Overview of Drinking Water Quality Management in Japan

日本の水道の歴史について

Yasuo Yanagibashi, MHLW, Japan

厚生労働省　柳橋泰生

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Yasuo YANAGIBASHI
Director, Office of Drinking Water Quality Management
Ministry of Health, Labour and Welfare

1. The beginning of water supply systems in Japan

The first water supply system in Japan was built in the Warring State Period in the 16th century. Each of the warring lords built a big town around the castle in the area he occupied, where securing a supply of drinking water and domestic water was a vital challenge for them. In 1545, the Hayakawa Water Supply System was built in Odawara, which was the main city in the Kanto Area at that time. In 1590, when Hideyoshi Toyotomi, who later in the same year gained full control of the nation, transferred Ieyasu Tokugawa to Edo (now Tokyo), the construction of the Koishikawa Water Supply System was started (this system was later rebuilt as the Kanda Water Supply System). Ieyasu Tokugawa assumed control of the nation after the Battle of Sekigahara in 1600 and established a shogunate government in the city of Edo. Edo then started its history of development as the nation's political capital. In 1654, the Tamagawa Water Supply System (43 km (27miles) in length and with a 92 m (302feet) difference in elevation) was completed in Edo. This system is considered to be the original form of the current water supply systems in Tokyo and is still partially in use in the current system. It is estimated that the Tamagawa Water Supply System supplied water to 1.2 million people in Edo, which with a population of approximately 2 million, was the largest city in the world at that time in 1787. In the same period, about 40 other cities and towns constructed a similar water supply system.

In 1854, the Japanese government signed the Japan-U.S. Treaty of Amity and Japan opened its doors to other countries for the first time since the beginning of the 200-year long period of isolation. As international exchange became more active, waterborne infectious diseases, such as cholera and typhoid, started to invade Japan from other countries and spread through the nation. In the first 20 years of the Meiji Era (1868–1912), more than 410,000 Japanese were infected by cholera bacteria, and more than half of those infected lost their lives. The outbreak served as an alarm signal for the government officials who in turn recognized the need for a modern water supply system. The momentum to build water supply systems was especially high in towns near a harbor, where the threat of a cholera attack was higher.

2. Spread of the modern water supply systems

In 1883, the government of Kanagawa Prefecture invited a British engineer, Henry Spencer Palmer, to carry out a survey and to design a pressurized water supply system that could continuously supply filtered water in Yokohama through iron pipes. The construction was finished in 1887, and the system, which carried water from the Sagami River, started services. Following Yokohama, water supply systems were constructed and services were started in Hakodate, Nagasaki, Osaka, Tokyo, Hiroshima, and Kobe.

By 1930, as many as 700 water supply systems were completed in Japan. After a government funded subsidy system for small water supply service was started in 1952, construction of water systems proceeded at an accelerated rate. By 1960, as many as 14,984 systems were built, supplying water to 53% of the nation's population. The number of systems reached 19,364 in 1970, but decreased to 14,580 by 2000 due to the integration of small systems into a single comprehensive system that covers a wider area. More recently, the official definition of private water supply systems was changed in 2002 to cover a wider range of systems, and as a result, the total number of systems on record in the same year (17,599 systems covering 97% of the nation's population) became higher than the previous year.

3. The current legal system regarding water supply systems in Japan

The high rate of spread of the current water supply systems in Japan is largely due to the Water Works Law, which was established in 1957 aimed at the well-planned construction of water supply systems and the protection and improvement of existing waterworks. Currently, the following types of systems are supplying water to consumers in Japan under the regulations listed below.

It should be noted that the Water Works Law specifies a "water supply system" as a whole facility that is used to supply water suitable for human consumption (i.e., drinking water) through pipes and other types of structures. Facilities that are temporary constructions are exempted from the scope of the law.

