ANNEX 5.5.1

COST ESTIMATION AND IMPLEMENTATION PLAN

THE STUDY ON WATER SUPPLY SYSTEM
FOR SIEM REAP REGION IN CAMBODIA

FINAL REPORT
Vol. III SUPPORTING REPORT

ANNEX 5.5.1 COST ESTIMATION AND IMPLEMENTATION PLAN

Table of Contents

List of Tables

List of Figures

ANNEX 5.5.1 COST ESTIMATION AND IMPLEMENTATION PLAN

1. Introduction

Based on preliminary design of water supply facilities for the Stage 1 Project, cost required for the Project implementation is estimated and described in this Annex. Not only direct construction cost but also other related costs and operation/maintenance costs are estimated. Project cost, construction cost and other related costs, are categorized into foreign cost and local cost.

2. Basis of Cost Estimates

Price Level: Base year for the cost estimation is1999, with an exchange rate of 1 US$=3,800 Riel or 1 US$=120 Yen, and all costs presented in this Annex are shown in US$.

Unit Cost: Unit cost data in this cost estimation are collected from government offices, local consultants and manufacturers as shown on Table 2.1. These information are also checked against costs used in recent similar projects in Cambodia.

Table 2.1 Source of Unit Cost Data

Source of Unit Cost Data	Item
Provincial Department of Industry, Mines and Energy (PDIME)	Cost for house connection, chemical costs and land acquisition, etc.
Electricity de Siem Reap	Power cost
Phnom Penh Water Supply Authority (PPWSA)	Salary of staff, chemical costs, etc.
JICA Project: The Study on Phnom Penh Water Supply System in the Kingdom of Cambodia, 1993	Costs of pipe and civil work, etc.

3. Cost Estimates

Project costs are divided into two categories, as follows, and are estimated separately.

- Construction cost, and
- Other related costs such as land acquisition cost, engineering service and administrative costs, physical and price contingencies.

3.1 Construction Cost

Construction cost for water supply system is estimated respectively for well

facilities, distribution center, and distribution pipelines and house connections.

A survey concerning unit costs of labor, materials, and equipment in Siem Reap and Phnom Penh was carried out. Based on the results of the survey, construction costs are estimated as about 11.32 million US Dollars as shown in Table 3.1.1. Total construction costs for the Stage 1 is slightly different from the costs, which were shown in the Master Plan. Necessities of the establishment of the meter district zone and inclusion of material costs for house connection replacement relating to the existing pipe replacement are identified during the Feasibility Study and these costs are additionally included in the Stage 1 construction cost.

Scope of the Stage 1 Project includes construction of 10 wells. Two wells out of these 10 wells were already constructed during this Study as pilot wells and these two wells will be used as production wells under the Stage 1. However, as discussed in the previous section, two monitoring wells will be required to monitor groundwater behavior. Therefore, construction costs of totally 10 wells, 8 production wells and two monitoring wells, are included in these cost estimates.

It should be noted that material and installation costs for new house connections that will increase in future are not included in these estimates, which are supposed to be paid by new customers. However, the costs for the replacement of existing house connection relating to the replacement of existing pipelines are included in the construction costs as mentioned above.

Breakdown of the costs for distribution pipeline, service mains and rehabilitation of existing pipeline costs are shown on Table 3.1.2 and unit cost of pipeline construction is shown on Table 3.1.3. Materials for the secondary mains and the service mains (diameter 150 mm to 50 mm) will be PVC or PE. For the cost estimation, unit cost of PVC is used for these mains.

Table 3.1.1 Estimated Construction Cost for the Stage 1

Description	Unit	Quantity	Amount (US $)
1. Well Facilities			**2,428,458**
1.1 Deep Wells (φ450mm × H 50 m, Q 800 m^3/d)	well	10 *	500,000
Submergible Pump (0.56 m^3/min × H 13 m, 2.2 kW)	set	3	86,339
Submergible Pump (0.56 m^3/min × H 18 m, 3.7 kW)	set	7	209,886
1.2 Connecting Pipelines			
DIP φ 250 mm	m	2,000	468,533
DIP φ 200 mm	m	1,600	322,987
DIP φ 150 mm	m	1,000	156,700
1.3 Generator House (50 m^2 × 2 houses)	m^2	100	199,619
Generator (3P 75 KVA/W Fuel Tank)	set	4	233,127
1.4 Well House (25 m^2 × 10 houses)	m^2	250	251,268
2. Disinfection, Reservoir, Power Facilities and Pump Station			**2,665,870**
2.1 Receiving Well (H 3 m × Area 14 m^2)	m^3	42	91,272
2.2 Chlorinator House (W 7 m × L 15 m)	m^2	105	180,635
2.3 Clear Water Reservoir (W 15 m × L 25 m × H 3.5 m ×3 basins)	m^3	2,625	670,922
2.4 Generator House (150 m^2)	m^2	150	42,000
Generator (3P 150 KVA/W Fuel Tank)	set	4	354,988
2.5 Instrumentation System etc.	L.S.	1	732,976
2.6 Pump Station (240 m^2)	m^2	240	433,524
Distribution Pump (1.0 m^3/min × H 35 m, 11 kW)	set	3	60,329
Distribution Pump (1.82 m^3/min × H 35 m, 18.5 kW)	set	4	99,223
3. Distribution Pipeline, Service Mains and Rehabilitation of Existing Pipeline			
New Distribution Pipelines φ 75～500 mm	m	17,025	4,919,882
Rehabilitation of Existing Pipeline φ 100～400 mm	m	6,310	881,423
Service Mains φ 50～75 mm	m	6,200	331,209
District Meter and Meter Box (φ150 ～500 mm)	unit	6	42,000
House Connections for Replaced Pipelines	unit	254	50,800
Total Cost			**11,319,642**

Exchange Rate: 1 US$=120 Yen L.S.: Lump Sum

* : 10 wells (8 production wells + 2 monitoring wells)

Table 3.1.2. Construction Cost of Pipeline

Diameter and Material	Unit Cost (US $/m)	Length of Distribution Pipeline (m)	Rehabilitation of Existing Pipeline (m)	Service Mains (m)	Cost		
					New Pipeline (US $)	Rehabilita-tion (US $)	Service Mains (US $)
700 DIP	706.3						
600 DIP	599.6						
500 DIP	477.2	7,450			3,555,306		
450 DIP	420.0	710			298,200		
400 DIP	356.9		166			59,244	
350 DIP	307.9		254			78,218	
300 DIP	271.5		230			62,445	
250 DIP	234.3	360	900		84,336	210,840	
200 DIP	201.9	2,630	92		530,909	18,572	
150 PVC	114.8	765	1,169		87,797	134,162	
100 PVC	90.9	1,860	3,499		169,012	317,942	
75 PVC	59.8	3,250		3,100	194,323		185,354
50 PVC	47.1			3,100			145,855
Subtotal		17,025	6,310	6,200	4,919,882	881,423	331,209
Total							**6,132,514**

Exchange Rate: 1 US$=120 Yen

Table 3.1.3 Unit Construction Cost of Pipeline

Diameter and Material	Unit Cost		
	Supply	Laying	Total Unit Cost
	US $/m	US $/m	US $/m
700 DIP	488.8	217.5	706.3
600 DIP	403.8	195.8	599.6
500 DIP	302.2	175.0	477.2
450 DIP	255.0	165.0	420.0
400 DIP	214.4	142.5	356.9
350 DIP	173.8	134.2	307.9
300 DIP	147.3	124.2	271.5
250 DIP	118.4	115.8	234.3
200 DIP	95.2	106.7	201.9
150 DIP	72.5	84.2	156.7
100 DIP	51.0	75.0	126.0
150 PVC	30.6	84.2	114.8
100 PVC	15.9	75.0	90.9
75 PVC	10.6	49.2	59.8
50 PVC	5.4	41.7	47.1

Exchange Rate: 1 US$=120 Yen

3.2 Project Costs

For the implementation of the Project, there are other related costs such as land acquisition cost, engineering service and administrative costs, physical and price contingencies besides the construction cost. In addition, cost allocation of foreign and local currency portions is also carried out.

The costs of engineering service and administrative costs, physical and price contingencies are estimated as a percentage of the construction costs.

3.2.1 Land acquisition Cost

No costs will be involved for the lands of well facilities and transmission lines, because these facilities and pipelines will be constructed in the road shoulder where the Government owns. The land acquisition cost for distribution center site is estimated based on the unit price of the land and space required.

3.2.2 Administration Cost

Administrative cost which will be paid by the Cambodian Government for the implementation of the Project is estimated to be 2% of the construction costs.

3.2.3 Engineering Service Cost

The cost of engineering service, which includes detailed design, soil investigation and field survey, and construction supervision, is commonly estimated at about 10% of the construction costs. This percentage is influenced by local conditions and the size of the Project, with higher percentages for smaller projects. Taking account of the scale of this Project, the cost of engineering service is estimated to be 15% of the construction costs.

3.2.4 Physical Contingency

Ten percent of the sum of the construction costs, administration cost and the engineering service cost has been added to finance unforeseen expenditure, such as unanticipated rock excavation or site dewatering.

3.2.5 Price Contingency

Considering the inflation rates in Cambodia in the past five years, 10% of the sum of all above costs has been added to include inflation of costs during construction period.

3.2.6 Summary of Project Cost

The estimated project costs including the related costs as well as cost allocation of foreign and local currency are summarized in Table 3.2.1.

3.3 Operation and Maintenance Costs

3.3.1 Power Costs

A generator system is proposed to supply electricity for well pumps, distribution pumps and lighting etc. of new water supply system, considering the current situation that public electric supply in Siem Reap is not stable and reliable, and the capacity of the public supply will not be guaranteed for future power requirement.

Annual power costs are divides into two categories as follows.

- Annual fuel cost
- Annual maintenance cost of generator

Annual fuel cost is estimated based on the unit price of fuel and annual consumed electric power of all pumps and lighting, etc., while annual maintenance cost of generator is estimated to be 10% of generator initial investment.

Estimated annual power costs of new and existing water supply systems from year 2002 to year 2006 are shown in Table 3.3.1.

Table 3.2.1 Summary of the Project Costs for the Stage 1

	Description	Foreign Currency (US$)	Local Currency				Total (US$)
			Skilled Worker (US$)	Unskilled Worker (US$)	Others (US$)	Subtotal (US$)	
A	Construction Cost of Water Supply System						
	1. Well Facilities (Deep Wells, Connecting Pipelines and Well House)	**2,290,302**	68,612	56,286	13,259	**138,156**	**2,428,458**
	2. Disinfection, Reservoir, Power Facilities and Pump Station	**2,288,691**	179,671	155,800	41,708	**377,179**	**2,665,870**
	3. Distribution Pipelines, Service Main and Replacement of Existing Pipe	**6,105,478**	75,469	44,367	0	**119,837**	**6,225,314**
	Subtotal of A	**10,684,470**	323,752	256,453	54,966	**635,172**	**11,319,642**
B	Land Acquisition Cost (10,000 m^2 × 25 US$/$m^2$)	**0**				**250,000**	**250,000**
C	Administration Cost [A × 2%]	**0**				**226,393**	**226,393**
D	Engineering Service [A × 15%]	**1,697,946**				**0**	**1,697,946**
E	Physical Contingency [(A + C + D)×10%]	**1,238,242**				**86,156**	**1,324,398**
	Subtotal of A～E	**13,620,658**				**1,197,721**	**14,818,379**
F	Price Contingency [10% of A～E]	**1,362,066**				**119,772**	**1,481,838**
	Total	**14,982,724**				**1,317,493**	**16,300,217**

Exchange Rate: 1 US$=120 Yen

Table 3.3.1 (1/2) Estimation of Power Consumption and Power Cost

Item	Unit	2002	2003	2004	2005	2006
Capacity of System (New Facilities + Existing Facilities)	m^3/d	Stage 1 (8,000) + Existing (1,440)=9,440				
Maximum Daily Water Demand	m^3/d	2,773	4,217	5,905	7,308	8,352
Average Daily Water Demand	m^3/d	2,042	3,093	4,322	5,398	6,208
Average Daily Supply of Existing Facilities	m^3/d	800	800	800	800	800
Average Daily Supply of New System	m^3/d	1,242	2,293	3,522	4,598	5,408
New System						
Fuel Cost	US $/	0.3	0.3	0.3	0.3	0.3
Unit Fuel Cost for Intake Facilities (75 KVA Generator)	US $/kWh	0.110	0.110	0.110	0.110	0.110
The Number of Submerged Pumps (2.2 kW) in Operating	Set	2	2	3	3	3
The Number of Submerged Pumps (3.7 kW) in Operating	Set	1	3	4	5	7
Intake Pump Facilities Capacity	kW	8.1	15.5	21.4	25.1	32.5
Annual Consumed Electric Power of Intake Facilities (83% operation rate)	kWh/year	59,130	113,150	156,220	183,230	237,250
Unit Fuel Cost for Distribution Facilities and Others (150 KVA Generator)	US $/kWh	0.107	0.107	0.107	0.107	0.107
The Number of Distribution Pumps (11 kW) in Operating	Set	0	1	1	2	2
The Number of Distribution Pumps (18.5 kW) in Operating	Set	1	1	2	2	3
Capacity of Distribution Pump and Others (lighting etc.)	kW	26.5	37.5	56.0	67.0	85.5
Annual Consumed Electric Power of Distribution and Others (83% operation rate)	kWh/year	193,450	273,750	408,800	489,100	624,150
Annual Fuel Cost for Electric Power	US $/Year	**27,238**	**41,793**	**61,006**	**72,584**	**93,004**
Unit Fuel Cost of Generator for New System	US $/$m^3$	0.060	0.050	0.047	0.043	0.047
Annual Maintenance Cost of Generator (= Generators Initial Investment × 10%)	US $/year	**58,812**	**58,812**	**58,812**	**58,812**	**58,812**
Unit Power Cost for New System	US $/$m^3$	0.190	0.120	0.093	0.078	0.077

Table 3.3.1 (2/2) Estimation of Power Consumption and Power Cost

Item	Unit	2002	2003	2004	2005	2006
Existing Facilities						
Unit Power Consumption of Existing Facilities	kWh/m^3	0.6	0.6	0.6	0.6	0.6
Annual Consumed Electric Power of Existing Facilities	kWh/Year	175,200	175,200	175,200	175,200	175,200
Unit Cost for Electric Power for Existing Facilities	US $/kWh	0.2	0.2	0.2	0.2	0.2
Annual Electric Power Cost of Existing Facilities	US $/year	**35,040**	**35,040**	**35,040**	**35,040**	**35,040**
Unit Power Cost for Existing Facilities	US $/$m^3$	0.120	0.120	0.120	0.120	0.120
Average Annual Power Cost for New and Existing System	US $/year	**121,090**	**135,645**	**154,857**	**166,436**	**186,855**
Unit Power Cost for System (New and Existing Facilities)	US $/$m^3$	0.162	0.120	0.098	0.084	0.082

3.3.2 Chemical Costs

Required chemicals will be chlorine gas for disinfection and lime for pH control. It is planned that the dosages of chlorine gas and lime will be 4.0 mg/l and 20.0 mg/l, respectively. Annual chemical costs are estimated based on the unit price of chemicals and annual average water supply.

Estimated chemical costs of new and existing water supply systems from year 2002 to year 2006 are shown in Table 3.3.2.

3.3.3 Personnel Cost

According to the results of organization study, the total number of employees in year 2006 will be 19, annual personnel cost is estimated based on the number and salaries of employees. Estimated personnel costs of new and existing water supply systems from year 2002 to year 2006 are shown in Table 3.3.3.

3.3.4 Maintenance Costs

Maintenance costs comprise all expenditures which will be required to keep the system in good condition after it is placed on line. It includes the costs for required materials and equipment such as spare parts, tools, leakage detection equipment, office and laboratory equipment, chemicals for water quality testing, etc., as well as training costs. Maintenance costs in this project are estimated to be 1% of the construction cost, although actual maintenance costs will be tend to increase as the facilities become older.

Table 3.3.2 (1/2) Estimation of Chemicals Costs

Item	Unit	2002	2003	2004	2005	2006
Capacity of System (New Facilities + Existing Facilities)	m^3/d	Stage 1 (8,000) + Existing (1,440)=9,440				
Maximum Daily Water Demand	m^3/d	2,773	4,217	5,905	7,308	8,352
Average Daily Water Demand	m^3/d	2,042	3,093	4,322	5,398	6,208
Average Daily Supply of Existing Facilities	m^3/d	800	800	800	800	800
Average Daily Supply of New System	m^3/d	1,242	2,293	3,522	4,598	5,408
New System						
Dosage of Chlorine for New System	mg/l	4.0	4.0	4.0	4.0	4.0
Annual Consumption of Chlorine for New System	ton/year	1.8	3.3	5.1	6.7	7.9
Unit Cost of Chlorine for New System	US $/ton	1,000	1,000	1,000	1,000	1,000
Annual Chlorine Cost for New System	US $/year	1,813	3,348	5,142	6,713	7,896
Dosage of Lime for New System	mg/l	20.0	20.0	20.0	20.0	20.0
Annual Consumption of Lime for New System	ton/year	9.1	16.7	25.7	33.6	39.5
Unit Cost of Lime for New System	US $/ton	150	150.0	150.0	150.0	150.0
Annual Lime Cost for New System	US $/year	1,360	2,511	3,857	5,035	5,922
Average Annual Chemical Cost for New System	US $/year	**3,173**	**5,859**	**8,999**	**11,748**	**13,817**
Unit Chemical Cost for New System	US $/$m^3$	0.007	0.007	0.007	0.007	0.007

Table 3.3.2 (2/2) Estimation of Chemicals Costs

Item	Unit	2002	2003	2004	2005	2006
Existing Facilities						
Dosage of Chlorine for Existing Facilities	mg/l	1.0	1.0	1.0	1.0	1.0
Annual Consumption of Chlorine for Existing Facilities	ton/year	0.29	0.29	0.29	0.29	0.29
Unit Cost of Chlorine for Existing Facilities	US $/ton	1,000	1,000	1,000	1,000	1,000
Annual Chlorine Cost for Existing Facilities	US $/year	292	292	292	292	292
Dosage of Lime for Existing Facilities	mg/l	45.0	45.0	45.0	45.0	45.0
Annual Consumption of Lime for Existing Facilities	ton/year	13.1	13.1	13.1	13.1	13.1
Unit Cost of Lime for Existing Facilities	US $/ton	150	150.0	150.0	150.0	150.0
Annual Lime Cost for Existing Facilities	US $/year	1,971	1,971	1,971	1,971	1,971
Average Annual Chemical Cost for Existing Facilities	US $/year	**2,263**	**2,263**	**2,263**	**2,263**	**2,263**
Unit Chemical Cost for Existing Facilities	US $/$m^3$	0.008	0.008	0.008	0.008	0.008
Average Annual Chemical Cost for System	US $/year	**5,436**	**8,122**	**11,262**	**14,011**	**16,080**
Unit Chemical Cost for System (New and Existing Facilities)	US $/$m^3$	0.007	0.007	0.007	0.007	0.007

Table 3.3.3 Estimation of Personnel Cost

Item	Unit	2002	2003	2004	2005	2006
Capacity of System	m^3/d	Stage 1 (8,000)+Existing (1,440)=9,440				
Maximum Daily Water Demand	m^3/d	2,773	4,217	5,905	7,308	8,352
Average Daily Water Demand	m^3/d	2,042	3,093	4,322	5,398	6,208
Average Daily Supply of Existing Facilities	m^3/d	800	800	800	800	800
Average Daily Supply of New System	m^3/d	1,242	2,293	3,522	4,598	5,408
Director	Person	1	1	1	1	1
Monthly Salary	US $/man･month	450	450	450	450	450
Deputy Director	Person	2	2	2	2	2
Monthly Salary	US $/man･month	350	350	350	350	350
Engineer	Person	2	2	2	2	2
Monthly Salary	US $/man･month	350	350	350	350	350
Clerk	Person	2	2	2	2	2
Monthly Salary	US $/man･month	200	200	200	200	200
Technician	Person	3	4	4	5	5
Monthly Salary	US $/man･month	200	200	200	200	200
Assist. Technician	Person	4	4	5	5	7
Monthly Salary	US $/man･month	100	100	100	100	100
Total Number of Staff for System	Person	14	15	16	17	19
Average Annual Salary for System	US $/year	**39,000**	**41,400**	**42,600**	**45,000**	**47,400**
Average Salary for System	US $/man･month	232	230	222	221	208
Unit Personnel Cost for System	US $/$m^3$	0.052	0.037	0.027	0.023	0.021

3.3.5 Summary of Operation and Maintenance Cost

Operation and maintenance costs (including not only the new system but also existing facilities) of system from year 2002 to year 2006 are estimated as shown on Table 3.3.4 and also on Table 3.3.5 in detail.

Table 3.3.4 Estimated Annual Operation and Maintenance Costs

Description	Unit	2002	2003	2004	2005	2006
Power Cost	US$/year	121,090	135,645	154,857	166,436	186,855
Chemicals Cost	US$/year	5,436	8,122	11,262	14,011	16,080
Personnel Cost	US$/year	39,000	41,400	42,600	45,000	47,400
Maintenance Cost	US$/year	113,196	113,196	113,196	113,196	113,196
Total	US$/year	**278,722**	**298,363**	**321,915**	**338,643**	**363,531**
Unit Power Cost	US$/$m^3$	0.162	0.120	0.098	0.084	0.082
Unit Chemicals Cost	US$/$m^3$	0.007	0.007	0.007	0.007	0.007
Unit Personnel Cost	US$/$m^3$	0.052	0.037	0.027	0.023	0.021
Unit Maintenance Cost	US$/$m^3$	0.152	0.100	0.072	0.057	0.050
Total	US$/$m^3$	**0.373**	**0.264**	**0.204**	**0.171**	**0.160**

Table 3.3.5 Summary of Operation and Maintenance Cost

Item	Unit	2002	2003	2004	2005	2006
Capacity of System (New Facilities + Existing Facilities)	m^3/d	Stage 1 (8,000) + Existing (1,440)=9,440				
Maximum Daily Water Demand	m^3/d	2,773	4,217	5,905	7,308	8,352
Average Daily Water Demand	m^3/d	2,042	3,093	4,322	5,398	6,208
Average Daily Supply of Existing Facilities	m^3/d	800	800	800	800	800
Average Daily Supply of New System	m^3/d	1,242	2,293	3,522	4,598	5,408
Average Annual Power Cost for New and Existing Facilities	US $/year	121,090	135,645	154,857	166,436	186,855
Average Annual Chemical Cost for New and Existing Facilities	US $/year	5,436	8,122	11,262	14,011	16,080
Average Annual Personnel Cost for New and Existing Facilities	US $/year	39,000	41,400	42,600	45,000	47,400
Annual Operation Cost for New and Existing Facilities	US $/year	165,526	185,166	208,719	225,446	250,336
Annual Maintenance Cost [=Construction Cost×1%]	US $/year	113,196	113,196	113,196	113,196	113,196
Annual Operation and Maintenance Cost	US $/year	**278,722**	**298,363**	**321,916**	**338,643**	**363,532**
Unit Operation and Maintenance Cost for System	US $/$m^3$	0.374	0.264	0.204	0.172	0.160
Among which						
Unit Power Cost for New and Existing Facilities	US $/$m^3$	0.162	0.120	0.098	0.084	0.082
Unit Chemical Cost for New and Existing Facilities	US $/$m^3$	0.007	0.007	0.007	0.007	0.007
Unit Personnel Cost for New and Existing Facilities	US $/$m^3$	0.052	0.037	0.027	0.023	0.021
Unit Operation Cost for New and Existing Facilities	US $/$m^3$	0.222	0.164	0.132	0.114	0.110
Percentage of Power Cost vs Operation Cost	%	73.2%	73.3%	74.2%	73.8%	74.6%
Percentage of Chemical Cost vs Operation Cost	%	3.3%	4.4%	5.4%	6.2%	6.4%
Percentage of Personnel Cost vs Operation Cost	%	23.6%	22.4%	20.4%	20.0%	18.9%
Unit Maintenance Cost for System	US $/$m^3$	0.152	0.100	0.072	0.057	0.050
Percentage of Maintenance Cost vs O & M Cost	%	40.6%	37.9%	35.2%	33.4%	31.1%

4. Implementation Plan

The proposed implementation schedule including budgetary arrangement, detailed design, tending and construction, as well as training and institutional development ,etc., is summarized in the Figure 4.1.

