

J 7 COST OF ALTERNATIVE THERMAL POWER PLANT

J 7.1 Basic Considerations

In selection of a thermal unit alternative to the proposed hydro-power plants, the alternative should be of the same capacity of power supply as the proposed hydropower plants. Furthermore, the generating cost of the alternative thermal power plant should be the lowest among various type of thermal power plants such as oil-fired, coal-fired and nuclear power plants in consideration of the existing power generating facilities and the long-term power development scheme established by the Government of Korea and KECO.

The nuclear power plant was eliminated from the alternative thermal power plants by the following reasons:

(1) Fuel cost (uranium cost)

The fuel cost per kWh of Gori nuclear power station has been estimated to be 5.4 US mills per kWh, but it is anticipated that the fuel cost consisting of four elements (refined uranium cost: 20 %, cost for enrichment: 20 %, formation treatment cost: 30 %, retreatment cost: 30 %) is going up sharply. In Japan, the fuel cost of nuclear power plants which will start operation at the beginning of 1980's is estimated to be 2.5 to 3.0 times the actual fuel cost of the nuclear power plants now under operation.

(2) Construction cost

The construction cost per kWh varies considerably by the type of nuclear reactors (BWR, PWR, GCR, AGR and HWR), but there is no definite idea about the type of reactor to be developed in late-1980's.

J 7.2 Construction Cost and Fuel Cost of 500 MW Steam Power Unit

The steam power plants of 500 MW units are going to be the main generating facilities in the power system in 1980's. Therefore, in this study, 500 MW unit capacity was selected as that of an alternative

thermal unit to the proposed hydropower projects. Table J 16 shows the unit construction cost of 500 MW for both coal-fired and oil-fired steam thermal power plants. Generating cost per kWh of the oil-fired thermal power plant is slightly higher than the coal-fired plant.

The cost for the economic evaluation of the proposed hydropower projects and an alternative thermal power plant should be calculated based on the economic cost. Therefore, in this study, the construction cost of the alternative thermal power plant was determined excluding such costs as interest during construction, taxes and duties. While the cost of flue gas desulfurization facilities was added to the above cost, because all new conventional steam thermal units are scheduled to be provided with them to prevent air contamination. Taking into account the above-mentioned consideration, the unit economic investment cost for 500 MW oil-fired steam unit was estimated at \$ 481/kW as shown in Table J 17.

In case 10 % discount rate was applied for the evaluation of the coal-fired and oil-fired thermal power plants, the same values were obtained as the present one, but, at 20% discount rate, the cost of the coal-fired thermal unit is 9.0 % higher than the oil-fired unit. Thus, 500 MW oil-fired steam thermal unit was finally adopted as the alternative to the proposed hydropower projects.

J 7.3 Fixed and Variable Costs of Oil-fired Thermal Power Plant

The hydropower plant has a certain advantage against the thermal power plant in terms of loss and outage. The adjustment factors for the hydro advantage were calculated as shown in Table J 18.

Annual costs during the service life of the power plant are divided in fixed and variable costs as shown below:

<u>Fixed cost</u>	<u>Variable cost</u>
a) Maintenance cost	a) Fuel cost
i) Salary and wages	b) Maintenance cost
ii) Repair	i) A portion of salary and wages
iii) Insurance and others	ii) A portion of repair cost

b) General administration cost

Note: Duties and taxes to the assets and business activities are not considered.

The fixed and variable costs were obtained as shown in Table J 19 taking into consideration the adjustment factor between hydro and thermal power plants.

J 7.4 Unit Cash Flow of Alternative Oil-fired Thermal Power Plant

The unit cash flow of alternative oil-fired thermal power plant is prepared in Table J 20, based on the data in Table J 19.

The annual equivalent cost of the alternative thermal power plant was calculated to be a composition of \$ 68.73/kW and 22.87 millis/kWh, at a discount rate of 8 % for an evaluation period of 50 years.

J 8 INTERCONNECTION OF PROPOSED SCHEMES WITH KECO SYSTEM

In consideration of the installed capacity of the proposed hydro-power plants, and also present and future power system composition, it is assumed that the proposed hydropower plants will be interconnected through 154 kV transmission lines with substations or power plants situated close to the proposed hydropower plants, as shown in Fig. 8.

The transmission capacity of the transmission line between the Hwacheon power station and Deogso substation is estimated as shown in the upper diagram in Fig. J 9. This line can be interconnected with either the Bamseonggol or Inje power stations. If both of them power station should be interconnected in a line, a new 154 kV line would be constructed between the Bamseonggol power station and Bug Seoul substation. Then the line can be interconnected with the Bamseonggol, Inje as well as Hongcheon power stations, as shown in the lower diagram in Fig. J 9.

REFERENCES

- J 1 THE LONG-TERM MULTIPURPOSE DAM SCHEMES PRELIMINARY FEASIBILITY STUDY, First Stage, June, 1978, JICA
- J 2 KECO FEASIBILITY REPORT ON MUJU PUMPED STORAGE POWER PROJECT, Chas. T. Main, U.S.A.
- J 3 STATISTICS OF ELECTRIC POWER IN KOREA, 1977, KECO
- J 4 THE ELECTRICAL YEAR BOOK, 1977, Korea Electrical Association
- J 5 NEW METHOD OF LONG RANGE OR VERY LONG RANGE DEMAND FORECAST OF ENERGY INCLUDING ELECTRICITY VIEWED FROM WORLDWIDE STANDPOINT, 1971, Hamaaki AOKI, EPDC
- J 6 KECO FEASIBILITY REPORT ON SAMRANGJIN PUMPED STORAGE POWER PROJECT, Chas. T. Main, U.S.A.
- J 7 MOC/ISWACO FEASIBILITY REPORT ON CHUNGJU MULTIPURPOSE DAM PROJECT, 1976, ECI

Table J 1 EXISTING KECO GENERATING FACILITIES
AS OF DECEMBER 31, 1977

Name of Power Plant	Number of Unit	Unit Cap. (MW)	Installed Cap. (MW)	In-service Date	Name of Owner	Remarks
1. Thermal power plants						
1.1 Steam-oil						
Incheon No.1 & No.2	2	250	500	1970, 1974	KECO	
Yeosu No.1	1	200	200	1975	KECO	
Yeosu No.2	1	300	300	1976	KECO	
Honam No.1 & No.2	2	300	600	1973	KECO	
Yeongnam No.1&No.2	2	200	400	1970, 1973	KECO	
Donghi No.1, No.2 & No.3	3	220	660	'70, '71, '73	KECO	Located in Ulsan
Gyongin No.1 & No.2	2	162.4	324.8	1972	Kyongin Co.	
Seoul No.5	1	250	250	1969	KECO	
Busan No.3 & No.4	2	105	210	1968, 1969	KECO	
Jeju	2	5	10	1970	KECO	Isolated system
Sub-total	18	-	3,454.8	-	-	
1.2 Steam-Coal						
Yeongdong No.1	1	125	125	1972	KECO	
Seoul No.3	1	25	25	1956	KECO	To be scrapped in 1986
Seoul No.4	1	137.5	187.5	1971	KECO	
Yeongweol No.1 & No.2	2	50	100	1965	KECO	
Busan No.1 & No.2	2	66	132	1964	KECO	
Samcheog No.1	1	25	25	1956	KECO	To be scrapped in 1986
Samcheog No.2	1	30	30	1962	KECO	
Gunsan	1	75	75	1968	KECO	
Masan	2	25	50	1956	KECO	To be scrapped in 1986
Sub-total	12	-	699.5	-	-	

Table J 1 Continued

Name of Power Plant	Number of Unit	Unit Cap. (MW)	Installed Cap. (MW)	In-service Date	Name of Owner	Remarks
1.3 Combined cycle and gas-turbines						
Ulsan C/C	4	55	220	1970	KECO	
Yeongweol C/C	1	200	200	1977	KECO	
Gunsan C/C	1	200	200	1977	KECO	
Bupyeong G/T	1	55	55	1977	KECO	
Ulsan G/T	12	10	120	1967, 1968	KECO	To be scrapped in 1983
Onsu G/T	3	10	30	1968	KECO	To be scrapped in 1983
Sub-total	22	-	825	-	-	
1.4 Diesel						
Wangsibri	-	-	39.9	-	KECO	30 MW among them will be scrapped in 1983
Dugdo	-	-	3	-	KECO	
Onsu	-	-	2.6	-	KECO	
Noryangjin	-	-	2	-	KECO	
Bupyeong Islands	6	5	30	1968	KECO	
	-	-	22.3	-	KECO	Isolated system
Sub-total	-	-	99.8	-	-	
Total of (1)	-	-	5,079.1	-	-	
2. Hydro power plants						
Hwacheon	4	27	108	'44, '57, '68	KECO	
Chuncheon	2	28.8	57.6	1965	KECO	
Uiam	2	22.5	45	1967	KECO	
Cheongpyeong No1 & No2	2	19.8	39.6	1943	KECO	
Cheongpyeong No3	1	40	40	1967	KECO	
Paldang	4	20	80	1973	KECO	
Gaesan	2	1.3	2.6	1957	KECO	
Chilbo	2	14.4	28.8	1965	KECO	
Unam	1	2.6	2.6	1931	KECO	
Boseonggang	2	1.56	3.1	1937	KECO	
Namgang	2	6.3	12.6	1971	KECO	
Chusan	2	0.6	1.2	1957	KECO	Isolated system
Soyanggang	2	100	200	1973	ISWACO	
Andong	2	40	80	1977	ISWACO	
Total of (2)	30	-	701.1	-	-	
Grand total (80)	-	-	5,780.2	-	-	

Note: Figures in parenthesis indicate number of unit excluding diesel power plants.

Table J 2 SUMMARY OF KECO GENERATING FACILITIES

	Installed Capacity	
	(MW)	(%)
Thermal		
Oil-fired steam	3,455	59.8
Coal-fired steam	700	12.1
Combined cycle & gas turbine	825	14.3
Diesel	100	1.7
Sub-total	5,080	87.9
Hydro	701	12.1
Total	5,781	100.0

Remarks: Figures as of December, 1977

Table J 3 KECO TRANSMISSION LINE FACILITIES

Voltage kV	Length km	Number of Supports				
		Steel Pole	Wooden Pole	Concrete Pole	Panza- mast	Steel Tower
345	565	-	-	-	-	1,432
154	2,536	7	74	37	36	7,538
66	3,838	711	6,321	12,447	10	4,932
22	482	19	1,690	2,625	40	81
Total	7,421	737	8,085	15,109	86	13,983

Table J 4 KECO TRANSFORMER CAPACITIES

	Unit: MVA		
	Regular	Reserve	Total
345 kV	1,500	167	1,667
154 kV	5,446	172	5,618
66 kV	1,958	143	2,101
22 kV	786	90	876
Total	9,690	572	10,262

Remarks: Figures as of December, 1977

Table J 5 PRIVATE POWER PLANTS

	Number of Self- producer	Number of Units	Installed Capacity (MW)	Available Capacity (MW)
Regular Service	35	60	233	223
Emergency Reserve	1,297	1,555	296	237
Total	1,332	1,615	530	460

Source : Ref. J 7

Table J 6 PRIVATE POWER GENERATION

Unit : GWh

<u>Year</u>	<u>Gross Generation</u>	<u>Year</u>	<u>Gross Generation</u>	<u>Year</u>	<u>Gross Generation</u>
1967	363	1971	412	1975	963
1968	482	1972	858	1976	1,065 *
1969	450	1973	408	1977	1,167 *
1970	430	1974	1,057		

Remarks ; * : Preliminary

Source ; Ref. J 7

Table J 7 GENERATION RECORD OF KECO POWER SYSTEM

		1961	1966	1967	1968	1969	1960	1971
Installed Capacity								
KECO	MW	367	769	917	1,274	1,636	2,068	2,188
Other Co.,	MW	-	-	-	-	-	440	440
Total	MW	367	769	917	1,274	1,636	2,508	2,628
Gross Generation								
KECO	GWh	1,773	3,886	4,911	6,000	7,700	9,126	9,055
Other Co.,	GWh	-	-	2	26	-	41	1,485
Total	GWh	1,773	3,886	4,913	6,026	7,700	9,167	10,540
Auxiliary use	%	5.0	5.5	4.9	4.7	4.6	4.2	4.9
Net Generation	GWh	1,684	3,673	4,671	5,744	7,348	8,780	10,028
Transmission & distribution Loss	%	29.4	18.1	16.5	15.6	13.5	11.8	11.4
Power Sold	GWh	1,213	3,008	3,903	4,850	6,358	7,740	8,884
Growth rate	%		22.1	29.7	24.3	31.1	21.7	14.8
Peak Output	MW	306	696	778	1,080	1,340	1,555	1,777
Load factor	%	66.2	63.7	72.0	63.5	65.6	67.3	67.7
Plant factor	%	50.9	57.6	61.1	53.8	53.7	41.7	45.8
Average revenue	W/kWh	2.79	5.37	5.57	6.04	5.85	6.33	6.40
Nos. of customers	10 ³	797	1,331	1,525	1,636	1,784	2,025	2,356
KECO generation per capita	kWh	70	133	166	200	250	292	331
Consumption per capita	kWh	46	103	132	161	207	246	279

Source : Ref. J 3

Table J 7 Continued

		1972	1973	1974	1975	1976	1977
Installed Capacity							
KECO	MW	2,947	3,747	3,998	4,195	4,195	5,175
Other Co.,	MW	925	525	525	525	615	605
Total	MW	3,872	4,272	4,523	4,720	4,810	5,780
Gross Generation							
KECO	GWh	9,886	12,376	14,428	17,307	20,607	23,851
Other Co.,	GWh	1,950	2,450	2,406	2,530	2,510	2,736
Total	GWh	11,836	14,826	16,834	19,837	23,117	26,587
Auxiliary use	%	5.3	5.4	5.4	5.5	5.2	5.2
Net Generation	GWh	11,208	13,956	15,912	18,752	21,919	25,172
Transmission & distribution loss	%	10.8	11.4	11.7	11.3	10.8	9.3
Power sold	GWh	9,992	12,367	14,048	16,630	19,620	22,833
Growth rate	%	12.5	23.8	13.6	18.4	18.0	16.4
Peak output	MW	2,097	2,556	2,922	3,351	3,807	4,187
Load factor	%	64.3	66.2	65.8	67.6	69.1	72.5
Plant factor	%	34.8	39.6	42.5	48.0	54.7	52.4
Average revenue	W/kWh	7.36	7.30	10.64	17.10	19.43	21.81
Nos. of customers	10 ³	2,597	2,999	3,428	3,939	4,237	4,659
KECO generation per capita	kWh	366	451	503	572	645	730
Consumption per capita	kWh	309	376	420	480	547	627

Source : Ref. J 3

Table J 8 EXISTING HYDRO POWER PLANTS

Name of Power Plant	Hwacheon	Cheongpyeong	Chuncheon
River	North Han	North Han	North Han
Installed capacity (MW)	108.8	79.6	57.6
Energy production (GWh)	326.0	271.5	145.0
Reservoir			
Catchment Area (km ²)	4,145	10,138	4,736
H.W.L. (EL.m)	181.0	51.0	103.0
L.W.L. (EL.m)	156.8	46.0	98.0
Surface area (km ²)	38.2	17.6	14.3
Total storage cap. (10 ⁶ m ³)	1,018.4	185.5	150.0
Effective storage cap. (10 ⁶ m ³)	658.0	82.6	61.0
Max. effective head (m)	74.5	26.0	28.8
Tailrace W.L (EL.m)	103.0	No.1,No.2,No.3 24.4,26.0	74.0
Dam			
Height (m)	77.5	31.0	40.0
Length (m)	435.0	407.0	453.0
Volume (10 ³ m ³)	885.0		250.7
Gate discharge cap. (m ³ /s)	5,428	20,736	12,600
Pressure tunnel (m)	5.4φx705x2	-	-
Penstocks (m)	3.2φx156x4	4.8φx25.8x3	5.5φx33.9x2
Water Turbine			
Type	V.F	No.1,No.2,No.3 V.K Propella	V.K
Capacity x unit (KW)	30,000 x 4	21,000 x 2 40,000 x 1	30,000 x 2
Maximum discharge (m ³ /s)	46.25 x 4	91.0x2,190.6x1	114.2x2
Generator			
Type	V	V. Umbrella	V. Umbrella
Capacity x unit (MVA)	30.0x4	22.0x2,430x1	32.0x2
Revolution (RPM)	200	163.8, 150	150
Transformers			
Capacity (MVA)	30.0x4	22.0x2,43.0x1	32.0x2
Voltage (kV)	154/66/10.5	154/10.5	154/66/10.5
Year Completed	1944/1968	1943/1967	1965

Remarks ; V : Vettical
H : Horizontal
V.F: Vertical Francis
V.K: Vertical Kaplan
H.F: Horizontal Francis

Table J 8 Continued (2)

Name of Power Plant	Soyanggang	Uiam	Paldang	Goesan
River	North Han	North Han	Han	South Han
Installed capacity (MW)	200.0	45.0	80.0	2.6
Energy production (GWh)	353.0	161.0	338.0	10.8
Reservoir				
Catchment Area (km ²)	2,703	7,666	23,800	671
H.W.L. (EL.m)	192.0	71.5	25.5	135.7
L.W.L. (EL.m)	150.0	66.3	25.0	131.7
Surface area (km ²)	70.0	17.2	36.5	1.8
Total storage cap. (10 ⁶ m ³)	2,476.0	80.0	244.0	15.3
Effective storage cap. (10 ⁶ m ³)	1,772.0	39.0	18.0	5.7
Max. effective head (m)	Rated 90.0	17.2	11.8	23.8
Tailrace W.L (EL.m)	80.7	54.0	10.6	113.3
Dam				
Height (m)	125	17.5	21.5	28.0
Length (m)	447.0	273.0	574.4	171.0
Volume (10 ³ m ³)	9,600.0	36.0	250.0	
Gate discharge cap. (m ³ /s)	5,500	16,000	26,000	3,080
Pressure tunnel (m)	8.5φx100.8x1	-		
Penstocks (m)	7.0φx189x1	-	9.2φ	
Water Turbine				
Type	V.F	V.K	H. Bulb	V.K
Capacity x unit (KW)	100,000x2	23,500x2	21,200x4	1,300x2
Maximum discharge (m ³ /s)	125.4x2	170x2	200x4	5.8x2
Generator				
Type	V	V. Umbrella	H	V
Capacity x unit (MVA)	110.0x2	25.0x2	22.6x4	1.6x2
Revolution (RPM)	189	112.5	120	600
Transformers				
Capacity (MVA)	110.0x2	25.0x2	45.2x2	3.3x1
Voltage (kV)	154/14.7	154/10.5	154/6.0	22/3.3
Year Completed	1973	1967		1957

Table J 8 Continued (3)

Name of Power Plant	Andong	Namgang	Chilbo
River	Nagdong	Nagdong	Seomjin
Installed capacity (MW)	80.0	12.6	28.8
Energy production (GWh)		40.0	160.3
Reservoir			
Catchment Area (km ²)	1,588	2,285	763
H.W.L. (EL.m)	160.0	35.5	196.5
L.W.L. (EL.m)	130.0	31.0	175.0
Surface area (km ²)	51.5	20	26.5
Total storage cap. (10 ⁶ m ³)	1,248.0	94.0	466.0
Effective storage cap. (10 ⁶ m ³)	1,000	66.5	370.0
Max. effective head (m)	Rated 54.0	15.0	151.7
Tailrace W.L. (EL.m)	98.0	22.0	30.4
Dam			
Height (m)	83.0	21.0	64.0
Length (m)	532.0	974.8	344.2
Volume (10 ³ m ³)	4,045.5	Dike Dam	410.0
Gate discharge cap. (m ³ /s)	5,350	773.0 62.0 6,320	1,868
Pressure tunnel (m)	8.5φ x 201.3 x 1		3.4φ x 6,216 x 1
Penstocks (m)	7.5φ x 79.4 x 2		1.35φ x 380.4 x 2
Water Turbine			
Type	V. Reversible Deriaz	H. Bulb	V.F
	at rated head		
Capacity x unit (KW) ₃	40,000 x 2	6,550 x 2	14,500 x 2
Maximum discharge (m ³ /s)	85.0 x 2	100.0 x 2	10.96 x 2
Generator			
Type	V. motor generator	H	V
Capacity x unit (MVA)	45.0MW x 2	6.3 x 2	16.0 x 2
Revolution (RPM)	189	189.5	514
Transformers			
Capacity (MVA)	50.0 x 2	14.0 x 1	10.7 x 4
Voltage (KV)	154/11.0	66/3.45	66/10.5
Year Completed	1976		1965

Remarks ; V : Vertical
H : Horizontal
V.F: Vertical Francis
H.F: Horizontal Francis

Table J 8 Continued (4)

Name of Power Plant	Unam	Boseonggang	Chusan
River	Seomjin	Seomjin	(Ulreung Do)
Installed capacity (MW)	2.6	3.1	1.2
Energy production (GWh)		16.1	3.8
Reservoir			
Catchment Area (km ²)		275	
H.W.L. (EL.m)		127.3	154.5
L.W.L. (EL.m)	156.0	120.5	150.8
Surface area (km ²)		1.8	
Total storage cap. (10 ⁶ m ³)		5.7	
Effective storage cap. (10 ⁶ m ³)		4.7	
Max. effective head (m)	75.2	83.7	143.6
Tailrace W.L (EL.m)	90.4	37.5	
Dam			
Height (m)		11.9	
Length (m)		273.8	
Volume (10 ³ m ³)		42.0	
Gate discharge cap. (m ³ /s)		2,419	
Pressure tunnel (m)	3.0φx2,750x1	2.1φx2,203x1	
Perstocks (m)	1.51φ114.7x1	1.55φx445.8x1	0.6φx724x1
Water Turbine			
Type	H.F	H.F	H.F
Capacity x unit (KW)	3,133 x 1	1,625 x 2	600 x 2
Maximum discharge (m ³ /s)	4.17	2.5 x 2	0.9
Generator			
Type	H	H	H
Capacity x unit (MVA)	3.2 x 1	1.9 x 2	0.8 x 2
Revolution (RPM)	720	720	1,200
Transformers			
Capacity (MVA)	2.2 x 1	1.3 x 4	
Voltage (KV)		66/3.3	6.6
Year Completed		1937	

Table J 9 MONTHLY ENERGY PRODUCTION OF HYDRO POWER PLANTS
Interconnected System - 1977

Unit : MWh

Plant	Installed Cap. (MW)	Interconnected System - 1977											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hwacheon	108	11,312	10,901	11,188	8,249	30,436	33,492	25,767	24,175	9,571	2,414	4,173	6,099
Chuncheon	57.6	5,579	5,517	7,113	9,655	16,689	18,112	18,743	15,179	4,461	1,719	2,598	2,745
Uiam	45	11,002	9,120	10,304	9,589	16,306	13,826	15,134	16,989	6,397	4,347	4,284	5,153
Cheongpyeong	79.6	15,436	12,433	12,657	25,186	27,086	22,425	31,931	29,768	11,327	7,401	7,102	8,684
Paldang	80	12,180	10,451	10,366	32,941	29,355	17,261	37,178	28,106	25,257	9,356	9,118	10,724
Goesan	2.6	374	32	280	1,609	904	166	960	803	1,240	277	352	336
Chilbo	28.8	2,555	3,352	1,295	8,242	16,906	12,470	10	9	21	14	-	-
Unam	2.6	130	125	134	692	1,621	1,673	1,244	1,510	1,165	270	-	-
Boseonggang	3.1	426	170	523	2,054	2,063	1,823	2,056	765	1,240	607	4	786
Namgang	12.6	775	264	565	6,530	4,373	2,261	1,878	1,034	1,733	878	895	983
Chusan	1.2	162	123	111	120	121	135	119	131	124	135	124	96
Soyanggang	200	42,883	30,197	34,957	18,585	39,489	22,072	25,603	50,664	23,523	17,478	16,198	22,134
Andong	80	5,929	6,054	7,020	10,462	15,336	9,765	13,484	9,406	4,507	4,884	5,799	6,182
Total	701	108,743	88,739	96,513	133,914	200,685	155,841	174,107	178,539	90,566	49,733	50,647	64,552
Three months total			293,995		490,440		443,212		164,932				

