

CHAPTER 4

STRENGTHENING

OF INSTITUTIONAL CAPACITY

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4.1 Project Implementation

The water shortage situation in Vientiane will worsen year by year. Therefore, it is strongly recommended to implement the priority projects as recommended in the Feasibility Study. The Laos PDR side is recommended to initiate budgetary arrangements to finance the project implementation.

For the implementation of the projects, it is recommended to establish a Project Implementation Unit (PIU) consisting of representatives from the WASA, DHUP, MCTPC, NPVC and DCTPC for the smooth implementation of the project. Many subjects such as budgetary arrangements, approval of construction or pipe installations, approval of raw water intake, and traffic control during construction, etc., should be managed and coordinated from among the government agencies concerned. For such management and coordination, the PIU will act as an effective organisation.

4.2 Operation and Maintenance

4.2.1 General

The Strengthening of the capacity of the organisation to deal with O&M tasks will not only depend on the availability of finance but on correct staffing levels, transport and equipment and also on the attitude of management and the workforce to address the task in hand. O&M improvement is starting from a current level and everyone will require motivating if rapid improvements are to take place.

4.2.2 Water Treatment Plant

Based on the results of investigations at the existing treatment plants, technicians and workers are doing there O&M tasks satisfactorily. However, lack of coordination among several sections in the treatment plants is one of the problems in the area of O&M. For instance, the water quality laboratory examines the raw water quality to determine the chemical dosage rate, however, the decided chemical dosage rate is not referred to by workers for chemical dosing. The chemical dosing amount should be decided by the dosing rate and the quantity of raw water, however, the sections which require this information of the quantity of raw water are not informed.

Data recording is done by the staff assigned on a daily basis, however, the records are not checked by a designated, qualified person. Some data shows that the amount of distributed water exceeds the amount of treated water.

Although individual staff are doing a good job, the function of the treatment plants are not effective because of a lack of overall coordination among the sections of the treatment plants. The role of coordination by higher level management structures than technicians or workers, such as at the engineer level or manager level is very important. Capacity development or training programs are discussed in the following Chapter 4.5.

Furthermore, maintenance work seems to be conducted in an allopathic manner. Maintenance tasks are not usually initiated until the equipment has broken down or there is a desperate need for maintenance. However, equipment usually requires periodical maintenance, such as lubrication, which helps to prevent malfunction.

The engineer or manager level staff should prepare periodical maintenance schedules for the required frequency such as daily, monthly, and yearly maintenance work.

4.2.3 Water Quality

An operational plan must be developed by the laboratory technologist to effectively control, monitor, and record all water quality procedures. A detailed plan must be drawn up by the laboratory technologist for approval by the chemist and cover raw and treated water from all water sources, samples from clear water tanks and reservoirs, and the distribution system. Tests should cover physical and chemical analysis, bacteriological testing and chlorine residual at the laboratory.

At the existing Chinaimo Treatment Plant, water quality analysis is conducted on a daily basis and the results are recorded satisfactorily. However, water quality analysis on distributed water is not sufficient. The NPVC is recommended to select several fixed points within the distribution system for monitoring residual chlorine and other necessary water quality indexes. These results should be disclosed to customers so they are aware of the safety of the distributed water.

These fixed points for water quality monitoring mentioned above will also utilize pressure monitoring points which are discussed below.

4.2.4 Water Transmission

Independent water transmission systems from connected distribution pipelines will be established after the completion of improvement works at the existing Chinaimo Treatment Plant. Water from the Chinaimo Treatment Plant will be transmitted through an independent transmission line to the far north end of the service area. Hourly fluctuations of water levels of reservoirs including elevated tanks should be recorded and this information should be relayed to the operators of the transmission pumps. The operators of the transmission pumps will be able to operate pumps to secure water transmission to northern area by referring to the data of the water level fluctuation and pressure and flow quantity at the outlet of the pumps.

Based on the water level fluctuation data, valve adjustment will also be required. When comparing the water level pattern at the respective reservoirs, the valves on pipes should be adjusted, closing the valve on the pipeline to always fulfilled reservoir or open the valve on pipeline to always low water level reservoir.

4.2.5 Water Distribution

The most important task for the water distribution section is for the reduction of unaccounted-for water. The reduction of the unaccounted-for water entails the finding and repair of leakages and the prevention of leakage.

Upon completion of the priority project, it is apparent that water pressure in the distribution system will increase significantly. Therefore, it is apprehensive of increasing unaccounted-for water ratio. On the other hand, increased pressure will help the NPVC to identify the locations of the leakage points. Currently, underground leakages are very difficult to find from the ground surface.

It is recommend to increase staff levels for leakage detection and repair and to stock leakage repair material required before completion of the priority project.

To prevent leakage, pressure control in the distribution system is indispensable. To conduct pressure control, the NPVC should know the pressure distribution in the service area. It is recommended to establish fixed pressure monitoring points at the same locations as the water quality monitoring

points and pressures should be measured periodically. Based on the pressure records from these fixed monitoring points, valve adjustments should be conducted to avoid extreme high pressure and to stabilize pressure distribution in the service area.

4.3 Water Conservation and Water Demand Management

4.3.1 Water Conservation and Water Demand Management

(1) Significance of Water Conservation and Water Demand Management

In the household survey carried out by the JICA study team, 22.7 % of households served by the public water supply service replied that they have pipe and tap defects in their house/yard. The respondents said that they would leave leakages to be repaired by the NPVC. It also revealed the common practice of households having connections to the public water supply shared and supplied water to their neighbors. The results of the survey showed that 20.0% of households not having a water supply connection obtained the water from public service in that way. The percentage became much higher (40%-60% of households) in households not having a water supply connection in their house, obtain water from the public supply service from neighbors' houses where the public water supply service is available. These factors might be contributing to relatively higher consumption per capita per day of 174 liters in Vientiane Capital City.

On the other hand, analysis of the water use by non-domestic users shows that 44% of total consumption in Vientiane Capital City is by this group. Further analysis was made by the JICA study team on water consumption by non-domestic users, categorizing them into 11 groups by the characteristics of business and institution (See Annex 26). The study revealed that the overall top fifty non-domestic users, of which number accounts only for 1% of the total of non-domestic users, consume 43% of the total non-domestic water consumption.

Furthermore, it shall be noted that “the Leak Detection Campaign and Reduction Unaccounted-for Water of Nam Papa Vientiane Capital City” mentioned that the losses in terms of volume of unaccounted-for water represented about 30% of the water transmitted to the distribution network.

