FINANCIAL TABLE 2

DARAGA WATER SUPPLY PROJECT

I + II

OPERATION AND MAINTENANCE COSTS
(₱1,000's)

Year	Fixed, 7-1-81 Costs				Escalated Costs	
	Power	Chemicals	Others	Total	Factor 1/	Amount
1981	-	30	174	204	1.000000	204
1982	-	31	174	205	1.150000	236
1983	-	32	174	206	1.322500	272
1984	-	33	183	216	1.520875	329
1985	-	68	210	278	1.703380	474
1986	-	72	229	301	1.907785	574
1987	-	76	274	350	2.136719	748
1988	-	81	319	400	2.393126	957
1989	-	88	374	462	2.680301	1,238
1990	24	94	419	537	2.948331	1,583
1991	52	100	473	625	3.243164	2,027
1992	79	105	473	657	3.567480	2,344
1993	107	111	473	691	3.924228	2,712
1994	107	111	473	691	4.316651	2,983
1995	107	111	473	691	4.748316	3,281
1996	107	111	473	691	5,223148	3,609
1997	107	111	473	691	5.745463	3,970
1998	107	111	473	691	6.320009	4,367

1/ Escalation currently 15 percent per year to 1984 (1981 = 1.00), 12 percent per year between 1985 and 1989 and 10 percent per year in 1990 and afterwards.

Daraga

I + II

FINANCIAL TABLE 3

DARAGA WATER SUPPLY PROJECT

LOAN DISBURSEMENTS AND DEBT SERVICE

(₱1,000's)

Year	Disbursement 1/		Loans Outstanding		Interest Payments		Principal Payments 3/	Total Debt Service
	Grant 20%	Loan 80%	Beginning	Ending	First Year 2/	Later Years		
1981								
1982								
1983	697	2,789		2,789	125			125
1984	2,637	10,546	2,789	13,335	474	251		725
1985	1,575	6,298	13,335	19,633	283	1,200		1,483
1986	3,207	12,826	19,633	32,459	577	1,766		2,343
1987	764	3,056	32,459	35,515	137	2,920		3,057
1988	1,275	5,098	35,515	40,613	229	3,195		3,424
1989			40,613	40,497		3,651	116	3,767
1990			40,497	39,943		3,631	554	4,185
1991			39,943	39,127		3,575	816	4,391
1992			39,127	37,777		3,490	1,350	4,840
1993			37,777	36,301		3,367	1,476	4,843
1994			36,301	34,613		3,229	1,688	4,917
1995			34,613	32,925		3,076	1,688	4,764
1996			32,925	31,237		2,925	1,688	4,613
1997			31,237	29,549		2,775	1,688	4,463
1998			29,549	27,861		2,621	1,688	4,309

1/ From Financial Table 1.

2/ Disbursements assumed to be equally spread during year. Charge with 50 per cent of annual interest in first year.

3/ Principal payments according to LWUA year plan.

FINANCIAL TABLE 4

DARAGA WATER SUPPLY PROJECT
CASH REQUIREMENTS PER REVENUE UNIT
(₱1,000's)

Year	Debt Service	O & M	Total Costs	Estimated Reserves 1/	Cost With Reserves	Revenue Units 2/	Cost Per Revenue Unit 3/
1981		204	204		204	739	0,28
1982		236	236		236	770	0.31
1983	125	272	397		397	847	0.47
1984	725	329	1,054		1,054	892	1.18
1985	1,483	474	1,957		1,957	1,729	1.13
1986	2,343	574	2,917		2,917	1,924	1.52
1987	3,057	748	3,805		3,805	2,161	1.76
1988	3,424	957	4,381		4,381	2,387	1.84
1989	3,767	1,238	5,005	250	5,255	2,655	1.98
1990	4,185	1,583	5,768	288	6,056	2,926	2.07
1991	4,391	2,027	6,418	642	7,060	3,228	2.19
1992	4,840	2,344	7,184	718	7,902	3,500	2.26
1993	4,843	2,712	7,555	756	8,311	3,822	2.17
1994	4,917	2,983	7,900	790	8,690	3,822	2.27
1995	4,764	3,281	8,045	805	8,850	3,822	2.32
1996	4,613	3,609	8,222	822	9,044	3,822	2.37
1997	4,463	3,970	8,433	843	9,276	3,822	2.43
1998	4,309	4,367	8,676	868	9,544	3,822	2.50

1/ Reserve estimate equal to 10 per cent of total costs. (5 per cent for the first two years)

2/ Revenue units from Tables 9A, 9B and 9C.

3/ Revenue units divided into costs with reserves.

FINANCIAL TABLE 5 - A

DARAGA WATER SUPPLY PROJECT

ABILITY TO PAY FOR WATER

I + II

1	2	3	4	5	6	7	8
Year	Ave. Monthly Family Income 1/	Available 5%	Average Family Size	Household Water Use		Revenue Units Per Month 2/	Max. Ability Per Rev. Unit
				lpcd	Cubic Meters/ Month		
1981	490.00	24.50	5.62	50	8	25	0.98
1982	563.35	28.18	5.61	50	8	25	1.13
1983	648.03	32.40	5.60	50	8	25	1.30
1984	745.23	37.26	5.59	50	8	25	1.49
1985	834.66	41.73	5.58	62	10	25	1.67
1986	934.82	46.74	5.57	80	13	29	1.61
1987	1,046.99	52.35	5.56	86	14	30	1.75
1988	1,172.63	58.63	5.55	94	16	32	1.89
1989	1,313.35	65.66	5.54	95	16	32	2.12
1990	1,444.69	72.23	5.53	101	17	33	2.19
1991	1,589.15	79.45	5.52	103	17	33	2.41
1992	1,748.07	87.40	5.51	116	19	36	2.43
1993	1,922.88	96.14	5.50	116	19	36	2.67

1/ Average monthly income escalated by 15 per cent per year to 1984, 12 per cent per year between 1985 and 1989, and 10 per cent in 1990 and afterwards.

2/ Assumed 1/2" service.

FINANCIAL TABLE 5 - B

DARAGA WATER SUPPLY PROJECT

ABILITY TO PAY FOR WATER

I + II

Year	Ave. Monthly Family Income 1/	Available 5%	Average Family Size	Household Water Use		Revenue Units Per Month 2/	Max. Ability Per Rev. Unit
				lpcd	Cubic Meters/ Month		
1994	2,115.17	105.76	5.49	116	19	36	2.94
1995	2,326.69	116.33	5.48	116	19	36	3.23
1996	2,559.36	127.97	5.47	116	19	36	3.56
1997	2,815.30	140.77	5.46	116	19	36	3.91
1998	3,096.83	154.84	5.45	116	19	36	4.30

1/ Average monthly income escalated by 15 percent year to 1984, 12 percent per year between 1985 and 1989, and 10 percent in 1990 and afterwards.

2/ Assumed 1/2" service.

FINANCIAL TABLE 6 - A

DARAGA WATER SUPPLY PROJECT

ILLUSTRATIVE CASH FLOW TABLE

₱1,000's EXCEPT CHARGES PER UNIT

I + II

Year	Revenue Units 1/	Charges Per Unit	Gross Revenues	Net Revenue 2/		Basic Costs 3/	Required Reserves 4/	Total Costs 5/	Net Income	
				%	Amount				Annual	Cumulative
1981	739	0.70	517	95	491	204		204	287	287
1982	770	0.70	539	95	512	236		236	276	563
1983	847	1.10	932	96	894	397		397	500	1,063
1984	892	1.10	981	96	942	1,054		1,054	-112	951
1985	1,729	1.60	2,766	96	2,655	1,957		1,957	698	1,649
1986	1,924	1.60	3,078	97	2,986	2,917		2,917	69	1,718
1987	2,161	1.75	3,782	97	3,669	3,805		3,805	-136	1,582
1988	2,387	1.75	4,177	97	4,052	4,381		4,381	-329	1,253
1989	2,655	2.10	5,576	98	5,464	5,005	279	5,284	180	1,433
1990	2,926	2.10	6,145	98	6,022	5,768	307	6,075	-53	1,380
1991	3,228	2.30	7,424	98	7,276	6,418	742	7,160	116	1,496
1992	3,500	2.30	8,050	98	7,889	7,184	805	7,989	-100	1,396
1993	3,822	2.60	9,937	98	9,738	7,555	994	8,549	1,189	2,585

1/ From Tables 9A, 9B and 9C.
2/ Gross revenues from water sales reduced by bad debt allowance.
3/ Total of project debt service, operation and maintenance costs.
4/ Ten percent of gross water sales, after completion of construction. (5 percent for the first two years)
5/ Includes the costs of replacing the first complement of project components with seven years of life expectancy.

FINANCIAL TABLE 6 - B

DARAGA WATER SUPPLY PROJECT

ILLUSTRATIVE CASH FLOW TABLE

₱1,000's EXCEPT CHARGES PER UNIT

I + II

Year	Revenue Units 1/	Charges Per Unit	Gross Revenues	Net Revenues 2/		Basic Costs 3/	Required Reserves 4/	Total Costs 5/	Net Income	
				%	Amount				Annual	Cumulative
1994	3,822	2.60	9,937	98	9,738	7,900	994	8,894	844	3,429
1995	3,822	2.60	9,937	98	9,738	8,045	994	9,039	745	4,174
1996	3,822	2.60	9,937	98	9,738	8,222	994	9,216	522	4,696
1997	3,822	2.60	9,937	98	9,738	8,433	994	9,427	311	5,007
1998	3,822	2.60	9,937	98	9,738	8,676	994	9,670	68	5,075

1/ From Tables 9A, 9B and 9C.