Project costs (construction costs and related costs) disbursement for Stage 1 is also carried out considering the implementation schedule of the Project, and the results are shown as Table 4.1 and Figure 4.1.

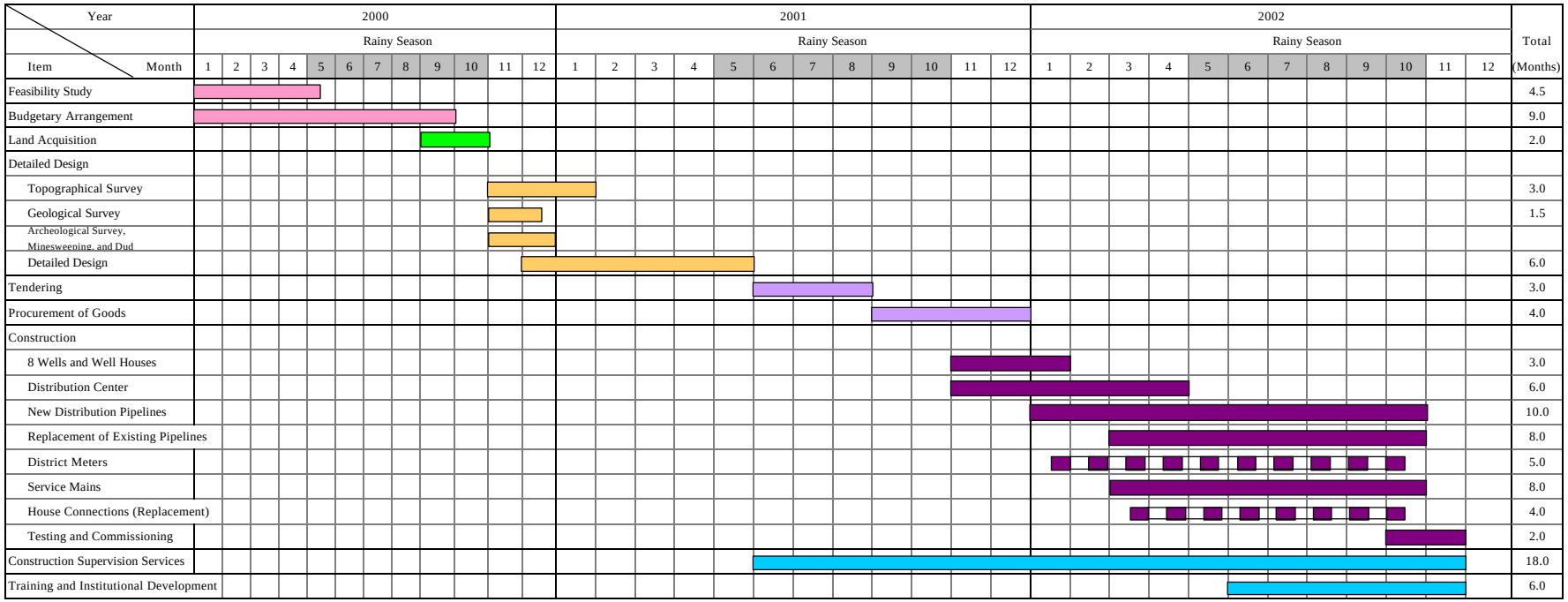
Table 4.1 Project Costs Disbursement for Stage 1

(Unit: US$1,000)

Year	Annual Disbursement	Ratio
2000	591	3.6%
2001	7,759	47.6%
2002	7,950	48.8%
Total	16,300	100%

Considering special situation in Siem Reap and Cambodia, archeological survey, minesweeping, and dud reconnaissance will be required for the location of the distribution center. The survey should be done under the cooperation of UNESCO and APSARA during the detail design stage just after the land acqusition.

Figure 4.1 Implementation and Disbursement Schedules for Stage 1



Year	2000												2001												2002												Total
	Rainy Season												Rainy Season												Rainy Season												
Item (US $) / Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	(US $)
Land Acquisition									125,000	125,000																											250,000
Detailed Design and Tendering											107,806	134,758	107,806	53,903	53,903	53,903	53,903	53,903	53,903	53,903																	727,691
Procurement of Goods (M/E)																				533,061	177,687	177,687	355,374	533,061													1,776,868
Construction																																					
10 Wells and Well Houses																						569,732	379,821	379,821	569,732												1,899,106
Distribution Center																						425,506	283,671	141,835	141,835	141,835	141,835	141,835									1,418,353
New Distribution Pipelines																								1,475,965	245,994	245,994	245,994	245,994	245,994	245,994	245,994	245,994	245,994	1,229,971			4,919,882
Replacement of Existing Pipelines																										264,427	44,071	44,071	44,071	44,071	88,142	88,142	88,142	176,285			881,423
District Meters																								8,400	2,100	2,100	2,100	2,100	2,100	2,100	4,200	4,200	4,200	8,400			42,000
Service Mains																										66,242	16,560	16,560	16,560	16,560	33,121	33,121	66,242	66,242			331,209
House Connections (Replacement)																										10,160	2,540	2,540	2,540	2,540	5,080	5,080	10,160	10,160			50,800
Testing and Commissioning																																					
Construction Supervision Services																		53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903	53,903		970,255
Administration Cost											9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056	9,056		226,393
Physical Contingency											11,686	14,381	11,686	6,296	6,296	6,296	6,296	11,686	11,686	64,992	24,065	123,588	108,182	260,204	102,262	79,372	51,606	51,606	37,422	37,422	43,950	43,950	47,770	155,402	6,296		1,324,398
Price Contingency									12,500	12,500	12,855	15,819	12,855	6,925	6,925	6,925	6,925	12,855	12,855	71,491	26,471	135,947	119,001	286,224	112,488	87,309	56,767	56,767	41,165	41,165	48,345	48,345	52,547	170,942	6,925		1,481,838
Sub-total of Each Month									137,500	137,500	141,403	174,014	141,403	76,180	76,180	76,180	76,180	141,403	141,403	786,406	291,181	1,495,419	1,309,007	3,148,469	1,237,370	960,397	624,432	624,432	452,812	452,812	531,790	531,790	578,013	1,880,359	76,180		
Annual Disbursement (A)												590,417												7,759,411											#######	########
Total of the Project Cost (B) =	16,300,217																																				
Ratio (A/B) %=												3.6%												47.6%											48.8%		100%

ANNEX 5.6.1

ECONOMIC AND FINANCIAL ANALYSIS

FOR FEASIBILITY STUDY

THE STUDY ON WATER SUPPLY SYSTEM
FOR SIEM REAP REGION IN CAMBODIA

FINAL REPORT
Vol. III SUPPORTING REPORT

ANNEX 5.6.1 ECONOMIC AND FINANCIAL ANALYSIS

Table of Contents

List of Tables

List of Figures

Attachment

ANNEX 5.6.1 ECONOMIC AND FINANCIAL ANALYSIS FOR FEASIBILITY STUDY

1. Introduction

In this Feasibility Study, financial and economic analysis presents mainly project evaluation of the Proposed Project. The Proposed Project is discussed in Section 5.3 in the Main Report. In this ANNEX, the viability of the Proposed from the socioeconomic viewpoints is examined. The project evaluation is conducted from two points of view: (1) economic aspect and (2) financial aspect. The economic evaluation is to examine the proposed project from the economic point of view, that is, viability of social investment in the national economy. The financial evaluation is to inspect the Proposed Project from the financial point of view, that is, tests of earning capacity and fund management. In addition, the financial simulation of the Proposed Project is conducted in the financial analysis section. On the basis of the results of the simulation, some points to notice on management are discussed in the analysis.

2 Financial Analysis

2.1 Overview of Financial Analysis

The Project Proposed in this Feasibility Study is an urgent scheme, which was formulated as the Stage 1 of the water supply system formulated in the Master Plan. The financial analysis aims at working out a successful financial plan for the Proposed Project. The fundamentals of the analysis are based on the following preconditions.

1) The tariff structure approved in July 1999 by PDIME was expected to fully recover costs of water production by the new plant system supported by French Government.

2) The Proposed Project in this Feasibility Study is expected to have long-term financial sustainability.

3) Establishment of a new organization for operation and maintenance will ensure the long-term financial viability of the managing entity by means of ensuring full cost recovery.

4) The management of the system will improve its performance efficiency through reduction of water losses, commercial practices and good working incentive.

The financial simulation is based on a financial projection model. It shows financial simulations under various financial conditions and assumptions. Through these simulations, the model suggests the relation between the new water tariff including the new installation charges and the financial management conditions that were adopted by this Feasibility Study. In order to assess the financial implications and long-term viability, all-important elements of the Proposed Project will be elucidated as results of the simulations, as well.

The financial model follows conventional accounting principles and standards like normal commercial enterprises. The accounting for the Proposed Project is done on an accrual basis, and standard commercial procedures, which are utilized for the accounting of revenue and expense as well as fixed assets and debt obligations. The Proposed Project is set to start its construction work in 2000 and its operation in 2002, although the existing plant is supplying water to consumers without a break. Thus, the simulations of the financial analysis are set to start in 2000. The financial conditions of the existing water supply system is involved as an initial financial precondition for the financial simulation.

2.2 Financial Viability

The Proposed Project in the Feasibility Study was evaluated in the same manner as done in the Master Plan. The financial viability was examined by means of a financial indicator of "FIRR". If the viability were not good to implement from the financial point of view, its constraints would be identified and analyzed, and some countermeasures would be discussed in this analysis.

In the evaluation procedure in the Feasibility Study, however, there are two preconditions different from the Master Plan. They are: (1) the revenue in 2002 does not accrue from water sales fully, because the system is inaugurated in the middle of the year; (2) the water supply system expands to surrounding consumers in the service areas even after the target year 2006, although the capacity of the water supply system is not enough to peak demand.

Table 2.2.1 shows the evaluation indices of the Proposed Project. The results were 0.33 of B/C, US$ -10.98 million of NPV and -2.7% of FIRR. The figures of B/C and NPV, were discounted at 10%. As a reference, Table 2.2.2 show B/C and NPV discounted at 7.5%, 5% and 0%, respectively. As shown in the table, the respective ratios of B/C were less than zero and the figures of NPV were negative. This means that the total revenues at current prices for the evaluation period are less than the total costs at current prices. In other words, the total revenues are too small as compared with the total costs to manage the Proposed Project.

Table 2.2.1 Financial Expenditure and Revenue Stream of Proposed Project

(Unit: US$1000 in Financial Terms)

	Year	Expenditure				Revenue				Balance
						Water Sales				
		Capital Investment	O&M	Replacement	Total	Domestic	Non-Domestic	Connection Charge	Total	
1	2000	590			590				0	-590
2	2001	7,759			7,759				0	-7,759
3	2002	8,137	23		8,160	9	9	187	204	-7,956
4	2003	103	298		401	160	167	103	429	28
5	2004	114	322		436	222	235	114	571	135
6	2005	121	339		459	294	273	121	689	229
7	2006	84	364		447	353	298	84	734	287
8	2007	146	364		510	362	298	146	806	296
9	2008	111	364		474	412	298	111	821	347
10	2009	56	364		419	437	309	56	801	382
11	2010	52	364		415	459	328	52	839	424
12	2011		364		364	459	328	0	787	424
13	2012		364		364	459	328	0	787	424
14	2013		364		364	459	328	0	787	424
15	2014		364		364	459	328	0	787	424
16	2015		364		364	459	328	0	787	424
17	2016		364		364	459	328	0	787	424
18	2017		364	1,777	2,140	459	328	0	787	-1,353
19	2018		364		364	459	328	0	787	424
20	2019		364		364	459	328	0	787	424
21	2020		364		364	459	328	0	787	424
22	2021		364		364	459	328	0	787	424
23	2022		364		364	459	328	0	787	424
24	2023		364		364	459	328	0	787	424
25	2024		364		364	459	328	0	787	424
26	2025		364		364	459	328	0	787	424
27	2026		364		364	459	328	0	787	424
28	2027		364		364	459	328	0	787	424
29	2028		364		364	459	328	0	787	424
30	2029		364		364	459	328	0	787	424
31	2030		364		364	459	328	0	787	424
32	2031		364		364	459	328	0	787	424
33	2032		364		364	459	328	0	787	424

Evaluation Indices	NPV:	-10,982	thousand US$ *1
	B/C:	0.33	*1
	FIRR:	-2.7%	

Note: *1 Discounted at 10%

Table 2.2.2 B/C and NPV under Discount Rates of 10%, 7.5%, 5% and 0%

Item	Discount Rate			
	10%	7.5%	5%	0%
B/C	0.33	0.40	0.49	0.78
NPV (US$ 1000)	-10,982	-10,960	-10,539	-6,631

Some countermeasures are considered to implement the Project from the financial viewpoint. According to these financial analyses, the countermeasures that make the scheme financially viable were as follows.

Case 1: The revenue of water sales is increased by means of raising water-charging rate to 3.3 times more than the present one. Refer to Table 2.2.3.

Case 2: More than 86% of the initial investment and replacement costs are covered by subsidy of the government or the foreign donors. Refer to Table 2.2.4.

Case 3: Combination of the following measures: (a) covering more than 68% of investment costs by subsidy and (b) raising the water-charging rate to 50% more than the present one. Refer to Table 2.2.5.

The respective cases above are considered as special cases among various countermeasures. Figure 2.2.1 shows the range of the countermeasure cases in terms of financial procurement and water charge, for which the Proposed Project could be viable. The area hatched in the figure indicates the effective combination of financial source and water charge. The case 3 above is one of the special cases in the areas hatched, as shown in the figure.

In the case that the initial investment costs are covered by grant from foreign countries, the Proposed Project would be also viable from the financial viewpoint. It is also included in the viable area in the figure above. In that case, the Project might be viable even if the charging rate of water went down to 60% of the present rate. However, if the charging rate were cut down to 60% of the present one, a cash position could be very difficult during an initial stage of the management.

Table 2.2.3 Financial Expenditure and Revenue Stream of Proposed Project: Case 1

(Unit: US$1000 in Financial Terms)

	Year	Expenditure				Revenue				Balance
						Water Sales				
		Capital Invest-ment	O&M	Replace-ment	Total	Domestic	Non-Domestic	Connec-tion Charge	Total	
1	2000	590			590				0	-590
2	2001	7,759			7,759				0	-7,759
3	2002	8,137	23		8,160	30	30	187	246	-7,914
4	2003	103	298		401	528	550	103	1,181	780
5	2004	114	322		436	732	777	114	1,622	1,187
6	2005	121	339		459	972	902	121	1,995	1,536
7	2006	84	364		447	1,164	983	84	2,231	1,784
8	2007	146	364		510	1,194	983	146	2,323	1,813
9	2008	111	364		474	1,361	983	111	2,455	1,980
10	2009	56	364		419	1,442	1,019	56	2,516	2,097
11	2010	52	364		415	1,516	1,082	52	2,650	2,234
12	2011		364		364	1,516	1,082	0	2,598	2,234
13	2012		364		364	1,516	1,082	0	2,598	2,234
14	2013		364		364	1,516	1,082	0	2,598	2,234
15	2014		364		364	1,516	1,082	0	2,598	2,234
16	2015		364		364	1,516	1,082	0	2,598	2,234
17	2016		364		364	1,516	1,082	0	2,598	2,234
18	2017		364	1,777	2,140	1,516	1,082	0	2,598	458
19	2018		364		364	1,516	1,082	0	2,598	2,234
20	2019		364		364	1,516	1,082	0	2,598	2,234
21	2020		364		364	1,516	1,082	0	2,598	2,234
22	2021		364		364	1,516	1,082	0	2,598	2,234
23	2022		364		364	1,516	1,082	0	2,598	2,234
24	2023		364		364	1,516	1,082	0	2,598	2,234
25	2024		364		364	1,516	1,082	0	2,598	2,234
26	2025		364		364	1,516	1,082	0	2,598	2,234
27	2026		364		364	1,516	1,082	0	2,598	2,234
28	2027		364		364	1,516	1,082	0	2,598	2,234
29	2028		364		364	1,516	1,082	0	2,598	2,234
30	2029		364		364	1,516	1,082	0	2,598	2,234
31	2030		364		364	1,516	1,082	0	2,598	2,234
32	2031		364		364	1,516	1,082	0	2,598	2,234
33	2032		364		364	1,516	1,082	0	2,598	2,234

Evaluation Indices

NPV:	-16	thousand US$
B/C:	1.00	
FIRR:	10.0%	

Note: *1 Discounted at 10%

Management Condition:

The rates of water charge are raised to 3.3 times of the present ones.

Table 2.2.4 Financial Expenditure and Revenue Stream of Proposed Project: Case 2

(Unit: US$1000 in Financial Terms)

	Year	Expenditure				Revenue				Balance
						Water Sales				
		Capital Investment	O&M	Replacement	Total	Domestic	Non-Domestic	Connection Charge	Total	
1	2000	83			83				0	-83
2	2001	1,086			1,086				0	-1,086
3	2002	1,300	23		1,323	9	9	187	204	-1,118
4	2003	103	298		401	160	167	103	429	28
5	2004	114	322		436	222	235	114	571	135
6	2005	121	339		459	294	273	121	689	229
7	2006	84	364		447	353	298	84	734	287
8	2007	146	364		510	362	298	146	806	296
9	2008	111	364		474	412	298	111	821	347
10	2009	56	364		419	437	309	56	801	382
11	2010	52	364		415	459	328	52	839	424
12	2011		364		364	459	328	0	787	424
13	2012		364		364	459	328	0	787	424
14	2013		364		364	459	328	0	787	424
15	2014		364		364	459	328	0	787	424
16	2015		364		364	459	328	0	787	424
17	2016		364		2,140	459	328	0	787	-1,353
18	2017		364	1,777	364	459	328	0	787	424
19	2018		364		364	459	328	0	787	424
20	2019		364		364	459	328	0	787	424
21	2020		364		364	459	328	0	787	424
22	2021		364		364	459	328	0	787	424
23	2022		364		364	459	328	0	787	424
24	2023		364		364	459	328	0	787	424
25	2024		364		364	459	328	0	787	424
26	2025		364		364	459	328	0	787	424
27	2026		364		364	459	328	0	787	424
28	2027		364		364	459	328	0	787	424
29	2028		364		364	459	328	0	787	424
30	2029		364		364	459	328	0	787	424
31	2030		364		364	459	328	0	787	424
32	2031		364		364	459	328	0	787	424
33	2032		364		364	459	328	0	787	424

Evaluation Indices

NPV:	99	thousand US$
B/C:	1.02	
FIRR:	10.5%	

Note: *1 Discounted at 10%

Management Condition:

86% of capital investment cost is subsidized.

Table 2.2.5 Financial Expenditure and Revenue Stream of Proposed Project: Case 3

(Unit: US$1000 in Financial Terms)

	Year	Expenditure				Revenue				Balance
						Water Sales				
		Capital Investment	O&M	Replacement	Total	Domestic	Non-Domestic	Connection Charge	Total	
1	2000	189			189				0	-189
2	2001	2,483			2,483				0	-2,483
3	2002	2,731	23		2,754	13	13	187	213	-2,540
4	2003	103	298		401	240	250	103	593	192
5	2004	114	322		436	333	353	114	799	364
6	2005	121	339		459	442	410	121	972	513
7	2006	84	364		447	529	447	84	1,060	613
8	2007	146	364		510	543	447	146	1,136	626
9	2008	111	364		474	619	447	111	1,176	702
10	2009	56	364		419	655	463	56	1,174	755
11	2010	52	364		415	689	492	52	1,232	817
12	2011		364		364	689	492	0	1,181	817
13	2012		364		364	689	492	0	1,181	817
14	2013		364		364	689	492	0	1,181	817
15	2014		364		364	689	492	0	1,181	817
16	2015		364		364	689	492	0	1,181	817
17	2016		364		364	689	492	0	1,181	817
18	2017		364	1,777	2,140	689	492	0	1,181	-960
19	2018		364		364	689	492	0	1,181	817
20	2019		364		364	689	492	0	1,181	817
21	2020		364		364	689	492	0	1,181	817
22	2021		364		364	689	492	0	1,181	817
23	2022		364		364	689	492	0	1,181	817
24	2023		364		364	689	492	0	1,181	817
25	2024		364		364	689	492	0	1,181	817
26	2025		364		364	689	492	0	1,181	817
27	2026		364		364	689	492	0	1,181	817
28	2027		364		364	689	492	0	1,181	817
29	2028		364		364	689	492	0	1,181	817
30	2029		364		364	689	492	0	1,181	817
31	2030		364		364	689	492	0	1,181	817
32	2031		364		364	689	492	0	1,181	817
33	2032		364		364	689	492	0	1,181	817

Evaluation Indices

NPV:	189	thousand US$
B/C:	1.03	
FIRR:	10.2%	

Note: *1 Discounted at 10%

Management Condition:

(1) 70% of capital investment cost is subsidized.

(2) The rates of water charge are raised to 45% higher than the present rates.

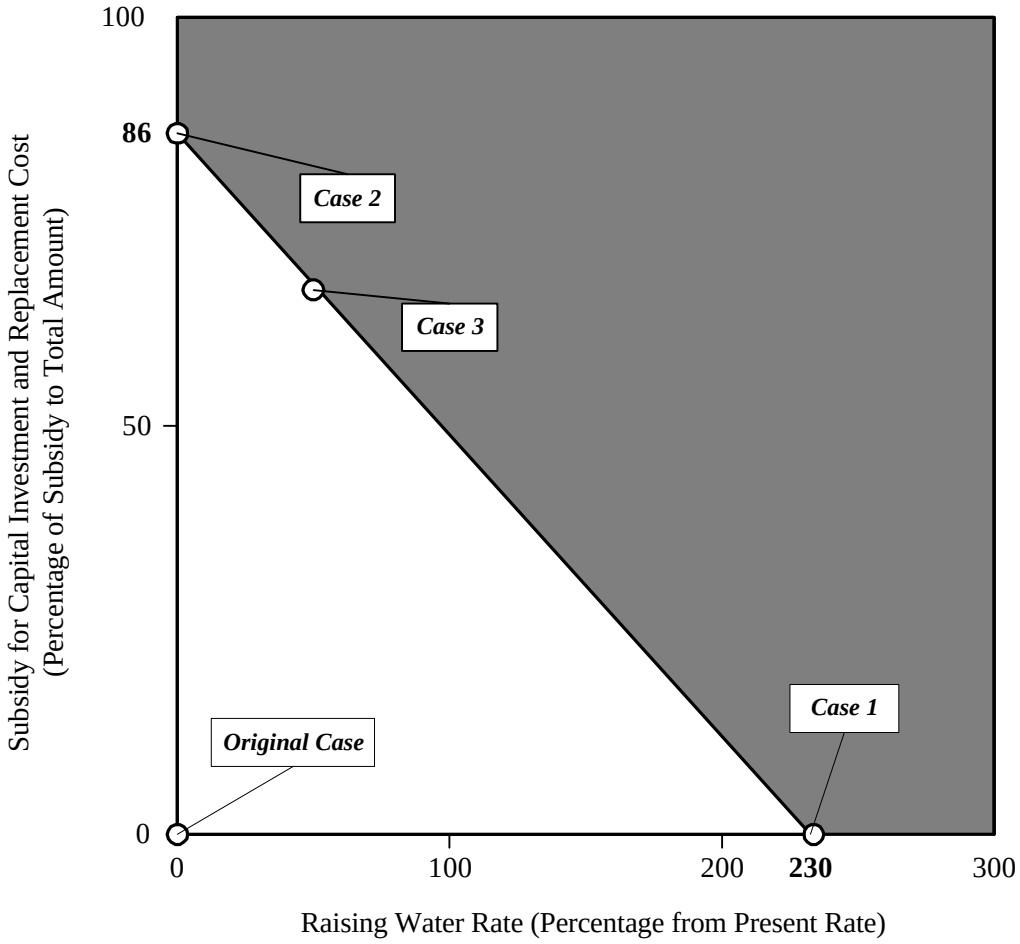


Figure 2.2.1 Effective Countermeasures for Making Proposed Project Viable

In these countermeasures above, the water rates were considered as one set of domestic and big consumers. However, a combination of the water rates can be changed in different ways. For example, the ratio between domestic and big consumers could be changed as a way.