A projection has been made that in the near future, the capacity of water supply system cannot satisfy the increasing demand of the city, with rapid population and industries growth being significant factors in the increased demand. The options for further augmentation of the water supply by developing physical infrastructures are limited, taking into consideration the time and cost

consuming factors.

In the master plan, the augmentation of the water supply by improvement of the infrastructure is planned, and priority projects are selected. However, it is projected that even the consecutive implementation of the projects will not satisfy the increasing demand in Vientiane Capital City. This is due to multiple factors and variables such as growing population, expansion of served areas, time lag between construction and supply, and so forth. Therefore, the problem of water availability can be solved by using an appropriate mix of supply- and demand- side measures.

Attention must be devoted to managing the increasing demand for water and to achieve a sustainable long-term balance between water availability and water requirement in an equitable manner. Thus, water conservation and water demand management should be given great significance for the water supply in Vientiane Capital City.

(2) Benefit of Water Conservation and Water Demand Management

It has been demonstrated in many countries that saving water rather than the development of new sources is often the best 'next' source of water, both from an economic and from an environmental point of view. It has often been seen that the real cost of water per cubic meter in second and third generation projects in some cities has doubled between a first and the second project and then doubled again between the second and third. Water demand management therefore is seen as the preferred alternative to meet increasing water demand and can be defined as a strategy to improve the efficiency and sustainable use of water resources taking into consideration the economic, social, and environmental factors.

(3) Water Demand Management Method

A PCM (Project Cycle Management) workshop was held on 1st and 2nd of October 2003, to identify and analyze the problems relating to water demand management and water conservation. This workshop was attended by the various stakeholders in a participatory and logical manner. Several problems were identified and their causes were duly analyzed in the form of a problem tree developed by the participants. The analyses made were utilized for the formation of a comprehensive action plan for the NVP to utilize for water demand management and water conservation.

The comprehensive program for water demand management includes software and hardware components. The major measure for demand management can be further divided into; 1) water conservation measures, 2) water pricing measures, 3) information and education measures, and 4)

legal measures. These main measures involve several sub-measures or methods, as follows:

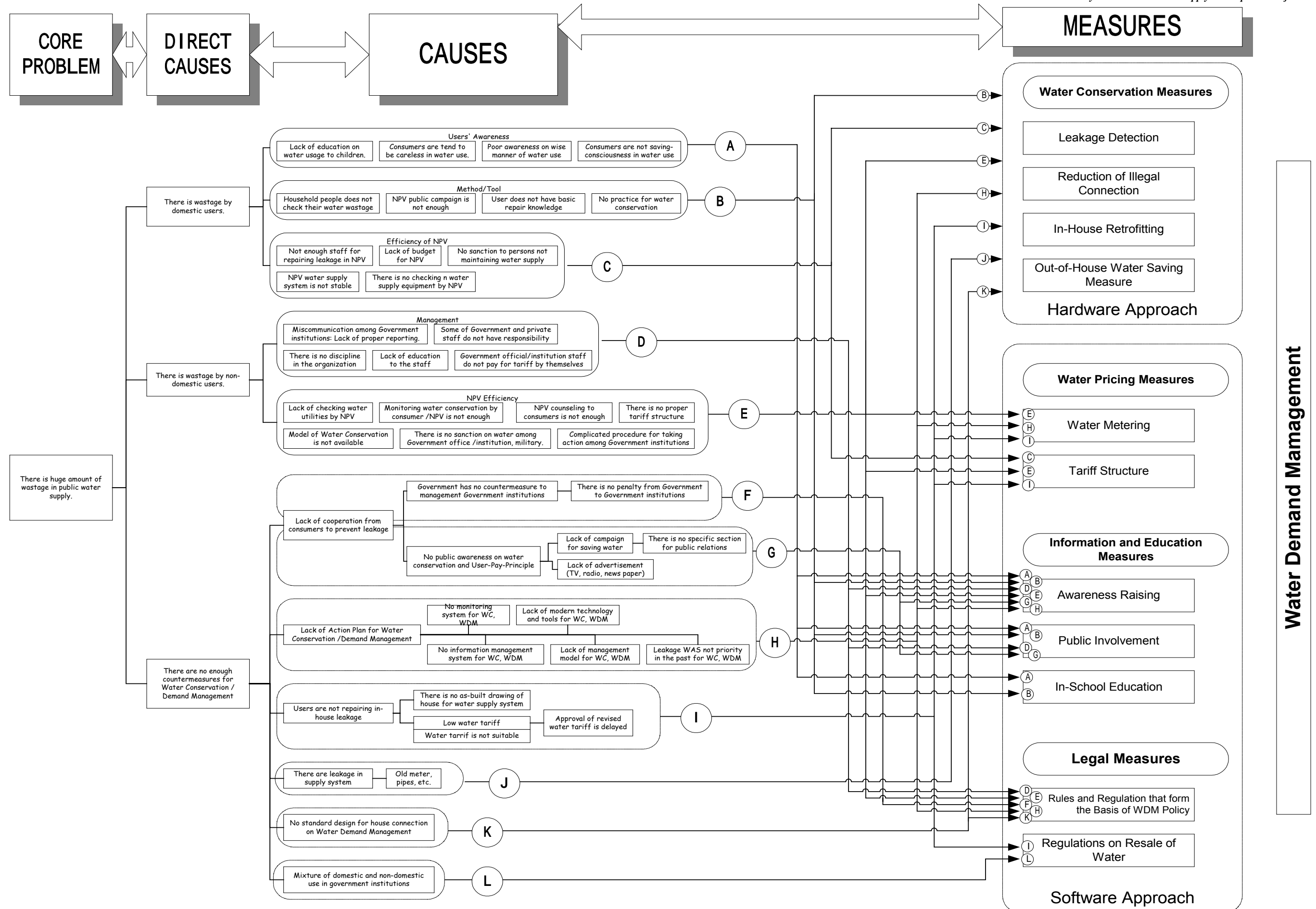
1. Water conservation measures, which includes 1) leakage detection, 2) reduction of illegal connections, 3) in-house retrofitting, 4) out-of-house water saving measures.
2. Water pricing measures, which involve 1) water metering, 2) tariff structure.
3. Information and education measures, which includes 1) awareness raising, 2) public involvement, 3) in-school education.
4. Legal measures, which includes 1) rules and regulations that form the basis of the WDM policy, 2) regulations on the resale of water

Followed by the PCM workshop, the meeting among counterpart staff of implementing agency and JICA study team was held to formulate the effective and efficient strategy and plan for water conservation and water demand management. Based on the problem tree developed in the PCM workshop, causes attributing to the wastage in the public water supply were categorized by “cause-effect” branches. Then, the countermeasures for those causes of the problem were identified by applying the four main measures and sub-measures described above together with counterpart staff and JICA study team (See Figure 43-1).