2/ Gross revenues from water sales reduced by bad debt allowance.

3/ Total of project debt service, operation and maintenance costs.

4/ Ten percent of gross water sales, after completion of construction.

5/ Includes costs of replacing the dirst complement of project components with seven years of life expectancy.

FINANCIAL TABLE 7

DARAGA WATER SUPPLY PROJECT

ILLUSTRATIVE RATE SCHEDULE

DOMESTIC AND GOVERNMENTAL SERVICE CONNECTIONS, 1/2"

Year	First 10 m^3 1/	Charge for Each Added m^3 2/			Charge 3/ per Revenue Unit
		11-20	21-45	over 45	
1981	17.50	0.84	0.98	1.19	0.70
1982	17.50	0.84	0.98	1.19	0.70
1983	27.50	1.32	1.54	1.87	1.10
1984	27.50	1.32	1.54	1.87	1.10
1985	40.00	1.92	2.24	2.72	1.60
1986	40.00	1.92	2.24	2.72	1.60
1987	43.75	2.10	2.45	2.98	1.75
1988	43.75	2.10	2.45	2.98	1.75
1989	52.50	2.52	2.94	3.57	2.10
1990	52.50	2.52	2.94	3.57	2.10
1991	57.50	2.76	3.22	3.91	2.30
1992	57.50	2.76	3.22	3.91	2.30
1993	65.00	3.12	3.64	4.42	2.60

Note: 1/ To obtain charge per m^3 for the first 10 m^3 classified by connection size, multiply R.U. charge shown in 3/ above by the following connection size factors.

Domestic : 1.0 for 3/8"; 2.5 for 1/2"; 4.0 for 3/4"; 8 for 1"

Commerical: 5.0 for 1/2"; 8.0 for 3/4"; 16.0 for 1"; 40.0 for 1 1/2"

2/ To obtain charge for each added m^3, multiply R.U. charges shown in 3/ by the following block factors.

Domestic : 1.2 for 11-20 m^3; 1.4 for 21-45 m^3; 1.7 for over 45 m^3

Commercial: 2.4 for 21-45 m^3; 2.8 for 45-100 m^3; 2.4 for over 100 m^3

FINANCIAL TABLE 8

DARAGA WATER SUPPLY PROJECT

GROWTH IN POPULATION, SERVICE CONNECTIONS AND IN DELIVERED AND PROCURED WATER

1	2	3	4	5	6	7	8
Year	Ave. Number Service Connections	Number For Service	Persons Served	Daily Use lpcd 1/	Annual Water Supply (1,000 M^3)		
					Delivered	% Unacct.	Produced
1981	1,223	14.9	18,200	63	418	45	759
1982	1,267	13.6	18,800	63	433	43	759
1983	1,511	13.3	20,100	63	482	40	803
1984	1,677	13.0	21,800	63	502	40	836
1985	1,922	11.6	22,300	126	1,026	40	1,710
1986	2,171	10.5	22,800	136	1,132	37	1,798
1987	2,456	9.5	23,270	148	1,253	34	1,899
1988	2,938	8.8	25,900	146	1,383	32	2,034
1989	3,555	8.1	28,800	146	1,535	30	2,193
1990	4,312	7.3	31,600	146	1,686	28	2,342
1991	5,250	6.5	34,200	148	1,843	26	2,490
1992	6,508	5.7	36,800	147	1,973	25	2,631
1993	8,235	4.8	39,240	145	2,083	25	2,777

1/ Liters per capita per day.

I + II

FINANCIAL TABLE 9A

DARAGA WATER SUPPLY PROJECT

CALCULATION OF REVENUE UNITS

A) AVERAGE NUMBER OF CONCESSIONAIRES

Year	Residential and Government					Commercial and Industrial					Total
	3/8"	1/2"	3/4"	1"	S-Total	1/2"	3/4"	1"	1 1/2"	S-Total	
1981	339	780	10	1	1,130	78	10	3	2	93	1,223
1982	374	860	12	1	1,247	78	10	3	2	93	1,340
1983	386	887	12	1	1,285	80	11	4	2	97	1,382
1984	434	997	12	2	1,445	85	11	4	2	102	1,547
1985	490	1,126	14	2	1,632	143	19	7	3	172	1,804
1986	557	1,280	16	2	1,855	202	27	10	3	242	2,097
1987	640	1,472	19	3	2,134	270	35	12	5	322	2,456
1988	783	1,801	23	3	2,610	275	36	12	5	328	2,938
1989	966	2,222	29	4	3,221	280	36	13	5	334	3,555
1990	1,192	2,741	35	4	3,972	285	36	14	5	340	4,312
1991	1,471	3,384	44	5	4,904	289	38	14	5	346	5,250
1992	1,847	4,248	55	6	6,151	294	39	14	5	352	6,508
1993	2,363	5,436	71	8	7,878	299	39	14	5	357	8,235

B) SERVICE REVENUE UNITS PER CUBIC METER

Year	Residential and Government					Commercial and Industrial					Total
	1.00	2.50	4.0	8.0	S-total	5.0	8.0	16.0	40.0	S-Total	
1981	339	1,950	40	8	2,337	390	80	48	80	598	2,935
1982	374	2,150	48	8	2,580	390	80	48	80	598	3,178
1983	386	2,218	48	8	2,660	400	88	64	80	632	3,292
1984	434	2,493	48	16	2,991	425	88	64	80	657	3,648
1985	490	2,815	56	16	3,377	715	152	112	120	1,099	4,476
1986	557	3,200	64	16	3,837	1,010	216	160	120	1,506	5,343
1987	640	3,680	76	24	4,420	1,350	280	192	200	2,022	6,442
1988	783	4,503	92	24	5,402	1,379	288	192	200	2,022	7,424
1989	966	5,555	116	32	6,669	1,400	288	208	200	2,096	8,765
1990	1,192	6,853	140	32	8,217	1,425	288	224	200	2,137	10,354
1991	1,471	8,460	176	40	10,147	1,445	304	224	200	2,173	12,320
1992	1,847	10,620	220	48	12,735	1,470	312	224	200	2,206	14,941
1993	2,363	13,590	284	64	16,301	1,495	312	224	200	2,231	18,532

FINANCIAL TABLE 9B1

DARAGA WATER SUPPLY PROJECT

CALCULATION OF REVENUE UNITS

I + II

DOMESTIC

Year	Delivered Water (x1000 cum)	Service Connections (x 0.12)	Net	11 - 20 cum		21 - 45 cum		over 45 cum		Total CRU's
				cum	x 1.2	cum	x 1.4	cum	x 1.7	
1981	372	136	236	136	163	100	140	-	-	303
1982	385	150	235	150	180	85	119	-	-	299
1983	429	154	275	154	185	121	169	-	-	354
1984	446	173	273	173	208	100	140	-	-	348
1985	913	196	717	196	235	521	729	-	-	964
1986	1,008	223	785	223	268	562	787	-	-	1,055
1987	1,116	256	860	256	307	604	846	-	-	1,153
1988	1,230	313	917	313	376	604	846	-	-	1,222
1989	1,366	387	979	387	464	592	829	-	-	1,293
1990	1,501	477	1,024	477	572	547	766	-	-	1,338
1991	1,640	588	1,052	588	706	464	650	-	-	1,356
1992	1,756	739	1,017	739	887	278	389	-	-	1,276
1993	1,853	945	908	945	1,134	-	-	-	-	1,134

FINANCIAL TABLE 9B2

DARAGA WATER SUPPLY PROJECT

CALCULATION OF WATER REVENUES UNITS

I + II

COMMERCIAL

Year	Delivered Water (x1000 cum)	Service Connections (x 0.12)	Net	11 - 45 cum		46 - 100 cum		Over 100 cum		Total CRU's
				cum	x 2.4	cum	x 2.8	cum	x 3.4	
1981	46	11	35	35	84	-	-	-	-	84
1982	48	11	37	37	89	-	-	-	-	89
1983	53	12	41	41	98	-	-	-	-	98
1984	56	12	44	43	103	1	3	-	-	106
1985	113	21	92	72	172	20	56	-	-	228
1986	124	29	95	95	228	-	-	-	-	228
1987	137	39	98	98	235	-	-	-	-	235
1988	153	39	114	114	274	-	-	-	-	274
1989	169	40	129	129	310	-	-	-	-	310
1990	185	41	144	143	343	1	3	-	-	346
1991	203	42	161	145	348	16	45	-	-	393
1992	217	42	175	148	355	27	76	-	-	431
1993	230	43	187	150	360	37	104	-	-	464

FINANCIAL TABLE 9C

SUMMARY OF REVENUE UNITS

I + II

Year	Residential and Governmental				Commercial and Industrial				Total All
	Service			Total R & C	Service			Total C & I	
	RU/Serv. Connection	Multiplied by 0.12	Commodity Rev. Units		RU/Serv. Connection	Multiplied by 0.12	Commodity Rev. Units		
1981	2,337	280	303	583	598	72	84	156	739
1982	2,580	310	299	609	598	72	89	161	770
1983	2,660	319	354	673	632	76	98	174	847
1984	2,991	359	348	707	657	79	106	185	892
1985	3,377	405	964	1,369	1,099	132	228	360	1,729
1986	3,837	460	1,055	1,515	1,506	181	228	409	1,924
1987	4,420	530	1,153	1,683	2,022	243	235	478	2,161
1988	5,402	648	1,222	1,870	2,022	243	274	517	2,387
1989	6,669	800	1,293	2,093	2,096	252	310	562	2,655
1990	8,217	986	1,338	2,324	2,137	256	346	602	2,926
1991	10,147	1,218	1,356	2,574	2,173	261	393	654	3,228
1992	12,735	1,528	1,276	2,804	2,206	265	431	696	3,500
1993	16,301	1,956	1,134	3,090	2,231	268	464	732	3,822

経　済　評　価　分　析　表

（第一期＋第二期）

ECONOMIC TABLE 1

I + II DARAGA WATER SUPPLY PROJECT

SUMMARY OF PROJECT COST

Costs as of July 1, 1981 in 1,000 Pesos

Components	Total Cost	Foreign Currency Portion	Local Currency Portion
1. Intake Facilities	700	175	525
2. Ground Reservoir	3,060	765	2,295
3. Transmission	6,424	4,304	2,120
4. Distribution	5,996	4,018	1,978
5. Valves	312	228	84
6. Fire Hydrants	450	297	153
7. Pumps	972	583	389
8. Meters	4,660	3,592	1,068
9. Chlorinators	30	27	3
10. Vehicles	210	105	105
11. Engineering	2,396	1,480	916
12. Lands	156	-	156
13. Supervision	798	493	305
14.			
15.			
16.			
17.			

