

Chairperson (Mr. Hiroto Oda)

Thank you very much. The Japanese standard for copper sulfate is below 1mg/liter. But considering the impact on crops, they try to keep its concentration below 0.1mg/liter and, for high quality water, below 0.05mg/liter. The minimal possible dose is used. Mr. Wong from Singapore has that answered your question?

Mr. Wong Kee Wei (SINGAPORE)

Thank you very much.

Presentation

Mr. Nguyen Viet Son

Manager of Planning and Investment Department

Transport & Urban Public Works Service of HCMC

Ho Chi Minh City

Chairperson (Mr. Hiroto Oda)

Next we will have a presentation from Mr. Nguyen Viet Son of Ho Chi Minh City.

Mr. Nguyen Viet Son (HO CHI MINH)

Ladies and gentlemen, good afternoon. I am very happy to make a presentation at this Asian-Pacific City Summit Working Level Conference. I would like to speak about the general outline of Ho Chi Minh City and the Water Supply Company.

Vietnam is an ASEAN member country, located in Indochina, on the side of the East China Sea. It consists of 61 provinces and cities and Ho Chi Minh City is one of the 21 largest cities. The other is Hanoi. With an area of around 2,000km², the city has 17 inner districts and 5 suburbs. Its population was over 5 million as of the end of 1998. The city is an economic, financial, trade and industrial center of Vietnam.

In terms of economic aspects, the GDP of Ho Chi Minh City was 63 trillion, 623 billion VND in 1998 and its growth rate was 9.0-9.2%. The average per capita income is 1,000 USD/year compared with the national average of 300 USD/year. The standard of living for the city inhabitants has been significantly improved, leading to increasing water demands.

The supply of clean water for the residents' domestic use started long ago when Ho Chi Minh City was still called Saigon. Under French colonial rule, water was mainly taken from shallow aquifers. The city adopted French technology and formed a network of many shallow and central wells connected by pipes. The total amount of intake



through this well system was 180,000m³ per day. Under the former regime, groundwater sources could not meet the demand growing with development. In order to supply water to the whole area of Saigon, Gia Dinh and the Bien Hoa Industrial Zone, a project to exploit surface water, was started in 1963 under an American assistance program. Under this project, the Thu Duc water supply system was completed and brought into operation by 1966. Its initially designed treatment capacity was 450,000m³/day.

The Ho Chi Minh City Water Supply Company was established upon the transfer and inheritance of the right of the above water supply system in 1975. Ever since, the company has made every endeavor for the continuous operation of the Thu Duc Water Treatment Plant, which was included in this water supply system. We not only continued its operation, especially even during the embargo, but also have increased its treatment capacity to meet the incessantly growing water demand. The pumping capacity was increased to 560,000m³/day in 1981 and further to 650,000m³/day in 1985. In 1991, all the 6 raw water pumps at the Hoa An Intake were replaced by new pumps with 2,250HP/motor to ensure a pumping capacity of 670,000m³. Accordingly, the treatment capacity of the Thu Duc Water Treatment Plant improved gradually and now is actually at 650,000m³/day, which is the highest treatment capacity of any single water treatment plant in Vietnam.

Recently under the BOT scheme, a second surface water treatment plant was constructed and brought into operation in August 1999. This is the Binh An BOT Water Treatment Plant with a treatment capacity of 100,000m³/day. The plant sells treated water in bulk volume to the Ho Chi Minh City Water Supply Company.

Besides surface water, nowadays the company keeps exploiting underground water through 37 industrial deep wells with a total capacity of 30,000m³/day. We take 12,000m³ of water every day, which is treated at the Binh Tri Dong Groundwater Treatment Plant. The company also purchases treated water in bulk volume at about 42,000m³/day from the Hoc Mon Groundwater Treatment Plant.

