

**“The Project for Improvement of Water Supply Facilities in Ulaanbaatar in Mongolia”**

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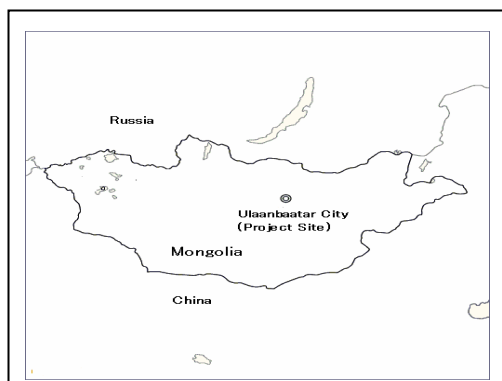
**0. Summary**

The objective of the project, which is to provide a stable water supply for the citizens of Ulaanbaatar City, was achieved by improving the water supply facilities at the upper and central water source areas through this project. As a result of enhancing the water supply capacity, effects were brought; in particular, the improved convenience in fetching water for the residents of the Ger area<sup>1</sup> and an improvement in the stability of the water supply.

Several cases of defects have arisen to date in the facilities constructed, but appropriate repairs have been made in each case by the contractor or the Water Supply & Sewerage System Co. of Ulaanbaatar City (USUG). The operation and maintenance system of USUG is clear, and there is also a certain degree of technical capability. With respect to its financial aspects, its operating income is increasing year by year and the budgets for the operation and maintenance of the facilities constructed by this project have been continuously secured. An issue of some concern is that foreign-exchange losses on settlements upon refund of principal and payment of interest for loans to the World Bank and the Spanish Government are imposing a burden on USUG.

In light of the above, this project is evaluated to be highly satisfactory.

**1. Project Description**



Project Location



Wells Pump Stations along the Tora River

**1.1 Background**

In Mongolia, there has been a rapid influx of population from the rural areas to the capital city of Ulaanbaatar following such events as the liberalization of the economy after 1990 and the mass death of livestock during the snow damage that occurred during 1999-2000. The rate of population growth

<sup>1</sup> The Ger area, located in Ulaanbaatar is an area where public infrastructure, including water and power supply and sewerage systems, is not so well developed.

of the city was less than 1% before 1992, but increased greatly to approximately 3-4% in 1993 and after. At the time of the basic design study (2003), a population increase of 3% a year until 2015 was forecast. Based on the future population forecast and the anticipated increase in demand for water due to the improvement of the living environment as a result of modernization, at the time of the basic design study, a shortage of water of 18,000 m<sup>3</sup>/day was projected for 2010. Therefore, securing drinking water for citizens by developing new water sources and improving water distribution facilities has been an urgent issue.

## 1.2 Project Outline

The objective of this project is to provide sufficient and safe water to the inhabitants of Ulaanbaatar by improving the water supply facilities at the upper and central water source areas.

Grant Limit/Actual Grant Amount	1,685 million yen/1,674 million yen
Exchange of Notes Date	Detailed Design : January, 2004 Construction Works: May, 2004
Implementing Agency	Water Supply & Sewerage System Co. of Ulaanbaatar City (USUG)
Project Completion Date	November, 2006
Main Contractor(s)	Dai Nippon Construction Co., Ltd.
Main Consultant(s)	NJS Consultants Co., Ltd.
Basic Design	“Basic Design Study on the Project for Improvement of Water Supply Facilities in Ulaanbaatar in Mongolia”, JICA/NJS Consultants Co., Ltd., December, 2003
Detailed Design	February, 2004 – January, 2005
Related Projects (if any)	<u>Technical Cooperation</u> <ul style="list-style-type: none"> <li>• Development Study “The Study on the Water Supply System in Ulaanbaatar (1993-1995)”</li> <li>• Dispatch of an expert for a review of the “Master Plan 2020 for Ulaanbaatar City (Water supply improvement)” (1999-2001)</li> <li>• Acceptance of Technical Training Participants (country focused training and dialogue, region focused training and dialogue, project counterpart training)</li> <li>• Development Study “The Study on the City Master Plan and Urban Development Program of Ulaanbaatar City in Mongolia (UBMPS)” (February, 2007-November, 2009)</li> </ul> <u>Grant Aid</u> <ul style="list-style-type: none"> <li>• “The Emergency Rehabilitation of Water Supply Facilities in Ulaanbaatar City” (1996-1998) (Phase-1)</li> <li>• “The Ulaanbaatar Water Supply Development Project in Gachuurt in Mongolia” (in process) (Phase-3)</li> </ul> <u>Other Donors</u> <ul style="list-style-type: none"> <li>• World Bank “Ulaanbaatar Services Improvement Project (USIP)” (1997-2003)</li> <li>• World Bank “Second Ulaanbaatar Services Improvement Project (USIP 2)” (2004-2011)</li> <li>• Netherlands Government “Water Operator Partnerships (WOPs)” (2007-2010)</li> </ul>

