5.3 Evaluation of The Project

5.3.1 Social Evaluation of The Project

The capital of Bolivia is La Paz City, which is the largest city in this country. It has a population of 1,000,000. In recent years, the population has been increasing monotonously, and the functions of the city, especially the water supply system has become unable to meet the requirements of the rapidly increasing population sufficiently.

The water supply conditions in La Paz City are becoming worse day by day, and in the dry season, water supply interrutions occur everyday. The old town area of La Paz City has originated in the valley of River Choqueyapu, and its population has become nearly saturated. There is no room for further accepting new comers, and the El Alto district, where this project is planned, is the new area to be developed.

Even in the El Alto district, the population is already increasing rapidly. Since it is the district destined to accept domestic immigrants of mine laborers, who leave the mines due to the inactive industry, stable supply of the living water of the El Alto district is the most important and urgent subject in this district.

The present state of waterworks in the El Alto district is as follows. Water of Lake Tuni at 4,500m altitude is conveyed through water conveyance pipes of 35 km to the El Alto purification plant, and the treated water from the plant is supplied. However, with increasing population in the recent years, the water demand has surpassed the supply quantity. It is expected that the population in this area should increase rapidly, and it is said that the population will increase from 240,000 at present up to 500,000 in the year of 2000.

On the other hand, the new development of surface water in the neighborhood as the water resources has been impossible, because most surface water has been already exhausted and any development is difficult in respect of either finance or time. As a drastic solution, it cannot but to note the groundwater as the water resource.

In view of the background mentioned above, it can be said that the "groundwater development project" is an only means to provide stable supply of living water to the said district, and the role this project is to do is very large. And, implementing this project as promptly as possible will contribute much to the stabilization of people's life which is one of the major targets of the gorvernment of Bolivia.

Moreover, in Bolivia, it will be indispensable to promote groundwater development in the future, and therefore, learning the groundwater development technology through the implementation of this project will be very significant for the same country in performing similar projects in any areas other than the El Alto destrict.

5.3.2 Technical and Economical Evaluation of The Project

1) As to the groundwater sources which have the satisfactory water quality, if the year of 1995 is taken as the target, the well field on the south-east side of Rio Seco, including water supply from existing facilities, can supply the predicted dwelling population of 385,000.

If the year of 2000 is taken as the target, the well field on the north-west of Rio Seco, if added to the above mentioned well field, can supply enough quantity, but there remains a possibility that the water quality is affected adversely by the Milluni mines. At this stage, the technical measures cannot be taken against this point, because it is impossible to assume the future water quality and quantity of mine wastewater.

2) As a means to supply living water to the dwellers in the El Alto district, it may be considered to construct a dam using the surface water as its water source. However, there are no suitable locations, and the possibility of this development is small. There is a plan to convey water of Lake Titicaca through pumping under pressure to the El Alto district in the far future. However, under the social conditions of Bolivia at present, such a big investment is impossible and collection of water charges enough for maintenance and management of the water conveyance system will be impossible. The groundwater development is the only feasible project.

3) SAMAPA, which is in charge of maintenance, management, and operation of water intake facilities, started the groundwater development business in 1987 and is now proceeding with securing of necessary organization and personnel, and learning of techniques. It is appreciated that the requirements for operation can be fully expected for SAMAPA.

4) Existing water supply sources depend on the surface water. Therefore, the treatment involves much costs. However, collecting the water charges to cover this expenditure is

impossible, as judged from the living conditions of the dwellers. Thus, SAMAPA is suffering from financial deficits at all times. The groundwater development under this project requires only small running costs due to electric power and disinfection charges, and as compared with the surface water treatment, water supply cost can be small. This will make a contribution to the financial condition of SAMAPA, and this point is appreciated high from the economical view point, as well.

5) In dry season, the existing facilities of water supply can supply the water stored in the rainy season in consideration of annual quantity of rainfall. However, Bolivia also is being affected by the recent worldwide climatic changes. The dam storage in the dry season becomes below the water intake limit level, and in the past, serious water shortage was encountered many times.

The seasonal fluctuations will not occur if the groundwater is developed, and the water quantity will be secured constantly at all the times. Therefore, in the event of water supply shortage as mentioned above, the groundwater thus developed can be expected to be the water supply source as an emergency measure, not only for the El Alto district, but also, for the entire La Paz area.

5.3.3 Environmental Impact Assessment

1) Influence of Water Level Decrease

As this project is completed and groundwater begins to be drawn up, the groundwater level will be decreased around the well field. The results of simulation indicate that this decrease of groundwater level will be 25m at the well point in 1995 and 35m in 2000, and a range of about 1.5 km from the well will be influenced in 2000.

The area scheduled for the well construction is being used at present as oveja pasturage and single-crop areas. Upon decrease of the groundwater level, it is anticipated that agricultural products will decrease because the precipitation water infiltrates into the ground at a faster rate. Therefore, for these areas, it is necessary to reconsider the method of land use, or to supply water from the planned water source so as to solve the problem.

Within the planned water intake area, there are existing Insa and Covima wells. Insa wells are not used at present, and for Covima wells, water consumption of about 30 m^3 per day is expected. Therefore, to Covima, it will be necessary to supply drinking water produced by this project. It is judged that there is no infuluence on other existing wells in the El Alto district.

2) Influence of Water Pollution

The 1st phase work is executed in the basin of Rio Seco, and outside the influence range of Rio Sece. Therefore, it seems that there is no problem in respect of water quality. For the 2nd phase work, the well field is planned in a range in which Rio Sece has no influence. However, it is expected that the wastewater of Milluni mine affects water quality of Rio Compulla and Rio Chialhouila. Therefore, in practice, it is necessary to take adequate measures to prevent this hazard. Even for the 1st phase work, it cannot be said that the said hazard does not exist at all. Therefore, once the work has

been completed, it is necessary to install a water test laboratory in the pump station so that the water quality can be monitored at all times.