

CHAPTER 5
PRELIMINARY COST ESTIMATES
FOR THE 1ST STAGE PROJECT

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5.1 Basis of the Preliminary Cost Estimates

From the results of the preliminary design of the priority projects, the preliminary cost estimates have been conducted. The cost estimates were carried out based on the costs as of April, 2003 and the results of the cost estimates are quoted in US Dollars. For the cost estimates of this study, the exchange rate of the Japanese Yen to US\$ was 119 yen to the US\$, and the exchange rate of the Lao PDR Kips to US\$ was 10,720 Kip to the US\$, as of April 30, 2003

5.1.1 Project Costs

(1) Facilities

Based on the preliminary design, the necessary installation of mechanical and electrical equipment and civil works are planned as described previous section. For the preliminary cost estimates, the equipment and material costs are estimated considering the following cost data.

- a. Costs of the rehabilitation and expansion of Chinaimo Treatment Plant which were implemented from 1992 to 1996 by Japan's grant aid
- b. Costs of the rehabilitation of the Nake Treatment Plant in Savannakhet which were implemented from 2000 to 2003 by Japan's grant aid
- c. "Price Data for Construction Cost Estimating" published in 2003 by the Economic Research Association, Japan
- d. Quoted Prices or Catalogue Prices from the manufacturers and suppliers
- e. Standard prices and actual costs of the NPVC in 2002

For the civil works, the construction cost of each facility is estimated from the volume of excavation works and concrete requires which are calculated based on the preliminary design.

(2) Pipelines

1) General

Pipeline works of greater than the nominal diameter of 300 mm, pipeline works embedded in concrete and above ground pipeline works, e.g. on bridges etc. are to be DIP. The remaining pipelines of a diameter less than 300 mm is to be PVC pipe. For the preliminary design and cost estimates, the following conditions are applied. The basis of the cost estimates are the same as the cost data for the facilities mentioned above.

2) Conditions for Cost Estimates

Materials

DIP is a cement mortar lined ductile iron pipe used for straight pipes, with fittings lined with epoxy resin and is manufactured to conform with Japanese Standard JIS G5526 "Ductile iron pipes", class D3 of K type. The PVC pipe used is pressure pipe capable of an internal pressure of 1.0 MP to ISO 4422 ". Pipes and fittings are made of unplasticized polyvinyl chloride (PVC-U) for water supply and are available in the Lao PDR.

Installation Works

For the installation of pipelines, the following works are taken into account.

- a. civil works including excavations, backfilling, bedding, side slope protection and restoration
- b. installation works including placing, jointing and pipe cutting

(3) House Connection

The installation cost of house connection is based on the number of house connections in an average year. The unit price of the installation of house connections is obtained from the past actual installation costs by the NPVC including the costs of saddles, service pipes, stop valves and water meters.

(4) Unaccounted-for Water Reduction

The costs for the unaccounted-for water reduction takes into account the following.

- a. Leakage repair in the main pipelines of visible and invisible leakages
- b. Leakage repair from the branch to the house connection of visible and invisible leakages
- c. Implementation of house connection pipe repair installed before 2004
- d. Routine replacement of water meters installed before 2004
- e. Installation of valves for isolation and step test
- f. District meter installation

(5) Other Costs

1) Consulting Services

The costs of the consulting services including detailed design, assistance for tendering and construction supervision are estimated as 7 % of the construction costs.

2) Contingency

The physical contingency cost is estimated as 10 % of the total costs of the construction cost and consulting services' cost. The price contingency cost is estimated as 3 % per annum of the total costs of the construction cost, consulting services' cost and physical contingency cost.

3) Administration

The administration cost is estimated as 5 % of the total costs of the construction cost, consulting services' cost and contingency costs.

5.1.2 Operation and Maintenance Costs

The operation and maintenance costs are estimated for the existing facilities and the facilities developed by the 1st stage of the project. From 2009, when the daily average water demand will exceed the supply capacity of the treatment plants, 140,000 m³/day, the operation and maintenance costs after 2009 are assumed to be the same costs in 2009. The method of estimating the operation and maintenance costs are outlined below.

(1) Electricity Cost

The electricity cost of each facility i.e. the existing and expanded Kaolieo Treatment Plant, the existing and improved Chinaimo Treatment Plant and the booster pumping stations was estimated from the electrical consumption (kWh) of the mechanical and electrical equipment. The unit price of the electricity charge used for the preliminary cost estimates is 400 Kip/kWh.