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Maki HAMAOKA, Foundation for Advanced Studies on International Development

### 2.2 Duration of Evaluation Study

Duration of the Study: November 2010–December 2011

Duration of the Field Study: January 17–February 1, 2011, June 13–22, 2011

### 2.3 Constraints during the Evaluation Study (if any)

Nil

## 3. Results of the Evaluation (Overall Rating: A<sup>2</sup>)

### 3.1 Relevance (Rating: ③<sup>3</sup>)

#### 3.1.1 Relevance with the Development Plan of Mongolia

The objective of this project has been highly relevant with the national development plan and water sector plans of Mongolia and development needs at the time of both the ex-ante evaluation (2003) and the ex-post evaluation (2011).

The Economic Growth Support and Poverty Reduction Strategy (EGSPRS) (2003) stated the “improvement of basic life and industrial infrastructure” as its priority objectives. The Ulaanbaatar Master Plan targeting the year 2020 (2003) placed emphasis on the construction of apartments, electric power supply and construction of water supply facilities. Water supply was given focus among them in order to meet population growth.

At the time of the ex-post evaluation, the Millennium Development Goals Based Comprehensive National Development Strategy of Mongolia (2008) included a “national apartment program”, which included a stable water supply for Ger Area. With regard to water sector policy, the Water National Programme approved in November 2010 stated a reinforcement of water supply services, such as the development of new water sources to increase the water supply capacity for Ulaanbaatar City, the renovation of existing water pipes for the supply of water to apartment areas, and an increase in the number of “water kiosks” (communal water points) in Ger Area.

#### 3.1.2 Relevance to the Development Needs of Mongolia

##### (1) Population growth in Ulaanbaatar

The population in Ulaanbaatar City has increased by 3-4 % annually since 1993. In 2009, it reached 1.17 million, which is equivalent to 40% of the total population of Mongolia. Among nine administrative districts in Ulaanbaatar City, USUG provides water supply services to six districts but not the three satellite districts. The population in these six districts has increased by 4-5 % annually

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<sup>2</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>3</sup> ③: High, ② Fair, ① Low

and reached 1.1 million in 2010. According to the development study conducted by JICA in 2009, the population of Ulaanbaatar City is expected to reach 1.25 million in 2015 if it continues to increase by 3.2 % annually from 2010 to 2015, and to 1.43 million in 2020 if it continues to increase by 2.3 % from 2015 to 2020.

After the completion of this project in 2007, the daily maximum water supply capacity increased from 222,000 m<sup>3</sup>/day to 240,000 m<sup>3</sup>/day and the water demand of Ulaanbaatar citizens has been satisfied. However, if the water demand continues to increase along with rapid population growth, the daily maximum water supply is expected to exceed the daily maximum water supply capacity of USUG (see the figure below). To cope with a prospective water shortage, a grant aid project, “The Ulaanbaatar Water Supply Development Project in Gachuurt in Mongolia” (Phase 3 of Japanese grant aid for the water supply in Ulaanbaatar City), is underway in order to increase the daily maximum water supply from 240,000 m<sup>3</sup>/day to 265,000 m<sup>3</sup>/day by 2014 by developing a new water source and constructing water service pipes.