Source: From Cost Estimates

ECONOMIC TABLE 2

I + II

DARAGA WATER SUPPLY PROJECT

ANNUAL DEMAND AND GROSS PRODUCTION IN 1,000 M^3

1	2	3	4	5	6	7	8	9
Year	Average Connections	Persons Per Service Connection	Population Served	Average Water Use		Net Increase in Delivered Volume	Unacounted Percentage	Annual Production
				Liters/ Capita Per Day	Water Delivered Annually			
1981	1,223	14.9	18,200	64	424		45	770
1982	1,340	13.6	18,200	64	433		45	788
1983	1,382	14.0	19,300	64	448		45	814
1984	1,547	13.0	20,100	64	466	18	45	847
1985	1,804	11.6	21,000	136	1,040	592	40	1,734
1986	2,097	10.5	22,000	143	1,148	700	37	1,823
1987	2,456	9.5	23,270	150	1,271	823	34	1,925
1988	2,938	8.8	25,900	148	1,402	954	32	2,062
1989	3,555	8.1	28,800	148	1,556	1,108	30	2,223
1990	4,312	7.3	31,600	148	1,709	1,261	28	2,374
1991	5,250	6.5	34,200	148	1,868	1,420	26	2,524
1992	6,508	5.7	36,800	149	2,000	1,552	25	2,667
1993	8,235	4.8	39,240	147	2,111	1,663	25	2,815

ECONOMIC TABLE 3-A

DARAGA WATER SUPPLY PROJECT

CONVERSION OF CONSTRUCTION COST TO ECONOMIC COST

Costs as of July 1, 1981 in 1,000 Pesos

I + II

Daraga

Component	Foreign Costs	Local Costs	Common Labor Costs	Residual Local Cost	Converted Value			
					Foreign x 1.25	Labor x 0.5	Residual x 0.95	Total
1. Intake Facilities	175	525	341	184	263	171	175	609
2. Reservoir	765	2,295	1,492	803	1,148	746	763	2,657
3. Transmission	4,304	2,120	574	1,546	6,456	287	1,469	8,212
4. Distribution	4,018	1,978	791	1,187	6,027	396	1,128	7,551
5. Valves	228	84	34	50	342	17	48	407
6. Hydrants	297	153	61	92	446	31	87	564
7. Pumps	583	389	194	195	875	97	185	1,157
8. Meters	3,592	1,068	214	854	5,388	107	811	6,306
9. Chlorinators	27	3	-	3	41	-	3	44
10. Vehicles	105	105	-	105	158	-	100	258
11. Engineering	1,480	916	-	916	2,220	-	870	3,090
12. Lands	-	156	-	156	-	-	148	148
13. Supervision	493	305	-	305	616	-	290	906
14.								
15.								
16.								
17.								

ECONOMIC TABLE 3-B

I + II

DARAGA WATER SUPPLY PROJECT

CONVERSION OF CONSTRUCTION COST TO ECONOMIC COST

Costs as of July 1, 1981 in 1,000 Pesos

Component	Foreign Costs	Local Costs	Common Labor Costs	Residual Local Cost	Converted Value			
					Foreign x 1.0	Labor x 0.5	Residual x 0.95	Total
1. Intake Facilities	175	525	341	184	175	171	175	521
2. Reservoirs	765	2,295	1,492	803	765	746	763	2,274
3. Transmission	4,304	2,120	574	1,546	4,304	287	1,469	6,060
4. Distribution	4,018	1,978	791	1,187	4,018	396	1,128	5,542
5. Valves	228	84	34	50	228	17	48	293
6. Hydrants	297	153	61	92	297	31	87	415
7. Pumps	583	389	194	195	583	97	185	865
8. Meters	3,592	1,068	214	854	3,592	107	811	4,510
9. Chlorinators	27	3	-	3	27	-	3	30
10. Vehicles	105	105	-	105	105	-	100	205
11. Engineering	1,480	916	-	916	1,480	-	870	2,350
12. Lands	-	156	-	156	-	-	148	148
13. Supervision	493	305	-	305	493	-	290	783
14.								
15.								
16.								
17.								

ECONOMIC TABLE 3-C

I + II

DARAGA WATER SUPPLY PROJECT

CONVERSION OF CONSTRUCTION COST TO ECONOMIC COST

Costs as of July 1, 1981 in 1,000 Pesos

Component	Foreign Costs	Local Costs	Common Labor Costs	Residual Local Cost	Converted Value			
					Foreign x 1.25	Labor x 1.0	Residual x 1.0	Total
1. Intake Facilities	175	525	341	184	263	341	184	788
2. Reservoirs	765	2,295	1,492	803	1,148	1,492	803	3,443
3. Transmission	4,304	2,120	574	1,546	6,456	574	1,546	8,576
4. Distribution	4,018	1,978	791	1,187	6,027	791	1,187	8,005
5. Valves	228	84	34	50	342	34	50	426
6. Hydrants	297	153	61	92	446	61	92	599
7. Pumps	583	389	194	195	875	194	195	1,264
8. Meters	3,592	1,068	214	854	5,388	214	854	6,456
9. Chlorinators	27	3	-	3	41	-	3	44
10. Vehicles	105	105	-	105	158	-	105	263
11. Engineering	1,480	916	-	916	3,220	-	916	4,136
12. Lands	-	156	-	156	-	-	156	156
13. Supervision	493	305	-	305	616	-	305	921
14.								
15.								
16.								
17.								

ECONOMIC TABLE 4-0

DARAGA WATER SUPPLY PROJECT

ECONOMIC COSTS DISTRIBUTED TO YEARS I + II

₱ x 1,000

Value without CONVERSION

Components	Total	1983	1984	1985	1986	1987	1988
1. Intake Facilities	700	-	700	-	-	-	-
2. Reservoir	3,060	-	-	-	1,531	-	1,529
3. Transmission	6,424	-	658	1,917	2,931	821	97
4. Distribution	5,996	-	1,732	1,060	2,447	389	368
5. Valves	312	-	77	77	114	24	20
6. Hydrants	450	-	150	-	247	23	30
7. Pumps	972	-	389	583	-	-	-
8. Meters	4,660	-	3,766	258	210	209	217
9. Chlorinators	30	-	-	29	-	-	1
10. Vehicles	210	-	140	70	-	-	-
11. Engineering	2,396	2,396	-	-	-	-	-
12. Lands	156	-	108	48	-	-	-
13. Supervision	798		160	160	160	159	159
14.							
15.							
16.							
17.							
18.							
Total	26,164	2,396	7,880	4,202	7,640	1,625	2,421

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ECONOMIC TABLE 4-A

DARAGA WATER SUPPLY PROJECT

ECONOMIC COSTS DISTRIBUTED TO YEARS

₱ x 1,000

I + II

Value with CONVERSION A

Components	Total	1983	1984	1985	1986	1987	1988
1. Intake Facilities	609	-	609	-	-	-	-
2. Reservoirs	2,657	-	-	-	1,328	-	1,329
3. Transmission	8,212	-	821	2,464	3,778	985	164
4. Distribution	7,551	-	2,190	1,359	3,020	453	529
5. Valves	407	-	102	102	147	33	23
6. Hydrants	564	-	186	-	316	28	34
7. Pumps	1,157	-	463	694	-	-	-
8. Meters	6,306	-	5,045	378	315	253	315
9. Chlorinators	44	-	-	43	-	-	1
10. Vehicles	258	-	173	85	-	-	-
11. Engineering	3,090	3,090	-	-	-	-	-
12. Lands	148	-	102	46	-	-	-
13. Supervision	906		182	181	181	181	181
14.							
15.							
16.							
17.							
18.							
Total	31,909	3,090	9,873	5,352	9,085	1,933	2,576

ECONOMIC TABLE 4-B

DARAGA WATER SUPPLY PROJECT

ECONOMIC COSTS DISTRIBUTED TO YEARS

₱ x 1,000

Value with CONVERSION B

Components	Total	1983	1984	1985	1986	1987	1988
1. Intake Facilities	521	-	521	-	-	-	-
2. Reservoirs	2,274	-	-	-	1,137	-	1,137
3. Transmission	6,060	-	606	1,818	2,788	788	60
4. Distribution	5,542	-	1,608	998	2,272	332	332
5. Valves	293	-	74	73	105	23	18
6. Hydrants	415	-	137	-	232	21	25
7. Pumps	865	-	346	519	-	-	-
8. Meters	4,510	-	3,608	271	226	180	225
9. Chlorinators	30	-	-	29	-	-	1
10. Vehicles	205	-	137	68	-	-	-
11. Engineering	2,350	2,350	-	-	-	-	-
12. Lands	148	-	102	46	-	-	-
13. Supervision	783	-	157	157	157	156	156
14.							
15.							
16.							
17.							
18.							
Total	23,996	2,350	7,296	3,979	6,917	1,500	1,954

