

In 2018, Kitakyushu City was selected, the first city in Asia, as "World Model City for Promotion of SDGs" by OECD (Organization for Economic Cooperation and Development) and also selected by Japanese government as "SDGs Future City."
 For the future, we will work toward "SDGs" as a leading runner of Asia in order to make our city "the most pleasant place to live in Japan."

The FY 2019 edition "Water and Sewer Bureau, Kitakyushu City Outline of Projects"

What are the SDGs (Sustainable Development Goals)?



SUSTAINABLE DEVELOPMENT GOALS
 17 GOALS TO TRANSFORM OUR WORLD

Public Private **ACTION** for Partnership!!

~ Cheer up Japan and give courage to the world people through SDGs; it's you that play the leading part! ~

- ① Goals of world development adopted by all the members (193 countries) at the United Nations World Summit in September 2015
- ② Goals that are to be tackled not only by developing countries but by advanced countries
- ③ Objectives of actions up to 2030, made up of 17 goals and 169 targets
- ④ Issues and objectives to be tackled and accomplished by whole Japan; also, as a local government, Kitakyushu City is to make citywide efforts for accomplishment in cooperation with citizens, enterprises and organizations concerned

Kitakyushu City Water and Sewer Bureau's mascot character

"Suippy"



The Water and Sewer Bureau's mascot character "Suippy" was born in 1993, the 30th anniversary of municipal system, originating from "Sui, that is, water in Japanese" and "Happy" with the hope that it would be popular among citizens to be a symbol of the Bureau. The vivid and charming Suippy is seen on the homepage of Water and Sewer Bureau and many events held by the Bureau.

The FY 2019 edition
 Water and Sewer Bureau, Kitakyushu City

Outline of Projects



"Suippy"
 Kitakyushu City
 Water and Sewer Bureau's
 mascot character

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Water tank truck additionally deployed in March 2019
(A scene at the joint emergency drill with
Kyushu Branch Office, Japan Water Works Association)

<Bottom right>

Extension of rainwater storage piping
(Sakuramachi-Kitaminato rainwater storage piping,
start of use: June 2019)

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Japan-Cambodia Water Supply Forum
~ 20th anniversary of water supply technology exchange
between Kitakyushu City and Cambodia ~
(A scene of the commemorative speech by the senior minister
of Cambodia Ministry of industry and Handcraft)

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Preface

In Kitakyushu City, the demand for water has continuously been on a downward trend against the backdrop of the advance of the falling birth rate and aging population, enhancement of awareness of water-saving, use of groundwater by large consumers, etc. In addition, the environment surrounding the water utility and sewer system has drastically changed due to growing interest in the safety and taste of water, making the managerial issues more diversified and sophisticated.

In order to respond to the abovementioned issues, we have been making steady progress toward the managerial goal of “providing safe, secure and high-quality services, and maintaining the current water bill structure” based on “Kitakyushu’s Medium-term Management Plan for Water Utility and Sewers” (from FY2016 to FY2020) drawn up in April 2016.

Regarding the water utility system, we have selected projects for renewal of aging water pipes and measures against earthquakes as issues to be focused on. With these projects and measures, we will become able to prevent water leakage accidents due to aging waterworks or natural disasters, as well as working on the supply of safe and stable water. Also, we have been working on promoting new steps of regional cooperation such as entering into an entrustment agreement with the Munakata Region Service Association with regard to overall services for the water utility system in April 2016.

Regarding the sewer system, we will work on various projects including the implementation of measures against heavy rain and earthquake for creating a safe, secure and disaster-proof environment. Also, the diffusion of low-carbon sewer system, which can contribute to the progress of the eco-culture city, renewal and reconstruction of the facilities which can contribute to the promotion of maintaining and upgrading the citizens’ lives, improvement of combined sewage, and discussion with neighboring cities of widening will be pursued, and studies on the regional cooperation with the neighboring municipalities will be undertaken.

As for the overseas projects, we have been promoting the diffusion and demonstration of our original U-BCF (Upward flow Bio Contact Filtration) in Vietnam, and have been engaged in the expansion and development projects of waterworks and sewage systems in the Kingdom of Cambodia. As for domestic projects, taking advantage of the international strategic hubs for water business such as the Administration Building of the Hiagari Sewage Treatment Plant (Visitor Center) and Water Plaza, we will implement international technical cooperation projects effectively by accepting technical trainees and visitors.

In 2015, the “United Nations adopted the Sustainable Development Goals (SDGs)”, which determined 17 goals common in the world. In 2018, Kitakyushu City was selected, the first city in Asia, as “World Model City for Promotion of SDGs by OECD (Organization for Economic Cooperation and Development)” and also selected by Japanese government as “SDGs Future City.” At present, the city is working on the accomplishment of “SDGs” by citywide efforts.

SDGs’ 6th goal says “Provide safe water and clean toilet for all people in the world.” Kitakyushu City will cooperate with and support the countries and regions which have the same issues that Kitakyushu City overcame in the past by utilizing the accumulated technologies and know-hows, which enhances city’s own strengths, makes accumulated technologies to be handed down to city stuff and encourages human resource development.

We will also voluntarily work on various projects from now on, making use of technologies and know-hows so far accumulated, with the aim of creating water utility and sewer systems that will win confidence of the customers.

Here, we have prepared this FY2019 edition of the Outline of the Projects of the Water and Sewer Bureau to summarize the current conditions and up-to-date transitions. We hope you can make use of this booklet as a document for studying about the water utility and sewer system projects of Kitakyushu City.

NAKANISHI Mitsunobu, Chief Executive, Water and Sewer Bureau, Kitakyushu

I History of Water Utility

1 | Water utility and industrial water supply business

Water utility during the times of former five cities

The Water Utility in Kitakyushu City has a history that has spanned 100 years since the former Moji City started a part of water supply in 1911. During this period, the former cities: Wakamatsu, Kokura, Yahata and Tobata established Water Utilities one after another along with the development of each city, and have responded to the water demand of the customers through unique management.

Water Utility in the former Moji City

The former Moji City, which had thrived from early times as an international city since it was designated as a specific open port in 1889, was municipalized in 1899 earliest among the former five cities; however, the city was deficient in water in terms of geographical features, which had caused the prevalence of epidemics year after year. For this reason, the city was pressed to install water supply service, and embarked upon the construction of water conveyance, water purification and water distribution facilities, etc., commencing with Fukuchi reservoir in 1909. As a result, a part of water supply was started in 1911, and a full water supply in the next year, 1912. Thereafter, along with the development of the city, Kagumeyoshi, Matsugae reservoirs, etc. were constructed through the execution of the expansion, improvement works from 1st stage to 4th stage.

Water Utility in the former Wakamatsu City

The former Wakamatsu City used to be a deserted village by the middle of 1880s; however, since the city was endowed with a natural good harbor, namely Dokai Bay and further was located near the Chikuhō Coal Field, it had thrived as a center of the shipment of coal and was municipalized in 1914. However, a further development could not be expected because the city had peninsula-like geographical features and was deficient in water. In addition, since there was a great deal of damage from epidemics and fires, a water purification plant was constructed in Makiyama in the former Tobata City, and the water supply was started in 1912 by installing the submarine transmission pipe across Dokai Bay. Thereafter, Shobudani reservoir, Hatadani and Fujinoki water purification facilities were constructed through the execution of the 2-staged expansion works.

Water Utility in the former Kokura City

The former Kokura City, which used to thrive as a castle town of the Ogasawara Clan, had developed as a mercantile and military city in line with the establishment of a railroad in 1891 and the foundation of the Headquarters of the 12th Division of the former Army of Japan in 1898, and was given city status in 1900. The city, which was pressed for the necessity of waterworks along with the increase in the population, constructed Dobaru reservoir and a water purification plant in 1913, and started water supply in May of the same year. Thereafter, Kuzumaki, Imamachi and Jono water resources were established respectively through the execution of the expansion works from 1st stage to 3rd stage.

Water Utility in the former Yahata City

The former Yahata City, where the state-owned "Yawata Steel Works" with western style blast furnace began operation in 1901 for the first time in Japan, had become a big industrial city in line with the foundation of large or small affiliated companies. The city, which was municipalized in 1917, constructed Yamanokami

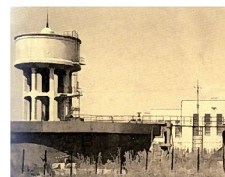
water purification plant because of the increase in the population and the development of these companies, and started water supply in 1930 upon receiving the divided water from Kawachi Reservoir and the water transmission pipe of Onga River of Yawata iron- and steel-making works. Thereafter, Yamanomisaki water purification plant and Hata Dam were completed through the execution of the 3-staged expansion works.

Water Utility in the former Tobata City

The former Tobata City used to be a fishing village; however, since the iron- and steel-making works was founded in the former Yahata City locating adjacent to the city, and the affiliated factories were constructed one after another therein, it had developed as an industrial city and was municipalized in 1924. In those days, the city had still received water supply from Wakamatsu, however, it constructed Otani water purification plant in order to dissolve such condition and started water supply in 1931. Thereafter, Otani water purification plant, and the water supply facilities for ship water and industrial water were reinforced through the execution of the expansion works.

Kitakyushu Water Supply Association (1952-1964)

Each of the former five cities had developed so far as to be mentioned as one of the 4 biggest Industrial districts in Japan, that is to say, the Kitakyushu Industrial area, while making use of respective geographical conditions. However, since the water resources on which each of the former cities had to depend were mostly limited to the Onga River, it was extremely difficult for each city to solve water supply problems independently in terms of the water rights and financial bearing capacity. In order to facilitate the establishment of sound finance as well as to drastically dissolve such water supply problems and to ensure the water resources, taking advantage of the designation as a specific area under the Comprehensive Development of the National Land in 1951, the Kitakyushu Water Supply Association was established in April 15 of the next year, 1952 upon consultation between the 4 cities (excluding the former Moji City) and Fukuoka Prefecture.



Construction work of installation of distribution pipe in the former Tobata City Jono Water Resource of the former Kokura City

The Kitakyushu Water Supply Association sought the Onga River for the water resource and embarked upon the expansion project immediately after its establishment. Isaza intake treatment plant and 1st Tonda reservoir had been already constructed as the prefectural water supply project; however, 2nd Tonda reservoir and Ano water purification plant were completed through this project. As a result, the capacity of water supply, which had been 156,000 m³ per day as of the establishment of the association, increased up to 288,000 m³ per day.

In addition, the 1st industrial water supply was completed and started water supply to Yawata iron- and steel-making works and other 10 companies in 1960. Thereafter, the association embarked upon the 2nd stage expansion project and 2nd industrial water supply, however, which were taken over by Waterworks Bureau of Kitakyushu City along with the inauguration thereof.

Water Utility of Kitakyushu City (1964~)

In January 1, 1964, the next year of the birth of Kitakyushu City, when the Water Supply Department of former Moji City and the Kitakyushu Waterworks Agency (Kitakyushu Water Supply Association was renamed as such in April, 1962) were consolidated, and at the same time, Waterworks Bureau of Kitakyushu City was inaugurated and Fukuoka Prefecture withdrew from the consolidation.

With the consolidation, Kitakyushu City had come to have a maximum capacity of water supply of 395,000 m³ per day with the major water resources in the Onga River, Rikimaru Dam, etc. However, the city was obliged to restrict the water supply for about 2 months totally because of a second straight year of drought in 1967 and 1968. (A service restriction of 170 days totally in the drought in 1978)

Then, the city held up the water resource development as one of its most important policies in order to respond to "water shortage" and an "increase in the water demand along with the development of the city", and had positively advanced such development, which resulted in the construction of Aburagi Dam in FY 1971, Masubuchi Dam in FY 1973 and the estuary weir of the Onga River in 1983, etc.

In addition, the city participated in the development of Yabakei Dam in Oita Prefecture beyond the prefectural boundary in 1977, which led to the flotation of the 5th stage expansion project.

Yabakei water conveyance channel as being a main of the project was completed in March, 1998, and the city facilitated the stabilization of the capacity of water resource by starting water passing from the water conveyance channel to Ideura water purification plant in Kokura-Minami Ward from April of the next year, 1999 prior to the completion of the water purification plant.

The expansion work of the Ideura water purification plant was completed at the end of FY 1999, which led to a maximum water supply capacity of 769,000m³ per day starting in FY 2000, consequently, our main issue was changed from "expansion" to "maintenance", because we had enough capacity and facilities for the water supply.