For example, the balance between the rates of small and big consumers is discussed under the following case.

(1) 50% higher than the present water rates

(2) Keep the domestic rate at the present one.

In this case, the tariff rate for big consumer has to be raised to US$ 0.80 per m^3 or 2.2 times the present rate. This case corresponds to the Case 3, mentioned above.

The following case corresponds to the Case 1 above.

(1) 3.3 times higher than the present water rates.

(2) Keep the domestic rate at the present one.

In this case, the tariff rate for big consumer has to be raised to US$ 2.40 per m^3 or 6.5 times the present rate.

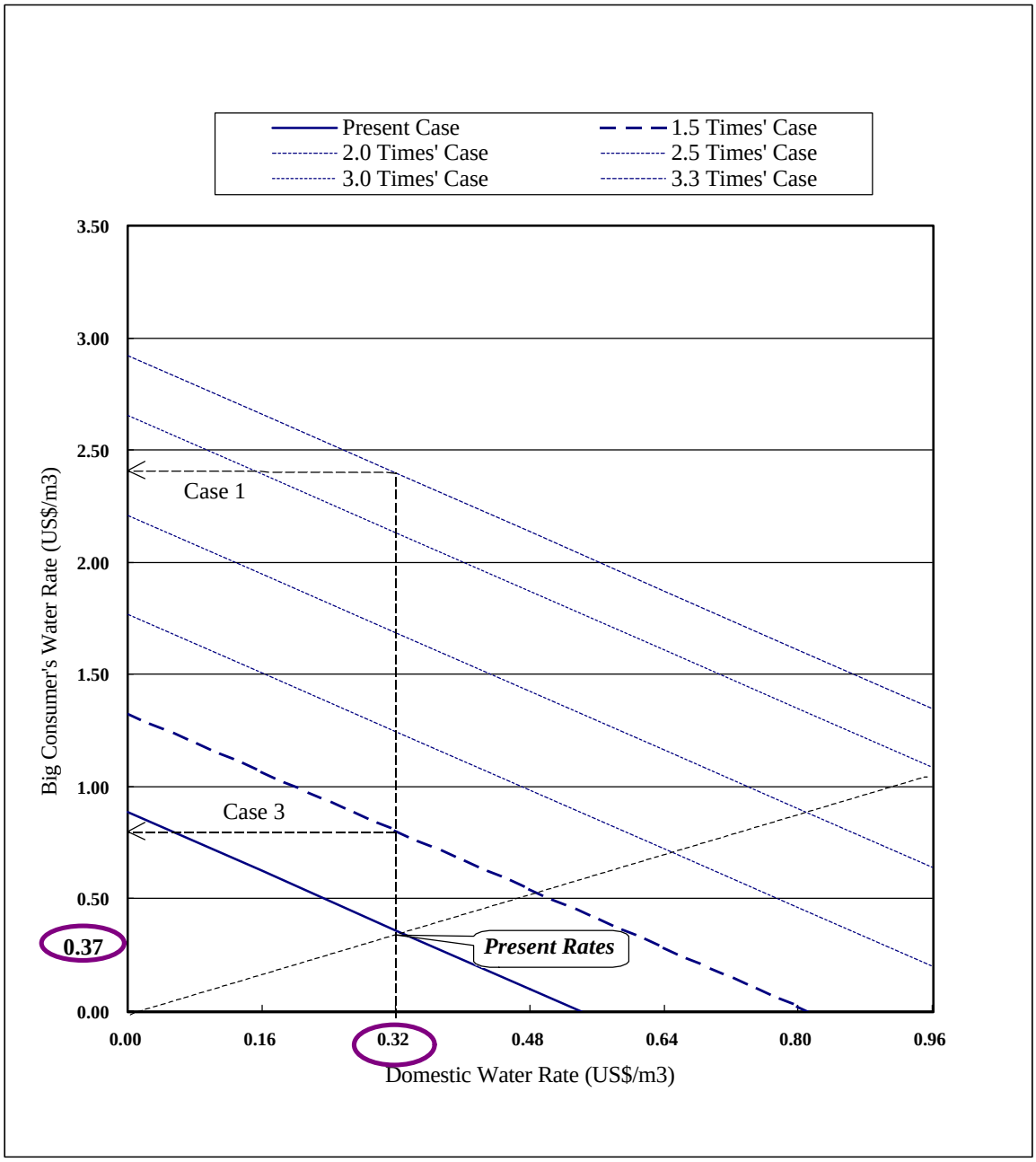


Figure 2.2.2 Relation Between Domestic and Big Consumer's Water Rates

This relation is illustrated in Figure 2.2.2. The water rates' variations between small and big consumers are made in various ways. This selection is considered as policy matter. Thus, the final selection will be made by the undertaker himself.

2.3 Financial Simulation

This section presents financial simulation of waterworks for the Proposed Project. The financial simulation is based on information about "existing financial system of water supply business" and "financial conditions for water sector". We apply an integrated financial simulation model for this analysis. Through this analysis, we will find the financial problems of the Proposed Project and fund requirement for the water supply entity.

Figure 2.3.1 gives an image of income statement trend in the financial simulation. The figure includes the following information: (a) revenue from water sales and installation charges, and interest of saving deposit; (b) expenditure of operation and maintenance; (c) net operating profit, i.e., a difference between revenue and expenditure; (d) annual net profit, i.e., the profit of the net operating profit minus depreciation and interest of loan; and (e) accumulation of profit.

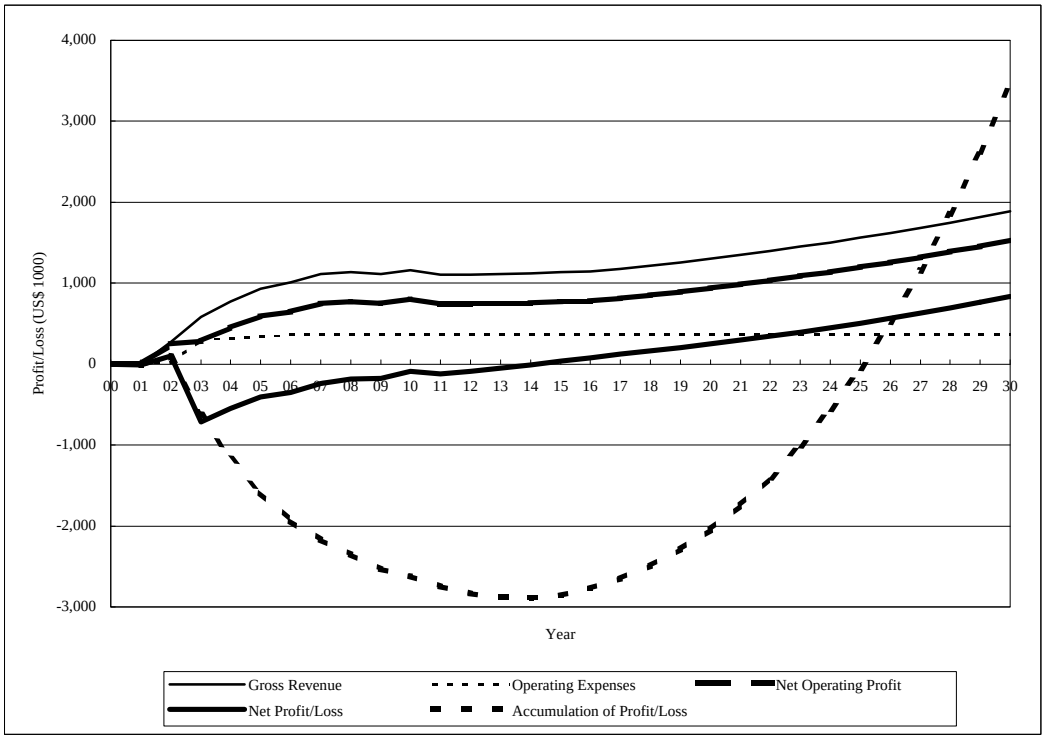


Figure 2.3.1 Image of Financial Simulation

The image figure indicates that the net loss continues until 2014, and moves toward surplus after 2015. The accumulation of losses continues until 2025 and

turns to the black after 2026. The accumulation profit increases rapidly after 2026. It hopefully reaches to the amount for investing the reconstruction of the facilities by the end of economic life. As seen in this figure, anyhow, the profit and loss of the enterprise are very serious for around 10 years from the beginning, in general. Thus, the financial simulation tables presented in this simulation include the beginning 11 years, i.e., from 2000 to 2010.

2.3.1 Selection of Financial Simulation Cases

For the most recommendable financial plans, a financial simulation was done applying a financial analysis model. In the model, the management of the water supply services is simulated as a financially autonomous entity. The model includes profit loss table (income statement), balance sheet, and cash flow table (funds statement). It also shows several management indicators to imply financial conditions and problems on management during the year analyzed.

Through this analysis, the financial and management problems was identified for the Proposed Project and the timing of fund requirement was analyzed for the water supply entity. To solve the problems, the Study Team referred to existing financial and administrative conditions.

Among various countermeasures discussed in the previous section, the following financial plans are adopted for financial simulation.

Financial Plan 1: The finance for initial investment is procured (a) 30% of the total investment costs from loan of international financial organization and (b) 70% from grant of foreign countries and central governments. In addition, the charging rate of water is set to 50% higher than the present rate.

Financial Plan 2: The finance for initial investment is procured from grant of foreign countries and central governments. The charging rate of water is set at the present water rate, because of avoiding difficulty of cash situation at the initial stage of the management, although the analysis said that the a half of the present rate would make the Project management feasible. This condition may promote to invest in the Stage 2 implementation.

2.3.2 Conditions and Assumptions to Financial Simulation

In financial analysis, the revenues from the water supply services and the expenditures for operation and maintenance as well as capital investment are estimated on the basis of the proposed water supply system. These basic estimates are provided by the cost estimators. Besides these data, the following conditions and assumptions are set-up for the financial simulation.

1) Projection period: 11 years, from 2000 as the start year of construction works of the Proposed Project through 2010. Simulations were also done up to 2030 to check cash balance and break-even point.

2) Prices and cost escalation: Projections of both revenues and expenditures were made without escalation to simplify and to make the simulation clearly understandable.

3) Currency and exchange rate: Capital costs, revenues and expenditures are evaluated in US dollar. Exchange rates of 3,800 Riels to US$ 1.00 and J¥120 per US$1.00 are applied in the Feasibility Study.

4) Finances for Implementation: Finances for the financial plans are set as follows:

Table 2.3.1 Finances of Financial Plan 1 and 2

	Financial Source	Amount (US$1000)	
		Financial Plan 1	Financial Plan 2
1.	Grant (Foreign Country)	11,974	17,106
2.	Loan*1 (International Agency)	5,132	-
3.	Local Government		
	a. Operation Capital	50	50
	b. Grant for Land Acquisition	250	250
	c. Investment in Kind (French System)	500	500

Note: *1 Terms of loan by international agency are as follows: 6.5% of annual interest rate, and 20 years of repayment period with 5 years of grace period.

*2 Financial shortage during the simulation period is assumed to be financed by the government as done for the present waterworks so far.

5) Income taxes: The water supply entity, i.e., PDIME is currently exempt from income taxes. The income taxes will be levied after the water supply entity is privatized in the future. In the evaluation period, however, the entity is assumed not to be privatized.

6) Water tariff structure: The present water tariff is constituted of two parts: (a) water charges by type of water consumer, i.e., Category 1 or normal consumers such as residential users and Category 2 or big consumers such as hotels and restaurants, and (b) an installation charge. The water charge is set-up in July 1999, as follows:

Table 2.3.2 Water Tariff of Water Supply Services

i)	Category 1	Normal consumers, mainly domestic use	12,000 Riels/m^3
ii)	Category 2	Big consumers, non-domestic use, such as hotels, restaurants, offices and factories	14,000 Riels/m^3

At present, the installation charge is furthermore divided into two categories, i.e., renewal connection users and new connection users, which is set-up as follows.

Table 2.3.3 Installation Charges of Water Supply Services

For Renewal Connection			Current Rate
i)	To settle any back water charges		
ii)	To pay a security deposit equivalent to 10 m^3	Category 1	12,000 Riels
		Category 2	14,000 Riels
iii)	To pay a maintenance fee of connection installations		US$20.00
For New Connection			
i)	To pay a security deposit equivalent to 10 m^3	Category 1	12,000 Riels
		Category 2	14,000 Riels
ii)	To pay a construction fee of connection installations		US$137.73

7) Water connection services: The current number of water connection was registered at 211 only as of the end of October 1999, consisting of 189 consumers of Category 1 and 22 consumers of Category 2. Under the present water supply system, the water connections are expected to increase to 410 in the near future. After the completion of the Proposed Project, the water connections will increase at the following pace during the period of the Stage 1.

Table 2.3.4 Increase Projection of Water Connection: 2001 - 2006

Item	~2001	2002	2003	2004	2005	2006	Total
Normal Consumers	385	1,255	680	748	830	577	4,475
Big Consumers	25	99	65	78	45	30	342
Total Connections	410	1,354	745	826	875	607	4,817

8) Water sales: The total amount of water sales is estimated as a product of water consumption volume and unit charge by type of consumers. The unit charges are presented in the water tariff above. The water consumption during the period of the Stage 1 is estimated for the respective types of consumers as follows.

Table 2.3.5 Water Consumption Volume Projection: 2002 - 2006

(Unit: 1000 m^3/day)

Consumer	2002	2003	2004	2005	2006
Normal Consumers	935	1,388	1,923	2,555	3,061
Big Consumers	801	1,240	1,751	2,034	2,216
Total Consumption	1,735	2,628	3,674	4,589	5,277

After 2007, the proposed scheme has water supply capacity enough to spare for some other water consumers, although its capacity is not sufficient for the peak load demand. In the simulation, then, 83% of the daily demand is assumed to be covered by the proposed scheme until 2010.

9) Revenues: The revenues of the water supply entity accrue from water sales bases on water usage, and installation charges. Both revenue sources are already discussed above. Regarding administration charges and deficits at the beginning stage of the water supply works, these expenses and losses are assumed to be filled by the government short-term support with no interest. In addition to these revenues, the entity could get other earnings from interests on short-term deposits, if it gains a net profit through its management.

10) Water losses: Water losses were divided into two categories: (a) technical losses through process of water production and through leakage during water distribution; and (b) unaccounted non-technical losses arising mostly through theft or improper commercial practices. The former losses were already counted in operation costs based on the technical information. The latter losses affect directly the revenue side of the operation. According to the experience of the water services for the last three months, however, there were no unaccounted losses so far. According to "Plan D'Urbanisme de Reference et projets Prioritaires, Novembre 1995, APSARA", uncollected bills were only 2.7% in 1993. Thus, the unaccounted losses are assumed at 0% of the total water sales in this simulation. In general, these losses are appropriated as accounts receivable in balance sheet.

11) Depreciation: Fixed assets such as water supply plant and distribution piping network are depreciated straight-line over 30 years after they are placed in service. Some machinery such as pumps and power generator are depreciated straight-line in 15 years. The engineering services are also set to be depreciated straight-line in 15 years.

12) Assumptions about accounting and tax: Grants from foreign countries are internalized as a part of equity of the waterworks entity. The facilities established on the basis of the grants are treated as depreciable assets in the accounting system without reduction entry of these facilities.

Tables 2.3.6 to 2.4.9 show the results of the financial simulation with regard to the financial plan 1. Tables 2.3.10 to 2.3.13 shows the results of the financial plan 2. These simulations are based on the given conditions and assumptions mentioned above.

Table 2.3.6 Summary of Key Financial Indicators of Financial Plan 1

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Projection Parameters											
1	Currency	US Dollar										
2	Prices/Cost	1999 Constant										
3	Exchange Rate	3,800 Riels per US$1.00										
	Operating Results											
4	Operating Revenues	0	0	307	644	856	1,033	1,102	1,218	1,241	1,212	1,275
5	Operating Expenses	0	0	210	401	436	459	447	475	439	384	380
6	Net Income	0	-6	-59	-1,056	-879	-726	-645	-545	-456	-398	-299
7	Cash from Operations	0	0	97	243	421	574	655	743	801	828	895
8	Operaing Ratio	-	-	68%	62%	51%	44%	41%	39%	35%	32%	30%
9	Total Assets	622	8,267	16,881	15,775	14,739	13,983	13,325	12,317	11,365	10,459	9,677
10	Working Capital	50	44	307	192	148	382	716	698	737	822	1,031
11	Working Capital Turnover (per year)	-	-	1.00	3.35	5.80	2.70	1.54	1.74	1.68	1.47	1.24
	Operating Efficiency											
12	Service Connections	-	-	1,744	2,489	3,314	4,190	4,797	5,860	6,662	7,067	7,442
13	Average Tariff (US$/m3)	-	-	0.51	0.51	0.51	0.51	0.51	0.44	0.42	0.42	0.42
14	Average Water Monthly Bill (US$/Connection)	-	-	15	16	17	17	17	14	13	13	13
15	Percent Growth in Connections	-	-	-	42.7%	33.2%	26.4%	14.5%	22.1%	13.7%	6.1%	5.3%
16	Water Sold (in 1000 m3 per year)	-	-	53	959	1,341	1,675	1,926	2,250	2,510	2,666	2,814
17	Water Losses	-	-	15%	15%	15%	15%	15%	15%	15%	15%	15%
18	Loss of Sales due to Water Losses (US$1000)	-	-	5	87	121	150	172	175	188	197	208
	Financial Performance Ratios											
19	Current Ratio	-	-	0.95	0.71	1.28	3.89	1.74	0.94	1.01	1.16	1.46
20	Capital Adequacy Ratio	0.84	0.71	0.70	0.68	0.67	0.65	0.64	0.65	0.66	0.68	0.70
21	Debt Service Coverage	-	7.96	0.90	0.47	0.72	1.22	1.60	1.10	1.17	1.31	1.45
22	Labor Productivity	-	-	15.46	15.56	20.10	22.95	23.24	25.51	25.98	25.36	26.55
23	Self Financing Ratio	-	0.6%	-0.2%	-	-	-	-	-	-	-	-
24	Fixed Ratio	108.9%	140.0%	140.3%	144.9%	147.7%	148.6%	148.2%	146.0%	141.6%	135.6%	127.0%
25	Ratio of Fixed Assets to Long-term Capital	92.0%	99.5%	100.1%	100.5%	99.8%	98.0%	97.6%	100.4%	100.0%	98.8%	96.4%
26	Return on Revenues	-	-	-217.4%	-215.5%	-128.2%	-85.2%	-66.0%	-55.1%	-42.8%	-35.6%	-25.4%
27	Return on Assets	-	-	-0.3%	-6.7%	-6.0%	-5.2%	-4.8%	-4.4%	-4.0%	-3.8%	-3.1%
28	Return on Equity	-	-	-0.5%	-9.8%	-8.9%	-7.9%	-7.6%	-6.8%	-6.1%	-5.6%	-4.4%
	Investment Program											
29	Investment Project	322	7,651	7,851	-	-	-	-	-	-	-	-
30	Land Acquisition	250	-	-	-	-	-	-	-	-	-	-
31	Spare Stock	-	-	202	-	-	-	-	-	-	-	-
	Financing Plan											
32	Capital Paid by Government	50	-	-	-	-	-	-	-	-	-	-
33	Capital of Government (French System)	-	-	500	-	-	-	-	-	-	-	-
34	Grants of Foreign Country	226	5,356	5,496	-	-	-	-	-	-	-	-
35	Loan of International Agency	97	2,295	2,355	-	-	-	-	-	-	-	-
36	Grant of Government	250	-	-	-	-	-	-	-	-	-	-
37	Cash Loan of Government	0	0	210	272	156	0	0	0	0	0	0

Table 2.3.7 Income Statement of Financial Plan 1

(Unit: US$ 1000)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Revenues											
38	Water Sales	0	0	27	490	686	852	976	990	1,065	1,118	1,181
39	Commodity & Meter Rental Charges	-	-	-	-	-	-	-	-	-	-	-
40	Sewerage Surcharge	-	-	-	-	-	-	-	-	-	-	-
41	Less: Discounts	-	-	-	-	-	-	-				
42	Installation Charges	0	0	280	154	171	181	126	220	166	84	77
43	Interest on Deposits	-	0	0	0	0	0	0	9	9	10	17
44	Penalties & Fines	-	-	-	-	-	-	-	-	-	-	-
45	**Gross Revenue**	0	0	307	644	856	1,033	1,102	1,218	1,241	1,212	1,275
	Operating Expenses											
	Water Supply & Distribution											
46	Power Cost	-	-	10	136	155	166	187	152	152	152	152
47	Chemical Cost	-	-	0	8	11	14	16	16	16	16	16
48	Personnel Cost	-	-	3	41	43	45	47	47	47	47	47
49	Sub-total of O/M Costs	-	-	14	185	209	225	250	215	215	215	215
50	Maintenance Costs	-	-	9	113	113	113	113	113	113	113	113
51	Other Expenses	-	-	187	103	114	121	84	146	111	56	52
52	**Total of Operating Expenses**	0	0	210	401	436	459	447	475	439	384	380
53	**Net Operating Profit**	0	0	97	243	421	574	655	743	801	828	895
54	Depreciation	-	-	-	991	991	991	991	991	991	991	991
55	Interest	-	6	155	309	309	309	308	297	266	235	203
56	Subtotal	0	6	155	1,300	1,300	1,300	1,299	1,288	1,257	1,226	1,194
57	**Income before Taxes**	0	-6	-59	-1,056	-879	-726	-645	-545	-456	-398	-299
58	Income Taxes	-	-	-	-	-	-	-	-	-	-	-
59	**Net Profit (/Loss)**	0	-6	-59	-1,056	-879	-726	-645	-545	-456	-398	-299
60	**Accumulation of Profit (/Loss)**	0	-6	-65	-1,121	-2,000	-2,726	-3,371	-3,916	-4,372	-4,769	-5,069

Table 2.3.8 Flow of Funds Statement of Financial Plan 1

(Unit: US$ 1000)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Internal Cash Generation											
61	Net Income before Interest Charges	0	0	97	-748	-570	-417	-336	-248	-190	-163	-96
62	Add: Depreciation Exp.	0	0	0	991	991	991	991	991	991	991	991
63	Operating Cash Flow	0	0	97	243	421	574	655	743	801	828	895
64	Add: Beginning Cash Position	0	50	44	0	0	0	103	112	75	110	96
65	**Cash before Debt Service**	0	50	141	243	421	574	757	855	877	938	991
66	**Debt Service**											
67	Interest Charges	0	6	155	309	309	309	308	297	266	235	203
68	Principal Repayments	0	0	0	0	0	6	166	482	482	482	482
69	Cash Loan Repayment to Government	0	0	0	210	272	156	0	0	0	0	0
70	**Total Debt Service**	0	6	155	519	581	471	474	780	748	717	686
71	**Cash after Debt Service**	0	44	-15	-276	-160	103	283	75	128	221	305
	Capital Investment Requirements											
72	Investment Projects	322	7,651	7,851	-	-	-	-	-	-	-	-
73	Stock of Spares	-	-	202	-	-	-	-	-	-	-	-
74	Land Acquisition	250	-	-	-	-	-	-	-	-	-	-
75	Administration	18	109	100	-	-	-	-	-	-	-	-
76	Annual Capital Investment	572	7,651	8,053	0	0	0	0	0	0	0	0
77	Add: Cash Ending Balance	50	44	0	0	0	103	112	75	110	96	95
78	**Financing Requirement**	-622	-7,651	-8,067	-276	-160	0	171	0	18	125	210
	Funds from Loans & Grants											
79	Grants of Foreign Country	226	5,356	5,496	-	-	-	-	-	-	-	-
80	Loans of International Agency	97	2,295	2,355	-	-	-	-	-	-	-	-
81	Security Deposit	0	0	6	4	4	4	3	5	4	2	2
82	Grants of Government	250	-	-	-	-	-	-	-	-	-	-
83	Capital by Government	50	-	-	-	-	-	-	-	-	-	-
84	Sub-total of Funds	622	7,651	7,857	4	4	4	3	5	4	2	2
85	Cash Loan of Government	0	0	210	272	156	0	0	0	0	0	0
86	**Total of Funds**	622	7,651	8,067	276	160	4	3	5	4	2	2
87	**Cash Surplus (Deficit)**	0	0	0	0	0	4	174	5	22	127	212
	If Cash Surplus:											
88	Purchase (/Sell) Deposits	0	0	0	0	0	4	174	5	22	127	212
	If Cash Deficit:											
89	Sale of Deposits	-	-	-	-	-	-	-	-	-	-	-
90	Additional Equity Needed	-	-	-	-	-	-	-	-	-	-	-
91	Total Cash Raised	-	-	-	-	-	-	-	-	-	-	-

Table 2.3.9 Balance Sheet of Financial Plan 1

(Unit: US$ 1000)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	ASSETS											
	Fixed Assets											
92	Land	250	250	250	250	250	250	250	250	250	250	250
93	Plants in Service*1	0	0	16,324	16,324	15,333	14,342	13,351	12,360	11,369	10,378	9,387
94	Less: Depreciation	-	-	-	991	991	991	991	991	991	991	991
95	Net Fixed Assets	250	250	16,574	15,583	14,592	13,601	12,610	11,619	10,628	9,637	8,646
96	Work in Process	322	7,973	-	-	-	-	-	-	-	-	-
97	**Total Fixed Assets**	572	8,223	16,574	15,583	14,592	13,601	12,610	11,619	10,628	9,637	8,646
	Current Assets											
98	Cash	50	44	0	0	0	103	112	75	110	96	95
99	Short-Term Deposits	0	0	0	0	0	4	178	184	206	332	544
100	Accounts Receivable (Net)	-	-	-	-	-	-	-	-	-	-	-
101	Inventories of Spares	-	-	202	202	202	202	202	202	202	202	202
102	**Total Current Assets**	50	44	307	192	148	382	716	698	737	822	1,031
103	**Total Assets**	622	8,267	16,881	15,775	14,739	13,983	13,325	12,317	11,365	10,459	9,677
	LIABILITIES & NET WORTH											
	Equity											
104	Paid in Capital*2	50	50	550	550	550	550	550	550	550	550	550
105	Grants	476	5,831	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327
106	Retained Earnings	0	-6	-65	-1,121	-2,000	-2,726	-3,371	-3,916	-4,372	-4,769	-5,069
107	**Total Net Worth**	526	5,875	11,812	10,755	9,876	9,150	8,506	7,961	7,505	7,107	6,808
	Borrowings											
108	Loans of International Agency	97	2,392	4,747	4,747	4,747	4,741	4,575	4,092	3,610	3,128	2,645
109	Other Loans	-	-	-	-	-	-	-	-	-	-	-
110	Other Credits	-	-	-	-	-	-	-	-	-	-	-
111	Less: Current Portion of Debt	0	0	0	0	0	6	166	482	482	482	482
112	**Total Borrowings**	97	2,392	4,747	4,747	4,747	4,734	4,409	3,610	3,128	2,645	2,163
	Current Liabilities											
113	Accounts Payables	0	0	105	200	218	230	224	237	220	192	190
114	Cash Loan of Government	0	0	210	272	156	0	0	0	0	0	0
115	Notes Payable	-	-	-	-	-	-	-	-	-	-	-
116	Security Deposit	0	0	6	10	14	18	21	26	30	32	34
117	Current Portion of Debt	-	-	-	-	-	6	166	482	482	482	482
118	Less: Cash Loan Repayment to Government	0	0	0	210	272	156	0	0	0	0	0
119	**Total Current Liabilities**	0	0	322	272	116	98	411	746	732	706	706
120	**Total Liablilities and Net Worth**	622	8,267	16,881	15,775	14,739	13,983	13,325	12,317	11,365	10,459	9,677

Note: *1 New french system is added into the proposed project scheme.