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ECONOMIC TABLE 4-C

I + II

DARAGA WATER SUPPLY PROJECT
ECONOMIC COSTS DISTRIBUTED TO YEARS
₱ x 1,000

Value with CONVERSION C

Components	Total	1983	1984	1985	1986	1987	1988
1. Intake Facilities	788	-	788	-	-	-	-
2. Reservoirs	3,443	-	-	-	1,722	-	1,721
3. Transmission	8,576	-	858	2,573	3,945	1,029	171
4. Distribution	8,005	-	2,321	1,441	3,202	480	561
5. Valves	426	-	107	107	153	34	25
6. Hydrants	599	-	198	-	335	30	36
7. Pumps	1,264	-	506	758	-	-	-
8. Meters	6,456	-	4,713	516	387	388	452
9. Chlorinator	44	-	-	43	-	-	1
10. Vehicles	263	-	176	87	-	-	-
11. Engineering	4,136	4,136	-	-	-	-	-
12. Lands	156	-	108	48	-	-	-
13. Supervision	921	-	185	184	184	184	184
14.							
15.							
16.							
17.							
18.							
Total	35,077	4,136	9,960	5,757	9,928	2,145	3,151

ECONOMIC TABLE 5

DARAGA WATER SUPPLY PROJECT I + II

OPERATION AND MAINTENANCE EXPENSES

Costs as of July 1, 1981 in 1,000 Pesos

Year	Power	Chemicals	Others	Total	Net Costs
1981	-	30	174	204	
1982	-	31	174	205	
1983	-	32	174	206	1
1984	-	33	183	216	11
1985	-	68	210	278	73
1986	-	72	229	301	96
1987	-	76	274	350	145
1988	-	81	319	400	195
1989	-	88	374	462	257
1990	24	94	419	537	332
1991	52	100	473	625	420
1992	79	105	473	657	452
1993	107	111	473	691	486

Base Year = 1983

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ECONOMIC TABLE 6-0

DARAGA WATER SUPPLY PROJECT

LIFE EXPECTANCY AND REPLACEMENT SCHEDULES

I + II

₱ x 1,000

Value without CONVERSION

Components	Life Expectancy of Components				
	7 Years	15 Years	50 Years	Infinite	Total
1. Intake Facilities			700		700
2. Reservoirs			3,060		3,060
3. Transmission			6,424		6,424
4. Distribution			5,996		5,996
5. Valves			312		312
6. Hydrants			450		450
7. Pumps		972			972
8. Meters		4,660			4,660
9. Chlorinators	30				30
10. Vehicles	210				210
11. Lands				156	156
12.					

7 Year Items	Years of Installation					Years of Replacement				
1. Chlorinator	1985	1988				1992	1995	1999	2002	2006
2.						2009				
3. Vehicles	1984	1985				1991	1992	1998	1999	2005
4.						2006	2012			

15 Year Items	Years of Installation					Years of Replacement				
1. Pumps	1984	1985				1999	2000			
2. Meters	1984	1985	1986	1987	1988	1999	2000	2001	2002	2003
3.										
4.										

ECONOMIC TABLE 6-A

DARAGA WATER SUPPLY PROJECT
LIFE EXPECTANCY AND REPLACEMENT SCHEDULES I + II
₱ x 1,000

Value with CONVERSION A

Components	Life Expectancy of Components				
	7 Years	15 Years	50 Years	Infinite	Total
1. Intake Facilities			609		609
2. Reservoirs			2,657		2,657
3. Transmission			8,212		8,212
4. Distribution			7,551		7,551
5. Valves			407		407
6. Hydrants			564		564
7. Pumps		1,157			1,157
8. Meters		6,306			6,306
9. Chlorinators	44				44
10. Vehicles	258				258
11. Lands				148	148
12.					

7 Year Items	Years of Installation					Years of Replacement					
1. Chlorinator	1985	1988				1992	1995	1999	2002	2006	2009
2. Vehicles	1984	1985				1991	1992	1998	1999	2005	
3.						2006	2012				
4.											

15 Year Items	Years of Installation					Years of Replacement				
1. Pumps	1984	1985				1999	2000			
2. Meters	1984	1985	1986	1987	1988	1999	2000	2001	2002	2003
3.										
4.										

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ECONOMIC TABLE 6-B

I + II

DARAGA WATER SUPPLY PROJECT
LIFE EXPECTANCY AND REPLACEMENT SCHEDULES
P x 1,000

Value with CONVERSION B

Components	Life Expectancy of Components				
	7 Years	15 Years	50 Years	Infinite	Total
1. Intake Facilities			521		521
2. Reservoirs			2,274		2,274
3. Transmission			6,060		6,060
4. Distribution			5,542		5,542
5. Valves			293		293
6. Hydrants			415		415
7. Pumps		865			865
8. Meters		4,510			4,510
9. Chlorinators	30				30
10. Vehicles	205				205
11. Lands				148	148
12.					

7 Year Items	Years of Installation					Years of Replacement					
1. Chlorinator	1985	1988				1992	1995	1999	2002	2006	200
2. Vehicles	1984	1985				1991	1992	1998	1999	2005	
3.						2006	2012				
4.											

15 Year Items	Years of Installation					Years of Replacement				
1. Pumps	1984	1985				1999	2000			
2. Meters	1984	1985	1986	1987	1988	1999	2000	2001	2002	2003
3.										
4.										

ECONOMIC TABLE 6-C

DARAGA WATER SUPPLY PROJECT I + II

LIFE EXPECTANCY AND REPLACEMENT SCHEDULES

P x 1,000

Value with CONVERSION C

Components	Life Expectancy of Components				
	7 Years	15 Years	50 Years	Infinite	Total
1. Intake Facilities			788		788
2. Reservoirs			3,443		3,443
3. Transmission			8,576		8,576
4. Distribution			8,005		8,005
5. Valves			426		426
6. Hydrants			599		599
7. Pumps		1,264			1,264
8. Meters		6,456			6,456
9. Chlorinators	44				44
10. Vehicles	263				263
11. Lands				156	156
12.					

7 Year Items	Years of Installation					Years of Replacement					
1. Chlorinator	1985	1988				1992	1995	1999	2002	2006	2009
2. Vehicles	1984	1985				1991	1992	1998	1999	2005	
3.						2006	2012				
4.											

15 Year Items	Years of Installation					Years of Replacement				
1. Pumps	1984	1985				1999	2000			
2. Meters	1999	1985	1986	1987	1988	1999	2000	2001	2002	2003
3.										
4.										

I + II

ECONOMIC TABLE 7-0

DARAGA WATER SUPPLY PROJECT

CALCULATION OF SALVAGE VALUES

₱ x 1,000

Value without CONVERSION

Components	Base Year Value	Percentage of Base Year Value	31st Year Salvage Base Year Values
Infinite Life, Year Purchased			
Land	156	75%	117
50 Year Life, Year Constructed			
1 1984	3,317	42%	1,393
2 1985	3,054	44%	1,344
3 1986	7,270	46%	3,344
4 1987	1,257	48%	603
5 1988	2,044	50%	1,022
15 Year Life, Year of Replacement			
1 1999	4,155	7%	291
2 2000	841	13%	109
3 2001	210	20%	42
4 2002	209	27%	56
5 2003	217	33%	72
7 Year Life, Years of Final Replacement			
1 2006	99	0%	0
2 2009	1	43%	0
3 2012	140	86%	120
Total			8,513

ECONOMIC TABLE 7-A

DARAGA WATER SUPPLY PROJECT

CALCULATION OF SALVAGE VALUES

₱ x 1,000

Value with CONVERSION A

Components	Base Year Value	Percentage of Base Year Value	31st Year Salvage Base Year Values
Infinite Life, Year Purchased			
Land	148	75%	111
50 Year Life, Year Constructed			
1 1984	3,908	42%	1,641
2 1985	3,925	44%	1,727
3 1986	8,589	46%	3,951
4 1987	1,499	48%	720
5 1988	2,079	50%	1,040
15 Year Life, Year of Replacement			
1 1999	5,508	7%	386
2 2000	1,072	13%	139
3 2001	315	20%	63
4 2002	253	27%	68
5 2003	315	33%	104
7 Year Life, Years of Final Replacement			
1 2006	128	0%	0
2 2009	1	43%	0
3 2012	173	86%	149
Total			10,099

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I + II

ECONOMIC TABLE 7-B

DARAGA WATER SUPPLY PROJECT

CALCULATION OF SALVAGE VALUES

₱ x 1,000

Value with CONVERSION B

Components	Base Year Value	Percentage of Base Year Value	31st Year Salvage Base Year Values
Infinite Life, Year Purchased			
Land	148	75%	111
50 Year Life, Year Constructed			
1 1984	2,946	42%	1,237
2 1985	2,889	44%	1,271
3 1986	6,534	46%	3,006
4 1987	1,164	48%	559
5 1988	1,572	50%	786
15 Year Life, Year of Replacement			
1 1999	3,954	7%	277
2 2000	790	13%	103
3 2001	226	20%	45
4 2002	180	27%	49
5 2003	225	33%	74
7 Year Life, Years of Final Replacement			
1 2006	97	0%	0
2 2009	1	43%	0
3 2012	137	86%	118
Total			7,636