In October, 2006, the city established a water wholesale business to supply purified water to 1 city, 1 town and 1 association by making use of the circulated water of the North Fukuoka Emergency Transmission Pipe, and started supplying purified water to Munakata City and Shinguu Town since April, 2011. Also, the city started the supply to Okagaki Town in April, 2015, also started supply to Fukutsu City and Koga City in April, 2016, and to Kawara Town in April, 2017. In addition, the city integrated the water utility business of Ashiya Town in October, 2007 and that of Mizumaki Town in October, 2012. Other approaches to the expansion of regional cooperation in the water utility business were made, such as implementation of the entrustment agreement with the Munakata Region Service Association in regards to the overall services for the water utility business in April, 2016.

In April 2012, in order to improve the services for citizens and to facilitate business efficiency, the organization of the Waterworks Bureau was consolidated with that of the Sewer Section of the Construction Bureau, and the Water and Sewer Bureau was inaugurated.

Concerning the industrial water supply, the city integrated the 1st, 2nd and 3rd industrial water supplies, and the supply for Coal mining Areas in April, 2008.

History of the project after the inauguration of Kitakyushu City

(As of September 1, 2019)

Category	Name of project	Commencement year/month	Completion year/month	Capacity of water supply (m ³ /day)	Main construction works	
Main Water Utility	Water supply utility	2nd stage expansion Continued from the Kitakyushu Water Supply Association.	April, 1960	March, 1967	395,000	Construction of Rikimaru Dam Expansion of Ano Water Purification Plant
		4th stage expansion Water Supply Department of former Moji City	April, 1966	March, 1976	609,000	
		3rd stage expansion	January, 1975	March, 1984	710,000	
		4th stage expansion	January, 1977	March, 2008	769,000	
	Water wholesale	Establishment (Targets for water supply: Munakata District Association, Koga City and Shinguu Town)	November, 2006	March, 2011 (water supply started on Apr. 1, 2011.)	20,000	Installation of North Fukuoka Emergency transmission pipe Construction of Tarumi Balancing Reservoir
		Expansion project in the south of the city (Kawara Town)	April, 2014	March, 2017	21,000	Yobuno booster pump preparation project
		Onga River watershed expansion project (Okagaki Town)	—	—	23,000	—
Industrial water service	1st industrial water supply facilities	April, 1957	May, 1960	70,000	Construction of water intake from the Onga River (Isaza) Construction of Hatakedo Water Purification Plant	
	2nd industrial water supply facilities	April, 1960	March, 1969	112,000	Construction of Hikino Water Purification Plant, & Rikimaru Dam Raising the top level of Tonda Reservoir	
	1st, 2nd industrial water supply facilities	April, 1972	May, 1977	—	Construction of wastewater treatment facilities in the existing water purification plants	
	3rd industrial water supply facilities	July, 1971	August, 1983	47,000	Construction of the estuary weir of the Onga River Construction of Honjo Water Purification Plant, Odake Water Distribution Reservoir	
	Project for development of industrial water supply for coal mining areas	April, 1969	August, 1983	25,000	Same as above	
	Total	—	—	—	254,000	—

2 | Sewer system

Sewer system project during the time of the former five cities

The history of the sewer system in Kitakyushu City dates back to 1918 when the approval of the 1st stage sewer system project was obtained by the former Wakamatsu City. The preparation of the sewer system based on sewerage treatment as the modern sewer systems started in 1951 when the 2nd stage sewer system project in front of Kurosaki Station in the former Yahata City was approved. Thereafter, in the 3rd stage sewer system project in 1957, Kogasaki Sewage Treatment Plant (current Kogasaki Water Purification Plant) was approved as a simple sewage treatment facility.

Sewer System project in the former Moji City

The former Moji City was municipalized in 1899, earliest among the former five cities, and had thrived as a port of call for large vessels of foreign routes before World War II, however, the public sewer system was not yet constructed at the time of the five-city consolidation although the application for the approval had already been filed. The approval (drainage area: 147.5ha) was obtained in February 1963, which was just before the five-city consolidation, or the official inauguration of Kitakyushu City. Therefore, the public sewer system of the former Moji City was not realized, and the project was handed over to the new municipality.

Sewer System project in the former Wakamatsu City

Wakamatsu was municipalized in 1914. Four years later, in July 1918, the approval for the 1st stage sewer system project was obtained and the construction was started immediately. This was the 1st sewer system construction in Kyushu and the 11th in Japan as a government-approved construction based on the Sewerage Service Act proclaimed in 1900. However, it becomes the 2nd in Kyushu and the 14th in Japan if including those constructed in the Yokohama foreign settlement, Nagasaki and Shimonoseki before the proclamation of the Sewerage Service Act. The rain water and sewage combined system was adopted in the sewer system, and untreated water from the sewer system was directly discharged into the sea.

Thereafter, the work for the sewer system in Wakamatsu City had continued up to the 3rd stage in the middle of the 1930s. The total pipe length constructed during the 3 stages was 32,530m with a drainage area of 197.5ha, which covered approximately 30% of the urban area.

Then, the sewer system extension was constructed to the east of Meijimachi and to the south of Hamanbanmachi (current 1-chome and 2-chome of Honmachi). According to the history book of Wakamatsu City issued in 1937, the total pipe length was 9,345m with a drainage area of 24.8ha, while discharging sewage mainly to the south coast. However, the period and the outline of the construction are not described in the history book.



Trickling filter of Kogasaki Sewage Treatment Plant

6 sprinklers revolve and sprinkle sewage onto the filter bed with a diameter of 30m. The filter bed is made of cobblestone, crushed stones and sand piled up to 1.8m, in which microbes living therein purify sewage. Treated water was discharged into the Wariko River after the sterilization by chlorine. This photograph is of historic importance because Kogasaki was the only one using the trickling filter method after Tokyo City had adopted the trickling filter method in the first sewage treatment plant in Japan.

Sewer System project in the former Kokura City

There were some drain sewers in Kokura City, but they were not enough to be called a sewer system. There came a tide of public opinion requesting the construction of the sewer system in the latter half of the Taisho period, or the years around 1920. So, Kokura City requested Hachiro Kimishima, a professor from the Kyushu Imperial University, to carry out the investigation and to design the sewer system. Then, the city prepared the construction plan for sewer systems for all city areas

and filed the application. However, the government instructed them to reduce the construction range due to financial reasons, and the plan was approved for the area limited to the city center in 1925. In the following year, they obtained the approval for the construction and design and started the work in August, and the inauguration ceremony took place on April 2 in 1936.

Among the sewer systems constructed based on the Sewerage Service Act, the one in Kokura was the 3rd, following Wakamatsu and Oita in Kyushu. As it was a combined rain water and sewage system, untreated water from the sewer system was discharged into the sea and rivers.

The 1st stage project (with a drainage area of 71.2ha, a total pipe length of 29,625m, and a total construction cost of 944,000 yen) was launched in August 1926 and completed finally, 10 years later, in April 1936. The Sino-Japan War broke out in the following year, which resulted in the suspension of all sewer system constructions and extension projects in Japan. It was in September 1957, 20 years after the suspension, that Kokura City started the 2nd stage project with the drainage area of 382.3ha. In the project, the drainage canals of Mihagino and Komonji areas were for flood prevention.

Sewer System project in the former Yahata City

Yahata City started the 1st stage sewer system project in 1934. After World War II, it was expanded steadily to the 2nd stage in 1951, and the 3rd stage in 1957. During the 3rd stage, a sewage treatment plant conducting middle class water treatment by use of the trickling filter method was constructed in Kogasaki, and the inauguration ceremony was held just before the five-city consolidation. The sewer system and final sewage treatment plant could also accept human waste, and so was a revolutionary facility coming into operation for the first time in Fukuoka Prefecture.

Sewer System project in the former Tobata City

Tobata City launched the construction of the sewer system in 1958, under the municipal government of the mayor, Masamoto Shiraki. While major companies enjoyed their boom, Tobata City was the richest among the 5 cities in Kitakyushu. Thanks to the smaller city size, the construction made progress in a short time. Even during 5 years of the transition period after the five-city consolidation, the construction of pipes advanced rapidly.

In the beginning, sewage and rain water was discharged directly into Dokai Bay without any treatment. However, as there had been a future plan to install a final sewage treatment plant near the mouth of Sakaigawa River, pipes and drains were designed so as to connect to the final sewage treatment plant. For this reason, immediately after the Hiagari Sewage Treatment Plant (current Hiagari Water Purification Plant) had started its operations in 1970, the combined treatment of human waste and sewage became available.

Sewer System project after the foundation of Kitakyushu City

Full-fledged preparation of sewer system

Kitakyushu City started full-fledged construction of the

sewer system in 1963, when the former 5 cities were integrated to start as Kitakyushu City. In July of the same year, the Kogasaki Sewage Treatment Plant started its operations as the 1st sewage treatment plant in the city. The treatment method at the Kogasaki Sewage Treatment Plant was changed to the activated sludge method in 1966. Thereafter, the construction of Hiagari Sewage Treatment Plant, which was the 1st plant built after the inauguration of Kitakyushu City, started in August 1968.

Completion of Fujita Pump Station

Fujita Pump Station started its operations in 1963, however, the rain water pump station was newly built to respond to the increase in rain water flow in recent years and to improve safety against flood damage. In order to prevent heavily polluted rain water from discharging into the rivers and sea, the rain water reservoir is equipped with the pump station for temporarily storing polluted water initially and conveying it to the sewage treatment plant after the rain stops.

After March 1968, when the transition period had ended, the sewer system projects were integrated, and the full-fledged construction was started starting with Hiagari in April. After the Hiagari Sewage Treatment Plant started its operations in April 1970, the Shimimachi and Kitaminato Sewage Treatment Plants (current Shin-machi and Kitaminato Water Purification Plants) started one after another in April 1972. In July 1974, as early as 6 years from the start of the project, the total pipe length of the public sewer system reached 1,000km. The coverage rate of sewer system in Kitakyushu City reached 50% in March 1977, and thereafter the sewer system in the city expanded rapidly.

Coverage of sewer system and improvement of water environment

In October 1979, the Sone Sewage Treatment Plant (current Sone Water Purification Plant) started its operations, with which the 5 sewage treatment plants using the activated sludge method started to cover all areas of the city.

In January 1982, when 13 years had passed since the start of the full-fledged construction work, the total pipe length of the public sewer system reached 2,000km. And, the coverage rate of the sewer system reached 80% in March 1986. Furthermore, the total pipe length of the public sewer system reached 2,500km with a further increase of 500km in November of the same year. Thereafter, in June 1989, the total pipe length of the public sewer system reached 3,000km as a result of the efforts to promote the project rapidly.

The coverage rate of the sewer system reached 90% in March 1991. Then, in April 1992, the city newly adopted the specific sewer system for environmental conservation and started to prepare the sewer system for the urbanization control area.

In line with the advance of the preparation, Dokai Bay which used to be called "the sea of death" and Murasaki River which had water quality like a "sewage canal" have improved significantly. The collaborative activities by the municipal government and citizens to improve the water environment received high evaluations from foreign countries as well. Kitakyushu City's activities to improve the water quality of Murasaki River through the construction of the sewer system, etc. won the 3rd Construction Minister's Prize (vivid sewer system award) in September 1994.

Near completion of sewer system (sewage system)

The coverage rate of the sewer system reached 95% in March 1996. Then, the project for improvement of combined sewer system for the Bachi River basin (branching sewer system) started in April 1997. In May of the same year, the project for making materials for cement from sewage sludge (effective use of sludge) started. In March 1998, the total pipe length of the public sewer system reached 3,500km. Then, in October of the same year, the rain water reservoir for the Kantake Pump Station was completed. Thereafter, in March 2005, 35 years after the start of the full-fledged construction

work, the "Emergency Plan for Improvement of the Combined Sewer System" was formulated, and the total pipe length of the public sewer system reached 4,000km as well. Then, in March 2006, the coverage rate of the sewer system reached 99.8%, when the preparation of the sewage system was almost completed, and in June of the same year, the Tobata Pump Station equipped with the rain water reservoir was completed.

Since the foundation of Kitakyushu City, 5 water purification plants in total, 34 pump stations, and the sewer pipes with a total length exceeding 4,400km have been prepared with an investment exceeding 700 billion yen thanks to understanding and cooperation from citizens and many other persons.

Diversification of roles of sewer system

In the early years, the sewer system projects focused on the improvement of living environment, prevention of flood, and conservation of water quality in public water areas, however, keeping pace with the arrival of the recycling-oriented society thereafter, which promotes energy saving as well as resource recycling, the new activities have been carried out, for example, power generation by digestion gas and the collaborative technology development with private companies to use sludge as materials for cement. Furthermore, Kitakyushu City has made pioneering efforts to provide technological cooperation to foreign countries facing environmental issues similar to those once experienced by Kitakyushu City in the past.

