED)	DEPTH OF HOLE	99.50 m	COMMENCED	90-08-21
ELEVATION	1025.08 m	DIRECTION OF HOLE	90°	COMPLETED	90-10-24
COORDINATE	X:4511918.62	CORE RECOVERY	%	DRILLED BY	Kaya-Celik
	Y:515742.32	DRILLING MACHINE		LOGGED BY	I.Vardal

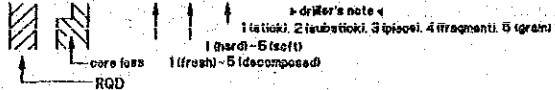
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt.H)	DEPTH	
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc							DEPTH RESULT
1005.08	20m			0 → 100%															20m	
	1	Alluvial Deposit								Silty, gravelly sand : Silt : 10% Fine gravel : 15-20% Sand : 70% Less amount of coarse gravel.										
	2																			
	3																			
	4																			
	5																			
	6																			
	7																			
	8																			
	9																			
	30																			
	1																			
	2																			
	3																			
	4																			
	5																			
	6																			
	7																			
	8																			
	9																			
985.08	40																			40



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT		HOLE No.	SK-214	(SHEET 3 of 5)	
LOCATION	DAM SITE(RIVER BED)	DEPTH OF HOLE	99.50 m	COMMENCED	90-08-21
ELEVATION	1025.08 m	DIRECTION OF HOLE	90°	COMPLETED	90-10-24
COORDINATE	X:4511918.62	CORE RECOVERY	%	DRILLED BY	Kaya-Celik
	Y:515742.32	DRILLING MACHINE		LOGGED BY	I.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE				TESTING					DEPTH								
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUFEON	Pmax	Pc		DEPTH RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt. H)		
995.08	40m			0 → 100%																40m		
	1	Alluvial Deposit								Silty, sandy gravel :										1		
	2										Silt-sand : 20-25% Gravel : 80%										2	
	3																				3	
	4																				4	
	5	Granite Porphyry																		5		
	6											Fractured zone, oxidized (brown) joint surfaces, alteration in minerals is not distinct.									6	
	7																				7	
	8																				8	
	9																				9	
50	50																					50
	1																					1
	2																					2
	3																					3
	4																					4
	5																			5		
	6																			6		
	7																			7		
	8																			8		
	9																			9		
965.08	60																			60		



GEOLOGIC LOG OF DRILL HOLE

Page _____

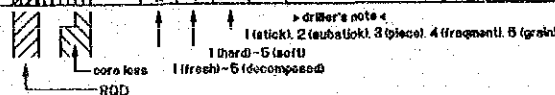
OLUR PROJECT

HOLE No. SK-214

(SHEET 4 of 5)

LOCATION	DAM SITE(RIVER BED)	DEPTH OF HOLE	99.50	m	COMMENCED	90-08-21
ELEVATION	1025.08	DIRECTION OF HOLE	90°		COMPLETED	90-10-24
COORDINATE	X:4511918.62	CORE RECOVERY		%	DRILLED BY	Kaya-Celik
	Y:515742.32	DRILLING MACHINE			LOGGED BY	I.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt.H)	DEPTH								
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LUCEON	Pmax	Pc							DEPTH RESULT							
965.08	60m			0 → 100%															60m								
	1	Granite Porphyry	+		Pinkish grey			2	3	59.50-61.15: Vertical joint with oxidized surface	Lu<1								1								
	2																							2			
	3											1	1	Several feather joints	Lu=4										3		
	4											1	1		Lu<1											4	
	5											2	2		Lu<1											5	
	6											2	3		Lu<1											6	
	7											2	2		Fractured zone, oxidized joint surfaces, 2mm clay infilling	Lu<1										7	
	8											3	3			Lu<1											8
	9											3	3			Lu<1											9
	70											2	2			Lu<1											70
	1						2	2	Lu<1													1					
	2						2	2	Occasional feather joints	Lu<1													2				
	3						2	2		Lu=1.2												3					
	4						1	1		Lu=2.5												4					
	5						3	3		Lu=2												5					
	6						2	2		Lu=2												6					
	7						2	2		Lu=2											7						
	8	Db	+		grey		1	1		Fractured zone	Lu=1.2										8						
	9	Gp	+		grey		3	3			Lu=1.2											9					
	80	Db	+		grey		3	3			Lu=1.2											80					
		Gp	+		grey		2	1-2																			

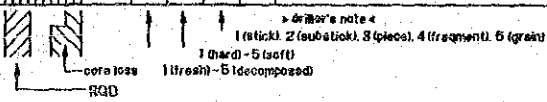


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GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT		HOLE No.	SK-214	(SHEET 5 of 5)	
LOCATION	DAM SITE(RIVER BED)	DEPTH OF HOLE	99.50 m	COMMENCED	90-08-21
ELEVATION	1025.08 m	DIRECTION OF HOLE	90°	COMPLETED	90-10-24
COORDINATE	X:4511918.62	CORE RECOVERY	%	DRILLED BY	Kaya-Celik
	Y:515742.32	DRILLING MACHINE		LOGGED BY	I.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE				TESTING				DEPTH									
					COLOR	WEATHER-ING	HARD-NESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUCEON	Pmax		Pc	DEPTH RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt.H)		
945.08	80m			0 → 100%																		80m
	1	Gp	+			2	1	1		Hard, sound	Lu=1.2											1
	2		+																			2
	3	Db	+			2	2	2		Oxidized joint surface	Lu<1											3
	4	Granite Porphyry	+				1				Lu<1											4
	5	Granite Porphyry	+				2	2			Lu<1											5
	6	Granite Porphyry	+				2	3			Lu<1											6
	7	Granite Porphyry	+				2	1			Lu=1.9											7
	8	Dibase	+																			8
	9	Dibase	+				2	3			Lu=2											9
	90	Granite Porphyry	+				3	2		Occasional shattered zones.	Lu<1											90
	1	Granite Porphyry	+				3	1			Lu<1											1
	2	Granite Porphyry	+				1	1			Lu<1											2
	3	Granite Porphyry	+				2	2			Lu<1											3
	4	Granite Porphyry	+				3	3		Fractured zone	Lu<1											4
	5	Granite Porphyry	+				1				Lu=1.2											5
	6	Granite Porphyry	+								Lu=1.6											6
	7	Granite Porphyry	+				1	1			Lu=1.1											7
	8	Granite Porphyry	+							Feather joints												8
	9	Granite Porphyry	+																			9
925.58										End of the Borehole												99.50
925.08	100																					100