*2 50 thousand US dollars and New french system is internalized to capital paid.

Table 2.3.10 Summary of Key Financial Indicators of Financial Plan 2

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Projection Parameters											
1	Currency	US Dollar										
2	Prices/Cost	1999 Constant										
3	Exchange Rate	3,800 Riels per US$1.00										
	Operating Results											
4	Operating Revenues	0	0	204	429	571	689	741	828	860	862	924
5	Operating Expenses	0	0	210	401	436	459	447	475	439	384	380
6	Net Income	0	0	-5	-963	-856	-762	-697	-638	-570	-513	-447
7	Cash from Operations	0	0	-5	28	135	229	294	353	421	478	544
8	Operaing Ratio	-	-	103%	93%	76%	67%	60%	57%	51%	45%	41%
9	Total Assets	640	8,291	16,899	15,850	14,923	14,298	13,597	12,976	12,391	11,851	11,404
10	Working Capital	68	68	325	268	332	698	988	1,358	1,763	2,215	2,758
11	Working Capital Turnover (per year)	-	-	0.63	1.60	1.72	0.99	0.75	0.61	0.49	0.39	0.34
	Operating Efficiency											
12	Service Connections	-	-	1,744	2,489	3,314	4,190	4,797	5,860	6,662	7,067	7,442
13	Average Tariff (US$/m3)	-	-	0.34	0.34	0.34	0.34	0.34	0.29	0.28	0.28	0.28
14	Average Water Monthly Bill (US$/Connection)	-	-	10	11	11	11	11	9	9	9	9
15	Percent Growth in Connections	-	-	-	42.7%	33.2%	26.4%	14.5%	22.1%	13.7%	6.1%	5.3%
16	Water Sold (in 1000 m3 per year)	-	-	53	959	1,341	1,675	1,926	2,250	2,510	2,666	2,814
17	Water Losses	-	-	15%	15%	15%	15%	15%	15%	15%	15%	15%
18	Loss of Sales due to Water Losses (US$1000)	-	-	3	58	81	100	115	116	125	132	139
	Financial Performance Ratios											
19	Current Ratio	-	-	1.24	1.52	3.15	2.89	4.15	5.33	7.36	10.38	12.98
20	Capital Adequacy Ratio	1.00	1.00	0.98	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98
21	Debt Service Coverage	-	-	-	-	-	-	-	-	-	-	-
22	Labor Productivity	-	-	10.31	10.37	13.40	15.30	15.49	17.00	17.32	16.90	17.70
23	Self Financing Ratio	-	0.6%	0.5%	-	-	-	-	-	-	-	-
24	Fixed Ratio	89.4%	99.2%	99.6%	99.4%	98.5%	96.8%	94.4%	91.3%	87.5%	82.8%	77.3%
25	Ratio of Fixed Assets to Long-term Capital	89.4%	99.2%	99.6%	99.4%	98.5%	96.8%	94.4%	91.3%	87.5%	82.8%	77.3%
26	Return on Revenues	-	-	-29.4%	-294.5%	-187.2%	-134.1%	-107.1%	-96.8%	-80.3%	-68.8%	-56.8%
27	Return on Assets	-	-	0.0%	-6.1%	-5.7%	-5.3%	-5.1%	-4.9%	-4.6%	-4.3%	-3.9%
28	Return on Equity	-	-	0.0%	-6.1%	-5.8%	-5.4%	-5.2%	-5.0%	-4.7%	-4.4%	-4.0%
	Investment Program											
29	Investment Project	322	7,651	7,851	-	-	-	-	-	-	-	-
30	Land Acquisition	250	-	-	-	-	-	-	-	-	-	-
31	Spare Stock	-	-	202	-	-	-	-	-	-	-	-
	Financing Plan											
32	Capital Paid by Government	50	-	-	-	-	-	-	-	-	-	-
33	Capital of Government (French System)	-	-	500	-	-	-	-	-	-	-	-
34	Grants of Foreign Country	322	7,651	7,851	-	-	-	-	-	-	-	-
35	Loan of International Agency	0	0	0	-	-	-	-	-	-	-	-
36	Grant of Government	250	-	-	-	-	-	-	-	-	-	-
37	Cash Loan of Government	0	0	153	122	0	0	0	0	0	0	0

Table 2.3.11 Income Statement of Financial Plan 2

(Unit: US$ 1000)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Revenues											
38	Water Sales	0	0	18	327	457	568	651	660	710	746	787
39	Commodity & Meter Rental Charges	-	-	-	-	-	-	-	-	-	-	-
40	Sewerage Surcharge	-	-	-	-	-	-	-	-	-	-	-
41	Less: Discounts	-	-	-	-	-	-	-				
42	Installation Charges	0	0	187	103	114	121	84	146	111	56	52
43	Interest on Deposits	-	0	0	0	0	0	7	22	39	61	85
44	Penalties & Fines	-	-	-	-	-	-	-	-	-	-	-
45	**Gross Revenue**	0	0	204	429	571	689	741	828	860	862	924
	Operating Expenses											
	Water Supply & Distribution											
46	Power Cost	-	-	10	136	155	166	187	152	152	152	152
47	Chemical Cost	-	-	0	8	11	14	16	16	16	16	16
48	Personnel Cost	-	-	3	41	43	45	47	47	47	47	47
49	Sub-total of O/M Costs	-	-	14	185	209	225	250	215	215	215	215
50	Maintenance Costs	-	-	9	113	113	113	113	113	113	113	113
51	Other Expenses	-	-	187	103	114	121	84	146	111	56	52
52	**Total of Operating Expenses**	0	0	210	401	436	459	447	475	439	384	380
53	**Net Operating Profit**	0	0	-5	28	135	229	294	353	421	478	544
54	Depreciation	-	-	-	991	991	991	991	991	991	991	991
55	Interest	-	0	0	0	0	0	0	0	0	0	0
56	Subtotal	0	0	0	991	991	991	991	991	991	991	991
57	**Income before Taxes**	0	0	-5	-963	-856	-762	-697	-638	-570	-513	-447
58	Income Taxes	-	-	-	-	-	-	-	-	-	-	-
59	**Net Profit (/Loss)**	0	0	-5	-963	-856	-762	-697	-638	-570	-513	-447
60	**Accumulation of Profit (/Loss)**	0	0	-5	-968	-1,824	-2,585	-3,282	-3,921	-4,491	-5,004	-5,451

Table 2.3.12 Flow of Funds Statement of Financial Plan 2

(Unit: US$ 1000)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Internal Cash Generation											
61	Net Income before Interest Charges	0	0	-5	-963	-856	-762	-697	-638	-570	-513	-447
62	Add: Depreciation Exp.	0	0	0	991	991	991	991	991	991	991	991
63	Operating Cash Flow	0	0	-5	28	135	229	294	353	421	478	544
64	Add: Beginning Cash Position	0	50	50	0	0	13	115	112	119	110	96
65	**Cash before Debt Service**	0	50	45	28	135	243	409	465	540	588	640
66	**Debt Service**											
67	Interest Charges	0	0	0	0	0	0	0	0	0	0	0
68	Principal Repayments	0	0	0	0	0	0	0	0	0	0	0
69	Cash Loan Repayment to Government	0	0	0	153	122	0	0	0	0	0	0
70	**Total Debt Service**	0	0	0	153	122	0	0	0	0	0	0
71	**Cash after Debt Service**	0	50	45	-124	13	243	409	465	540	588	640
	Capital Investment Requirements											
72	Investment Projects	322	7,651	7,851	-	-	-	-	-	-	-	-
73	Stock of Spares	-	-	202	-	-	-	-	-	-	-	-
74	Land Acquisition	250	-	-	-	-	-	-	-	-	-	-
75	Administration	18	109	100	-	-	-	-	-	-	-	-
76	Annual Capital Investment	590	7,759	8,152	0	0	0	0	0	0	0	0
77	Add: Cash Ending Balance	50	50	0	0	13	115	112	119	110	96	95
78	**Financing Requirement**	-640	-7,759	-8,108	-124	0	128	297	346	430	491	545
	Funds from Loans & Grants											
79	Grants of Foreign Country	322	7,651	7,851	-	-	-	-	-	-	-	-
80	Loans of International Agency	0	0	0	-	-	-	-	-	-	-	-
81	Security Deposit	0	0	4	2	3	3	2	3	3	1	1
82	Grants of Government	268	109	100	-	-	-	-	-	-	-	-
83	Capital by Government	50	-	-	-	-	-	-	-	-	-	-
84	Sub-total of Funds	640	7,759	7,955	2	3	3	2	3	3	1	1
85	Cash Loan of Government	0	0	153	122	0	0	0	0	0	0	0
86	**Total of Funds**	640	7,759	8,108	124	3	3	2	3	3	1	1
87	**Cash Surplus (Deficit)**	0	0	0	0	3	131	299	349	432	493	546
	If Cash Surplus:											
88	Purchase (/Sell) Deposits	0	0	0	0	3	131	299	349	432	493	546
	If Cash Deficit:											
89	Sale of Deposits	-	-	-	-	-	-	-	-	-	-	-
90	Additional Equity Needed	-	-	-	-	-	-	-	-	-	-	-
91	Total Cash Raised	-	-	-	-	-	-	-	-	-	-	-

Table 2.3.13 Balance Sheet of Financial Plan 2

(Unit: US$ 1000)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	ASSETS											
	Fixed Assets											
92	Land	250	250	250	250	250	250	250	250	250	250	250
93	Plants in Service*1	0	0	16,324	16,324	15,333	14,342	13,351	12,360	11,369	10,378	9,387
94	Less: Depreciation	-	-	-	991	991	991	991	991	991	991	991
95	Net Fixed Assets	250	250	16,574	15,583	14,592	13,601	12,610	11,619	10,628	9,637	8,646
96	Work in Process	322	7,973	-	-	-	-	-	-	-	-	-
97	**Total Fixed Assets**	572	8,223	16,574	15,583	14,592	13,601	12,610	11,619	10,628	9,637	8,646
	Current Assets											
98	Cash	50	50	0	0	13	115	112	119	110	96	95
99	Short-Term Deposits	0	0	0	0	3	133	432	781	1,214	1,706	2,253
100	Accounts Receivable (Net)	-	-	-	-	-	-	-	-	-	-	-
101	Inventories of Spares	-	-	202	202	202	202	202	202	202	202	202
102	**Total Current Assets**	68	68	325	268	332	698	988	1,358	1,763	2,215	2,758
103	**Total Assets**	640	8,291	16,899	15,850	14,923	14,298	13,597	12,976	12,391	11,851	11,404
	LIABILITIES & NET WORTH											
	Equity											
104	Paid in Capital*2	50	50	550	550	550	550	550	550	550	550	550
105	Grants	590	8,241	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092
106	Retained Earnings	0	0	-5	-968	-1,824	-2,585	-3,282	-3,921	-4,491	-5,004	-5,451
107	**Total Net Worth**	640	8,291	16,637	15,674	14,818	14,057	13,360	12,721	12,151	11,638	11,191
	Borrowings											
108	Loans of International Agency	0	0	0	0	0	0	0	0	0	0	0
109	Other Loans	-	-	-	-	-	-	-	-	-	-	-
110	Other Credits	-	-	-	-	-	-	-	-	-	-	-
111	Less: Current Portion of Debt	0	0	0	0	0	0	0	0	0	0	0
112	**Total Borrowings**	0	0	0	0	0	0	0	0	0	0	0
	Current Liabilities											
113	Accounts Payables	0	0	105	200	218	230	224	237	220	192	190
114	Cash Loan of Government	0	0	153	122	0	0	0	0	0	0	0
115	Notes Payable	-	-	-	-	-	-	-	-	-	-	-
116	Security Deposit	0	0	4	7	9	12	14	17	20	21	23
117	Current Portion of Debt	-	-	-	-	-	0	0	0	0	0	0
118	Less: Cash Loan Repayment to Government	0	0	0	153	122	0	0	0	0	0	0
119	**Total Current Liabilities**	0	0	262	176	105	242	238	255	240	213	213
120	**Total Liablilities and Net Worth**	640	8,291	16,899	15,850	14,923	14,298	13,597	12,976	12,391	11,851	11,404

Note: *1 New french system is added into the proposed project scheme.

*2 50 thousand US dollars and New french system is internalized to capital paid.

2.4 Analysis of Financial Simulation

In the financial plan 1, the waterworks will continue a net loss, although their operating results record net gains as shown in Table 2.3.7. In the target year 2006 of the Project, the total revenue is expected to be US$ 1.102 million, which comprises the US$ 976,000 of water sales and US$ 126,000 of installation charge. On the other hand, the operating expenses amount to US$ 447,000 in the same year. Then the net operating profit becomes US$ 655,000. However, the depreciation and interest of loan are estimated at US$ 1,299,000, so the income before tax results in a deficit of US$ 645,000. The accumulated deficit aggregated to US$ 3.371 million in 2006. Since the amount of net loss decreases year by year, the cash balance is expected to return to the black in 17th year (2018). After that, the accumulated deficit will reduce and return to break-even in 24th year (2025)

In the beginning stage, the waterworks will face a cash flow crisis from 2002 to 2004. Table 2.3.8 suggests that the waterworks has to request short-time cash loan of the government as shown in the line 85. After that, the management will have no problems in terms of cash situation, since the financial sources are procured from internal finance.

In the financial plan 2 as well, the waterworks will continue operating at a net loss, although their operating results record net gains as shown in Table 2.3.11. In the target year 2006 of the Project, the total revenue is expected to be US$ 741,000, which comprises the US$ 651,000 of water sales amount, US$ 84,000 of installation charge and US$7,000 of deposit's interest. On the other hand, the operating expenses amount to US$ 447,000 in the same year. Then the net operating profit becomes US$ 294,000. However, the depreciation is estimated at US$ 991,000, so the income before tax results in a deficit of US$ 697,000. The accumulated deficit aggregated to US$ 3.282 million in 2006. Since the amount of net loss decreases year by year, the cash balance is expected to return to the block in 17th year (2018). After that, the accumulated deficit will reduce and return to break-even in 27th year (2028).

In the beginning stage, the waterworks will face a cash flow crisis in 2002 and 2003. Table 2.3.12 suggests that the waterworks has to request cash loan of the government as shown in line 85. After that, the management will have no problems in terms of cash situation, since the financial sources are procured from internal finance. However, the simulation makes it clear that the cash situation of the plan 2 is much more positive than that of plan 1 during the starting period and especially after 2007, the end of grace period of the loan in the plan 1.

Table 2.4.1 shows management indicators of the respective financial plans. The indicators are tabulated in Tables 2.3.6 and 2.3.10. The figures in Table 2.4.1 are

the indicators in the year 2006, the target year of the Project. As a reference, some indicators of waterworks in Japan are listed in the same table. Japanese indicators were calculated on the basis of management data from 180 waterworks, which are located in middle-scale towns having populations between 30,000 and 50,000. However, the management conditions in Japan are quite different from those in Cambodia, so the figures of Japanese waterworks should be considered only for reference.

In 2006, the waterworks are still run at a net loss, so indicators in the lines 7 to 9 result in negative figures, as shown in the table. Although the income statements show the net loss in 2006, the financial situation is not bad as shown in Tables 2.3.8 and 2.3.12, since the internal finance based on depreciation functions well. As shown in the tables, cash surplus in 2006 is expected to be US$ 174,000 in the plan1 and US$ 299,000 in the plan 2.

A fixed ratio of the financial plan 1 looks much harder than that of the financial plan 2. Even for the financial plan 1, however, a Ratio of Fixed Assets to Long-term Capital is smaller than 100%, so there would be little problems on the management. In the case of the Japanese case, the fixed ratio was more serious.

Labor productivity seems to be worse as compared with the Japanese case. In the financial plan 1, a labor cost yields the total revenue of about 23 times the labor cost. In the financial plan 2, it was only 15 times. These figures are far smaller than the Japanese case of 71 times as shown in Table 2.4.1.

Table 2.4.1 Management Indicators of Respective Financial Plans: 2006

	Indicator	Financial Plan 1[*1]	Financial Plan 2[*1]	Reference[*2]
1.	Turnover Ratio of Working Capital (per year)	1.54	0.75	1.17
2.	Current Ratio	1.74	4.15	4.71
3.	Capital Adequacy Ratio	0.64	0.98	0.45
4.	Debt Service Coverage	1.60	-[*3]	-
5.	Fixed Ratio	148.2%	94.4%	191.8%
6.	Ratio of Fixed Assets to Long-term Capital	97.6%	94.4%	89.1%
7.	Return on Revenues	-66.0%	-107.1%	9.5%
8.	Return on Assets	-4.8%	-5.1%	1.7%
9.	Return on Equity	-7.6%	-5.2%	3.7%
10.	Labor Productivity	23.2	15.5	71.3

Note: *1 Indicators in 2006, when the services of the waterworks become to matured stage.

*2 Indicators of Waterworks in Japan, which serve middle-scale towns having population between 30,000 and 50,000. The information is quoted from "Management Indicators of Waterworks Business, 1991, Japan Society of Waterworks".

*3 No interests and principle repayments because the investment was covered by grants.

2.5 Financial Issues of Water Consumers

As discussed in the Master Plan Study, the water charge of family accounted for 1.4% of the total household expenditure in urban areas excluding Phnom Penh. The annual amount of the water charge was estimated at around 67,600 Riels on average, since the monthly amount was reported as 5,631 Riels. The annual total expenditure was also estimated at 4,839,000 Riels on average.

As of September 1999, the water rate of domestic use is 1,200 Riels per m^3 as shown in Table 2.3.2. Under this water rate, a water charge of a household is estimated to account for 4.2% on average, as discussed in the Master Plan. The rate is three times of the survey result of 1.4% mentioned above. Whereas, the financial plan 1 proposed that the water rate is set up to 50% higher than that of the present. Then, the annual charge is calculated as 369,300 Riels per household. This accounts for 6.3% of the annual family income of 5,855,000 Riels in 1999.

On the other hand, the financial plan 2 proposed that the water rate is set up as the present water rate. Then, the annual amount of water charge accounts for 4.2% of the annual family income.

Incidentally, the World Bank report of "Investing in Development, 1985" insisted that the price of the minimum block of water is commonly set at 3 to 5 percent of household income, which experience suggests is affordable. The rate of 4.2% in the financial plan 2 seems to be within the block. To cover lower-income people in the water supply services, however, the waterworks have to make endeavors to reduce the tariff as much as possible, taking into consideration of the financial conditions in the future.

It is said that the installation charges are heavy burden for a new connection of water supply services. As shown in Table 2.3.3, a new connection of household has to pay for US$ 137 for connection installations plus 12,000 Riels of security deposit at the time of application. This charging amount exceeds the average monthly household income, i.e., US$ 128 calculated from the annual family income of 5,855 million Riels mentioned above. In particular, the connection charge of US$ 137 seems to be serious for the new connection of low-income earner. Thus, it would be recommendable that a system of lending and/or subsiding to new connection fee is established with some regulations such as loan program in accordance with household income. The system could make lower-income families accessible to the water supply system more easily than the present.

3 Economic Analysis

3.1 Overview of Economic Analysis

In economic analysis, an economic evaluation is a major part. The methodology of economic evaluation is the same as done in the Master Plan. In the Feasibility

Study, the respective experts estimate the costs with discretion and more precisely than those in the Master Plan. Then, the Project could be evaluated more accurately. In spite of that, some uncertainty still exists in the estimation. In particular, a case with long implementation period and increment of future water demand growth has risks in terms of judgment on project viability. In this context, the sensitivity test is introduced in the certain aspects.

3.2 Assumptions for Economic Evaluation

In the Feasibility Study, preconditions and assumptions for economic evaluation are the same as set-up in the Master Plan. The costs and benefits are estimated on the basis of economic values instead of market values, which were applied for financial analysis. The economic values are converted from the financial values basically applying conversion factors. For the economic evaluation, the following criteria and assumptions are applied to calculate economic values and evaluation indicators.

Schedule and evaluation period of the Proposed Project are set as follows. Basic conditions and assumptions are also set in the same manner as done in the Master Plan.

(a)	Base Year:	The year 2000
(b)	Construction Period:	Two years in real terms from 2000 through 2002
(c)	Economic Life and Evaluation Period:	30 years after the completion
(d)	Timing of Benefits Accruing:	After the completion of the Project. The matured benefit is attained in 2006 of the Stage 1's target. After 2007, the full capacity of the plant is utilized for the beneficiaries in the service area.
(e)	Price Level:	Cost and benefit of the Project are set in 1999
(f)	Prevailing Exchange Rates:	3,800 Riels per US$1.00 and J¥120 per US$1.00
(g)	Opportunity Cost of Capital:	10% per annum
(h)	Conversion Factor	90% of financial value
(i)	Shadow Wage	Skilled worker: 100% of legislated wage Unskilled worker: 60% of legislated wage
(j)	Value of Land for Plant	Negligible small

3.3 Estimate of Economic Benefits

Unit economic benefit has already been estimated in the Master Plan. It was figured out as follows: US$ 0.80 per m^3 for domestic use and US$ 1.16 per m^3 for hotels and non-residential use. The detail procedures were described in Chapter 5 in ANNEX 4.7.1.

