CHAPTER 10

10. Conclusion and Recommendations

10.1 Conclusion

The major conclusions derived from the results of the Study are as follows:

1) The Water Supply Source in the Central Plateau Area

In many of the municipalities the spring water sources should be effectively utilized, because the quantity is stable and the quality is good.

In order to upgrade the service level and meet the increasing water demand, groundwater (deep and shallow wells) and surface water (rivers and lakes) utilization should be taken into consideration in addition to springs.

The use of surface water however should not be intended for drinking due to the progressive deterioration in water quality. Use of surface water should only be planned after countermeasures against sewage and waste disposal are taken and the waters are clean enough for human use. Given this, future additional supply source development will focus on groundwater.

2) Groundwater Development Potential

Groundwater development is very difficult or almost impossible in the northern part of the Study Area, which is widely underlain with hydrogeological basement rocks such as metamorphic rocks and cretaceous rocks. Groundwater development is possible however in the greater part of the Study Area where basement rocks are overlain by Tertiary volcanic rocks and Quaternary volcanic rocks. Pumping of groundwater from the uppermost layer of Quaternary volcanics and their secondary deposits widely distributed in the intramountain basins has been going on since the 1960s, particularly from the basins of the departments of Guatemala, Sacatepeques and Quetzaltenango.

The results of the hydrogeological study which included test drilling to the Tertiary volcanic rock formation revealed that the long-term pumping of groundwater from Tertiary volcanic rocks, which are mostly more compact and massive than the rocks of the Quaternary Formation, is possible. However, well construction works may not always hit a productive aquifer. Drilling of the Tertiary volcanic formation, therefore, should be focused at cracked or fractured zone, particularly targeting the faults within the zone, as they are usually abundantly filled with water.

The groundwater level in the majority of the Central Plateau area is generally very deep due to topographic

features, making the groundwater development very expensive both for well construction and pumping.

The development of groundwater, particularly from Tertiary rock formations, would therefore require sufficient budgetary allocation.

3) Present Administration of Water Supply Services

The municipal government is responsible for the formulation of water supply and facility plans, project implementation and day-to-day operation including collection of water fees, and is technically and financially assisted by INFOM. The majority of the municipal governments, however, have poor policies concerning water supply and are inexperienced in the planning and implementation of programs. Moreover, municipal officials do not recognize the water supply scheme as one of the most important public services.

The physical surroundings of the water supply sources of many of the municipalities are insanitary and are left unimproved. Water is also distributed without treatment. These factors are not only a result of the poor economic status of the area but also of municipal officials' lack of understanding of the importance of public services.

Beneficiaries usually put little importance on the improvement of their living environment and have little desire to participate in the implementation of improvement programs. They do not see the point in paying for water supply services since they have long been accustomed to free spring water. Their willingness-to-pay was surveyed to be generally low. Again, this could be attributed to lack of encouragement from municipal officials.

4) Water Source Development Strategy

Fifty-four municipalities were categorized by water source development potential and facility maintenance capacity. Strategies for water source development were established by category.

It is desirable to select the water supply source to be developed in the future based on the aforementioned categorization. However, if the present administration of water supply services is to be significantly improved, the categorization of some municipalities may have to be changed.

5) Groundwater Development Plan for the 10 Selected Municipalities

The groundwater development plan, which includes facility design and project cost estimation, for the 10

prioritized municipalities was incorporated in the Study.

The facilities to be constructed are designed based on the following.

- The quantity of groundwater to be developed is determined as the difference between the demand in 2010 and the existing source capacity, excluding sources presumed to be no longer productive in the future.

- The facilities to be constructed are (1) new deep wells with pumps, (2) transmission pipes and (3) supplementary distribution tanks. Supplementary distribution tanks will be constructed in municipalities where the tanks are not capable of an 8-hour supply. New wells will only be constructed in the 4 municipalities where the production capacity of test wells is not enough to satisfy the projected demand in 2010, and where test wells were unsuccessful.

The facility design includes the replacement of 7,770m of distribution pipeline in San Juan Comalapa.

The construction of the aforementioned facilities, excluding the 9 wells, is estimated to cost a total of US$4.8 million with an average annual O & M cost of about US $320,000.

6) Project Evaluation

Assuming a project life of 30 years, this project is assessed to be barely feasible as the financial internal rate of return (FIRR), calculated considering the best possible situation, was only 6.56%.

A very favorable financial plan should, therefore, be considered for the implementation of the project.

The economic internal rate of return (EIRR) of the project, however, was calculated at 30.45%, a figure that indicates significant positive impacts of the project on the society.

10.2 Recommendations

1) Recommendations on Tariff Policy

Groundwater in the Central Plateau Area will be developed as the future major water supply source in order to meet the growing water demand.

The construction and operation of groundwater supply facilities however will be more costly than those for the spring source. Since the municipality will not be able to maintain these facilities with the present water fee collection system, the following tariff policies are recommended.

(1) All beneficiaries in the municipality shall be obliged to pay water charges, regardless of the type of service (either by house connection or by public standpost).

(2) Different water charges should be applied for the use of house connections and public faucets. Households without connections shall pay the same charge as that for the use of public faucets.

(3) Separate "Tariff Register Books" shall be prepared for households with house connections and those using public faucets, for a highly efficient collection.

(4) Reference water rates should be established nationwide. This could facilitate the setting of water rates at the municipal level, on the basis of percent variation as a function of the population and facilities types.

(5) In the future, every house with connections shall be installed with a water meter, and the water rate system will be changed from a fixed system to a variable system wherein rates are determined according to the water amount consumed.

2) Reinforcement of INFOM's Guidance Program

Since many of the municipal governments lack the ability to: plan and implement programs, maintain a sanitary environment, maintain and operate water supply facilities, and lead the residents in various community activities, INFOM is recommended to carry out the following to strengthen the capability of municipal governments.

(1) To periodically hold seminars for managers and

training workshops for the people involved in the operation and maintenance of water supply facilities.

(2) To invigorate the activities of the officials of INFOM's branch offices.

3) Recommendations for Project Implementation

An evaluation of the groundwater development plan for the 10 prioritized municipalities resulted in an EIRR of 30.45%, indicating significant positive impacts of the project on communities in the Study Area.

Since there is no doubt about the need for improved drinking water supply in the 10 municipalities, the implementation of the project should be carried out urgently.

However, if the project were to be divided into 10 sub-projects, and each separately evaluated, some municipalities will not be able to cover even the operation and maintenance costs. In order to overcome this situation, use of subsidies from the Central Government is recommended to cover the water supply costs in the short-run. But over the long-run, implementation of a continued education campaign is recommended to raise residents awareness on the importance of paying appropriate water rates so as to improve the willingness-to-pay for water services.