(1) Types of water supply systems

a. Water supply service:

A service that supplies drinking water through a water supply system to a population of 101 or larger, responding to a demand from the public.

b. Small water supply service:

A service that supplies drinking water through a water supply system that supplies water to 5,000 consumers or fewer. Although not defined by the Law, water supply service that supply water to more than 5,000 people are customarily referred to as “jo-suido jigyo” (literally “upper water supply services”).

c. Wholesale water supply service:

A service that provides water to water suppliers.

d. Private water supply system:

A water supply system for private use at a school or company dormitory, sanatorium, or other type of public housing whose the number of consumers exceeds 100 or whose maximum daily capacity of water supplied exceeds 20 cubic meters (706 cubic feet).

e. Small scale private water supply system:

A water supply facility that uses water supplied by a water supplier as the only water source and is equipped with water tank(s) whose total effective capacity exceeds 10 cubic meters.

(2) Obligations and regulations in accordance with the type of water supply system

The Water Works Law provides the following regulations according to the type of water supply system.

a. Applicable to all types of water supply systems:

i. Application of drinking water quality standards:

The standards that apply to water that is supplied by a water supply system are specified by the Ministry of Health, Labour and Welfare (MHLW).

ii. Application of facility standards:

The technical standards that apply to water supply facilities are specified by the MHLW. These standards also include those for chemicals, such as coagulants, pH control chemicals, and powdered activated carbon.

b. Applicable to water supply service, wholesale water supply service, and private water supply system

i. Notification and inspection prior to the start of service:

Prior to the start of a water supply service, water suppliers, etc. must notify the Minister of Health, Labour and Welfare of the start of service and carry out inspections of the water quality and facility.

ii. Technical administrator of water service:

Water suppliers, etc. must employ a technical administrator for the water service to take charge of technical matters.

iii. Water inspection:

Water suppliers, etc. must carry out regular and emergency water inspections to check the quality of the water they supply.

iv. Health check:

Water suppliers, etc. must provide regular and emergency health checks for employees who work at intake facilities, purification plants, or drainage basins.

v. Hygienic measures:

Water suppliers, etc. must take hygienic measures, including disinfection of the water by chlorine.

vi. Emergency suspension of water supply:

Water suppliers, etc. must immediately suspend the water supply and notify related authorities should the supplier learn of the possibility that the water being supplied is harmful to public health.

vii. Consignment of services:

Water suppliers, etc. may consign technical practices concerning water management to another water supplier, the private sector, etc.

c. Applicable to water supply service and wholesale water supply services

i. Authorization of business operation:

Any parties who are planning to start business as providers of water supply services must obtain authorization from the Minister of Health, Labour and Welfare. When a supplier expands its service area, the change of business operation must be authorized by the Minister. Authorization of water supply service and wholesale water supply services with 50,000 or fewer customers is made by the prefectural governor concerned.

ii. Permission for suspension and discontinuation of service:

Water suppliers, etc. may not suspend or discontinue the water supply service without authorization from the Minister of Health, Labour and Welfare. When a water supplier, etc. transfers all the practices of its water supply operation to another party, it must notify the same Minister of the transaction.

iii. Supervision of construction by an engineer:

Water suppliers, etc. must have a qualified engineer supervise the construction of water facilities.

iv. Provision of information:

Water suppliers, etc. must provide consumers with information on the plan and the results of water quality inspections and other matters.

d. Applicable to water supply service

i. Water supply regulations:

Water suppliers must lay down regulations concerning water supply conditions including the water rate.

ii. Obligation to supply water:

Water suppliers may not refuse a request for a contract to supply water from a consumer inside its service area without a justifiable reason.

iii. Water service installations:

Water suppliers may refuse a request for a contract to supply water when the structure or material of the consumer's water supply equipment or facility does not comply with standards designated by the government ordinance. Water suppliers may appoint the builder of the water service installation. Water suppliers may enter the land and/or buildings of the consumer in order to carry out inspection of the water service installation.

iv. Request for inspection:

The water consumer may request the water supplier to conduct inspections of a water service installation and the quality of the water supplied.

v. Installation of fire hydrants:

Water suppliers must install fire hydrants to be used for public fire-fighting operations. (Small-scale water utilities are exempted from this regulation.)

e. Applicable to private water supply systems

i. Confirmation of conformity of facility standards:

Parties who are installing a private water service installation must have the prefectural governor confirm that the facility conforms to the applicable facility standards prior to the start of construction.

f. Applicable to small scale private water supply systems

i. Compliance with management standards:

The party who installs a facility must manage the facility in compliance with the ordinance of the Ministry of Health, Labour and Welfare.

ii. Inspection of management status:

The party who installed the facility must allow inspection of the management status at least once a year by an organization of the local public corporation or an inspection organization registered with the Minister of Health, Labour and Welfare.

(3) State subsidy for facility construction

The Water Works Law states that the state government may subsidize local public corporations that provide water supply service or wholesale water supply service to cover part of their costs. The subsidies from the state government for water supply services are classified into two types: subsidies for the development of water resources or the construction of advanced water treatment and other facilities by water supply services and wholesale water supply services; and construction of facilities for small water supply service. These government subsidy systems have promoted the spread of water service installations and suppressed possible regional differences in water utility rates.

In fiscal 2003, approximately 150 billion yen was budgeted for these subsidies.

4. History of the legal system for waterworks

(1) Enactment of the Waterworks Ordinance

In 1890, when the Waterworks Ordinance (the “old Water Works Law”) was instituted, municipal governments were the only type of organization that were authorized to operate waterworks. The government recognized that operation of drinking water service

installations, which had a public mission to prevent epidemics of cholera and other infectious diseases, should not be consigned to the private sector, for it would impose a substantial influence on the administration of hygiene. The ordinance went through five stages of amendment, and as a result, eventually allowed non-governmental bodies to construct and operate water service installations. In addition, a certain part of the authority of the Minister of Home Affairs was entrusted to prefectural governors.

(2) Enactment of the Water Works Law

In 1957, the current Water Works Law was enacted after some flaws were recognized in the old law. For example, many cases of epidemics of waterborne infectious diseases originated from water service installations for private use, which were not covered by the old law.

The new Water Works Law stipulates the obligations of the water suppliers in their business operation and hygiene and safety measures. It also regulates procedures for state subsidies and the operations of wholesale water supply services and private water service installations.

(3) Amendment of the Water Works Law

While water supply systems spread over a wide area of Japan rapidly after the enactment of the Water Works Law, some serious problems have arisen. The rapid growth in population and industrial activities have imposed a large burden on the existing water supply systems. The concentration of population in large cities and the progress of industrialization has brought serious problems with the quality of water at its sources. Under these situations, the need for water resources development and enlargement of water supply areas has become more clearly recognized. In response to these situations, a new state subsidy system was established in the budget for fiscal 1967.

In 1977, the Water Works Law was amended to allow the following items: 1) Prefectural governors may carry out the Water System Arrangement Plan for Wide Area Supply at the request of the local public entities concerned, 2) water suppliers, etc. may request the governmental institutions concerned to take appropriate measures to maintain the water quality at its source, and 3) systems that supply water using a storage tank with a certain size (systems in buildings that obtain their water from a water supplier, for example) are defined as small scale private water supply systems and specific regulations apply to these systems.

The amendment of the law in 1996 stipulated the licensing system for water system construction companies. Until then, each water supplier could designate the construction company for water supply facilities following the local ordinance and other regulations. In this amendment of the law, a national licensing system was established for engineers for the construction of water supply facilities. This amendment allowed qualified engineers to work in water supply facility construction at the request of a supplier located anywhere in the nation.