The total benefits were calculated as a product of unit benefits of the respective categories and total consumption volumes of the corresponding categories. Finally, the total economic benefits were estimated at US$ 0.612 million in 2002 and US$ 1.835 million in 2006. The details are shown in Table 3.3.1.

Table 3.3.1 Estimate of Economic Benefits

Item	2002	2006	2010*1
I. Water Demand (1000 m^3/Year)			
Domestic Demand	341	1,117	1,454
Non-residential Demand*2	292	809	890
Total	633	1,926	2,344
II. Benefit (US$1000/Year)			
Domestic Demand	273	894	1,165
Non-residential Demand	339	941	1,036
Total	612	1,835	2,201

Note: *1 Although the full water demand will not covered by the system, 83% (1/1.2) of the total demand is assumed to be covered by the system.
*2 Special use is included in this category in economic analysis.

3.4 Economic Costs

The estimate of the Proposed Project was already described in Section 4.3 in this ANNEX. The estimate, however, was enumerated in market prices, what is called "financial value". In economic evaluation, the financial value has to be converted into economic value. The procedure of this conversion was already discussed in Section 5.2 in this ANNEX 4.7.1. The total economic cost of the Proposed Project was calculated at US$14.4 million. The economic costs are broken down in Table 3.4.1.

The construction costs are disbursed in compliance with the construction schedule of three years. Then, the disbursement of economic construction costs is as follows: US$ 0.285 million in 2000, US$ 6.985 million in 2001 and US$ 7.155 million in 2002. In addition to these main works, the connection works to the respective consumers are estimated at US$ 0.874 million in economic value. The costs for the connection works are disbursed in proportion to the expansion of consumers.

The pipeline facilities of the respective projects are considered to last 30 years long. Then, the evaluation period is set up as 30 years. On the other hand, the machinery such as submersible pump and booster pump is considered to last 15 years. These machines have to be replaced during the system's life, as mentioned above. In the disbursement schedule, the replacement costs of these machines are

appropriated every 15 years. Thus, these replacement costs were estimated in economic terms as follows: US$ 1.731 million in 2017. In addition, the connection work costs are distributed between 2002 and 2010, although some consumers cannot enjoy the full services at demand-peak time after the year 2007.

After the evaluation period of 30 years, the replaced machines will still be able to work well, because they are in their durable period after the replacement. In the evaluation procedure, however, these residual values were neglected because they were quite small at the end of evaluation period.

Table 3.4.1 Economic and Financial Costs of Proposed Project

(Unit: US$ 1000)

Description	Foreign Portion	Local Portion				Total
		Skilled Labor	Unskilled Labor	Others	Sub-total	
Financial Costs						
1. Construction Cost	10,684	324	256	55	635	10,319
2. Land Acquisition	0	-	-	250	250	250
3. Administration Cost	0	-	-	226	226	226
4. Engineering Services	1,698	-	-	0	0	1,698
5. Physical Contingency	1,238	-	-	84	84	1,324
6. Price Contingency	1,362	-	-	117	117	1,482
Total	14,983	324	256	737	1,317	16,300
Economic Costs						
1. Construction Cost	10,684	324	154	49	527	11,212
2. Land Acquisition	0	-	-	0	0	0
3. Administration Cost	0	-	-	204	204	204
4. Engineering Services	1,698	-	-	0	0	1,698
5. Physical Contingency	1,238	-	-	73	73	1,311
6. Price Contingency	0	-	-	0	0	0
Total	13,621	324	154	326	804	14,425

The O&M cost is annually required during the economic life of the Proposed Project. The O&M unit cost in economic terms was estimated at US$ 0.344 per m^3 in 2002 and went down to US$ 0.142 per m^3 in 2006. After 2007, the plant will be operated in full capacity to meet excessive water demand, so the O&M unit costs is estimated at US$ 0.102 per m^3 in economic terms.

3.5 Economic Efficiency

The stream of economic costs and benefits during the economic evaluation period are tabulated in Table 3.5.1. The evaluation factors were 9.2% of EIRR, 0.94 of B/C and US$ -0.92 million of NPV.

Table 3.5.1 Economic Cost and Benefit Stream of Proposed Projecct

(Unit: US$1000 in Economic Terms)

	Year	Cost				Benefit			Balance
		Capital	O&M	Replace-ment	Total	Domestic	Non-Domestic	Total	
1	2000	285			285			0	-285
2	2001	6,985			6,985			0	-6,985
3	2002	7,323	21		7,344	23	28	51	-7,293
4	2003	92	267		359	406	527	932	573
5	2004	102	288		390	562	743	1,305	915
6	2005	108	303		412	746	863	1,610	1,198
7	2006	75	325		401	894	941	1,835	1,434
8	2007	132	296		428	917	952	1,870	1,442
9	2008	100	298		397	1,046	964	2,010	1,612
10	2009	50	298		348	1,108	975	2,083	1,735
11	2010	46	298		344	1,165	1,036	2,201	1,857
12	2011		298		298	1,165	1,036	2,201	1,903
13	2012		298		298	1,165	1,036	2,201	1,903
14	2013		298		298	1,165	1,036	2,201	1,903
15	2014		298		298	1,165	1,036	2,201	1,903
16	2015		298		298	1,165	1,036	2,201	1,903
17	2016		298		298	1,165	1,036	2,201	1,903
18	2017		298	1,731	2,029	1,165	1,036	2,201	173
19	2018		298		298	1,165	1,036	2,201	1,903
20	2019		298		298	1,165	1,036	2,201	1,903
21	2020		298		298	1,165	1,036	2,201	1,903
22	2021		298		298	1,165	1,036	2,201	1,903
23	2022		298		298	1,165	1,036	2,201	1,903
24	2023		298		298	1,165	1,036	2,201	1,903
25	2024		298		298	1,165	1,036	2,201	1,903
26	2025		298		298	1,165	1,036	2,201	1,903
27	2026		298		298	1,165	1,036	2,201	1,903
28	2027		298		298	1,165	1,036	2,201	1,903
29	2028		298		298	1,165	1,036	2,201	1,903
30	2029		298		298	1,165	1,036	2,201	1,903
31	2030		298		298	1,165	1,036	2,201	1,903
32	2031		298		298	1,165	1,036	2,201	1,903
33	2032		298		298	1,165	1,036	2,201	1,903

Evaluation Indices

NPV:	-922	thousand US$
B/C:	0.94	
EIRR:	9.2%	

Note: *1 Discounted at 10%

*2 In 2002, the water supply system is operated for one month only in December.

The EIRR was slightly lower than the opportunity cost of capital of 10% in spite of the fact that the EIRR of the Master Plan was 10.5%. This is because the facilities designed in the Feasibility Study include a part of prior investment. In the future, thus, the EIRR is expected to be over 10% after the Stage 2 is implemented.

3.6 Sensitivity Test

As mentioned in Section 3.1, the sensitivity test is commenced in this section. A case with long implementation period and increment of future water demand growth has risks in terms of judgment on project viability. It is customary, therefore, to test the results of economic analysis for sensitivity to variations in certain important inputs. The test is made for the variations in ±10% of the cost and benefit with respect to evaluation factors of the Proposed Project. Then, there are nine cases under these variations. The results are given in Table 3.6.1.

Table 3.6.1 Results of Sensitivity Test

	Cost	Benefit	IRR (%)	B/C	NPV (US$1000)
1.	Original Case	-	9.2	0.94	-922
2.	-	10% Decrease	7.9	0.84	-2,294
3.	-	10% Increase	10.4	1.03	449
4.	10% Increase	-	8.1	0.85	-2,323
5.		10% Decrease	6.9	0.94	-3,695
6.		10% Increase	9.2	0.94	-952
7.	10% Decrease	-	10.5	1.04	479
8.		10% Decrease	9.1	0.93	-892
9.		10% Increase	11.7	1.14	1,851

The cases, which the EIRR exceeds 10%, were the following conditions among the nine cases: (a) 10% decrease of cost; (b) 10% increase of benefit; and (c) condition fulfilling both (a) and (b). All other cases were less than 10% of EIRR. Figure 3.5.1 shows the project viable range of cost and benefit variation from the original estimate. Accordingly, the estimates of cost and benefit should be reconsidered with prudence at the implementation stage.

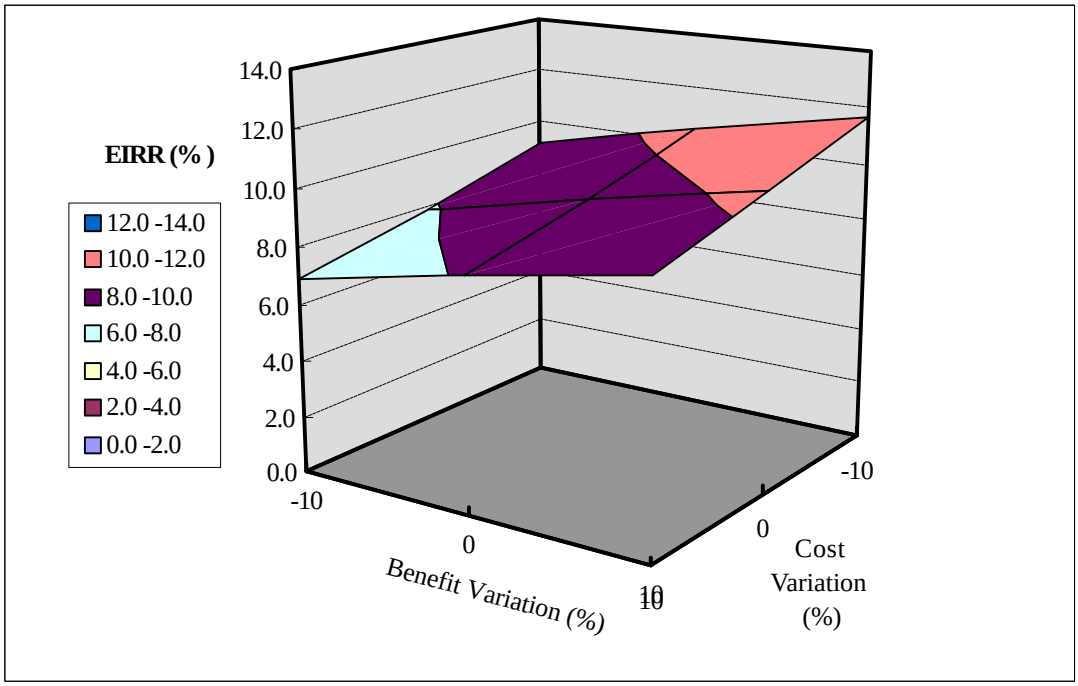


Figure 3.5.1 Project Viable Range of Cost and Benefit Variation from Original Estimate

ATTACHMENT-1

Financial Analysis (2000-2030)

Table 1 Income Statement of Financial Plan 1(1/3)

(Uni

Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Revenues										
Water Sales	0	0	27	490	686	852	976	990	1,065	1,118
Commodity & Meter Rental Charges	-	-	-	-	-	-	-	-	-	-
Sewerage Surcharge	-	-	-	-	-	-	-	-	-	-
Less: Discounts	-	-	-	-	-	-	-			
Installation Charges	0	0	280	154	171	181	126	220	166	84
Interest on Deposits	-	0	0	0	0	0	0	9	9	10
Penalties & Fines	-	-	-	-	-	-	-	-	-	-
Gross Revenue	0	0	307	644	856	1,033	1,102	1,218	1,241	1,212
Operating Expenses										
Water Supply & Distribution										
Power Cost	-	-	10	136	155	166	187	152	152	152
Chemical Cost	-	-	0	8	11	14	16	16	16	16
Personnel Cost	-	-	3	41	43	45	47	47	47	47
Sub-total of O/M Costs	-	-	14	185	209	225	250	215	215	215
Maintenance Costs	-	-	9	113	113	113	113	113	113	113
Other Expenses	-	-	187	103	114	121	84	146	111	56
Total of Operating Expenses	0	0	210	401	436	459	447	475	439	384
Net Operating Profit	0	0	97	243	421	574	655	743	801	828
Depreciation	-	-	-	991	991	991	991	991	991	991
Interest	-	6	155	309	309	309	308	297	266	235
Subtotal	0	6	155	1,300	1,300	1,300	1,299	1,288	1,257	1,226
Income before Taxes	0	-6	-59	-1,056	-879	-726	-645	-545	-456	-398
Income Taxes	-	-	-	-	-	-	-	-	-	-
Net Profit (/Loss)	0	-6	-59	-1,056	-879	-726	-645	-545	-456	-398
Accumulation of Profit (/Loss)	0	-6	-65	-1,121	-2,000	-2,726	-3,371	-3,916	-4,372	-4,769

Table 1 Income Statement of Financial Plan 1(2/3)

it: US$ 1000) (Unit: US$ 1000)

Item	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Revenues											
Water Sales	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,181
Commodity & Meter Rental Charges	-	-	-	-	-	-	-	-	-	-	-
Sewerage Surcharge	-	-	-	-	-	-	-	-	-	-	-
Less: Discounts											
Installation Charges	77	0	0	0	0	0	0	0	0	0	0
Interest on Deposits	17	27	36	47	59	75	92	124	170	219	270
Penalties & Fines	-	-	-	-	-	-	-	-	-	-	-
Gross Revenue	1,275	1,208	1,217	1,227	1,240	1,256	1,273	1,305	1,351	1,400	1,451
Operating Expenses											
Water Supply & Distribution											
Power Cost	152	152	152	152	152	152	152	152	152	152	152
Chemical Cost	16	16	16	16	16	16	16	16	16	16	16
Personnel Cost	47	47	47	47	47	47	47	47	47	47	47
Sub-total of O/M Costs	215	215	215	215	215	215	215	215	215	215	215
Maintenance Costs	113	113	113	113	113	113	113	113	113	113	113
Other Expenses	52	52	52	52	52	52	52	52	52	52	52
Total of Operating Expenses	380	380	380	380	380	380	380	380	380	380	380
Net Operating Profit	895	828	837	847	860	876	893	925	971	1,019	1,070
Depreciation	991	991	991	991	991	949	949	991	702	702	139
Interest	203	172	141	109	78	47	16	0	0	0	0
Subtotal	1,194	1,163	1,132	1,100	1,069	996	965	991	702	702	139
Income before Taxes	-299	-335	-295	-253	-209	-121	-72	-66	269	318	931
Income Taxes	-	-	-	-	-	-	-	-	-	-	-
Net Profit (/Loss)	-299	-335	-295	-253	-209	-121	-72	-66	269	318	931
Accumulation of Profit (/Loss)	-5,069	-5,404	-5,699	-5,951	-6,160	-6,281	-6,353	-6,419	-6,150	-5,832	-4,901

Table 1 Income Statement of Financial Plan 1(3/3)

(Unit: US$ 1000)

Item	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Revenues										
Water Sales	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,181
Commodity & Meter Rental Charges	-	-	-	-	-	-	-	-	-	-
Sewerage Surcharge	-	-	-	-	-	-	-	-	-	-
Less: Discounts										
Installation Charges	0	0	0	0	0	0	0	0	0	0
Interest on Deposits	323	379	438	500	565	634	705	781	860	943
Penalties & Fines	-	-	-	-	-	-	-	-	-	-
Gross Revenue	1,504	1,560	1,619	1,681	1,746	1,815	1,886	1,962	2,041	2,124
Operating Expenses										
Water Supply & Distribution										
Power Cost	152	152	152	152	152	152	152	152	152	152
Chemical Cost	16	16	16	16	16	16	16	16	16	16
Personnel Cost	47	47	47	47	47	47	47	47	47	47
Sub-total of O/M Costs	215	215	215	215	215	215	215	215	215	215
Maintenance Costs	113	113	113	113	113	113	113	113	113	113
Other Expenses	52	52	52	52	52	52	52	52	52	52
Total of Operating Expenses	380	380	380	380	380	380	380	380	380	380
Net Operating Profit	1,124	1,180	1,239	1,301	1,366	1,435	1,506	1,582	1,661	1,744
Depreciation	0	0	0	0	0	0	0	0	0	0
Interest	0	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0	0	0
Income before Taxes	1,124	1,180	1,239	1,301	1,366	1,435	1,506	1,582	1,661	1,744
Income Taxes	-	-	-	-	-	-	-	-	-	-
Net Profit (/Loss)	1,124	1,180	1,239	1,301	1,366	1,435	1,506	1,582	1,661	1,744
Accumulation of Profit (/Loss)	-3,777	-2,597	-1,357	-56	1,310	2,744	4,251	5,832	7,493	9,236

Table 2 Flow of Funds Statement of Financial Plan 1(1/3)

(Unit: US$ 1000)

Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Internal Cash Generation											
Net Income before Interest Charges	0	0	97	-748	-570	-417	-336	-248	-190	-163	-96
Add: Depreciation Exp.	0	0	0	991	991	991	991	991	991	991	991
Operating Cash Flow	0	0	97	243	421	574	655	743	801	828	895
Add: Beginning Cash Position	0	50	44	0	0	0	103	112	75	110	96
Cash before Debt Service	0	50	141	243	421	574	757	855	877	938	991
Debt Service											
Interest Charges	0	6	155	309	309	309	308	297	266	235	203
Principal Repayments	0	0	0	0	0	6	166	482	482	482	482
Cash Loan Repayment to Government	0	0	0	210	272	156	0	0	0	0	0
Total Debt Service	0	6	155	519	581	471	474	780	748	717	686
Cash after Debt Service	0	44	-15	-276	-160	103	283	75	128	221	305
Capital Investment Requirements											
Investment Projects	322	7,651	7,851	-	-	-	-	-	-	-	-
Stock of Spares	-	-	202	-	-	-	-	-	-	-	-
Land Acquisition	250	-	-	-	-	-	-	-	-	-	-
Administration	18	109	100	-	-	-	-	-	-	-	-
Annual Capital Investment	572	7,651	8,053	0	0	0	0	0	0	0	0
Add: Cash Ending Balance	50	44	0	0	0	103	112	75	110	96	95
Financing Requirement	-622	-7,651	-8,067	-276	-160	0	171	0	18	125	210
Funds from Loans & Grants											
Grants of Foreign Country	226	5,356	5,496	-	-	-	-	-	-	-	-
Loans of International Agency	97	2,295	2,355	-	-	-	-	-	-	-	-
Security Deposit	0	0	6	4	4	4	3	5	4	2	2
Grants of Government	250	-	-	-	-	-	-	-	-	-	-
Capital by Government	50	-	-	-	-	-	-	-	-	-	-
Sub-total of Funds	622	7,651	7,857	4	4	4	3	5	4	2	2
Cash Loan of Government	0	0	210	272	156	0	0	0	0	0	0
Total of Funds	622	7,651	8,067	276	160	4	3	5	4	2	2
Cash Surplus (Deficit)	0	0	0	0	0	4	174	5	22	127	212
If Cash Surplus:											
Purchase (/Sell) Deposits	0	0	0	0	0	4	174	5	22	127	212
If Cash Deficit:											
Sale of Deposits	-	-	-	-	-	-	-	-	-	-	-
Additional Equity Needed	-	-	-	-	-	-	-	-	-	-	-
Total Cash Raised	-	-	-	-	-	-	-	-	-	-	-

Table 2 Flow of Funds Statement of Financial Plan 1(2/3)

(Unit: US$ 1000)

Item	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Internal Cash Generation										
Net Income before Interest Charges	-163	-154	-144	-131	-74	-56	-66	269	318	931
Add: Depreciation Exp.	991	991	991	991	949	949	991	702	702	139
Operating Cash Flow	828	837	847	860	876	893	925	971	1,019	1,070
Add: Beginning Cash Position	95	95	95	95	95	95	95	95	95	95
Cash before Debt Service	923	932	942	955	971	988	1,020	1,066	1,115	1,165
Debt Service										
Interest Charges	172	141	109	78	47	16	0	0	0	0
Principal Repayments	482	482	482	476	476	246	0	0	0	0
Cash Loan Repayment to Government	0	0	0	0	0	0	0	0	0	0
Total Debt Service	654	623	592	554	523	262	0	0	0	0
Cash after Debt Service	269	309	351	401	448	726	1,020	1,066	1,114	1,165
Capital Investment Requirements										
Investment Projects	-	-	-	-	-	-	-	-	-	-
Stock of Spares	-	-	-	-	-	-	-	-	-	-
Land Acquisition	-	-	-	-	-	-	-	-	-	-
Administration	-	-	-	-	-	-	-	-	-	-
Annual Capital Investment	0	0	0	0	0	0	0	0	0	0
Add: Cash Ending Balance	95	95	95	95	95	95	95	95	95	95
Financing Requirement	174	214	256	306	353	631	925	971	1,019	1,070
Funds from Loans & Grants										
Grants of Foreign Country	-	-	-	-	-	-	-	-	-	-
Loans of International Agency	-	-	-	-	-	-	-	-	-	-
Security Deposit	0	0	0	0	0	0	0	0	0	0
Grants of Government	-	-	-	-	-	-	-	-	-	-
Capital by Government	-	-	-	-	-	-	-	-	-	-
Sub-total of Funds	0	0	0	0	0	0	0	0	0	0
Cash Loan of Government	0	0	0	0	0	0	0	0	0	0
Total of Funds	0	0	0	0	0	0	0	0	0	0
Cash Surplus (Deficit)	174	214	256	306	353	631	925	971	1,019	1,070
If Cash Surplus:										
Purchase (/Sell) Deposits	174	214	256	306	353	631	925	971	1,019	1,070
If Cash Deficit:										
Sale of Deposits	-	-	-	-	-	-	-	-	-	-
Additional Equity Needed	-	-	-	-	-	-	-	-	-	-
Total Cash Raised	-	-	-	-	-	-	-	-	-	-

Table 2 Flow of Funds Statement of Financial Plan 1(3/3)

(Unit: US$ 1000)

Item	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Internal Cash Generation										
Net Income before Interest Charges	1,124	1,180	1,239	1,301	1,366	1,435	1,506	1,582	1,661	1,744
Add: Depreciation Exp.	0	0	0	0	0	0	0	0	0	0
Operating Cash Flow	1,124	1,180	1,239	1,301	1,366	1,435	1,506	1,582	1,661	1,744
Add: Beginning Cash Position	95	95	95	95	95	95	95	95	95	95
Cash before Debt Service	1,219	1,275	1,334	1,396	1,461	1,530	1,601	1,677	1,756	1,839
Debt Service										
Interest Charges	0	0	0	0	0	0	0	0	0	0
Principal Repayments	0	0	0	0	0	0	0	0	0	0
Cash Loan Repayment to Government	0	0	0	0	0	0	0	0	0	0
Total Debt Service	0	0	0	0	0	0	0	0	0	0
Cash after Debt Service	1,219	1,275	1,334	1,396	1,461	1,530	1,601	1,677	1,756	1,839
Capital Investment Requirements										
Investment Projects	-	-	-	-	-	-	-	-	-	-
Stock of Spares	-	-	-	-	-	-	-	-	-	-
Land Acquisition	-	-	-	-	-	-	-	-	-	-
Administration	-	-	-	-	-	-	-	-	-	-
Annual Capital Investment	0	0	0	0	0	0	0	0	0	0
Add: Cash Ending Balance	95	95	95	95	95	95	95	95	95	95
Financing Requirement	1,124	1,180	1,239	1,301	1,366	1,435	1,506	1,582	1,661	1,744
Funds from Loans & Grants										
Grants of Foreign Country	-	-	-	-	-	-	-	-	-	-
Loans of International Agency	-	-	-	-	-	-	-	-	-	-
Security Deposit	0	0	0	0	0	0	0	0	0	0
Grants of Government	-	-	-	-	-	-	-	-	-	-
Capital by Government	-	-	-	-	-	-	-	-	-	-
Sub-total of Funds	0	0	0	0	0	0	0	0	0	0
Cash Loan of Government	0	0	0	0	0	0	0	0	0	0
Total of Funds	0	0	0	0	0	0	0	0	0	0
Cash Surplus (Deficit)	1,124	1,180	1,239	1,301	1,366	1,435	1,506	1,582	1,661	1,744
If Cash Surplus:										
Purchase (/Sell) Deposits	1,124	1,180	1,239	1,301	1,366	1,435	1,506	1,582	1,661	1,744
If Cash Deficit:										
Sale of Deposits	-	-	-	-	-	-	-	-	-	-
Additional Equity Needed	-	-	-	-	-	-	-	-	-	-
Total Cash Raised	-	-	-	-	-	-	-	-	-	-

Table3 Balance Sheet of Financial Plan 1(1/3)

(Unit: US$ 1000)

Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ASSETS											
Fixed Assets											
Land	250	250	250	250	250	250	250	250	250	250	250
Plants in Service*1	0	0	16,324	16,324	15,333	14,342	13,351	12,360	11,369	10,378	9,387
Less: Depreciation	-	-	-	991	991	991	991	991	991	991	991
Net Fixed Assets	250	250	16,574	15,583	14,592	13,601	12,610	11,619	10,628	9,637	8,646
Work in Process	322	7,973	-	-	-	-	-	-	-	-	-
Total Fixed Assets	572	8,223	16,574	15,583	14,592	13,601	12,610	11,619	10,628	9,637	8,646
Current Assets											
Cash	50	44	0	0	0	103	112	75	110	96	95
Short-Term Deposits	0	0	0	0	0	4	178	184	206	332	544
Accounts Receivable (Net)	-	-	-	-	-	-	-	-	-	-	-
Inventories of Spares	-	-	202	202	202	202	202	202	202	202	202
Total Current Assets	50	44	307	192	148	382	716	698	737	822	1,031
Total Assets	622	8,267	16,881	15,775	14,739	13,983	13,325	12,317	11,365	10,459	9,677
LIABILITIES & NET WORTH											
Equity											
Paid in Capital*2	50	50	550	550	550	550	550	550	550	550	550
Grants	476	5,831	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327
Retained Earnings	0	-6	-65	-1,121	-2,000	-2,726	-3,371	-3,916	-4,372	-4,769	-5,069
Total Net Worth	526	5,875	11,812	10,755	9,876	9,150	8,506	7,961	7,505	7,107	6,808
Borrowings											
Loans of International Agency	97	2,392	4,747	4,747	4,747	4,741	4,575	4,092	3,610	3,128	2,645
Other Loans	-	-	-	-	-	-	-	-	-	-	-
Other Credits	-	-	-	-	-	-	-	-	-	-	-
Less: Current Portion of Debt	0	0	0	0	0	6	166	482	482	482	482
Total Borrowings	97	2,392	4,747	4,747	4,747	4,734	4,409	3,610	3,128	2,645	2,163
Current Liabilities											
Accounts Payables	0	0	105	200	218	230	224	237	220	192	190
Cash Loan of Government	0	0	210	272	156	0	0	0	0	0	0
Notes Payable	-	-	-	-	-	-	-	-	-	-	-
Security Deposit	0	0	6	10	14	18	21	26	30	32	34
Current Portion of Debt	-	-	-	-	-	6	166	482	482	482	482
Less: Cash Loan Repayment to Government	0	0	0	210	272	156	0	0	0	0	0
Total Current Liabilities	0	0	322	272	116	98	411	746	732	706	706
Total Liablilities and Net Worth	622	8,267	16,881	15,775	14,739	13,983	13,325	12,317	11,365	10,459	9,677

Note: *1 New french system is added into the proposed project scheme.