Simultaneously with the rehabilitation and expansion of water sources, our water distribution network has been continually improved through the restoration of eroded pipes and the development of new pipelines, as well as through the replacement and installation of water meters in the service area. The area includes 22 districts and suburbs of Ho Chi Minh City, the Bien Hoa Industrial Zone and part of Thuan An Suburb in Binh Duong Province. Actually, the distribution network of the Ho Chi Minh City Water Supply Company is 3,181km long. The diameters of the distribution pipes range from 20mm to 2,000mm, stretching over 280,000 meters. Regular rehabilitation and maintenance have also helped the company significantly reduce water loss percentages in the system from 43% in 1992 to 31.6% in 1998.

In spite of these endeavors, the water sector of Ho Chi Minh City still cannot meet

the demand growing with the development of the city. Therefore radical measures to overcome the present supply deficit for demand are to build up and develop new water supply systems for a substantial increase in the treatment amount and distribution capacity, and at the same time to improve water quality.

Facing such demand from development, the Ho Chi Minh City Water Supply Company needs to diversify its investment sources for the construction of waterworks facilities. Besides, the company is discussing an increase in water charges, which are actually too low to support the costs of system maintenance, rehabilitation and expansion. The present water charge structure of the city is as follows:

- Water charge for domestic use: 1,000VND/m³ within the limit of 4m³/month per capita with a surcharge for development of 300VND/m³; 1,500VND/m³ for over 4m³/month per capita plus a surcharge of 600VND/m³
- Water charge for industrial service: 2,500VND/m³ plus a surcharge of 600VND/m³
- Water charge for commercial service: 4,700VND/m³ within the limit of 8m³/month plus 600VND/m³ surcharge; 4,700VND/m³ for over 8m³/month plus 4,000VND/m³ as surcharge.

Next, I'll talk about the water source and treatment process of the Dong Nai River water in Vietnam. In Ho Chi Minh City, there are 2 main rivers, the Dong Nai River and the Saigon River. The Dong Nai River is the main water source for the city. Besides surface water, the city has quite a generous reserve of underground water, which can be exploited on an industrial scale in a certain area of the city. However, the city has some regions totally lacking fresh water sources such as the Can Gio suburb. Both surface water and underground water are saline there.

The Dong Nai River plays a very important role in the development of industrial production and domestic life of not only the inhabitants of Ho Chi Minh City, but also of more than 7 million people who live in the river catchment area in other provinces such as Tay Ninh, Binh Duong and Dong Nai. The river is the main water source for domestic use as well as industrial and agricultural production. Also the aquatic ecological system of its downstream and estuary areas facilitates the development of fisheries and maintains biological diversity.

According to measurements, the pH level of the Dong Nai River water varies from 6.1 to 8.3, meeting the standard as a water source for the urban water supply of Vietnam. However, the value varies according to seasons and has a tendency to decrease gradually from the upstream to the downstream.

The conductivity of the Dong Nai River water changes from 54 to 83μS/cm, which is within the permissible limit of surface water normally at 50-500μS/cm. However, at certain points the value of water conductivity dramatically increases as it does in Cat Lai, where it may augment to 6,000μS/cm. This is perhaps due to the impact of the wastewater from industrial zones, but especially due to salinity intrusion. The conductivity tends to grow

upstream and to diminish progressively downstream. At the same time, it tends to be high in the dry season and considerably low during the rainy season.

The suspensions in the Dong Nai River water perceptibly increase from upstream to downstream. Although the value meets the standard in the dry season, it rises considerably during the rainy season. And it always exceeds the permissible value between May and August.

The values of almost all heavy metals in the Dong Nai River water are lower than the permissible standard of Ho Chi Minh City. However, this excludes mercury and chromium, whose values are a little higher than the standard from time to time. This must be an alarming sign indicating the necessity for due attention and for appropriate timely measures to reduce the contamination risk of the river.

The contents of dissolved oxygen, DO, and of organic substances, COD/BOD of the Dong Nai River show that its water starts being polluted due to drainage from Bien Hoa Town and industrial zones in Dong Nai Province. The DO content varies between 4 and 6.8mg/liter compared with the permissible level of over 6mg/liter. The COD's concentration is 4.5, which is the lowest from June to August, and significantly augments during the last months of the dry season. This increases the pollution risk of the water source for Bien Hoa Town and Ho Chi Minh City.