In recent years, on the basis of the proposal given by Kitakyushu Sewer System Policy Review Committee in October 2001, "Future Concept of Sewer System of Kitakyushu City in the 21st Century", the city has strengthened the activities for ensuring citizens' safe, secure and comfortable living, such as "renovation and renewal" of aging facilities and "measures against earthquakes", etc., in addition to existing activities. Further, the city has made significant efforts regarding the "improvement of the combined sewer system" for the conservation of water quality in the rivers and sea and "arrangement of waterfront environment" in harmony with the river development for creating better global environment.

However, the changes in the environment surrounding people's lives has increasingly become obvious on a global scale in the forms of global warming, depletion of resources, and deterioration of water circulation, etc. In such a difficult time, since the sewer system has the functions of circulating and recycling resources and energy, such as water and sludge, which will help realize the sustainable recycling-oriented society, it has become necessary for us to make the best of these functions.

Visions of sewer system and activities toward becoming the World Capital of Sustainable Development

On the other hand, the society is going to change drastically due to the low birth rate, aging population, decreasing population, and changes in the industrial structure, etc. Under such social circumstances, Kitakyushu City drew up a plan in December 2008, titled "Vigor from Kitakyushu!" as the new "basic concept and master plan", and decided to start the future urban development in accordance with this plan. Also in the sewer system project, it is requested to realize "the world's environmental capital" and "technological capital in Asia" held up as the city brand and to carry out new measures contributing to the creation of low-carbon society as an environmental model city. To this end, the city has formulated the "Kitakyushu City Sewer System Vision" which stipulates the principles for the activities for the sewer system to be implemented in the future with the planning period from FY 2010 to FY 2020.

In this vision, the basic concept "Aiming for a Comfortable Water Circulating City" and the following 3 goals are stipulated.

From now on, Kitakyushu City will share the resolution lying in the basic concept of this vision with all citizens and promote the activities collaboratively with the citizens to realize the "Comfortable Water Circulating City".



II Main Water Utility



Water Utility

1 | Current conditions and issues of water utility

1. Changes of water demand

The water demand in Kitakyushu City had shown a rapid increase up to the mid-1970s in line with the high economic growth and the development of urban infrastructure, etc. as a megacity since the consolidation of former five cities.

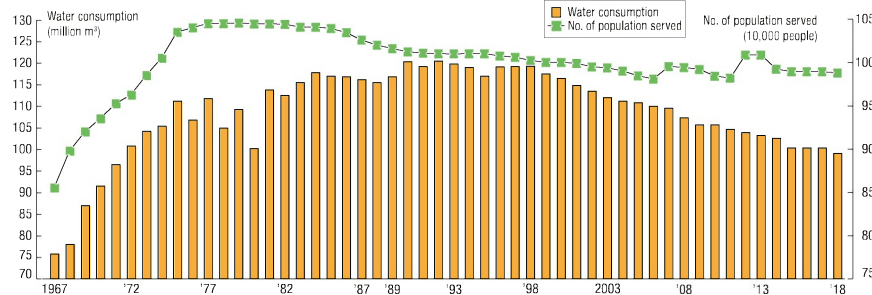
However, the increase had slowed down under the influence of the economic downturn since the first oil shock in 1973 and the service restriction due to the abnormal water shortage in 1978 and 1982, etc., and the water demand had been on a declining trend since 1985 because of the structural recession resulting from the changes in the industrial structure.

From 1989, the water demand temporarily increased

owing to the bubble economy, and recorded highest water use volume in the past in 1992, however thereafter, turned to a declining trend again due to the collapse of the bubble economy, etc. The water demand was recovered in 1996, and the water consumption exceeded that of the previous fiscal year for the first time in 4 years, and had been walking sideways thereafter, however, it has been on a declining trend from FY 1999 because of a decrease in the water demand in line with the progress of the declining birthrate and aging population, use of groundwater by large-scale consumers, etc.

In line with the economic stagnation since the Lehman's Shock in 2008, the water demand had decreased drastically, and is still on a downward trend currently.

Annual changes in the amount of water supplied to an consumed by the local population



* In Oct. 2007, the water utility system of Ashiya Town was consolidated, and in Oct. 2012 that of Mizumaki Town was consolidated.

2. Issues and responses for the future

The Water and Sewer Bureau drew up the "Medium-term Management Plan for Water Utility and Sewer of Kitakyushu City" in April 2016 as the five-year management plan (from FY2016 to FY2020) with the basic philosophy of "establishing waterworks that are trusted by the customers" and "aiming for a comfortable city in terms of water services."

With regards to the water utility and sewer projects, a severe management environment is foreseen due to the facts that the demand for water is anticipated to decrease and that the demand for renovation is anticipated to increase.

In order to properly respond to the 6 major issues faced by the water utility and sewer projects, 15 measures and 41 projects are planned to be implemented for further reduction of expenses and increase in revenues. These will help realize the managerial goal of "providing safe, secure and high-quality services under the current water bill structure."

In the future, upon receiving the inauguration of the Water and Sewer Bureau in FY 2012, we will aim to realize a far safer,

securer and more trusted water utility and sewer system to everyone, taking advantage of the effects arising from the consolidation of water utility and sewer projects.



The Master Plan for Water Utilities of Kitakyushu City

3. Main measures and projects to be implemented

Based on the "Medium-term Management Plan for Water Utility and Sewer of Kitakyushu City", the city will strive to maintain and enhance infrastructures of water utilities and sewers, which are directly connected to the lives of the citizens. These will comprise of safe and stable supply water, sewage treatment and rainwater discharge. In addition, by utilizing the high-level water utility and sewer technology the city possesses within Japan and overseas, Kitakyushu will promote the expansion of regional cooperation and overseas businesses in water utility and sewer projects.

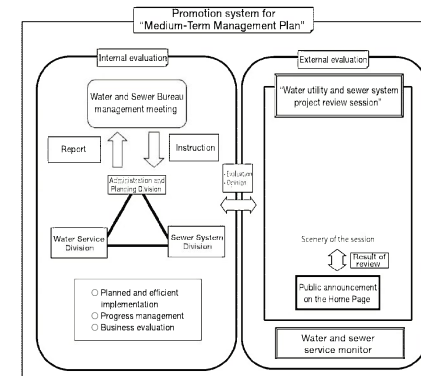
- (1) **Preparing for the increasing occurrences of downpours, earthquakes and other natural disasters in recent years through "Crisis Management Measures against Natural Disasters"**
 - Earthquake-resistant facilities
 - Measures against floods responding to instances including downpour in July 2013
 - Enhancement of measures against cold weather based on the record-breaking cold waves in January 2016
- (2) **"Lifespan Extension and Renovation of Ageing Facilities" that were hastily developed during Japan's rapid economic growth**
 - Leveling of replacement investment by utilizing asset management techniques
 - Repair and reinforcement based on the lifespan extension plan
- (3) **"Supplying Safe, Secure and Tasty Water" to consumers which are high in demand**
 - Optimization of residual chlorine based on the water safety plan
 - Going forward with direct water supply to schools with the Aqua-fresh project
- (4) **"Reducing Environmental Load" by controlling the greenhouse gas generated and the amount of pollution load into rivers and sea**
 - Preservation of water environment by improving the combined sewer system
 - Effective utilization of sludge and energy
- (5) **"A Water and Sewer System that Contribute Domestically and Internationally", making the most of the technical power and experience possessed by the city**
 - Endorsing overseas water business and expansion of the regional cooperation with strengthened affiliation with city enterprises and Kitakyushu Water Service Co., Ltd.
- (6) **"Strengthening Management Foundation based on Revenue-Expenditure Balance" to cope with the decrease of water billing revenue**
 - Endorsing administration and financial reform
 - Cut down expenditure by saving interest expense and by making sludge into fuel, etc.
 - Measures to increase revenue by increasing supply of city water and industrial water and by accepting drainage water

4. Promotion system

At the "Water and Sewer Bureau management meeting" consisting of Chief Executive of Water and Sewer Bureau and executive directors of head office, the state of progress in water utility and sewer system projects is grasped and evaluated in order to proceed with steady promotion of measures which are stipulated in the "Medium-Term Project Management Plan for Kitakyushu City Water Utility and Sewer System" and the sound operation of the project based on City's financial plan.

At the same time, further enhancement and efficiency of project operation is planned by means of PDCA cycle method based on the professional and objective suggestions from external point of view such as opinions from "Kitakyushu City Water Utility and Sewer System Project Review Session" and "Kitakyushu City Water and Sewer Service Monitor" composed of citizens and experts.

In addition, the next master plan is also under formulation, reflecting the opinions from "Kitakyushu City Water Utility and Sewer System Project Review Session."



2 | Current conditions of water utility

1. Amount of water supply

The current capacity of water supply has become 769,000m³ per day, which is 88 times larger than that at the time of establishment of the water utility (former Moji City: 8,700m³) and the annual total supplied water amounted to 112.01 million m³ in FY2018.

(1) Maximum supply amount per day

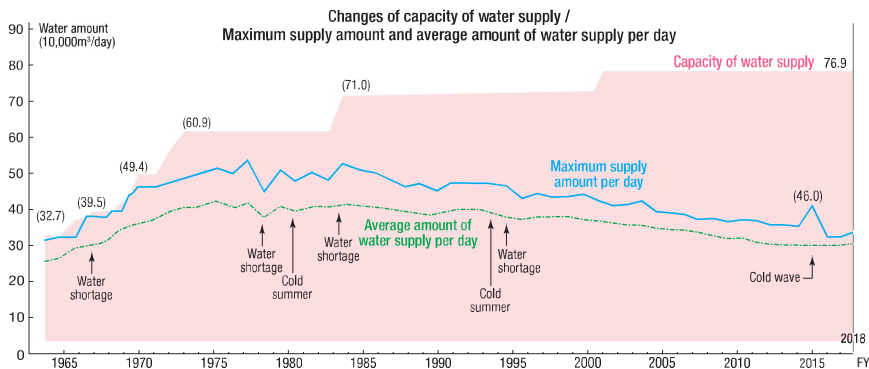
The amount of water supply, which had been steadily increasing year by year after World War II, had remained a slight increase since 1970s, and recorded a record-high quantity (524,000 m³ per day) in 1977. Thereafter, the amount of water

supply had shown an irregular movement due to water shortage, cold summer, etc. In FY2015, the record was 460,351m³ per day (January 25, 2016) due to a number of water leakage problems caused by breakage of water supply pipes etc. under a record-breaking cold wave strongest in the last 40 years.

The maximum supply amount in FY2018 was 339,233m³ per day.

(2) Average amount of water supply per day

The average amount of water supply had been steadily increasing up to FY 1975, and in FY2018, the record was 306,882m³ per day.



2. Served water supply

(1) Number of customers

The number of customers was 502,849 households (483,649 households in Kitakyushu City only) as of the end of FY2018.

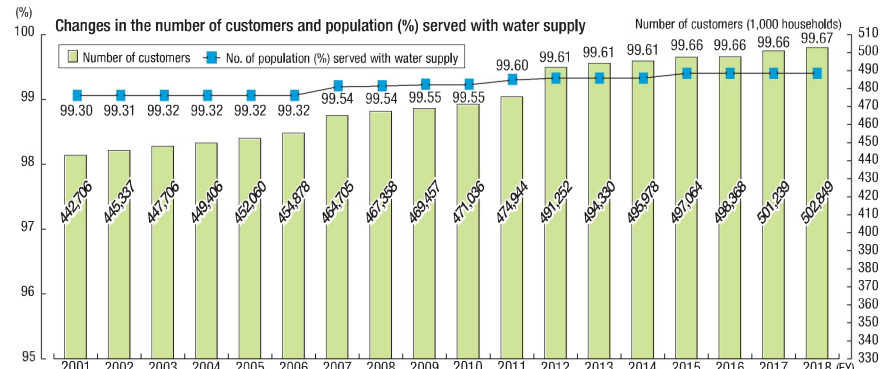
(2) Population served by water supply

The population served by water supply was 99.67% as of the end of FY2018, surpassing 99% in every ward and town, which is almost a full diffusion.

Water supply rate in FY2018

Ward	Area (km ²)	No. of population in the administrative district (people)	Number of households (house)	Population in the coverage area of water supply (people)	Actual water supply		No. of population served by water supply (%)
					Number of houses (house)	Population (people)	
Moji	73.67	98,335	49,872	98,310	49,950	97,671	99.35
Kokurakita	39.23	180,501	100,441	180,469	108,342	180,268	99.89
Kokuraminami	171.74	210,710	100,572	210,367	99,134	208,913	99.31
Wakamatsu	71.31	82,859	40,018	82,711	38,434	82,418	99.65
Yahatahigashi	36.26	66,350	34,762	66,139	33,297	66,001	99.79
Yahatanishi	83.13	253,671	122,949	253,618	123,611	253,071	99.78
Tobata	16.61	57,756	29,935	57,756	30,881	57,756	100.00
Ashiya Town	11.60	13,838	6,476	13,495	6,288	13,468	99.80
Mizumaki Town	11.01	28,381	13,336	28,381	12,912	28,381	100.00
Total	514.56	992,401	498,361	991,246	502,849	987,947	99.67

* The areas in the table above are as of October 1, 2018. And, the populations and number of houses within the administrative districts are those recorded in the Basic Resident Registers as of March 31, 2019.