Many constraints have been identified as contributing to, or causing poor performance in water demand management and increasing the level of water loss and unaccounted-for water. These range from poor organizational structures in the service provider, lack of equipment, inappropriate technology, lack of trained staff, absence of career opportunities, insufficient funds, inadequate legal framework problems, lack of motivation by sector personnel, non-involvement of the users, the low profile of actions addressing the optimization of services including leakage control, inadequate tariff and collection systems and negative political interference. This is the reason why water demand management shall be an integral part of the water resource and water service planning process.

Thus, planning, implementation and monitoring of water demand management shall be comprehensively incorporated into a longer-term development plan. While a comprehensive plan for water conservation and water demand management is developed by the NPVC through the PCM workshop and consecutive meetings as shown in Annex 27, in this section, immediate attention and suggestions on the introduction of some important and progressive measures to be taken by the service provider are emphasized as followed. The introduction of a hardware approach, such as leakage detection and detection of illegal connection will be further explained in the following section in conjunction with the issues relating to the reduction of unaccounted-for water (UFW).

Figure 43-1 Correlation between “cause – effect” branches and Measures



1) Introduction of Pricing Measures

One of the most effective measures for water demand management could be water pricing measures, with an introduction of a progressive block tariff system or increasing the tariff system as is extensively discussed in the following chapters. However, it can be emphasized that water pricing measures may only be effective in combination with an extensive awareness raising program. Furthermore, the success and effectiveness of pricing measures is largely reliant on the commitment of the service provider (NPVC) to improve the degree of service and the mutual understanding between the provider and user for their individual responsibilities.

It should also be noted that the effects of this system can be adverse for the urban poor in specific circumstances. As was explained before, relatively large numbers of households (20%) not owning house connections obtained water from the public supply service from their neighbors. With this resale, the neighbor will end up in a higher tariff bracket and will adapt the price for the neighbors. This means that because the original buyer of the water is in a higher tariff, they are paying more for their water, and this increased cost is being passed on to the second purchaser. It would be cheaper for both households to be connected to the public system. Thus, consumers should be notified and made aware of this pricing disparity. There is also a need to encourage households not owning connections to join the public service to have their own connections, and hence save money.

2) Introduction of Information and Education Measures

(a) Public Involvement

A successful water demand management program depends a lot on the involvement of consumers in the planning, implementation, and monitoring. The need for demand control will be more easily understood and supported by local leaders and large non-domestic consumers, or it may not function effectively. Conditions or problems of concern in respect of both consumers and the provider shall be exchanged in workshops and incorporated into a program in a comprehensive manner.

It is recommended that the NPVC form a formal advisory group, which will develop a program that can be presented to the general public. The following is a list of members recommended for the establishment of the advisory committee.

- Elected or appointed officials from all jurisdictions immediately affected by the process; from various government levels.
- Staff from the WASA/NPVC
- Representatives of major local interest groups – major industries (large non-domestic users), community group leaders, government institutes, military, and so forth

- Representatives of major community forces – schools, local unions, local press and media owners
- Local professionals with credibility, such as economists, engineers etc.

(b) Raising Awareness

Awareness issues should be emphasized when dealing with the pricing of water and its socio-economic aspects. In any issue of public policy, the public is more likely to accept difficult decision like the introduction of progressive tariff structures if it is well aware of the commitment and effort of the service provider for the provision of better services in a cost effective way.

The household survey conducted by JICA study team revealed that only 8.0% of households owning household connections to the public water supply service responded that the NPVC is the jurisdiction institute for water supply. It is also observed that merely 38.7% of households connected were aware of the user-pay-principle in the management, operation and maintenance of the public water supply service. Furthermore, 23.0% of households owning connections answered that they have in-house/yard leakages, and among them, 64.7% of household perceived that repair of in-house/yard leakage is the responsibility of the NPVC. Thus, it is indispensable the for service provider to commit itself to the provision of improved services and widely express their commitment to the public in a convincing manner. The specific needs and opportunities are identified for increased public awareness in the following areas:

- NPVC's commitment to the management, operation and maintenance of the public water supply service
- User-Pay-Principle in the management, operation and maintenance of public water supply service
- NPVC's effort to provide safe water (improved water quality)
- Understanding on the issue of water as a common and vital necessity for life, but emphasis on the fact that water is a limited resource

(c) Public education for water demand management / water conservation

Public education is certainly one of the most important instruments for achieving a successful campaign for water demand management. It is suggested to implement public education in the following steps:

- Distribute conservation literature along with the regular mailing of bills. An excellent time to provide this information to consumers is just prior to the summer season when water demand

normally peaks.

- Promote water conservation benefits and techniques through local newspaper articles, radio and television public service announcements, information centers at local fairs and shopping centers, and public displays or exhibits.
- Seek the cooperation of local school officials in initiating a program of water education activities.
- Sponsor water conservation posters, slogans, essays, or exhibit contents for children within the service area.
- Initiate a water conservation program at high-use facilities such as commercial businesses, government institutions, military centres, schools and colleges, hotels, and hospitals etc., with the dissemination of water conservation literature.
- Promote a campaign of household leak detection. Provide leak detection tips and establish a telephone contact number for a customer relation officer for leak detection on billing cards. Direct meter readers to inform customers with unusually high recorded usage rates to check for household water leaks.
- Purchase promotional materials (i.e. buttons, bumper stickers, Tee-shirts) encouraging water conservation for distribution throughout the service area or community.
- Conduct public tours of water treatment plants, reservoirs, pumping stations, and other related facilities.
- Conduct a workshop for plumbers, plumbing fixture suppliers, builders, and major water users to discuss the benefit of water conservation by using water-saving plumbing fixtures.
- Meet with major water users to formulate demand management plans for their facilities.

In a very real sense, therefore, a well-informed public is true public good, which can promote public policy objectives like water demand management, adequate pricing policies and the necessary support for politicians having to take controversial economic decision.

Public education is a fundamental method of influencing political opinion. A frequently expressed constraint to adopting water demand management approaches is that the political will to implement these approaches is lacking. This is particularly the case when proposals are made for increasing water prices. These are frequently opposed on the basis that they are politically unacceptable. Demand management solutions tend to be quite efficient economically, and accordingly, tend to save large amounts of money, sometimes over short periods of time. Also they tend to stretch available resources over a larger project. Once those basic facts are understood, the probability of public and political acceptance is increased.