GEOLOGIC LOG OF DRILL HOLE

Page _____

OLUR PROJECT		HOLE No.	N1A-218	(SHEET 1 of 3)	
LOCATION	DAM SITE (RIVER BED)	DEPTH OF HOLE	52.65 m	COMMENCED	91-07-11
ELEVATION	1026.10 m	DIRECTION OF HOLE	90°	COMPLETED	91-09-02
COORDINATE	X:4511807.45	CORE RECOVERY	%	DRILLED BY	M.Celik
	Y:515786.68	DRILLING MACHINE		LOGGED BY	I.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE						TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt.H)	DEPTH	
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUCEON	P _{max}	P _c							DEPTH RESULT
1026.10	0m			0 → 100%															0m	
	1									Still and fine sand, containing roots									1	
	2									1.5-21.0m Mainly φ=5-15cm gravels and φ=1-5mm coarse sands. Shape of sands is angular to subangular.								2		
	3																			3
	4																			4
	5																			5
	6																			6
	7																			7
	8																			8
	9																			9
	10																			10
	11																			11
	12																			12
	13																			13
	14																			14
	15																		15	
	16																		16	
	17																		17	
	18																		18	
	19																		19	
	20																		20	

Alluvial deposit

6.20m N=22
7.60m N=50
9.20m N=7
10.60m N=21
12.20m N=27
13.60m N=25

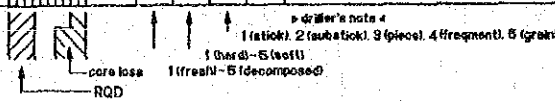
1.40m
(Final)

Driller's note:
1 (fresh), 2 (partially), 3 (spiral), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)
core loss
RQD

GEOLOGIC LOG OF DRILL HOLE

OLLR PROJECT		HOLE No.	NIA-218	(SHEET 2 of 3)	
LOCATION	DAM SITE (RIVER BED)	DEPTH OF HOLE	52.65 m	COMMENCED	91-07-11
ELEVATION	1026.10 m	DIRECTION OF HOLE	90°	COMPLETED	91-09-02
COORDINATE	X: 4511807.45	CORE RECOVERY	%	DRILLED BY	M. Celik
	Y: 515786.68	DRILLING MACHINE		LOGGED BY	I. Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH				
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc							DEPTH RESULT			
1006.10	20m			0 → 100%																20m			
	1	Alluvial Deposit		0 → 100%						21.0-21.45 Mainly fine sand, containing 10% gravel N=27 Mainly coarse sand (φ=1-5mm) containing fine sand and gravels (φ=1-3cm) 24.0-24.46m N=42 Coarse sand and gravels. N= Same to 1.5-21.0m. Slime and Fragments Mainly sharp edged fragments 3-5cm fragments only										1			
	2																						2
	3																						3
	4																						4
	5																						5
	6	Rhyolite		0 → 100%						Brown to Brownish grey Grey Hard substick core, but crack surface is oxidated and brown. 36.0-37.0m, Cracky C=3-4 Mainly Vertical and cross joints. Crack surface is strongly weatherd, brownish.										6			
	7																						7
	8																						8
	9																						9
	30																						30
	1																						1
	2																						2
	3																						3
	4																						4
	5																						5
	6																		6				
	7																		7				
	8																		8				
	9																		9				
988.10	40																		40				

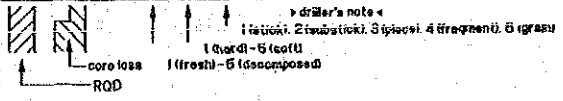


GEOLOGIC LOG OF DRILL HOLE

Page _____

OLUR PROJECT		HOLE No.	NIA-218	(SHEET 3 of 3)	
LOCATION	DAM SITE (RIVER BED)	DEPTH OF HOLE	52.65 m	COMMENCED	91-07-11
ELEVATION	1026.10 m	DIRECTION OF HOLE	90°	COMPLETED	91-09-02
COORDINATE	X:4511807.45	CORE RECOVERY	%	DRILLED BY	M.Celik
	Y:515786.68	DRILLING MACHINE		LOGGED BY	I.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE				TESTING				BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH		
					COLOR	WEATHER-ING	HARD-NESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUBEON	Pmax							Pc	DEPTH RESULT
	40m			0 → 100%															40m	
986.10	1	Rhyolite	[Vertical lines]	[Vertical lines]	Grey to dark Grey	3	3	4	Fragments only 5cm core and fragments Mainly fragments and some pieces of core. Crack surfaces are sharp but weathered (brown) 45.0-45.9m Granite Porphyry											
	2					3	3	4												
	3					3	3	4												
	4					3	3	4												
	5					3	3	4												
	6					3	3	4												
	7					2	3	3												
	8	Granite Porphyry	[Vertical lines]	[Vertical lines]	Grey	2	3	3	Somewhat cracky, but fracture surfaces are fresh. 48.9-49.0m, sheared zone. Fresh and hard, stick core.											
	9					2	3	3												
50	50					2	3	3												
1	1					2	2	2												
	2																			
973.45	3								End of the Borehole											
	4																			
	5																			
	6																			
	7																			
	8																			
	9																			
986.10	60																			60



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GEOLOGIC LOG OF DRILL HOLE

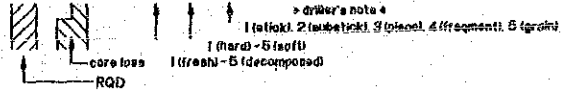
OLUR PROJECT

HOLE No. NI-219

(SHEET 1 of 4)

LOCATION	DAM SITE (RIVER BED)	DEPTH OF HOLE	62.00 m	COMMENCED	91-11-01
ELEVATION	1025.48 m	DIRECTION OF HOLE	90°	COMPLETED	91-12-30
COORDINATE	X: 4511997.36	CORE RECOVERY	%	DRILLED BY	M. Celik
	Y: 515737.56	DRILLING MACHINE		LOGGED BY	I. Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G. W. L. (Opt. H)	DEPTH		
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc							DEPTH RESULT	
1025.48	0m			0 → 100%															0m		
	1	Alluvial Deposit								0.0-43.0 Alluvium											
	2											0.0-1.5 Open excavation Silty sand									1
	3											Silty, sandy gravel : Silt-sand : 15-20% Gravel : 80% Gravels are fine, medium, and coarse in size, sub-rounded and angular in shape and originated from granite, diabase, rhyolite and limestone. Fine particles are washed away. 10cm block (granite) is encountered between 3.0-4.5m.									2
	4																				3
	5																				4
	6																				5
	7											Rhyolite block									6
	8											Silty, sandy gravel : Silt-sand : 15% Gravel : 85% Characteristics of gravel are as it is mentioned above. Fine particles are completely washed away.									7
	9																				8
	10																				9
	11																		10		
	12																		1		
	13																		2		
	14																		3		
	15																		4		
	16																		5		
	17																		6		
	18																		7		
	19																		8		
	20																		9		
1005.48	20																		20		