The risk of biological pollution of the Dong Nai River is growing higher and higher due to the rapid development in the riparian residential areas, while no proper measures have been taken thoroughly and timely in order to limit the pollution resulting from domestic wastes. The content of the coliform group shows that the Dong Nai River water is contaminated with microbes of a value 1.5 to 2.5 times higher than the standard. Nevertheless, treating biological pollution and contamination with organic matters is not so hard at the Thu Duc Water Treatment Plant.

Besides, it should be noted that the Dong Nai River also has been polluted with oil and fat mainly due to vessel movements and industrial wastewater. The content of oil and fat in the water varies in the range of 0.01-0.8mg/liter. This contamination is not subject to any rules, which proves that it is difficult to control pollution whose source is unidentified.

Not only in Ho Chi Minh City, but the Dong Nai Province also takes raw water from the Dong Nai River. The water is supplied through the existing Bien Hoa Water Treatment Plant and the Thien Tan Water Treatment Plant currently under construction with a treatment capacity of 42,000m³/day and 100,000m³/day, respectively.

Now let me talk about the treatment process of the Dong Nai River water. The water is treated at the Thu Duc Water Treatment Plant. Starting from a raw water pumping station in Hoa An with 6 vertical pumps, the system goes on for several kilometers.

Raw water pumped to the treatment plant passes through a junction well to reduce the water pressure before flowing into the treatment process. From the junction chamber,

water flows per gravity through 2 pipelines with venturi to record the flow of raw water going into the plant. Based on the river water quality, as well as water analysis results of the laboratory, an appropriate dose of alum is injected into the water. In order to maximize the effect of coagulation, water mixed with alum is sent into 2 preliminary mixing basins. After mixing for about 3 minutes, water flows into a flocculation basin.

The process of coagulation and flocculation lasts approximately 15 minutes, when an electrochemical reaction on the surface produces tiny positive flocs. Alum is used to trigger this reaction.

Water carrying these flocs passes through the water distribution channel, and is distributed equally into 5 horizontal sedimentation basins measuring $140 \times 20 \times 4.3$ m in dimension. Here, flocs formed during the coagulation and flocculation process are removed from the water because of their weight. This sedimentation process lasts about 2 hours and 30 minutes.

After the flocs are settled, water flows into the last phase of the treatment process, that is, rapid filtration. It is performed by 20 filters measuring $12.6 \times 10.3 \times 4.5$ m. This is a physical process to remove flocs bigger than $5-10 \mu\text{m}$. Therefore, filtration cannot remove all of the tiny flocs that still remain in water if the coagulation and flocculation process is inefficient.

To ensure water quality, water is sent to 2 secondary mixing basins after filtration, where chlorine for disinfection, lime for pH adjustment to 7-7.5 and fluorine for the teeth are added. Finally, water flows into 4 clear water reservoirs with a total storage volume of $260,000\text{m}^3$, waiting for the distribution through the transmission pump room equipped with 3 big and 2 smaller pumps. The total distribution capacity is $730,000-800,000\text{m}^3$ per day.

This concludes my presentation on the water supply of Ho Chi Minh City. Mr. Vo Quang Chau, director of the Water Supply Company will answer your questions.

(Applause)

Discussion

Chairperson (Mr. Hiroto Oda)

Thank you very much, Mr. Nguyen Viet Son from Ho Chi Minh City. We have listened to a presentation about efforts to deal with water demand growing along with development, and on the present situation of water quality control as well as the water treatment process at water treatment plants. It seems that well-planned installation and replacement of distribution pipes greatly contributed to the reduction of water loss. Are there any questions?