3) Introduction of Legal Measures

It has been observed that there is huge amount of loss and wastage of water, particularly by government institutions, which, in many cases, ignore the water bills charged. In these circumstances, the water loss is amplified by a lack of awareness of water conservation. Disconnection of supply is often hampered by political will. Thus, there is need to formulate governmental regulations that form the basis of water demand management and water conservation, in particular, for government institutions, over the long term.

Disclosure of information for the general public is also an effective measure to change the political will. Information on the amount consumed by governmental institution can be disseminated to the public by distribution of the annual report of the water service provider and/or by local media along with the message relating to water conservation. This forms social pressure and eventually shifts the political will.

4) Re-Clarification of Domestic and Non-Domestic Use in Governmental Institutions

It is realized that some governmental institutions, which are categorized as non-domestic user, distribute large quantities of water provided for staff accommodations in residential areas. The water bill charged to those governmental institution amounts to large sums, and those institutions tend to accumulate the arrears. It is also assumed that officers in those governmental residential areas are not water-saving consciousness consumers, since many government institutions have a policy to subsidize their water bills and so the consumer lacks the will to save water.

Thus, re-classification of domestic and non-domestic use of water in government organizations should be made, and the use of water in their provided accommodation should be regarded as domestic use. It should be followed with the introduction of individual meter reading and billing system, whether or not those bills are subsidized by the governmental institutions. Regular procedures such as disconnection of services should be taken in these circumstances if unacceptable arrears are observed, which can also effect as pressure for the government organization to pay the bill in case they are subsidizing the bills.

4.3.2 Reduction of Unaccounted-for Water (UFW)

Reduction of unaccounted-for water (UFW) is the most acute, and should be the first priority action within a water demand management strategy. The level of UFW reaches 30% in the NPVC's service area, UFW being defined as the difference between the total volume of inflow to the distribution

system and the sum of water volume measured by individual water meters in the distributed area. Thus, the demand management strategy, which includes reduction of UFW, shall be an integral component of the NPVC's goal.

In 2002, the Government of Lao PDR and the French Development Agency (AFD) implemented the program for Leak Detection Campaign and Reduction of Unaccounted-for Water, which duly formed the two-year action plan for reduction of UFW. The action plan concluded that it is possible to reduce the ratio of UFW down to 25% by the end of 2004, provided that following conditions are effectively implemented:

- a) Implementation of various sub-projects aiming for a reduction of physical and commercial losses (including metering loss).
- b) Institutional strengthening of the NPVC including these various components of the organization: a more adapted organization, improvement of the management information system (including the billing system), improved monitoring, staff training and greater responsibility.

In addition, procurement of equipment and tools for leakage detection, and the procurement and installation of district meters are also planned in the two-year action plan. The two-year plan is regarded as a preparatory plan to put the UFW reduction works carried out by the NPVC on track, which have to be further developed into a long-term plan.

It is anticipated that the UFW level may actually increase, due to the staged pressure increase which will be caused by the implementation of subsequent stages of the project until the target year, 2015 planned in the master plan. Thus, it is required that the long-term plan for the reduction of UFW shall be deliberated and incorporated into the master plan as a responsibility of the NPVC, taking into consideration the planned work progress of the project in the master plan. The following staged actions are recommended.

(1) 1st Stage (from the present to 2007)

- Visible leakage repairs (main and service pipes to house connections)
- Zoning and installation of direct meters (in pilot zones and newly formed zones)
- Replacement of defective water meters

(2) 2nd Stage (2008 to 2012)

- Invisible leakage repairs (main and service pipes to house connections) detected by the district metering, waste water metering, the Step Test, and use of technical testing and equipment

- Zoning and installation of district meters (in the zones newly formed by the 2nd Stage)
- Replacement of defective water meters

(3) 3rd Stage (2013 to 2015)

- Invisible leakage repair, detected by the district metering, waste water metering, the Step Test, and use of technical testing and equipment
- Zoning and installation of district meters (in zones newly formed by the 3rd Stage)

In the process for the reduction of UFW, detection of illegal connections shall be also emphasized, assuming the there are numbers of illegal connections which contribute to a higher ratio of UFW. Detection can be possible by applying the methods widely used for detection of water loss such as District Metering, Waste Metering, and Step Test as described above.

Taking into account the situation, development stages, and repair works mentioned above, the UFW ration is estimated to be 25 % by year 2015.

4.3.3 Customer Services and Public Relations

The public water supply service will become viable and sustainable when the level of mutual confidence and cooperation is increased between the service provider and consumers. This can be achieved by the service provider committing itself to an improvement in service quality, and consumers placing a higher value on the services provided and utilizing the service in a responsible manner.

Having no specific section for customer service and public relations, the NPVC is hindered in its attempts to improve its customer services and public relations. Improvement of customer service and public relations are considerably indispensable to increase awareness and cooperation of customers in water supply service, in particular when some crucial actions such as pricing measures and the campaign for water conservation and water demand control are taken into account. Disclosure of information, such as financial status and how the revenue collected is utilized, by media and the publication of an annual report, is another measure to increase the transparency of the service provider, thus increasing users' awareness and cooperation. Mitigation of users' dissatisfactions and claims will also contribute to convincing consumers of the genuine desire of the NPVC to be committed to a sincere relationship between the NPVC and consumers.

It should be noted that the degree of users' satisfaction found in the household survey, which was conducted by JICA study team fluctuates depending on the aspects surveyed. Dissatisfaction is concentrated on the "manner in which defects are repaired (45.3%)", followed by the "manner of public relations (41.3%)", "water quality (36.0%)", "manner of notice (32.0%)", and "quantity and pressure (32.0%)", in the management and operation field. These complaints should be solved with the highest priority in order to build mutual confidence between service provider and the consumers.

Among users' dissatisfactions, manners in which defects are repaired and how claims are treated should be regarded as a management/operation field for priority improvement. A staged list of activities should be implemented by the NPVC, as follows;

- 1) Establish a database of complains,
- 2) Categorize the location of claims,
- 3) Analyze the causes of claims,
- 4) Explain the causes to users,
- 5) Develop staged plans (countermeasures, budgets, time schedules) for improvement,
- 6) Promote the plan to consumers,
- 7) Implement the plan, and,
- 8) Monitor and evaluate the plan.