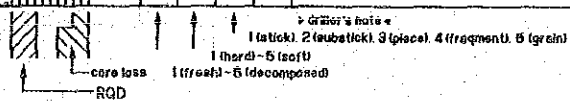


GEOLOGIC LOG OF DRILL HOLE

Page _____

OLUR PROJECT	DAM SITE (RIVER BED)	HOLE No.	NI-219	(SHEET 2 of 4)	
LOCATION	DAM SITE (RIVER BED)	DEPTH OF HOLE	62.00 m	COMMENCED	91-11-01
ELEVATION	1025.48 m	DIRECTION OF HOLE	90°	COMPLETED	91-12-30
COORDINATE	X:4511997.36	CORE RECOVERY	%	DRILLED BY	M.Celik
	Y:515737.56	DRILLING MACHINE		LOGGED BY	I.Vardal

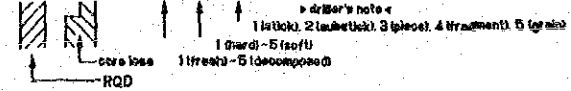
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH		
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc							DEPTH RESULT	
1005.48	20m			0 → 100%															20m		
	1	Alluvial Deposit		0 → 100%																	
	2																				
	3																				
	4																			Clayey, silty, sandy gravel: Gravels are mostly fine in size; occasionally medium gravels are encountered. Certain amount of fine particles are washed away. Fine material contains less percentage of clay. Fine material: 65% Gravel : 35%	24.10m N=20
	5																			Silty, sandy gravel: Gravels are generally fine and medium in size; less amount of coarse gravels are encountered in place. Fine material: 25% Gravel : 75%	25.10m N=37
	6																				
	7																				27.10m N=30
	8																				
	9																				
	30																				
	1																				
	2																				
	3																				
	4	9cm rhyolite block between 33.0-33.45m. Silty sandy gravel: Fine material: 40-45% Gravel : 50-55% Gravels are generally fine in size; occasionally 2-3cm gravels are also encountered.																			
	5																				
	6		36.10m N=31																		
	7																				
	8	Silty, sandy gravel: Gravels are generally fine; less amount of medium gravels are encountered in place; gravels are originated from granite. Fines are washed away. Fine material: 25% Gravel : 75%	37.70m N=38																		
	9																				
985.48	40																				



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT	HOLE No. NI-219	(SHEET 3 of 4)
LOCATION DAM SITE (RIVER BED)	DEPTH OF HOLE 62.00 m	COMMENCED 91-11-01
ELEVATION 1025.48 m	DIRECTION OF HOLE 90°	COMPLETED 91-12-30
COORDINATE X: 4511997.36	CORE RECOVERY %	DRILLED BY M. Celik
Y: 515737.56	DRILLING MACHINE	LOGGED BY I. Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				DEPTH								
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUBRICANT	Pmax	Pc		DEPTH RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt. H)		
966.48	40m	Alluvial Deposit		0-100%																	40m	
	1																					1
	2																					2
	3																					3
	4																					4
	5																					5
	6																					6
	7																					7
	8																					8
	9																					9
	50	Granite Porphyry																				50
	1																					1
	2																					2
	3																					3
	4																					4
	5																					5
	6																					6
	7																					7
	8																					8
	9																					9
966.48	60																					60

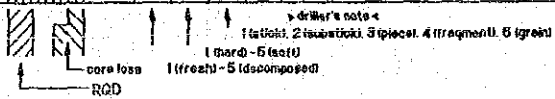


GEOLOGIC LOG OF DRILL HOLE

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OLUR PROJECT			HOLE No.	N1-219		(SHEET 4 of 4)	
LOCATION	DAM SITE (RIVER BED)		DEPTH OF HOLE	62.00	m	COMMENCED	91-11-01
ELEVATION	1025.48	m	DIRECTION OF HOLE	90°		COMPLETED	91-12-30
COORDINATE	X: 4511997.36		CORE RECOVERY			DRILLED BY	M. Celik
	Y: 515737.56		DRILLING MACHINE			LOGGED BY	J. Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				DEPTH					
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUCEON	P _{max}	P _c		DEPTH RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN
965.48	60m	Gp	+	0 → 100%	Whitish grey	2	1	2		Very hard and sound									60m
963.48	3		+			3	1	1		End of the borehole									2
	3		+																3
	4		+																4
	5		+																5
	6		+																6
	7		+																7
	8		+																8
	9		+																9
	70		+																70
	1		+																1
	2		+																2
	3		+																3
	4		+																4
	5		+																5
	6		+																6
	7		+																7
	8		+																8
	9		+																9
925.48	80		+																80

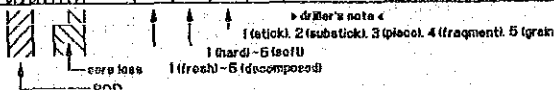


GEOLOGIC LOG OF DRILL HOLE

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OLUR PROJECT		HOLE No.	SK-210	(SHEET 1 of 7)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	127.00 m	COMMENCED	90-06-05
ELEVATION	1085.22 m	DIRECTION OF HOLE	90°	COMPLETED	90-10-04
COORDINATE	X: 4511879.04	CORE RECOVERY	%	DRILLED BY	N. Cakir
	Y: 515613.04	DRILLING MACHINE		LOGGED BY	I. Vardal

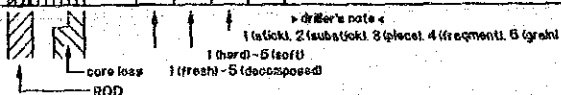
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LUGEDN	Pmax	Pc						
1085.22	0m			0 → 100%						Strongly weathered 0-0.8m open excavation									0m
	1				tr	5	5	5											1
	2						3	4											2
	3																		3
	4						2	3											4
	5					3		3											5
	6						3	1		Crack surface is oxidized									6
	7							4											7
	8	Diabase			Dark Green														8
	9					2	3				Lu=35	10							9
	10					3	3												10
	11					2	3			Crack surface is oxidized	Lu=9	10							11
	12							2											12
	13					3		2											13
	14						2	1											14
	15							3		Fragments									15
	16					3		4											16
	17							2											17
	18									Cracky along the contact	Lu=24.7	10							18
	19	Rhyolite			Pinkish White	3	3	4		17.00-17.25m Cracky	Lu=40.7	10							19
	20					2	2	2											20
	21					3	3	3											21
	22	Diabase				2	2	2		18.40-18.70m Cracky	Lu=40.1	10							22
1065.22	20					3	3	3											20