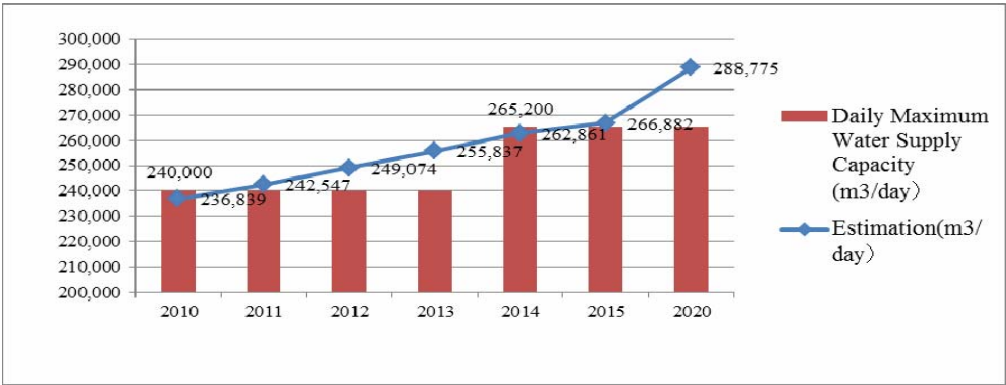


Figure 1 : Estimation of daily maximum water supply

Source : Preparatory Survey (Basic Design) Report on the Ulaanbaatar Water Supply Development Project in Gachuurt in Mongolia (2010)

The population of Ulaanbaatar City is expected to keep increasing in and after 2014, which is the target year for the grant aid project described above. However, there is no remaining capacity for the further development of ground water from the existing water sources (upper and central water sources), which have been developed for the purpose of drinking water. 25,200m<sup>3</sup>/day, corresponding to the differential in water demand in 2014, will be provided by the above grant aid project currently being carried out, but it is forecast that in case the population continues to increase in 2014 and after, there will be a water shortage of 23,575m<sup>3</sup> (the difference between the daily maximum demand and supply capacity) in 2020. As can be seen, the demand for water in Ulaanbaatar City remains high<sup>4</sup>.

### 3.1.3 Relevance with Japan’s ODA Policy

The Japanese government has placed priority on assistance in four priority areas that include support

<sup>4</sup> The water demand is estimated based on the daily maximum water supply (Preparatory Survey (Basic Design) Report on the Ulaanbaatar Water Supply Development Project in Gachuurt in Mongolia (2010)).

for basic human needs (education, health and medical services and water supply), since policy dialogues on assistance policy were held between Japan and Mongolia through the High-Level Mission on Economic and Technical Cooperation in 1997. With regard to the water supply, the assistance policy included cooperation for a stable water supply by improving and expanding existing facilities and improving water quality. In light of the above, this project is highly relevant with Japan's ODA policy at the time of the ex-ante evaluation.

This project has been highly relevant with Mongolia's development plan and development needs, as well as with Japan's ODA policy; therefore, its relevance is high.

### 3.2 Efficiency (Rating: ③)

#### 3.2.1 Project Outputs

Outputs by the Japanese side were produced as planned though there were slight changes in design, as mentioned below.

Table 1 : Main outputs

[Construction Works and Supply of Material]		
Rehabilitation	Transmission Pump Station at Upper Water Source: 5 sets	
	Distribution Pump Station at Central Water Source: 2 sets	
New Facilities	Well Pump Station at Upper Water Source: 16 sets	
	Water Hammer Prevention Equipment	
Supply Material	Insulation Works (at well pump periphery pipe): 55 wells (39 existing wells and 16 newly developed wells))	
[Soft Component]		
Area	No. of Participants from USUG	Expected Result
Business Structure Strengthening	3	▪ Water tariff calculation model
Efficiency Increase of Water Supply Facilities Operation and Management	3	▪ Operation manual on upper water source facilities ▪ Guidance for effective water supply system operation
Leakage Detection	5	▪ Basic technology information ▪ Leakage investigation plan
Environmental Water Quality Monitoring	4	▪ Monitoring plan
Public Relations Improvement	3	▪ Materials for information awareness

The main changes from the initial design were changes in the locations of several wells, which also caused changes in the distance of pipelines. These design changes are judged to be appropriate because they were changed precisely in accordance with the result of detailed design and condition changes during construction.