For improvement in the manner of public relations and notices, a committee or taskforce specializing in publicity should be established in the NPVC at the first stage. It is recommended to include members from civic organizations, other public service providers, and experts/consultant in the field for the full consideration and diversification of possible approaches. Along with the implementation of the plan to mediate the claims and complains explained earlier, the committee/taskforce should develop a strategy for publicity. The main task of the committee should correspond to users' demands for what they want to know.

In the household survey, it is revealed that a high percentage of users expressed concerns about the accountability of the service provider in "how the water rate is decided" (86.7%), followed by "how the water rates collected are utilized" (54.7%). Other concerns concentrated on "water quality control" (48.0%) and, "what is water source and how water is transmitted, treated, and distributed" (40.0%). A publicity package should be developed taking into consideration the users' interests in management. The publicity should utilize a selection of media such as local newspaper, radio, TV (infomercial).

The specific needs and requirements for an improvement of the public relations for water conservation and water demand management is described in detail in 4.3.1 Water Conservation and Demand Management, 2) Introduction of Information and Education. These countermeasures entail the strengthening of public relation for water conservation and water demand control, such as (a) public involvement, (b) raising awareness, (c) public education for water demand control/water conservation, and were developed together with counterparts from the WASA/NPVC and JICA Study Team. The countermeasures were based on the analysis made with various stakeholders in the PCM (Project Cycle Management) workshop.

The detailed strategies and action plans for these countermeasures are further incorporated into “NPVC Challenges for Water Conservation/Water Demand Management” (See Volume V, Annex 27).

It shall be repeatedly emphasized, however, that the improvement of public relations, where information flows are often one sided from the service provider to consumers, alone can not increase user awareness and responsibility in water supply service, without provision of improved service, such as swift response and the action of the service provider to process the claims and suggestions of customers. It can be said that mutual communication between the service provider and consumers ensures mutual confidence and cooperation, as mentioned previously.

4.3.4 NPVC Challenges for Water Conservation/Water Demand Management

Based on the results of studies concerning water conservation/water demand management (WC/WDM) as described in the previous sections, the counterparts of the Study, from WASA and NPVC, prepared a report “NPVC Challenges for Water Conservation/Water Demand Management”. The report is included in Annex 27.

The report includes detailed strategies and action plans for WC/WDM and contents of the report are as follows:

NPVC Challenges for Water Conservation/Water Demand Management

1. General Introduction of Economical Water Use and Water Management
2. Current Status of Water Use in Vientiane Capital City
 - 2.1 Water Consumption of Households, Stage Administrative Authorities and Institutions
 - 2.2 Water Consumption of State Administrative Authorities and Institutions

- 2.3 Per Capita Water Consumption
- 3. Current Status of Customer Relations
 - 3.1 Types of Claims Made By Customers to the NPVC
 - 3.2 Recommendations of the NPVC against Claims Made by Customers
- 4. Current Structure of Water Tariff
 - 4.1 Current Structure of Water Tariff
 - 4.2 Comparison of Water Tariff
 - 4.3 Comments of Clients on Water Tariff
- 5. NPVC Challenges for Water Conservation/Water Demand Management
 - 5.1 Engineering Overview
 - 5.2 Water Quality in the Future
 - 5.3 Water Tariff
 - 5.4 Sound Promotion and Customer Relations

In the Chapter 5, actions which will be taken by the NPVC is also described and these actions are as follows:

- Definition of Targets for WC/WDM
- Transparency to Customers
- Annual Report of the NPVC
- Competition of Posters at Primary School
- Building Participatory Awareness on WC/WDM in State Administrative Authorities and Institutions
- Regulations for Consumers in Institutions and State Authorities

4.4 Effective Billing System

The following nine items are recommendations proposed in the Master Plan relating to the improvement of the billing practices of the NPVC.

- 1) Place top priority on domestic customers
- 2) Complete a process management plan
- 3) Review the tasks of meter readers
- 4) Regular meter reading by fixed dates
- 5) Special zoning systems are to be reconsidered
- 6) The option for bill payment at banks, etc.
- 7) Outsourcing of meter reading and bill collection
- 8) Setting of an internal inspection system
- 9) The aim is to collect 100 % of all bills submitted to consumers

In order to fulfill performance targets by the introduction of improvement plans, the following systems are useful measures to adopt. The ultimate purpose of the billing system is to provide a better water supply service to the satisfaction of all customers, and to provide a water rate that is compensation to the cost of provision of the water service to customers.

1) Place top priority on domestic customers

Of the customer base of the NPVC, domestic customers accounts for 84% of connections, and 56% of the total water consumption. These figures indicate that domestic customers are the largest single consumer group of the NPVC. It is crucially important for the water supply enterprise to carry out this large quantity of business effectively and smoothly. This can be achieved by improving the business effectiveness of the NPVC as a whole, maintaining good relations with customers, and stabilizing the management of the NPVC. The NPVC should commit significant resources into this area as it is important for their future growth as an organisation.

2) Improvement of meter reading systems

- a) Decide the daily tasks for a skilled meter reader.

There are some differences in the situation of the service area between the residential, commercial, industrial, school, and various religious institutions. With the mixture of these differing classes of connections in the service area, the density of residential connections, which are the quickest to read, can vary. This means that the number of meters read on a daily basis can fluctuate markedly. From experience however, a skilled meter reader can read an average of 100-120 meters daily. It is desirable to decide the reasonable daily tasks for meter readers by comparing the tasks of similar workers in other public utilities such as the electricity supply.

- b) A meter reader's sole task is to read meters.
- c) The meter reader hands a meter reading slip (a duplicated copy from the meter reading book) to every domestic customer after he read meters.

On slip is written, the current month water consumption. If the water tariff table, which shows the rates for given consumption levels, is printed on the reverse of slip, the customers will be aware of the correct amount of money that is due for their water bill. By knowing the amount of monthly water rate, the customer will be able to prepare the payment of water rate in advance.