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT	DAM SITE (LEFT BANK)	HOLE No.	SK-210	(SHEET 2 of 7)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	127.00 m	COMMENCED	90-06-05
ELEVATION	1085.22 m	DIRECTION OF HOLE	90°	COMPLETED	90-10-04
COORDINATE	X:4511879.04	CORE RECOVERY	%	DRILLED BY	N.Cakir
	Y:515613.04	DRILLING MACHINE		LOGGED BY	I.Vardal

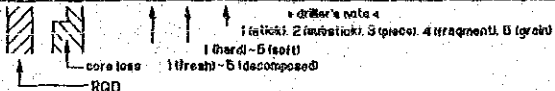
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH		
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LU	Pmax	Pc							DEPTH RESULT	
1085.22	20m			0 → 100%															20m		
	1	Diabase	[Hatched]	[Hatched]	Brownish Green, Grey	3	3	3	3		Shear zone (20deg)	Lu=40	10						1		
	2							3	4			Vertical Joint	Lu=43.5	8						2	
	3							3	4				Lu=45	8							3
	4							3	4				Crack surface is oxidized	Lu=45	8						4
	5	Rhyolite	[Dotted]	[Dotted]	Light Grey	1	1	1				Lu=13	10						5		
	6							1	1				Lu=38	10						6	
	7							1	1				Lu=45	10							7
	8							2	2				Lu=45	10							8
	9	Diabase	[Hatched]	[Hatched]	Dark Green	2	2					Lu=40.5	3						9		
	30							2	2				Lu=36	10						30	
	1							3	2	2			33.80-34.20 diabase (30deg)	Lu=45	10						1
	2							3	2	1			Cracky zone	Lu=40.5	3						2
	3						2				Lu=96	10						3			
	4						2											4			
	5						2											5			
	6						2											6			
	7						2											7			
	8						3											8			
	9						3											9			
1015.22	40											Lu=4	10					40			



GEOLOGIC LOG OF DRILL HOLE

OLUR	PROJECT	HOLE No.	SK-210	(SHEET 3 of 7)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	127.00 m	COMMENCED	90-06-05
ELEVATION	1085.22 m	DIRECTION OF HOLE	90°	COMPLETED	90-10-04
COORDINATE	X:4511879.04	CORE RECOVERY	%	DRILLED BY	N.Cakir
	Y:515613.04	DRILLING MACHINE		LOGGED BY	I.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Dpt.H)	DEPTH
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax						
1045.22	40m			0 → 100%														40m
	1					3	3	3										1
	2																	2
	3																	3
	4						2											4
	5																	5
	6																	6
	7					2												7
	8					3	4											8
	9																	9
	50	Diabase				2	2											50
	1																	1
	2					2	2											2
	3					3	3											3
	4																	4
	5																	5
	6																	6
	7																	7
	8																	8
	9																	9
1025.22	60																	60



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT		HOLE No.	SK-210	(SHEET 4 of 7)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	127.00 m	COMMENCED	90-06-05
ELEVATION	1085.22 m	DIRECTION OF HOLE	90°	COMPLETED	90-10-04
COORDINATE	X:4511879.04	CORE RECOVERY	%	DRILLED BY	N.Cakir
	Y:515613.04	DRILLING MACHINE		LOGGED BY	J.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE				TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH				
					COLOR	WEATHER-ING	HARD-NESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUCEON							Pmax	Pc	DEPTH RESULT	
1025.22	60m			0 → 100%							Kgf/cm ²				%		60m				
	1	Diabase	[Hatched]		Dark Grey						Lu<1	10					1				
	2					2	2	1												2	
	3							2						Lu<1	10						3
	4							2													4
	5							3						Lu=3	10						5
	6							2													6
	7							3						Lu=7	10						7
	8							3													8
	9							3						Lu<1	10						9
	70																				70
	1	Diabase	[Hatched]		Dark Green													1			
	2																				2
	3							2													3
	4							4						Lu=4	10						4
	5							2													5
	6							3						Lu<1	10						6
	7							2						Lu<1	10						7
	8							1													8
	9							2						Lu<1	10						9
1005.22	80																				80

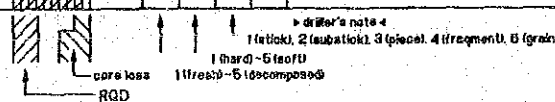
Slickenside observed on crack surface. Shear zone.

Shear zone. Some part is silty.

Slime

Slickenside on crack surface, slightly oxidized.

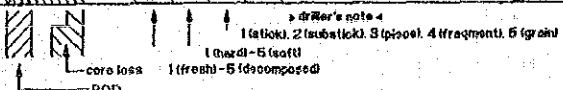
74.9-75.0m Small fragment



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT	HOLE No. SK-210	(SHEET 5 of 7)
LOCATION DAM SITE (LEFT BANK)	DEPTH OF HOLE 127.00 m	COMMENCED 90-06-05
ELEVATION 1085.22 m	DIRECTION OF HOLE 90°	COMPLETED 90-10-04
COORDINATE X:4511879.04	CORE RECOVERY %	DRILLED BY N.Cakir
Y:515613.04	DRILLING MACHINE	LOGGED BY I.Vardal

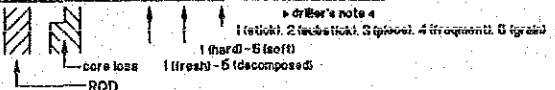
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE				DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt.H)	DEPTH					
					COLOR	WEATHERING	HARDNESS	CRACK SPACING		ROCK EVALUATION	LUCEON	Pmax							Pc	DEPTH RESULT			
1006.22	80m			0 → 100%														80m					
	1	Diabase	[Hatched]	[Hatched]	Dark Green			1	Crack surface is not oxidized (fresh). Calcite on crack surface	Lu<1	10							1					
	2					1	1	2														2	
	3					1	1							Lu=4.6	10								3
	4					2	2	1						Lu=2	10								4
	5																						5
	6										2	3	3	Vertical Joint									6
	7										1	1	2	Vertical Joint	Lu<1	10							7
	8	Rhyolite	[Dotted]	[Dotted]	Pinkish White			2										8					
	9					2	2	2					Lu=4	10							9		
	10					3	3	4														10	
	11	Diabase	[Hatched]	[Hatched]	Dgn			2										11					
	12					3	2	2					Lu<1	10							12		
	13	Rhyolite	[Dotted]	[Dotted]	White-Pinkish White			2										13					
	14					2	2	3					Lu<1	10							14		
	15					3	2	2														15	
	16					3	3	3														16	
	17							3										17					
	18							3										18					
	19							3	HTA red color. Easily broken by finger in some part.	Lu<1	10							19					
885.22	100							4	Small hard fragments	Lu<1	10							100					