(2) Chemical Cost

The chemical costs of alum, polymer and hypo for the Kaolieo and Chinaimo Treatment Plants were estimated based on the actual average dosage rate over the past 20 years of the Chinaimo Treatment Plant and the chemical dosage plan of the Kaolieo Treatment Plant as described in Annex 25 in more detail. Table 51-1 shows the unit price and the average dosage rates of the chemicals.

Table 51-1 Unit Prices and Average Dosage Rates of Chemicals

Chemicals	Unit Price	Average Dosage Rate	
		Chinaimo Plant	Kaolieo Plant
Alum	2,222 Kip/kg	22 mg/l	25 mg/l
Polymer	81,320 Kip/kg	0.02 mg/l	0.03 mg/l
Hypo	15,447 Kip/kg	1.5 mg/l	2.0 mg/l

(3) Salary

The cost of salaries is divided into the three categories of treatment plants, meter readers and administration/engineering. The estimate of the salaries for the treatment plants is based on the existing number of staff and the proposed number of staff for the expanded Kaolieo Treatment Plant.

The salary for meter readers is based on the number of house connections and the salary of administration/engineering staff is based on the served population. The average salary per capita is estimated at 65 US\$/month based on the actual personnel costs in 2002.

(4) Others

Operation and maintenance costs other than the electrical, chemical and salary costs are estimated from the actual expenses in 2002 with the increase of house connections. In 2002 these other cost was about 15% of the total operation and maintenance costs.

(5) Human Resource Development

The costs for human resource development are estimated at the 5% of the personnel cost, utilised for human resource development according to the 2002 data of the NPVC expenses. Although a lot of projects by the AFD, JICA, ADB etc, for the human resource development are implemented and planned, only the personnel costs of the NPVC are considered in the cost estimates of this study.

5.2 Preliminary Cost Estimates

5.2.1 Project Costs

Table 52-1 Project Costs for the 1st Stage (x 1,000 US\$)

	Total	Foreign	Local
A. Priority Projects by JICA Study			
A1. Construction Cost	20,312	13,341	6,971
A1.1 Rehabilitation of Kaolieo T.P.	3,024	2,217	806
A1.2 Improvement of Chinaimo T.P.	2,433	1,428	1,004
Reservoir with Pumping Facilities	1,841	902	939
Electrical and Other Facilities	592	526	66
A1.3 Expansion of Kaolieo T.P.	9,625	5,723	3,902
Construction of Intake Facility	2,002	1,365	637
Construction of Treatment Facility	3,193	1,521	1,672
Construction of Distribution Facility	2,085	1,021	1,065
Electrical and Other Facilities	2,345	1,817	528
A1.4 Improvement of Km6 BP Station	736	634	102
A1.5 Installation of Transmission Mains	1,211	970	240
A1.6 Installation of Distribution Mains	3,285	2,369	916
A2. Consulting Services, D/D and S/V	7% 1,422	934	488
A3. Contingencies	4,637	3,064	1,573
A3.1 Physical Contingency = (1.+ 2.)× (10)%	2,173	1,427	746
A3.2 Price Contingency = (1.+ 2. + 3.1)×rate ^{2004~} (3)%	2,463	1,637	827
A4. Administration Cost = (1.+ 2. +3.)× 5%	1,319	0	1,319
Total Project Costs for A = (1.+ 2. +3. +4.)	27,689	17,339	10,350
B. Other Projects			
B1. Construction Cost	5,711	4,107	1,604
B1.1 Installation of Distribution Mains	3,108	2,325	783
B1.2 Secondary & Tirtially Distribution Mains	606	510	96
B1.3 House Connection Installation	752	620	132
B1.4 Unaccounted-for Water Reduction	1,245	652	593
B2. Consulting Services, D/D and S/V	7% 400	287	112
B3. Contingencies	1,214	877	337
B3.1 Physical Contingency = (1.+ 2.)× (10)%	611	439	172
B3.2 Price Contingency = (1.+ 2. + 3.1)×rate ^{2004~} (3)%	603	437	165
B4. Administration Cost = (1.+ 2. +3.)× 5%	366	0	366
Total Project Costs for B = (1.+ 2. +3. +4.)	7,691	5,271	2,420