Nam Papa Vientiane	
Meter Reading Slip	
Month of meter reading: / 2003	
Customer No.	
Name:	Date:
This time Figure:.....m ³ (a)	Name of Meter reader
<u>Previous Figure:.....m³ (b)</u> (—	
Consumption:.....m ³ (a-b)	
* You may know the amount of water rate of the month by looking the other side of the slip (Category 1)	

C-1 Water Tariff for Domestic used (Monthly)

Consumption m3	Water rate Kip	Consumption m3	Water rate Kip	Consumption m3	Water rate Kip	Consumption m3	Water rate Kip
1	219	26	7014	51	15293	76	24868
2	438	27	7343	52	15676	77	25251
3	657	28	7672	53	16059	78	25634
4	876	29	8001	54	16442	79	26017
5	1095	30	8330	55	16825	80	26400
6	1358	31	8659	56	17208	81	26783
7	1621	32	8988	57	17591	82	27166
8	1884	33	9317	58	17974	83	27549
9	2147	34	9646	59	18357	84	27932
10	2410	35	9975	60	18740	85	28315
11	2673	36	10304	61	19123	86	28698
12	2936	37	10633	62	19506	87	29081
13	3199	38	10962	63	19889	88	29464
14	3462	39	11291	64	20272	89	29847
15	3725	40	11620	65	20655	90	30230
16	3988	41	11949	66	21038	91	30613
17	4251	42	12278	67	21421	92	30996
18	4514	43	12607	68	21804	93	31379
19	4777	44	12936	69	22187	94	31762
20	5040	45	13265	70	22570	95	32145
21	5369	46	13594	71	22953	96	32528
22	5698	47	13923	72	23336	97	32911
23	6027	48	14252	73	23719	98	33294
24	6356	49	14581	74	24102	99	33677
25	6685	50	14910	75	24485	100	34060

< 5m3	219 Kip/m3
6-20m3	263 Kip/m3
21-50m3	329 Kip/m3
51m3 <	383 Kip/m3

3) Improvement of the water rate collection system

- a) Employ staff whose specific task is the collection of monies for water rates.
- b) The rate collector visits the domestic customers to collect the money due to pay the water rate.
The collector should collect not only the bill for the current month, but also any outstanding arrears.
- c) When a rate collector visits non-domestic customers, they only present the customers the bills (or a notification of payment).
- d) A system of bank account transfer should be installed for the customers convenience to pay their bills by using bank accounts.
- e) The customers could then pay at the counter of the bank or post offices, in addition to the

offices of the NPVC.

4) Improvement of billing

- a) The Branch manager sends copies of meter reading slip to the computer center the day after meter reading.
- b) The computer center issues the bills within a few days.
- c) The bills are handed to the water rate collectors, the collectors visit all the customers and collect the water rate directly, except in the case of non-domestic customers.
- d) A quick billing and rate collection system is necessary after finishing meter reading to collect outstanding monies efficiently, thus generating a smooth cash flow for the NPVC.

5) The customer's complaints often block smooth water rate collection.

A crucial element of improving the consumers speed in paying their bills is to decrease consumers complaints about the service provided by the NPVC. Complaints include problems with water supply pressure, water availability hours, water quality, transparency of water supply management, etc. The NPVC and customers have mutual rights and obligations with water supply as both sides are parties of the water supply contract. The NPVC's duty is to provide an efficient, better water service to customers.

7) The water rate collection results to be reported to the GM.

The results of the water collection (the balance, collection efficiency rate) should be reported to the GM on a daily basis so that any issues arising from the process can be addressed immediately.

4.5 Human Resources Development

4.5.1 Increasing Training Demand in Future

(1) Increasing training demand in future

- 1) The training carried out by the NPVC is not only intended for the NPVC staff, but also for all of the staff of water supply enterprises throughout Laos. Therefore, it is necessary that the training program should systematically cover the future staffing program of the whole country's water supply development.
- 2) The trainees are selected from two groups, one is from staff currently engaged in the business of water supply and the other is from newly employed staff. The contents of the training programs for each group are different.

- 3) The training aims to upgrade the staff's necessary knowledge (basic theories and the application of that theory) and increasing the ability of staff to carry out the current their duties.
- 4) Staff training is carried out to develop and promote increased knowledge, and improve staff's ability to cope with the managerial changes such as the further modernization of facilities, improvement for efficiency and grouping of water supply facilities.
- 5) Currently, the total number of water supply technical staff employed in Laos totals 507 people in 21 water supply enterprises. According to the program 'Capacity Development of Urban Water Supply in Lao PDR' by JICA, it is estimated that staff levels will increase to 687 people, employed by 33 water supply enterprises by 2006, 1,137 people in 63 water supply enterprises by 2010, and 2,037 people employed in 123 water supply enterprises by 2020 in accordance with the projected water supply development (mainly due to an increase of the national water supply coverage ratio).
- 6) The above program indicates that there is a strong demand for staff training demand, an increase of 4 times over the next 17 years. Taking into account that staff work with the water supply enterprise for an average of 30 years, it can be projected that approximately 70 staff will leave from the water supply enterprises every year on average, and in 20 years, 100 staff will leave. This means that the water supply enterprises throughout the country will need to replace those staff and will employ nearly same number of new staff.
- 7) When it is assumed that one-third of the total staff undergoes annual training, that means that about 700 staff will undertake training nationally, except about 100 newly employed staff.
- 8) In response to the increase of staff training opportunities, the function of the training centre should be improved and strengthened. Various unified training programs will be planned and implemented by the training centre at the NPVC. Successful training will be brought about by a substantial training centre supported by the WASA.

The future training practices of the NPVC will be carried out based on the following framework and concepts.

(2) The Classification of trainees

Table 45-1 Classification of Trainees

Position	Name of Position	
Executive	General Manager (GM)	
	Deputy General Manager (DGM)	
Section Manager	Engineer	Administration
Supervisor	Engineer/Technical	×
General Staff	Engineer/Technical	Administration/Clerical

4.5.2 Staff Structure of NPVC

Staff engaged by the water supply enterprises can be classified according to their jobs, as follows.

(1) Employees jobs can be classified by divisions as follows,

- 1) Construction of facilities, and their operation and maintenance
- 2) Administration and clerical works
- 3) Labor works

(2) Employees jobs can be classified by a hierarchical structure as follows,

- 1) Executive
- 2) Management
- 3) Supervisor
- 4) General staff
- 5) Non-regular staff (contemporary, contract staff)

(3) Various jobs within a water supply enterprise

The jobs in a water supply company are classified into the following two divisions. The training is usually carried out according to the classified groups of jobs as follows.

1) Divisions relating to the construction of facilities / their O&M

- i) Water intake (including groundwater)
- ii) The transmission and distribution systems of water supply (including leakage control)
- iii) Water treatment
- iv) Instrumentation
- v) Water quality control
- vi) Electrical/Mechanical (including pumps)
- vii) Service pipe/devices (including meters)

2) Management / Administration divisions

- i) Administration (laws, documentation, liaison between other institutions)
- ii) Accounting / Financing / Water tariffs
- iii) Tariff collection related business (meter reading, collection, handling of arrears)
- iv) Customer relations / Public information

4.5.3 Task and Training required

Upon completion of the 1st Stage Project in year 2007, number of additionally required staff will be 15 staff (10 additional meter readers and 5 for additional operators at Kaolieo Treatment Plant) and 50 additional staff for pipeline maintenance including some general administrative staff will be required. Task and training required which are described in this section are not only for the additional staff required mentioned above but also for present staff of the NPVC.