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT	HOLE No. SK-210	(SHEET 6 of 7)
LOCATION DAM SITE (LEFT BANK)	DEPTH OF HOLE 127.00 m	COMMENCED 90-06-05
ELEVATION 1085.22 m	DIRECTION OF HOLE 90°	COMPLETED 90-10-04
COORDINATE X:4511879.04	CORE RECOVERY %	DRILLED BY N.Cakir
Y:515613.04	DRILLING MACHINE	LOGGED BY I.Vardal

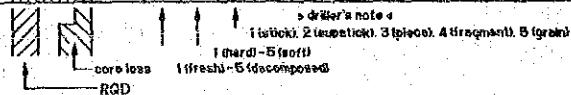
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH										
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUCEON	Pmax							PC	DEPTH RESULT								
985.22	100m			0 → 100%														100m										
	1	Rhyolite	[]	[]	White-Pinkish White	3	3	4	4	HTA light grey, easily broken by finger in some place.	Lu=2	10						1										
	2																									2		
	3																		Lu<1	10							3	
	4																										4	
	5																		Lu=1.2	10							5	
	6	Diabase	[]	[]	Dark Green	2	2	2	2	Calcite vein along cracks	Lu<1	10							6									
	7																									7		
	8																		Lu<1	10							8	
	9	Rhyolite	[]	[]	White-Pinkish White	2	2	2	2	Generally, crack surface is in pinkish color.	Lu<1	10							9									
	10																										10	
	11																		Lu<1	10								11
	12																											12
	13																											13
	14																		14									
	15																		15									
	16									117.6-117.8m Cracky	Lu<1	10							16									
	17																		17									
	18																		18									
	19									HTA	Lu<1	10							19									
	20									118.4-118.8m Diabase substic core	Lu=2	10							20									



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT	HOLE No. SK-210	(SHEET 7 of 7)
LOCATION DAM SITE (LEFT BANK)	DEPTH OF HOLE 127.00 m	COMMENCED 90-06-05
ELEVATION 1085.22 m	DIRECTION OF HOLE 90°	COMPLETED 90-10-04
COORDINATE X:4511879.04	CORE RECOVERY %	DRILLED BY N.Cakir
Y:515613.04	DRILLING MACHINE	LOGGED BY I.Vardal

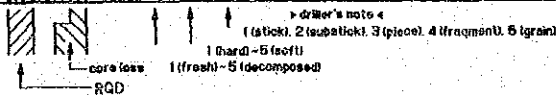
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				DEPTH						
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc		DEPTH RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Dpt.H)
965.22	120m			0 → 100%																120m
	1	Rhyolite								Mainly fragmental Somewhat HTA	Lu=2	10								1
	2										Lu=3	10								2
	3										Lu=6.5	10								3
	4	Gp			Pinkish white						Lu=6.1	10								4
	5										Lu=6.1	10								5
	6	R									Lu=6.1	10								6
958.22	7									End of the borehole										7
	8																			8
	9																			9
	130																			130
	1																			1
	2																			2
	3																			3
	4																			4
	5																			5
	6																			6
	7																			7
	8																			8
	9																			9
945.22	140																			140



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT	HOLE No. SK-212	(SHEET 1 of 8)
LOCATION DAM SITE (LEFT BANK)	DEPTH OF HOLE 160.00 m	COMMENCED 90-10-31
ELEVATION 1125.97 m	DIRECTION OF HOLE 90°	COMPLETED 91-03-09
COORDINATE X:4511856.03	CORE RECOVERY %	DRILLED BY Cakir.Celi
Y:515565.43	DRILLING MACHINE	LOGGED BY

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				DEPTH								
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc		DEPTH RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)		
1125.97	0m			0 → 100%															0m			
	1				Brown		4	4		Surfaces of fragments are strongly oxidized.									1			
	2						3	2			Small fragments, partially soil									2		
	3						4	5				6-7cm fractured zone at 6.9m (clay and breccia)									3	
	4						4	4					Generally substick core									4
	5						4	4						Generally substick core								
	6								Crack surfaces are oxidized (brown color)													6
	7					2	2			Crack surfaces are oxidized (brown color)												7
	8					3					Contact of diabase and dolite is adherent.											8
	9					2	2					Contact of diabase and dolite is adherent.	Lu=19		10							9
	10					1	1						Contact of diabase and dolite is adherent.	Lu=25.2	10							10
	11					3	3		Contact of diabase and dolite is adherent.					Lu=10	10							11
	12					2				Contact of diabase and dolite is adherent.				Lu=12	10							12
	13					2	2				Contact of diabase and dolite is adherent.			Lu=17	10							13
	14					1	2					Contact of diabase and dolite is adherent.		Lu=32	10							14
	15					3							Contact of diabase and dolite is adherent.	Lu=10	10							15
	16					3	3		Contact of diabase and dolite is adherent.					Lu=10	10							16
	17					3	3			Contact of diabase and dolite is adherent.				Lu=10	10							17
	18					3	3				Contact of diabase and dolite is adherent.			Lu=10	10							18
	19					3	3					Contact of diabase and dolite is adherent.		Lu=10	10							19
1105.97	20	Ry				3	3	4														20

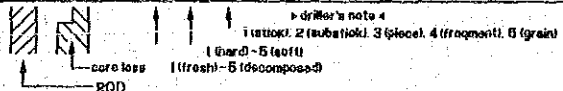


GEOLOGIC LOG OF DRILL HOLE

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OLUR	PROJECT	HOLE No.	SK-212	(SHEET 2 of 8)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	160.00 m	COMMENCED	90-10-31
ELEVATION	1125.97 m	DIRECTION OF HOLE	90°	COMPLETED	91-03-09
COORDINATE	X: 4511856.03 Y: 515565.43	CORE RECOVERY	%	DRILLED BY	Cakir, Celi
		DRILLING MACHINE		LOGGED BY	