Table J 10 1978 POWER DEMAND PROJECTION BY KECO

Year	(A) Max. demand (MW)	(B) Gross genera- tion (GWh)	(C) Annual load factor (%)	(D) Pumped genera- tion (GWh)	(E) Pumped energy loss (GWh)	(F) Genera- ting energy (GWh)	(G) Total Loss (%)	(H) Energy Sold (GWh)
1977 ^{/1}	4,187	26,587	72.5	26	13	26,548	14.1	22,833
1978	5,010	31,176	71.0	69	35	31,072	15.0	26,506
1979	5,879	35,671	69.3	80	40	35,551	14.8	30,300
1980	6,773	41,130	69.3	280	140	40,710	14.7	34,735
1981	7,805	47,024	68.8	310	155	46,559	14.6	39,771
1982	8,848	53,262	68.7	310	155	52,797	14.5	45,149
1983	10,023	60,278	68.7	310	155	59,813	14.4	51,205
1984	11,349	68,535	69.0	490	245	67,800	14.4	58,043
1985	12,850	77,755	69.1	670	335	76,750	14.3	65,778
1986	14,548	87,968	69.0	670	335	86,963	14.3	74,530
1987	16,266							
1988	18,187							
1989	20,337							
1990	22,743							
1991	25,437							
1992	28,030							
1993	30,716							
1994	33,660							
1995	36,891							
1996	40,482							

Remarks ; (B) = (D) + (E) + (F) (H) = (F) (1 - (G))

^{/1} : Actual record

Table J 11 ENERGY DEMAND FORECAST BY MACROSCOPIC METHOD

Year	GNP at 1975 Price (10 ⁹ US\$)	GNP/Capita at 1968 Price (US\$)	Energy generation Per Capita (kWh/Capita)	Projected Population (10 ³ persons)	Energy Generation in Whole Country (GWh)	Annual Increase in Energy Generation
1977	23.8	233	779	35,610	27,754	
1978		250		36,180	31,470	
1979		271		36,760	35,690	13.4
1980		293		37,350	40,470	(4th Plan)
1981	34.5	317	1,210	37,950	45,920	
1982		344		38,560	52,120	
1983		373		39,170	59,160	
1984		406		39,800	67,140	13.5
1985		441		40,440	77,210	(5th Plan)
1986	56.3	478	2,110	41,080	86,680	
1987		519		41,660	97,250	
1988		565		42,240	109,120	
1989		614		42,830	122,430	12.2
1990		667		43,430	137,370	(6th Plan)
1991	92.0	727	3,500	44,040	154,140	
1992		791		44,660	169,860	
1993		860		45,280	187,190	
1994		936		45,920	206,280	10.2
1995		1,019		46,560	227,320	(7th Plan)
1996	150.2	1,108	5,300	47,210	250,210	

Note ; GNP deflators : 100.0 for 1968 and 287.1 for 1975

Table J 12 POWER DEMAND PROJECTION
BY MACROSCOPIC METHOD

Year	Gross Generation			KECO Load Factor (%)	KECO Maximum Demand (MW)
	Whole Country (GWh)	Self - Producer (GWh)	KECO (GWh)		
1977	27,754	1,167	26,587	72.5	4,187
1978	31,470	1,299	30,171	70.0	4,320
1979	35,690	1,430	34,260	70.0	5,587
1980	40,470	1,562	38,908	70.0	6,345
1981	45,920	1,693	44,227	70.0	7,216
1982	52,120	1,693	50,427	69.0	8,343
1983	59,160	1,693	57,467	69.0	9,507
1984	69,140	1,693	65,447	69.0	10,827
1985	77,210	1,693	75,517	69.0	12,493
1986	86,680	1,693	84,987	69.0	14,060
1987	97,250	1,693	95,557	68.0	16,042
1988	109,120	1,693	107,427	68.0	18,034
1989	122,430	1,693	120,737	68.0	20,269
1990	137,370	1,693	135,667	68.0	22,775
1991	154,140	1,693	152,447	68.0	25,592
1992	169,860	1,693	168,167	67.0	28,652
1993	187,190	1,693	185,497	67.0	31,605
1994	206,280	1,693	204,587	67.0	34,858
1995	227,320	1,693	225,627	67.0	38,443
1996	250,210	1,693	248,517	67.0	42,342

Remarks ; Actual record for 1977

Table J 13 LONG-TERM POWER DEVELOPMENT SCHEME

		1977	1981	1986	1991	1996	2000
Hydro	(MW)	712	801	1,764	1,764	1,764	1,764
	(%)	(12.3)	(7.4)	(8.7)	(4.9)	(3.1)	(2.2)
Pumped-storage	(MW)	-	400	1,400	3,000	5,800	9,600
	(%)	-	(3.7)	(6.9)	(8.4)	(10.3)	(12.0)
Oil-fired	(MW)	4,378	7,236	7,504	8,904	8,904	8,904
	(%)	(75.6)	(66.8)	(37.0)	(24.8)	(15.9)	(12.4)
Coal-fired	(MW)	700	1,800	3,200	7,400	8,050	8,050
	(%)	(12.1)	(16.6)	(15.8)	(20.6)	(14.3)	(10.0)
Nuclear	(MW)	-	595	6,424	14,824	31,624	50,824
	(%)	-	(5.4)	(31.7)	(41.3)	(56.3)	(63.4)
Total	(MW)	5,790	10,832	20,292	35,892	56,142	80,142
	(%)	(100)	(100)	(100)	(100)	(100)	(100)

Table J 14 FOSSIL FUEL REQUIREMENT FOR LONG-TERM POWER DEVELOPMENT SCHEME

Period	Bunker C. (10 ⁹ liter)	Kerosine (10 ⁹ liter)	Anthracite (10 ⁹ tons)	Bitumi- nous (10 ⁶ tons)	Uranium (ton)
1982 to 1986	41.5	1.2	14	22	3,198
1987 to 1991	32.7	0.9	10	54	10,152
1992 to 1996	34.3	1.1	7	46	23,174
1997 to 2000	27.8	1.4	5	45	32,564
Total	136.3	4.6	36	167	63,088

Table J 15 LONG-TERM POWER FACILITIES EXPANSION PROGRAM
(REVISED IN AUGUST 1, 1978)

Year	Month	Plant Name	Construction Start	Construction	Unit Capacity (MW)	Total Capacity (MW)	Available Capacity (MW)	Peak Demand (MW)	Power Reserve (MW)	Ratio (%)
1977	Dec	Existing				5,790	4,573	4,187	386	9.2
1978	Apr	Gori Nuclear No.1	Sep	1970	587					
	Apr	Anheung small Hydro			0.45					
	May	Chusan small Hydro			0.2					
	May	Incheon (Oil) No.3	Jul	1974	325					
	Aug	Incheon (Oil) No.4	Jul	1974	325					
	Sep	Gunsan combined cycle	Jul	1976	100					
	Nov	Yeongweol combined cycle	Jul	1976	100					
		Derating			-112					
		Sub Total			1,326	7,116	5,772	5,010	762	15.2
1979	Jun	Hanlim diesel	Aug	1978	2.5x4					
	Jul	Ulsan combined cycle	Mar	1977	100					
	Sep	Yeongdong No.2 (Coal & Oil)	Aug	1976	200					
	Sep	Ulleung diesel (1st)	Sep	1978	0.5x4					
	Nov	Cheongpyeong pumped storage (1st)	Sep	1975	200					
	Dec	Ulsan (Oil) No.4	Apr	1977	400					
	Dec	Daechyeong hydro	Mar	1975	90					
	Dec	Namjeju (Oil) No.1	Jun	1977	10					
		Retire			-3					
		Sub Total			1,009	8,125	6,824	5,879	945	16.1
1980	Mar	Asan (Oil) No.1	Dec	1976	350					
	Mar	Cheongpyeong pumped storage (2nd)	Sep	1975	200					
	Mar	Ulleung diesel (2nd)	Sep	1978	0.5x2					
	Jun	Namjeju (Oil) No.2	Jul	1977	10					
	Sep	Asan (Oil) No.2	Dec	1976	350					
	Dec	Ulsan (Oil) No.5	Apr	1977	400					
		Sub Total			1,311	9,436	8,105	6,773	1,332	19.7

Table J 15 Continued (2)

Year	Month	Plant Name	Construction Start	Unit Capacity (MW)	Total Capacity (MW)	Available Capacity (MW)	Peak Demand (MW)	Power Reserve (MW)	Ratio (%)
1981	Jun	Ulsan (Oil) No.6	Apr 1977	400					
	Aug	Seohae (Coal & Oil) No.1	Oct 1978	200					
		Sub Total		600	10,036	9,005	7,805	1,200	15.4
1982	Feb	Seohae (Coal & Oil) No.2	Oct 1978	200					
		Jeju (Additional)		20					
	Apr	Samcheonpo (Coal) No.1	Oct 1978	500					
	Oct	Samcheonpo (Coal) No.2	Oct 1978	500					
	Nov	Asan (Oil) No.3	Oct 1979	500					
	Retire		-131.8						
	Sub Total		1,588.2	11,624	10,442	8,848	1,594	18.0	
1983	Apr	Weolseong Nuclear	Jan 1976	678.7					
	May	Asan (Oil) No.4	Oct 1979	500					
	Apr	Gocheong(Coal)No.1	Dec 1979	500					
	Oct	Gocheong(Coal)No.2	Dec 1979	500					
	Dec	Gori Nuclear No.2	May 1977	650					
		Retire		-210					
	Sub Total		2,619	14,243	11,984	10,023	1,961	19.6	
1984	Jun	Chungju hydro (1st)	Jun 1978	300					
	Jun	Samrangjin pumped storage	Oct 1979	600					
	Sep	Gori Nuclear No.3	Jan 1978	900					
	Oct	Habcheon hydro	Mar 1980	80					
		Sub Total		1,880	16,123	13,888	11,349	2,539	22.4
1985	Sep	Gori Nuclear No.4	Jan 1978	900					
	Sep	New Nuclear No.1	Apr 1980	900					
		Sub Total		1,800	17,923	15,261	12,850	2,411	18.8

Table J 15 Continued (3)

Year	Month	Plant Name	Construction Start	Unit Capacity (MW)	Total Capacity (MW)	Available Capacity (MW)	Peak Demand (MW)	Power Reserve (MW)	Ratio (%)
1986	Jun	Imha hydro	Mar 1982	50					
	Jun	Hongcheon hydro	Mar 1982	63					
	Jun	Tidal	Jan 1981	400					
	Sep	New nuclear No.2	Apr 1980	900					
	Sep	New nuclear No.3	Apr 1980	900					
Dec	Habcheon pumped storage	Mar 1983	400						
		Sub Total		2,713	20,636	17,217	14,547	2,670	18.4
1987	-	New thermal (Coal)	-	500					
	-	" (Coal)	-	500					
	-	Nuclear	-	900					
		Sub Total		1,900	22,536	-	16,266	-	-
1988	-	New thermal (Coal)	-	900					
	-	Nuclear	-	900x3					
	-	Sub Total	-	3,600	26,136	-	18,187	-	-
1989	-	New thermal (Coal)	-	900					
	-	Nuclear	-	900x3					
	-	Sub Total	-	3,600	29,736	-	20,337	-	-
1990	-	Thermal (Oil)	-	500					
	-	Nuclear	-	1,200x2					
	-	Pumped storage	-	500					
		Sub Total		3,400	33,136	-	22,743	-	-

Table J 16 UNIT CONSTRUCTION COST AND GENERATING COST OF STEAM POWER PLANT

Plant Name	Unit Construction Cost (US\$/kW) (1978 Price)	Unit Generation Cost (US\$/kWh) (1978 Price)	Remarks
Coal-fired Steam Power Plant			
Samcheonpo No.1 & No.2 (500MW x 2)	548	2.79 (1.33)	35US\$/ton (CIF) 6,200kcal/kg 7.0 % moisture
Gocheong No.1 & No.2 (500MW x 2)	603	2.94 (1.33)	
Oil-fired Steam Power Plant			
500MW unit class	422	3.02 (2.07)	Bunder C Oil 8.80US\$/liter (CIF).

Source : From KECO's information

- 1) Annual interest rate of 10 % is included in the unit construction cost.
- 2) SO₂ elimination facilities cost is not involved in the unit construction cost.
- 3) Duties and taxes of 0.3 % in total are considered in the unit construction cost.
- 4) Figures in parenthesis indicate unit fuel consumption cost.
- 5) Plant factor : 70 %

Table J 17 ESTIMATED UNIT ECONOMIC INVESTMENT COST OF 500MW OIL-FIRED UNIT

	Unit: \$/kW
Boilers	106
Fuel gas desulfurization equipment	111
Turbines & generators	111
Transforming facilities	14
Civil & other costs	139
Total	481

Table J 18 HYDRO ADVANTAGE

Loss Factor	Hydro	Thermal
Transmission loss	4.0 %	2.0 %
Forced outage	-	5.0
Station service loss	0.3	6.0
Maintenance & repair loss	2.0	12.5
Capacity adjustment factor	$= \frac{(1-0.04)(1-0.003)(1-0.02)}{(1-0.02)(1-0.05)(1-0.06)(1-0.125)} = 1.225$	
Energy adjustment factor	$= \frac{(1-0.04)(1-0.003)}{(1-0.02)(1-0.06)} = 1.039$	

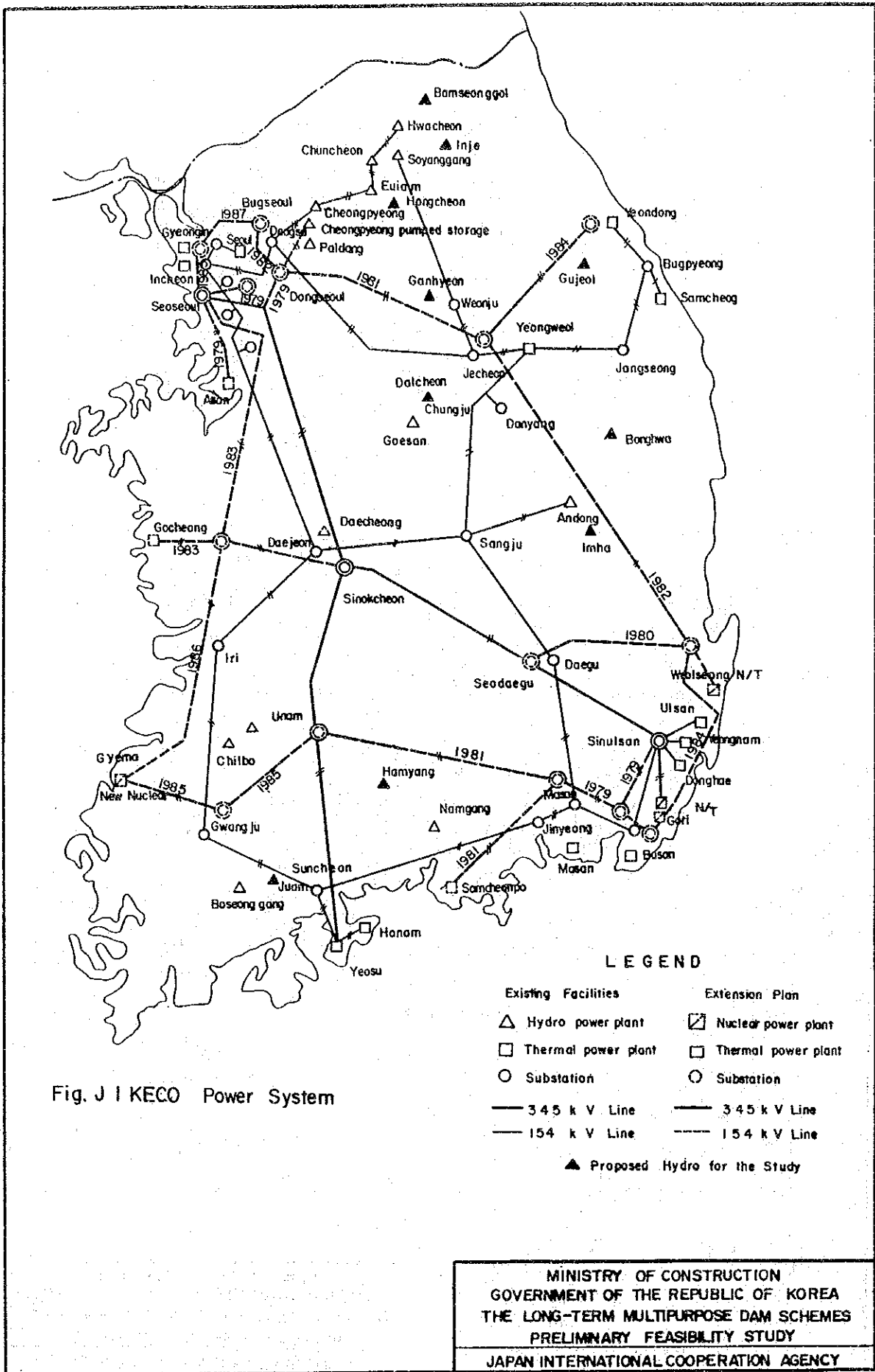
Table J 19 ALTERNATIVE THERMAL COST

	Capacity Cost (\$/kW)	Energy Cost (mills/kWh)
1. Capacity Cost		
(1) Investment cost	481.00	
(2) Insurance; 0.6 % of (1)	2.89	
(3) Fixed O & M; 1.85 % of (1)	8.90	
(4) (2) + (3)	11.79	
2. Energy Cost		
(5) Fuel cost; 0.227 x 95 mills ^{/1}		21.53
(6) Variable O & M; 2.25 % of (5)		0.48
(7) Total (5) + (6)		22.01
3. Adjustment		
(8) Capital cost; 1.225 x (1)	589.23	
(9) Annual fixed cost; (4)	11.79	
(10) Annual variable cost; 1.039 x (7)		22.87

Remarks; /1 : Wholesale price of Bunker C fuel (in June, 1978, ex-factory price) indicated in "Monthly Economic Statistics, December, 1978", BOK.

Table J 20 UNIT CASH FLOW OF ALTERNATIVE
OIL-FIRED THERMAL POWER PLANT

No. of Year	Capital Cost (US\$/kW)	Fixed Cost (US\$/kW)	Variable Cost (mills/kWh)
-3	176.77	-	-
-2	235.69	-	-
-1	176.77	-	-
1	0	11.79	22.87
2	0	11.79	22.87
3	0	11.79	22.87
4	0	11.79	22.87
5	0	11.79	22.87
...
25	0		
26	0		
27	0		
28	159.09	ditto	ditto
29	212.12		
30	159.09		
...
45	0	11.79	22.87
46	0	11.79	22.87
47	0	11.79	22.87
48	0	11.79	22.87
49	0	11.79	22.87
50	0	11.79	22.87



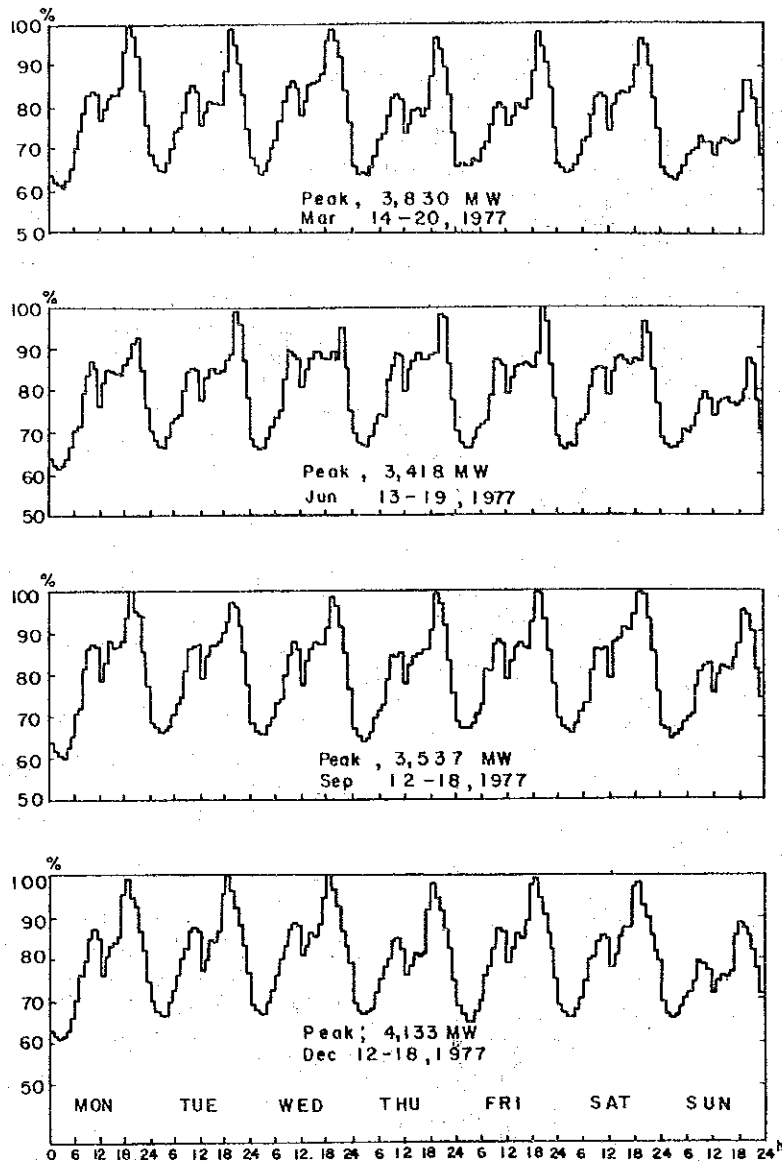


Fig.J 2 Weekly Load Curve

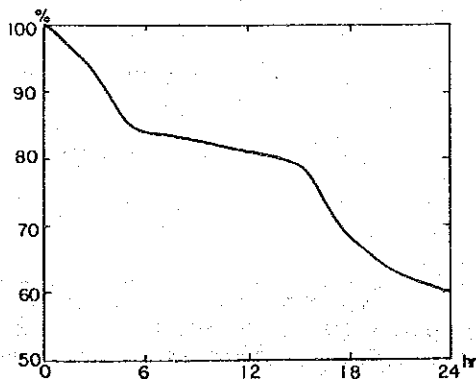


Fig.J 3 Typical Load Duration Curve

MINISTRY OF CONSTRUCTION
GOVERNMENT OF THE REPUBLIC OF KOREA
THE LONG-TERM MULTIPURPOSE DAM SCHEMES
PRELIMINARY FEASIBILITY STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY

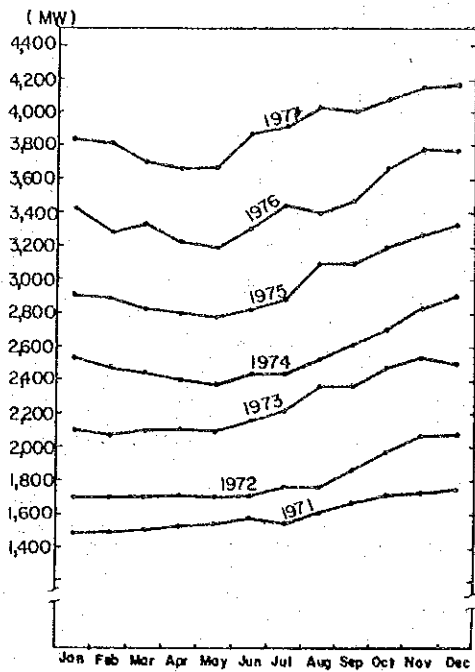


Fig. J 4 Monthly Maximum Demand

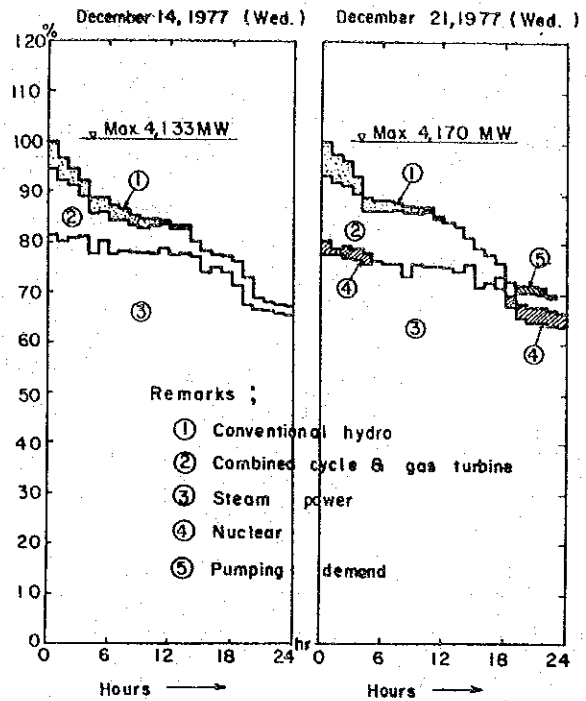


Fig. J. 5 Composition of Load Duration Curve by Type of Generation Facilities

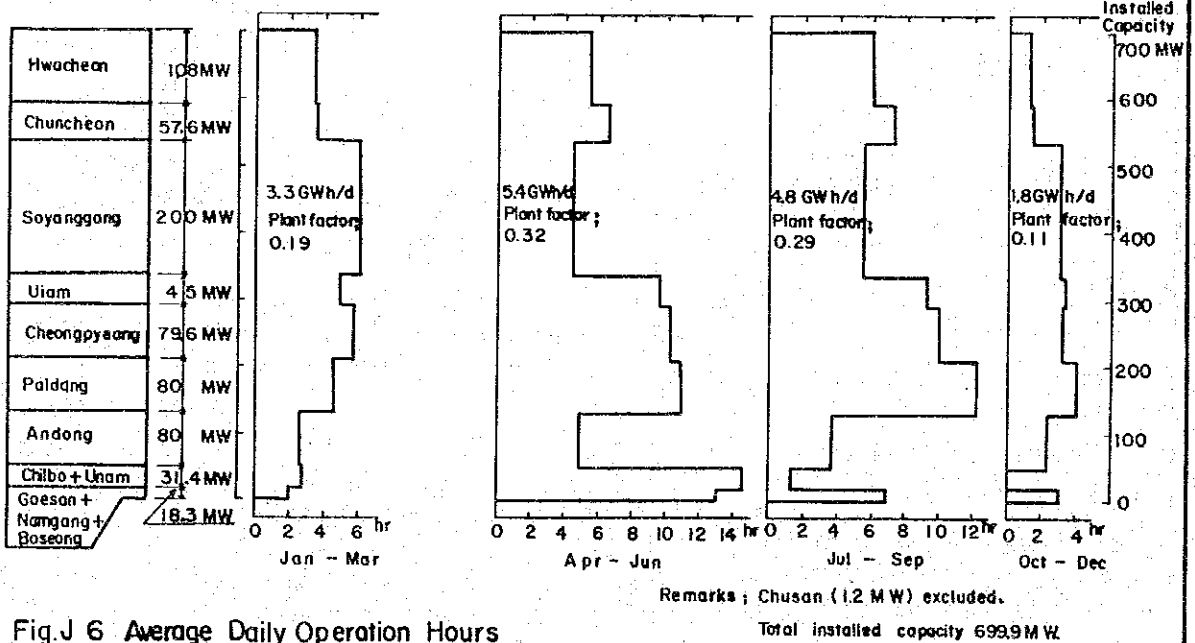


Fig. J 6 Average Daily Operation Hours of Hydro Power Stations in 1977

MINISTRY OF CONSTRUCTION
GOVERNMENT OF THE REPUBLIC OF KOREA
THE LONG-TERM MULTIPURPOSE DAM SCHEMES
PRELIMINARY FEASIBILITY STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY

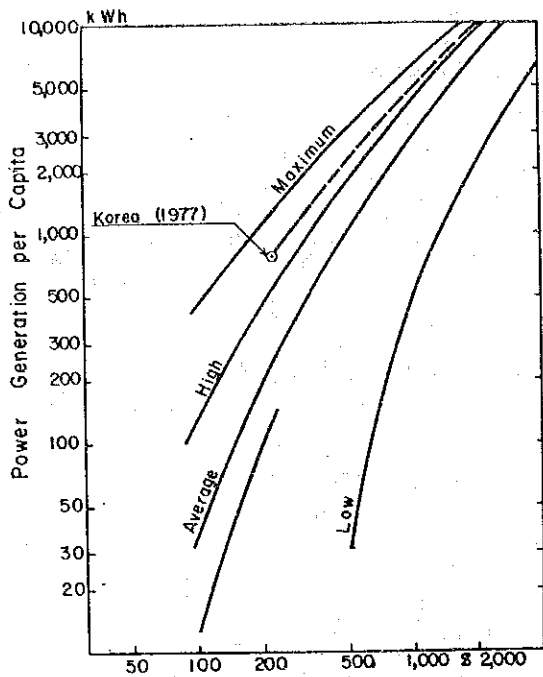


Fig. J 7 Correlation Between GNP per Capita and Power Generation per Capita

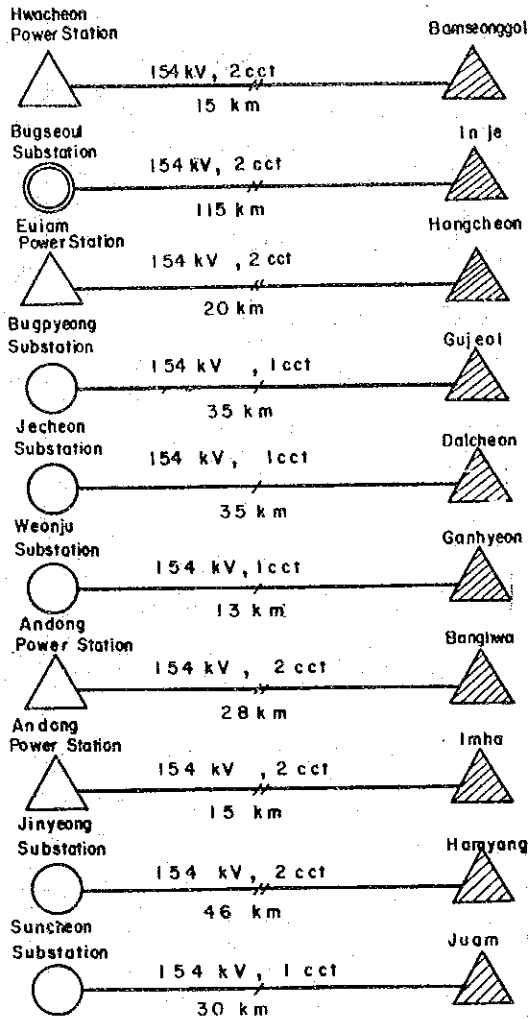


Fig. J 8 Interconnection of Proposed Schemes with KECO System

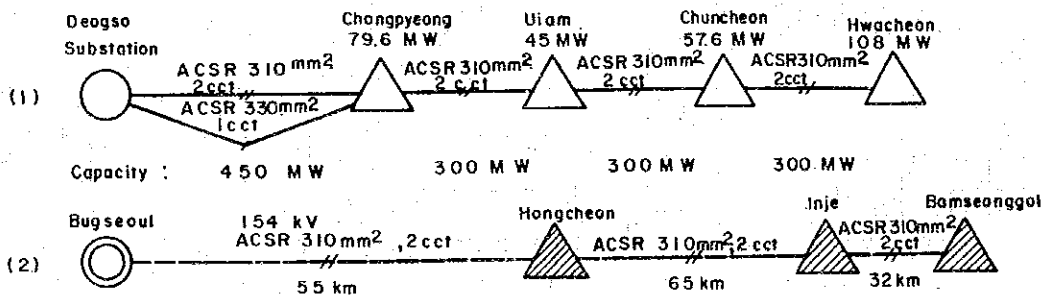


Fig. J 9 Alternative Interconnection

A N N E X K

WATER BUDGET

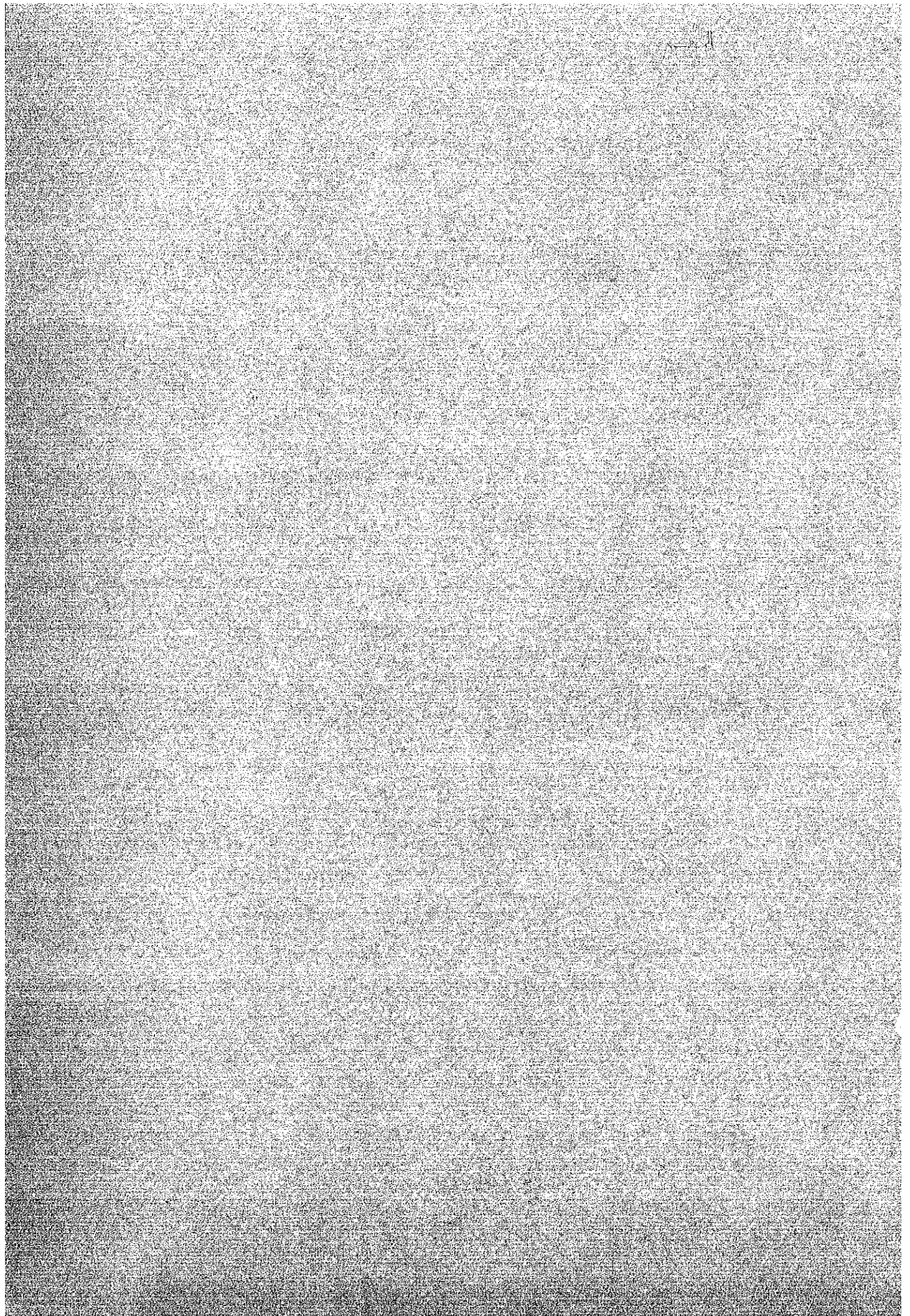


TABLE OF CONTENTS

	Page
LIST OF COMMON SYMBOLS	
K 1 INTRODUCTION -----	K 1
K 2 INCORPORATED DATA -----	K 2
K 2.1 Methodology -----	K 2
K 2.2 Division of Basis -----	K 2
K 2.3 Measured Flow -----	K 3
K 2.4 M&I Net Water Withdrawal -----	K 3
K 2.5 Agricultural Net Water Withdrawal -----	K 4
K 2.6 River Maintenance Flow -----	K 4
K 3 EXPLANATION OF CALCULATIONS -----	K 5
K 3.1 Water Budget in the Han River -----	K 5
K 3.2 Water Budget in the Nagdong River -----	K 6
K 3.3 Water Budget in the Seomjin River -----	K 10
K 4 RESULTS OF CALCULATION -----	K 13

LIST OF TABLES

	Page
K 1 5-DAY FLOW RECORD -----	K 14
K 2 NET M&I WATER WITHDRAWAL -----	K 17
K 3 NET AGRICULTURAL WATER WITHDRAWAL IN THE BASE YEAR -----	K 19
K 4 NET AGRICULTURAL WATER WITHDRAWAL ALONG THE MAIN STREAM IN THE FUTURE -----	K 21
K 5 NET AGRICULTURAL WATER WITHDRAWAL IN THE TRIBUTARY AREA IN THE FUTURE -----	K 28
K 6 RIVER MAINTENANCE FLOW IN THE NAGDONG RIVER IN THE FUTURE -----	K 36
K 7 CALCULATION OF MEASURED FLOW AT PALDANG -----	K 37
K 8 CALCULATION OF WATER DEFICIT IN THE HAN RIVER -----	K 39
K 9 CALCULATION OF NATURAL FLOW IN THE NAGDONG RIVER -----	K 55
K 10 CALCULATION OF WATER DEFICIT AT GORYEONG BRIDGE -----	K 61
K 11 CALCULATION OF WATER DEFICIT BETWEEN GORYEONG BRIDGE AND JINDONG -----	K 77
K 12 CALCULATION OF WATER DEFICIT BETWEEN JINDONG AND ESTUARY -----	K 93
K 13 CALCULATION OF WATER DEFICIT IN THE NAM RIVER -----	K 109
K 14 CALCULATION OF WATER DEFICIT AT THE NAGDONG ESTUARY -----	K 117
K 15 CALCULATION OF NATURAL FLOW IN THE SEOMJIN RIVER (I) ---	K 133
K 16 CALCULATION OF NATURAL FLOW IN THE SEOMJIN RIVER (II) ---	K 143
K 17 CALCULATION OF WATER DEFICIT IN THE SEOMJIN RIVER CASE 1 -----	K 153
K 18 CALCULATION OF WATER DEFICIT IN THE SEOMJIN RIVER CASE 2 -----	K 164
K 19 CALCULATION OF WATER DEFICIT IN THE SEOMJIN RIVER CASE 3 -----	K 173
K 20 CALCULATION OF WATER DEFICIT IN THE SEOMJIN RIVER CASE 4 -----	K 183

	Page
K 21 SUMMARY OF ESTIMATED WATER DEFICIT IN THE HAN RIVER BASIN -----	K 193
K 22 SUMMARY OF ESTIMATED WATER DEFICIT IN THE NAGDONG RIVER BASIN -----	K 195
K 23 SUMMARY OF ESTIMATED WATER DEFICIT IN THE SEOMJIN RIVER BASIN -----	K 201

LIST OF FIGURES

- K 1 Water Deficit at Paldang of the Han River
- K 2 Water Deficit at Goryeong Bridge of the Nagdong River
- K 3 Water Deficit at estuary of the Nagdong River case 1
- K 4 Water Deficit at estuary of the Nagdong River case 2
- K 5 Water Deficit at estuary of the Seomjin River case 1
- K 6 Water Deficit at estuary of the Seomjin River case 2
- K 7 Water Deficit at estuary of the Seomjin River case 3
- K 8 Water Deficit at estuary of the Seomjin River case 4

LIST OF COMMON SYMBOLS

The following symbols are commonly used in this ANNEX, but certain symbols are added to them, if it is necessary to limit the meaning of the symbol.

- A : River maintenance flow
- AM : Net agricultural water withdrawal in the main stream
in the projected year
- AT : Net agricultural water withdrawal in the tributary
in the projected year
- AW : Net agricultural water withdrawal in the base year
- D : Water deficit in the main stream
- DT : Water deficit in the tributary
- D' : Water deficit in the main stream calculated
disregarding the river maintenance flow
- MM : Net M&I water withdrawal in the main stream
in the projected year
- MT : Net M&I water withdrawal in the tributary stream
in the projected year
- MW : Net M&I water withdrawal in the base year
- N : Natural flow

K 1 INTRODUCTION

This ANNEX presents the detailed calculation results of the water budget, which was made based on the results of hydrological study in ANNEX B study on the irrigation water demand in ANNEX G and the M&I water demand projection in ANNEX H, in order to facilitate for the study on the reservoir operation and the determination of the construction horizons of the proposed dams.

K 2.1 Methodology

The method of water budget analysis established by KOR 16 was applied in this study.

The measured flow in a particular dry year was converted into the natural flow by being added with the net water withdrawal in the year.

It was assumed that the tributary water users have the priority to the main stream, wherein the main stream means the areas along the river stretch between the proposed damsite and the estuary and the other areas are called the tributary areas. If the net water withdrawal in the tributary in a projected year deducted by the natural flow is positive, there is a water deficit in the tributary and no river flow is available for the main stream areas. If the above-mentioned value takes a negative sign, it is the river flow available in the main stream, its sign being charged. The net water withdrawal in the main stream in the projected year less the river flow available in the main stream is the deficit to be met by the proposed dam.

The calculation was made for each 5-day period of the base dry year.

K 2.2 Division of Basins

The water deficit in the Han river was calculated at just downstream of the Paldang dam, where a certain river maintenance flow was assumed. The inflow from and water withdrawal in the catchment areas of the Soyanggang and Chungju dams were excluded, for the convenience of the use of the results of calculation. A calculation was also made for the area between the proposed Gujeol damsite and the backwater end of the Chungju reservoir, but no deficit came out.

The water deficit in the Nagdong river was calculated at the Goryeong bridge where the water pollution by Daegu and Gumi is the problem and the estuary where both the sea water intrusion and water

pollution are the problem. The catchment area of the Andong dam was assumed to be shut down. The Yeongcheon dam was also excluded because the dam is expected to divert the total inflow to Pohang. The calculation was carried out dividing the basin into four; upstream of the Goryeon Bridge, Goryeon Bridge to Jindong, the Nam river basin, and Jindong to estuary. The deficit between the proposed Hamyang damsite and the backwater end of the Namgang dam was separately calculated, but no deficit came out.

The water deficit in the Seomjin river basin was calculated at the estuary. The shut down of the catchment areas of the Seomjingang dam and Dongbog dam was assumed, because these dams will totally divert the inflow out of the river basin. For the convenience of the use of the results, the cases assuming the shut down of the catchment area of the proposed Juam dam were also analysed.

K 2.3 Measured Flow

The measured flow used are 5-day flow record derived from the daily run-off records in a base dry year at the Jeongseon, Goan, Changri, Waegwan, Jindong and Abrog water level gauges.

A study on the run-off records in the 15 years between 1962 and 1976 at the above-mentioned gauges revealed that a year period between October, 1967 and September, 1968 is the driest year which result the largest water deficit. This one year period was set as the base year.

The 5-day measured flow records at the six selected gauges are shown in Table K 1.

K 2.4 M&I Net Water Withdrawal

The M&I net water withdrawals for the base year and the projected years were calculated in ANNEX H. They are summarized in accordance with the basin division in Table K 2.

K 2.5 Agricultural Net Water Withdrawal

The agricultural net water withdrawals estimated in ANNEX G are summarized by the basin division in Table K 3 for the base year and in Table K 4 for the main stream in the projected years in Table K 5 for the tributaries in the projected years.

K 2.6 River Maintenance Flow

The river maintenance flow was assumed to be $32.6 \text{ m}^3/\text{s}$ at just downstream of the Paldang dam for the Han river, $4 \text{ m}^3/\text{s}$ at just downstream of the intake of the Yecheon/Gwangyang Water Supply System for the Seomjin river, and as shown in Table K 6 for the Nagdong river.

K 3 EXPLANATION OF CALCULATIONS

K 3.1 Water Budget in the Han River

The Goan gauge has a catchment area of 23,613 km, being located just below the Paldang dam. Its run-off record between 1962 and 1976 is affected by the operation of the Hwacheon dam.

The measured flow at the Paldang dam being deducted by the measured flow at the Soyanggang damsite (2,703 km) and Chungju damsite (6,648 km) was calculated by the following equation:

$$\begin{aligned} \text{MFP} &= \text{MFG} - \frac{2,703 + 6,648}{23,613} (\text{MG} - \text{HR}) \\ &= \text{MFG} - 0.396 (\text{MG} - \text{HR}) \quad \dots\dots\dots (\text{K } 1) \end{aligned}$$

where, MFP: Measured flow at Paldang reduced by the measured flow at the Soyanggang and Chungju damsites

MFG: Measured flow at Goan

HR : Inflow less outflow at the Hwacheon dam.

The calculation sheet of MFP is presented in Table K 7.

Natural flow was calculated by the following equation:

$$N = \text{MF} + \text{MW} + \text{AW} \quad \dots\dots\dots (\text{K } 2)$$

where, N : Natural flow

MF: Measured flow

MW: Net M&I water withdrawal in the base year

AW: Net agricultural water withdrawal in the base year.

The deficit in the tributary area, or the available flow in the main stream was calculated by the following equation:

$$\text{DT} = \text{MT} + \text{AT} - \text{N} \quad \dots\dots\dots (\text{K } 3)$$

where, DT: Deficit in the tributary area, if the value is positive, or, -DT is the available flow in the main stream, if the value is negative

MT: Net M&I water withdrawal in the tributary area in the projected year

AT: Net agricultural water withdrawal in the tributary area in the projected year.

The deficit to be supplied by the existing and proposed dams was calculated by the following equation:

$$D = MM + AM + A + DT \dots\dots\dots (K 4)$$

where, D : Deficit to be supplied by the existing and proposed dams

MM: Net M&I water withdrawal in the main stream in the projected year

AM: Net agricultural water withdrawal in the main stream in the projected year.

Note that DT shall be taken as zero in Equation (K 4), if it takes a positive value. If the value of D is negative, -D is the flow exceeding the water requirement.

The calculation sheet of the water deficit in the Han river is shown in Table K 8.

K 3.2 Water Budget in the Nagdong River

The catchment areas at the locations related with the calculation of the natural flow in the Nagdong river are as follows:

			Unit: km ²
Andong dam	1,588	Namgang mouth	3,466
Waegwan gauge	11,074	Jindong gauge	20,311
Yeongcheon dam	235	Estuary	23,656
Goryeong bridge	13,930		

The natural flow at the Waegwan gauge with no outflow from the Andong dam was calculated by the following equation:

$$\begin{aligned}
 \text{NW} &= \text{MFW} \times \frac{11,074 - 235}{11,074} + \text{MWW} + \text{AWW} \\
 &= 0.857 \text{ MFW} + \text{MWW} + \text{AWW} \dots\dots\dots (\text{K } 5)
 \end{aligned}$$

where, NW : Natural flow at Waegwan assuming no outflow from the Andong dam

MFW: Measured flow at Waegwan

MWW: Net M&I water withdrawal in the base year between the Andong dam and Waegwan

AWW: Net agricultural water withdrawal in the base year between the Andong dam and Waegwan.

The natural flow attributable to the catchment area between Waegwan and Jindong excluding the catchment area of the Yeongcheon dam was calculated by the following equation:

$$\begin{aligned}
 \text{NWJ} &= \frac{13,930 - 11,074 - 235}{20,311 - 11,074} (\text{MFJ} - \text{MFW}) + \text{MWWJ} + \text{AWWJ} \\
 &= 0.975 (\text{MFJ} - \text{MFW}) + \text{MWWJ} + \text{AWWJ} \dots\dots (\text{K } 6)
 \end{aligned}$$

where, NWJ : Natural flow attributable to the catchment area between Waegwan and Jindong excluding the catchment area of the Yeongcheon dam.

MFJ : Measured flow at Jindong

MWWJ: Net M&I water withdrawal in the base year between Waegwan and Jindong excluding the catchment area of the Yeongcheon dam

AWWJ: Net agricultural water withdrawal in the base year between Waegwan and Jindong excluding the catchment area of the Yeongcheon dam.

The natural flow at the Goryeong bridge was calculated by the following equation:

$$\begin{aligned}
 NG &= MW + \frac{13,930 - 11,074 - 235}{20,311 - 11,074 - 235} \times NWJ \\
 &= NW + 0.291 NWJ \dots\dots\dots (K 7)
 \end{aligned}$$

where, NG: Natural flow at Goryeong bridge with no outflow from the Andong and Yeongcheon dams.

The natural flow attributable to the catchment area between the Goryeong Bridge and Jindong was calculated by the following equation:

$$\begin{aligned}
 NGJ &= \frac{20,311 - 13,930 - 3,466}{20,311 - 11,074 - 235} NWJ \\
 &= 0.324 NWJ \dots\dots\dots (K 8)
 \end{aligned}$$

where, NGJ: Natural flow attributable to the catchment area between the Goryeong Bridge and Jindong.

The natural flow in the Nam river was calculated by the following equation:

$$\begin{aligned}
 NN &= \frac{3,466}{20,311 - 11,074 - 235} NWJ \\
 &= 0.385 NWJ \dots\dots\dots (K 9)
 \end{aligned}$$

where, NN: Natural flow at the Nam river mouth

The natural flow attributable to the catchment area between Jindong and the estuary was calculated by the following equation:

$$\begin{aligned}
 NJE &= \frac{23,656 - 20,311}{20,311} MFJ + MWJE + AWJE \\
 &= 0.165 MFJ + MWJE + AWJE \dots\dots\dots (K 10)
 \end{aligned}$$

where, NJE : Natural flow attributable to the catchment area between Jindong and the estuary

MWJE: Net M&I water withdrawal in the base year between Jindong and the estuary

AWJE: Net agricultural water withdrawal in the base year between Jindong and the estuary.

The calculation sheet of the natural flow in the Nagdong river basin is shown in Table K 9.

The calculation sheet of the water deficit at the Goryeong Bridge is compiled in Table K 10.

The deficit in the tributary/available flow in the main stream (DT) was calculated by Equation (K 3) to which the value of N is that of NG in Table K 9. The water deficit at the Goryeong bridge was calculated by Equation (K 4).