3. Water demand classified by meter diameter

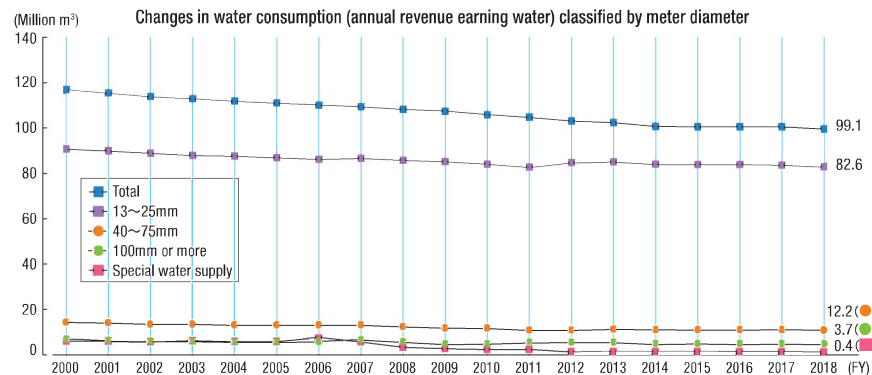
When looking at the current conditions in terms of usage and meter diameters, the number of customers in FY2018 has increased in all diameters classified by meter diameter: 13 to 25mm, 40 to 75mm, and 100mm or above.

Annual water consumption in FY 2018 showed a decrease of 61,358m³ for the water diameter of 13 to 25mm, an increase of 4,883m³ for the water diameter of 40 to 75, an increase of 7,940m³ for the water diameter of 100mm or above, and a decrease of 13,147m³ for special water supply.

Number of customers and average monthly water consumption (revenue water) classified by meter diameter

Class, usage, diameter	Division	2016		2017		2018	
		Number of customers (meters)	Average monthly consumption (m ³)	Number of customers (meters)	Average monthly consumption (m ³)	Number of customers (meters)	Average monthly consumption (m ³)
13~25mm		494,125	6,976,727	496,960	6,942,451	498,542	6,881,093
40~75mm		3,988	1,030,316	4,019	1,022,439	4,038	1,017,556
100mm or more		158	302,185	158	316,021	160	308,081
Special water supply		97	48,816	102	49,382	109	36,235
Total		498,368	8,358,043	501,239	8,330,293	502,849	8,242,965

* "Special water supply" indicates those for shared use, public bath, extraordinary use and shipping.



4. Capacity of water supply facilities and water resources

The water resources in Kitakyushu City can be broadly classified into Ima River water system, Murasaki River water system, Onga River water system, and Yamakuni River water system. The water right for each water system is 65.5% for Onga River, 15.7% for Murasaki River, 12.1% for Ima River and 6.7% for Yamakuni River.

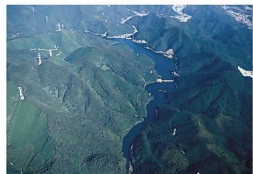
As for the capacity of water supply of main water purification plants, Ano water purification plant in the Onga River water system occupies 39.0% (300,000m³ per day) of the total, which is followed by Ideura water purification plant belonging both to Ima River water system and to Murasaki River water system occupying 33.2% (255,200m³ per day), and Honjo water purification plant in the Onga River water system occupying 18.3% (141,000m³ per day).



Rikimaru Dam (completed in 1965)



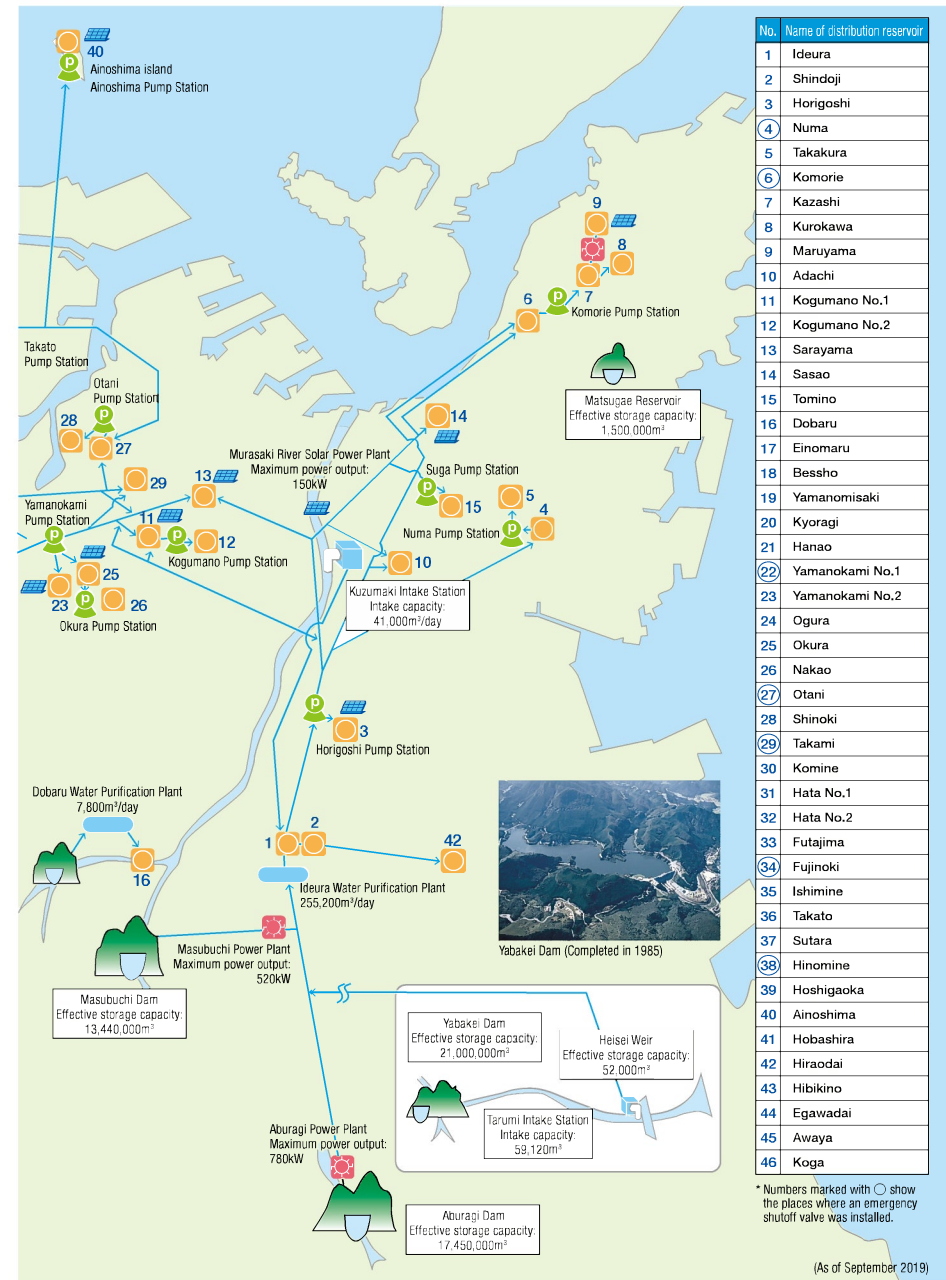
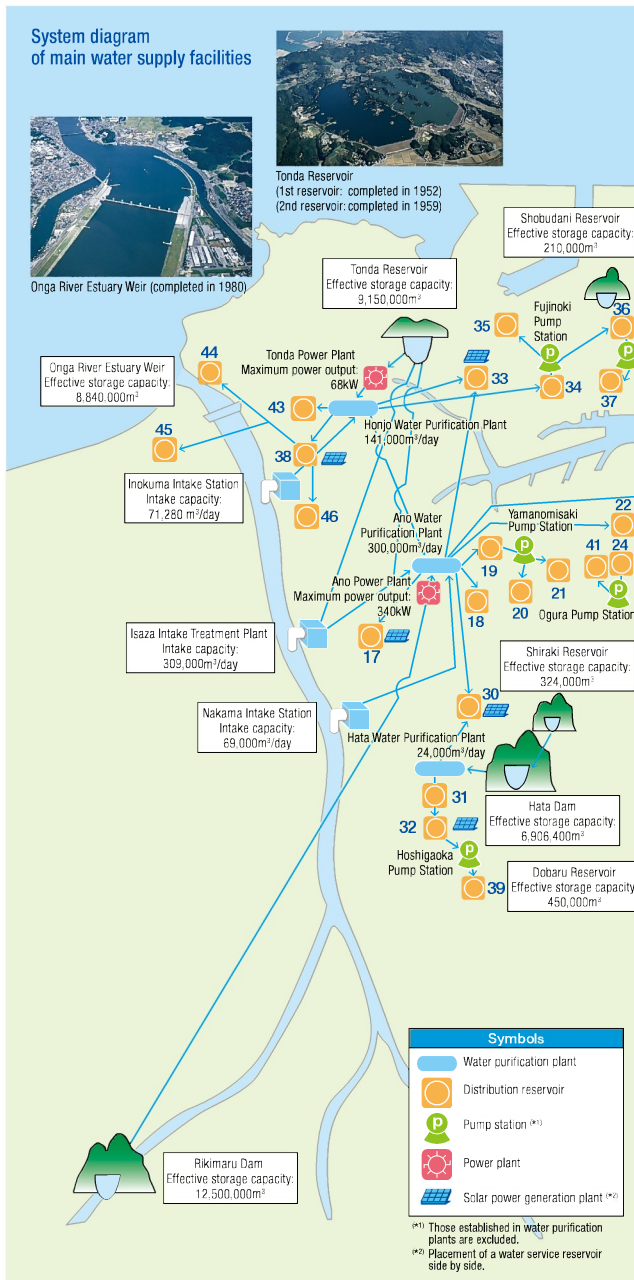
Hata Dam (completed in 1955)



Masubuchi Dam (completed in 1973)



Aburagi Dam (completed in 1977)



* Numbers marked with ○ show the places where an emergency shutoff valve was installed.

(As of September 2019)

5. Main water supply facilities

There are a variety of water supply facilities in the course until clean water from water resources is supplied to each user, and the facilities can be broadly classified into water storage facilities, water intake facilities, water conveyance

facilities, water purification facilities, water transmission facilities and water supply facilities.

The outline of the facilities in Kitakyushu City as of March 31, 2019 is as follows.

(1) Water storage facilities (Water Resources)

Name	Effective storage capacity (m ³)	Location	River system
Aburagi Dam	17,450,000	Oaza Tsuno, Soeda-machi, Tagawa-gun	Ima River
Masubuchi Dam	13,440,000	Oaza Kagumeyoshi, Kokuraminami-ku	Murasaki River
Dobaru Reservoir	450,000	Oaza Dobaru, Kokuraminami-ku	
Hata Dam	6,906,400 (2,960,000)	Oaza Hata, Yahatanishi-ku	Onga River
Shiraki Reservoir	324,000	Oaza Hata, Yahatanishi-ku	
Rikimaru Dam	12,500,000	Left shore: Shimo, Miyawaka-shi Right shore: Miyata, Miyawaka-shi	
Tonda No.1 Reservoir	4,400,000 (Pumping up from Isaza Intake Treatment Plant)	Oaza Tonda, Wakamatsu-ku	
Tonda No.2 Reservoir	4,750,000 (Pumping up from Isaza Intake Treatment Plant)	Oaza Tonda, Wakamatsu-ku and Oaza Takenami	
Onga River Estuary Weir	8,840,000	Left shore: Gion-machi, ashiya-machi, Onga-gun Right shore: Inokuma, Mizumaki-machi, Onga-gun	
Matsugae Reservoir	1,500,000	Oaza Hata, Moji-ku	Tani River
Shobudani Reservoir	210,000	Oaza Koishi, Wakamatsu-ku	Akasaki River
Yabakei Dam	21,000,000	Left shore: Oaza Oshima, Yabakei-machi, Nakatsu-shi, Oita-ken Right shore: Oaza Kikusaka, Yabakei-machi, Nakatsu-shi, Oita-ken	Yamakuni River
Heisei Weir	52,000	Left shore: Oaza Tarumi, Kamige-machi, Chikujo-gun Right shore: Oaza Takase, Nakatsu-shi, Oita-ken	

* Figures described in () indicate the water amount retained by Water and Sewer Bureau.