Outputs by the Mongolian side (the installation of well pump hot insulation material, the construction of power cables for well pumps, the removal and disposal of pumps located in existing pump stations, the acquisition of land, and the acquisition of an Environmental Impact Assessment (EIA)) were

produced as planned.

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The project cost borne by the Japanese side was lower than the planned cost. The actual grant cost was 167.4 million yen against the planned cost of 168.5 million yen (equal to 99.4% of the planned cost). The difference between the planned cost and the actual cost was caused by design changes and the difference between the ceiling cost of the tender and the contract cost for the construction works. For this ex-post evaluation, only the costs of the Japanese side were compared since the actual cost borne by the Mongolian side was not available.

#### 3.2.2.2 Project Period

The actual project period was 32.5 months against the planned period of 32.5 months (100% of the planned period).

Both the project cost and project period were within the plan; therefore, the efficiency of the project is high.

### 3.3 Effectiveness (Rating: ③<sup>5</sup>)

#### 3.3.1 Quantitative Effects (Operation indicators)

Sixteen wells were newly constructed in the upper water sources by this project, and the water supply capacity increased from the previous 222,000 m<sup>3</sup> to 240,000 m<sup>3</sup> per day, which enabled USUG to meet the water demand until 2010. In addition, by renewing the existing conveying pumps in the upper water sources and the existing distribution pumps in the central water sources, it has been made possible to appropriately convey the planned amount of water.

Table 2 : Operation indicators

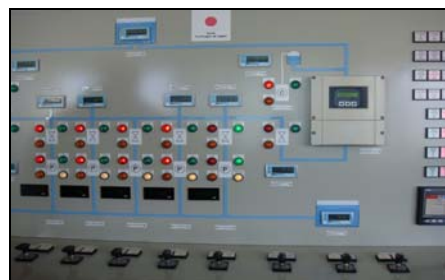
Indicator (Unit)	Baseline	Target	Actual	Actual	Actual
	(2003)	(2007)	(2007)	(2009)	(2010)
Daily Maximum Water Supply Capacity (m <sup>3</sup> /day)	222,000	240,000	240,000	240,000	240,000
Water Development Capacity of Transmission Pumps at Upper Source (m <sup>3</sup> /day)	72,000	90,000	90,000	90,000	90,000
Actual Amount of Water Developed at Upper Source (m <sup>3</sup> /day)	32,472		48,180	47,075	52,283
Water Distribution Capacity at Central Water Source (m <sup>3</sup> /day)	N.A.	96,000	96,000	96,000	96,000
Actual Amount of Water Distributed from Central Water Source (m <sup>3</sup> /day)	78,675		67,809	62,078	57,992
Daily Maximum Water Supply (m <sup>3</sup> /day)		223,296	236,834	231,785	177,192
Daily Average Water Supply (m <sup>3</sup> /day)		194,910	192,167	145,843	142,683

Source : USUG

<sup>5</sup> Effectiveness is scored also in the light of factors regarding Impact.



Transmission pump at upper source



Remote control panel at central source

In addition to the above mentioned quantitative effects, with regard to electrical power, the improvement of energy efficiency though the renewal of aging pumps was expected at the time of the basic design study. In fact, an improvement in the efficiency of power consumption has been reported with respect to the upper water source.

### 3.3.2 Quantitative Effect (Effect Indicators)

With respect to effect indicators, the percentage of population served and the rate of accounted-for water are shown in the table below. A steady increase in the percentage of population served is seen, as well as an improvement in the rate of accounted-for water. It is considered that the improvement of the rate of accounted-for water resulted from the installation of water meters in water conveyance pump stations in 80 locations and the installation of water meters in the approximately 3,300 businesses to which USUG supplies water. This is in addition to enhancements through the soft component of this project, which are comprised of such efforts as biannual inspections and the diagnoses of leakages of the water mains.