(1) Positions according to hierarchy

1) Executive

The management is usually divided into top, middle and lower, depending on the level of responsibility and authority. In the NPVC, the General Manager is defined as the top level of management, the Deputy GMs are the middle level, and the Section Managers (and their equivalents) are the lower level of management. The supervisors of the various departments are put under these managers.

i) The General Manager (GM)

The GM is responsible for the whole business that the NPVC should execute, and the GM represents the NPVC in the execution of the business (3.1.1(4) 6)). The GM is responsible (while getting advice from the DGM's relating to the business of individual divisions) for executing his job, and to control and develop the staff capabilities at the top of organization.

As the GM is at the top of the hierarchy, it is desirable that they are expert in the specified field, but this is not a necessary condition of appointment. As the senior level of management in a large organization such as the NPVC, the GM can judge and decide issues from specific divisions by acting on reports and advice from the DGM's and the relevant section managers.

Therefore, as the senior level of management, the GM should maintain a broad view of the enterprises operations, and it is important for them to have a well-balanced ability to comprehensively judge and execute decisions.

Furthermore, it is desirable that the GM has a persuasive and influence power not only with subordinates but also in organisations outside of the NPVC. Notwithstanding this, the GM can also be considered as a trainee.

ii) The Deputy General Managers

The Deputy GM's assist the GM, and are responsible for executing the jobs of the various divisions assigned to them by the GM (3.1.1(4)7)). The Deputy GM's responsibilities are divided into 3 divisions, namely, Administration, Technical & Production and Financing & Marketing. These divisions are further divided into 8 sections and 10 organizations. The DGM's duties include supervising these sections and their equivalent organizations.

The role of the DGM's is to execute the plans of the divisions and to implement the division's strategic annual policies. They also coordinate issues between the sections, and develop human resources.

2) The Section (equivalent organizations) Manager

The section managers execute their assigned tasks by instructing and utilizing his staff effectively. The section manager has to completely understand the contents of the assigned jobs. He has to achieve the section's targets through the cooperation of the staff members. The section manager's jobs are to execute their appointed tasks, and to instruct staff to execute the section's roles.

The section managers' main task is to instruct staff to achieve the sections targets. This is achieved by gathering and unifying staff cooperation. This is the most important work of the manager. It is necessary for the section manager to train good management skills for the next generation of managers. The section manager is also responsible for managing staff at the various work sites. This responsibility includes the personnel management as well as the management of works handled by staff. The personnel management includes staff training, disciplinary actions if necessary, personnel changes, promotions, retirements, etc.

The personnel management is important for the section managers who have subordinate staff.

3) The Supervisor

The supervisor is usually assigned to the engineering and technical fields, and they plan or prepare schedules for construction, oversee civil works at sites, coordinate material supplies or pump operations, and supervises manual workers under the instruction of a section manager. A supervisor is usually stationed at the work sites and supervises operations at the site. When accidents occur, he often deals with the local complaints in place of the section manager.

4) General staff

The general staff are assigned daily routine jobs under the supervision of their superiors. The training subjects for individual specific works will be discussed in other sections

(2) Job Classification by divisions

The training required for the divisions classified by jobs are described as follows, from a view point of management. The roles of the GM, DGMs and section managers are included within this section.

1) Executive Level (EL)

- i) General Manager: Manages and represents all of the NPVC's works and responsibilities
- ii) Deputy GMs:
 - a. Administration: Manages overall administration & planning sections works
 - b. Technical & Production: manages overall production section works
 - c. Financial & Marketing: manages overall accounting, material and marketing sections works

2) Section Managers Level (SML)

- a. Administration: Manages and coordinates overall section works
- b. Planning: "
- c. Production: "
- d. Accounting: "
- e. Material: "
- f. Marketing: "
- g. Construction & Maintenance: "
- h. Survey & Design: "
- i. Training Centre: Manages and coordinates overall training works
- j. Water Treatment Plant: Manages and coordinates overall plant works
- k. Branch: Manages and coordinates overall branch works
- l. Drinking Water Factory: Manages and coordinates overall factory works

3) Supervisor level (SL)

Supervisor level (SL): Mainly assigned to engineering and technical fields, such as

- a. Treatment plant: Control overall plant operation and maintenance
- b. " : Control overall mechanics / electricians
- c. Transmission / Distribution system: Control overall transmission / distribution pipelines, etc.

4) General Staff Level (GSL)

General Staff (GS): Assigned to all of the sections and execute the assigned routine works under their superior's instruction and supervision.

4.5.4 The Training Programmes

The training programmes are proposed as follows.

(1) Executive

The training programme for Executive Level (GM and DGM) is proposed as follows.

Table 45-2 Training Programme for Executives

No	Title of Training	GM	DGM	Remarks
1	Management system for water supply	○	○	
2	Present situation of water supply in Laos PDR	○	○	
3	Comparative study on some of other public utilities	○	○	
4	Comparative study on water supplies in SE Asia	○	○	
5	Issues relating to NPVC of managerial & technical aspects	○	○	
6	Water tariff, problems and solution	○	○	
7	Work conditions	○	○	
8	Water supply management and PPP	○	○	
9	Free discussion focused on various topics	○	○	
10	Water supply and finance	○	○	
11	Economic and financial analysis	○	○	
12	A long-term planning	○	○	
13	Meter reading, collection, customer relations	○	○	
14	IT and its application	○	○	
15	Survey and control of water leakage	○	○	
16	Customer and water conservation behavior	○	○	
17	Management of pumps & plant	△	○	
18	Water quality analysis	○	○	
19	Safety management	○	○	
20	Recent development of water supply technology	○	○	
21	Account of materials & stocks	△	○	
22	Risk management and water supply	○	○	
23	Other urgent topics	○	○	

note : join, option

(2) Section Managers and General Staff

The training programme for Section Managers (including supervisors) Level (SML) and General Staff (GSL) are proposed as follows.