(2) Intake facilities (intake stations)

Name	Water intake capacity (m ³ /day)	Location	River system
Nakama Water Intake Station	69,000	Oaza Shimookuma, Nakama-shi	Onga River
Isaza Intake Treatment Plant	309,000	Futanishi 4-chome, Mizumaki-machi, Onga-gun	
Inokuma Water Intake Station	71,280	Inokuma, Mizumaki-machi, Onga-gun	Onga River (Onga Estuary Weir)
Tarumi Water Intake Station	59,120	Oaza Tarumi, Kamige-machi, Chikujo-gun	Yamakuni River (Heisei Weir)
Kuzumaki Water Intake Station	41,000	Higashi-shinozaki, Kokurakita-ku, and others	Murasaki River (Kuzumaki, Imamachi, Jono and Murasakigawa Service Storages)

(3) Water conveyance facilities

a. Main water conveyance channels

Zone	Location	Length (m)
Aburagi Dam to Kinoshita interflow well	Oaza Tsuno, Soeda-machi, Tagawa-gun to Oaza Kinoshita, Kokuraminami-ku	25,221
Masubuchi Dam to Kinoshita interflow well	Oaza Kagumeyoshi, Kokuraminami-ku to Oaza Kinoshita, Kokuraminami-ku	2,483
Kinoshita interflow well to Ideura Water Purification Plant	Oaza Kinoshita, Kokuraminami-ku to Oaza Ideura, Kokuraminami-ku	1,432
Yunokawachi junction well to the interflow point of Aburagi driving channel	Oaza Baba, Buzen-shi to Aka-mura, Tagawa-gun	16,308

b. Water conveyance pipes

Diameter (mm)	200	250	300	350	400	450	500	600	
Length (m)	1	1,122	1,268	87	7,756	1,524	3,866	9,839	
	700	800	900	1,000	1,100	1,200	1,350	1,500	Water channel
	16,906	8,487	6,199	28,319	1,029	22,624	20,300	5,961	46,546
									182,434

(4) Purification facilities

Name	Treatment method	Purification capacity (m ³ /day)	Location	Water source
Ideura Water Purification Plant	Rapid filtration method	255,200	Oaza Ideura, Kokuraminami-ku	Aburagi Dam, Masubuchi Dam, Heisei Weir (Tarumi Water Intake St.), Kuzumaki Water Intake St.
Dobaru Water Purification Plant	Slow filtration method	7,800	Oaza Dobaru, Kokuraminami-ku	Dobaru Dam
Hata Water Purification Plant	Rapid filtration method	24,000	Shimohata-machi, Yahatanishi-ku	Hata Dam
Ano Water Purification Plant	Rapid filtration method	300,000	Takanosu 3-chome, Yahatanishi-ku	Rikimaru Dam, Nakama Water Intake St., Isaza Intake Treatment Plant (Tonda Reservoir)
Honjo Water Purification Plant	Rapid filtration method	141,000	Ohiraki 5-chome, Yahatanishi-ku	Isaza Intake Treatment Plant (Tonda Reservoir), Onga estuary weir (Inokuma Water Intake St.)

(5) Water transmission facilities

a. Pump stations

Name	Number of pumps	Location	Water source
Horigoshi Pump Station	10 units	Oaza Horikoshi, Kokuraminami-ku	Ideura water Purification Plant
Numa Pump Station	2 units	Oaza Numa, Kokuraminami-ku	
Komorio Pump Station	3 units	Hayama 2-chome, Moji-ku	
Kogumano Pump Station	2 units	Izumidai 2-chome, Kokurakita-ku	
Suga Pump Station	3 units	Suga-machi, Kokurakita-ku	
Yamanokami Pump Station	14 units	Otani 2-chome, Yahatahigashi-ku	Ano water Purification Plant
Yamanomisaki Pump Station	5 units	Sainokami 2-chome, Yahatanishi-ku	
Okura Pump Station	3 units	Okura 3-chome, Yahatahigashi-ku	
Otani Pump Station	2 units	Shiinoki-machi, Tobata-ku	
Ogura Pump Station	2 units	Oaza Ogura, Yahatahigashi-ku	
Hoshigaoka Pump Station	3 units	Hoshigaoka 1-chome, Yahatanishi-ku	Hata water Purification Plant
Fujinoki Pump Station	5 units	Imamitsu 2-chome, Wakamatsu-ku	Honjo water Purification Plant
Takato Pump Station	3 units	Shin otani-machi, Wakamatsu-ku	
Ainoshima Pump Station	2 units	Oaza Ainoshima Kokurakita-ku	

* Those established in water purification plants are excluded.

b. Transmission pipe

Diameter (mm)	75	100	150	200	250	300	350	400	450	500	
Length (m)	540	6,204	6,046	3,844	7,646	4,566	1,522	4,639	12,688	19,985	
	600	700	800	900	1,000	1,100	1,200	1,350	1,500	1,900	Water channel
	20,330	28,596	13,613	41,334	42,658	12,068	3,019	1,288	104	4,167	16
											234,879



Ano Water Purification Plant
(Completed in 1961)

Area: 84,150m²
10-16, Takanosu 3-chome, Yahatanishi-ku, Kitakyushu-shi, 806-0047
TEL. +81-93-641-3338
FAX. +81-93-641-3339



Ideura Water Purification Plant
(Completed in 1972)

Area: Approx. 210,000m²
418, Oaza Ideura, Kokuraminami-ku, Kitakyushu-shi, 803-0189
TEL. +81-93-451-0262
FAX. +81-93-451-0291



Honjo Water Purification Plant
(Completed in 1983)

Area: Approx. 110,000m²
4-1, Ohiraki 5-chome, Yahatanishi-ku, Kitakyushu-shi
TEL. +81-93-693-1385
FAX. +81-93-603-5780

(6) Water distribution facilities

a. Distribution reservoirs

Name	Details (m ²) x (reservoir)		Location
Ideura Water Distribution Reservoir *	21,250×1	10,550×2	Oaza Ideura, Kukuraminami-ku
Shindoji Distribution Reservoir	1,400×1		Oaza Ideura, Kukuraminami-ku
Horigoshi Distribution Reservoir	1,500×2		Oaza Horikoshi, Kukuraminami-ku
Numa Distribution Reservoir	5,390×2		Oaza Numa, Kukuraminami-ku
Takakura Distribution Reservoir	600×2		Oaza Numa, Kukuraminami-ku
Hiraodai Distribution Reservoir	150×2		Oaza Shindoji Kukuraminami-ku
Komorie Distribution Reservoir	4,500×2	4,580×1	Hayama 2-chome, Moji-ku
Kazashi Distribution Reservoir	3,500×1		Oaza Komorie, Moji-ku to Oaza Kurokawa
Kurokawa Distribution Reservoir	560×1		Oaza Kurokawa, Moji-ku
Maruyama Distribution Reservoir	1,800×2		Maruyama 4-chome, Moji-ku
Adachi Distribution Reservoir	6,660×2		Yugawa 2-chome, Kukuraminami-ku
Kogumano No.1 Distribution Reservoir	6,300×2		Izumidai 2-chome, Kukurakita-ku
Kogumano No.2 Distribution Reservoir	150×2		Izumidai 2-chome, Kukurakita-ku
Sasao Distribution Reservoir	5,250×2		Oaza Dairi, Moji-ku
Tomino Distribution Reservoir	700×2		Oaza Tomino, Kukurakita-ku
Dobaru Distribution Reservoir *	520×1	1,000×2	Oaza Dobaru, Kukuraminami-ku
Sarayama Distribution Reservoir	3,870×2	2,550×2	Sarayama-machi, Kukurakita-ku
Takami Distribution Reservoir	5,300×2	3,850×2	Hachioji-machi, Yahatahigashi-ku
Einomaru Distribution Reservoir	2,530×2		Oaza Einomaru, Yahatanishi-ku
Bessho Distribution Reservoir	5,100×2		Bessho-machi, Yahatanishi-ku
Yamanomisaki Distribution Reservoir	2,695×2	3,810×1	Sainokami 2-chome, Yahatanishi-ku
Kyoragi Distribution Reservoir	120×2	1,000×1 1,240×2	Kyoragi-machi, Yahatanishi-ku
Hanao Distribution Reservoir	550×2		Oaza Narumizu, Yahatanishi-ku
Yamanokami No.1 Distribution Reservoir	4,090×3	4,160×1	Otani 2-chome, Yahatahigashi-ku
Yamanokami No.2 Distribution Reservoir	1,840×2	3,440×1	Otani 2-chome, Yahatahigashi-ku
Ogura Distribution Reservoir	1,000×2		Oaza Ogura, Yahatahigashi-ku
Hobashira Distribution Reservoir	45×2		Oaza Ogura, Yahatahigashi-ku
Okura Distribution Reservoir	1,200×1	1,650×2	Okura 3-chome, Yahatahigashi-ku
Otani Distribution Reservoir	2,800×2	2,600×2	Shiinoki-machi, Tobata-ku
Shinoki Distribution Reservoir	600×2	1,110×1	Shiinoki-machi, Tobata-ku
Nakao Distribution Reservoir	360×2		Oaza Okura, Yahatahigashi-ku
Komine Distribution Reservoir	3,900×2	2,430×2	Komine 3-chome, Yahatahigashi-ku
Hata No.1 Distribution Reservoir *	615×2	1,655×2	Shimohata-machi, Yahatanishi-ku
Hata No.2 Distribution Reservoir	3,150×2		Shimohata-machi, Yahatanishi-ku
Hoshigaoka Distribution Reservoir	242×1	270×1	Hoshigaoka 2-chome, Yahatanishi-ku
Futajima Distribution Reservoir	2,430×1	4,140×1	Oaza Futajima, Wakamatsu-ku
Fujinoki Distribution Reservoir	1,810×3		Imamitsu 2-chome, Wakamatsu-ku
Ishimine Distribution Reservoir	500×2		Oaza Fujinoki, Wakamatsu-ku
Takato Distribution Reservoir	2,430×2		Shiin otani-machi, Wakamatsu-ku
Sutara Distribution Reservoir	770×1	1,010×1	Oaza Sutara, Wakamatsu-ku
Hinomine Distribution Reservoir	6,190×2		Oaza Asakawa, Yahatanishi-ku
Hibikino Distribution Reservoir	1,850×2		Hibikino, Wakamatsu-ku
Ainoshima Distribution Reservoir	94.5×2		Oaza Ainoshima, Kukurakita-ku
Egawadai Distribution Reservoir	2,800×1		Egawadai, Ashiya-machi
Awaya Distribution Reservoir	1,300×1	500×1	Oaza Ashiya, Ashiya-machi
Koga Distribution Reservoir	2,000×2		Muta, Mizumaki-machi

* Equipped beside water purification plant. (As of September, 2019)

b. Distribution pipe

Diameter (mm)	50	75	100	125	150	200	250	300	350	
Length (m)	165,173	166,543	2,044,530	5,187	858,162	316,057	103,051	182,424	78,214	
	400	450	500	600	700	800	900	1,000	1,100	Total
	80,003	51,232	65,073	31,760	12,273	5,228	5,809	905	189	4,171,813

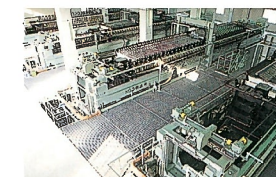
* Those of 50mm or less diameter are excluded.

(7) Emergency facilities against Water Shortage

Name	Type	Classification	Location	Water source
Matsugae Dam	Pump	Water conveyance facility	Oaza Hata, Moji-ku	Matsugae Dam



Hiraodai Distribution Reservoir



Filter press dehydrator

(8) Waste water treatment facilities

a. Mechanical dehydration facilities

Location	Treatment method	Treatment capacity (t-ds/D)	Number of presses	Start of operation
Isaza	Filter press	6.9	3	March 1997
Honjo	Filter press	4.5	2	April 2010
Ano	Filter press	9.28	4	August 1991

b. Solar evaporation facilities

Location	Area (m ²)	Treatment capacity (t-ds/D)	Days for evaporation	Number of reservoir	Start of operation
Ideura	12,000	2.38	165	12	August 1991
Hata	1,688	0.27	120	4	April 1974
Isaza	3,130	2.61	120	5	April 1976
Tonda	4,080	0.69	120	12	April 1974
Honjo	2,160	0.57	120	6	October 1983
Inokuma	2,796	0.50	120	6	October 1983

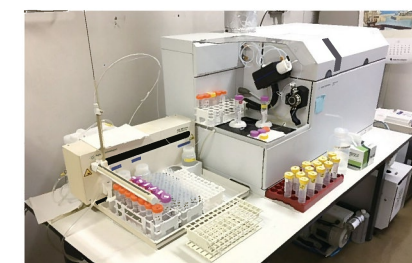


Drying bed

3 | Water quality

Although some improvement is observed, the water quality of Onaga River, one of the main water resources of the city, is still suffering a large pollution load caused by much organic substances due to the inflow of living wastewater from the river basin. The water blocked by the estuary weir retains and boosts biological activity to lead to the growth of blue green algae; as a result, high-concentrated mold odor substances are sometimes detected. Meanwhile, at the water reservoirs for the east area, in recent years, it is becoming a major problem that mold odor substances increase in summer due to the overgrowth of blue green algae.