The river maintenance flow at the Goryeong bridge is the water requirement for the pollution control and it is available for the use in the downstream reaches. The available flow downstream of the Goryeong bridge was calculated by the following equation:

$$D' = MM + AM + DT \dots\dots\dots (K 11)$$

where, D': deficit at the station assuming no water requirement for the pollution control if the value is positive.
- D' is the available flow downstream of the station if the value of D' is negative.

The water deficit at the Jindong gauge was calculated as shown in Table K 11, assuming that there is no inflow from the Goryeong Bridge. The equations applied are Equations (K 3), (K 4) and (K 11). The value of N in Equation (K 3) was the value of NGJ in Table K 9.

The water deficit at the estuary assuming no outflow from the Jindong gauge was calculated as shown in Table K 12. Equations (K 3) and (K 4) were applied but the river maintenance flow A in Equation (K 4) was assumed in two ways: One is the water requirement for the sea water repulsion named A1, and the other is the water requirement for the pollution control called A 2. The deficits are correspondingly expressed as D1 and D2.

The water deficit in the Nam river was calculated as shown in Table K 13 therein the deficit was adjusted by adding the inflow less the outflow of the Namgang dam which was expressed by SN.

The water deficit at the estuary was calculated in Table K 14 based on the deficits in Tables K 10, K 11, K 12 and K 13. The symbols in Table K 14 are:

- D'G : Available flow from the Goryeong Bridge assuming no water requirement for the pollution control
- D'GJ: Available flow from Jindong assuming no inflow from the Goryeong Bridge and no water requirement for the pollution control
- DN : Available flow from the Nam river
- D'G : Deficit at the Goryeong Bridge assuming no water requirement for the pollution control
- D'GJ: Deficit at Jindong assuming no inflow from the Goryeong Bridge and no water requirement for the pollution control
- DE1 : Water deficit at the estuary assuming the water requirement for the sea water requirement applicable for the case that there is no estuary barrage
- DE2 : Water deficit at the estuary assuming the water requirement for the pollution control applicable for the case that there is an estuary barrage.

The water deficit in the Nam river was regarded to be zero, because it does not affect the main stream water budget.

K 3.3 Water Budget in the Seomjin River

The water deficit was calculated for the following four cases in the Seomjin river;

- Case 1: Net M&I water withdrawal out of the basin is only $250 \times 10^3 \text{ m}^3/\text{d}$. There is no outflow from the proposed Juam dam.
- Case 2: All the water demand depends on the Seomjin river. There is no outflow from the proposed Juam dam.
- Case 3: Net M&I water withdrawal out of the basin is only $250 \times 10^3 \text{ m}^3/\text{d}$. There is no shut down of the basin.

Case 4: All the water demand depends on the Seomjin river. There is no shut down of the basin.

The natural flow was accordingly calculated for the whole basin less the catchment area of the proposed Juam dam, and the whole basin.

The catchment areas related with the calculation of natural flow are as follows:

Seomjinggang dam:	763 km ²	Abrog gauge:	2,448 km ²
Boseong dam :	275 km ²	Estuary :	4,934 km ²
Dongbog dam :	187 km ²	SM-03 :	664 km ²
Juam dam :	1,010 km ²	SM-04 :	1,058 km ²

The area SM-03 and SM-04 together makes the area between the Seomjinggang dam and the confluence between the Seomjin main stream and the Boseong river (see ANNEX G).

The natural flow from the whole basin less the catchment area of the proposed Juam dam was calculated by the following equation:

$$N1 = \frac{4,934 - 763 - 1,010}{2,448 - 763} MFA + \frac{4,934 - 763 - 1,010}{664 + 1,058}$$

$$\times (MWA + AWA) = 1,876 MFA + 1,835 (MWA + AWA)$$

..... (K 12)

where, N1 : The natural flow at the estuary assuming the shut down of the catchment area of the proposed Juam dam

MFA: The measured flow at the Abrog gauge. Note that the outflow from the Seomjin dam is negligibly small

MWA: Net M&I water withdrawal in SM-03 and SM-04

AWA: Net M&I water withdrawal in SM-03 and SM-04.

The calculation sheet is presented in Table K 15.

The natural flow in the whole basin was calculated by the following equation:

$$\begin{aligned}
N2 &= \frac{4,934 - 763 - 275 - 187}{2,448 - 763} \text{ MFA} + \frac{4,934 - 763 - 275 - 187}{664 + 1,058} \\
&\quad \times (\text{MWA} + \text{AWA}) + \text{BO} \\
&= 2.201 \text{ MFA} + 2.154 (\text{MWA} + \text{AWA}) + \text{BO} \\
&\quad \dots\dots\dots (\text{K } 13)
\end{aligned}$$

where, BO: The spillout from the Boseong dam

The calculation sheet is presented in Table K 16.

The calculation of water deficit for each case was made based on Equations (K 3) and (K 4) as shown in Tables K 17 to K 20.

K 4 RESULTS OF CALCULATION

The calculated water deficit in each 5-day period is shown in Tables K 21 to K 23 and illustrated in Figs. K 1 to K 8.

Table K 1 5-DAY FLOW RECORD
Jeongseon Discharge Gauging Station in the Han River

C.A: 1,425.4 km²

Unit: m³/s

1967 Oct. - 1968 Sep.

Period	1-5	6-10	11-15	16-20	21-25	26-End
Oct.	17.39	13.85	12.22	10.74	9.77	10.22
Nov.	8.72	7.47	6.56	5.70	4.88	44.13
Dec.	37.78	10.98	9.33	9.04	8.13	7.43
Jan.	6.67	7.95	6.17	4.91	4.08	3.21
Feb.	2.53	2.23	4.36	7.91	25.11	45.40
Mar.	35.71	29.43	25.44	21.24	20.18	19.77
Apr.	19.17	17.73	16.01	14.68	13.42	11.76
May	18.81	18.93	19.17	19.30	18.68	18.42
Jun.	17.96	17.20	18.46	17.49	18.95	15.71
Jul.	16.33	16.50	18.77	264.04	108.75	69.66
Aug.	34.20	27.89	14.25	27.57	249.65	232.32
Sep.	87.51	60.62	33.04	15.77	13.35	9.14

Goan Discharge Gauging Station in the Han River

C.A: 23,613 km²

Unit: m³/s

1967 Oct. - 1968 Sep.

Period	1-5	6-10	11-15	16-20	21-25	26-End
Oct.	254.58	232.58	278.66	269.27	130.55	118.63
Nov.	155.86	166.16	189.99	141.10	212.94	280.92
Dec.	412.10	257.95	126.40	101.07	98.83	71.13
Jan.	63.03	50.65	48.30	47.53	64.75	105.50
Feb.	69.85	61.08	69.30	60.84	64.49	72.04
Mar.	95.85	129.94	132.48	113.07	130.92	189.27
Apr.	258.98	190.34	269.47	135.55	145.00	78.15
May	70.68	61.98	82.71	66.55	75.98	67.37
Jun.	118.57	80.87	242.01	171.52	184.10	146.88
Jul.	159.21	165.99	125.68	3,175.57	1,144.39	353.33
Aug.	351.79	553.82	507.46	1,543.04	3,576.04	997.33
Sep.	578.12	1,328.85	540.18	248.82	203.95	197.61

Remarks; C.A: Catchment area

Table K 1 Continued (2)
Changri Discharge Gauging Station in the Nagdong River

C.A: 924.6 km²

Unit: m³/s

1967 - 1968

Period	1-5	6-10	11-15	16-20	21-25	26-End
Oct.	7.24	6.92	6.76	4.68	3.68	2.93
Nov.	3.28	4.56	3.88	5.04	6.24	23.16
Dec.	8.68	5.12	4.52	4.16	3.12	2.90
Jan.	1.32	1.60	1.36	1.20	1.08	1.50
Feb.	1.40	1.20	1.24	0.97	0.88	0.94
Mar.	1.30	5.20	3.90	4.04	12.20	7.87
Apr.	10.56	7.16	7.48	10.66	7.84	2.34
May	0.44	0.24	0.15	8.39	4.72	2.63
Jun.	1.14	3.38	10.76	2.78	0.46	0.11
Jul.	0.11	0.18	1.61	152.76	4.00	9.43
Aug.	30.72	13.16	11.12	361.40	79.76	17.77
Sep.	5.92	17.04	12.40	5.56	5.56	4.52

Jindong Discharge Gauging Station in the Nagdong River

C.A: 20,311.3 km²

Unit: m³/s

1967 - 1968

Period	1-5	6-10	11-15	16-20	21-25	26-End
Oct.	81.20	80.40	77.60	73.40	58.20	50.00
Nov.	46.10	51.80	50.00	47.10	71.60	87.20
Dec.	178.40	90.40	59.80	57.20	47.70	35.17
Jan.	33.10	43.50	39.40	33.30	33.90	35.00
Feb.	28.20	28.40	29.00	29.70	30.00	30.00
Mar.	30.00	32.90	41.90	37.30	58.90	58.25
Apr.	95.30	61.00	58.50	60.70	69.10	44.90
May	28.20	20.90	17.90	42.70	56.90	32.58
Jun.	26.90	22.00	118.70	66.60	30.00	12.46
Jul.	7.50	7.54	6.46	1,800.80	292.20	115.67
Aug.	619.40	321.20	324.20	4,625.40	1,258.20	924.17
Sep.	221.40	242.60	209.20	163.80	130.20	109.20

Remarks; C.A: Catchment area

Table K 1. Continued (3)
 Waegwan Discharge Gauging Station in the Nagdong River

C.A: 11,074.4 km²

Unit: m³/s

1967 - 1968

Period	1-5	6-10	11-15	16-20	21-25	26-End
Oct.	49.20	46.60	45.38	38.96	29.00	23.38
Nov.	19.28	20.80	19.68	17.88	30.70	74.60
Dec.	107.60	56.00	37.80	22.96	14.36	17.33
Jan.	12.20	11.10	10.40	10.00	10.00	9.37
Feb.	8.50	8.50	8.08	7.32	6.32	9.80
Mar.	9.68	11.70	13.10	10.32	17.86	17.70
Apr.	30.86	23.70	27.96	30.60	32.50	16.04
May	9.06	6.48	4.54	3.95	10.54	8.58
Jun.	7.32	6.88	59.56	33.92	11.42	5.60
Jul.	3.75	4.07	4.68	933.60	168.80	62.08
Aug.	210.60	125.00	98.80	1,726.00	715.20	365.00
Sep.	95.40	102.60	80.00	62.00	53.20	47.60

Abrog Discharge Gauging Station in the Seomjin River

C.A: 2,447.5 km²

Unit: m³/s

1967 - 1968

Period	1-5	6-10	11-15	16-20	21-25	26-End
Oct.	3.02	4.11	4.51	3.86	3.14	2.71
Nov.	3.00	6.58	4.70	7.07	11.01	40.45
Dec.	21.06	10.72	9.42	7.71	5.78	5.77
Jan.	5.41	4.36	3.79	4.17	3.79	4.28
Feb.	4.10	4.10	4.10	4.10	5.12	5.53
Mar.	15.17	25.49	16.32	12.33	14.28	26.92
Apr.	29.81	14.56	12.06	29.19	20.23	8.61
May	6.48	4.78	2.57	2.57	2.65	1.71
Jun.	1.16	8.79	8.54	2.11	0.38	0.10
Jul.	0.28	0.28	2.38	19.01	4.24	2.25
Aug.	57.66	25.96	14.22	276.03	223.89	25.16
Sep.	6.68	21.48	8.95	8.53	5.13	3.61

Remarks; C.A: Catchment area

Table K 2 NET M&I WATER WITHDRAWAL

Unit: $10^3 \text{ m}^3/\text{d}$

	Historial years			years			
	1967	1968	1981	1986	1991	1996	2001
1. Han River Basin							
<u>Gujeol Proposed Dam--Backwater End of Chungju Reservoir</u>							
Main Depending	0.1	0.2	1.4	2.0	2.4	2.8	3.3
Trib. Depending	3.8	4.3	8.5	10.2	11.7	12.9	14.2
Total	3.9	4.5	9.9	12.2	14.1	15.7	17.5
<u>Paldang (Excluding Soyanggang & Chungju Dam Catchment Area)</u>							
Main Depending	8.0	11.2	1,896.2	2,802.9	3,953.3	5,553.6	7,953.1
Trib. Depending	9.5	8.8	17.7	20.7	23.1	25.4	27.9
Total	17.5	20.0	1,913.9	2,823.6	3,976.4	5,579.0	7,981.0
2. Nagdong River Basin							
<u>Andong--Goryeong Bridge</u>							
Main Depending	-6.7	-4.5	176.5	201.2	266.1	322.4	379.8
Trib. Depending	50.5	50.5	49.9	102.7	105.3	108.2	111.1
Total	43.8	46.0	226.4	303.9	371.4	430.6	490.9
<u>Goryeong Bridge--Jindong (Excluding Nam River Basin)</u>							
Main Depending	0.2	0.2	1.5	2.0	2.3	2.5	2.9
Trib. Depending	4.6	4.6	5.2	5.5	5.6	6.0	6.2
Total	4.8	4.8	6.7	7.5	7.9	8.5	9.1
<u>Jindong--Estuary</u>							
Main Depending	124.6	129.9	1,799.6	2,443.4	2,982.8	3,556.6	4,123.0
Trib. Depending	7.2	7.3	11.9	12.4	12.5	13.0	13.3
Total	131.8	137.2	1,811.5	2,455.8	2,995.3	3,569.6	4,136.3
3. Seomjin River Basin							
<u>Juam Proposed Dam--Estuary (case 1)</u>							
Main Depending	0.1	0.1	250.9	251.0	251.2	251.3	251.5
Trib. Depending	5.8	5.7	7.3	7.6	7.9	8.5	8.9
Total	5.9	5.8	258.2	258.6	259.1	259.8	260.4

Table K 2 Continued (2)

Unit: $10^3 \text{ m}^3/\text{d}$

	Historical years			Projected years			
	1967	1968	1981	1986	1991	1996	2001
<u>Juam Proposed Dam - Estuary (case 2)</u>							
Main Depending	0.1	0.1	300.3	609.0	887.4	1,120.9	1,355.7
Trib. Depending	5.8	5.7	7.3	7.6	7.9	8.5	8.9
Total	5.9	5.8	307.6	616.6	895.3	1,129.4	1,364.6
<u>Estuary (case 3)</u>							
Main Depending	0.1	0.1	250.9	251.0	251.2	251.3	251.5
Trib. Depending	6.8	6.7	8.3	8.6	8.9	9.5	9.9
Total	6.9	6.8	259.2	259.6	260.1	260.8	261.4
<u>Estuary (case 4)</u>							
Main Depending	0.1	0.1	300.3	609.0	887.4	1,120.9	1,355.7
Trib. Depending	6.8	6.7	8.3	8.6	8.9	9.5	9.9
Total	6.9	6.8	308.6	617.6	896.3	1,130.4	1,365.6

Remarks; Case 1: No outflow from the Juam dam site and the M&I water dam and out of the basin only $250 \times 10^3 \text{ m}^3/\text{d}$ in the projected years.

Case 2: No outflow from the Juam dam site and total water demand assumed.

Case 3: No shut down at the Juam dam site and the M&I water demand out of the basin only $250 \times 10^3 \text{ m}^3/\text{d}$ in the projected years.

Case 4: No shut down at the Juam dam site and total water demand assumed.

Table K 3 NET AGRICULTURAL WATER WITHDRAWAL IN THE BASE YEAR

Unit: $10^6 m^3$

	1967			1968								
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
<u>Gujeol Proposed Dam—Backwater End of Chungju Reservoir</u>												
E	1.99	0.14	0	0.03	0.03	0.03	0.50	0.29	7.89	8.61	5.24	5.62
M	0.85	0.14	0	0.02	0.02	0.03	0	0.58	4.10	4.22	5.24	2.70
L	0.58	0.14	0	0.03	0.02	0.03	0.64	3.94	6.42	2.17	4.81	2.03
T	3.42	0.42	0	0.08	0.07	0.09	1.14	4.81	18.41	15.00	15.29	10.35
<u>Paldang (Excluding Soyonggang & Chungju Dam Catchment Areas)</u>												
E	14.35	1.72	0	0.30	0.28	0.34	6.11	2.18	50.97	86.99	44.93	45.52
M	9.47	1.72	0	0.30	0.28	0.34	0	5.18	27.41	33.67	41.33	16.16
L	4.62	1.73	0	0.34	0.26	0.38	3.87	24.10	47.32	8.04	33.45	8.49
T	28.44	5.17	0	0.94	0.82	1.06	9.98	31.46	125.70	128.70	119.71	70.17
<u>Andong—Waegwan</u>												
E	15.07	7.36	0	0	0	0.92	0.46	1.68	25.70	23.58	43.08	13.39
M	21.82	7.36	0	0	0	0.92	5.25	6.01	12.42	72.75	36.80	12.58
L	6.27	7.36	0	0	0	1.02	1.63	7.64	37.34	26.85	21.58	13.60
T	43.16	22.08	0	0	0	2.86	7.34	15.33	75.46	123.18	101.46	39.57
<u>Waegwan—Jindong (Excluding Yeongcheon Dam Catchment Area)</u>												
E	30.24	6.56	0	0	0.21	5.27	6.07	3.92	13.87	42.57	42.37	3.13
M	27.66	6.56	0	0	0.21	5.27	7.68	22.49	25.25	114.65	138.49	27.51
L	11.81	6.55	0	0	0.18	5.79	0.82	0.79	101.69	70.83	16.98	-1.09
T	69.71	19.67	0	0	0.60	16.33	14.57	27.20	140.81	228.05	197.84	29.55
<u>Jindong—Estuary</u>												
E	22.6	2.97	0	0	0.30	2.64	3.51	0.32	1.53	17.63	24.46	3.92
M	15.84	2.97	0	0	0.30	2.64	1.21	26.39	14.05	41.12	24.48	22.65
LL	7.14	2.96	0	0	0.28	2.90	0.10	0.24	44.56	47.03	10.25	8.22
T	45.58	8.90	0	0	0.88	8.18	4.82	26.95	60.14	105.78	59.19	34.79

Remarks: E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 3 Continued (2)

Unit: 10^6 m^3

	1967				1968								
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	
<u>Abrog Gauging Station (Excluding Seomjin Dam Catchment Area)</u>													
E	4.87	3.22	0	0	0.03	1.57	0.86	4.00	9.13	-3.33	30.18	12.83	
M	2.71	3.22	0	0	0.02	1.56	2.50	2.03	10.35	10.24	23.22	8.14	
L	1.27	3.21	0	0	0.02	1.73	0	-0.39	12.51	9.49	9.62	0.10	
T	8.85	9.65	0	0	0.07	4.86	3.36	5.64	31.99	16.40	63.02	21.07	

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 4 NET AGRICULTURAL WATER WITHDRAWAL
ALONG THE MAIN STREAM IN THE FUTURE

Unit: 10^6 m^3

	1967			1968								
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Gujeol proposed dam--Backwater End of Chungju Reservoir												
<u>1985 Oct. - 1986 Sep.</u>												
E	0.05	0	0	0	0	0	0.04	0.05	0.32	0.21	0.24	0.21
M	0.02	0	0	0	0	0	0.05	0.29	0.60	0.16	0.18	0.21
L	0.02	0	0	0	0	0	0.05	0.56	0.53	0.24	0.27	0.15
T	0.09	0	0	0	0	0	0.14	0.90	1.45	0.61	0.69	0.57
<u>1990 Oct. - 1991 Sep.</u>												
E	0.06	0	0	0	0	0	0.06	0.07	0.38	0.25	0.28	0.25
M	0.02	0	0	0	0	0	0.06	0.34	0.71	0.18	0.20	0.25
L	0.02	0	0	0	0	0	0.06	0.66	0.63	0.29	0.32	0.18
T	0.10	0	0	0	0	0	0.18	1.07	1.72	0.72	0.80	0.68
<u>1995 Oct. - 1996 Sep.</u>												
E	0.07	0	0	0	0	0	0.08	0.08	0.46	0.30	0.34	0.30
M	0.03	0	0	0	0	0	0.08	0.41	0.86	0.22	0.25	0.30
L	0.03	0	0	0	0	0	0.07	0.78	0.76	0.35	0.39	0.22
T	0.13	0	0	0	0	0	0.23	1.27	2.08	0.87	0.98	0.82
<u>2000 Oct. - 2001 Sep.</u>												
E	0.08	0	0	0	0	0	0.10	0.10	0.56	0.36	0.41	0.37
M	0.04	0	0	0	0	0	0.09	0.49	1.03	0.26	0.29	0.37
L	0.03	0	0	0	0	0	0.09	0.94	0.92	0.42	0.46	0.26
T	0.15	0	0	0	0	0	0.28	1.53	2.51	1.04	1.16	1.00

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 4 Continued (2)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Paldang (Excluding Soyanggang & Chungju Dam Catchment Areas)												
<u>1985 Oct. - 1986 Sep.</u>												
E	1.09	0	0	0	0	0	0.24	0.78	7.20	5.05	5.94	5.31
M	0.40	0	0	0	0	0	1.12	7.04	14.53	3.96	4.57	5.31
L	0.19	0	0	0	0	0	0.90	14.09	12.47	5.98	6.66	3.38
T	1.68	0	0	0	0	0	2.26	21.91	34.20	14.99	17.17	14.00
<u>1990 Oct. - 1991 Sep.</u>												
E	1.18	0	0	0	0	0	0.36	0.89	7.78	5.37	6.32	5.66
M	0.43	0	0	0	0	0	1.22	7.51	15.52	4.22	4.83	5.65
L	0.23	0	0	0	0	0	1.01	14.98	13.36	6.37	7.10	3.63
T	1.84	0	0	0	0	0	2.59	23.38	36.66	15.96	18.25	14.94
<u>1995 Oct. - 1996 Sep.</u>												
E	1.27	0	0	0	0	0	0.48	1.00	8.40	5.78	6.76	6.07
M	0.46	0	0	0	0	0	1.33	7.54	16.65	4.51	5.14	6.05
L	0.26	0	0	0	0	0	1.12	16.00	14.36	6.83	7.62	3.91
T	1.99	0	0	0	0	0	2.93	25.04	39.41	17.12	19.52	16.03
<u>2000 Oct. - 2001 Sep.</u>												
E	1.37	0	0	0	0	0	0.60	1.12	9.06	6.20	7.23	6.50
M	0.49	0	0	0	0	0	1.44	8.62	17.87	4.82	5.48	6.48
L	0.30	0	0	0	0	0	1.24	17.11	15.43	7.32	8.17	4.21
T	2.16	0	0	0	0	0	3.28	26.85	42.36	18.34	20.88	17.19

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 4 Continued (3)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Andong-Goryeong Bridge												
<u>1985 Oct. - 1986 Sep.</u>												
E	3.31	0	0	0	0	0	0.57	2.22	15.07	16.38	13.42	11.65
M	0.55	0	0	0	0	0	0.76	4.46	31.75	11.58	10.61	10.70
L	0.59	0	0	0	0	0	1.55	9.00	20.26	16.41	14.38	10.28
T	4.45	0	0	0	0	0	2.88	15.68	67.08	44.37	38.41	32.63
<u>1990 Oct. - 1991 Sep.</u>												
E	3.49	0	0	0	0	0	0.69	2.45	16.00	17.38	14.09	12.25
M	0.61	0	0	0	0	0	0.83	4.82	33.38	12.26	11.12	11.23
L	0.71	0	0	0	0	0	1.69	9.64	21.49	17.34	15.10	10.86
T	4.81	0	0	0	0	0	3.21	16.91	70.87	46.98	40.31	34.34
<u>1995 Oct. - 1996 Sep.</u>												
E	3.66	0	0	0	0	0	0.80	2.66	16.90	18.34	14.77	12.82
M	0.67	0	0	0	0	0	0.90	5.14	34.99	12.93	11.61	11.74
L	0.81	0	0	0	0	0	1.83	10.23	22.68	18.23	15.81	11.43
T	5.14	0	0	0	0	0	3.53	18.03	74.57	49.50	42.19	35.99
<u>2000 Oct. - 2001 Sep.</u>												
E	3.82	0	0	0	0	0	0.93	2.89	17.76	19.25	15.38	13.35
M	0.72	0	0	0	0	0	0.96	5.46	36.47	13.55	12.06	12.20
L	0.93	0	0	0	0	0	1.96	10.78	23.81	19.07	16.45	11.96
T	5.47	0	0	0	0	0	3.85	19.13	78.04	51.87	43.89	37.51