- 1) Administration / Clerical

Table 45-3 Plan for Training of Administration / Clerical Staff (1/2)

No	Title of Training	Classification		Remarks
		Section Manager	General Staff	
1	Introduction of Water Supply	○	○	
	1 Legal framwork of water supply			
	2 Regulation of water supply			
	3 Conservation of environment			
	4 Liaison affairs			
	5 Public information 6 Financing			
	6 Financing			
	7 Water tariff			
	8 Budget, settlement of account			
	9 Procurement			
	10 Customer relations			
	11 Billing			
	12 Meter reading & collection			
	13 Personnel management			
	14 Statistics			
	15 Discussion			
16 Observation at water treatment plant				
2	Customer Relations	○	○	
	1 Positive public release			
	2 Transparency of management			
	3 Utilization of mass media			
	4 Quick solution of customers complaints			
	5 Public hearing			
	6 Marketing			
7 Discussion				
3	Accounting	○	○	
	1 Bookkeeping			
	2 Ledger management			
	3 Assets management			
	4 Inventory			
5 Various slip control				
4	Financing	○	○	
	1 Financial documents			
	2 Balance Sheet/ Income Statement			
	3 Subsidy			
	4 Audit			
5 Budgeting/ Settlement of account				
5	Contract	○	○	
	1 Regulations & procedures			
	2 Competitive bidding & its exceptions			
	3 Prequalification			
	4 Contract documents			
	5 Security			
6 Payment procedure				

note : join, option

Table 45-3 Plan for Training of Administration / Clerical Staff (2/2)

No	Title of Training	Classification		Remarks
		Section Manager	General Staff	
6	Rate Collection	○	○	
	1 Meter reading			
	2 Billing			
	3 Rate collection			
	4 Arrears handling			
	5 Disconnection			
	6 Issues relating rate collection			
7	Procurement	○	○	
	1 Construction plan			
	2 Store keeping			
	3 Inventory			
8	Personnel Management	○	○	
	1 Management of total No. of staff			
	2 Concept & practices of labor management			
	3 Employment			
	4 Position change			
	5 Promotion			
	6 Reward & punishment			
	7 Retirement			
	8 Personnel management			
	9 Salary management			
	10 Fringe benefits			
11 Pension				

note : join, option

2) Engineer / Technician

Table 45-4 Plan for training of Engineering & Technology (1/2)

No	Title of training	Section manager	Supervisor	Engineer	Technician	Remarks
1	Basic Engineering & Technology Theories	○	○	○	○	
	1 Introduction					
	2 Intake & Store facility (include groundwater)					
	3 Transmission, Distribution pipelines					
	4 Instrumentation					
	5 Water treatment					
	6 Leakage control (include field work)					
	7 Electric equipments					
	8 Mechanical equipment					
	9 Water Quality control					
	10 Water quality examination					
	11 Water service installation					
	12 Mapping system					
	13 Safety at work					
	14 Discussion					
	15 Observation at water treatment plant					
16 Recent development of water supply technology						
2	Water Supply Installation	○	○	○	○	
	1 Standard of design & inspection					
	2 Structure, materials & devices					
	3 Certification					
	4 Qualification of contractor					
	5 Execution of water supply installation					
	6 Maintenance of water supply installation					
	7 Management of meter					
	8 Case study					
	9 Observation at water treatment plant					
10 Discussion						
3	Water Quality Management	○	○	○	○	
	1 Raw water control					
	2 Treated water control					
	3 Water in transmission, distribution & service pipe					
	4 Precision & indication of results gained					
	5 Examination of physics & chemistry					
	a Metal					
	b Non-metal					
	c Microorganism					
	d Biological					
	e Pesticide					
	f Organic					
6 Chlorination						
7 Discussion						
8 Instrumental analysis						
9 Observation at water treatment plant						
		△				
		○				

note : join, option

Table 45-4 Plan for training of Engineering & Technology (2/2)

No	Title of training	Section manager	Superviso	Engineer	Technician	Remarks
4	Equipment at Water Treatment Plant	○	○	○	○	
	1 Pump theory					
	2 Sequential control					
	3 Electrical equipments of water supply	△				
	4 Taking pump to pieces & assembling them					
	5 Pump ability test	○				
	6 Chemical feeder					
	7 Safety countermeasures					
	8 Discussion	○				
9 Observation at water treatment plant						
5	Pipe Designing & Piping Technology	○	○	○	○	
	1 Basic theories of piping					
	2 Pipe designing					
	3 Hydraulic within pipeline & species of pipe, valv					
	4 Pipeline designing					
	5 Costing	△				
	6 Demonstration (Field work)					
	7 Jointing, cutting & detaching	○				
	8 Pressure by pump & pressure test					
	9 Leakage control					
	10 Draining & cleaning					
11 Discussion	○					

note : join, option

4.5.6 Cooperation by International Agencies to Implement Human Resource Development

Human resource development projects have been implemented by various donors and international agencies. These many projects should be well coordinated to avoid incoherent training topics or duplication of topics. In the previous section, the training program required for the human resource development was identified by level and division of staff of the waterworks and these programmes cover the various fields of job within the waterworks operations. When the WASA and the NPVC implement these training program with the assistance of international agencies, the well coordinated programming of these various training will be indispensable.

As mentioned in the previous section, “Capacity Development of Urban Water Supply Authorities in Lao PDR”, just commenced in September 2003 implemented by JICA (CDUWS). The JICA technical cooperation project will be the main method of implementation of these training programmes that are required and identified in the previous section. The CDUWS will cover training not only for engineers (115 engineers and 360 technicians will be trained), but also for administrative staff (160 managers/administrators will be trained). The identified training programmes required are for executives, for administrative and clerical staff, and for engineers/technicians. These three fields will be covered by the CDUWS. The CDUWS will

develop training text books and manuals and will initially train Lao trainers in order to disseminate knowledge and know-how to their colleagues and subordinates. The CDUWS will continue until the middle of 2006 and it is hoped that a sustainable human resource development system will be established by the CDUWS.

To implement the training program following the schedule of the CDUWS, effective usage of the Training Centre, to be constructed by the AFD in 2004, should be taken into account. Upon completion of the construction of the Training Centre, the WASA and the NPVC are recommended to consider the progress of the CDUWS, and training at the training centre should be programmed carefully to maintain consistency with the CDUWS.

Emphasis should be put on the training of executives in the areas of water conservation and water demand management since the conditions of water shortage will continue until completion of the 2nd stage of the project. The executives should always have the consciousness to reduce wastage for an effective and sustainable water supply system.

Through the PCM Workshop for technology transfer, held during the study, the needs of training of technicians for repairing pumps and motors were identified as very high. A training program for these topics will be a great help for the maintenance and operations of the waterworks.