As to the mold odor substances, etc. to be the cause of disinfection biproduct and offensive smell and taste arising especially from organic substance in the water source, the city established a target value as a critical item for water quality management among the regulatory standards for water quality. In addition, the water quality standard is revised at any time according to social and scientific circumstances but the



Analytical instrument for heavy metal measuring (ICP-MS)

city is improving the system and organization of experiment sufficiently in order to catch up with the revision. The city also provides well-planned and highly-reliable water quality management system such as formulation and announcement of water quality inspection plan and acquisition of certification for an excellent laboratory for tap water inspection (Good Laboratory Practice) in order to supply safe and tasty water which the users can drink at ease.

1. Water quality monitoring in water resources

(1) Water quality monitoring in rivers

The annual total flow volume of the Onga River is about 1 billion m³, and Kitakyushu City takes about 150 million m³ from the river. Since this river has one of the highest water utilization rates for clean water, agricultural water, etc. in Japan, the water in the estuary weir is likely to stagnate, the concentration of mold odor substances tend to increase due to proliferation of algae, etc. in summer seasons. We have been conducting a periodical water quality survey once a month at 1 point in the middle reach and 4 or more times a month at 2 intake points in the estuary weir and an occasional water quality survey in case of deterioration of water quality or water quality accidents.

Concerning the countermeasures for water quality conservation and against water quality accidents in the Onga River, we participated in the Onga River Water Environment Preservation and Renovation Promotion Council and the Waterworks Council for Onga River, and have been making efforts to reinforce the emergency transmission system in case of a water quality accident, as well as exchanging information about water quality and water treatment technologies, and making requests to related organizations for water quality conservation, etc.

For Murasaki River water system, a periodical water quality survey has been conducted once a month, under the Shinozaki Bridge in the lower reach of the river.

For Yamakuni River water system which draws effluent water from Yabakei Dam at Heisei weir located in the lower reach, a periodical water quality survey has been conducted 4 times a year in Yabakei Dam, and once a month in Heisei weir as an intake point.

In addition, we participated in Water Quality Conservation Council for Yamakuni River, and have been working on the reinforcement of the countermeasures against water quality accidents.

(2) Water quality monitoring in reservoirs

For Tonda reservoir which pumps up and retains the surface stream water of the Onga River, a depth-classified water quality survey has been conducted once a month, and for other reservoirs, a surface water quality survey has been conducted once a month, and a depth-classified water quality survey has been conducted once in 2 months.

In principle, the reservoirs taking water directly from an intake tower for waterworks take water from the deepest gate of the intake tower throughout the year, which has achieved the effects, including the prevention of anaerobic condition of low-layer water in the stratified period, reduction of internal load generated from phosphorus, etc. and avoidance of the impacts from algae, etc. proliferating in the surface layer, etc.

2. Water quality management in water purification plants

In water purification plants, a periodical water quality survey has been conducted once a month for each process of raw water, water sedimentation, water filtration and water purification treatments in order to assess the conditions of such treatments. An examination of raw water and water purification has been conducted 4 times a year for all the items to be examined. In addition, the quality of the chemicals for water purification treatment has been confirmed 4 times a year by a sampling inspection.

Furthermore, we have been working on daily water quality management, while establishing the managerial objectives for water purification so that the tap water quality could sufficiently conform to the water quality standards for the purpose of ensuring a more appropriate water purification treatment.

3. Water quality monitoring at tap

A daily inspection of residual chlorine etc. as stipulated in Article 20 of the Water Supply Act has been conducted for the water taps installed in 46 places (including the monitoring stations for water quality), and a periodic water quality survey of the water taps has also been conducted once a month at each of these 46 places.

Inquiries from customers about water quality have been handled in cooperation with the Construction Offices and Customer Center as the contact points to the customers.

4. Activities to keep safer and toward better quality

In order to address the water quality of the Onga River which would be deteriorated in the dry season, the powdered activated carbon injection equipment was installed in Isaza intake treatment plant in FY 1991, and an aerohydraulic gun was installed in Tonda reservoir in FY 1993.

In addition, advanced water purification facilities were developed in order to reduce (1) mold odor substances, (2) ammonium nitrogen, (3) dissolved manganese, (4) anionic surface active agent and (5) organic matters that are the precursor substances of trihalomethane. These facilities, which have adopted an upward flow biological contact filtration system (U-BCF), started the operation at Honjo Water Purification Plant in August 2000 and at Ano Water Purification Plant in June 2003.

order to secure a stable water supply even in case of the occurrence of an earthquake.

(1) Earthquake-resistant measures for structures

- Seismic diagnosis for concrete structures and buildings
- Construction for reinforcement of earthquake resistance on the basis of seismic diagnosis

(2) Earthquake-resistant measures for conduits

We have been promoting constructions for earthquake resistance for water conveyance pipes, transmission pipes and distribution main (Radius 400mm or more), and distribution pipes leading to the disaster prevention bases and emergency medical institutions designated in the "Kitakyushu City Regional Disaster Prevention Plan."

In addition, we have been implementing the projects to promote mutual accommodation of tap water in the facilities by Northern Fukuoka Emergency Connecting Pipe and the Waterworks Triangle Connection Concept, etc.



Earthquake-resistant joint for conduit

2. Various measures relating to emergency water supply

We have been implementing various measures relating to emergency water supply so as to secure drinking water for 7 days (46 liters per person) in case of the occurrence of a suspension of water supply covering a wide range of areas.

• Facilities to secure drinking water in case of a disaster

We intend to secure 46,000m³ in total of drinking water at 14 places in the city even in the event of a disaster.

[4 water purification plants]

Ideura Water Purification Plant, Ano Water Purification Plant, Hata Water Purification Plant, and Honjo Water Purification Plant.

[East-west transmission pipe] (3 places)

[7 water service reservoirs]

An emergency shutoff valve is equipped in the following distribution reservoirs to secure drinking water required for emergency water supply.

Komorie Water Service Reservoir, Takami Water Service Reservoir, Numa Water Service Reservoir, Otani Water Service Reservoir, Yamanokami Water Service Reservoir, Hinomine Water Service Reservoir, and Fujinoki Water Service Reservoir.

Emergency shutoff valve



This emergency shutoff valve can functionally be fully-closed automatically by detecting a certain amount of seismic intensity and flow rate, and this function makes it possible to secure half of the water capacity of each water service reservoir as drinking water.

For emergency water supply in evacuation sites, drinking water will be transported by polyethylene tanks with a capacity of 1m³, and evacuees will be supplied with temporary water tanks, temporary water supply taps and emergency water supply bags.

Further, for medical institutions requiring purified water for medical care, emergency water supply will be carried out by water supply trucks with pumps.

- Polyethylene tanks with a capacity of 1m³ (storage of 53 tanks)
- Temporary water tanks with a capacity of 1m³ (storage of 40 tanks)
- Preparation of emergency water supply bags (storage of 43,000 bags)
- Temporary water supply taps (94 taps are secured)
- Water supply trucks with pumps (4 vehicles)
- Water tank truck equipped with pressure device (1 vehicle)



Polyethylene tank with a capacity of 1m³



Emergency water supply bag (6L)



Water tank truck equipped with pump

4 | Earthquake disaster countermeasures

On the basis of the Regional Disaster Prevention Plan of Kitakyushu City, we have been promoting the earthquake resistance for waterworks facilities (water service reservoirs and main water service pipes). Further, we have been taking various measures relating to emergent water supply against wide-area water stoppage.

1. Earthquake-resistant measures for waterworks facilities

We have been carrying out seismic diagnoses and constructions for earthquake resistance for the main waterworks facilities (3 water purification plants, 7 water service reservoirs) in

Seismic diagnosis for concrete structure

3. Project for North Fukuoka emergency transmission pipe

Along with the opportunity of the Fukuoka West Offshore Earthquake (on Mar. 20, 2005), the early commercialization of the project was determined under the agreement of 3 persons, such as, the Governor of Fukuoka Prefecture, the Mayor of Fukuoka City, and the Mayor of Kitakyushu City.

As one of risk management measures against emergent situations, such as natural disasters, including earthquakes, and accidents in waterworks facilities, etc., the project connects Kitakyushu City with Fukuoka Urban Area with a distance of about 47km by the transmission pipe withstanding M7 class inland earthquake whose epicenter is directly below the area,

and Kitakyushu City in cooperation of Fukuoka Prefecture started the project in FY 2006.

Works within Kitakyushu City were carried out by the city, and those out of Kitakyushu City were constructed by Fukuoka Prefecture administrating the roads and rivers where the transmission pipe would be installed.

Thanks to the Emergency Transmission Pipe, it has become possible to exchange tap water of 50,000 m³ a day at a maximum mutually between Kitakyushu City and Fukuoka Urban Area in case of an emergency, and the most basic life line was secured even in case of emergency.

5 Countermeasures for improving revenue earning water ratio

We have been promoting the following activities for purposes of making effective use of water resources and reducing expenses as the countermeasures for improving the revenue earning water ratio.

Changes of revenue earning water ratio (Unit: %)

FY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Plan	88.2	88.3	88.2	88.4	88.6	90.2	90.5	90.8	91.1	91.4	91.7
Actual	87.3	86.6	87.6	88.0	89.2	90.4	90.0	90.4	90.6	90.2	-

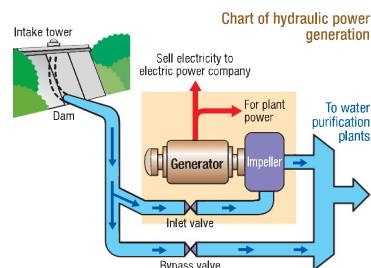
- (1) Early detection and immediate repair by leakage survey.
- (2) Replacement and renewal of old pipes.
- (3) Appropriate water pressure management by use of distribution blocks and pressure reducing valves.
- (4) Efficient leakage survey by the analysis of data from distribution management system.

6 Created clean energy by hydraulic power and solar power

To effectively utilize clean hydraulic energy produced from water supply facilities, hydraulic power plants have been operating, making use of water intake drop of dams.

The surplus electricity generated in Masubuchi and Aburagi hydraulic power plants and in Maruyama small hydraulic power plant has been sold to an electric power company, while all the electricity generated in Tonda and Ano hydraulic power plants has been consumed within Honjo and Ano water purification plants.

In addition, photovoltaic power plants to make use of solar energy were constructed to promote effective use of new clean energy.



Ainoshima Solar Power Plant



Murasaki River Solar Power Plant

Hydraulic power generator

Item	Masubuchi Power Plant	Aburagi Power Plant	Tonda Power Plant	Ano Power Plant	Maruyama small hydraulic power plant
Max. output [kW]	520	780	68	340	9
Yearly available power [kWh]	2,140,000	3,350,000	360,000	1,320,000	6,000
Start of operation	Apr. 1994	Apr. 1996	Apr. 1998	Apr. 2007	Aug. 2014

Solar power generation plant

Item	Ainoshima Solar Power Plant	Murasaki River Solar Power Plant	Solar power plant in Okura, Komine, Hinomine and Futajima	Solar power plant in Sasao and Horigoshi	Solar power plant in Maruyama and Einomaru	Solar power plant in Sarayama and Kogumano	No.2 solar power plant in YamanoKami	No.2 solar power plant in Hata
Max. output [kW]	12.7	150	9.5	9.7	9.5	20.3	21	31.5
Yearly available power [kWh]	14,000	168,000	9,000	9,000	9,000	20,000	20,000	29,000
Start of operation	Oct. 1998	Apr. 1999	Feb. 2010	Feb. 2011	Mar. 2012	Oct. 2013	Sept. 2014	Sept. 2014

7 Financial conditions

1. Outline of water utility finances

In FY2018, we made efforts in maintaining and strengthening of infrastructure and promotion of new cooperation among areas as well as building-up of sound and stable business management by steady implementation of projects based on the "Medium-Term Management for Water Utility and Sewer System", which was drawn up in April 2016.

With regard to the projects, we have especially focused on "crisis-management measures in case of disaster, etc.," "life elongation and renewal of aged water pipes," "supplying safe, secure, and tasty water," "reduction of environmental burden," water and sewage services contributing to both inside and outside Japan."

Additionally, we have promoted the new regional collaboration and began operation and maintenance of water facilities in Munakata region, and pricing in the area, based on the newly signed comprehensive subcontracting agreement of water utility with the region.