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 4 Continued (4)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Goryeong Bridge-Jindong Gauging Station (Excluding Nam River Basin)												
<u>1985 Oct. - 1986 Sep.</u>												
E	0.24	0	0	0	0	0	0.01	0.13	1.03	1.12	1.00	0.81
M	0.02	0	0	0	0	0	0.02	0.13	2.45	0.82	0.76	0.76
L	0.01	0	0	0	0	0	0.10	0.27	1.36	1.13	1.03	0.77
T	0.27	0	0	0	0	0	0.13	0.53	4.84	3.07	2.79	2.34
<u>1990 Oct. - 1991 Sep.</u>												
E	0.25	0	0	0	0	0	0.01	0.15	1.12	1.22	1.08	0.87
M	0.02	0	0	0	0	0	0.02	0.15	2.64	0.88	0.82	0.82
L	0.01	0	0	0	0	0	0.11	0.30	1.47	1.22	1.10	0.83
T	0.28	0	0	0	0	0	0.14	0.60	5.23	3.32	3.00	2.52
<u>1995 Oct. - 1996 Sep.</u>												
E	0.27	0	0	0	0	0	0.02	0.16	1.21	1.32	1.17	0.94
M	0.02	0	0	0	0	0	0.02	0.17	2.86	0.96	0.88	0.89
L	0.02	0	0	0	0	0	0.12	0.33	1.60	1.32	1.19	0.90
T	0.31	0	0	0	0	0	0.16	0.66	5.67	3.60	3.24	2.73
<u>2000 Oct. - 2001 Sep.</u>												
E	0.30	0	0	0	0	0	0.03	1.18	1.32	1.43	1.25	1.01
M	0.03	0	0	0	0	0	0.03	0.19	3.07	1.04	0.95	0.95
L	0.03	0	0	0	0	0	0.13	0.37	1.74	1.43	1.28	0.97
T	0.36	0	0	0	0	0	0.19	0.74	6.13	3.90	3.48	2.93

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 4 Continued (5)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Nam River Basin												
<u>1985 Oct. - 1986 Sep.</u>												
E	1.74	0	0	0	0	0	0.04	0.54	4.28	3.65	2.94	2.82
M	0.14	0	0	0	0	0	0.07	0.27	9.50	2.92	2.62	2.03
L	0.12	0	0	0	0	0	0.48	0.81	4.46	3.32	3.46	1.95
T	2.00	0	0	0	0	0	0.59	1.62	18.24	9.89	9.02	6.80
<u>1990 Oct. - 1991 Sep.</u>												
E	1.91	0	0	0	0	0	0.05	0.60	4.69	4.00	3.21	3.08
M	0.16	0	0	0	0	0	0.08	0.29	10.39	3.20	2.86	2.22
L	0.15	0	0	0	0	0	0.53	0.89	4.90	3.64	3.79	2.13
T	2.22	0	0	0	0	0	0.66	1.78	19.98	10.84	9.86	7.43
<u>1995 Oct. - 1996 Sep.</u>												
E	2.07	0	0	0	0	0	0.06	0.66	5.07	4.33	3.47	3.33
M	0.18	0	0	0	0	0	0.09	0.32	11.22	3.46	3.09	2.39
L	0.18	0	0	0	0	0	0.58	0.97	5.30	3.94	4.09	2.31
T	2.43	0	0	0	0	0	0.73	1.95	21.59	11.73	10.65	8.03
<u>2000 Oct. - 2001 Sep.</u>												
E	2.24	0	0	0	0	0	0.07	0.72	5.45	4.66	3.73	3.58
M	0.21	0	0	0	0	0	0.09	0.34	12.03	3.72	3.32	2.56
L	0.21	0	0	0	0	0	0.62	1.05	5.71	4.24	4.39	2.48
T	2.66	0	0	0	0	0	0.78	2.11	23.19	12.62	11.44	8.62

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 4 Continued (6)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Jindong Gauging Station-Estuary												
<u>1985 Oct. - 1986 Sep.</u>												
E	4.54	0	0	0	0	0	0.07	1.35	11.26	9.60	7.58	7.64
M	0.28	0	0	0	0	0	0.18	0.66	25.17	7.36	6.65	5.32
L	0.20	0	0	0	0	0	1.24	2.12	11.83	8.46	9.31	5.29
T	5.02	0	0	0	0	0	1.49	4.13	48.26	25.42	23.54	18.25
<u>1990 Oct. - 1991 Sep.</u>												
E	5.73	0	0	0	0	0	0.09	1.71	13.79	11.85	8.45	10.17
M	0.74	0	0	0	0	0	0.21	0.76	31.01	7.66	6.88	6.23
L	0.25	0	0	0	0	0	1.48	2.68	15.14	9.14	12.08	7.15
T	6.72	0	0	0	0	0	1.78	5.15	59.94	28.65	27.41	23.55
<u>1995 Oct. - 1996 Sep.</u>												
E	6.03	0	0	0	0	0	0.10	1.76	14.03	12.06	8.60	10.31
M	0.51	0	0	0	0	0	0.21	0.78	31.48	7.82	7.01	6.33
L	0.50	0	0	0	0	0	1.51	2.73	15.40	9.33	12.26	7.25
T	7.04	0	0	0	0	0	1.82	5.27	60.91	29.21	27.87	23.89
<u>2000 Oct. - 2001 Sep.</u>												
E	5.93	0	0	0	0	0	0.11	1.80	14.24	12.25	8.74	10.45
M	0.39	0	0	0	0	0	0.22	0.79	31.94	7.97	7.14	6.43
L	0.32	0	0	0	0	0	1.54	2.78	15.63	9.50	12.43	7.35
T	6.64	0	0	0	0	0	1.87	5.37	61.81	29.72	28.31	24.23

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 4 Continued (7)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Juam Proposed Dam-Estuary												
<u>1980 Oct. - 1981 Sep.</u>												
E	0.31	0	0	0	0	0	0.02	0.08	0.62	0.69	0.56	0.50
M	0.10	0	0	0	0	0	0.02	0.14	1.54	0.73	0.41	0.47
L	0.04	0	0	0	0	0	0.09	0.26	0.85	1.00	0.61	0.44
T	0.45	0	0	0	0	0	0.13	0.48	3.01	2.42	1.58	1.41
<u>1985 Oct. - 1986 Sep.</u>												
E	0.36	0	0	0	0	0	0.04	0.09	0.71	0.80	0.64	0.56
M	0.12	0	0	0	0	0	0.02	0.17	1.75	0.84	0.46	0.53
L	0.05	0	0	0	0	0	0.10	0.31	0.98	1.15	0.69	0.50
T	0.53	0	0	0	0	0	0.16	0.57	3.44	2.79	1.79	1.59
<u>1990 Oct. - 1991 Sep.</u>												
E	0.40	0	0	0	0	0	0.07	0.10	0.77	0.88	0.69	0.60
M	0.14	0	0	0	0	0	0.02	0.19	1.88	0.92	0.49	0.56
L	0.07	0	0	0	0	0	0.11	0.34	1.06	1.26	0.74	0.54
T	0.61	0	0	0	0	0	0.20	0.63	3.71	3.06	1.92	1.70
<u>1995 Oct. - 1996 Sep.</u>												
E	0.43	0	0	0	0	0	0.10	0.11	0.83	0.96	0.74	0.62
M	0.16	0	0	0	0	0	0.03	0.21	2.00	0.99	0.51	0.59
L	0.10	0	0	0	0	0	0.13	0.37	1.14	1.37	0.79	0.57
T	0.69	0	0	0	0	0	0.26	0.69	3.97	3.32	2.04	1.78
<u>2000 Oct. - 2001 Sep.</u>												
E	0.47	0	0	0	0	0	0.14	0.12	0.89	1.04	0.78	0.65
M	0.19	0	0	0	0	0	0.03	0.23	2.12	1.07	0.54	0.61
L	0.13	0	0	0	0	0	0.14	0.41	1.22	1.48	0.83	0.61
T	0.79	0	0	0	0	0	0.31	0.76	4.23	3.59	2.15	1.87

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 5 NET AGRICULTURAL WATER WITHDRAWAL
IN THE TRIBUTARY AREA IN THE FUTURE

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
<u>Gujeol proposed dam--Backwater End of Chungju Reservoir</u>												
<u>1985 Oct. - 1986 Sep.</u>												
E	0.48	0.25	0.01	0.04	0.10	0.06	1.12	0.54	4.30	12.21	6.74	4.37
M	0.30	0.25	0	0.04	0.10	0.05	0.60	3.81	7.94	4.48	5.07	2.79
L	0.11	0.25	0.01	0.05	0.08	0.06	0.46	7.06	8.04	2.68	4.63	1.14
T	0.89	0.75	0.02	0.13	0.28	0.17	2.18	11.41	20.28	19.37	16.44	8.30
<u>1990 Oct. - 1991 Sep.</u>												
E	0.52	0.28	0.01	0.05	0.11	0.07	1.34	0.63	4.87	13.26	7.14	4.40
M	0.32	0.28	0	0.04	0.11	0.06	0.66	4.25	8.40	4.65	5.14	2.89
L	0.14	0.27	0.01	0.05	0.09	0.07	0.54	7.44	8.59	2.70	4.69	1.22
T	0.98	0.83	0.02	0.14	0.31	0.20	2.54	12.32	21.86	20.61	16.97	8.51
<u>1995 Oct. - 1996 Sep.</u>												
E	0.56	0.30	0.01	0.05	0.12	0.07	1.56	0.74	5.30	14.13	7.51	4.40
M	0.35	0.30	0	0.05	0.11	0.07	0.72	4.54	8.90	4.74	5.17	3.00
L	0.18	0.29	0.01	0.06	0.10	0.07	0.61	7.88	9.15	2.73	4.74	1.31
T	1.09	0.89	0.02	0.16	0.33	0.21	2.89	13.16	23.35	21.60	17.42	8.71
<u>2000 Oct. - 2001 Sep.</u>												
E	0.60	0.32	0.01	0.06	0.13	0.08	1.76	0.83	5.69	14.89	7.84	4.44
M	0.37	0.32	0	0.05	0.12	0.07	0.79	4.81	9.39	4.83	5.22	3.13
L	0.21	0.31	0.01	0.06	0.1	0.08	0.69	8.29	9.72	2.80	4.82	1.41
T	1.18	0.95	0.02	0.17	0.35	0.23	3.24	13.93	24.80	22.52	17.88	8.98

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 5 Continued (2)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Paldang (Excluding Soyanggang & Chungju Dam Catchment Areas)												
<u>1985 Oct. - 1986 Sep.</u>												
E	1.80	3.12	0.07	0.53	1.24	0.72	11.60	2.86	27.75	128.81	57.57	26.12
M	2.11	3.12	0.07	0.53	1.24	0.72	2.93	23.34	41.70	34.88	37.70	13.07
L	0.26	3.12	0.07	0.57	0.98	0.80	1.86	35.82	50.21	7.16	25.03	0.96
T	4.17	9.36	0.21	1.63	3.46	2.24	16.39	62.02	119.66	170.85	120.30	40.15
<u>1990 Oct. - 1991 Sep.</u>												
E	1.96	3.35	0.07	0.56	1.33	0.78	12.88	3.28	30.03	136.80	60.48	25.72
M	2.26	3.35	0.07	0.56	1.33	0.77	3.23	24.96	44.10	35.52	37.94	13.47
L	0.38	3.35	0.08	0.63	1.06	0.85	2.18	38.07	53.40	6.69	24.82	1.09
T	4.60	10.05	0.22	1.75	3.72	2.40	18.29	66.31	127.53	179.01	123.24	40.28
<u>1995 Oct. - 1996 Sep.</u>												
E	2.13	3.55	0.08	0.60	1.36	0.82	14.05	3.69	32.18	143.54	63.03	25.25
M	2.40	3.54	0.07	0.60	1.36	0.82	3.53	26.53	46.53	36.08	38.15	13.91
L	0.50	3.54	0.08	0.65	1.21	0.90	2.49	40.41	56.45	6.43	24.73	1.34
T	5.03	10.63	0.23	1.85	3.93	2.54	20.07	70.63	135.16	186.05	125.91	40.50
<u>2000 Oct. - 2001 Sep.</u>												
E	2.33	3.75	0.09	0.63	1.49	0.87	15.26	4.11	34.44	150.77	65.72	25.19
M	2.55	3.75	0.08	0.63	1.48	0.86	3.84	28.15	48.98	36.66	38.36	14.35
L	0.62	3.75	0.09	0.70	1.19	0.96	2.81	42.63	59.58	6.11	24.60	1.59
T	5.50	11.25	0.26	1.96	4.16	2.69	21.91	74.89	143.00	193.54	128.68	41.13

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 5 Continued (3)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
--	------	------	------	------	------	------	------	-----	------	------	------	------

Andong--Goryeong Bridge

1985 Oct. - 1986 Sep.

E	19.36	15.23	0	0	0	7.23	7.56	9.69	59.81	59.62	78.97	4.23
M	11.96	15.23	0	0	0	7.23	21.01	21.56	86.67	252.19	177.24	22.51
L	3.23	15.24	0	0	0	7.95	2.02	15.64	77.65	70.24	11.67	-7.01
T	34.55	45.70	0	0	0	22.41	30.59	46.89	224.13	382.05	267.88	19.73

1990 Oct. - 1991 Sep.

E	19.04	16.18	0	0	0	7.57	8.19	10.61	64.22	62.99	80.66	4.31
M	12.25	16.18	0	0	0	7.57	22.31	23.33	90.88	262.80	182.25	23.49
L	3.68	16.18	0	0	0	8.32	2.34	17.19	82.39	70.89	10.53	-6.81
T	34.97	48.54	0	0	0	23.46	32.84	51.13	237.49	396.68	273.44	20.99

1995 Oct. - 1996. Sep.

E	19.40	17.05	0	0	0	7.89	8.81	11.54	68.71	66.50	82.14	4.63
M	12.48	17.05	0	0	0	7.89	23.56	25.17	95.62	272.51	186.95	24.64
L	4.12	17.05	0	0	0	8.67	2.69	19.03	87.30	71.63	9.60	-6.37
T	36.00	51.15	0	0	0	24.45	35.06	55.74	251.63	410.64	278.69	22.90

2000 Oct. - 2001 Sep.

E	19.71	18.00	0	0	0	8.22	9.45	12.52	73.54	70.26	83.92	5.01
M	12.75	18.00	0	0	0	8.22	24.89	27.11	100.49	283.01	191.71	25.87
L	4.59	18.01	0	0	0	9.03	3.05	20.89	92.54	72.37	8.68	-5.59
T	37.05	54.01	0	0	0	25.47	37.39	60.52	266.57	425.64	284.31	25.29

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 5 Continued (4)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Goryeong Bridge-Jindong Gauging Station (Excluding Nam River Basin)												
<u>1985 Oct. - 1986 Sep.</u>												
E	71.17	22.32	0	0	0	1.84	1.71	2.21	12.23	13.87	17.29	1.73
M	23.63	22.32	0	0	0	1.84	3.72	2.52	31.56	55.48	50.39	6.85
L	3.49	22.32	0	0	0	2.02	0.62	1.71	18.11	23.40	5.28	-0.45
T	98.29	66.96	0	0	0	5.70	6.05	6.44	61.90	92.75	72.96	8.13
<u>1990 Oct. - 1991 Sep.</u>												
E	76.03	22.36	0	0	0	1.98	1.89	2.43	13.14	14.70	17.42	1.55
M	23.38	22.36	0	0	0	1.98	4.02	2.77	33.57	58.27	53.10	7.08
L	4.23	22.37	0	0	0	2.18	0.70	1.91	19.21	23.69	4.70	-0.60
T	103.64	67.09	0	0	0	6.14	6.61	7.11	65.92	96.66	75.22	8.03
<u>1995 Oct. - 1996 Sep.</u>												
E	78.67	25.74	0	0	0	2.12	2.08	2.66	14.02	15.50	17.54	1.33
M	23.30	25.74	0	0	0	2.12	4.32	3.04	35.45	61.09	55.80	7.27
L	5.10	25.74	0	0	0	2.34	0.78	2.12	20.29	23.99	4.09	-0.78
T	107.07	77.22	0	0	0	6.58	7.18	7.82	69.76	100.58	77.43	7.82
<u>2000 Oct. - 2001 Sep.</u>												
E	81.53	27.63	0	0	0	2.28	2.29	2.91	15.02	16.41	17.67	1.10
M	22.63	27.63	0	0	0	2.28	4.65	3.32	37.57	64.20	58.79	7.49
L	6.04	27.63	0	0	0	2.50	0.87	2.34	21.50	24.31	3.43	-0.96
T	110.20	82.89	0	0	0	7.06	7.81	8.57	74.09	104.92	79.89	7.63

Remaks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 5 Continued (5)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Nam River Basin												
<u>1985 Oct. - 1986 Sep.</u>												
E	6.55	2.96	0	0	0.31	2.63	3.50	0.66	6.40	13.01	15.44	-1.67
M	4.20	2.96	0	0	0.31	2.63	1.34	24.79	23.18	36.99	19.37	16.29
L	0.44	2.96	0	0	0.25	2.89	0.88	0.51	15.70	39.54	2.43	-0.75
T	11.19	8.88	0	0	0.87	8.15	5.72	25.96	45.28	89.54	37.24	13.87
<u>1990 Oct. - 1991 Sep.</u>												
E	6.77	3.17	0	0	0.34	2.82	3.78	0.75	6.46	13.37	15.57	-2.07
M	4.42	3.17	0	0	0.34	2.82	1.44	26.57	24.06	38.58	19.57	16.60
L	0.56	3.18	0	0	0.26	3.10	0.94	0.53	16.28	41.54	1.60	-1.00
T	11.75	9.52	0	0	0.94	8.74	6.16	27.85	46.80	93.49	36.74	13.53
<u>1995 Oct. - 1996 Sep.</u>												
E	7.06	3.37	0	0	0.34	3.00	4.06	0.86	6.70	13.87	15.72	-2.34
M	4.62	3.37	0	0	0.34	3.00	1.54	28.28	25.34	40.11	19.73	16.89
L	0.68	3.38	0	0	0.32	3.30	1.02	0.60	17.05	43.51	0.87	-1.15
T	12.36	10.12	0	0	1.00	9.30	6.62	29.74	49.09	97.49	36.32	13.40
<u>2000 Oct. - 2001 Sep.</u>												
E	7.25	3.60	0	0	0.38	3.20	4.35	0.94	6.69	14.21	15.83	-2.81
M	4.85	3.60	0	0	0.38	3.20	1.64	30.15	26.11	41.75	19.92	17.20
L	0.79	3.60	0	0	0.30	3.51	1.08	0.61	17.60	45.57	-0.04	-1.44
T	12.89	10.80	0	0	1.06	9.91	7.07	31.70	50.40	101.53	35.71	12.95

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 5 Continued (6)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Jindong Gauging Station-Estuary												
<u>1985 Oct. - 1986 Sep.</u>												
E	8.35	3.89	0	0	0.41	3.46	4.89	1.35	7.69	16.08	17.53	-2.89
M	5.63	3.89	0	0	0.41	3.46	1.83	32.74	28.61	45.79	21.93	18.83
L	1.38	3.90	0	0	0.33	3.80	1.24	0.89	20.01	49.84	0.37	-1.40
T	15.36	11.68	0	0	1.15	10.72	7.96	34.98	56.31	111.71	39.83	14.54
<u>1990 Oct. - 1991 Sep.</u>												
E	8.74	4.05	0	0	0.43	3.60	5.17	1.58	8.04	16.63	17.75	-3.04
M	5.93	4.06	0	0	0.43	3.60	1.93	34.14	29.75	47.18	22.15	19.11
L	1.67	4.06	0	0	0.34	3.97	1.34	1.03	20.84	51.58	-0.11	-1.46
T	16.34	12.17	0	0	1.20	11.17	8.44	36.75	58.63	115.39	39.79	14.61
<u>1995 Oct. - 1996 Sep.</u>												
E	9.12	4.18	0	0	0.42	3.71	5.41	1.81	8.49	17.17	18.01	-3.06
M	6.19	4.18	0	0	0.42	3.71	2.01	35.22	30.93	48.34	22.39	19.37
L	1.94	4.18	0	0	0.39	4.09	1.45	1.18	21.66	53.03	-0.35	-1.43
T	17.25	12.54	0	0	1.23	11.51	8.87	38.21	61.08	118.54	40.05	14.88
<u>2000 Oct. - 2001 Sep.</u>												
E	9.43	4.31	0	0	0.45	3.83	5.63	1.98	8.75	17.59	18.21	-3.20
M	6.42	4.31	0	0	0.45	3.83	2.08	36.35	31.81	49.51	22.62	19.63
L	2.16	4.31	0	0	0.37	4.21	1.53	1.27	22.28	54.46	-0.71	-1.49
T	18.01	12.93	0	0	1.27	11.87	9.24	39.60	62.84	121.56	40.12	14.94

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 5 Continued (7)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Juam Proposed Dam-Estuary (Excluding Seomjin Dam Catchment Area)												
<u>1980 Oct. - 1981 Sep.</u>												
E	6.21	6.00	0	0	0.05	2.92	1.66	8.41	39.99	7.77	52.89	20.56
M	1.61	5.99	0	0	0.05	2.92	4.95	3.41	26.25	20.20	40.05	13.60
L	0.86	5.99	0	0	0.04	3.22	1.36	2.93	3.94	19.82	15.47	-0.01
T	8.68	17.98	0	0	0.14	9.06	7.97	14.75	70.18	47.79	108.41	34.15
<u>1985 Oct. - 1986 Sep.</u>												
E	6.56	6.41	0	0	0.05	3.12	1.81	9.00	42.14	7.93	55.16	20.87
M	1.73	6.40	0	0	0.05	3.12	5.28	3.65	27.16	20.99	41.57	13.82
L	0.94	6.40	0	0	0.04	3.44	1.46	3.13	3.67	20.73	15.37	-0.15
T	9.23	19.21	0	0	0.14	9.68	8.55	15.78	72.97	49.65	112.10	34.54
<u>1990 Oct. - 1991 Sep.</u>												
E	6.97	6.79	0	0	0.06	3.31	1.99	9.58	44.32	8.27	57.38	21.24
M	1.87	6.79	0	0	0.05	3.31	5.59	3.91	28.39	21.90	43.05	14.11
L	1.04	6.79	0	0	0.04	3.64	1.59	3.40	3.63	21.85	15.38	-0.18
T	9.88	20.37	0	0	0.15	10.26	9.17	16.89	76.34	52.02	115.81	35.17
<u>1995 Oct. - 1996 Sep.</u>												
E	7.37	7.18	0	0	0.06	3.50	2.17	10.15	46.45	8.58	59.56	21.59
M	2.02	7.17	0	0	0.05	3.49	5.91	4.17	29.55	22.78	44.50	14.39
L	1.14	7.17	0	0	0.05	3.85	1.71	3.66	3.56	22.93	15.36	-0.21
T	10.53	21.52	0	0	0.16	10.84	9.79	17.98	79.56	54.29	119.42	35.77
<u>2000 Oct. - 2001^{II} Sep.</u>												
E	7.75	7.58	0	0	0.07	3.70	2.37	10.74	48.63	8.81	61.85	21.93
M	2.17	7.58	0	0	0.05	3.69	6.23	4.42	30.53	23.62	46.03	14.62
L	1.26	7.57	0	0	0.05	4.07	1.82	3.89	3.35	23.92	15.30	-0.33
T	11.18	22.73	0	0	0.17	11.46	10.42	19.05	82.51	56.35	123.18	36.22

Remarks; E: Early ten days of the month
M: Middle ten days of the month
L: Last ten days of the month
T: Total for the month

Table K 5 Continued (8)

Unit: 10^6 m^3

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
<u>Estuary (Excluding Seomjin Dam, Boseong Dam, and Dongbog Dam Catchment Areas)</u>												
<u>1980 Oct. - 1981 Sep.</u>												
E	7.10	6.89	0	0	0.06	3.36	1.91	9.66	45.86	8.86	60.64	23.52
M	1.84	6.88	0	0	0.05	3.35	5.68	3.91	30.02	23.13	45.91	15.55
L	0.99	6.88	0	0	0.05	3.69	1.56	3.35	4.45	22.69	17.68	-0.04
T	9.93	20.65	0	0	0.16	10.40	9.15	16.92	80.33	54.68	124.23	39.03
<u>1985 Oct. - 1986 Sep.</u>												
E	7.53	6.68	0	0	0.06	3.58	2.08	10.33	48.32	9.12	63.22	23.92
M	1.98	6.67	0	0	0.05	3.58	6.06	4.19	31.21	24.08	47.64	15.85
L	1.08	6.67	0	0	0.05	3.94	1.68	3.61	4.24	23.80	17.62	-0.15
T	10.59	20.02	0	0	0.16	11.10	9.82	18.13	83.77	57.00	128.48	39.62
<u>1990 Oct. - 1991 Sep.</u>												
E	8.00	7.78	0	0	0.06	3.79	2.29	10.98	50.79	9.52	65.74	24.34
M	2.15	7.78	0	0	0.06	3.79	6.40	4.48	32.60	25.12	49.31	16.18
L	1.20	7.77	0	0	0.05	4.17	1.83	3.91	4.20	25.09	17.64	-0.18
T	11.35	23.33	0	0	0.17	11.75	10.52	19.37	87.59	59.73	132.69	40.34
<u>1995 Oct. - 1996 Sep.</u>												
E	8.46	8.20	0	0	0.07	4.00	2.49	11.61	53.16	9.90	68.14	24.74
M	2.33	8.20	0	0	0.06	3.99	6.75	4.78	33.96	26.14	50.91	16.51
L	1.31	8.19	0	0	0.05	4.39	1.97	4.22	4.18	26.34	17.64	-0.18
T	12.10	24.59	0	0	0.18	12.38	11.21	20.61	91.30	62.38	136.69	41.07
<u>2000 Oct. - 2001 Sep.</u>												
E	8.91	8.65	0	0	0.07	4.22	2.71	12.27	55.61	10.20	70.69	25.14
M	2.50	8.64	0	0	0.06	4.21	7.11	5.07	35.16	27.10	52.61	16.79
L	1.45	8.64	0	0	0.06	4.64	2.10	4.49	4.01	27.50	17.60	-0.29
T	12.86	25.93	0	0	0.19	13.07	11.92	21.83	94.78	64.80	140.90	41.64