ECONOMIC TABLE 7-C

I + II

DARAGA WATER SUPPLY PROJECT

CALCULATION OF SALVAGE VALUES

₱ x 1,000

Value with CONVERSION C

Components	Base Year Value	Percentage of Base Year Value	31st Year Salvage Base Year Values
Infinite Life, Year Purchased			
Land	156	75%	117
50 Year Life, Year Constructed			
1 1984	4,272	42%	1,794
2 1985	4,121	44%	1,813
3 1986	9,357	46%	4,304
4 1987	1,573	48%	755
5 1988	2,514	50%	1,257
15 Year Life, Year of Replacement			
1 1999	5,219	7%	365
2 2000	1,274	13%	166
3 2001	387	20%	77
4 2002	388	27%	105
5 2003	452	33%	149
7 Year Life, Years of Final Replacement			
1 2006	130	0%	0
2 2009	1	43%	0
3 2012	176	86%	151
Total			11,053

ECONOMIC TABLE 8-0

DARAGA WATER SUPPLY PROJECT

SUMMARY OF ALL PROJECT COSTS

Costs as of July 1, 1981 in 1,000 Pesos

Value without CONVERSION

Year	Cost of Facilities	Net O & M	Replace-ment Costs	Total	Salvage	Net Cost
1982						
1983	2,396	1		2,397		
1984	7,880	11		7,891		
1985	4,202	73		4,275		
1986	7,640	96		7,736		
1987	1,625	145		1,770		
1988	2,421	195		2,616		
1989		257		257		
1990		332		332		
1991		420	140	560		
1992		452	99	551		
1993		486		486		
1994		486		486		
1995		486	1	487		
1996		486		486		
1997		486		486		
1998		486	140	626		
1999		486	4,254	4,740		
2000		486	841	1,327		
2001		486	210	696		
2002		486	210	696		
2003		486	217	703		
2004		486		486		
2005		486	140	626		
2006		486	99	585		
2007		486		486		
2008		486		486		
2009		486	1	487		
2010		486		486		
2011		486		486		
2012		486	140	626		
Total	26,164	11,702	6,492	44,358	(8,513)	35,845

ECONOMIC TABLE 8-A

DARAGA WATER SUPPLY PROJECT

SUMMARY OF ALL PROJECT COSTS

Costs as of July 1, 1981 in 1,000 Pesos

Value with CONVERSION A

Year	Cost of Facilities	Net O & M	Replace-ment Costs	Total	Salvage	Net Cost
1982						
1983	3,090	1		3,091		
1984	9,873	11		9,884		
1985	5,352	73		5,425		
1986	9,085	96		9,181		
1987	1,933	145		2,078		
1988	2,576	195		2,771		
1989		257		257		
1990		332		332		
1991		420	173	593		
1992		452	128	580		
1993		486		486		
1994		486		486		
1995		486	1	487		
1996		486		486		
1997		486		486		
1998		486	173	659		
1999		486	5,636	6,122		
2000		486	1,072	1,558		
2001		486	315	801		
2002		486	254	740		
2003		486	315	801		
2004		486		486		
2005		486	173	659		
2006		486	128	614		
2007		486		486		
2008		486		486		
2009		486	1	487		
2010		486		486		
2011		486		486		
2012		486	173	659		
Total	31,909	11,702	8,542	52,153	(10,099)	42,054

I + II

ECONOMIC TABLE 8-B

DARAGA WATER SUPPLY PROJECT
SUMMARY OF ALL PROJECT COSTS
Costs as of July 1, 1981 in 1,000 Pesos

Value with CONVERSION B

Year	Cost of Facilities	Net O & M	Replace-ment Costs	Total	Salvage	Net Cost
1982						
1983	2,350	1		2,351		
1984	7,296	11		7,307		
1985	3,979	73		4,052		
1986	6,917	96		7,013		
1987	1,500	145		1,645		
1988	1,954	195		2,149		
1989		257		257		
1990		332		332		
1991		420	137	557		
1992		452	97	549		
1993		486		486		
1994		486		486		
1995		486	1	487		
1996		486		486		
1997		486		486		
1998		486	137	623		
1999		486	4,051	4,537		
2000		486	790	1,276		
2001		486	226	712		
2002		486	181	667		
2003		486	225	711		
2004		486		486		
2005		486	137	623		
2006		486	97	583		
2007		486		486		
2008		486		486		
2009		486	1	487		
2010		486		486		
2011		486		486		
2012		486	137	623		
Total	23,996	11,702	6,217	41,915	(7,636)	34,279

ECONOMIC TABLE 8-C

I + II

DARAGA WATER SUPPLY PROJECT
SUMMARY OF ALL PROJECT COSTS
Costs as of July 1, 1981 in 1,000 Pesos

Value with CONVERSION C

Year	Cost of Facilities	Net O & M	Replace-ment Costs	Total	Salvage	Net Cost
1982						
1983	4,136	1		4,137		
1984	9,960	11		9,971		
1985	5,757	73		5,830		
1986	9,928	96		10,024		
1987	2,145	145		2,290		
1988	3,151	195		3,346		
1989		257		257		
1990		332		332		
1991		420	176	596		
1992		452	130	582		
1993		486		486		
1994		486		486		
1995		486	1	487		
1996		486		486		
1997		486		486		
1998		486	176	662		
1999		486	5,349	5,835		
2000		486	1,274	1,760		
2001		486	387	873		
2002		486	389	875		
2003		486	452	938		
2004		486		486		
2005		486	176	662		
2006		486	130	616		
2007		486		486		
2008		486		486		
2009		486	1	487		
2010		486		486		
2011		486		486		
2012		486	176	662		
Total	35,077	11,702	8,817	55,596	(11,053)	44,543

I + II

ECONOMIC TABLE 9

DARAGA WATER SUPPLY PROJECT

BENEFITS AT 1981 PRICES

(₱ x 1,000)

Year	Volume	Qualitative	Fire Loss Reduction	Total	National Interest Adjustment
1982					
1983					
1984	67	166	70	303	333
1985	2,190	332	81	2,603	2,863
1986	2,590	497	94	3,181	3,499
1987	3,045	497	111	3,653	4,018
1988	3,530	497	135	4,162	4,578
1989	4,100	497	160	4,757	5,233
1990	4,666	497	195	5,358	5,894
1991	5,254	497	283	6,034	6,637
1992	5,742	497	294	6,533	7,186
1993	6,153	497	327	6,977	7,675
1994	6,153	497	327	6,977	7,675
1995	6,153	497	327	6,977	7,675
1996	6,153	497	327	6,977	7,675
1997	6,153	497	327	6,977	7,675
1998	6,153	497	327	6,977	7,675
1999	6,153	497	327	6,977	7,675
2000	6,153	497	327	6,977	7,675
2001	6,153	497	327	6,977	7,675
2002	6,153	497	327	6,977	7,675
2003	6,153	497	327	6,977	7,675
2004	6,153	497	327	6,977	7,675
2005	6,153	497	327	6,977	7,675
2006	6,153	497	327	6,977	7,675
2007	6,153	497	327	6,977	7,675
2008	6,153	497	327	6,977	7,675
2009	6,153	497	327	6,977	7,675
2010	6,153	497	327	6,977	7,675
2011	6,153	497	327	6,977	7,675
2012	6,153	497	327	6,977	7,675
Total	154,244	13,917	7,963	176,124	193,741

ECONOMIC TABLE 10-0

DARAGA WATER SUPPLY PROJECT

INTERNAL RATE OF RETURN COMPUTATION

I & II

Cost Value without CONVERSION

Year	Total Cost	Total Benefit	Net Benefit	Present Benefit
1982				
1983	2,397	-	-2,397	-2,397
1984	7,891	333	-7,558	-6,180
1985	4,275	2,863	-1,412	-944
1986	7,236	3,499	-4,237	-2,316
1987	1,770	4,018	2,248	1,005
1988	2,616	4,578	1,962	717
1989	257	5,233	4,976	1,487
1990	332	5,894	5,562	1,359
1991	560	6,637	6,077	1,214
1992	551	7,186	6,635	1,083
1993	486	7,675	7,189	960
1994	486	7,675	7,189	785
1995	487	7,675	7,188	642
1996	486	7,675	7,189	525
1997	486	7,675	7,189	429
1998	626	7,675	7,049	344
1999	4,740	7,675	2,935	117
2000	1,327	7,675	6,348	207
2001	696	7,675	6,979	186
2002	696	7,675	6,979	152
2003	703	7,675	6,972	124
2004	486	7,675	7,189	105
2005	626	7,675	7,049	84
2006	585	7,675	7,090	69
2007	486	7,675	7,189	57
2008	486	7,675	7,189	47
2009	487	7,675	7,188	38
2010	486	7,675	7,189	31
2011	486	7,675	7,189	26
2012	626	7,675	15,562*	45
Salvage(-)	8,513			
Total	35,845	193,741	157,896	1

* Values include salvage.