In the financial aspects, the fund balance on a single-year basis was 240.65 million yen in minus. Also, a fund surplus of 8,026.70 million yen including a reserve fund for improvement of construction was secured on a cumulative basis, which shows that a stable business operation is being continued.

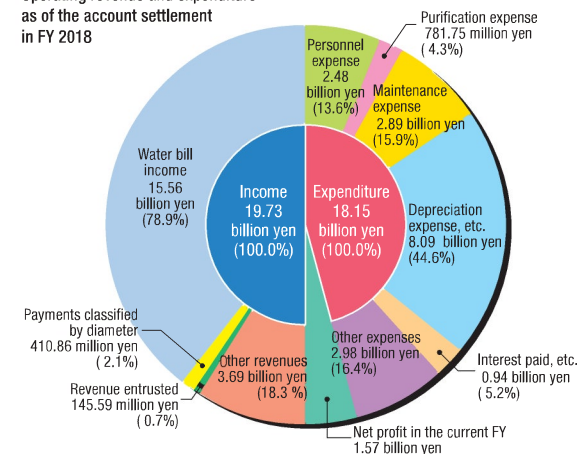
2. Account settlement in FY 2018 (including tax)

(1) Operating revenue and expenditure

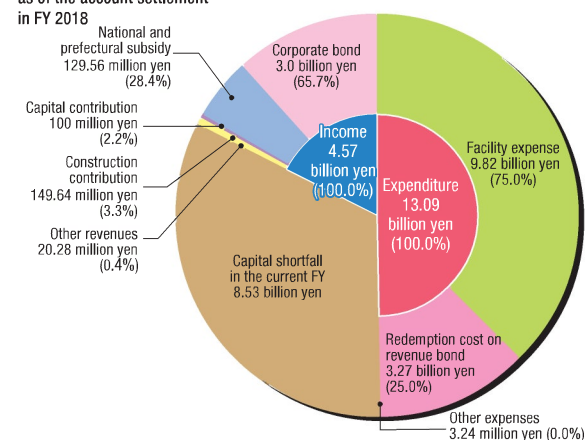
Revenues consisted of operating revenue of 17,147.19 million yen (including a water bill income of 15,561.99 million yen), a non-operating revenue of 2,573.30 million yen and an extraordinary profit of 7.30 million yen, totaling 19,727.79 million yen.

On the other hand, expenditures consisted of an operating expense of 15,786.30 million yen, a non-operating expense of 2,311.06 million yen and an extraordinary loss of 57.50 million yen, totaling 18,154.86 million yen. All in all, a profit of 1,572.93 million yen was gained in FY2018.

Operating revenue and expenditure as of the account settlement in FY 2018



Capital revenue and expenditure as of the account settlement in FY 2018



(2) Capital revenue and expenditure

A corporate bond of 3.00 billion yen, a national and prefectural subsidy of 1,295.61 million yen, a contribution to capital of 100 million yen, etc. were recorded as revenue, which resulted in 4,565.53 million yen in total. On the other hand, regarding expenditures, a facility expense of 9,822.27 million yen, a redemption cost on a revenue bond of 3,267.48 million yen, etc. were recorded, which amounted to 13,092.99 million yen in total. Consequently, a capital shortfall of 8,527.46 million yen was recorded as the balance of revenue and expenditure.

(3) Fund balance

As a result of compensation of the capital shortfall 8,527.46 million yen by the reserved fund of profit and loss account, etc., the single-year fund balance became 240.65 million yen in minus, and the cumulative fund surplus in FY2018 counted 6,036.55 million yen.

Water wholesale business

1 | Current conditions of water wholesale business

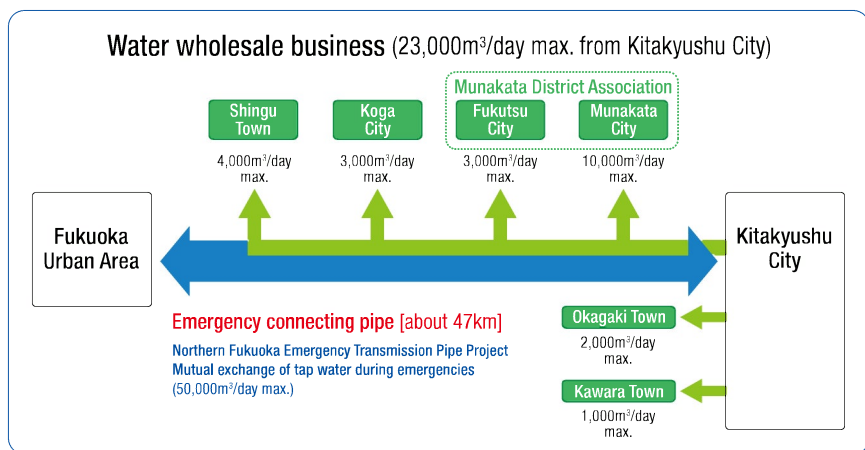
1. History and outline

3 cities and 1 town (Munkata City, Koga City, Fukutsu City and Shingu Town) along the North Fukuoka Emergency Transmission Pipe had problems with their own water sources such as deterioration of water quality, instability of water volume and aged waterworks facilities. It was necessary to keep circulated water constantly running in the emergency transmission pipe in order to keep the water quality good enough for the transmission pipe to be used immediately in case of a disaster.

For this reason, Kitakyushu City established the "Kitakyushu City Water Wholesale Business" to supply a maximum of 20,000m³ of purified water a day to the 3 cities and 1 town, making use of the circulated water for the emergency

transmission pipe in October 2006. As a cooperative business of the North Fukuoka Emergency Transmission Pipe, we launched the business in FY2006 and started supplying a maximum of totaling 13,000m³ of purified water a day to Munakata City was Shingu Town from FY2011. Further, joined by Fukutsu City and Koga City, we increased the supply of a maximum of 20,000m³ of purified water a day from FY2016.

In addition, using other facilities than the Emergency Transmission Pipe, we have started supplying a maximum of 2,000m³ of purified water a day to Okagaki Town from FY 2015 and we have also started supplying a maximum of 1,000m³ of purified water a day to Kawara Town in FY 2017.



2. Water supply conditions

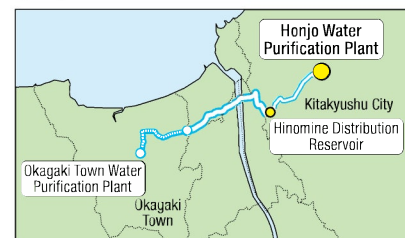
Receiving body	Maximum supply amount per day (m ³ /day)
Munakata District Association	13,000 m ³
Koga City	3,000 m ³
Shingu Town	4,000 m ³
Okagaki Town	2,000 m ³
Kaharu Town	1,000 m ³
Total	23,000 m³

3. System diagram of waterworks facilities

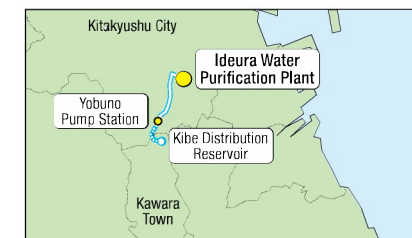
1) Munakata Region Service Association, Koga City, Shingu Town



2) Okagaki Town



3) Kawara Town



4. Water rates

1) Munakata Region Service Association, Koga City, Shingu Town

Basic rate (per 1m ³)	102.9 yen
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2) Okagaki Town
3) Kawara Town

Basic rate (per 1m ³)	139.0 yen
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5. Main water supply facilities

The facilities of the water wholesale business are composed of water storage facilities, water intake facilities, water conveyance facilities, water purification facilities, water transmission facilities, and water distribution facilities, the same as those of the water utility business.

Outline of the facilities in Kitakyushu City as of March 31, 2019 is as follows.

(1) Water storage facilities (shared with the water utility business)

Name	Effective storage capacity (m ³)	Location	Water system
Onga River Estuary Weir	8,840,000	Left shore: Gin-machi, Ashiya-machi, Onga-gun Right shore: Inokuma, Mizumaki-machi, Onga-gun	Onga River system

(2) Water intake facilities (shared with the water utility business)

Name	Water intake capacity (m ³ /day)	Location	Water system
Inokuma Water Intake Station	21,000	Inokuma, Mizumaki-machi, Onga-gun	Onga River system (Onga River Estuary Weir)

(3) Water conveyance facilities (water conduit)

Caliber (mm)	800	1,350	Total
Length (m)	4	5,131	5,135

(4) Water purification facilities (shared with the water utility business)

Name	Treatment method	Water purification capacity (m ³ /day)	Location	Water system
Honjo Water Purification Plant	Rapid filtration method	20,000	Ohiraki 5-chome, Yahatanishi-ku	Inokuma Water Intake Station (Onga River Estuary Weir)

(5) Water transmission facilities

a. Balancing reservoir

Name	Capacity (m ³) x (reservoir)	Location
Tarumi Balancing Reservoir	2,000 × 2	Ikeda, Munakata-shi

b. Pump station (shared with the North Fukuoka Emergency Transmission Pipe)

Name	Contents	Location
Harugami Pump Station	Equipped with 2 pumps	Harugami, Shingu-machi

c. Water transmission pipe

Caliber (mm)	75	100	150	200	250	300	400	450	500	600	900	1,000	1,100	Total
Length (m)	1	51	1,321	1,077	1,818	2,487	8	961	18	2	18,882	27,388	30	54,044

(6) Water distribution facilities

a. Receiving and distribution reservoirs

Name	Receiving capacity (m ³ /day)	Location	Receiving party	Water system
Ikeda Water Distribution Reservoir	13,000	Ikeda, Munakata City	Munakata Area Government Office	Tarumi Balancing Reservoir
Kato Branch		Kato, Munakata City		
Hinosato Water Distribution Reservoir		Hinosato, Munakata City		
Oi Water Distribution Reservoir		Oi, Munakata City		
Azemachi Water Distribution Reservoir		Azemachi, Fukuoka City		
Ioji Water Distribution Reservoir	3,000	Mushirouchi, Koga City	Koga City	
Tachibana Water Distribution Reservoir	4,000	Mishiro, Shingu Town	Shingu Town	

6. Financial conditions

(1) Outline of water supply business finance

From FY2011, we started supplying purified water to Munakata Region Service Association and Shingu Town, to Okagaki Town in FY2015, and additionally started supplying to Koga City in FY2016, and to Kawara Town in FY2017, currently supplying to 5 operators in total.

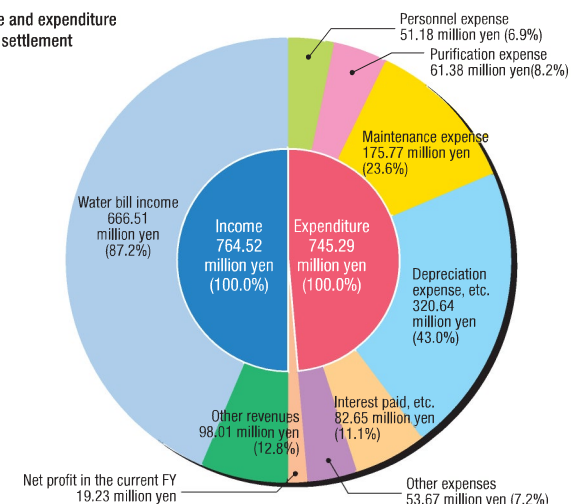
In the financial aspect, the fund balance on a single-year basis was 56.88 million yen in plus and resulted in a fund shortfall of 191.77 million yen on a cumulative basis.

(2) Account settlement in FY2018 (including tax)

a. Operating revenue and expenditure

Revenue consisted of an operating of 666.55 million yen (including a water bill income of 666.51) and a non-operating revenue of 97.97 million yen. On the other hand, expenditure consisted of an operating expense of 626.46 million yen, a non-operating expense of 118.33 million yen and an extraordinary loss of 500 thousand yen, totaling 745.29 million yen. All in all, a profit of 19.23 million yen was incurred in FY2018.

Operating revenue and expenditure as of the account settlement in FY 2018



b. Capital revenue and expenditure

Expenditure consisted of a facility expense of 22.08 million yen and a redemption cost on revenue bond of 166.56 million yen, totaling 189.28 million yen. As no revenue was recorded, a capital shortfall of 189.28 million yen was recorded as the balance of income and expenditure.

c. Fund balance

The capital shortfall of 189.28 million yen arising out of the capital revenue and expenditure was compensated for by the reserved fund of profit and loss account, etc. Consequently, the fund balance on a single-year basis became 56.88 million yen in plus, which resulted in a fund shortfall of 191.77 million yen on a cumulative basis.

III Industrial Water Supply Business



1 Current conditions of industrial water supply business

1. Current conditions

(1) Capacity of water supply

The Industrial Water Supply Business of Kitakyushu City has undergone several expansion works since the Kitakyushu Water Supply Association embarked on the 1st Industrial Water Supply Business in 1957.