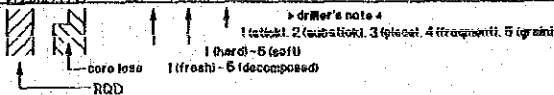
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE				DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Dpt. H)	DEPTH		
					WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LUGEON	Pmax	Pc							DEPTH RESULT	
1105.97	20m			0 → 100%														20m		
	1	Rhyolite	[Hatched Pattern]	Light Green-Greenish Grey					Crack surfaces are oxidized (brownish color)	Lu=34	10							1		
	2																			2
	3											Lu=10	10							3
	4							3	2	2										4
	5											Lu'=42	5							5
	6																			6
	7											Lu=30.5	10							7
	8																			8
	9											Lu'=46	2							9
	30																30			
	1	Diabase	[Cross-hatched Pattern]	Dark Green					Crack surface is oxidized but no infilling along the crack surface.	Lu'=48	0							1		
	2																			2
	3											Lu'=48	0							3
	4																			4
	5											Lu'=48	10							5
	6																			6
	7											Lu=7	10							7
	8											Lu<1	10							8
	9											Lu<1	10							9
1085.97	40																40			



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT	DAM SITE (LEFT BANK)	HOLE No.	SK-212	(SHEET 3 of 8)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	160.00 m	COMMENCED	90-10-31
ELEVATION	1125.97 m	DIRECTION OF HOLE	90°	COMPLETED	91-03-09
COORDINATE	X:4511856.03	CORE RECOVERY	%	DRILLED BY	Cakir.Celi
	Y:515565.43	DRILLING MACHINE		LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LUGEON	Pmax	Pc						
1085.97	40m			0 → 100%						41-42m nearly vertical joints. Joints surfaces are brown.	Lu<1	10							40m
	1																		1
	2				3	2	2												2
	3										Lu=1.6	10							3
	4																		4
	5				2	2	1			Stick core	Lu<1	10							5
	6									46.0-46.5m vertical joint									6
	7				3	2	2				Lu=4.9	10							7
	8																		8
	9				2	2	2				Lu<1	10							9
	50	Diabase			3	3	3			50.0-50.3. 51.0-51.3m fragments	Lu=1.5	10		ø86mm					50
	1																		1
	2									53.15-53.3m fragments Cracks are oxidized	Lu<1	10							2
	3				2														3
	4				1	2	2												4
	5				3														5
	6									56.2-57.0m continuous lots of Quartz									6
	7					2	3				Lu=3.9	10							7
	8									Small brownish fragments									8
	9					4	5												9
					2	2	2				Lu=1.7	10							
1085.97	60																		60

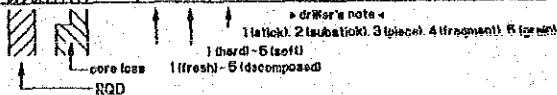


GEOLOGIC LOG OF DRILL HOLE

Page _____

OLUR PROJECT	HOLE No. SK-212	(SHEET 4 of 8)
LOCATION DAM SITE (LEFT BANK)	DEPTH OF HOLE 160.00 m	COMMENCED 90-10-31
ELEVATION 1125.97 m	DIRECTION OF HOLE 90°	COMPLETED 91-03-09
COORDINATE X:4511856.03	CORE RECOVERY %	DRILLED BY Cakir.Celi
Y:515565.43	DRILLING MACHINE	LOGGED BY

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Dpt.H)	DEPTH
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LUCEON	Pmax	Pc						
1065.97	60m			0 → 100%															60m
	1									Sheared zone (consolidated)	Lu<1	10							1
	2					2					Lu<1	10							2
	3					2					Lu<1	10							3
	4										Lu<1	10							4
	5					3	2	2	3		Lu=4.1	10							5
	6										Lu<1	10							6
	7									Fresh and hard stick core	Lu<1	10							7
	8					2	2		1	Cracks are slightly weathered.	Lu<1	10							8
	9										Lu<1	10							9
	70	Diabase								Dark Green	Lu<1	10							70
	1										Lu<1	10							1
	2					3	2		2	72.0-72.4m calcite vein (1cm)	Lu<1	10							2
	3					2	2		2	Fragments	Lu<1	10							3
	4								4	Crack surfaces are brownish	Lu<1	10							4
	5					3	1		1		Lu<1	10							5
	6								3	77.0-77.2 somewhat cracky	Lu<1	10							6
	7					2			2		Lu<1	10							7
	8					1	2		3	Cracks are brown.	Lu<1	10							8
	9					3			2		Lu<1	10							9
1045.97	80																		80

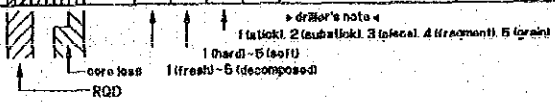


GEOLOGIC LOG OF DRILL HOLE

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OLUR PROJECT	HOLE No. SK-212	(SHEET 5 of 8)
LOCATION DAM SITE (LEFT BANK)	DEPTH OF HOLE 160.00 m	COMMENCED 90-10-31
ELEVATION 1125.97 m	DIRECTION OF HOLE 90°	COMPLETED 91-03-09
COORDINATE X:4511856.03	CORE RECOVERY %	DRILLED BY Cakir.Celi
Y:515565.43	DRILLING MACHINE	LOGGED BY

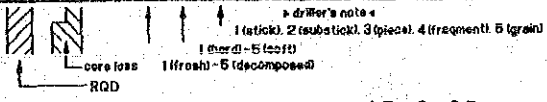
ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt.H)	DEPTH
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax						
1045.97	80m			0 → 100%						Fragments in some places Surfaces of fragments are brown.	Lu=2	10						80m
	1						2	3			Lu=2	10						1
	2					3	3	4			Lu=1	10						2
	3										Lu=1	10						3
	4										Lu=1	10						4
	5					2	2	2			Lu=1	10						5
	6						2	3			Lu=1	10						6
	7										Lu=1	10						7
	8									Fresh and hard stick core	Lu=1	10						8
	9					2	2	2			Lu=1	10						9
	90										Lu=1	10						90
	1										Lu=1	10						1
	2										Lu=1	10						2
	3							2		92.5m, 2cm sheared zone. (consolidated)	Lu=1	10						3
	4							2		Mainly fragmental Surfaces of fragments are brown.	Lu=1	10						4
	5					3	3	3			Lu=1	10						5
	6							3			Lu=0	10						6
	7							4			Lu=0	10						7
	8						3	4		Crack surfaces are fresh below 97.6m depth.	Lu=0	10						8
	9					2	2	2		97.8-98.0m sheared zone. Fragments	Lu=0	10						9
1025.97	100																	100