Mr. Yoshinobu Yonekawa (UN DEPARTMENT of ECONOMIC and SOCIAL AFFAIRS)

I am Yoshinobu Yonekawa of the Department of Economic and Social Affairs of the United Nations. I believe the report is of great significance in that it also addresses financial issues. Particularly, the presenter touched on BOT. I listened with much interest to the story of the Binh An BOT Water Treatment Plant. In the case of BOT, one of the most important points for investors is to secure returns without failure. I understand that the plant sells water to the Ho Chi Minh City Water Supply Company. I would like to know how they sell water. Is there any rule stipulating the minimum purchase amount? Also who decides the amount?

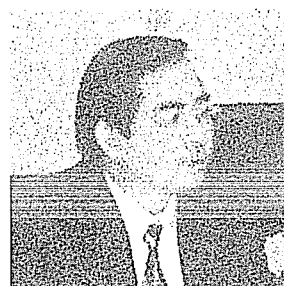
Chairperson (Mr. Hiroto Oda)

Thank you, Mr. Yonekawa of the United Nations. Mr. Vo Quang Chau from Ho Chi Minh City, please.

Mr. Vo Quang Chau (HO CHI MINH)

Mr. Chairman, thank you very much. Please allow me to take the liberty of sitting while answering.

Ho Chi Minh City, like other cities, has made progress in urban planning. Urbanization as well as industrialization contributed to the soaring water demand. Now our water supply meets only 60% of the total demand of the city.



The water supply of Ho Chi Minh City is insufficient, which is a great disadvantage. Thus the Ho Chi Minh Water Supply Company pursues water development, for which financial issues are essential. In addition to our own funds, we have various loans at low interest rates from foreign governments as well as further financial assistance from private companies.

With the goal of supplying 1,700,000m³ of water by 2005, we are trying to seek ways to raise funds, including BOT. We are planning a project with the aid of foreign assistance on the scale of about \$300 million. We are at the stage of implementing our water resource development project based on the BOT scheme. As mentioned, Malaysian assistance resulted in the completion of a water treatment plant on August 1, 1999.

To facilitate assistance from various governments and related organizations, we believe it is important for us to guarantee production, remittance of foreign money orders and other issues. The Water Supply Company committed itself to purchase all the produced water. For example, if 100,000m³ of water are produced, we will pay the amount equivalent to that, even if we cannot purchase all the water for some reason on our side. This is one of the conditions. I hope this answers the question.

Chairperson (Mr. Hiroto Oda)

Has that answered your question, Mr. Yonekawa? Any other questions?

Ms. Keiko Yamamoto (JICA)

Thanks to the kindness of the Ho Chi Minh City Water Supply Company, I visited some water treatment plants and conducted interviews, mainly about training, this past September. So I would like to take this opportunity to express my appreciation to the company. It was already mentioned, but I had the impression that the pressing need for development forced water treatment plants to treat more than their designed treatment capacity. Then, it was explained that water was not so badly contaminated yet and that reasonably good quality water was distributed. However, it was mentioned in the presentation that 7 million residents live along the Dong Nai River, which has worsened water pollution. Therefore, I would like to ask about the relation between the deteriorating water quality and water intake source of this water treatment plant. How are you tackling this situation?

Mr. Vo Quang Chau (HO CHI MINH)

Judging from your story, you are very familiar with the situation of city water in Vietnam, especially in Ho Chi Minh City. Since you visited various water treatment plants, I figure you know about the situation well.

The treatment capacity of the Dong Nai Water Treatment Plant was 450,000m³/day. Financial situations did not allow us to construct a new plant. However, we were able to increase the treatment capacity to 650,000m³/day by improving part of the existing plant. In spite of that, we actually have to treat even more water than that, which makes for a so-called "over-loaded" situation. Even so, water safety is always secured.

Also, with Swedish assistance, a pump facility was constructed 40km away from the upstream of the Dong Nai River. It further improved water quality. However, the Dong Nai River is huge. It serves as a water source used by 7 million people living along it. Therefore, we pay special attention to the preservation and protection of its environment.