Table 3 : Effect indicators

Indicators		2004	2005	2006	2007	2008	2009	2010
Population in the Service Area (thous. persons)		861.5	896.8	930.3	967.2	1,008.7	1,048	1,100
Population Served (thous. persons)		800.8	848.1	883.1	924.8	967.4	998.4	N/A
Percentage of Population Served (%)		93.0	94.6	94.9	95.6	95.9	95.3	N/A
Water supply per capita (L/capita/day)	Apartment Area	204	190	206	234	232	204	N/A
	Ger Area	6.6	7.4	8.1	7.2	6.8	6.6	N/A
Accounted-for Water Rate (%)		N/A	78.5	76.1	80.8	83.9	84	N/A

Source : USUG

### 3.3.3 Qualitative Effects

In interviews with USUG it was found that before carrying out this project, there were cases in which the water would freeze during conveyance, but that, as a result of increasing the number of wells from 39 to 55 through the construction of new wells by this project, the amount of water conveyed and the speed of water flow increased. The effect was a reduction in the cost of water supply attained through the water not freezing during conveyance even without warming with boilers, as had to be done

previously.

This project has largely achieved its objectives; therefore; its effectiveness is high.

### 3.4 Impact

#### 3.4.1 Intended Impacts

As a part of this ex-post evaluation, a survey of the citizens of Ulaanbaatar was conducted during January and February of 2011, as a beneficiary survey to evaluate the impacts of this project<sup>6</sup>.

##### 3.4.1.1 Change in Water Supply

30% of the respondents in the apartment areas and 70% in the Ger area answered that “there was a change”. Of the Ger area, in the target areas of the project carried out by the World Bank, previously water tankers came to supply water to water-tanks in the areas. Now the water supply capacity has been enhanced by this project and the water conveyance pipes were expanded and directly connected to the kiosks (communal water points) by the World Bank project. As a result of this, the residents are now able to obtain water at any time and they more strongly appreciate the change compared to residents of the apartment areas.

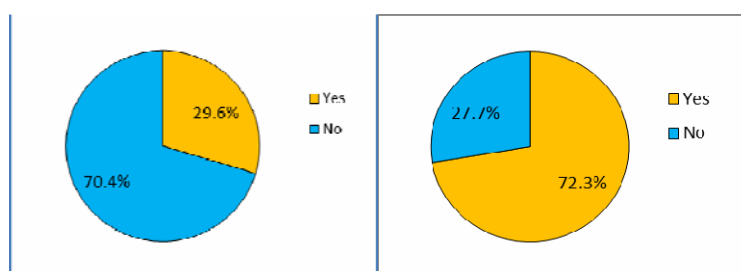


Figure 3 : Changes in water supply after 2007 (Apartment area)

Figure 4 : Changes in water supply after 2007 (Ger area)

##### 3.4.1.2 Concrete Changes

In the Ger area, 90% or more of the respondents refer to the reduction in time to fetch water (including a reduction in waiting time). In the apartment areas, 65% of the respondents refer to the stability of the water supply, 15% refer to the water pressure and the water quantity respectively. According to interviews with USUG, there were many complaints by the users that in the past, the water did not reach higher floors in the apartments to inadequate water volume/pressure.



A water kiosk in the Ger area which was connected to the water tank behind in the past)

<sup>6</sup> To compare the water supply before-and after the project, the survey targeted citizens who lived in the area before 2006, namely, before the project completion. The sample households were 246 in total in six districts of the USUG service area, 84 households from the apartment area and 162 households from the Ger area.



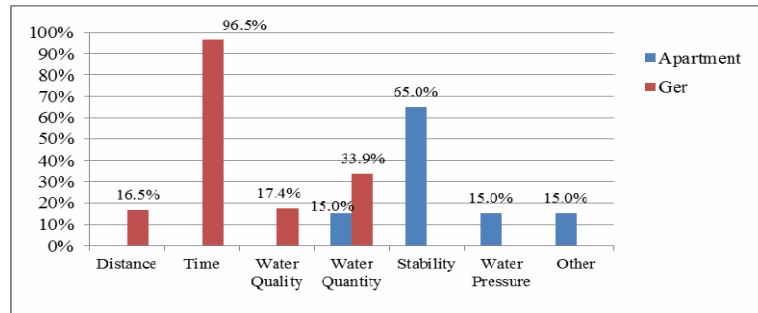


Figure 5: Concrete changes (multiple answers)

#### 3.4.1.3 Views of Users Concerning Water Quality

With regard to the water quality, approximately 55% of the sample households in the apartment areas answered “very good” or “good”, and 85% in the Ger areas answered “very good” or “good”. Half of the households who answered “very poor” or “poor” refer to “taste” as the reason for the answer<sup>7</sup>.