GEOLOGIC LOG OF DRILL HOLE

OLUR PROJECT		HOLE No.	SK-212	(SHEET 6 of 8)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	160.00 m	COMMENCED	90-10-31
ELEVATION	1125.97 m	DIRECTION OF HOLE	90°	COMPLETED	91-03-09
COORDINATE	X: 4511856.03	CORE RECOVERY	%	DRILLED BY	Cakir.Celi
	Y: 515565.43	DRILLING MACHINE		LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Dpt. H)	DEPTH
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LUGEON	Pmax	Pc						
1025.97	100m			0 → 100%															100m
	1					2	2	2		Fragment surfaces are slightly weathered.	Lu=0	10							1
	2																		2
	3									100.4-100.6 silicified	Lu<1	10							3
	4								2										4
	5									Calcite along cracks	Lu=0	10							5
	6								3										6
	7					1													7
	8																		8
	9								1	Fresh and hard, stick to substick core.	Lu<1	10							9
	10	Diebase			Dark Green	5	2	1											10
	11								2										11
	12					2													12
	13																		13
	14																		14
	15									115.1-115.5m cracky slickenside along crack surface.	Lu=0	10							15
	16																		16
	17									Vertical joint	Lu=1.3	10							17
	18					3	3	3											18
	19					1				Silicified (30deg)	Lu=1.5	10							19
	20					1	2	2											20
1005.97	120					2													120

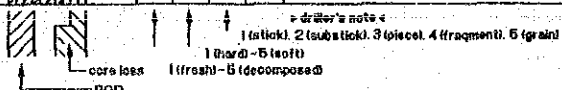


GEOLOGIC LOG OF DRILL HOLE

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OLUR PROJECT	DAM SITE (LEFT BANK)	HOLE No.	SK-212	(SHEET 7 of 8)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	160.00 m	COMMENCED	90-10-31
ELEVATION	1125.97 m	DIRECTION OF HOLE	90°	COMPLETED	91-03-09
COORDINATE	X: 4511856.03	CORE RECOVERY	%	DRILLED BY	Cakir.Celi
	Y: 515565.43	DRILLING MACHINE		LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt. H)	DEPTH
					COLOR	WEATHER-ING	HARD-NESS	CRACK SPACING	ROCK EVALUATION		LUCEON	Pmax	Pc						
1005.97	120m			0 → 100%															120m
	1	Diabase	[Hatched]	[Hatched]	Dark Green	2	2	2	2	Sheared zone (40deg) Fragment	Lu<1	10		ø86mm					1
	2					3	3	3	3		Lu=1.2	10	2						
	3					2	2	2	2		Lu=1.3	10	3						
	4					2	2	2	2		Lu<1	10	4						
	5					2	2	2	2		Lu=1.3	10	5						
	6					2	2	2	2		Lu<1	10	6						
	7					2	2	2	2		Lu<1	10	7						
	8	Rhyolite	[Dotted]	[Dotted]	Grey	3	3	3	3	Many Qz (2-3mm, diameter)	Lu<1	10		8					
	9					2	2	2	2	Partially fragmental	Lu=1.1	10	9						
	10					2	2	2	2	Dark green	Lu=7	10	10						
	11	Rhyolite	[Dotted]	[Dotted]	Whitish Grey	3	3	3	3	Dark green	Lu=7	10		11					
	12					2	2	2	2	Crack surface is slightly reddish brown.	Lu<1	10	12						
	13					2	2	2	2	Flow structure	Lu=1.8	10	13						
	14					2	2	2	2	Fragments in some place	Lu<1	10	14						
	15					2	2	2	2		Lu<1	10	15						
	16					2	2	2	2		Lu<1	10	16						
	17					2	2	2	2		Lu<1	10	17						
	18					2	2	2	2		Lu<1	10	18						
	19					2	2	2	2		Lu<1	10	19						
985.97	140	Db	[Hatched]	[Hatched]	Dgn	3	3	3	3										140

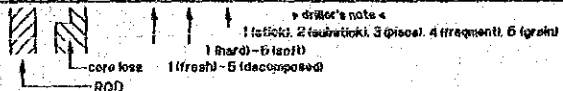


GEOLOGIC LOG OF DRILL HOLE

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OLUR PROJECT		HOLE No.	SK-212	(SHEET 8 of 8)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	160.00 m	COMMENCED	90-10-31
ELEVATION	1125.97 m	DIRECTION OF HOLE	90°	COMPLETED	91-03-09
COORDINATE	X:4511856.03	CORE RECOVERY	%	DRILLED BY	Cakir,Celi
	Y:515565.43	DRILLING MACHINE		LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Opt.H)	DEPTH
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax						
985.97	140m			0 → 100%														140m
	1	Rhyolite				2	2	3		Some vertical joints	Lus0	10						1
	2						2	1	2									2
	3						2	2										3
	4						3	3	4		Fragments Slickenside of calcite on crack surface	Lus0	10					4
	5	Diabase									Lus0	10						5
	6																	6
	7																	7
	8																	8
	9						2				Calcite on crack surface	Lus2.3	10					9
	150						2				Calcite on crack surface	Lus0	10					150
	1						2					Lus0	10					1
	2											Lus0	10					2
	3						2	3				Lus0	10					3
	4																	4
	5					2	2				Lus0	10					5	
	6																6	
	7						3	3		Fragments	Lus0	10					7	
	8					2	2	2									8	
	9					3	3	3		Fragments and 5-10cm vertical joint.	Lus0	10					9	
965.97	160									End of the borehole							160	



GEOLOGIC LOG OF DRILL HOLE

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OLUR PROJECT	DAM SITE (LEFT BANK)	HOLE No.	SKE-216	(SHEET 1 of 3)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	50.00 m	COMMENCED	91-05-07
ELEVATION	1048.3 m	DIRECTION OF HOLE	45°	COMPLETED	91-06-11
COORDINATE	X: 4511845.76	CORE RECOVERY	%	DRILLED BY	M. Celik
	Y: 515663.26	DRILLING MACHINE		LOGGED BY	I. Vardal