In 1998, a law concerning environmental protection was adopted. Ho Chi Minh City, in cooperation with local administrative institutions along the river, is always committed to the preservation of its surrounding environment.

We plan to draw up a document as a legal standard subordinate to a law, and draw up detailed rules to preserve the water quality and environment of the river basin. A practical law stipulating strict penal provisions is also to be formulated. In addition, we intend to heighten the awareness of the people living along the river through education, as well as public relations activities.

Chairperson (Mr. Hiroto Oda)

Thank you, Mr. Vo Quang Chau. There are difficulties in taking water from the Dong Nai River as well as in increasing the water treatment capacity of the water treatment plant. They are well aware of the importance of environmental preservation along the river, and thus are making further efforts by cooperating with related organizations, making laws and educating citizens.

Ms. Keiko Yamamoto (JICA)

I have another question. I have visited various countries and one issue that is mentioned in most countries is privatization. What is important from now on is how to strike a balance between privatization and safe water supply, which is today's theme. I hear that following the Malaysian assistance, you will then receive BOT from a French company. How does the Ho Chi Minh City Water Supply Company manage water quality? How do you regulate it? I would like to hear your ideas about these issues, including measures to be taken.

Mr. Vo Quang Chau (HO CHI MINH)

As a public corporation directly managing city water, we believe water quality should be strictly managed even with the growing trend of privatization. Although Ho Chi Minh City uses the Dong Nai River as its water source, geographically the river does not actually run through the city. Therefore learning how to keep a closer and better relation with its adjacent areas is a big issue.

In the near future, based on a long-term perspective, we intend to build a structure to take sufficient measures to preserve water quality and the environment with the cooperation of local administrations in the area.

Chairperson (Mr. Hiroto Oda)

Thank you very much. Has that answered your question?

Ms. Keiko Yamamoto (JICA)

What about guaranteeing city water?

Mr. Vo Quang Chau (HO CHI MINH)

When the private sector is involved in water supply services, firstly, it is important for us to guarantee water quality. But at the same time, a company that produces water is required to promise or guarantee its water quality.

As a result, representatives of both the company producing water and our company will together conduct tests on the produced city water, and confirm whether water quality

is maintained or not.

This means that the Ho Chi Minh City Water Supply Company, as an authorized organization equivalent to an administrative institution, always checks the water quality even if it is under the BOT scheme. Let me give you one example of administrative measures. If a city water sample we check does not meet the standard or is below the standard, we impose a fine against the sample case based on the rule.

When an indicator of microbes does not comply with the standard, we will prohibit or suspend production, take away the company's license, or demand relevant compensations.

Chairperson (Mr. Hiroto Oda)

Mr. Vo Quang Chau, thank you very much. He pointed out that it is important for a private company to guarantee the quality and amount of city water it produces. As an administrative organization, the company continues to check the water even if it is produced under the BOT scheme.

This concludes the presentations given by each city and the Q&A session. We will take a coffee break here.

Volunteer Group Activity Report

Ms. Michiko Kawaguchi

Director

Hakata-Yumematsubara no kai

Chairperson (Mr. Hiroto Oda)

Now I would like to move on to a report about the activities of a citizen's volunteer group. As for the organization, "Hakata-Yumematsubara no kai" and its Director, Ms. Michiko Kawaguchi, please refer to your handouts. Ms. Michiko Kawaguchi, the Director of "Hakata-Yumematsubara no kai," please.

Ms. Michiko Kawaguchi (HAKATA-YUMEMATSUBARA NO KAI)

Thank you for your introduction. I am Michiko Kawaguchi. On the occasion of this significant working level conference, I am greatly honored to have been given the opportunity to introduce the modest activities of our citizen's campaign. In the 20 minutes that I have been given, I will use slides to facilitate my brief report. Would you please show the first slide?



This is a reclaimed beach in Momochi. In Fukuoka, approximately 130 rivers flow into Hakata Bay. We wanted to recreate the pine grove areas that used to be on this reclaimed beach along Hakata Bay. We made a nationwide appeal for contributions to