Remarks; E: Early ten days of the month

M: Middle ten days of the month

L: Last ten days of the month

T: Total for the month

Table K 6 RIVER MAINTENANCE FLOW IN THE NAGDONG RIVER
IN THE FUTURE

Unit: m³/s

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
<u>Goryeong Bridge</u>												
1986	10	10	10	14	18	30	37	37	30	23	14	10
1991	11	11	11	17	22	39	47	47	39	30	17	11
1996	13	13	13	19	25	41	52	52	41	34	19	13
2001	14	14	14	21	28	45	56	56	45	36	21	14
<u>Jindong</u>												
1986	10	10	10	13	16	24	26	26	24	20	13	10
1991	11	11	11	15	19	28	29	29	28	25	15	11
1996	12	12	12	17	22	32	33	33	32	28	17	12
2001	14	14	14	19	25	34	37	37	34	31	19	14
<u>Estuary (For sea water repulsion)</u>												
1986	38	38	38	38	44	44	44	44	44	38	38	38
1991	38	38	38	38	44	44	44	44	44	38	38	38
1996	38	38	38	38	44	44	44	44	44	38	38	38
2001	38	38	38	38	44	44	44	44	44	38	38	38
<u>Estuary (For pollution control)</u>												
1986	9	9	9	10	12	15	16	16	15	14	10	9
1991	10	10	10	12	14	17	18	18	17	16	12	10
1996	11	11	11	13	15	18	20	20	19	17	13	11
2001	12	12	12	14	16	19	21	21	20	18	14	12

Table K 7 CALCULATION OF MEASURED
FLOW AT PALDANG

Unit: 10^6 m^3

Period	1 MG	2 HR	3 a(1+2)	4 MFP	
<u>1967</u>					
Oct.	1-5	109.98	-14.04	37.99	71.99
	6-10	100.47	-14.04	34.23	66.24
	11-15	120.38	-14.04	42.11	78.27
	16-20	116.32	-14.04	40.50	75.82
	21-25	56.40	-14.04	16.78	39.62
	26-31	61.50	-16.85	17.68	43.82
	Total	565.05	-87.05	189.29	375.76
Nov.	1-5	67.33	-26.57	16.14	51.19
	6-10	71.78	-26.57	17.90	53.88
	11-15	82.08	-26.57	21.98	60.10
	16-20	60.96	-26.57	13.62	47.34
	21-25	91.99	-26.57	25.91	66.08
	26-30	121.36	-26.57	37.54	83.82
	Total	495.50	-159.42	133.09	362.41
Dec.	1-5	178.03	-19.31	62.85	115.18
	6-10	111.43	-19.31	36.48	74.95
	11-15	54.60	-19.31	13.98	40.62
	16-20	43.66	-19.31	9.64	34.02
	21-25	42.69	-19.31	9.26	33.43
	26-31	36.87	-23.17	5.43	31.44
	Total	467.28	-119.72	137.64	329.64
<u>1968</u>					
Jan.	1-5	27.23	-16.24	4.35	22.88
	6-10	21.88	-16.24	2.23	19.65
	11-15	20.86	-16.24	1.83	19.03
	16-20	20.53	-16.24	1.70	18.83
	21-25	27.97	-16.24	4.65	23.32
	26-31	54.69	-19.49	13.94	40.75
	Total	173.16	-100.69	28.70	144.46
Feb.	1-5	30.18	-14.77	6.10	24.08
	6-10	26.39	-14.77	4.60	21.79
	11-15	29.94	-14.77	6.01	23.93
	16-20	26.29	-14.77	4.56	21.73
	21-25	27.86	-14.77	5.18	22.68
	26-28	24.90	-11.82	5.18	19.72
	Total	165.56	-85.67	31.63	133.93
Mar.	1-5	41.41	-12.18	11.58	29.83
	6-10	56.13	-12.18	17.40	38.73
	11-15	57.23	-12.18	17.84	39.39
	16-20	48.85	-12.18	14.52	34.33
	21-25	56.56	-12.18	17.57	38.99
	26-31	98.12	-14.62	33.07	65.05
	Total	358.30	-75.52	111.98	246.32

Remarks; a = 0.396, see Equation (K 1).

Table K 7 Continued (2)

Unit: 10^6 m^3

Period	1 MG	2 HR	3 a(1+2)	4 MFP	
<u>1968</u>					
Apr.	1-5	111.88	-3.37	42.97	68.91
	6-10	82.23	-3.37	31.23	51.00
	11-15	116.41	-3.37	44.77	71.64
	16-20	58.56	-3.37	21.86	36.70
	21-25	62.64	-3.37	23.47	39.17
	26-30	33.76	-3.37	12.03	21.73
	Total	465.48	-20.22	176.33	289.15
May	1-5	30.53	-3.33	10.77	19.76
	6-10	26.78	-3.33	9.29	17.49
	11-15	35.73	-3.33	12.83	22.90
	16-20	28.75	-3.33	10.07	18.68
	21-25	32.82	-3.33	11.68	21.14
	26-31	34.93	-3.99	12.25	22.68
	Total	189.54	-20.64	66.89	122.65
Jun.	1-5	51.22	0.91	20.64	30.58
	6-10	34.94	0.91	14.20	20.74
	11-15	104.55	0.91	41.76	62.79
	16-20	74.10	0.91	29.70	44.39
	21-25	79.53	0.91	31.86	47.67
	26-30	63.45	0.91	25.49	37.96
	Total	407.79	5.46	163.65	244.13
Jul.	1-5	68.78	62.16	51.85	16.93
	6-10	71.71	62.16	53.01	18.70
	11-15	54.29	62.16	46.12	8.17
	16-20	1,371.85	62.16	567.88	803.97
	21-25	494.38	62.16	220.40	273.98
	26-31	183.17	74.60	102.08	81.09
	Total	2,244.18	385.40	1,041.34	1,202.84
Aug.	1-5	151.97	27.48	71.06	80.90
	6-10	239.25	27.48	105.63	133.62
	11-15	219.22	27.48	97.70	121.52
	16-20	666.59	27.48	274.86	391.73
	21-25	1,588.05	27.48	639.77	948.28
	26-31	517.02	32.97	217.80	299.22
	Total	3,382.10	170.37	1,406.82	1,975.27
Sep.	1-5	249.75	-4.32	97.19	152.56
	6-10	574.06	-4.32	225.62	348.44
	11-15	233.36	-4.32	90.70	142.66
	16-20	107.49	-4.32	40.86	66.63
	21-25	88.11	-4.32	33.18	54.93
	26-30	85.37	-4.32	32.10	53.27
	Total	1,338.14	-25.92	519.65	818.49

Table K 8 CALCULATION OF WATER DEFICIT IN THE HAN RIVER

Unit: 10^6 m^3

<u>Paldang</u>		1.	2.	3.	4=1+2+3	5.	6.
Period		MF	MW	AW	N	MT	AT
<u>1985</u>							
	1-5	71.99	0.09	7.18	79.26	0.10	0.90
	6-10	66.24	0.09	7.17	73.50	0.10	0.90
	11-15	78.27	0.09	4.74	83.10	0.10	1.06
Oct.	16-20	75.82	0.09	4.73	80.64	0.10	1.05
	21-25	39.62	0.09	2.10	41.81	0.10	0.12
	26-31	43.82	0.11	2.52	46.45	0.12	0.14
	Total	375.76	0.56	28.44	404.76	0.62	4.17
	1-5	51.19	0.09	0.86	52.14	0.10	1.56
	6-10	53.88	0.09	0.86	54.83	0.10	1.56
	11-15	60.10	0.09	0.86	61.05	0.10	1.56
Nov.	16-20	47.34	0.09	0.86	48.29	0.10	1.56
	21-25	66.08	0.09	0.87	67.04	0.10	1.56
	26-30	83.82	0.09	0.86	84.77	0.10	1.56
	Total	362.41	0.54	5.17	368.12	0.60	9.36
	1-5	115.18	0.09	0	115.27	0.10	0.04
	6-10	74.95	0.09	0	75.04	0.10	0.03
	11-15	40.62	0.09	0	40.71	0.10	0.04
Dec.	16-20	34.02	0.09	0	34.11	0.10	0.03
	21-25	33.43	0.09	0	33.52	0.10	0.03
	26-31	31.44	0.11	0	31.55	0.12	0.04
	Total	329.64	0.56	0	330.20	0.62	0.21
<u>1986</u>							
	1-5	22.88	0.10	0.15	23.13	0.10	0.27
	6-10	19.65	0.10	0.15	19.90	0.10	0.26
	11-15	19.03	0.10	0.15	19.28	0.10	0.27
Jan.	16-20	18.83	0.10	0.15	19.08	0.10	0.26
	21-25	23.32	0.10	0.15	23.57	0.10	0.26
	26-31	40.75	0.12	0.19	41.06	0.12	0.31
	Total	144.46	0.62	0.94	146.02	0.62	1.63
	1-5	24.08	0.10	0.14	24.32	0.10	0.62
	6-10	21.79	0.10	0.14	22.03	0.10	0.62
	11-15	23.93	0.10	0.14	24.17	0.10	0.62
Feb.	16-20	21.73	0.10	0.14	21.97	0.10	0.62
	21-25	22.68	0.10	0.14	22.92	0.10	0.61
	26-28	19.72	0.08	0.12	19.92	0.06	0.37
	Total	133.93	0.58	0.82	135.33	0.56	3.46
	1-5	29.83	0.10	0.17	30.10	0.10	0.36
	6-10	38.73	0.10	0.17	39.00	0.10	0.36
	11-15	39.39	0.10	0.17	39.66	0.10	0.36
Mar.	16-20	34.33	0.10	0.17	34.60	0.10	0.36
	21-25	38.99	0.10	0.17	39.26	0.10	0.36
	26-31	65.05	0.12	0.21	65.38	0.12	0.44
	Total	246.32	0.62	1.06	248.00	0.62	2.24

Table K 8

Continued (2)

Paldang		Unit: 10^6 m^3					
Period	7=5+6-4	8.	9.	10.	11=8+9+10-7(2)		
	7(1) DT +	7(2) -	MM	AM	A	D + -	
<u>1985</u>							
Oct.	1-5	78.26	14.01	0.55	14.08	49.62	
	6-10	72.50	14.01	0.54	14.08	43.87	
	11-15	81.94	14.01	0.20	14.08	53.65	
	16-20	79.49	14.01	0.20	14.08	51.20	
	21-25	41.59	14.01	0.09	14.08	13.41	
	26-31	46.19	16.82	0.10	16.90	12.37	
	Total	399.97	86.87	1.68	87.30	224.12	
Nov.	1-5	50.48	14.01	0	14.08	22.39	
	6-10	53.17	14.01	0	14.08	25.08	
	11-15	59.39	14.01	0	14.08	31.30	
	16-20	46.63	14.01	0	14.08	18.54	
	21-25	65.38	14.01	0	14.08	37.29	
	26-30	83.11	14.01	0	14.08	55.02	
	Total	358.16	84.06	0	84.48	189.62	
Dec.	1-5	115.13	14.01	0	14.08	87.04	
	6-10	74.91	14.01	0	14.08	46.82	
	11-15	40.57	14.01	0	14.08	12.48	
	16-20	33.98	14.01	0	14.08	5.89	
	21-25	33.39	14.01	0	14.08	5.30	
	26-31	31.39	16.82	0	16.90	2.33	
	Total	329.37	86.87	0	87.30	2.33	157.53
<u>1986</u>							
Jan.	1-5	22.76	14.01	0	14.08	5.33	
	6-10	19.54	14.01	0	14.08	8.55	
	11-15	18.91	14.01	0	14.08	9.18	
	16-20	18.72	14.01	0	14.08	9.37	
	21-25	23.21	14.01	0	14.08	4.88	
	26-31	40.63	16.82	0	16.90	6.91	
	Total	143.77	86.87	0	87.30	37.31	6.91
Feb.	1-5	23.60	14.01	0	14.08	4.49	
	6-10	21.31	14.01	0	14.08	6.78	
	11-15	23.45	14.01	0	14.08	4.64	
	16-20	21.25	14.01	0	14.08	6.84	
	21-25	22.21	14.01	0	14.08	5.88	
	26-28	19.49	8.41	0	8.45	2.63	
	Total	131.31	78.46	0	78.85	28.63	2.63
Mar.	1-5	29.64	14.01	0	14.08	1.55	
	6-10	38.54	14.01	0	14.08	10.45	
	11-15	39.20	14.01	0	14.08	11.11	
	16-20	34.14	14.01	0	14.08	6.05	
	21-25	38.80	14.01	0	14.08	10.71	
	26-31	64.82	16.82	0	16.90	31.10	
	Total	245.14	86.87	0	87.30	70.97	

Table K 8 Continued (3)

Paldang		Unit: 10^6 m^3					
Period	1. MF	2. MW	3. AW	4=1+2+3 N	5. MT	6. AT	
<u>1986</u>							
Apr.	1-5	68.91	0.10	3.06	72.07	0.10	5.80
	6-10	51.00	0.10	3.05	54.15	0.10	5.80
	11-15	71.64	0.10	0	71.74	0.10	1.47
	16-20	36.70	0.10	0	36.80	0.10	1.46
	21-25	39.17	0.10	1.94	41.21	0.10	0.93
	26-30	21.73	0.10	1.93	23.76	0.10	0.93
	Total	289.15	0.60	9.98	299.73	0.60	16.39
May	1-5	19.76	0.10	1.09	20.95	0.10	1.43
	6-10	17.49	0.10	1.09	18.68	0.10	1.43
	11-15	22.90	0.10	2.59	25.59	0.10	11.67
	16-20	18.68	0.10	2.59	21.37	0.10	11.67
	21-25	21.14	0.10	10.95	32.19	0.10	16.28
	26-31	22.68	0.12	13.15	35.95	0.12	19.54
	Total	122.65	0.62	31.46	154.73	0.62	62.02
Jun.	1-5	30.58	0.10	25.49	56.17	0.10	13.88
	6-10	20.74	0.10	25.48	46.32	0.10	13.87
	11-15	62.79	0.10	13.71	76.60	0.10	20.85
	16-20	44.39	0.10	13.70	58.19	0.10	20.85
	21-25	47.67	0.10	23.66	71.43	0.10	25.11
	26-30	37.96	0.10	23.66	61.72	0.10	25.10
	Total	244.13	0.60	125.70	370.43	0.60	119.66
Jul.	1-5	16.93	0.10	43.50	60.53	0.10	64.41
	6-10	18.70	0.10	43.49	62.29	0.10	64.40
	11-15	8.17	0.10	16.84	25.11	0.10	17.44
	16-20	803.97	0.10	16.83	820.90	0.10	17.44
	21-25	273.98	0.10	3.65	277.73	0.10	3.25
	26-31	81.09	0.12	4.39	85.60	0.12	3.91
	Total	1,202.84	0.62	128.70	1,332.16	0.62	170.85
Aug.	1-5	80.90	0.10	22.47	103.47	0.10	28.79
	6-10	133.62	0.10	22.46	156.18	0.10	28.78
	11-15	121.52	0.10	20.67	142.29	0.10	18.85
	16-20	391.73	0.10	20.66	412.49	0.10	18.85
	21-25	948.28	0.10	15.20	963.58	0.10	11.38
	26-31	299.22	0.12	18.25	317.59	0.12	13.65
	Total	1,975.27	0.62	119.71	2,095.60	0.62	120.30
Sep.	1-5	152.56	0.10	22.76	175.42	0.10	13.06
	6-10	348.44	0.10	22.76	371.30	0.10	13.06
	11-15	142.66	0.10	8.08	150.84	0.10	6.54
	16-20	66.63	0.10	8.08	74.81	0.10	6.53
	21-25	54.93	0.10	4.25	59.28	0.10	0.48
	26-30	53.27	0.10	4.24	57.61	0.10	0.48
	Total	818.49	0.60	70.17	889.26	0.60	40.15

Table K 8

Continued (4)

Paldang

Unit: 10^6 m^3

Period	7=5+6-4		8. MM	9. AM	10. A	11=8+9+10-7(2)	
	7(1) +	DT 7(2) -				D +	-
1986							
Apr.	1-5	66.17	14.01	0.12	14.08		37.96
	6-10	48.25	14.01	0.12	14.08		20.04
	11-15	70.17	14.01	0.56	14.08		41.52
	16-20	35.24	14.01	0.56	14.08		6.59
	21-25	40.18	14.01	0.45	14.08		11.64
	26-30	22.73	14.01	0.45	14.08	5.81	
	Total	282.74	84.06	2.26	84.48	5.81	117.75
May	1-5	19.42	14.01	0.39	14.08	9.06	
	6-10	17.15	14.01	0.39	14.08	11.33	
	11-15	13.82	14.01	3.52	14.08	17.79	
	16-20	9.60	14.01	3.52	14.08	22.01	
	21-25	15.81	14.01	6.40	14.08	18.68	
	26-31	16.29	16.82	7.69	16.90	25.12	
	Total	92.09	86.87	21.91	87.30	103.99	
Jun.	1-5	42.19	14.01	3.60	14.08		10.50
	6-10	32.35	14.01	3.60	14.08		0.66
	11-15	55.65	14.01	7.27	14.08		20.29
	16-20	37.24	14.01	7.26	14.08		1.89
	21-25	46.22	14.01	6.24	14.08		11.89
	26-30	36.52	14.01	6.23	14.08		2.20
	Total	250.17	84.06	34.20	84.48		47.43
Jul.	1-5	3.98	14.01	2.53	14.08	30.62	
	6-10	2.21	14.01	2.52	14.08	30.61	
	11-15	7.57	14.01	1.98	14.08	22.50	
	16-20	803.36	14.01	1.98	14.08		773.29
	21-25	274.38	14.01	2.72	14.08		243.57
	26-31	81.57	16.82	3.26	16.90		44.59
	Total	6.19 1,166.88	86.87	14.99	87.30	83.73	1,061.45
Aug.	1-5	74.58	14.01	2.97	14.08		43.52
	6-10	127.30	14.01	2.97	14.08		96.24
	11-15	123.34	14.01	2.29	14.08		92.96
	16-20	393.54	14.01	2.28	14.08		363.17
	21-25	952.10	14.01	3.03	14.08		920.98
	26-31	303.82	16.82	3.63	16.90		266.47
	Total	1,974.68	86.87	17.17	87.30		1,783.34
Sep.	1-5	162.26	14.01	2.66	14.08		131.51
	6-10	358.14	14.01	2.65	14.08		327.40
	11-15	144.20	14.01	2.66	14.08		113.45
	16-20	68.18	14.01	2.65	14.08		37.44
	21-25	58.70	14.01	1.69	14.08		28.92
	26-30	57.03	14.01	1.69	14.08		27.25
	Total	848.51	84.06	14.00	84.48		665.97

Table K 8 Continued (5)

Paldang							Unit: 10^6 m^3
Period	1. MF	2. MW	3. AW	4=1+2+3 N	5. MT	6. AT	
<u>1990</u>							
Oct.	1-5	71.99	0.09	7.18	79.26	0.12	0.98
	6-10	66.24	0.09	7.17	73.50	0.12	0.98
	11-15	78.27	0.09	4.74	83.10	0.12	1.13
	16-20	75.82	0.09	4.73	80.64	0.12	1.13
	21-25	39.62	0.09	2.10	41.81	0.12	0.17
	26-31	43.82	0.11	2.52	46.45	0.14	0.21
	Total	375.76	0.56	28.44	404.76	0.74	4.60
Nov.	1-5	51.19	0.09	0.86	52.14	0.12	1.68
	6-10	53.88	0.09	0.86	54.83	0.12	1.67
	11-15	60.10	0.09	0.86	61.05	0.12	1.68
	16-20	47.34	0.09	0.86	48.29	0.12	1.67
	21-25	66.08	0.09	0.87	67.04	0.12	1.68
	26-30	83.82	0.09	0.86	84.77	0.12	1.67
	Total	362.41	0.54	5.17	368.12	0.72	10.05
Dec.	1-5	115.18	0.09	0	115.27	0.12	0.04
	6-10	74.95	0.09	0	75.04	0.12	0.03
	11-15	40.62	0.09	0	40.71	0.12	0.04
	16-20	34.02	0.09	0	34.11	0.12	0.03
	21-25	33.43	0.09	0	33.52	0.12	0.04
	26-31	31.44	0.11	0	31.55	0.14	0.04
	Total	329.64	0.56	0	330.20	0.74	0.22
<u>1991</u>							
Jan.	1-5	22.88	0.10	0.15	23.13	0.12	0.28
	6-10	19.65	0.10	0.15	19.90	0.12	0.28
	11-15	19.03	0.10	0.15	19.28	0.12	0.28
	16-20	18.83	0.10	0.15	19.08	0.12	0.28
	21-25	23.32	0.10	0.15	23.57	0.12	0.29
	26-31	40.75	0.12	0.19	41.06	0.14	0.34
	Total	144.46	0.62	0.94	146.02	0.74	1.75
Feb.	1-5	24.08	0.10	0.14	24.32	0.12	0.67
	6-10	21.79	0.10	0.14	22.03	0.12	0.66
	11-15	23.93	0.10	0.14	24.17	0.12	0.67
	16-20	21.73	0.10	0.14	21.97	0.12	0.66
	21-25	22.68	0.10	0.14	22.92	0.12	0.66
	26-28	19.72	0.08	0.12	19.92	0.07	0.40
	Total	133.93	0.58	0.82	135.33	0.67	3.72
Mar.	1-5	29.83	0.10	0.17	30.10	0.12	0.39
	6-10	38.73	0.10	0.17	39.00	0.12	0.39
	11-15	39.39	0.10	0.17	39.66	0.12	0.39
	16-20	34.33	0.10	0.17	34.60	0.12	0.38
	21-25	38.99	0.10	0.17	39.26	0.12	0.39
	26-31	65.05	0.12	0.21	65.38	0.14	0.46
	Total	246.32	0.62	1.06	248.00	0.74	2.40

Table K 8

Continued (6)

<u>Paldang</u>							Unit: 10 ⁶ m ³	
Period	7=5+6-4	8.	9.	10.	11=8+9+10-7(2)			
	7(1) DT +	7(2) -	MM	AM	A	D +	-	
<u>1990</u>								
Oct.	1-5	78.16	19.77	0.59	14.08		43.72	
	6-10	72.40	19.77	0.59	14.08		37.96	
	11-15	81.85	19.77	0.22	14.08		47.78	
	16-20	79.39	19.77	0.21	14.08		45.33	
	21-25	41.52	19.77	0.10	14.08		7.57	
	26-31	46.10	23.72	0.13	16.90		5.35	
	Total	399.42	122.57	1.84	87.30		187.71	
Nov.	1-5	50.34	19.77	0	14.08		16.49	
	6-10	53.04	19.77	0	14.08		19.19	
	11-15	59.25	19.77	0	14.08		25.40	
	16-20	46.50	19.77	0	14.08		12.65	
	21-25	65.24	19.77	0	14.08		31.39	
	26-30	82.98	19.77	0	14.08		49.13	
	Total	357.35	118.62	0	84.48		154.25	
Dec.	1-5	115.11	19.77	0	14.08		81.26	
	6-10	74.89	19.77	0	14.08		41.04	
	11-15	40.55	19.77	0	14.08		6.70	
	16-20	33.96	19.77	0	14.08		0.11	
	21-25	33.36	19.77	0	14.08	0.49		
	26-31	31.37	23.72	0	16.90	9.25		
	Total	329.24	122.57	0	87.30	9.74	129.11	
<u>1991</u>								
Jan.	1-5	22.73	19.77	0	14.08	11.12		
	6-10	19.50	19.77	0	14.08	14.35		
	11-15	18.88	19.77	0	14.08	14.97		
	16-20	18.68	19.77	0	14.08	15.17		
	21-25	23.16	19.77	0	14.08	10.69		
	26-31	40.58	23.72	0	16.90	0.04		
	Total	143.53	122.57	0	87.30	66.34		
Feb.	1-5	23.53	19.77	0	14.08	10.32		
	6-10	21.25	19.77	0	14.08	12.60		
	11-15	23.38	19.77	0	14.08	10.47		
	16-20	21.19	19.77	0	14.08	12.66		
	21-25	22.14	19.77	0	14.08	11.71		
	26-28	19.45	11.86	0	8.45	0.86		
	Total	130.94	110.71	0	78.85	58.62		
Mar.	1-5	29.59	19.77	0	14.08	4.26		
	6-10	38.49	19.77	0	14.08		4.64	
	11-15	39.15	19.77	0	14.08		5.30	
	16-20	34.10	19.77	0	14.08		0.25	
	21-25	38.75	19.77	0	14.08		4.90	
	26-31	64.78	23.72	0	16.90		24.16	
	Total	244.86	122.57	0	87.30	4.26	39.25	