**Table 52-2 Project Costs of the Priority Projects selected
for the JICA Study (x 1,000 US\$)**

	Total	Foreign	Local
1. Construction Cost	20,312	13,341	6,971
1.1 Rehabilitation of Kaolieo T.P.	3,024	2,217	806
1.2 Improvement of Chinaimo T.P.	2,433	1,428	1,004
Reservoir with Pumping Facilities	1,841	902	939
Electrical and Other Facilities	592	526	66
1.3 Expansion of Kaolieo T.P.	9,625	5,723	3,902
Construction of Intake Facility	2,002	1,365	637
Construction of Treatment Facility	3,193	1,521	1,672
Construction of Distribution Facility	2,085	1,021	1,065
Electrical and Other Facilities	2,345	1,817	528
1.4 Improvement of Km6 BP Station	736	634	102
1.5 Installation of Transmission Mains	1,211	970	240
1.6 Installation of Distribution Mains	3,285	2,369	916
2. Consulting Services, D/D and S/V 7%	1,422	934	488
Total Project Costs = (1.+ 2.)	21,734	14,275	7,459

5.2.2 Operation and Maintenance Costs

Table 52-3 Operation and Maintenance Cost for the 1st Stage (x 1,000 US\$)

	2004			2005			2006			2007			2008			2009		
	Sub Total	Foreign	Local	Sub Total	Foreign	Local	Sub Total	Foreign	Local	Sub Total	Foreign	Local	Sub Total	Foreign	Local	Sub Total	Foreign	Local
C. Operation & Maintenance and Human Resource Development Costs,																		
C1. Operation and Maintenance Cost	1,504	306	1,198	1,526	306	1,220	1,560	306	1,254	1,728	329	1,399	2,033	393	1,640	2,108	407	1,701
C1.1 Electricity	625		625	625		625	625		625	712		712	919		919	946		946
Existing Kaolieo T.P.	174		174	174		174	174		174	165		165	153		153	158		158
Expanded Kaolieo T.P.										72		72	225		225	233		233
Existing Chinaimo T.P.	377		377	377		377	377		377	320		320	215		215	222		222
Improved Chinaimo T.P.										59		59	184		184	190		190
Existing Booster Pump Station	74		74	74		74	74		74	69		69	60		60	60		60
Improved Booster Pump Station										28		28	83		83	83		83
C1.2 Chemical Cost	306	306		306	306		306	306		329	329		393	393		407	407	
Existing Kaolieo T.P.	71	71		71	71		71	71		67	67		62	62		64	64	
Alum	46	46		46	46		46	46		43	43		40	40		42	42	
Polymer	2	2		2	2		2	2		2	2		2	2		2	2	
Chlorine	23	23		23	23		23	23		22	22		20	20		21	21	
Expanded Kaolieo T.P.										40	40		125	125		129	129	
Alum										26	26		80	80		83	83	
Polymer										1	1		4	4		4	4	
Chlorine										13	13		41	41		42	42	
Existing Chinaimo T.P.	235	235		235	235		235	235		222	222		206	206		213	213	
Alum	163	163		163	163		163	163		154	154		143	143		148	148	
Polymer	4	4		4	4		4	4		4	4		4	4		4	4	
Chlorine	68	68		68	68		68	68		64	64		59	59		61	61	
C1.3 Salary	261		261	271		271	285		285	303		303	317		317	332		332
Treatment Plant	54		54	54		54	54		54	58		58	58		58	58		58
Existing Kaolieo T.P.	27		27	27		27	27		27	27		27	27		27	27		27
Expanded Kaolieo T.P.										4		4	4		4	4		4
Existing Chinaimo T.P.	27		27	27		27	27		27	27		27	27		27	27		27
Meter Reader	35		35	37		37	39		39	42		42	44		44	47		47
Administration/Engineering	172		172	180		180	192		192	203		203	215		215	227		227
C1.4 Others	312		312	324		324	344		344	384		384	404		404	423		423
C2. Human Resource Development	11		11	12		12	13		13	17		17	17		17	17		17
Total Costs for C	1,515	306	1,209	1,538	306	1,232	1,573	306	1,267	1,745	329	1,416	2,050	393	1,657	2,125	407	1,718