The amendment in 2001 was made under the main theme of "enforcement of waterworks management systems." It permitted the entrustment of management practices to third parties and facilitated the procedures to merge water suppliers. A new definition, private water supply system, was applied to water supply systems that had a high capacity but had not been regulated by the law. The amendment also clarified the responsibilities of water suppliers and installers of storage tanks that are stated in water supply regulations determined by the supplier. Disclosure of information to water consumers was also encouraged in the amendment.

In 2003, another amendment of the Water Works Law was made to introduce new provisions on water quality inspection. Before this amendment, designation by the Minister of Health, Labour and Welfare had been required when a water supplier chose a water quality inspection institution to whom to entrust their water quality inspection and inspection of the management status of private water supply facilities. In this amendment, however, a registration system for such inspection institutions was introduced. Now the institutions are required to meet the registration standards, including items to ensure the credibility of these inspections.

(4) Current status of water quality standards

The Waterworks Ordinance (the "old Water Works Law") of 1890 did not include provisions for water quality standards. In 1908, the Waterworks Council laid down the Agreed Method of Examination as the national standard method for inspecting the water quality. In 1958, the Drinking Water Quality Standards were established based on the current Water Works Law, which was enacted in the previous year. After amendments in 1960, 1966, and 1978, the standards went through a substantial amendment in 1992. In May 2003, about 10 years after the previous amendment, water quality standards were revised one more time in part in response to the amendment to the Guidelines for Drinking Water Quality by the World Health Organization (WHO). The latest standards have been effective since April 2004.

5. Conclusion

For Japanese waterworks, the 20th century was an era in which its services were extended to consumers throughout the nation. How to carry on these services in a sustainable way is a critical challenge for waterworks in the 21st century. Specifically, sustainable operation, including proper replacement, maintenance, and management of the existing facilities, must be carried out as the nation's population is decreasing rapidly. In addition, while the spread of the water supply systems has reached 97% of the population, the rest (approximately 4 million people) still depend on well water, which does not necessarily supply an appropriate quality of water. Appropriate measures need to be taken especially in these areas to improve the water quality management systems.

In June 2004, the Ministry of Health, Labor and Welfare issued their "Vision of water services," a long-term plan for the nation's water supply services. The Vision will be a fundamental tool to develop governmental measures for the forthcoming years.

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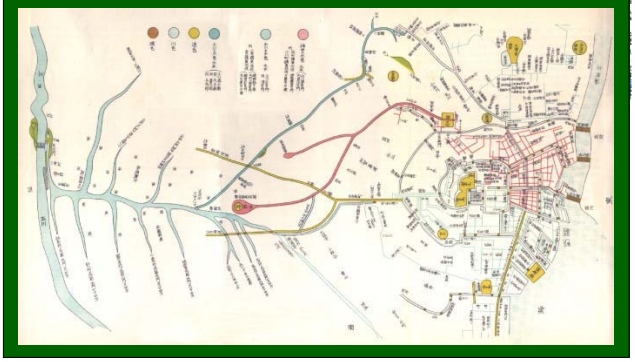
Yasuo YANAGIBASHI
Office of Drinking Water Quality Management
Health Service Bureau
Ministry of Health,Labor and Welfare

History of Waterworks

16th Century:The Warring State Period
Construction of Castle Towns
1545 Hayakawa Josui
17th Century: Edo Period
(1590 Koishikawa(Kanda) Josui)
1654 Tamagawa Josui
Waterworks in About 40 Cities

江戸時代の水道
正徳末頃(１７１５～１７１８)の図



現在の羽村取水堰

東都名所
御茶の水付近の樋管（広重）

Modern Water Supply System

- *1854 Opening of Japan*
  (1639 National Seclusion)
- *Prevalence of Cholera and Typhoid Fever*
- *1887 The First Modern Waterworks in Yokohama City*
- *Today 97%(Population Coverage)*

淀橋浄水場起工式の図
（明治２６年１０月）

Conclusion

- *20th century: throughout the nation*
- *The nation's population is decreasing*
- *Proper replacement,maintenance*
- *4 million people still depend on well water*
- *The vision of water services*