Table K 8 Continued (7)

Paldang							Unit: 10 ⁶ m ³	
Period	1. MF	2. MW	3. AW	4=1+2+3 N	5. MT	6. AT		
<u>1991</u>								
Apr.	1-5	68.91	0.10	3.06	72.07	0.12	6.44	
	6-10	51.00	0.10	3.05	54.15	0.12	6.44	
	11-15	71.64	0.10	0	71.74	0.12	1.62	
	16-20	36.70	0.10	0	36.80	0.12	1.61	
	21-25	39.17	0.10	1.94	41.21	0.12	1.09	
	26-30	21.73	0.10	1.93	23.76	0.12	1.09	
	Total	289.15	0.60	9.98	299.73	0.72	18.29	
May	1-5	19.76	0.10	1.09	20.95	0.12	1.64	
	6-10	17.49	0.10	1.09	18.68	0.12	1.64	
	11-15	22.90	0.10	2.59	25.59	0.12	12.48	
	16-20	18.68	0.10	2.59	21.37	0.12	12.48	
	21-25	21.14	0.10	10.95	32.19	0.12	17.30	
	26-31	22.68	0.12	13.15	35.95	0.14	20.77	
	Total	122.65	0.62	31.46	154.73	0.74	66.31	
Jun.	1-5	30.58	0.10	25.49	56.17	0.12	15.02	
	6-10	20.74	0.10	25.48	46.32	0.12	15.01	
	11-15	62.79	0.10	13.71	76.60	0.12	22.05	
	16-20	44.39	0.10	13.70	58.19	0.12	22.05	
	21-25	47.67	0.10	23.66	71.43	0.12	26.70	
	26-30	37.96	0.10	23.66	61.72	0.12	26.70	
	Total	244.13	0.60	125.70	370.43	0.72	127.53	
Jul.	1-5	16.93	0.10	43.50	60.53	0.12	68.40	
	6-10	18.70	0.10	43.49	62.29	0.12	68.40	
	11-15	8.17	0.10	16.84	25.11	0.12	17.76	
	16-20	803.97	0.10	16.83	820.90	0.12	17.76	
	21-25	273.98	0.10	3.65	277.73	0.12	3.04	
	26-31	81.09	0.12	4.39	85.60	0.14	3.65	
	Total	1,202.84	0.62	128.70	1,332.16	0.74	179.01	
Aug.	1-5	80.90	0.10	22.47	103.47	0.12	30.24	
	6-10	133.62	0.10	22.46	156.18	0.12	30.24	
	11-15	121.52	0.10	20.67	142.29	0.12	18.97	
	16-20	391.73	0.10	20.66	412.49	0.12	18.97	
	21-25	948.28	0.10	15.20	963.58	0.12	11.28	
	26-31	299.22	0.12	18.25	317.59	0.14	13.54	
	Total	1,975.27	0.62	119.71	2,095.60	0.74	123.24	
Sep.	1-5	152.56	0.10	22.76	175.42	0.12	12.86	
	6-10	348.44	0.10	22.76	371.30	0.12	12.86	
	11-15	142.66	0.10	8.08	150.84	0.12	6.74	
	16-20	66.63	0.10	8.08	74.81	0.12	6.73	
	21-25	54.93	0.10	4.25	59.28	0.12	0.55	
	26-30	53.27	0.10	4.24	57.61	0.12	0.54	
	Total	818.49	0.60	70.17	889.26	0.72	40.28	

Table K 8

Continued (8)

Paldang		Unit: 10 ⁶ m ³					
Period	7=5+6-4		8.	9.	10.	11=8+9+10-7(2)	
	7(1) DT +	7(2) -	MM	AM	A	D +	-
<u>1991</u>							
Apr.	1-5	65.51	19.77	0.18	14.08		31.48
	6-10	47.59	19.77	0.18	14.08		13.56
	11-15	70.00	19.77	0.61	14.08		35.54
	16-20	35.07	19.77	0.61	14.08		0.61
	21-25	40.00	19.77	0.51	14.08		5.64
	26-30	22.55	19.77	0.50	14.08	11.80	
	Total	280.72	118.62	2.59	84.48	11.80	86.83
May	1-5	19.19	19.77	0.45	14.08	15.11	
	6-10	16.92	19.77	0.44	14.08	17.37	
	11-15	12.99	19.77	3.76	14.08	24.62	
	16-20	8.77	19.77	3.75	14.08	28.83	
	21-25	14.77	19.77	6.81	14.08	25.89	
	26-31	15.04	23.72	8.17	16.90	33.75	
	Total	87.68	122.57	23.38	87.30	145.57	
Jun.	1-5	41.03	19.77	3.89	14.08		3.29
	6-10	31.19	19.77	3.89	14.08	6.55	
	11-15	54.43	19.77	7.76	14.08		12.82
	16-20	36.02	19.77	7.76	14.08	5.59	
	21-25	44.61	19.77	6.68	14.08		4.08
	26-30	34.90	19.77	6.68	14.08	5.63	
	Total	242.18	118.62	36.66	84.48	17.77	20.19
Jul.	1-5	7.99	19.77	2.69	14.08	36.54	
	6-10	6.23	19.77	2.68	14.08	36.53	
	11-15	7.23	19.77	2.11	14.08	28.73	
	16-20	803.02	19.77	2.11	14.08		767.06
	21-25	274.57	19.77	2.90	14.08		237.82
	26-31	81.81	23.72	3.47	16.90		37.72
	Total	14.22 1,166.63	122.57	15.96	87.30	101.80	1,042.60
Aug.	1-5	73.11	19.77	3.16	14.08		36.10
	6-10	125.82	19.77	3.16	14.08		88.81
	11-15	123.20	19.77	2.42	14.08		86.93
	16-20	393.40	19.77	2.41	14.08		357.14
	21-25	952.18	19.77	3.23	14.08		915.10
	26-31	303.91	23.72	3.87	16.90		259.42
	Total	1,971.62	122.57	18.25	87.30		1,743.50
Sep.	1-5	162.44	19.77	2.83	14.08		125.76
	6-10	358.32	19.77	2.83	14.08		321.64
	11-15	143.98	19.77	2.83	14.08		107.30
	16-20	67.96	19.77	2.82	14.08		31.29
	21-25	58.61	19.77	1.82	14.08		22.94
	26-30	56.95	19.77	1.81	14.08		21.29
	Total	848.26	118.62	14.94	84.48		630.22

Table K 8 Continued (9)

Paldang							Unit: 10 ⁶ m ³
Period	1. MF	2. MW	3. AW	4=1+2+3 N	5. MT	6. AT	
<u>1995</u>							
Oct.	1-5	71.99	0.09	7.18	79.26	0.13	1.07
	6-10	66.24	0.09	7.17	73.50	0.13	1.06
	11-15	78.27	0.09	4.74	83.10	0.13	1.20
	16-20	75.82	0.09	4.73	80.64	0.13	1.20
	21-25	39.62	0.09	2.10	41.81	0.13	0.23
	26-31	43.82	0.11	2.52	46.45	0.15	0.27
	Total	375.76	0.56	28.44	404.76	0.80	5.03
Nov.	1-5	51.19	0.09	0.86	52.14	0.13	1.78
	6-10	53.88	0.09	0.86	54.83	0.13	1.77
	11-15	60.10	0.09	0.86	61.05	0.13	1.77
	16-20	47.34	0.09	0.86	48.29	0.13	1.77
	21-25	66.08	0.09	0.87	67.04	0.13	1.77
	26-30	83.82	0.09	0.86	84.77	0.13	1.77
	Total	362.41	0.54	5.17	368.12	0.78	10.63
Dec.	1-5	115.18	0.09	0	115.27	0.13	0.04
	6-10	74.95	0.09	0	75.04	0.13	0.04
	11-15	40.62	0.09	0	40.71	0.13	0.04
	16-20	34.02	0.09	0	34.11	0.13	0.03
	21-25	33.43	0.09	0	33.52	0.13	0.04
	26-31	31.44	0.11	0	31.55	0.15	0.04
	Total	329.64	0.56	0	330.20	0.80	0.23
<u>1996</u>							
Jan.	1-5	22.88	0.10	0.15	23.13	0.13	0.30
	6-10	19.65	0.10	0.15	19.90	0.13	0.30
	11-15	19.03	0.10	0.15	19.28	0.13	0.30
	16-20	18.83	0.10	0.15	19.08	0.13	0.30
	21-25	23.32	0.10	0.15	23.57	0.13	0.30
	26-31	40.75	0.12	0.19	41.06	0.15	0.35
	Total	144.46	0.62	0.94	146.02	0.80	1.85
Feb.	1-5	24.08	0.10	0.14	24.32	0.13	0.68
	6-10	21.79	0.10	0.14	22.03	0.13	0.68
	11-15	23.93	0.10	0.14	24.17	0.13	0.68
	16-20	21.73	0.10	0.14	21.97	0.13	0.68
	21-25	22.68	0.10	0.14	22.92	0.13	0.67
	26-28	19.72	0.08	0.12	19.92	0.10	0.54
	Total	133.93	0.58	0.82	135.33	0.75	3.93
Mar.	1-5	29.83	0.10	0.17	30.10	0.13	0.41
	6-10	38.73	0.10	0.17	39.00	0.13	0.41
	11-15	39.39	0.10	0.17	39.66	0.13	0.41
	16-20	34.33	0.10	0.17	34.60	0.13	0.41
	21-25	38.99	0.10	0.17	39.26	0.13	0.41
	26-31	65.05	0.12	0.21	65.38	0.15	0.49
	Total	246.32	7.62	1.06	248.00	0.80	2.54

Table K 8

Continued (10)

Paldang		Unit: $10^6 m^3$					
Period	7=5+6-4		8.	9.	10.	11=8+9+10-7(2)	
	7(1) DT +	7(2) -	MM	AM	A	D + -	
<u>1995</u>							
Oct.	1-5	78.06	27.77	0.64	14.08		35.57
	6-10	72.31	27.77	0.63	14.08		29.83
	11-15	81.77	27.77	0.23	14.08		39.69
	16-20	79.31	27.77	0.23	14.08		37.23
	21-25	41.45	27.77	0.12	14.08	0.52	
	26-31	46.03	33.32	0.14	16.90	4.33	
	Total	398.93	172.17	1.99	87.30	4.85	142.32
Nov.	1-5	50.23	27.77	0	14.08		8.38
	6-10	52.93	27.77	0	14.08		11.08
	11-15	59.15	27.77	0	14.08		17.30
	16-20	46.39	27.77	0	14.08		4.54
	21-25	65.14	27.77	0	14.08		23.29
	26-30	82.87	27.77	0	14.08		41.02
	Total	356.71	166.62	0	84.48		105.61
Dec.	1-5	115.10	27.77	0	14.08		73.25
	6-10	74.87	27.77	0	14.08		33.02
	11-15	40.54	27.77	0	14.08	1.31	
	16-20	33.95	27.77	0	14.08	7.90	
	21-25	33.35	27.77	0	14.08	8.50	
	26-31	31.36	33.32	0	16.90	18.86	
	Total	329.17	172.17	0	87.30	36.57	106.27
<u>1996</u>							
Jan.	1-5	22.70	27.77	0	14.08	19.15	
	6-10	19.47	27.77	0	14.08	22.38	
	11-15	18.85	27.77	0	14.08	23.00	
	16-20	18.65	27.77	0	14.08	23.20	
	21-25	23.14	27.77	0	14.08	18.71	
	26-31	40.56	33.32	0	16.90	9.66	
	Total	143.37	172.17	0	87.30	116.10	
Feb.	1-5	23.51	27.77	0	14.08	18.34	
	6-10	21.22	27.77	0	14.08	20.63	
	11-15	23.36	27.77	0	14.08	18.49	
	16-20	21.16	27.77	0	14.08	20.69	
	21-25	22.12	27.77	0	14.08	19.73	
	26-29	19.28	22.21	0	11.27	14.20	
	Total	130.65	161.06	0	81.67	112.08	
Mar.	1-5	29.56	27.77	0	14.08	12.29	
	6-10	38.46	27.77	0	14.08	3.39	
	11-15	39.12	27.77	0	14.08	2.73	
	16-20	34.06	27.77	0	14.08	7.79	
	21-25	38.72	27.77	0	14.08	3.13	
	26-31	64.74	33.32	0	16.90		14.52
	Total	244.66	172.17	0	87.30	29.33	14.52

Table K 8 Continued (11)

Paldang							Unit: $10^6 m^3$	
Period	1. MF	2. MW	3. AW	4=1+2+3 N	5. MT	6. AT		
<u>1996</u>								
Apr.	1-5	68.91	0.10	3.06	72.07	0.13	7.03	
	6-10	51.00	0.10	3.05	54.15	0.13	7.02	
	11-15	71.64	0.10	0	71.74	0.13	1.77	
	16-20	36.70	0.10	0	36.80	0.13	1.76	
	21-25	39.17	0.10	1.94	41.21	0.13	1.25	
	26-30	21.73	0.10	1.93	23.76	0.13	1.24	
	Total	289.15	0.60	9.98	299.73	0.78	20.07	
May	1-5	19.76	0.10	1.09	20.95	0.13	1.85	
	6-10	17.49	0.10	1.09	18.68	0.13	1.84	
	11-15	22.90	0.10	2.59	25.59	0.13	13.27	
	16-20	18.68	0.10	2.59	21.37	0.13	13.26	
	21-25	21.14	0.10	10.95	32.19	0.13	18.37	
	26-31	22.68	0.12	13.15	35.95	0.15	22.04	
	Total	122.65	0.62	31.46	154.73	0.80	70.63	
Jun.	1-5	30.58	0.10	25.49	56.17	0.13	16.09	
	6-10	20.74	0.10	25.48	46.32	0.13	16.09	
	11-15	62.79	0.10	13.71	76.60	0.13	23.27	
	16-20	44.39	0.10	13.70	58.19	0.13	23.26	
	21-25	47.67	0.10	23.66	71.43	0.13	28.23	
	26-30	37.96	0.10	23.66	61.72	0.13	28.22	
	Total	244.13	0.60	125.70	370.43	0.78	135.16	
Jul.	1-5	16.93	0.10	43.50	60.53	0.13	71.77	
	6-10	18.70	0.10	43.49	62.29	0.13	71.77	
	11-15	8.17	0.10	16.84	25.11	0.13	18.04	
	16-20	803.97	0.10	16.83	820.90	0.13	18.04	
	21-25	273.98	0.10	3.65	277.73	0.13	2.92	
	26-31	81.09	0.12	4.39	85.60	0.15	3.51	
	Total	1,202.84	0.62	128.70	1,332.16	0.80	186.05	
Aug.	1-5	80.90	0.10	22.47	103.47	0.13	31.52	
	6-10	133.62	0.10	22.46	156.18	0.13	31.51	
	11-15	121.52	0.10	20.67	142.29	0.13	19.08	
	16-20	391.73	0.10	20.66	412.49	0.13	19.07	
	21-25	948.28	0.10	15.20	963.58	0.13	11.24	
	26-31	299.22	0.12	18.25	317.59	0.15	13.49	
	Total	1,975.27	0.62	119.71	2,095.60	0.80	125.91	
Sep.	1-5	152.56	0.10	22.76	175.42	0.13	12.63	
	6-10	348.44	0.10	22.76	371.30	0.13	12.62	
	11-15	142.66	0.10	8.08	150.84	0.13	6.96	
	16-20	66.63	0.10	8.08	74.81	0.13	6.95	
	21-25	54.93	0.10	4.25	59.28	0.13	0.67	
	26-30	53.27	0.10	4.24	57.61	0.13	0.67	
	Total	818.49	0.60	70.17	889.26	0.78	40.50	

Table K 8

Continued (12)

Paldang		Unit: $10^6 m^3$					
Period	7=5+6-4		8.	9.	10.	11=8+9+10-7(2)	
	7(1) +	DT 7(2) -	MM	AM	A	D + -	
<u>1996</u>							
Apr.	1-5	64.91	27.77	0.24	14.08		22.82
	6-10	47.00	27.77	0.24	14.08		4.91
	11-15	69.84	27.77	0.67	14.08		27.32
	16-20	34.91	27.77	0.66	14.08	7.60	
	21-25	39.83	27.77	0.56	14.08	2.58	
	26-30	22.39	27.77	0.56	14.08	20.02	
	Total	278.88	166.62	2.93	84.48	30.20	55.05
May	1-5	18.97	27.77	0.50	14.08	23.38	
	6-10	16.71	27.77	0.50	14.08	25.64	
	11-15	12.19	27.77	4.02	14.08	33.68	
	16-20	7.98	27.77	4.02	14.08	37.89	
	21-25	13.69	27.77	7.27	14.08	35.43	
	26-31	13.76	33.32	8.73	16.90	45.19	
	Total	83.30	172.17	25.04	87.30	201.21	
Jun.	1-5	39.95	27.77	4.20	14.08	6.10	
	6-10	30.10	27.77	4.20	14.08	15.95	
	11-15	53.20	27.77	8.33	14.08		3.02
	16-20	34.80	27.77	8.32	14.08	15.37	
	21-25	43.07	27.77	7.18	14.08	5.96	
	26-30	33.37	27.77	7.18	14.08	15.66	
	Total	234.49	166.62	39.41	84.48	59.04	3.02
Jul.	1-5	11.37	27.77	2.89	14.08	44.74	
	6-10	9.61	27.77	2.89	14.08	44.74	
	11-15	6.94	27.77	2.26	14.08	37.17	
	16-20	802.73	27.77	2.25	14.08		758.63
	21-25	274.68	27.77	3.10	14.08		229.73
	26-31	81.94	33.32	3.73	16.90		27.99
	Total	20.98	1,166.29	172.17	17.12	87.30	126.65
Aug.	1-5	71.82	27.77	3.38	14.08		26.59
	6-10	124.54	27.77	3.38	14.08		79.31
	11-15	123.08	27.77	2.57	14.08		78.66
	16-20	393.29	27.77	2.57	14.08		348.87
	21-25	952.21	27.77	3.46	14.08		906.90
	26-31	303.95	33.32	4.16	16.90		249.57
	Total	1,968.89	172.17	19.52	87.30		1,689.90
Sep.	1-5	162.66	27.77	3.04	14.08		117.77
	6-10	358.55	27.77	3.03	14.08		313.67
	11-15	143.75	27.77	3.03	14.08		98.87
	16-20	67.73	27.77	3.02	14.08		22.86
	21-25	58.48	27.77	1.96	14.08		14.67
	26-30	56.81	27.77	1.95	14.08		13.01
	Total	847.98	166.62	16.03	84.48		580.85

Table K 8 Continued (13)

<u>Paldang</u>		Unit: 10 ⁶ m ³					
Period	1. MF	2. MW	3. AW	4=1+2+3 N	5. MT	6. AT	
<u>2000</u>							
	1-5	71.99	0.09	7.18	79.26	0.14	1.17
	6-10	66.24	0.09	7.17	73.50	0.14	1.16
	11-15	78.27	0.09	4.74	83.10	0.14	1.28
Oct.	16-20	75.82	0.09	4.73	80.64	0.14	1.27
	21-25	39.62	0.09	2.10	41.81	0.14	0.28
	26-31	43.82	0.11	2.52	46.45	0.17	0.34
	Total	375.76	0.56	28.44	404.76	0.87	5.50
	1-5	51.19	0.09	0.86	52.14	0.14	1.88
	6-10	53.88	0.09	0.86	54.83	0.14	1.87
	11-15	60.10	0.09	0.86	61.05	0.14	1.88
Nov.	16-20	47.34	0.09	0.86	48.29	0.14	1.87
	21-25	66.08	0.09	0.87	67.04	0.14	1.88
	26-30	83.82	0.09	0.86	84.77	0.14	1.87
	Total	362.41	0.54	5.17	368.12	0.84	11.25
	1-5	115.18	0.09	0	115.27	0.14	0.05
	6-10	74.95	0.09	0	75.04	0.14	0.04
	11-15	40.62	0.09	0	40.71	0.14	0.04
Dec.	16-20	34.02	0.09	0	34.11	0.14	0.04
	21-25	33.43	0.09	0	33.52	0.14	0.04
	26-31	31.44	0.11	0	31.55	0.17	0.05
	Total	329.64	0.56	0	330.20	0.87	0.26
<u>2001</u>							
	1-5	22.88	0.10	0.15	23.13	0.14	0.32
	6-10	19.65	0.10	0.15	19.90	0.14	0.31
	11-15	19.03	0.10	0.15	19.28	0.14	0.32
Jan.	16-20	18.83	0.10	0.15	19.08	0.14	0.31
	21-25	23.32	0.10	0.15	23.57	0.14	0.32
	26-31	40.75	0.12	0.19	41.06	0.17	0.38
	Total	144.46	0.62	0.94	146.02	0.87	1.96
	1-5	24.08	0.10	0.14	24.32	0.14	0.75
	6-10	21.79	0.10	0.14	22.03	0.14	0.74
	11-15	23.93	0.10	0.14	24.17	0.14	0.74
Feb.	16-20	21.73	0.10	0.14	21.97	0.14	0.74
	21-25	22.68	0.10	0.14	22.92	0.14	0.74
	26-28	19.72	0.08	0.12	19.92	0.08	0.45
	Total	133.93	0.58	0.82	135.33	0.78	4.16
	1-5	29.83	0.10	0.17	30.10	0.14	0.44
	6-10	38.73	0.10	0.17	39.00	0.14	0.43
	11-15	39.39	0.10	0.17	39.66	0.14	0.43
Mar.	16-20	34.33	0.10	0.17	34.60	0.14	0.43
	21-25	38.99	0.10	0.17	39.26	0.14	0.44
	26-31	65.05	0.12	0.21	65.38	0.17	0.52
	Total	246.32	0.62	1.06	248.00	0.87	2.69

Table K 8

Continued (14)

Paldang		Unit: 10 ⁶ m ³					
Period	7=5+6-4		8.	9.	10.	11=8+9+10-7(2)	
	7(1) +	DT 7(2) -	MM	AM	A	D + -	
<u>2000</u>							
Oct.	1-5	77.95	39.77	0.69	14.08		23.41
	6-10	72.20	39.77	0.68	14.08		17.67
	11-15	81.68	39.77	0.25	14.08		27.58
	16-20	79.23	39.77	0.24	14.08		25.14
	21-25	41.39	39.77	0.14	14.08	12.60	
	26-31	45.94	47.72	0.16	16.90	18.84	
	Total	398.39	246.57	2.16	87.30	31.44	93.80
Nov.	1-5	50.12	39.77	0	14.08	3.73	
	6-10	52.82	39.77	0	14.08	1.03	
	11-15	59.03	39.77	0	14.08		5.18
	16-20	46.28	39.77	0	14.08	7.57	
	21-25	65.02	39.77	0	14.08		11.17
	26-30	82.76	39.77	0	14.08		28.91
	Total	356.03	238.62	0	84.48	12.33	45.26
Dec.	1-5	115.08	39.77	0	14.08		61.23
	6-10	74.86	39.77	0	14.08		21.01
	11-15	40.53	39.77	0	14.08	13.32	
	16-20	33.93	39.77	0	14.08	19.92	
	21-25	33.34	39.77	0	14.08	20.51	
	26-31	31.33	47.72	0	16.90	33.29	
	Total	329.07	246.57	0	87.30	87.04	82.24
<u>2001</u>							
Jan.	1-5	22.67	39.77	0	14.08	31.18	
	6-10	19.45	39.77	0	14.08	34.40	
	11-15	18.82	39.77	0	14.08	35.03	
	16-20	18.63	39.77	0	14.08	35.22	
	21-25	23.11	39.77	0	14.08	30.74	
	26-31	40.51	47.72	0	16.90	24.11	
	Total	143.19	246.57	0	87.30	190.68	
Feb.	1-5	23.43	39.77	0	14.08	30.42	
	6-10	21.15	39.77	0	14.08	32.70	
	11-15	23.29	39.77	0	14.08	30.56	
	16-20	21.09	39.77	0	14.08	32.76	
	21-25	22.04	39.77	0	14.08	31.81	
	26-28	19.39	23.86	0	8.45	12.92	
	Total	130.39	222.71	0	28.85	171.17	
Mar.	1-5	29.52	39.77	0	14.08	24.33	
	6-10	38.43	39.77	0	14.08	15.42	
	11-15	39.09	39.77	0	14.08	14.76	
	16-20	34.03	39.77	0	14.08	19.82	
	21-25	38.68	39.77	0	14.08	15.17	
	26-31	64.69	47.72	0	16.90		0.07
	Total	244.44	246.57	0	87.30	89.50	0.07