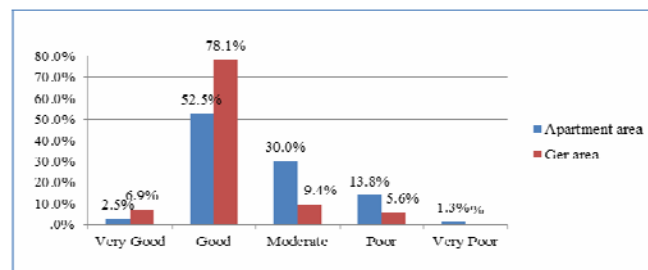


Figure 6 : Views of users on water quality

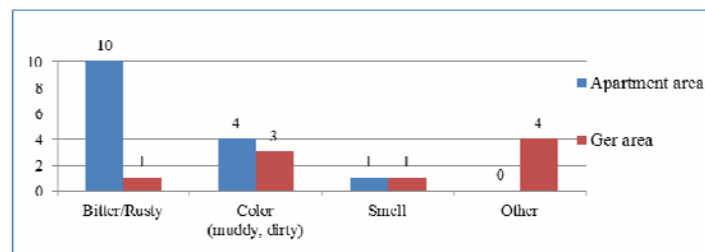


Figure 7 : Reasons for dissatisfaction with water quality (multiple answers)

#### 3.4.1.4 Satisfaction with the Water Supply Service

The satisfaction with the present water supply service is as shown in the table below. Approximately 70% of the respondents in the apartment areas and 90% or more in the Ger area are satisfied. The reason most frequently given for “poor” or “very poor” is “water quality”.

<sup>7</sup> However, as it is conjectured that taste and color are the results of corrosion of the water mains and water distribution pipes inside buildings, which take place beyond the warm water supply center (CTP), it may be said to be outside the purview of USUG.

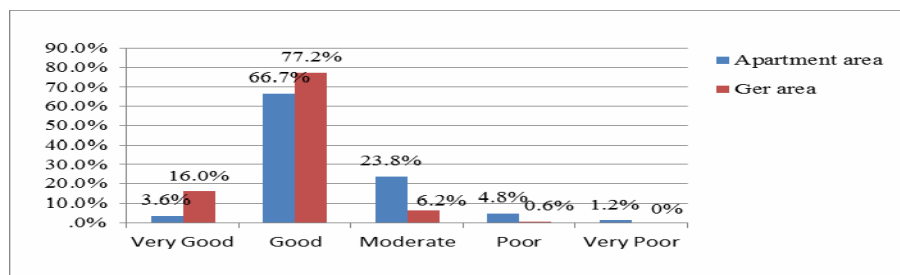


Figure 8 : Satisfaction with the water supply service

Table 4 : Reasons for dissatisfaction with the water supply service (multiple answers)

Reasons	Apartment area	Ger area	Total
Water quality	5	1	6
Water leakage	1	0	1
Water charge	1	1	2
Distance	0	1	1
Total	5	1	6

Although there were expectations of the reduced incidence of water-borne infectious diseases at the time of the basic design study, no incidence has been found of a water-borne infectious disease in the beneficiary survey of either before or after the implementation of the project.

### 3.4.2 Other Impacts

Various training programs were implemented as a soft component (technical assistance) of this project in 2005. The descriptions below show the recognized positive impacts of the soft component implementation.

#### 3.4.2.1 Effect of joint work of the Japanese and Mongolian parties (Change in USUG Staff Attitudes Toward Duties)

According to the interviews with USUG, USUG staff changed their attitudes toward duties while they were working with Japanese consultants on the supervision of construction. The examples include: (1) they started making work plans (e.g. weekly or biweekly plans); (2) they carried out those plans while monitoring their progress; and (3) they improved working conditions and paid more attention to safety control on-site (e.g. they always put on uniforms and gloves, held morning meetings, and made reports on safety without negligence).