*2 50 thousand US dollars and New french system is internalized to capital paid.

Table3 Balance Sheet of Financial Plan 1(2/3)

(Unit: US$ 1000)

Item	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ASSETS										
Fixed Assets										
Land	250	250	250	250	250	250	250	250	250	250
Plants in Service*1	8,396	7,405	6,414	5,423	4,432	3,482	2,533	1,542	840	139
Less: Depreciation	991	991	991	991	949	949	991	702	702	139
Net Fixed Assets	7,655	6,664	5,673	4,682	3,732	2,783	1,792	1,090	389	250
Work in Process	-	-	-	-	-	-	-	-	-	-
Total Fixed Assets	7,655	6,664	5,673	4,682	3,732	2,783	1,792	1,090	389	250
Current Assets										
Cash	95	95	95	95	95	95	95	95	95	95
Short-Term Deposits	718	932	1,188	1,494	1,847	2,478	3,402	4,373	5,393	6,463
Accounts Receivable (Net)	-	-	-	-	-	-	-	-	-	-
Inventories of Spares	202	202	202	202	202	202	202	202	202	202
Total Current Assets	1,205	1,419	1,675	1,981	2,334	2,965	3,889	4,860	5,880	6,950
Total Assets	8,860	8,082	7,347	6,663	6,066	5,748	5,681	5,951	6,269	7,200
LIABILITIES & NET WORTH										
Equity										
Paid in Capital*2	550	550	550	550	550	550	550	550	550	550
Grants	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327
Retained Earnings	-5,404	-5,699	-5,951	-6,160	-6,281	-6,353	-6,419	-6,150	-5,832	-4,901
Total Net Worth	6,473	6,178	5,925	5,717	5,596	5,524	5,457	5,727	6,044	6,976
Borrowings										
Loans of International Agency	2,163	1,680	1,198	722	246	0	0	0	0	0
Other Loans	-	-	-	-	-	-	-	-	-	-
Other Credits	-	-	-	-	-	-	-	-	-	-
Less: Current Portion of Debt	482	482	482	476	476	246	0	0	0	0
Total Borrowings	1,680	1,198	716	246	-230	-246	0	0	0	0
Current Liabilities										
Accounts Payables	190	190	190	190	190	190	190	190	190	190
Cash Loan of Government	0	0	0	0	0	0	0	0	0	0
Notes Payable	-	-	-	-	-	-	-	-	-	-
Security Deposit	34	34	34	34	34	34	34	34	34	34
Current Portion of Debt	482	482	482	476	476	246	0	0	0	0
Less: Cash Loan Repayment to Government	0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	706	706	706	700	700	470	224	224	224	224
Total Liablilities and Net Worth	8,860	8,082	7,347	6,663	6,066	5,748	5,681	5,951	6,269	7,200

Note: *1 New french system is added into the proposed p
*2 50 thousand US dollars and New french system

Table3 Balance Sheet of Financial Plan 1(3/3)

(Unit: US$ 1000)

Item	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ASSETS										
Fixed Assets										
Land	250	250	250	250	250	250	250	250	250	250
Plants in Service*1	0	0	0	0	0	0	0	0	0	0
Less: Depreciation	0	0	0	0	0	0	0	0	0	0
Net Fixed Assets	250	250	250	250	250	250	250	250	250	250
Work in Process	-	-	-	-	-	-	-	-	-	-
Total Fixed Assets	250	250	250	250	250	250	250	250	250	250
Current Assets										
Cash	95	95	95	95	95	95	95	95	95	95
Short-Term Deposits	7,587	8,767	10,007	11,308	12,674	14,108	15,615	17,196	18,857	20,601
Accounts Receivable (Net)	-	-	-	-	-	-	-	-	-	-
Inventories of Spares	202	202	202	202	202	202	202	202	202	202
Total Current Assets	8,074	9,254	10,493	11,794	13,161	14,595	16,101	17,683	19,344	21,087
Total Assets	8,324	9,504	10,743	12,044	13,410	14,845	16,351	17,933	19,593	21,337
LIABILITIES & NET WORTH										
Equity										
Paid in Capital*2	550	550	550	550	550	550	550	550	550	550
Grants	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327
Retained Earnings	-3,777	-2,597	-1,357	-56	1,310	2,744	4,251	5,832	7,493	9,236
Total Net Worth	8,100	9,280	10,519	11,820	13,187	14,621	16,127	17,709	19,369	21,113
Borrowings										
Loans of International Agency	0	0	0	0	0	0	0	0	0	0
Other Loans	-	-	-	-	-	-	-	-	-	-
Other Credits	-	-	-	-	-	-	-	-	-	-
Less: Current Portion of Debt	0	0	0	0	0	0	0	0	0	0
Total Borrowings	0	0	0	0	0	0	0	0	0	0
Current Liabilities										
Accounts Payables	190	190	190	190	190	190	190	190	190	190
Cash Loan of Government	0	0	0	0	0	0	0	0	0	0
Notes Payable	-	-	-	-	-	-	-	-	-	-
Security Deposit	34	34	34	34	34	34	34	34	34	34
Current Portion of Debt	0	0	0	0	0	0	0	0	0	0
Less: Cash Loan Repayment to Government	0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	224	224	224	224	224	224	224	224	224	224
Total Liablilities and Net Worth	8,324	9,504	10,743	12,044	13,410	14,845	16,351	17,933	19,593	21,337

Note: *1 New french system is added into the proposed p
*2 50 thousand US dollars and New french system

Table 4 Income Statement of Financial Plan 2(1/3)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008
	Revenues									
38	Water Sales	0	0	18	327	457	568	651	660	710
39	Commodity & Meter Rental Charges	-	-	-	-	-	-	-	-	-
40	Sewerage Surcharge	-	-	-	-	-	-	-	-	-
41	Less: Discounts	-	-	-	-	-	-	-		
42	Installation Charges	0	0	187	103	114	121	84	146	111
43	Interest on Deposits	-	0	0	0	0	0	7	22	39
44	Penalties & Fines	-	-	-	-	-	-	-	-	-
45	**Gross Revenue**	0	0	204	429	571	689	741	828	860
	Operating Expenses									
	Water Supply & Distribution									
46	Power Cost	-	-	10	136	155	166	187	152	152
47	Chemical Cost	-	-	0	8	11	14	16	16	16
48	Personnel Cost	-	-	3	41	43	45	47	47	47
49	Sub-total of O/M Costs	-	-	14	185	209	225	250	215	215
50	Maintenance Costs	-	-	9	113	113	113	113	113	113
51	Other Expenses	-	-	187	103	114	121	84	146	111
52	**Total of Operating Expenses**	0	0	210	401	436	459	447	475	439
53	**Net Operating Profit**	0	0	-5	28	135	229	294	353	421
54	Depreciation	-	-	-	991	991	991	991	991	991
55	Interest	-	0	0	0	0	0	0	0	0
56	Subtotal	0	0	0	991	991	991	991	991	991
57	**Income before Taxes**	0	0	-5	-963	-856	-762	-697	-638	-570
58	Income Taxes	-	-	-	-	-	-	-	-	-
59	**Net Profit (/Loss)**	0	0	-5	-963	-856	-762	-697	-638	-570
60	**Accumulation of Profit (/Loss)**	0	0	-5	-968	-1,824	-2,585	-3,282	-3,921	-4,491

Table 4 Income Statement of Financial Plan 2(2/3)

(Unit: US$ 1000)

	Item	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Revenues												
38	Water Sales	746	787	787	787	787	787	787	787	787	787	787	787
39	Commodity & Meter Rental Charges	-	-	-	-	-	-	-	-	-	-	-	-
40	Sewerage Surcharge	-	-	-	-	-	-	-	-	-	-	-	-
41	Less: Discounts												
42	Installation Charges	56	52	0	0	0	0	0	0	0	0	0	0
43	Interest on Deposits	61	85	113	139	166	195	225	256	289	324	361	399
44	Penalties & Fines	-	-	-	-	-	-	-	-	-	-	-	-
45	**Gross Revenue**	862	924	900	926	953	982	1,012	1,044	1,077	1,112	1,148	1,186
	Operating Expenses												
	Water Supply & Distribution												
46	Power Cost	152	152	152	152	152	152	152	152	152	152	152	152
47	Chemical Cost	16	16	16	16	16	16	16	16	16	16	16	16
48	Personnel Cost	47	47	47	47	47	47	47	47	47	47	47	47
49	Sub-total of O/M Costs	215	215	215	215	215	215	215	215	215	215	215	215
50	Maintenance Costs	113	113	113	113	113	113	113	113	113	113	113	113
51	Other Expenses	56	52	52	52	52	52	52	52	52	52	52	52
52	**Total of Operating Expenses**	384	380	380	380	380	380	380	380	380	380	380	380
53	**Net Operating Profit**	478	544	520	546	573	602	632	663	697	731	768	806
54	Depreciation	991	991	991	991	991	991	949	949	991	702	702	139
55	Interest	0	0	0	0	0	0	0	0	0	0	0	0
56	Subtotal	991	991	991	991	991	991	949	949	991	702	702	139
57	**Income before Taxes**	-513	-447	-471	-445	-418	-389	-318	-286	-294	30	66	667
58	Income Taxes	-	-	-	-	-	-	-	-	-	-	-	-
59	**Net Profit (/Loss)**	-513	-447	-471	-445	-418	-389	-318	-286	-294	30	66	667
60	**Accumulation of Profit (/Loss)**	-5,004	-5,451	-5,922	-6,367	-6,785	-7,175	-7,492	-7,778	-8,072	-8,043	-7,976	-7,309

Table 4 Income Statement of Financial Plan 2(3/3)

	Item	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Revenues										
38	Water Sales	787	787	787	787	787	787	787	787	787	787
39	Commodity & Meter Rental Charges	-	-	-	-	-	-	-	-	-	-
40	Sewerage Surcharge	-	-	-	-	-	-	-	-	-	-
41	Less: Discounts										
42	Installation Charges	0	0	0	0	0	0	0	0	0	0
43	Interest on Deposits	440	482	526	573	622	673	728	784	844	906
44	Penalties & Fines	-	-	-	-	-	-	-	-	-	-
45	**Gross Revenue**	1,227	1,269	1,314	1,360	1,409	1,461	1,515	1,572	1,631	1,694
	Operating Expenses										
	Water Supply & Distribution										
46	Power Cost	152	152	152	152	152	152	152	152	152	152
47	Chemical Cost	16	16	16	16	16	16	16	16	16	16
48	Personnel Cost	47	47	47	47	47	47	47	47	47	47
49	Sub-total of O/M Costs	215	215	215	215	215	215	215	215	215	215
50	Maintenance Costs	113	113	113	113	113	113	113	113	113	113
51	Other Expenses	52	52	52	52	52	52	52	52	52	52
52	**Total of Operating Expenses**	380	380	380	380	380	380	380	380	380	380
53	**Net Operating Profit**	847	889	934	980	1,029	1,081	1,135	1,191	1,251	1,314
54	Depreciation	0	0	0	0	0	0	0	0	0	0
55	Interest	0	0	0	0	0	0	0	0	0	0
56	Subtotal	0	0	0	0	0	0	0	0	0	0
57	**Income before Taxes**	847	889	934	980	1,029	1,081	1,135	1,191	1,251	1,314
58	Income Taxes	-	-	-	-	-	-	-	-	-	-
59	**Net Profit (/Loss)**	847	889	934	980	1,029	1,081	1,135	1,191	1,251	1,314
60	**Accumulation of Profit (/Loss)**	-6,462	-5,573	-4,639	-3,659	-2,630	-1,549	-415	777	2,028	3,341

Table 5 Flow of Funds Statement of Financial Plan 2 (1/3)

(Unit: US$ 1000)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Internal Cash Generation											
61	Net Income before Interest Charges	0	0	-5	-963	-856	-762	-697	-638	-570	-513	-447
62	Add: Depreciation Exp.	0	0	0	991	991	991	991	991	991	991	991
63	Operating Cash Flow	0	0	-5	28	135	229	294	353	421	478	544
64	Add: Beginning Cash Position	0	50	50	0	0	13	115	112	119	110	96
65	**Cash before Debt Service**	0	50	45	28	135	243	409	465	540	588	640
66	**Debt Service**											
67	Interest Charges	0	0	0	0	0	0	0	0	0	0	0
68	Principal Repayments	0	0	0	0	0	0	0	0	0	0	0
69	Cash Loan Repayment to Government	0	0	0	153	122	0	0	0	0	0	0
70	**Total Debt Service**	0	0	0	153	122	0	0	0	0	0	0
71	**Cash after Debt Service**	0	50	45	-124	13	243	409	465	540	588	640
	Capital Investment Requirements											
72	Investment Projects	322	7,651	7,851	-	-	-	-	-	-	-	-
73	Stock of Spares	-	-	202	-	-	-	-	-	-	-	-
74	Land Acquisition	250	-	-	-	-	-	-	-	-	-	-
75	Administration	18	109	100	-	-	-	-	-	-	-	-
76	Annual Capital Investment	590	7,759	8,152	0	0	0	0	0	0	0	0
77	Add: Cash Ending Balance	50	50	0	0	13	115	112	119	110	96	95
78	**Financing Requirement**	-640	-7,759	-8,108	-124	0	128	297	346	430	491	545
	Funds from Loans & Grants											
79	Grants of Foreign Country	322	7,651	7,851	-	-	-	-	-	-	-	-
80	Loans of International Agency	0	0	0	-	-	-	-	-	-	-	-
81	Security Deposit	0	0	4	2	3	3	2	3	3	1	1
82	Grants of Government	268	109	100	-	-	-	-	-	-	-	-
83	Capital by Government	50	-	-	-	-	-	-	-	-	-	-
84	Sub-total of Funds	640	7,759	7,955	2	3	3	2	3	3	1	1
85	Cash Loan of Government	0	0	153	122	0	0	0	0	0	0	0
86	**Total of Funds**	640	7,759	8,108	124	3	3	2	3	3	1	1
87	**Cash Surplus (Deficit)**	0	0	0	0	3	131	299	349	432	493	546
	If Cash Surplus:											
88	Purchase (/Sell) Deposits	0	0	0	0	3	131	299	349	432	493	546
	If Cash Deficit:											
89	Sale of Deposits	-	-	-	-	-	-	-	-	-	-	-
90	Additional Equity Needed	-	-	-	-	-	-	-	-	-	-	-
91	Total Cash Raised	-	-	-	-	-	-	-	-	-	-	-

Table 5 Flow of Funds Statement of Financial Plan 2 (2/3)

(Unit: US$ 1000)

	Item	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Internal Cash Generation										
61	Net Income before Interest Charges	-471	-445	-418	-389	-318	-286	-294	30	66	667
62	Add: Depreciation Exp.	991	991	991	991	949	949	991	702	702	139
63	Operating Cash Flow	520	546	573	602	632	663	697	731	768	806
64	Add: Beginning Cash Position	95	95	95	95	95	95	95	95	95	95
65	**Cash before Debt Service**	615	641	668	697	727	758	792	826	863	901
66	**Debt Service**										
67	Interest Charges	0	0	0	0	0	0	0	0	0	0
68	Principal Repayments	0	0	0	0	0	0	0	0	0	0
69	Cash Loan Repayment to Government	0	0	0	0	0	0	0	0	0	0
70	**Total Debt Service**	0	0	0	0	0	0	0	0	0	0
71	**Cash after Debt Service**	615	641	668	697	727	758	792	826	863	901
	Capital Investment Requirements										
72	Investment Projects	-	-	-	-	-	-	-	-	-	-
73	Stock of Spares	-	-	-	-	-	-	-	-	-	-
74	Land Acquisition	-	-	-	-	-	-	-	-	-	-
75	Administration	-	-	-	-	-	-	-	-	-	-
76	Annual Capital Investment	0	0	0	0	0	0	0	0	0	0
77	Add: Cash Ending Balance	95	95	95	95	95	95	95	95	95	95
78	**Financing Requirement**	520	546	573	602	632	663	697	731	768	806
	Funds from Loans & Grants										
79	Grants of Foreign Country	-	-	-	-	-	-	-	-	-	-
80	Loans of International Agency	-	-	-	-	-	-	-	-	-	-
81	Security Deposit	0	0	0	0	0	0	0	0	0	0
82	Grants of Government	-	-	-	-	-	-	-	-	-	-
83	Capital by Government	-	-	-	-	-	-	-	-	-	-
84	Sub-total of Funds	0	0	0	0	0	0	0	0	0	0
85	Cash Loan of Government	0	0	0	0	0	0	0	0	0	0
86	**Total of Funds**	0	0	0	0	0	0	0	0	0	0
87	**Cash Surplus (Deficit)**	520	546	573	602	632	663	697	731	768	806
	If Cash Surplus:										
88	Purchase (/Sell) Deposits	520	546	573	602	632	663	697	731	768	806
	If Cash Deficit:										
89	Sale of Deposits	-	-	-	-	-	-	-	-	-	-
90	Additional Equity Needed	-	-	-	-	-	-	-	-	-	-
91	Total Cash Raised	-	-	-	-	-	-	-	-	-	-

Table 5 Flow of Funds Statement of Financial Plan 2 (3/3)

(Unit: US$ 1000)

	Item	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Internal Cash Generation										
61	Net Income before Interest Charges	847	889	934	980	1,029	1,081	1,135	1,191	1,251	1,314
62	Add: Depreciation Exp.	0	0	0	0	0	0	0	0	0	0
63	Operating Cash Flow	847	889	934	980	1,029	1,081	1,135	1,191	1,251	1,314
64	Add: Beginning Cash Position	95	95	95	95	95	95	95	95	95	95
65	**Cash before Debt Service**	942	984	1,029	1,075	1,124	1,176	1,230	1,286	1,346	1,409
66	**Debt Service**										
67	Interest Charges	0	0	0	0	0	0	0	0	0	0
68	Principal Repayments	0	0	0	0	0	0	0	0	0	0
69	Cash Loan Repayment to Government	0	0	0	0	0	0	0	0	0	0
70	**Total Debt Service**	0	0	0	0	0	0	0	0	0	0
71	**Cash after Debt Service**	942	984	1,029	1,075	1,124	1,176	1,230	1,286	1,346	1,409
	Capital Investment Requirements										
72	Investment Projects	-	-	-	-	-	-	-	-	-	-
73	Stock of Spares	-	-	-	-	-	-	-	-	-	-
74	Land Acquisition	-	-	-	-	-	-	-	-	-	-
75	Administration	-	-	-	-	-	-	-	-	-	-
76	Annual Capital Investment	0	0	0	0	0	0	0	0	0	0
77	Add: Cash Ending Balance	95	95	95	95	95	95	95	95	95	95
78	**Financing Requirement**	847	889	934	980	1,029	1,081	1,135	1,191	1,251	1,314
	Funds from Loans & Grants										
79	Grants of Foreign Country	-	-	-	-	-	-	-	-	-	-
80	Loans of International Agency	-	-	-	-	-	-	-	-	-	-
81	Security Deposit	0	0	0	0	0	0	0	0	0	0
82	Grants of Government	-	-	-	-	-	-	-	-	-	-
83	Capital by Government	-	-	-	-	-	-	-	-	-	-
84	Sub-total of Funds	0	0	0	0	0	0	0	0	0	0
85	Cash Loan of Government	0	0	0	0	0	0	0	0	0	0
86	**Total of Funds**	0	0	0	0	0	0	0	0	0	0
87	**Cash Surplus (Deficit)**	847	889	934	980	1,029	1,081	1,135	1,191	1,251	1,314
	If Cash Surplus:										
88	Purchase (/Sell) Deposits	847	889	934	980	1,029	1,081	1,135	1,191	1,251	1,314
	If Cash Deficit:										
89	Sale of Deposits	-	-	-	-	-	-	-	-	-	-
90	Additional Equity Needed	-	-	-	-	-	-	-	-	-	-
91	Total Cash Raised	-	-	-	-	-	-	-	-	-	-

Table 6 Balance Sheet of Financial Plan 2(1/3)

(Unit: US$ 1000)

	Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	ASSETS											
	Fixed Assets											
92	Land	250	250	250	250	250	250	250	250	250	250	250
93	Plants in Service*1	0	0	16,324	16,324	15,333	14,342	13,351	12,360	11,369	10,378	9,387
94	Less: Depreciation	-	-	-	991	991	991	991	991	991	991	991
95	Net Fixed Assets	250	250	16,574	15,583	14,592	13,601	12,610	11,619	10,628	9,637	8,646
96	Work in Process	322	7,973	-	-	-	-	-	-	-	-	-
97	**Total Fixed Assets**	572	8,223	16,574	15,583	14,592	13,601	12,610	11,619	10,628	9,637	8,646
	Current Assets											
98	Cash	50	50	0	0	13	115	112	119	110	96	95
99	Short-Term Deposits	0	0	0	0	3	133	432	781	1,214	1,706	2,253
100	Accounts Receivable (Net)	-	-	-	-	-	-	-	-	-	-	-
101	Inventories of Spares	-	-	202	202	202	202	202	202	202	202	202
102	**Total Current Assets**	68	68	325	268	332	698	988	1,358	1,763	2,215	2,758
103	**Total Assets**	640	8,291	16,899	15,850	14,923	14,298	13,597	12,976	12,391	11,851	11,404
	LIABILITIES & NET WORTH											
	Equity											
104	Paid in Capital*2	50	50	550	550	550	550	550	550	550	550	550
105	Grants	590	8,241	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092
106	Retained Earnings	0	0	-5	-968	-1,824	-2,585	-3,282	-3,921	-4,491	-5,004	-5,451
107	**Total Net Worth**	640	8,291	16,637	15,674	14,818	14,057	13,360	12,721	12,151	11,638	11,191
	Borrowings											
108	Loans of International Agency	0	0	0	0	0	0	0	0	0	0	0
109	Other Loans	-	-	-	-	-	-	-	-	-	-	-
110	Other Credits	-	-	-	-	-	-	-	-	-	-	-
111	Less: Current Portion of Debt	0	0	0	0	0	0	0	0	0	0	0
112	**Total Borrowings**	0	0	0	0	0	0	0	0	0	0	0
	Current Liabilities											
113	Accounts Payables	0	0	105	200	218	230	224	237	220	192	190
114	Cash Loan of Government	0	0	153	122	0	0	0	0	0	0	0
115	Notes Payable	-	-	-	-	-	-	-	-	-	-	-
116	Security Deposit	0	0	4	7	9	12	14	17	20	21	23
117	Current Portion of Debt	-	-	-	-	-	0	0	0	0	0	0
118	Less: Cash Loan Repayment to Government	0	0	0	153	122	0	0	0	0	0	0
119	**Total Current Liabilities**	0	0	262	176	105	242	238	255	240	213	213
120	**Total Liablilities and Net Worth**	640	8,291	16,899	15,850	14,923	14,298	13,597	12,976	12,391	11,851	11,404

Note: *1 New french system is added into the proposed project scheme.