Rate of Return = 0.22

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I + II

ECONOMIC TABLE 10-A

DARAGA WATER SUPPLY PROJECT

INTERNAL RATE OF RETURN COMPUTATION

Cost Value with CONVERSION A

Year	Total Cost	Total Benefit	Net Benefit	Present Benefit
1982				
1983	3,091	-	-3,091	-3,091
1984	9,884	333	-9,551	-8,082
1985	5,425	2,863	-2,562	-1,835
1986	9,181	3,499	-5,682	-3,443
1987	2,078	4,018	1,940	995
1988	2,771	4,578	1,807	784
1989	257	5,233	4,976	1,827
1990	332	5,894	5,562	1,728
1991	593	6,637	6,044	1,589
1992	580	7,186	6,606	1,470
1993	486	7,675	7,189	1,354
1994	486	7,675	7,189	1,145
1995	487	7,675	7,188	969
1996	486	7,675	7,189	820
1997	486	7,675	7,189	694
1998	659	7,675	7,016	573
1999	6,122	7,675	1,553	107
2000	1,558	7,675	6,117	358
2001	801	7,675	6,874	340
2002	740	7,675	6,935	291
2003	801	7,675	6,874	244
2004	486	7,675	7,189	216
2005	659	7,675	7,016	178
2006	614	7,675	7,061	152
2007	486	7,675	7,189	131
2008	486	7,675	7,189	111
2009	487	7,675	7,188	94
2010	486	7,675	7,189	79
2011	486	7,675	7,189	67
2012	659	7,675	17,115*	135*
Salvage(-)	10,099			
Total	42,054	193,741	151,687	0

* Values include salvage.

Rate of Return = 0.18

ECONOMIC TABLE 10-B

DARAGA WATER SUPPLY PROJECT

I + II

INTERNAL RATE OF RETURN COMPUTATION

Cost Value with CONVERSION B

Year	Total Cost	Total Benefit	Net Benefit	Present Benefit
1982				
1983	2,351	-	-2,351	-2,351
1984	7,307	333	-6,974	-5,624
1985	4,052	2,863	-1,189	-773
1986	7,013	3,499	-3,514	-1,843
1987	1,645	4,018	2,373	1,004
1988	2,149	4,578	2,429	829
1989	257	5,233	4,976	1,369
1990	332	5,894	5,562	1,234
1991	557	6,637	6,080	1,088
1992	549	7,186	6,637	958
1993	486	7,675	7,189	837
1994	486	7,675	7,189	675
1995	487	7,675	7,188	544
1996	486	7,675	7,189	439
1997	486	7,675	7,189	354
1998	623	7,675	7,052	280
1999	4,537	7,675	3,138	101
2000	1,276	7,675	6,399	165
2001	712	7,675	6,963	145
2002	667	7,675	7,008	118
2003	711	7,675	6,964	94
2004	486	7,675	7,189	79
2005	623	7,675	7,052	62
2006	583	7,675	7,092	50
2007	486	7,675	7,189	41
2008	486	7,675	7,189	33
2009	487	7,675	7,188	27
2010	486	7,675	7,189	22
2011	486	7,675	7,189	17
2012	623	7,675	13,990 *	27*
Salvage(-)	7,636			
Total	34,279	193,741	159,462	1

* Values include salvage.

Rate of Return = 0.24

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I + II

ECONOMIC TABLE 10-C

DARAGA WATER SUPPLY PROJECT

INTERNAL RATE OF RETURN COMPUTATION

Cost Value with CONVERSION C

Year	Total Cost	Total Benefit	Net Benefit	Present Benefit
1982				
1983	4,137	-	-4,137	-4,137
1984	9,971	333	-9,638	-8,268
1985	5,830	2,863	-2,967	-2,183
1986	10,024	3,499	-6,525	-4,119
1987	2,290	4,018	1,728	936
1988	3,346	4,578	1,232	572
1989	257	5,233	4,976	1,983
1990	332	5,894	5,562	1,901
1991	596	6,637	6,041	1,771
1992	582	7,186	6,604	1,661
1993	486	7,675	7,189	1,551
1994	486	7,675	7,189	1,331
1995	487	7,675	7,188	1,141
1996	486	7,675	7,189	979
1997	486	7,675	7,189	840
1998	662	7,675	7,013	703
1999	5,835	7,675	1,840	158
2000	1,760	7,675	5,915	436
2001	873	7,675	6,802	430
2002	875	7,675	6,800	369
2003	938	7,675	6,737	314
2004	486	7,675	7,189	287
2005	662	7,675	7,013	240
2006	616	7,675	7,059	207
2007	486	7,675	7,189	181
2008	486	7,675	7,189	155
2009	487	7,675	7,188	133
2010	486	7,675	7,189	114
2011	486	7,675	7,189	98
2012	662	7,675	18,066*	212*
Salvage(-)	11,053			
Total	44,543	193,741	149,198	-4

* Values include salvage.

Rate of Return = 0.17

政府補助金率算定のための財政分析資料

〔政府補助金率を一段階低い１５％（対総投資額）とした場合の財政分析結果は非有意。〕

Daraga

I + II

FINANCIAL TABLE 3

DARAGA WATER SUPPLY PROJECT
LOAN DISBURSEMENTS AND DEBT SERVICE
(₱1,000's)

Year	Disbursement 1/		Loans Outstanding		Interest Payments		Principal Payments 3/	Total Debt Service
	Grant 15%	Loan 85%	Beginning	Ending	First Year 2/	Later Years		
1981								
1982								
1983	523	2,963		2,963	133			133
1984	1,977	11,206	2,963	14,169	504	266		770
1985	1,181	6,692	14,169	20,861	301	1,274		1,575
1986	2,405	13,628	20,861	34,489	613	1,876		2,489
1987	573	3,247	34,489	37,736	146	3,102		3,248
1988	956	5,417	37,736	43,153	243	3,394		3,637
1989			43,153	43,031		3,879	122	4,001
1990			43,031	42,443		3,858	588	4,446
1991			42,443	41,577		3,799	866	4,665
1992			41,577	40,145		3,709	1,432	5,141
1993			40,145	38,579		3,577	1,566	5,143
1994			38,579	36,789		3,432	1,790	5,222
1995			36,789	34,999		3,271	1,790	5,061
1996			34,999	33,209		3,110	1,790	4,900
1997			33,209	31,419		2,948	1,790	4,738
1998			31,419	29,629		2,787	1,790	4,577

1/ From Financial Table 1.

2/ Disbursements assumed to be equally spread during year. Charge with 50 per cent of annual interest in first year.

3/ Principal payments according to LWUA year plan.

FINANCIAL TABLE 4

DARAGA WATER SUPPLY PROJECT
CASH REQUIREMENTS PER REVENUE UNIT
(₱1,000's)

Year	Debt Service	O & M	Total Costs	Estimated Reserves 1/	Cost With Reserves	Revenue Units 2/	Cost Per Revenue Unit 3/
1981		204	204		204	739	0.28
1982		236	236		236	770	0.31
1983	133	272	405		405	847	0.48
1984	770	329	1,099		1,099	892	1.23
1985	1,575	474	2,049		2,049	1,729	1.19
1986	2,489	574	3,063		3,063	1,924	1.59
1987	3,248	748	3,996		3,996	2,161	1.85
1988	3,637	957	4,594		4,594	2,387	1.92
1989	4,001	1,238	5,239	262	5,501	2,655	2.07
1990	4,446	1,583	6,029	301	6,330	2,926	2.16
1991	4,665	2,027	6,692	669	7,361	3,228	2.28
1992	5,141	2,344	7,485	749	8,234	3,500	2.35
1993	5,143	2,712	7,855	786	8,641	3,822	2.26
1994	5,222	2,983	8,205	821	9,026	3,822	2.36
1995	5,061	3,281	8,342	834	9,176	3,822	2.40
1996	4,900	3,609	8,509	851	9,360	3,822	2.45
1997	4,738	3,970	8,708	871	9,579	3,822	2.51
1998	4,577	4,367	8,944	894	9,838	3,822	2.57

1/ Reserve estimate equal to 10 per cent of total costs. (5 per cent for the first two years)

2/ Revenue units from Tables 9A, 9B and 9C.

3/ Revenue units divided into costs with reserves.

FINANCIAL TABLE 6 - A

DARAGA WATER SUPPLY PROJECT

ILLUSTRATIVE CASH FLOW TABLE

₱1,000's EXCEPT CHARGES PER UNIT

Year	Revenue Units 1/	Charges Per Unit	Gross Revenues	Net Revenue 2/		Basic Costs 3/	Required Reserves 4/	Total Costs 5/	Net Income	
				%	Amount				Annual	Cumulative
1981	739	0.70	517	95	491	204		204	287	287
1982	770	0.70	539	95	512	236		236	276	563
1983	847	1.10	932	96	894	405		405	489	1,052
1984	892	1.10	981	96	942	1,099		1,099	-157	895
1985	1,729	1.60	2,766	96	2,655	2,049		2,049	606	1,501
1986	1,924	1.60	3,078	97	2,986	3,063		3,063	-77	1,424
1987	2,161	1.75	3,782	97	3,669	3,996		3,996	-327	1,097
1988	2,387	1.75	4,177	97	4,052	4,594		4,594	-542	555
1989	2,655	2.10	5,576	98	5,464	5,239	279	5,518	-54	501
1990	2,926	2.10	6,145	98	6,022	6,029	307	6,336	-314	187
1991	3,228	2.30	7,424	98	7,276	6,692	742	7,434	-158	29
1992	3,500	2.30	8,050	98	7,889	7,485	805	8,290	-401	-372
1993	3,822	2.60	9,937	98	9,738	7,855	994	8,849	889	517

1/ From Tables 9A, 9B and 9C.
2/ Gross revenues from water sales reduced by bad debt allowance.
3/ Total of project debt service, operation and maintenance costs.
4/ Ten percent of gross water sales, after completion of construction. (5 percent for the first two years)
5/ Includes the costs of replacing the first complement of project components with seven years of life expectancy.