#### 3.4.2.2 Effect of Soft Component

##### (1) Reinforcement of Administration

The contracted consultant provided USUG staff with a training session to enhance administrative abilities. After the training, USUG revised the water tariff three to four times by applying the simulation model acquired through the training. In addition, USUG included the prediction of the water rate in the five-year plan for the first time, which they did not do in the previous plans (it was

applied to the plan for 2006 to 2010). Furthermore, accounting reports came to be shared among the executives on a quarterly basis; the reports had been circulated only in the Finance Department previously.

## (2) Reinforcement of Water Leakage Detection

A training session was provided for the improvement of leakage detection skills by using the devices that were provided in Phase 1 (grant aid before this project). USUG now carries out water leak detection every season (twice a year) based on the “Leakage investigation plan” prepared during the above-mentioned training. USUG carried out such investigations at 731 points from 2006 to 2010 and identified 545 pipe positions, which comprised 75% of the total.

Before the plan, USUG dug the ground to identify the positions. They occasionally cut electric cables by mistake while digging the ground. Owing to the use of the devices mentioned above, they eliminated these mistakes. USUG investigate not just the pipes within their responsibility. They also check the pipes in the factories and provide training of how to use the water leakage detection devices to the power and heat suppliers in response to requests.

## (3) Reinforcement of Public Relations and Promotion of Users’ Awareness

A plan to promote awareness among water users was prepared for the years following 2005. The actions below have been taken according to the plan:

- Campaign to improve the awareness of saving water as well as knowledge of water-related matters; it is held over a period of three months in association with “World Water Day” (March 22) each year.
- Seminars and forums in cooperation with the Natural Environment Information Center (NGO).
- Creation of the symbol of USUG (a water drop)<sup>8</sup> as well as enlightening tools for children such as picture books and puzzles to distribute.
- Creation of four kinds of stickers for the promotion of water saving awareness. The stickers were sent to ministries and government offices, elementary schools and contracted companies.



Symbol of USUG

No environmental impacts or problems with regard to land acquisition and relocation of residents by this project have arisen. With regard to environmental protection, during the construction phase, the consultant always determined the locations of the wells and pipelines in the presence of the Ministry of the Environment to avoid environmental impacts. Negative environmental impacts have not arisen since. In addition, efforts in the conservation of water resources on the Mongolian side have been taking place, such as regular monitoring of the water quality of the ground water which is being

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<sup>8</sup> The water drop symbol was created by one of the USUG staff members that participated in the “Training Course for Water Works Engineering Training for Cold Regions” held at Sapporo, Hokkaido in 2005; the trainee got an idea from the symbol of the Sapporo Waterworks Bureau.

strictly conducted by USUG, and the prevention of excessive development by national designation of the Tora river basin as a water resource protection district.

From the above, it can be confirmed that the enhancement of the water supply capacity by this project is contributing to the improvement of the convenience of the water supply for residents and that the effects are being realized to a certain degree.

### 3.5 Sustainability (Rating:②)

#### 3.5.1 Structural Aspects of Operation and Maintenance

It is judged that there is no problem with the system of operation and maintenance of the facilities/equipment developed by this project, in accordance with the following points.

The role of the organization of USUG is clear, as are its internal assignments. In the upper water source, which has been improved by this project, 49 engineers such as pump station engineers, electrical engineers, well-repair workers, well electrical engineers, welders, boiler mechanics, lead pipe workers and boiler men are working on the operation and maintenance of equipment such as six units of water conveyance pumps. In the central source, about thirty employees assigned to the maintenance team are carrying out regular inspections, recording and reporting the operating conditions of all wells and equipment as well as repairs as required.

There are continuing structural reforms being carried out with the goal of making the organization more efficient through the technical cooperation, “Water Operator Partnerships (WOPs)” (2007-2010), conducted by the Netherlands Government. The technical cooperation through “WOPs” includes components spanning a wide range, such as business reinforcement, leakage detection, and technical assistance on water quantity measurement. This is in addition to the organizational reforms described above, and the enhancement of the organizational capability and the technical capability of the staff of the entire USUG is being carried out continuously.

#### 3.5.2 Technical Aspects of Operation and Maintenance

The operation and maintenance of each facility/piece of equipment is being appropriately carried out by USUG, and there is no problem regarding the technical aspects of operations and maintenance. It is considered that inputs from various schemes, such as the technical support provided by Phase 1, the soft component of this project and the acceptance of trainees (country-focused training, general training, counterpart training), are also having their effects.