*2 50 thousand US dollars and New french system is internalized to capital paid.

Table 6 Balance Sheet of Financial Plan 2(2/3)

(Unit: US$ 1000)

	Item	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	ASSETS										
	Fixed Assets										
92	Land	250	250	250	250	250	250	250	250	250	250
93	Plants in Service*1	8,396	7,405	6,414	5,423	4,432	3,482	2,533	1,542	840	139
94	Less: Depreciation	991	991	991	991	949	949	991	702	702	139
95	Net Fixed Assets	7,655	6,664	5,673	4,682	3,732	2,783	1,792	1,090	389	250
96	Work in Process	-	-	-	-	-	-	-	-	-	-
97	**Total Fixed Assets**	7,655	6,664	5,673	4,682	3,732	2,783	1,792	1,090	389	250
	Current Assets										
98	Cash	95	95	95	95	95	95	95	95	95	95
99	Short-Term Deposits	2,773	3,318	3,892	4,493	5,125	5,789	6,485	7,217	7,985	8,791
100	Accounts Receivable (Net)	-	-	-	-	-	-	-	-	-	-
101	Inventories of Spares	202	202	202	202	202	202	202	202	202	202
102	**Total Current Assets**	3,278	3,824	4,397	4,998	5,630	6,294	6,990	7,722	8,490	9,296
103	**Total Assets**	10,932	10,487	10,069	9,680	9,362	9,077	8,782	8,812	8,878	9,546
	LIABILITIES & NET WORTH										
	Equity										
104	Paid in Capital*2	550	550	550	550	550	550	550	550	550	550
105	Grants	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092
106	Retained Earnings	-5,922	-6,367	-6,785	-7,175	-7,492	-7,778	-8,072	-8,043	-7,976	-7,309
107	**Total Net Worth**	10,720	10,275	9,857	9,467	9,150	8,864	8,570	8,599	8,666	9,333
	Borrowings										
108	Loans of International Agency	0	0	0	0	0	0	0	0	0	0
109	Other Loans	-	-	-	-	-	-	-	-	-	-
110	Other Credits	-	-	-	-	-	-	-	-	-	-
111	Less: Current Portion of Debt	0	0	0	0	0	0	0	0	0	0
112	**Total Borrowings**	0	0	0	0	0	0	0	0	0	0
	Current Liabilities										
113	Accounts Payables	190	190	190	190	190	190	190	190	190	190
114	Cash Loan of Government	0	0	0	0	0	0	0	0	0	0
115	Notes Payable	-	-	-	-	-	-	-	-	-	-
116	Security Deposit	23	23	23	23	23	23	23	23	23	23
117	Current Portion of Debt	0	0	0	0	0	0	0	0	0	0
118	Less: Cash Loan Repayment to Government	0	0	0	0	0	0	0	0	0	0
119	**Total Current Liabilities**	213	213	213	213	213	213	213	213	213	213
120	**Total Liablilities and Net Worth**	10,932	10,487	10,069	9,680	9,362	9,077	8,782	8,812	8,878	9,546

Note: *1 New french system is added into the proposed

*2 50 thousand US dollars and New french system

Table 6 Balance Sheet of Financial Plan 2(3/3)

(Unit: US$ 1000)

	Item	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	ASSETS										
	Fixed Assets										
92	Land	250	250	250	250	250	250	250	250	250	250
93	Plants in Service*1	0	0	0	0	0	0	0	0	0	0
94	Less: Depreciation	0	0	0	0	0	0	0	0	0	0
95	Net Fixed Assets	250	250	250	250	250	250	250	250	250	250
96	Work in Process	-	-	-	-	-	-	-	-	-	-
97	**Total Fixed Assets**	250	250	250	250	250	250	250	250	250	250
	Current Assets										
98	Cash	95	95	95	95	95	95	95	95	95	95
99	Short-Term Deposits	9,638	10,527	11,460	12,441	13,470	14,550	15,685	16,877	18,128	19,441
100	Accounts Receivable (Net)	-	-	-	-	-	-	-	-	-	-
101	Inventories of Spares	202	202	202	202	202	202	202	202	202	202
102	**Total Current Assets**	10,143	11,032	11,965	12,946	13,975	15,056	16,190	17,382	18,633	19,946
103	**Total Assets**	10,393	11,282	12,215	13,195	14,225	15,305	16,440	17,631	18,882	20,196
	LIABILITIES & NET WORTH										
	Equity										
104	Paid in Capital*2	550	550	550	550	550	550	550	550	550	550
105	Grants	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092	16,092
106	Retained Earnings	-6,462	-5,573	-4,639	-3,659	-2,630	-1,549	-415	777	2,028	3,341
107	**Total Net Worth**	10,180	11,069	12,003	12,983	14,012	15,093	16,227	17,419	18,670	19,983
	Borrowings										
108	Loans of International Agency	0	0	0	0	0	0	0	0	0	0
109	Other Loans	-	-	-	-	-	-	-	-	-	-
110	Other Credits	-	-	-	-	-	-	-	-	-	-
111	Less: Current Portion of Debt	0	0	0	0	0	0	0	0	0	0
112	**Total Borrowings**	0	0	0	0	0	0	0	0	0	0
	Current Liabilities										
113	Accounts Payables	190	190	190	190	190	190	190	190	190	190
114	Cash Loan of Government	0	0	0	0	0	0	0	0	0	0
115	Notes Payable	-	-	-	-	-	-	-	-	-	-
116	Security Deposit	23	23	23	23	23	23	23	23	23	23
117	Current Portion of Debt	0	0	0	0	0	0	0	0	0	0
118	Less: Cash Loan Repayment to Government	0	0	0	0	0	0	0	0	0	0
119	**Total Current Liabilities**	213	213	213	213	213	213	213	213	213	213
120	**Total Liablilities and Net Worth**	10,393	11,282	12,215	13,195	14,225	15,305	16,440	17,631	18,882	20,196

Note: *1 New french system is added into the proposed

*2 50 thousand US dollars and New french system

ANNEX

MINUTES OF MEETING

MINUTES OF MEETINGS

ON

SCOPE OF WORK

FOR

THE STUDY ON

WATER SUPPLY SYSTEM

FOR SIEM REAP REGION

IN CAMBODIA

AGREED UPON BETWEEN

THE MINISTRY OF INDUSTRY, MINES AND ENERGY

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Phnom Penh, September 26, 1996

H.E. Mr. Vann Molyvann
State Minister

H.E. Mr. Pou Sothirak
Minister for Industry, Mines and Energy

Ms. Keiko YAMAMOTO
Leader of the Preparatory Study Team,
Japan International Cooperation Agency
(JICA)

H.E. Mr. Toan Chay
Governor of Siem Reap Province

1.Introduction

In response to the request of the Royal Government of Cambodia (hereinafter referred to as "the Government of Cambodia"), the Preparatory Study Team (hereinafter referred to as "the Team") of the Japan International Cooperation Agency (hereinafter referred to as "JICA") visited Cambodia from September 13 to September 30, 1996 to discuss the Scope of Work (hereinafter referred to as "S/W") for the Study on Water Supply System for Siem Reap Region in Cambodia (hereinafter referred to as "the Study").

The Team carried out field surveys of the study area and held a series of discussions with the authorities concerned of the Ministry of Industry, Mines and Energy (hereinafter referred to as "the MIME"), and other organizations.

The list of attendants is shown in Appendix.

The Minutes of Meetings has been prepared for the better understanding of the S/W agreed upon between the MIME and the Team on September 26, 1996, summarizing main points of the discussions made in the course of the preparation of the S/W.

2.Study Title

Both sides agreed that the title of the Study would be "The Study on Water Supply System for Siem Reap Region in Cambodia" as described in the S/W.

3.Target Year

Both sides agreed that the target year for M/P would be set in the year 2010 in accordance with the urban development plan for Siem Reap prepared by the Superior Council of National Culture and A.P.S.A.R.A. in 1995.

4.Water Sources to be investigated

Both sides agreed that the Study would investigate following four water sources;

(1) West Baray reservoir
(2) Siem Reap River
(3) Lake Tonle Sap
(4) Groundwater.

The Team explained their intention to limit target water sources of the Study to the four candidates mentioned above. The MIME agreed to that.

5.Study Area

The Team emphasized that it was very important to secure the safety of the JICA plenary study team (hereinafter referred to as "JICA Study Team"). In this line, both sides agreed to limit the study area to a sphere where the safety was confirmed.

6.Service Area of Water Supply System

Both sides agreed that the service area of water supply system would be decided in the course of formulation of the master plan.

7.Evaluation of Effects on the Angkor Heritage Caused by Groundwater Development

The Team explained that while groundwater was hopeful as a water source of water supply system for Siem Reap region, evaluation of effects on the Angkor heritage should be carefully investigated. The necessity was well recognized by the MIME. In this line, both sides agreed to make a careful investigation into possibility of land subsidence which might be caused by pumping up of groundwater.

In addition, the Team suggested that it would be better to consult people concerned in preservation and restoration of the Angkor heritage. The MIME agreed to that.

8.Observation of water level, water quantity and water quality

The Team explained that the observation of hydrological and hydrogeological data such as groundwater level, water quantity and water quality would be very important item of the Study and requested that counterpart personnel conduct the observation while the JICA Study Team work in Japan. Measuring method and skill will be transferred to the counterpart personnel by the JICA Study Team in advance. The MIME agreed to that.

9.Counterpart Agency

The MIME shall act as a counterpart agency as described in the S/W and the Unit of Potable Water Supply will be in charge of actual detail affairs. The MIME explained possibility to change its organization. The Team requested that, in case of setup reform, the present staff of the Unit of Potable Water Supply take full responsibility for the implementation of the Study.

10.Coordination with Other Ministries and Organizations

The Team requested the MIME to coordinate with other ministries and organizations concerned such as the Superior Council of National Culture, the Ministry of Agriculture, Siem Reap Province, Siem Reap Water Supply Authority, A.P.S.A.R.A., UNESCO and CFD to get maximum cooperation from these organizations as well as to avoid any duplicated works. The Team also suggested to establish a coordinating committee to achieve the above mentioned coordination and to invite people concerned in preservation and restoration of the Angkor heritage as observers. The MIME agreed to this point and promised to set up the committee and invite representatives from relevant ministries and organizations for the smooth implementation of the Study.

11.Undertakings of the Government of Cambodia

(1)It was confirmed that the MIME would secure the full support and participation of organizations concerned in the course of the Study.

(2)It was confirmed that the MIME would take necessary measures to secure the safety of the JICA Study Team, especially during field surveys.

(3)It was confirmed that the MIME would assign the appropriate number of counterpart personnel to the JICA Study Team covering the following fields. A good command of English is a preferable qualification for the counterpart personnel for the better communication between JICA Study Team and counterpart personnel. The number and fields of counterpart personnel will, however, be finalized between the MIME and the JICA Study Team throughout discussions at the commencement of the Study.

a.Supervision (Water Supply Planning)
b.Hydrogeology/ Groundwater Development
c.Hydrology/ Water Quality Analysis
d.Geophysics. preferably with knowledge of a logarithmic function sheet and available for field survey
e.Surveying
f.Design of Water Supply Facilities, including cost estimation and construction planning
g.Water Supply Management
h.Economy/ Financial Analysis
i.Environmental Investigation
j.Coordination for JICA Study Team
k.Others

In addition, the Team suggested that the MIME staff in Siem Reap Province and staff of Siem Reap Water Supply Authority would be included to counterpart personnel for the effective implementation of field work in Siem Reap region.

(4)The Team requested that the MIME would provide the suitable office space with necessary equipment in Phnom Penh and Siem Reap, sufficient numbers of vehicles with drivers for the Study. The MIME replied that the office space enough to work could be prepared by MIME in both Phnom Penh and Siem Reap. The MIME, however, expressed concern that, due to the budgetary constraints, it would be hard to provide office equipment and vehicles with drivers. The Team recognized the situation and promised to convey the message to JICA H.Q. for consideration.

(5)The Team requested that the MIME should bear travel cost, daily allowance and hotel charges of counterpart personnel for field surveys in Siem Reap according to the principle of JICA's Development Study. The MIME, however, expressed concern that it could not be fulfilled due to the budgetary constraints. The Team recognized the situation and promised to convey the request to JICA H.Q. for consideration. The Team, however, again requested the MIME to reconsider to take any measures to overcome the above mentioned budgetary constraints.

12.Counterpart Training

The MIME requested that JICA conduct counterpart training in Japan for the purpose of the smooth transfer of technology during the Study. The Team agreed to convey it to JICA H.Q. for consideration. The training period, training field and selection of personnel shall be mutually discussed after the Study starts.

13.Technology Transfer Seminar

The MIME requested that JICA hold a seminar as a part of technology transfer in the course of the Study. The Team recognized the necessity and promised to convey the request to JICA H.Q. for positive consideration.

14.Study Schedule

The MIME expressed the need to shorten the Study period to respond to the local demand while maintaining the quality of the Study. The Team recognized this necessity and promised to convey this request to JICA H.Q. for consideration.

15. Equipment

It was mutually confirmed that JICA would make necessary arrangements for drilling machines to maintain the Study schedule. Other necessary equipment which cannot be provided by MIME will be prepared by JICA.

16. Reports

As for the Study reports, the MIME agreed to make them open to the public in order to achieve maximum use of the Study results.

The MIME requested that JICA provide executive summaries for the Draft Final Report and Final Reports as a reference in Khmer for better understanding of the Study result. The Team recognized this necessity and promised to convey this request to JICA H.Q. for positive consideration.

17. Others

(1) The Team explained JICA's Development Study Program and the MIME fully understood the Program.

(2) Besides this Study, JICA will conduct a development study named "Topographic Mapping for Angkor Archaeological Area in Siem Reap Region of the Kingdom of Cambodia". More effective international cooperation can be realized by mutual help between two studies. Along this line, the Team pointed out usefulness of aerial photos covering Siem Reap City to grasp the present situation of urbanization and explained that the Team had requested the preparatory study team of above mentioned JICA's development study to take them.

APPENDIX LIST OF ATTENDANTS

(Cambodian side)

H.E. Mr. Vann Molyvann	State Minister
Ministry of Industries Mines and Energy	
H.E. Mr. Pou Sothirak	Minister for Industries Mines and Energy
H.E. Mr. Hul Lim	Under Secretary of State
Mr. Ken Vath	Director of Unit of Potable Water Supply
Mr. Pok Chann	in charge of technic, Unit of Potable Water Supply
Mr. Soun Ratanak	in charge of accounting and cost/ price estimation, Unit of Potable Water Supply
Mr. Tang Sochatra	in charge of accounting and cost/ price estimation, Unit of Potable Water Supply
Mr. Prum Sokunarith	in charge of logistic and procurement, Unit of Potable Water Supply
Mr. Ke Chhan	Director, Office of MIME in Siem Reap
Mr 2th Praing	Secretary of Minister - State (MLME)
Ministry of Foreign Affairs and International Cooperation	
Mr. Eat Ly Heng	Deputy Chief, Department of Asia and Australia
Siem Reap Province	
H.E. Mr. Toan Chay	Governor
CFD Phnom Penh Office	
Mr. Jean-Yves Misselis	Director
UNESCO	
Mr. Sebastien Cavalier	Secretariat Permanent
Council for the Development of Cambodia (CDC)	
Ms. Heng Sokun	Deputy Director, Bilateral Aid Coordination Department

(Japanese side)

Embassy of Japan	
Mr. Shohei Naito	Ambassador
Mr. Shigenobu Kato	Minister-Counsellor
Mr. Kenji Shigemura	Third Secretary
JICA Cambodia Office	
Mr. Hiroyuki Arai	Resident Representative
Mr. Hiroshi Enomoto	Assistant Resident Representative
Preparatory Study Team	
Ms. Keiko Yamamoto	Leader
Mr. Masaki Itoh	Member
Mr. Masao Higuchi	Member
Mr. Yoshiyuki Tomioka	Member
Mr. Manabu Atsuchi	Member
Mr. Mineo Kai	Member
Mr. Shigeyuki Matsumoto	Member

MINUTES OF MEETINGS
ON
INCEPTION REPORT
FOR
THE STUDY ON WATER SUPPLY SYSTEM
FOR SIEM REAP REGION IN CAMBODIA

AGREED UPON BETWEEN

THE MINISTRY OF INDUSTRY, MINES AND ENERGY
AND
THE JICA STUDY TEAM

Phnom Penh, December 20, 1996

H.E. Mr. Ith PRAING
Secretary of State
Ministry of Industry, Mines
and Energy

Mr Kiyohiro INOUE
Team Leader of the JICA
Study Team for the Water
Supply System for Siem Reap
Region

1. Introduction

In the occasion of commencing the study for "Water Supply System for Siem Reap Region", the meeting was held between the Ministry of Industry, Mines and Energy (MIME), and the JICA Study Team at the MIME's conference room at Phnom Penh, Cambodia through 18th to 19th of December 1996.

The JICA Study Team submitted the Inception Report (20 copies) to the MIME, and made a brief explanation on the report. Overall work schedule, staffing, plan of operation were major items explained and discussed. The MIME well understood the importance of this study in consideration of the actual situation of the study area.

The MIME basically agreed on the descriptions in the report, and promised to render his cooperation to the JICA Study Team to the maximum extent during the course of the study.

2. Explanations and Discussions

2.1 Work Schedule of the Study

The JICA Study Team explained the study will be carried out in three phases, that is Phase 1 : Investigations for Water Resources, Phase 2 : Study on Water Supply Master Plan, and Phase 3 : Feasibility Study on Priority Project. The MIME confirmed that it will take about 31 months for the entire works starting December 1996 and ending July 1999. It is squeezed by 7 months from 38 months previously agreed by both the MIME and the JICA S/W Mission on last September, 1996. The study should strictly be followed as scheduled in the report.

The JICA Study Team explained that the field investigations such as drilling works, topographic survey, etc. will be mainly made in the early part of Phase 1, and asked the MIME to introduce the competent local contractors who can carry out those works under the contract basis. In case that it is difficult to find such local contractors here in Cambodia, the JICA Study

Team will seek the way to find contractors from outside of Cambodia.

The MIME explained that it was observed some delays in the implementation of drilling works by the contractors from outside of Cambodia, which was made in the course of study by Caisse Francaise de developpement (CFD) due to custom clearance of drilling equipment and materials and also visa problems for the contractor's personnel. The JICA Study Team asked the MIME his kind help in case the similar situations are observed in the future.

2.2 Counterpart Personnel of MIME

The JICA Study Team requested the MIME to provide several counterpart personnel so that the transfer of knowledge and/or exchange of technical know-how between the two are well attained in the course of the study. The MIME showed his well understanding for this, however, explained that the number of counterpart personnel are limited due to lack of staff members of the MIME.

The JICA Study Team requested the MIME the counterpart personnel to join the field investigations, especially from the viewpoint of safety measures to be taken, as the experts of the JICA Study Team are not familiar with the site conditions yet. The MIME promised to take necessary actions in due course.

2.3 Reports

The JICA Study Team will submit several reports to the MIME in the course of the study such as Inception Report, Progress Report, Interim Report, Draft Final Report, and Final Report as the study progresses. The reports are basically complied in English, however, the JICA Study Team considers it may be necessary to produce the summary report in Khmer language for the better understanding of the study results by the counterpart personnel and other related agencies concerned. The both sides will discuss this matter again in the course of the study.

2.4 Office Space

The JICA Study Team asked the MIME to provide enough office space at both Phnom Penh and Siem Reap. The MIME informed the JICA Study Team that he can provide the required office space at Siem Reap, but the office space at Phnom Penh has not been arranged yet. The MIME promised the arrangement of electric power supply will immediately be made after checking the required capacity at Siem Reap. It will take some time until the office space at Phnom Penh will be arranged. The JICA Study Team asked the MIME to expedite it.

2.5 Coordination with other Ministries and Organizations

It was confirmed that the MIME will organize the coordinating committee, and take a necessary action to hold a coordination meeting with other ministries and organizations from time to time as the study progresses. The JICA Study Team will inform the MIME in advance the necessity of such coordination meeting during the course of the study.

2.6 Commencement of Field Works

The JICA Study Team is moving to Siem Reap on Dec. 22 (Sun) '96 to commence the field works at the site. It is requested one of the counterpart personnel of MIME to join the JICA Study Team who can arrange the courtesy call to local government and related organizations, and meeting with staff concerned. The MIME agreed to arrange it.

The MIME will arrange a pass to the members of the JICA Study Team with which each expert can access to the premises of the Angkor Heritage for the purpose of field investigations.

APPENDIX

LIST OF ATTENDANTS

Cambodian side

- Ministry of Industry Mines and Energy

Mr. Ken Vath	Director, Unit of Potable water Supply
Mr. Ke Chhan	Director, Office of IME in Siem Reap
Mr. Pok Chann	in charge of technic, Unit of Potable Water Supply

Japanese side

- JICA Head Quarter

Mr. Masato Togawa	Deputy Director, Social Development Study Dept.,Second Development Study Div.

- JICA Advisory Committee

Ms. Keiko Yamamoto	Leader
Mr. Masaki Itoh	Member

- JICA Study Team

Mr. Kiyohiro Inoue	Team Leader
Mr. Tadao Suzumura	Hydrogeologist/Geotechnical Engineer
Mr. Takemasa Mamiya	Water Supply Engineer
Mr. Nurul Islam	Environmentalist
Ms. Tomoshi Ichikawa	Coordinator

[Siem Reap Water Supply Study Team]
TEL [00855-15-83-2741] [00855-15-83-1327]
FAX [00855-63-380-150] E-mail [nksr@forum.org.kh]

FAX OUT .....