ELEVATION	DEPTH	ROCK NAME	L O G	CORE RECOVERY	OBSERVATION OF CORE					TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G. W. L. (Opt. H)	DEPTH
					COLOR	WEATHER-ING	HARD-NESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax						
1048.30	0m			0 → 100%														0m
	1	Granite Porphyry	+		Pinkish Brown			3			Generally fractured; all joint surfaces are oxidized; mostly no alteration in minerals, occasional feather joints							
	2							4										
	3							3										
	4							3										
	5							3										
	6							2										
	7							3										
	8							4										
	9							3										
	10							3										
	11			3														
	12			4														
	13			4														
	14			4														
	15			4														
	16			4														
	17			4														
	18			4														
	19			4														
	20			4														
	21	Db	+		Dark Grey			3			Fractured zone, oxidized joint surfaces							
	22	Gp	+		Dark Grey			2										
	23				Dark Grey			3			Oxidized joint surfaces							
	24				Dark Grey			2										
	25				Dark Grey			3			Hard, sound							
	26				Dark Grey			2										
	27				Dark Grey			3										
	28				Dark Grey			2										
	29				Dark Grey			3										
	30				Dark Grey			2										

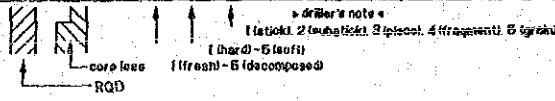
Driller's note: 1 (a tick), 2 (sub a tick), 3 (space), 4 (fragment), 5 (grain)
 6 (hard) - 5 (soft)
 1 (fresh) - 5 (decomposed)
 core loss
 RQD

GEOLOGIC LOG OF DRILL HOLE

Page _____

OLUR PROJECT		HOLE No.	SKE-216	(SHEET 2 of 3)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	50.00 m	COMMENCED	91-05-07
ELEVATION	1048.3 m	DIRECTION OF HOLE	45°	COMPLETED	91-06-11
COORDINATE	X:4511845.76	CORE RECOVERY	%	DRILLED BY	M.Celik
	Y:515663.26	DRILLING MACHINE		LOGGED BY	I.Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					TESTING				BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH	
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LU	Pmax	Pc							DEPTH RESULT
1028.50	20m			0 → 100%															20m	
	1	Diabase	[Hatched Pattern]		Dark Grey	3	2	1												
	2																			
	3																			
	4																			
	5	Granite Porphyry	[Dotted Pattern]		Pinkish Brown	3	2	1	2-3	Oxidized joint surfaces, feather joints in place.										
	6																			
	7																			
	8																			
	9	Diabase	[Hatched Pattern]		Dark Grey	3	2	2												
	10																			
	11																			
	12																			
	13	Granite Porphyry	[Dotted Pattern]		Pinkish Brown	3	3	2	3	Fractured zone, oxidized joint surfaces										
	14																			
	15																			
	16																			
	17	Diabase	[Hatched Pattern]		Dark Grey	3	2	2												
	18																			
	19																			
	20																			
	21	Granite Porphyry	[Dotted Pattern]		Pinkish Brown	3	2	2	3	Fractured zone										
	22																			
	23																			
	24																			
	25	Diabase	[Hatched Pattern]		Dark Grey	3	2	2												
	26																			
	27																			
	28																			
	29	Granite Porphyry	[Dotted Pattern]		Pinkish Brown	3	2	2	3											
	30																			
	31																			
	32																			
	33	Diabase	[Hatched Pattern]		Dark Grey	3	2	2												
	34																			
	35																			
	36																			
	37	Granite Porphyry	[Dotted Pattern]		Pinkish Brown	3	2	2	3											
	38																			
	39																			
	40																			



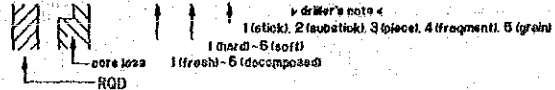
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GEOLOGIC LOG OF DRILL HOLE

Page _____

OLUR PROJECT			HOLE No.	SKE-216	(SHEET 3 of 3)	
LOCATION	DAM SITE (LEFT BANK)	DEPTH OF HOLE	50.00	m	COMMENCED	91-05-07
ELEVATION	1048.3	m	DIRECTION OF HOLE	45°	COMPLETED	91-06-11
COORDINATE	X:4511845.76	CORE RECOVERY	%	DRILLED BY	M.Celik	
	Y:515663.26	DRILLING MACHINE		LOGGED BY	I.Vardal	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING			BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH				
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LUGEON	Pmax	Pc							DEPTH RESULT			
1008.30	40m			0 → 100%															40m				
	1	Granite Porphyry	+		Pinkish Brown														1				
	2																						2
	3																						3
	4																						4
	5																						5
	6																						6
	7																						7
	8																						8
	9																						9
998.30	50									End of the Borehole									50				
	1																		1				
	2																		2				
	3																		3				
	4																		4				
	5																		5				
	6																		6				
	7																		7				
	8																		8				
	9																		9				
908.30	60																		60				



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GEOLOGIC LOG OF DRILL HOLE

OUR PROJECT		HOLE No.	SK-211	(SHEET 1 of 8)	
LOCATION	DAM SITE (RIGHT BANK)	DEPTH OF HOLE	150.00 m	COMMENCED	90-11-15
ELEVATION	1103.87 m	DIRECTION OF HOLE	90°	COMPLETED	91-04-04
COORDINATE	X:4511860.16	CORE RECOVERY	%	DRILLED BY	H. Basaran
	Y:515884.19	DRILLING MACHINE		LOGGED BY	I. Vardal

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE					DESCRIPTION	TESTING				DEPTH							
					COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION		LUGEON	Pmax	Pc	DEPTH RESULT		BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Dpt.H)		
1103.87	0m			0 → 100%						Open excavation									0m			
	1	Granite Porphyry	Pinkish brown	100%						Slime									1			
	2				4	3	4					Highly weathered fragments									2	
	3																					3
	4																					4
	5												1-2cm thick diabase dikes have intruded along joints between 0.0-20.0m. Frequent feather joints, alteration in minerals, oxidation in joint surfaces.									5
	6							3	3				5.9-6.2m, 6.6-6.8m Cracky C=4-3									6
	7																					7
	8																					8
	9																					9
	10							3	3				9.4-9.6m, 10.3-10.8m Fragments									10
	11							4	3													11
	12																					12
	13																					13
	14												Fairly hard and substick core, but many hair cracks.									14
	15							3	1													15
	16												1-2cm thick diabase intrudes along vertical joints.									16
	17																					17
	18																					18
	19												Fractured zone fragments and piece core.									19
	20												Highly weathered vertical joint from 18.8m to 19.9m.									20