FINANCIAL TABLE 6 - B

DARAGA WATER SUPPLY PROJECT

ILLUSTRATIVE CASH FLOW TABLE

₱1,000's EXCEPT CHARGES PER UNIT

Year	Revenue Units 1/	Charges Per Unit	Gross Revenues	Net Revenues 2/		Basic Costs 3/	Required Reserves 4/	Total Costs 5/	Net Income	
				%	Amount				Annual	Cumulative
1994	3,822	2.60	9,937	98	9,738	8,205	994	9,199	539	1,056
1995	3,822	2.60	9,937	98	9,738	8,342	994	9,336	402	1,458
1996	3,822	2.60	9,937	98	9,738	8,509	994	9,503	235	1,693
1997	3,822	2.60	9,937	98	9,738	8,708	994	9,702	36	1,729
1998	3,822	2.60	9,937	98	9,738	8,944	994	9,938	-200	1,529

1/ From Tables 9A, 9B and 9C.

2/ Gross revenues from water sales reduced by bad debt allowance.

3/ Total of project debt service, operation and maintenance costs.

4/ Ten percent of gross water sales, after completion of construction.

5/ Includes costs of replacing the dirst complement of project components with seven years of life expectancy.

資　　料

資料1. 水質試験記録

本調査では既存水源および将来水源として可能性のあるものについて水質試験を行なう。試験結果を表1.1に、またフィリピン国の水質基準を表1.2に示す。湧水、深井戸ならびに伏流水の水質をまとめると以下の通りである。

1) 湧　　水

a　ほとんどの湧水水質は、消毒以外の処理施設を必要としない良質のものである。

b　通常、軟水水質であり非腐蝕性である。溶解性物質の濃度、硬度、塩分濃度はきわめて低い値を示している。

c　バニャデロ湧水の水質は、比較的硫酸分に富んでいる（600㎎/ℓ）。健康上また、パイプ保護のためには他の硫酸分の少ない湧水と混合して給水することが望まれる。

2) 深　井　戸

a　都市部にある深井戸の水質は色度、においとも高い値を示している。

b　家事用水としては好ましくない溶解性物質の濃度は高い。

c　家庭汚水からの汚染の心配はない。

3) 伏　流　水

河床に掘られた浅井戸および伏流水の水質は、概して良好である。現在、近隣の住民によって使用されており、家事用水としても処理する必要はないものと思われる。

水質分析表

Table 1 Water Quality of Existing Water Soueces in Legaspi City and Daraga

Items \ Source	Budiao Spring No. 1	Budiao Spring No. 2	Banadero Spring	Daraga Spring	Camp Ibalon Deep Well	Bogtong Spring	Salbacion Spring	Tinapian Spring	Lacag Spring	Buyoan Spring	Tinago Deep Well	Malabog Spring	Bicol Deep Well	Bitano Deep Well
Sampling date	10 Aug	10 Aug	10 Aug	11 Aug	11 Aug	11 Aug	19 Aug	14 Aug	17 Aug	11 Aug	11 Aug	11 Aug	11 Aug	11 Aug
Weather	fine	fine	fine	Clouded	Clouded	Clouded	fine	fine	fine	Clouded	Clouded	Clouded	Clouded	Clouded
Atom. Temperature (°C)	27	27	27	25	25	25	28	27	26	25	25	25	25	25
Water Temperature (°C)	25	25	26	26	27	26	26	23	24	24.5	29	26	36	27
Turbidity (mg/l)	0	0	0	0	0	0	0	0	8	0	5	0	0	20
Color (mg/l)	0	0	0	10	15	0	0	0	0	0	20	0	8	40
Conductivity (μ℧/cm)	350	380	1060	650	1000	1050		230		340	2600	320	1690	
Hardness (mg/l)	60	85	310	775	100	190	67.5	35	25	95	325	50	30	300
Calcium (mg/l)	12	16	96	20	32	64	13	8	6	22	90	12	8	64
Magnesium (mg/l)	7.3	8.5	17	6.7	4.9	7.3	9	3.6	2.4	9.7	24	5	2.4	34
Chloride (mg/l)	12	18	76	36	70	40	50	12	35	12	340	10	230	290
pH	7.2	7.1	7.2	6.9	6.8	7.4	7.0	6.6	6.9	6.8	7.6	6.6	6.5	7.6
Alkalinity (mg/l)	70	50	80	60	160	100	80	40	50	70	240	80	200	210
Sulfate (mg/l)	2	1	600	20	15	140	2.5	0	1	0	215	0	41	275
Ammonia-N (mg/l)	<0.3	<0.3	<0.3	0.3	2.5	<0.3	<0.3	<0.3	0.4	<0.3	1.0	<0.3	1.5	2.0
Iron (mg/l)	0.001	0.01	0.015	0.01	0.01	0.01	0.01	0.015	0.045	0.005	0.025	0.01	0.015	0.04
Manganese (mg/l)	0.05	nil	0.05	0.15	0.20	0.00	0.00	0.00	0.00	0.00	0.20	0.02	0.10	0.35
Odor[1/]	0	0	1	1	3	1	0	0	0	0	4	2	4	5
Total Bacteria (/ml)	negative	100	100	90	negative	20	50	50	more than 3000	negative	negative	negative	negative	negative
Coliform groups (/ml)	negative	negative	negative	50	negative	20	15	20	more than 1000	negative	negative	negative	negative	negative

Daraga

フィリピン国飲料水質基準

Table 2 Water Quality Standard
Key Parameters of the Philippines
Standard for Drinking Water

Parameters[1/]	Permissible Level[2/]	Maximum Permissible[2/]
Coliform groups	No detecting in 100 ml	-
Total Bacteria	10/ml	-
Odor	Unobjectionable	-
Taste	Unobjectionable	-
Color	5 units	50 units
Turbidity	5 units	25 units
Total solids	500	1,500
pH	7.0 - 8.5	6.5 - 9.2
Total hardness	100	500
Calcium, as Ca	75	200
Magnesium, as Mg	50	150
Chloride, as Cl	200	600
Sulfate, as SO_4	200	400
Nitrate, as NO_3	-	30
Iron, as Fe	0.3	1.0
Manganese, as Mn	0.1	0.5

1/ The above table shows only main parameters of the Standard, which are considered essential for judging characteristics of drinking water quality.

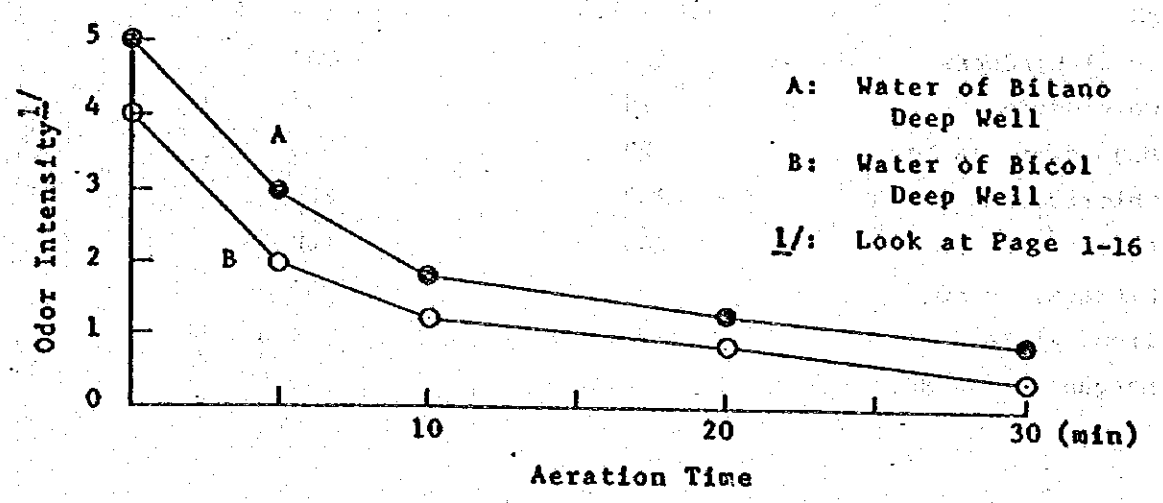
2/ All units are in mg/l, unless otherwise stated.

上記水源水質のうち特記すべき事項は、いくつかの湧水を除き、特に深井戸水は、水素硫化物の臭気および色度が高い値を示していることである。以下に臭気および色度について説明を加える。

1) 水素硫化物による臭気

第1編「水道の現況」の表1.3.1に示すように、調査地域の深井戸水は、特に強い臭気がある。これは、火山地域に一般的にみられる現象である。この硫化水素臭は、硫酸の還元によるものと思われる。一方、河川表流水、浅井戸およびいくつかの湧泉の臭気は零かあってもわずかである。

臭気を除去するために、現地でエアレーションテストを実施した。その結果、図1に示すように、短時間で臭気は減少した。



エアレーションによる臭気除去結果

Fig 1 Test Result of Odor Removed by Aeration

2) 色　　度

表1.3.1に示すように、調査地域のほとんどの深井戸水およびダラガ湧水は黄色を呈しており、その色度は、飲料水水質基準をはるかに超えている。色度の原因は、溶解性物質によるものと思われ、色度と溶解性物質の関連を調査した。