Table K 8 Continued (15)

Paldang		Unit: 10^6 m^3					
Period	1. MF	2. MW	3. AW	4=1+2+3 N	5. MT	6. AT	
<u>2001</u>							
Apr.	1-5	68.91	0.10	3.06	72.07	0.14	7.63
	6-10	51.00	0.10	3.05	54.15	0.14	7.63
	11-15	71.64	0.10	0	71.74	0.14	1.92
	16-20	36.70	0.10	0	36.80	0.14	1.92
	21-25	39.17	0.10	1.94	41.21	0.14	1.41
	26-30	21.73	0.10	1.93	23.76	0.14	1.40
	Total	289.15	0.60	9.98	299.73	0.84	21.91
May	1-5	19.76	0.10	1.09	20.95	0.14	2.06
	6-10	17.49	0.10	1.09	18.68	0.14	2.05
	11-15	22.90	0.10	2.59	25.59	0.14	14.08
	16-20	18.68	0.10	2.59	21.37	0.14	14.07
	21-25	21.14	0.10	10.95	32.19	0.14	19.38
	26-31	22.68	0.12	13.15	35.95	0.17	23.25
	Total	122.65	0.62	31.46	154.73	0.87	74.89
Jun.	1-5	30.58	0.10	25.49	56.17	0.14	17.22
	6-10	20.74	0.10	25.48	46.32	0.14	17.22
	11-15	62.79	0.10	13.71	76.60	0.14	24.49
	16-20	44.39	0.10	13.70	58.19	0.14	24.49
	21-25	47.67	0.10	23.66	71.43	0.14	29.79
	26-30	37.96	0.10	23.66	61.72	0.14	29.79
	Total	244.13	0.60	125.70	370.43	0.84	143.00
Jul.	1-5	16.93	0.10	43.50	60.53	0.14	75.39
	6-10	18.70	0.10	43.49	62.29	0.14	75.38
	11-15	8.17	0.10	16.84	25.11	0.14	18.33
	16-20	803.97	0.10	16.83	820.90	0.14	18.33
	21-25	273.98	0.10	3.65	277.73	0.14	2.78
	26-31	81.09	0.12	4.39	85.60	0.17	3.33
	Total	1,202.84	0.62	128.70	1,332.16	0.87	193.54
Aug.	1-5	80.90	0.10	22.47	103.47	0.14	32.86
	6-10	133.62	0.10	22.46	156.18	0.14	32.86
	11-15	121.52	0.10	20.67	142.29	0.14	19.18
	16-20	391.73	0.10	20.66	412.49	0.14	19.18
	21-25	948.28	0.10	15.20	963.58	0.14	11.18
	26-31	299.22	0.12	18.25	317.59	0.17	13.42
	Total	1,975.27	0.62	119.71	2,095.60	0.87	128.68
Sep.	1-5	152.56	0.10	22.76	175.42	0.14	12.60
	6-10	348.44	0.10	22.76	371.30	0.14	12.59
	11-15	142.66	0.10	8.08	150.84	0.14	7.18
	16-20	66.63	0.10	8.08	74.81	0.14	7.17
	21-25	54.93	0.10	4.25	59.28	0.14	0.80
	26-30	53.27	0.10	4.24	57.61	0.14	0.79
	Total	818.49	0.60	70.17	889.26	0.84	41.13

Table K 8

Continued (16)

Paldang		Unit: $10^6 m^3$					
Period	7=5+6-4		8.	9.	10.	11=8+9+10-7(2)	
	7(1) DT +	7(2) -	MM	AM	A	D + -	
<u>2001</u>							
Apr.	1-5	64.30	39.77	0.30	14.08		10.15
	6-10	46.38	39.77	0.30	14.08	7.77	
	11-15	69.68	39.77	0.72	14.08		15.11
	16-20	34.74	39.77	0.72	14.08	19.83	
	21-25	39.66	39.77	0.62	14.08	14.81	
	26-30	22.22	39.77	0.62	14.08	32.25	
	Total	276.98	238.62	3.28	84.48	74.66	25.26
May	1-5	18.75	39.77	0.56	14.08	35.66	
	6-10	16.49	39.77	0.56	14.08	37.92	
	11-15	11.37	39.77	4.31	14.08	46.79	
	16-20	7.16	39.77	4.31	14.08	51.00	
	21-25	12.67	39.77	7.78	14.08	48.96	
	26-31	12.53	47.72	9.33	16.90	61.42	
	Total	78.97	246.57	26.85	87.30	281.75	
Jun.	1-5	38.81	39.77	4.53	14.08	19.57	
	6-10	28.96	39.77	4.53	14.08	29.42	
	11-15	51.97	39.77	8.94	14.08	10.82	
	16-20	33.56	39.77	8.93	14.08	29.22	
	21-25	41.50	39.77	7.72	14.08	20.07	
	26-30	31.79	39.77	7.71	14.08	29.77	
	Total	226.59	238.62	42.36	84.48	138.87	
Jul.	1-5	15.00	39.77	3.10	14.08	56.95	
	6-10	13.23	39.77	3.10	14.08	56.95	
	11-15	6.64	39.77	2.41	14.08	49.62	
	16-20	802.43	39.77	2.41	14.08		746.17
	21-25	274.81	39.77	3.33	14.08		217.63
	26-31	82.10	47.72	3.99	16.90		13.49
	Total	28.23 1,165.98	246.57	18.34	87.30	163.52	977.29
Aug.	1-5	70.47	39.77	3.62	14.08		13.00
	6-10	123.18	39.77	3.61	14.08		65.72
	11-15	122.97	39.77	2.74	14.08		66.38
	16-20	393.17	39.77	2.74	14.08		336.58
	21-25	952.26	39.77	3.71	14.08		894.70
	26-31	304.00	47.72	4.46	16.90		234.92
	Total	1,966.05	246.57	20.88	87.30		1,611.30
Sep.	1-5	162.68	39.77	3.25	14.08		105.58
	6-10	358.57	39.77	3.25	14.08		301.47
	11-15	143.52	39.77	3.24	14.08		86.43
	16-20	67.50	39.77	3.24	14.08		10.41
	21-25	58.34	39.77	2.11	14.08		2.38
	26-30	56.58	39.77	2.10	14.08		0.73
	Total	847.29	238.62	17.19	84.48		507.00

Table K 9 CALCULATION OF NATURAL FLOW
IN THE NAGDONG RIVER BASIN

Period	Unit: 10^6 m^3						
	1 MFW	2 MFJ	3 2-1	4 2x0.165	5 AWW	6 MWW	
<u>1967</u>							
Oct.	1-5	21.25	35.08	13.83	5.78	7.54	0.08
	6-10	20.13	34.73	14.60	5.72	7.53	0.08
	11-15	19.60	33.52	13.92	5.52	10.91	0.08
	16-20	16.83	31.71	14.88	5.22	10.91	0.08
	21-25	12.53	25.14	12.61	4.14	2.85	0.08
	26-31	12.12	25.92	13.80	4.27	3.42	0.09
	Total	102.46	186.10	83.64	30.65	43.16	0.49
Nov.	1-5	8.33	19.92	11.59	3.28	3.68	0.08
	6-10	8.99	22.38	13.39	3.69	3.68	0.08
	11-15	8.50	21.60	13.10	3.56	3.68	0.08
	16-20	7.72	20.35	12.63	3.35	3.68	0.08
	21-25	13.26	30.93	17.67	5.09	3.68	0.08
	26-30	32.23	37.67	5.44	6.20	3.68	0.08
	Total	79.03	152.85	73.82	25.17	22.08	0.48
Dec.	1-5	46.48	77.07	30.59	12.69	0	0.08
	6-10	24.19	39.05	14.86	6.43	0	0.08
	11-15	16.33	25.83	9.50	4.25	0	0.08
	16-20	9.92	24.71	14.79	4.07	0	0.08
	21-25	6.20	20.61	14.41	3.39	0	0.08
	26-31	8.98	18.23	9.25	3.00	0	0.09
	Total	112.10	205.50	93.40	33.83	0	0.49
<u>1968</u>							
Jan.	1-5	5.27	14.30	9.03	2.36	0	0.08
	6-10	4.80	18.79	13.99	3.09	0	0.08
	11-15	4.49	17.02	12.53	2.80	0	0.08
	16-20	4.32	14.39	10.07	2.37	0	0.08
	21-25	4.32	14.65	10.33	2.41	0	0.08
	26-31	4.86	18.14	13.28	2.99	0	0.10
	Total	28.06	97.29	69.23	16.02	0	0.50
Feb.	1-5	3.67	12.18	8.51	2.01	0	0.08
	6-10	3.67	12.27	8.60	2.02	0	0.08
	11-15	3.49	12.53	9.04	2.06	0	0.08
	16-20	3.16	12.83	9.67	2.11	0	0.08
	21-25	2.73	12.96	10.23	2.13	0	0.08
	26-28	3.39	10.37	6.98	1.71	0	0.06
	Total	20.11	73.14	53.03	12.04	0	0.46
Mar.	1-5	4.18	12.96	8.78	2.13	0.46	0.08
	6-10	5.05	14.21	9.16	2.34	0.46	0.08
	11-15	5.66	18.10	12.44	2.98	0.46	0.08
	16-20	4.46	16.11	11.65	2.65	0.46	0.08
	21-25	7.72	25.45	17.73	4.19	0.46	0.08
	26-31	9.18	30.20	21.02	4.97	0.56	0.10
	Total	36.25	117.03	80.78	19.26	2.86	0.50

Table K 9 Continued (2)

Unit: 10^6 m^3

Period	7 AWWJ	8 MWWJ	9 AWJE	10 MWJE	11=1x0.857+5+6 NW	
<u>1967</u>						
	1-5	15.12	0.20	11.30	0.66	25.82
	6-10	15.12	0.20	11.30	0.66	24.85
	11-15	13.83	0.20	7.92	0.66	27.78
Oct.	16-20	13.83	0.20	7.92	0.66	25.41
	21-25	5.37	0.20	3.25	0.66	13.66
	26-31	6.44	0.24	3.89	0.79	13.89
	Total	69.71	1.24	45.58	4.09	131.41
	1-5	3.28	0.20	1.49	0.66	10.90
	6-10	3.28	0.20	1.48	0.66	11.46
	11-15	3.28	0.20	1.49	0.66	11.04
Nov.	16-20	3.28	0.20	1.48	0.66	10.37
	21-25	3.28	0.20	1.48	0.66	15.12
	26-30	3.27	0.20	1.48	0.66	31.37
	Total	19.67	1.20	8.90	3.96	90.26
	1-5	0	0.20	0	0.66	39.89
	6-10	0	0.20	0	0.66	20.80
	11-15	0	0.20	0	0.66	14.07
Dec.	16-20	0	0.20	0	0.66	8.58
	21-25	0	0.20	0	0.66	5.39
	26-31	0	0.24	0	0.79	7.78
	Total	0	1.24	0	4.09	96.51
<u>1968</u>						
	1-5	0	0.21	0	0.69	4.59
	6-10	0	0.21	0	0.69	4.19
	11-15	0	0.21	0	0.69	3.93
Jan.	16-20	0	0.21	0	0.69	3.78
	21-25	0	0.21	0	0.69	3.78
	26-31	0	0.25	0	0.82	4.26
	Total	0	1.30	0	4.27	24.53
	1-5	0.11	0.21	0.15	0.69	3.22
	6-10	0.10	0.21	0.15	0.69	3.22
	11-15	0.11	0.21	0.15	0.69	3.07
Feb.	16-20	0.10	0.21	0.15	0.69	2.79
	21-25	0.10	0.21	0.16	0.69	2.42
	26-28	0.08	0.17	0.12	0.55	2.96
	Total	0.60	1.22	0.88	4.00	17.68
	1-5	2.64	0.21	1.32	0.69	4.12
	6-10	2.63	0.21	1.32	0.69	4.87
	11-15	2.64	0.21	1.32	0.69	5.39
Mar.	16-20	2.63	0.21	1.32	0.69	4.36
	21-25	2.63	0.21	1.32	0.69	7.15
	26-31	3.16	0.25	1.58	0.82	8.52
	Total	16.33	1.30	8.18	4.27	34.41

Table K 9 Continued (3)

Unit: $10^6 m^3$

Period	12=3x 0.975+7+8 NWJ	13=11+12 x0.291 NG	14= 12x0.324 NGJ	15= 4+9+10 NJE	16= 12x0.385 NN	
<u>1967</u>						
	1-5	28.80	34.21	9.33	17.74	11.09
	6-10	29.55	33.45	9.57	17.68	11.38
	11-15	27.60	35.82	8.94	14.10	10.63
Oct.	16-20	28.53	33.72	9.24	13.80	10.98
	21-25	17.86	18.86	5.78	8.05	6.88
	26-31	20.13	19.75	6.52	8.95	7.75
	Total	152.47	175.81	49.38	80.32	58.71
	1-5	14.78	15.20	4.79	5.43	5.69
	6-10	16.63	16.30	5.39	5.83	6.40
	11-15	16.25	15.77	5.26	5.71	6.26
Nov.	16-20	15.79	14.97	5.11	5.49	6.08
	21-25	20.60	21.12	6.67	7.23	7.93
	26-30	8.77	33.92	2.84	8.34	3.38
	Total	92.82	117.28	30.06	38.03	35.74
	1-5	30.01	48.63	9.72	13.35	11.55
	6-10	14.68	25.07	4.75	7.09	5.65
	11-15	9.46	16.82	3.06	4.91	3.64
Dec.	16-20	14.61	12.83	4.73	4.73	5.63
	21-25	14.24	9.54	4.61	4.05	5.48
	26-31	9.25	10.47	3.00	3.79	3.56
	Total	92.25	123.36	29.87	37.92	35.51
<u>1968</u>						
	1-5	9.01	7.21	2.92	3.05	3.47
	6-10	13.84	8.22	4.48	3.78	5.33
	11-15	12.42	7.55	4.02	3.49	4.78
Jan.	16-20	14.23	7.92	4.61	3.06	5.48
	21-25	10.28	6.77	3.33	3.10	3.96
	26-31	13.19	8.10	4.27	3.81	5.08
	Total	72.97	45.77	23.63	20.29	28.10
	1-5	8.61	5.73	2.79	2.85	3.31
	6-10	8.69	5.75	2.81	2.86	3.35
	11-15	9.13	5.73	2.96	2.90	3.52
Feb.	16-20	9.73	5.62	3.15	2.95	3.75
	21-25	10.28	5.41	3.33	2.98	3.96
	26-29	7.05	5.01	2.28	2.38	2.71
	Total	53.49	33.25	17.32	16.92	20.60
	1-5	11.41	7.44	3.70	4.14	4.39
	6-10	11.77	8.30	3.81	4.35	4.53
	11-15	14.97	9.75	4.85	4.99	5.76
Mar.	16-20	14.19	8.49	4.60	4.66	5.46
	21-25	20.12	13.01	6.51	6.20	7.75
	26-31	23.90	15.48	7.74	7.37	9.20
	Total	96.36	62.47	31.21	31.71	37.09

Table K 9 Continued (4)

Unit: 10^6 m^3

Period	1 MFW	2 MFJ	3 2-1	4 2x0.165	5 AWW	6 MWW	
<u>1968</u>							
Apr.	1-5	13.33	41.17	27.84	6.78	0.23	0.08
	6-10	10.24	26.35	16.11	4.34	0.23	0.08
	11-15	12.08	25.27	13.19	4.16	2.63	0.08
	16-20	13.22	26.22	13.00	4.32	2.62	0.08
	21-25	14.04	29.85	15.81	4.92	0.82	0.08
	26-30	6.93	19.40	12.47	3.19	0.81	0.08
	Total	69.84	168.26	98.42	27.71	7.34	0.48
May	1-5	3.91	12.18	8.27	2.01	0.84	0.08
	6-10	2.80	9.03	6.23	1.49	0.84	0.08
	11-15	1.96	7.73	5.77	1.27	3.01	0.08
	16-20	1.71	18.45	16.74	3.04	3.00	0.08
	21-25	4.55	24.58	20.03	4.05	3.47	0.08
	26-31	4.45	16.89	12.44	2.78	4.17	0.10
	Total	19.38	88.86	69.48	14.64	15.33	0.50
Jun.	1-5	3.16	11.62	8.46	1.91	12.85	0.08
	6-10	2.97	9.50	6.53	1.56	12.85	0.08
	11-15	25.73	51.28	25.55	8.45	6.21	0.08
	16-20	14.65	28.77	14.12	4.74	6.21	0.08
	21-25	4.93	12.96	8.03	2.13	18.67	0.08
	26-30	2.42	5.38	2.96	0.89	18.67	0.08
	Total	53.86	119.51	65.65	19.68	75.46	0.48
Jul.	1-5	1.62	3.25	1.63	0.54	11.79	0.08
	6-10	1.76	3.26	1.50	0.54	11.79	0.08
	11-15	2.02	2.79	0.77	0.46	36.38	0.08
	16-20	403.32	777.95	374.63	128.12	36.37	0.08
	21-25	72.92	126.23	53.31	20.79	12.20	0.08
	26-31	32.18	59.96	27.78	9.87	14.65	0.10
	Total	513.82	973.44	459.62	160.32	123.18	0.50
Aug.	1-5	90.98	267.58	176.60	44.07	21.54	0.08
	6-10	54.00	138.76	84.76	22.85	21.54	0.08
	11-15	42.68	140.05	97.37	23.06	18.40	0.08
	16-20	745.63	1,998.17	1,252.54	329.07	18.40	0.08
	21-25	308.97	543.54	234.57	89.51	19.81	0.08
	26-31	189.22	479.09	289.87	78.90	11.77	0.10
	Total	1,431.48	3,567.19	2,135.71	587.46	101.46	0.50
Sep.	1-5	41.21	95.65	54.44	15.75	6.70	0.08
	6-10	44.32	104.80	60.48	17.26	6.69	0.08
	11-15	34.56	90.37	55.81	14.88	6.29	0.08
	16-20	26.78	70.76	43.98	11.65	6.29	0.08
	21-25	22.98	56.33	33.35	9.28	6.80	0.08
	26-30	20.56	42.17	26.61	7.77	6.80	0.08
	Total	190.41	465.08	274.67	76.59	39.57	0.48

Table K 9 Continued (5)

Unit: 10^6 m^3

Period	7 AWWJ	8 MWWJ	9 AWJE	10 MWJE	11=1x0.857+5+6 NW	
<u>1968</u>						
Apr.	1-5	3.04	0.21	1.76	0.69	11.73
	6-10	3.03	0.21	1.75	0.69	9.08
	11-15	3.84	0.21	0.61	0.69	13.06
	16-20	3.84	0.21	0.60	0.69	14.02
	21-25	0.41	0.21	0.05	0.69	12.93
	26-30	0.41	0.21	0.05	0.69	6.83
	Total	14.57	1.26	4.82	4.14	67.65
May	1-5	1.96	0.21	0.16	0.69	4.27
	6-10	1.96	0.21	0.16	0.69	3.32
	11-15	11.25	0.21	13.20	0.69	4.77
	16-20	11.24	0.21	13.19	0.69	4.54
	21-25	0.36	0.21	0.11	0.69	7.45
	26-31	0.43	0.25	0.13	0.82	8.08
	Total	27.20	1.30	26.95	4.27	32.43
Jun.	1-5	6.94	0.21	0.77	0.69	15.64
	6-10	6.93	0.21	0.76	0.69	15.47
	11-15	12.63	0.21	7.03	0.69	28.33
	16-20	12.62	0.21	7.02	0.69	18.84
	21-25	50.85	0.21	22.28	0.69	22.97
	26-30	50.84	0.21	22.28	0.69	20.82
	Total	140.81	1.26	60.14	4.14	122.07
Jul.	1-5	21.29	0.21	8.82	0.69	13.26
	6-10	21.28	0.21	8.81	0.69	13.38
	11-15	57.33	0.21	20.56	0.69	38.19
	16-20	57.32	0.21	20.56	0.69	381.93
	21-25	32.20	0.21	21.38	0.69	74.74
	26-31	38.63	0.25	25.65	0.82	42.32
	Total	228.05	1.30	105.78	4.27	563.82
Aug.	1-5	21.19	0.21	12.23	0.69	99.55
	6-10	21.18	0.21	12.23	0.69	67.88
	11-15	69.25	0.21	12.24	0.69	55.04
	16-20	69.24	0.21	12.24	0.69	657.19
	21-25	7.72	0.21	4.66	0.69	274.55
	26-31	9.26	0.25	5.59	0.82	173.96
	Total	197.84	1.30	59.19	4.27	1,328.17
Sep.	1-5	1.57	0.21	1.96	0.69	42.08
	6-10	1.56	0.21	1.96	0.69	44.73
	11-15	13.76	0.21	11.33	0.69	35.97
	16-20	13.75	0.21	11.32	0.69	29.30
	21-25	-0.54	0.21	4.11	0.69	26.56
	26-30	-0.55	0.21	4.11	0.69	24.49
	Total	29.55	1.26	34.79	4.14	203.13

Table K 9 Continued (6)

Unit: $10^6 m^3$

Period	12=3x 0.975+7+8 NWJ	13=11+12 x0.291 NG	14= 12x0.324 NGJ	15= 4+9+10 NJE	16= 12x0.385 NN	
<u>1968</u>						
Apr.	1-5	30.38	20.58	9.84	9.23	11.70
	6-10	18.94	14.59	6.13	6.78	7.29
	11-15	16.90	17.98	5.47	5.46	6.51
	16-20	16.72	18.89	5.41	5.61	6.44
	21-25	16.03	17.60	5.19	5.66	6.17
	26-30	12.77	10.55	4.14	3.93	4.92
	Total	111.74	100.19	36.18	36.67	43.03
May	1-5	10.23	7.25	3.31	2.86	3.94
	6-10	8.24	5.72	2.67	2.34	3.17
	11-15	17.08	9.74	5.53	15.16	6.58
	16-20	27.76	12.62	8.99	16.92	10.69
	21-25	20.09	13.30	6.51	4.85	7.73
	26-30	12.80	11.81	4.14	3.73	4.93
	Total	96.20	60.44	31.15	45.86	37.04
Jun.	1-5	15.39	20.12	4.98	3.37	5.93
	6-10	13.50	19.40	4.37	3.01	5.20
	11-15	37.74	39.32	12.22	16.17	14.53
	16-20	26.59	26.58	8.61	12.45	10.24
	21-25	58.89	40.12	19.07	25.10	22.67
	26-30	53.93	36.52	17.46	23.86	20.76
	Total	206.04	182.06	66.71	83.96	79.33
Jul.	1-5	23.09	19.98	7.48	10.05	8.89
	6-10	22.95	20.06	7.43	10.04	8.84
	11-15	58.29	55.16	18.88	21.71	22.44
	16-20	422.63	504.98	136.86	149.37	162.72
	21-25	84.36	99.30	27.32	42.86	32.48
	26-31	65.95	61.52	21.36	36.34	25.39
	Total	677.27	761.00	219.33	270.37	260.76
Aug.	1-5	193.51	155.89	62.67	56.99	74.50
	6-10	103.99	98.16	33.68	35.77	40.04
	11-15	164.35	102.89	53.22	35.99	63.28
	16-20	1,290.13	1,032.81	417.80	342.00	496.72
	21-25	236.53	343.42	76.60	94.86	91.07
	26-31	292.01	258.98	94.56	85.31	112.43
	Total	2,280.52	1,992.15	738.53	650.92	878.04
Sep.	1-5	54.84	58.05	17.76	18.40	21.11
	6-10	60.71	62.41	19.66	19.91	23.37
	11-15	68.36	55.87	22.14	26.90	26.32
	16-20	56.82	45.84	18.40	23.66	21.88
	21-25	32.17	35.93	10.42	14.08	12.39
	26-30	25.59	31.94	8.29	12.57	9.85
	Total	298.49	290.04	96.67	115.52	114.92