Although several cases of defects have arisen to date in the facilities constructed, appropriate repairs have been made in each case by the contractor or USUG. The records of operations and maintenance and the records of repair works of the facilities and equipment are kept in a notebook for each piece of equipment by workers and are also managed electronically.

### 3.5.3 Financial Aspects of Operations and Maintenance

Although the financial balance of USUG has been in the red, sales profits have been largely increasing these years and no financial problems have been observed with regard to the expense of the operations and maintenance of facilities constructed by this project.

The gross operating income of USUG was in the red for 2005 and 2006, but has returned to profit since 2007. The sales income is producing profits that sufficiently exceed the operating expenses (maintenance costs, sales expenses, general administrative expenses), but the operating profit has been in deficit every year since 2005. According to USUG's five-year plan for 2011 to 2015, a return to profit is expected in 2013 and thereafter if the water rates are raised incrementally and the loan issue described below is resolved.

In terms of cash flow, the cash income from sales and customers has been increasing steadily since 2005. This appears to be the result of the taking of effect of measures taken in regard to water rate collection and water leakage. For example, the rate of accounted-for water, which had been 45% in 1998, has exceeded 80% since 2007 with the drive to install water meters (100% in 2009) in public facilities, which are the main customer group.

An issue of concern with respect to USUG's finances is the incurring of losses on exchange rate changes on settlements for refunds of principal, and payment of interest due to foreign exchange losses for loans such as the USIP1 of the World Bank loan and project loans from the Spanish government (upgrading of the processing of the central sewerage facility). USUG has continued to ask the Parliament since 2004 to make foreign exchange losses on settlement a national investment through the revision of the act on the urban water supply and sewerage facilities. It is said that this will be deliberated and approved in the Parliament in the near future, but it had not yet been approved as of August 2011. The resolution of this issue is the key to the improvement in the future financial status of USUG.

### 3.5.4 Current Status of Operations and Maintenance

The facilities constructed by this project have been mostly functioning well since the completion of the project to date. The main defects since the start of the utilization of the facilities and the measures taken by USUG are as follows:

- With regard to the wells in the upper water source, an inability to control ON-OFF of the pumps was found during the inspection for defects in 2007. In eight of the well pumps, the pumps and motors were replaced by the contractor, since a lowered insulation resistance was found.
- In 2008, control panels in intake pump facilities in four locations were damaged by lightning strikes. Three of these were repaired independently by USUG. USUG included in the 2010 budget the repair of one facility that received great damage, such as the charring of instrumentation, upon field validation by the Japanese supplier manufacturer, and the repair was completed.

In this way, not only have routine inspections of the facilities been made, but also appropriate repairs have been carried out for defects and no particular problem has arisen.

Some problems have been observed in terms of financial aspects; therefore, the sustainability of the project effect is fair.

#### 4. Conclusion, Lessons Learned and Recommendations

##### 4.1 Conclusion

The objective of the project, which is to provide a stable water supply for the citizens of Ulaanbaatar City, was achieved by improving the water supply facilities at the upper and central water source areas through this project. As a result of enhancing the water supply capacity, effects were brought; in particular, the improved convenience in fetching water for the residents of the Ger area and an improvement in the stability of the water supply.

Several cases of defects have arisen to date in the facilities constructed, but appropriate repairs have been made in each case by the contractor or the Water Supply & Sewerage System Co. of Ulaanbaatar City (USUG). The operation and maintenance system of USUG is clear, and there is also a certain degree of technical capability. With respect to its financial aspects, its operating income is increasing year by year and the budgets for the operation and maintenance of the facilities constructed by this project have been continuously secured. An issue of some concern is that foreign-exchange losses on settlements upon refund of principal and payment of interest for loans to the World Bank and the Spanish Government are imposing a burden on USUG.

In light of the above, this project is evaluated to be highly satisfactory.

##### 4.2 Recommendations

###### 4.2.1 Recommendations to the Executing Agency

Nil

###### 4.2.2 Recommendations to JICA

Nil

##### 4.3 Lessons Learned

Nil