その結果、図2に示すように、色度に対するマンガンの相関係数が0.94と高いことが判明した。

3) 結　　論

臭気および色度については、以下のように結論付けられる。

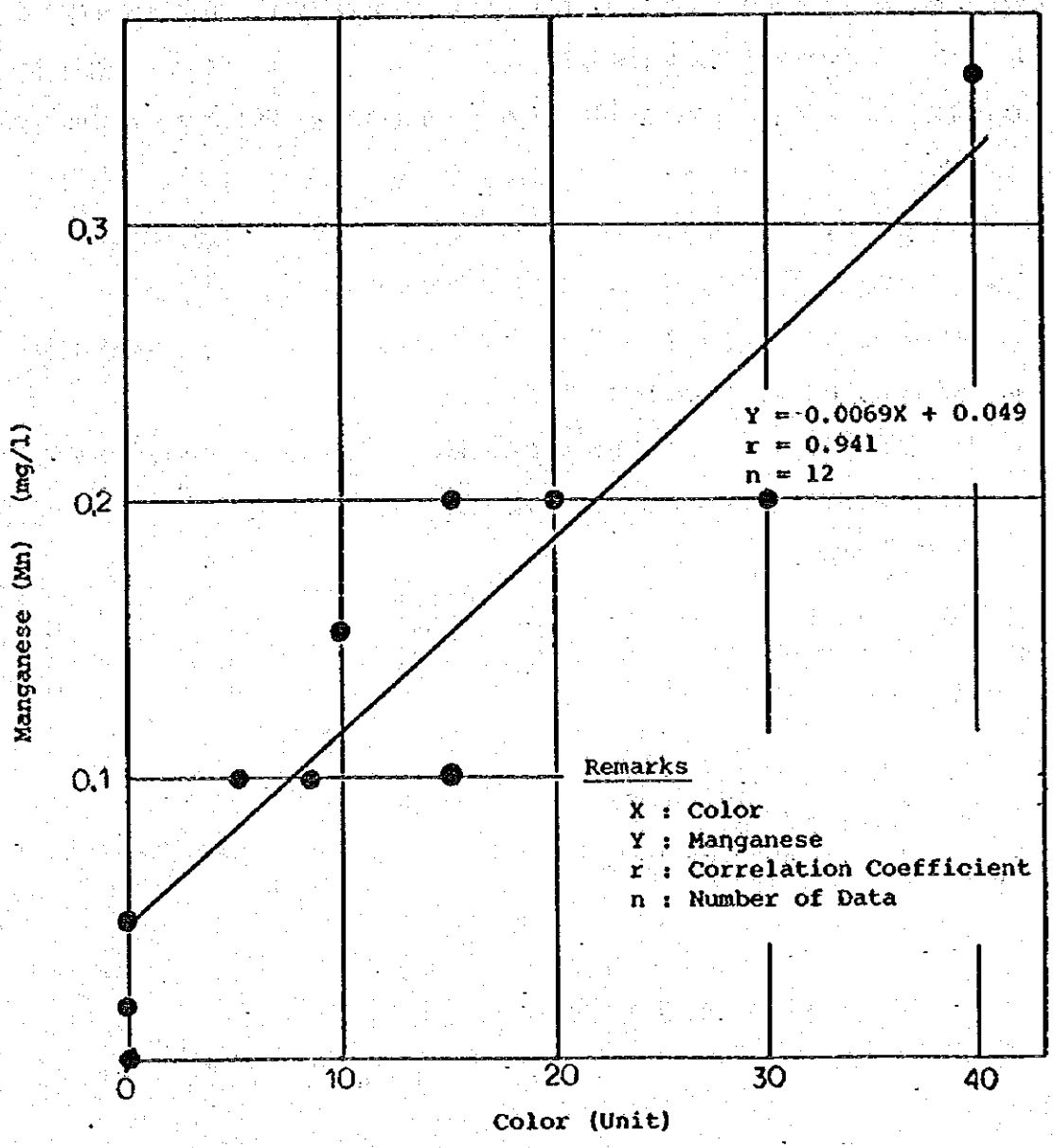
a. 臭気はエアレーションによって簡単に除去できる。

b. 色度はエアレーションでは除去できない。

c. マンガンを酸化によって不溶解性にするためには、10 mg/ℓ 以上の塩素が要求される。

d. 色度除去処理を行うためには、一連の浄水処理が必要となる。

Daraga



色度とマンガンの相関関係

Fig 2 Correlation of Color and Manganese Concentration

資料2. 送水管の現況

アルバイ州水道の送水管は１９８１年６月の洪水により、ひどい損傷を受けたままとなっている。マヨン火山のふもとに布設されたパイプラインがとくにひどく、玉石、砂利、砂を含んだマヨン火山からの泥流により損傷を受けたものと思われる。パイプの破損状況を調べ、その改善方策を見い出す目的で現地調査を行なった。調査時点は洪水２ケ月後の１９８１年８月である。調査結果を以下にまとめる。

1. ブディアオ湧水系

a. 付図に示すA地点およびB地点の間で、管路の破損個所が多く見られた。目に付く破損個所は既に応急処置がとられており、現在通水している。

b. B地点では、満管では流れていない。

c. B地点およびその下流側では、パイプから直接ハンドポンプを使用して取水している需用家もいる。

d. B地点およびC地点の丁度中央付近に、排気用のパイプが設置してあり、稼動中であった。

e. C地点の水圧は 0.5 Kg/cm² であった。

f. A地点における湧水量の測定値は 7,６００ m³/日程度であった。なお、過去のデータでは6,540 m³/日が最小湧水量である。

g. パイプの通水能力は、流速係数 C＝９０を仮定して 3,９００ m³/日と計算される。

上述の調査結果は、1) A地点およびB地点の間には、修理が行き届いていないパイプの破損個所が依然存在している、2)現在のパイプ中の流量はその通水能力に比べてはるかに少ない、3)湧水量は充分にあるが、たとえパイプが完全に修理されたとしても、湧水量全部を流せるだけのパイプの通水能力は現在のところない、の３点に集約される。

2. バニャデロ湧水系

現地調査時点においては、未だ、パイプの修理は行なわれていなかった。取水施設も同様に破損しており、実際の湧水量は確認されなかった。

口径、延長より、管路の通水能力はC＝９０を仮定して 2,２００ m³/日と計算された。なお、湧水量のデータは 2,９４０ m³/日である。

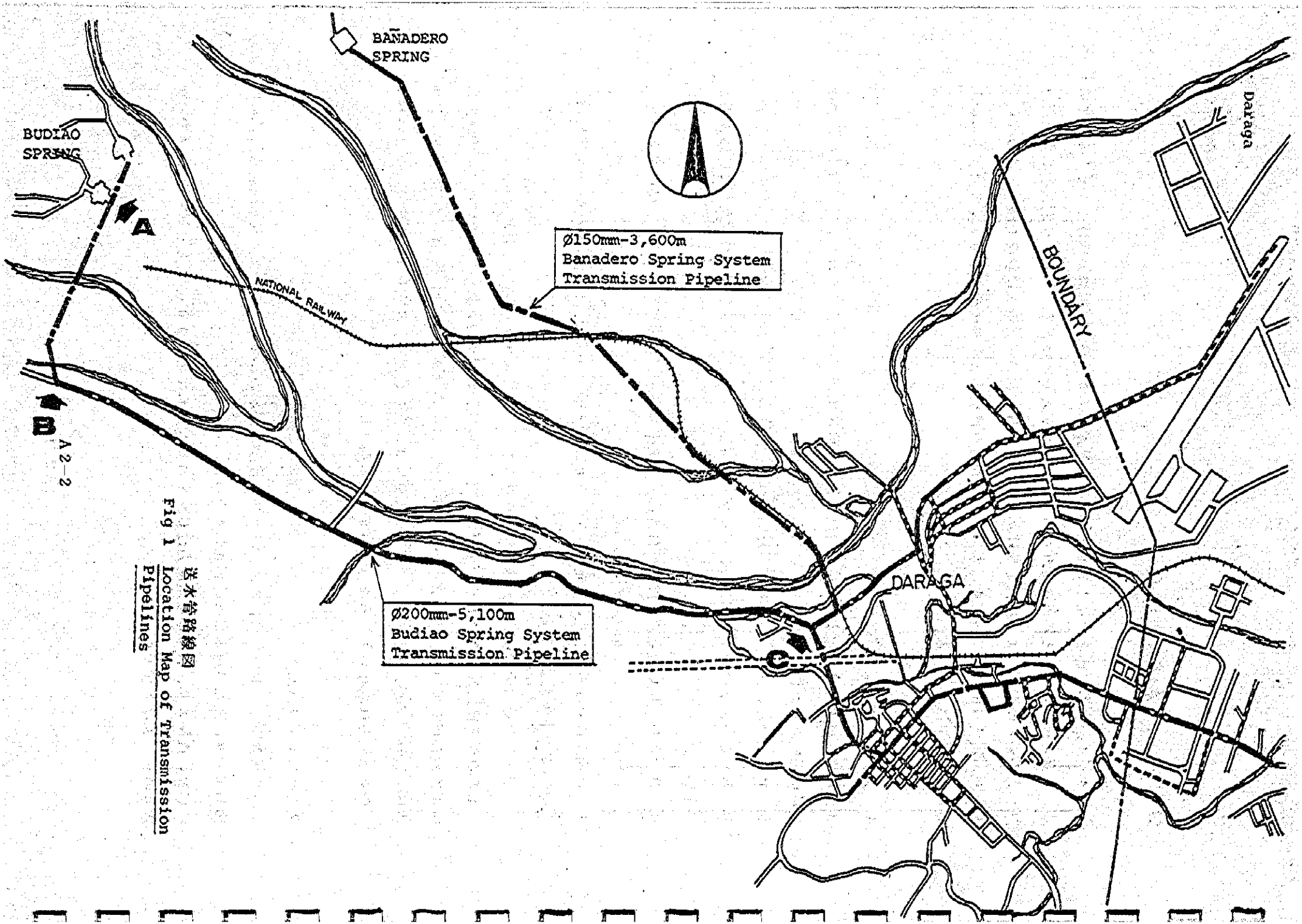


Fig 1 Location Map of Transmission Pipelines

送水管路線図