Date:10 February 1998

Minutes of Meeting

Date/time : 09 February 1998/ from 8:00a.m to 8:30a.m
Place : Director's room of Unit of Potable Water Supply(UPWS)
Ministry of Industry, Mime and Energy(MIME)

Attendants:

MIME(UPWS)
- Mr. Ken Vath(director of UPWS)
- Mr. Pok Chhan(UPWS, project planning section)
- Mr. Prom Sokannarith(UPWS)
- Mr. Yin Sobin(UPWS, secretary of coordination committee)

JICA study team member of the water supply in Siem Reap
- Tadao Suzumura(hydrogeologist/soil mechanical engineer)
- Nurul Islam(environmentalist/social analysts)

Main items of discussion:

1) JICA members submitted 20 copies of the progress report(1), and explained the outline of the report, which was prepared at July 1997 on the 1st field work. MIME expressed to distribute the report by itself to the concerned government officials,
2) JICA members explained their main activities in Siem Reap in this period, and asked MIME about JICA property, and about the availability of the office space in MIME Siem Reap for this period. MIME reported that JICA property was kept well by MIME in the Siem Reap office. MIME also reported that they shall make effort to provide the office space in Siem Reap for this period, and MIME will report timely to JICA members about safety and security during their stay in Siem Reap. JICA members will check the condition of JICA property kept at Siem Reap and inform MIME duly.
3) MIME submitted to JICA member the field data since July 1997 to October 1997, and January 1998, which was taken by MIME during the absence of JICA member. JICA member will check the data at site,
4) JICA asked about the progress of the passport arrangement for Mr. Monirath who is assigned for the training course in Japan from the end of March 1998, and the visa extension for Mr. Nurul Islam of JICA member. MIME explained that the arrangement of passport and visa extension shall be done with the cooperation with JICA Phnom Penh office,
5) MIME explained that Mr. Ken Vath may go to hospital in Hoh Chi Minh city on 9 February 1998 for the treatment of his eye problem for one month. However, Mr. Pok Chann, Mr. Prom Sokannarith and Mr. Yin Sobin of his staff will follow up the activity of JICA member in this period. JICA member will move to Siem Reap from 10 February, 1998 for his 2nd field work.

Attachment :

List of JICA property which was kept in MIME Siem Reap office(1 sheet)
Hydrological data from July 1997 to October 1997(3 sheets)

鈴木忠男
Tadao Suzumura
JICA study team

Pok Chhan
UPWS

10-2.98

[*Siem Reap Water Supply Study Team*]
TEL [*00855-15-83-2741*] [*00855-15-83-1327*]
FAX [*00855-63-380-150*] E-mail [nksr@forum.org.kh]

Date:19 March, 1998

Minutes of Meeting

Date/time : 19 March, 1998/ from 3:30 p.m. to 4:00 p.m.

Place : Director's room of Unit of Potable Water Supply(UPWS), Ministry of Industry, Mime and Energy(MIME)

Attendants:

MIME(UPWS)
- Mr. Ken Vath(director of UPWS)
- Mr. Pok Chhan(UPWS, project planning section)
- Mr. Prom Sokannarith(UPWS)
- Mr. Yin Sobin(UPWS, secretary of coordination committee)

JICA study team member of the water supply in Siem Reap
- Kiyohiro Inoue(team leader of the study team)
- Tadao Suzumura(hydrogeologist/soil mechanical engineer)
- Nurul Islam(environmentalist/social analysts)

Main items of discussion:

1) JICA members distributed total 5 copies of the progress report No.2. The detail is A.P.S.A.R.A in Siem Reap, MIME in Siem Reap, Mr. Toan Chay, Governor of Siem Reap, A.P.S.A.R.A in Phnom Penh and H.E. Mr. Van Molyvan in Phnom Penh. The JICA members explained the outline of the report to the above concerned officials, which was prepared at March, 1998 on the 2nd field work.
2) JICA members submitted 15 copies of the progress report No.2, and explained the outline of the report, which was prepared at March, 1998 on the 2nd field work. MIME expressed to distribute the report of the 15 sets by itself to the concerned government officials,
3) JICA members explained their main activities in Siem Reap in this period.

Kiyohiro Inoue
Team Leader
JICA study team

Ken Vath
Director
UPWS

MINUTES OF MEETING

ON

PRELIMINARY RESULTS OF PHASE 2: MASTER PLAN

FOR

THE STUDY ON WATER SUPPLY SYSTEM
FOR SIEM REAP REGION IN CAMBODIA

AGREED UPON BETWEEN

STEERING COMMITTEE

AND

JAPAN INTERNATIONAL COOPERATION AGENCY STUDY TEAM

Phnom Penh, 22nd July, 1999

(On behalf of
Mr. Osamu Takahashi,
Team Leader
JICA Study Team)

H.E. Phork Sovanrith,
Under Secretary of State of MIME
Chairman of the Steering Committee

Mr. Takemasa Mamiya
Member of Study Team

Japan International Cooperation Agency Study Team (hereinafter referred to as 'JICA Study Team') and members of the Steering Committee (hereinafter referred to as 'the Committee') headed by His Excellency Phork Sovanrith, Under Secretary of State of Ministry of Industry, Mines and Energy (MIME), held a meeting on 21st July, 1999 at the Conference Room of MIME in Phnom Penh, Cambodia. This meeting was also attended by His Excellency Vann Molyvann, President Director General of APSARA Authority. This meeting was to present the preliminary results of Phase 2: Master Plan by the JICA Study Team during their field work in Cambodia from May 13 until July 26, 1999.

A list of the participants for the meeting is presented in Annex-1 to these minutes.

In the beginning, the Chairman of the Steering Committee, His Excellency Phork Sovanrith, Under Secretary of State of MIME, expressed his thanks to His Excellency Vann Molyvann for his kind attendance and to JICA Study Team. The JICA Study Team also expressed their thanks towards the Steering Committee and His Excellency Vann Molyvann for their cordial cooperation. The Team also thanked MIME for their support during the Team's work.

After that, the JICA Study Team presented the preliminary results to the Steering Committee. The Steering Committee agreed on the preliminary results of Phase 2 of the Study.

The Study Team also explained that based on these preliminary results and comments from Cambodian side, the work would continue during the next homework in Japan in order to prepare the Master Plan.

Major points discussed in the meeting are as follows:

1. Opening Address

The presentation of the Japanese side was started with a opening address from Ms. Yamamoto, Chairman of the JICA Advisory Committee. She expressed her gratitude to Cambodian side for their continuing support.

2. Objectives and Schedule of the Study

The JICA Study Team reminisced the four major objectives of the Study and mentioned that the target year of the Study is 2010. Further, the Team described about

the three phases of the Study and pointed out that the Study is at present at the middle of the Phase 2, which is 'Preparation of Master Plan'.

3. Future Population and Water Demand

The Study Team explained the methodology adopted in order to forecast future water demand. A service area is proposed and considering appropriate future growth scenario, the future water demand was calculated by combining the demands of domestic, hotels, guesthouses, restaurants and special uses. The net demand is then adjusted by peak factors and loss factor.

His Excellency Vann Molyvann made a comment that the water demand is rather low. He pointed out that according to APSARA's forecast, the tourist population expected in 2010 is higher than the figure considered by JICA Study Team. He also mentioned that expected population in Siem Reap City in 2010 is again higher than the figure considered by JICA Study Team. As a result, considering higher population and higher hotel rooms, he commented that the water demand should be higher than the figure obtained by JICA Study Team. The Team replied that they would review the water demand based on this comment during the preparation of Master Plan in August and September, 1999.

The Committee requested the Study Team to take into account the water demand of public toilet, watering of public park and day tourists, who are not staying overnight. He also requested to reconsider the water demand for temples since water is used in temples for various public services. The Team agreed to reflect these views in the Master Plan.

In relation to the present groundwater abstraction by hotels and residents, His Excellency Vann Molyvann clearly mentioned that necessary institutional and legal steps would be taken in future so that no groundwater wells would be operated in Siem Reap apart from the wells in the Project.

His Excellency Vann Molyvann also asked the Study Team to reconsider the service area. He requested to expand the service area in northeast and southeast parts of the city in compliance with the expected development as stipulated in the city plan.

4. Comparative Study on Four Alternative Water Sources

The Study considered four alternative water resources as future water source. These are groundwater, West Baray Reservoir, Siem Reap River, and Lake Tonle Sap. For each alternatives, total cost was calculated in Net Present Value (NPV) and the NPVs were compared. Although investment cost and operation & maintenance cost were the major criteria, the Study Team also comprehensively considered all other possible aspects including, ease in operation & maintenance, impact on Angkor heritage, system reliability, water quality, system flexibility and impact on environment. Explaining the advantages and disadvantages of each alternatives, the Study Team recommended that groundwater would be most appropriate water source to meet the demand in year 2010.

The Committee fully agreed with the Study Team that the groundwater should be considered as the initial water source for the water supply system.

Mr. Chairman remarked as a comment that if another water source in addition to groundwater system be required, extra cost would be necessary for developing two systems. In that case, he viewed that one system would be better to develop from the beginning. The Study Team replied that if that is the case they would calculate the relative costs. Furthermore, the Study Team agreed to study the possibility of additional wells at western side of the proposed well field to meet future water demand in 2010 which will be reviewed by the Study Team. In such case, the diameters of the well connecting pipeline and the distribution trunk main will be reviewed.

His Excellency Vann Molyvann requested the Study Team to make cost breakdown for the water resources development components of alternative 2 and 3. The Team replied that these cost breakdowns are already available and would be incorporated in the Master Plan report, that is the Interim Report.

5. Distribution System

To provide reliable and conforming water supply to the end users, the Study Team proposed layout of distribution pipelines, which would work in conjunction with the existing distribution network. However, JICA Study Team pointed out that the existing pipelines are rather old and may be required to be replaced. Necessity of the pipeline replacement will be studied in the feasibility study stage.

His Excellency Vann Molyvann asked to consider an independent main pipeline from the distribution pumping station directly to the proposed hotel zone along the proposed road from hotel zone to National Road No. 6 to be constructed in 2001. The Study Team replied that the Study fully considered about the water delivery to the hotel zone. The Team's proposal is to supply water to the hotel zone from the northern tip of the new water mains. However, the Team agreed to make technical and cost analysis for new proposal.

A number of members of the Steering Committee expressed a common view that more importance should be given to the northern portion since most of the hotels, offices and other facilities are located in the northern portion of the city.

6. Implementation Schedule

The Study Team proposed two alternative implementation schedules for groundwater development. The first option is to construct the total facilities at once while the second option provides a stepwise implementation.

Mr. Chairman commented that based on expected rapid growth of the city, first option is better. The Team mentioned that more detail analysis would be done in Master Plan stage.

7. System Operation of the Waterworks

The Study Team proposed a preliminary idea for the future organizational structure required operating the activities of waterworks efficiently. The Team also provided some concept for system operation in future.

8. Economic and Financial Analysis

The Study Team presented the basic methodology, criteria and assumptions of economic and financial analysis to be complied in the Master Plan.

9. Meeting Conclusion and Closing

To wrap up the meeting, Mr. Chairman thanked all parties for attending the meeting.

ANNEX-1

LIST OF PARTICIPANTS

Special Guest of Honor

1. H.E. Vann Molyvann	President Director General of APSARA Authority.	

The Steering Committee

1.	H.E. Phork Sovanrith	Under Secretary of State, MIME	Chairman
2.	H.E. Suy San	Deputy Governor, Siem Reap Province	Deputy Chairman
3.	Ms. Tep Vattho	Chief of APSARA in Siem Reap,	Deputy Chairman
4.	Mr. Peng Navuth	Director, Urban Water Supply, MIME	Member
5.	Mr. Sun Soklin	Chief of Service, Ministry of Public Works and Transport, Siem Reap	Member
6.	Mr. Phiv Phalkun	Ministry of Water Resources and Meteorology	Member
7.	Mr. Tat Bunchhoeun	Dept. of Agriculture, Forestry and Fisheries	Member
8.	Mr. Chiv Hur	Director, MIME, Siem Reap	Member
9.	Mr. Chan Sengla	Water Supply Station in Siem Reap	Member
10.	Mr. Yin Sobin	Urban Water Supply, MIME	Member
11.	Mr. Cheav Channy	Urban Water Supply, MIME	Member

MIME

1.	Mr. Chhrien Seng Kong	Deputy Director, Urban Water Supply
2.	Mr. Som Kunthea	Urban Water Supply
3.	Mr. Som Kosal	Urban Water Supply
4.	Mr. Prom Sokannarith	Urban Water Supply

Japan International Cooperation Agency

1.	Ms. Keiko Yamamoto	Chairman, JICA Advisory Committee
2.	Mr. Shinichi Masuda	Assistant Resident Representative, Cambodia

JICA Study Team

1.	Mr. Takemasa Mamiya	Member
2.	Mr. Hiroshi Machida	Member
3.	Mr. Tatsuo Tashino	Member
4.	Mr. Nurul Islam	Member

MINUTES OF MEETING

ON

INTERIM REPORT: MASTER PLAN

FOR

THE STUDY ON WATER SUPPLY SYSTEM

FOR SIEM REAP REGION IN CAMBODIA

AGREED UPON BETWEEN

THE STEERING COMMITTEE

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY STUDY TEAM

Phnom Penh, 13th October 1999

H.E. Phork Sovanrith,
Under Secretary of State of MIME
Chairman of the Steering Committee

Mr. Osamu Takahashi
Team Leader
JICA Study Team

Witnessed by

Ms. Keiko Yamamoto
Chairperson, JICA Advisory Committee

The Japan International Cooperation Agency Study Team (hereinafter referred to as 'the JICA Study Team') and members of the Steering Committee (hereinafter referred to as 'the Steering Committee') headed by His Excellency Phork Sovanrith, Under Secretary of State of Ministry of Industry, Mines and Energy (MIME), held a meeting on 12th October, 1999 at the Conference Room of MIME in Phnom Penh, Cambodia. At the meeting, the Interim Report: Master Plan was explained by the JICA Study Team.

A list of participants for the meeting is presented in Annex-1 to these minutes.

In the beginning, the Chairman of the Steering Committee, His Excellency Phork Sovanrith, Under Secretary of State of MIME, expressed his thanks to the JICA Advisory Committee and the JICA Study Team. The presentation of the Japanese side was started with an opening address from Ms. Keiko Yamamoto, Chairperson of the JICA Advisory Committee. She expressed her gratitude to Cambodian side for their continuing support and cordial cooperation. The JICA Study Team also thanked MIME for their support during the Team's work.

After that, the JICA Study Team presented the Interim Report (IT/R) to the Steering Committee. The Steering Committee basically agreed on the results of Phase 2: Master Plan of the Study.

The JICA Study Team also explained that based on the IT/R and comments from Cambodian side, the work would move into the next phase, which is the Feasibility Study (F/S).

Major points discussed at the meeting are as follows:

1. Presentation and Discussion on the IT/R

The Leader of the JICA Study Team started his presentation focusing the main purpose of this meeting and he also reminded the major comments raised by the Steering Committee at the last meeting held on 21st July 1999.

The JICA Study Team explained about the revision of water demand projection. For the domestic water demand calculation, future population growth rates are reconsidered. The service area is proposed to be expanded in two stages. For the visitor water demand, the annual tourist growth is revised together with restaurant water demand. Water demands for temples and markets are doubled. Based on the new water demand, water supply facilities are planned.

Chairman of the Steering Committee pointed that even after doubling the demand for temples and markets from the previous proposal, it may still not be sufficient. The JICA Study Team explained that since the demands for temples and markets uses are less than 1% of the total demand, these demands could be easily adjustable in actual operation.

The Steering Committee clarified that some of the expression used in the IT/R may be confusing. The Steering Committee said that to explain Stage 1 and 2, the IT/R

sometimes mentioned 'year 2006' and 'year 2010', respectively. These should be better understood with the expressions that the service will commence 'from year 2002' and 'from year 2007'. The JICA Study Team agreed to this view.

Chairman of the Steering Committee inquired about the revised well field location. The JICA Study Team said that the exact location is not yet fixed. The location will be fixed in the F/S phase incorporating results from the two pilot wells.

The Steering Committee expressed great concern on the degraded condition of existing pipelines and requested to replace all existing pipelines in Stage 1 if necessary. The JICA Study Team replied that exact pipes to be-replaced would be recommended in the F/S.

On the impact of well field on West Baray, the JICA Study Team explained that based on investigation results, there is little correlation between the water level in West Baray and groundwater level. Hence, the impact would be negligible.

About the independent bulk water supply to the hotel zone proposed by the Steering Committee in the previous meeting, the Steering Committee revised its approach because of the uncertainty of the implementation of the access road to the hotel zone. The Steering Committee preferred to provide water to the hotel zone through the proposed distribution network at the northern end in bulk. The JICA Study Team agreed to reflect this view and review the diameter of the pipelines in order to meet the water demand.

The Steering Committee asked the opinion in case the water quality degrades in future. The JICA Study Team replied that such possibility is remote based on investigations so far made. However, in such a case relocation of wells or treatment could be considered.

On the implementation schedule of the Project, the Steering Committee requested to JICA to implement the Project as quickly as possible. The JICA Advisory Committee took note of it.

The Steering Committee recommended to use 'Provincial Department of IME' instead of 'Regional Office of MIME'. The JICA Study Team agreed to this.

The Steering Committee pointed that some of the data used in the IT/R are rather old. The Steering Committee offered to provide updated data for the F/S. The JICA Study Team thanked for this cooperation.

2. Meeting Conclusion and Closing

Based on the explanation and discussion on the Master Plan presented in the IT R, both parties agreed to conduct the F/S on the identified priority project, which is the Stage 1 Project with a capacity of 8,000 m^3/day.

To wrap up the meeting, Mr. Chairman thanked all parties for attending the meeting

ANNEX-1

LIST OF PARTICIPANTS

The Steering Committee

1.	H.E. Phork Sovanrith	Under Secretary of State, MIME	Chairman
2.	Mr. Peng Navuth	Director, Urban Water Supply Department, MIME	Member
3.	Mr. Son Suklin	Chief of Service, Department of Public Works and Transport, Siem Reap	Member
4.	Mr. Phiv Phalkun	Chief Officer, Ministry of Water Resources and Meteorology	Member
5.	Mr. Tat Bunchhoeun	Dept. of Agriculture, Forestry and Fisheries	Member
6.	Mr. Chiv Hur	Director, MIME, Siem Reap	Member
7.	Mr. Chan Sengla	Deputy Director, Siem Reap Water Works	Member
8.	Mr. Yin Sobin	Officer, Urban Water Supply Dept., MIME	Member
9.	Mr. Cheav Channy	Officer, Urban Water Supply Dept., MIME	Member

Japan International Cooperation Agency

1.	Ms. Keiko Yamamoto	Chairperson, JICA Advisory Committee
2.	Mr. Masaki Itoh	Member, JICA Advisory Committee
3.	Mr. Taketo Kuroki	JICA Head Quarters, Tokyo.

JICA Study Team

1.	Mr. Osamu Takahashi	Team Leader
2.	Mr. Takemasa Mamiya	Member
3.	Mr. Hiroshi Machida	Member
4.	Mr. Nurul Islam	Member

MINUTES OF MEETING

ON

DRAFT FINAL REPORT

FOR

THE STUDY ON WATER SUPPLY SYSTEM

FOR SIEM REAP REGION IN CAMBODIA

AGREED UPON BETWEEN

THE STEERING COMMITTEE

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY STUDY TEAM

Phnom Penh, 23rd March 2000

H.E. Phork Sovanrith,
Under Secretary of State of MIME
Chairman of the Steering Committee

Mr. Osamu Takahashi
Team Leader
JICA Study Team

Witnessed by

Ms. Keiko Yamamoto
Chairperson, JICA Advisory Committee

The Japan International Cooperation Agency Study Team (hereinafter referred to as 'the JICA Study Team') and members of the Steering Committee (hereinafter referred to as 'the Steering Committee') headed by His Excellency Phork Sovanrith, Under Secretary of State of Ministry of Industry, Mines and Energy (MIME), held a meeting on 22nd March, 2000 with attendance of His Excellency Nhep Bunchin, Secretary of State of MIME, at the Conference Room of Thai San Hotel in Phnom Penh, Cambodia. At the meeting, the Draft Final Report was explained by the JICA Study Team.

A list of participants for the meeting is presented in Annex-1 to these minutes.

In the beginning, the Chairman of the Steering Committee, His Excellency Phork Sovanrith, Under Secretary of State of MIME, expressed his thanks to the JICA Advisory Committee and the JICA Study Team. The presentation of the Japanese side was started with an opening address from Ms. Keiko Yamamoto, Chairperson of the JICA Advisory Committee. She expressed her gratitude to Cambodian side for their continuing support and cordial cooperation. The JICA Study Team also thanked MIME for their support during the Team's work.

After that, the JICA Study Team presented the Draft Final Report to the Steering Committee. The Steering Committee agreed on the results of the Study and contents of the Draft Final Report.

The JICA Study Team also explained that based on the Draft Final Report and comments from the Cambodian side, the Final Report will be prepared in next May and be submitted to the Cambodian side.

Major points discussed at the meeting are as follows:

1. Presentation and Discussion on the Draft Final Report

Representative of APSARA Authority stated that the APSARA Authority has discussed several times with the JICA Study Team on using groundwater as a source of the Siem Reap Water Supply and the APSARA has never received any objection from organizations including NGOs concerning the utilization of groundwater. Representatives of APSARA Authority and UNESCO recommended to explain the results of the Study at the ICC Meeting which will be held in next June. JICA Advisory Committee thanked the recommendation and stated that JICA Advisory Committee would convey the recommendation to the JICA Headquarters in Tokyo.

Representative of the UNESCO requested to supply the Final Report in electrical format and the JICA Study Team replied that the request would be conveyed to JICA Headquarters in Tokyo.

The Steering Committee requested to include replacement of the remaining half of the existing pipeline, which will not be replaced under the Stage 1, to the Stage 2. The JICA Study Team replied that the remaining existing pipes would be replaced or repaired by the Siem Reap Waterworks using own found or donor's assistance.

The Study Team stated that the number of wells and unit capacity of well were confirmed during the Feasibility Study stage. However, to avoid confusion and to help better understanding of the report, the Study Team proposed and the Steering Committee agreed to revise the Master Plan conforming to the results of the Feasibility Study.

Chairman of the Steering Committee pointed that the MIME started the reinforcement of the organization of the Siem Reap Waterworks in order to achieve effective operation and maintenance. MIME will appoint new director of the Waterworks.

Representative of the UNESCO requested and the JICA Study Team agreed to add a description of the "Archaeological Survey" for the location of the Distribution Center during detailed design period in the implementation schedule for the Stage I.

The JICA Advisory Committee pointed that the continuous monitoring of the groundwater level was indispensable and the Steering Committee stated that the monitoring of the groundwater should be responsibility of the Siem Reap Provincial Department of Industry, Mines and Energy (PDIME).

The JICA Study Team stated that should there be any further comments on the Draft Final Report, the Team will consider the comments which are received through MIME by the middle of April, 2000.

2. Meeting Conclusion and Closing

Based on the explanation and discussion on the Draft Final Report, both parties agreed to finalize the Draft Final Report to the Final Report reflecting the results of the discussion of this meeting.

To wrap up the meeting, Mr. Chairman thanked all parties for attending the meeting.

ANNEX-1

LIST OF PARTICIPANTS

The Steering Committee			
1.	H.E. Nhep Bunchin	Secretary of Stage, MIME	
2.	H.E. Phork Sovanrith	Under Secretary of State, MIME	Chairman
3.	H.E. Suy San	Deputy Governor of Siem Reap Province	Deputy Chairman
4	Ms. Chau Sun Kerya	Director of Tourism Department, APSARA Authority	Member
5.	Mr. Peng Navuth	Director, Potable Water Supply Department, MIME	Member
6.	Mr. Kang Chantra	Deputy Director, Department of Public Works and Transport, Siem Reap	Member
7.	Mr. Phiv Phalkun	Chief Officer, Ministry of Water Resources and Meteorology	Member
8.	Mr. Chiv Hur	Director, MIME, Siem Reap	Member
9.	Mr. Chan Sengla	Deputy Director, Siem Reap Water Works	Member
10.	Mr. Yin Sobin	Officer, Potable Water Supply Dept., MIME	Member
11.	Mr. Cheav Channy	Officer, Potable Water Supply Dept , MIME	Member
UNESCO			
1.	Ms. Tamara Teneszhvili	Culture Program Specialist	
2.	Mr. Hor Rachna	Secretary of ICC	
JICA Advisory Committee			
1.	Ms. Keiko Yamamoto	Chairperson, JICA Advisory Committee	
2.	Mr. Masaki Itoh	Member, JICA Advisory Committee	
JICA Study Team			
1.	Mr. Osamu Takahashi	Team Leader	
2.	Mr. Takemasa Mamiya	Member	
3.	Mr. Hiroshi Machida	Member	
4.	Mr. Tatuo Tashino	Member	