In August, 1983, Honjo water purification plant, which had been constructed as part of the 3rd Industrial Water Supply Business and the Industrial Water Supply Business for coal mining areas, started its operation, as well as starting water intake from Onga River estuary weir. Consequently, the capacity of water supply has become 254,000m³ per day.

Current conditions in FY 2018

As of March 31, 2019

Name of project	Kitakyushu City Industrial Water Supply
Capacity of water supply (m ³ /day)	254,000
Minimum Volume of Water	71
Contract water Volume (m ³ /day)	200,670
Yearly revenue earning water (m ³)	36,946,105
Water purification plant, etc.	Honjo, Isaza, Rikimaru

* 1st, 2nd and 3rd industrial water utilities and Industrial Water Supply for coal mining areas were consolidated into Kitakyushu City Industrial Water Supply Business. (April 1, 2008)



Inokuma Water Intake Station (completed in 1983)



Isaza Intake Treatment Plant (completed in 1944)

(2) Water supply establishment and revenue earning water

In FY2018, the number of customer establishments was 71 and the amount of accounted-for water was 36,946,105m³ and, along with the increase of the number of companies supplied with water and the amount of contracted supply water, the amount of accounted-for water increased by 3,315,948m³ (9.9%) from the previous year.



(3) Industrial water charge

Enforced in April 1, 2014 (charge/m³ excluding tax)

Basic water amount or specific water amount	Basic water charge	Basic water use charge	Specific water charge	Specific water use amount	Excess water charge
300m ³ /day or less	34 yen	4 yen	34 yen	4 yen	47 yen
300m ³ /day or more	19.50 yen	4 yen	19.50 yen	4 yen	47 yen

(Note)

- The basic water charge is applied to basic water amount, and is calculated as 1 month basic water amount, irrespective of water use amount. Meanwhile, for the industrial water supply which is deemed to have special circumstances to be considered, such as the advancement of regional economy, etc., the basic water charge can be reduced for a certain period (a special exemption of the basic water charge).
- The basic water use charge is applied to basic water use amount.
- The specific water charge is applied to specific water use amount, and is calculated as 1 month specific water amount, irrespective of water use amount.
- The specific water use charge is applied to specific water use amount.
- The excess water charge is calculated as the highest water amount among those stated below.

(1) An excess water amount

- When water exceeding the hourly maximum water supply amount is used, a water amount calculated by deducting basic water amount or specific water amount from the hourly maximum water use amount (converted to a daily-basis).
- When a sum of the hours using water exceeding basic water amount or specific water amount (on an hourly equivalent basis) exceeds the prescribed hours, a water amount calculated by deducting basic water amount or specific water amount from the hourly maximum water supply amount (converted to a daily-basis).
- The industrial water charge shall be an amount which is obtained by multiplying an amount calculated from the table above by consumption tax rate, including local consumption tax rate (fractions of less than 1 yen to be rounded off).



2. Main water supply facilities

In order to supply necessary water for industrial activities, there are a variety of Industrial water supply facilities in the course until water is supplied to each demander from water resources, and such facilities can be broadly classified into

water storage facilities, water intake facilities, water conveyance facilities, water purification facilities, water transmission facilities and water distribution facilities, same as those for public water.

The outline of the facilities in Kitakyushu City as of March 31, FY2019 is as follows.

(1) Water storage facilities (shared with supply water)

Name	Effective storage capacity (m ³)	Location	River system
Rikimaru Dam	12,500,000	Left shore: Shimo, Miyawaka-shi, Right shore: Miyata, Miyawaka-shi	Onga River
Tonda No.1 Reservoir	4,400,000 (Pumping up from Isaza Intake Plant)	Tonda, Wakamatsu-ku	
Tonda No.2 Reservoir	4,750,000 (Pumping up from Isaza Intake Plant)	Tonda Wakamatsu-ku and Oaza Takenami, Wakamatsu-ku	
Onga Estuary Weir	8,840,000	Left shore: Gion, Ashiya-machi, Onga-gun, Right shore: Inokuma, Mizumaki-machi, Onga-gun	

(2) Intake facilities (shared with public water)

Name	Intake capacity (m ³ /day)	Location	River system
Isaza Intake Treatment Plant	209,400	Futanishi 4-chome, Mizumaki-machi, Onga-gun	Onga River
Inokuma Water Intake Station	63,200	Inokuma, Mizumaki-machi, Onga-gun	Onga River (Onga Estuary Weir)

(3) Water conveyance facilities (water conveyance channels)

Diameter (mm)	300	400	500	600	700	800	900	1,000	1,100	1,200	1,350	1,500	Water channel	Total
Length (m)	28	17	42	4	22	1,020	23	7,253	175	17,348	11,719	12	3	37,666

(4) Water purification facilities

Name	Treatment method	Purification capacity (m ³ /day)	Location	Water source
Honjo Water Purification Plant [1st]	Sedimentation	70,000	Ohiraki 5-chome, Yahatanishi-ku	Isaza Intake Treatment Plant (Tonda Reservoir)
Isaza Intake Treatment Plant [2nd]	Sedimentation	112,000	Futanishi 4-chome, Mizumaki-machi, Onga-gun	Isaza Intake Treatment Plant (Onga Runoff)
Honjo Water Purification Plant [3rd]	Sedimentation	72,000	Ohiraki 5-chome, Yahatanishi-ku	Inokuma Water Intake Station (Onga Estuary Weir)

(5) Water transmission facilities (transmission pipes)

Diameter (mm)	200	250	300	350	400	450	500	600	700	800	900	1,000	1,200	1,350	Total
Length (m)	571	20	46	5	154	8,639	592	13	783	8,628	8,163	120	47	27,781	

(6) Water distribution facilities

a. Distribution reservoirs

Name	Capacity (m ³) x (reservoir)	Location	Water source
Shiroyama Distribution Reservoir	4,400×2	Yashiki 1-chome, Yahatanishi-ku	Honjo Water Purification Plant
Hikino Distribution Reservoir	3,650×1	Besshomachi, Yahatanishi-ku	Isaza Intake Treatment Plant
Hatadani Distribution Reservoir	1,000×1	Hatadani machi, Wakamatsu-ku	Honjo Water Purification Plant
Odake Distribution Reservoir	2,080×1 2,680×1 3,200×1	Oaza Kotake, Wakamatsu-ku	Honjo Water Purification Plant

b. Distribution pipes

Diameter (mm)	50	75	100	150	200	250	300	350	400	450	500	600	700	800	900	1,000	Total
Length (m)	5	33	2,689	4,524	5,231	2,850	4,003	8,244	9,406	6,594	785	16,912	21,294	1,675	8,419	35	92,700

3. Financial conditions

(1) Outline of financial conditions of industrial water business

In FY2018, we promoted the reconstruction projects for industrial water supply facilities to ensure stable water supply.

In the financial aspect, a fund shortfall of 7.21 million yen on a single-year basis was recorded but, on a cumulative basis, fund surplus of 177.611 million yen was secured, which has resulted in continuous and stable business operation.

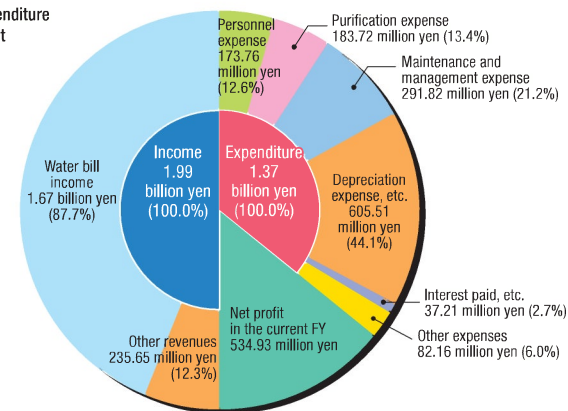
(2) Account settlement in FY2018 (including tax)

a. Operating revenue and expenditure

Revenues consisted of operating revenue of 1,673.46 million yen (including a water bill income of 1,673.46 million yen), a non-operating revenue of 235.56 million yen and an extraordinary profit of 80 thousand yen, totaling 1,909.11 million yen. On the other hand, expenditures consisted of an operating

expense of 1,293.65 million yen, non-operating expense of 78.98 million yen and an extraordinary expense of 1.55 million yen, totaling 1,374.18 million yen. Consequently, 534.93 million yen profit was gained in FY2018.

Operating revenue and expenditure as of the account settlement in FY 2018

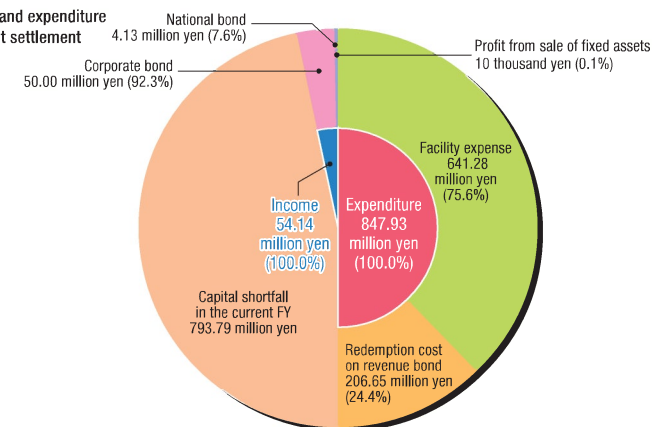


b. Capital revenue and expenditure

A corporate bond of 50 million yen, a national subsidy 4.13 million yen and a profit from sale of fixed assets of 10 thousand yen, which resulted in 54.14 million yen in total. On the other hand, regarding expenditures, a facility expense of 641.28

million yen and redemption cost on a revenue bond of 206.65 million yen were recorded, which amounted to 847.93 million yen in total. Consequently, a capital shortfall of 793.79 million yen was recorded as the balance of revenue and expenditure.

Capital revenue and expenditure as of the account settlement in FY 2018



c. Fund balance

A capital shortfall of 793.79 million yen arising out of the capital revenue and expenditure was compensated for by the reserved fund of profit and loss account, etc. Consequently, a fund shortfall of 7.21 million yen was recorded on a single-year basis. The cumulative fund surplus at the end of FY2018 was 1,776.11 million yen.

IV Sewer System



1 Roles and outline of the sewer system

1. Roles of the sewer system

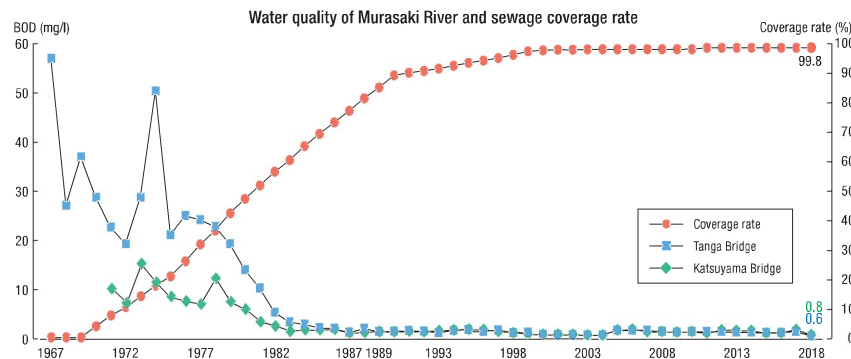
The sewer system is one of the most fundamental facilities which are indispensable for comfortable urban life. It provides citizens with a healthy, safe and comfortable living environment by preventing floods, facilitating the construction of sewage system connections for toilets and removing polluted water. Also, the sewer system is important for water circulation in urban areas due to its indispensable role in preserving water quality in waterways and basins polluted by domestic wastewater. Effective and versatile use of the facilities in the sewer system is expected for the future.



- 1 Removal of rainwater (prevention of floods)**
 The sewer system prevents damage to houses and roads caused by flooding during the rainy season and typhoons.
- 2 Improvement of the surrounding environment**
 The sewer system eliminates dirty puddles, and prevents the generation of offensive odors, flies and mosquitoes.
- 3 Promotion of the spread of sewer system connections for toilets**
 The sewer system facilitates building new sewage system connections for toilets, resulting in a comfortable and clean living environment.
- 4 Conservation of water quality**
 The sewer system prevents inflow of polluted water and protects the abundant natural environment.

(1) The Murasaki River changed to a clear stream

The Murasaki River, which is popular among citizens as a symbol of Kitakyushu City, was once polluted like a sewage canal. At present, fishes, such as sweetfish and ice goby have come back to the river, and fireflies are seen upstream. It is mainly because the polluted water in the river was purified due to the preparation of the sewer system. As stated above, the sewer system has been playing an important role in purifying the water in rivers and the sea and protecting the abundant natural environment.



* BOD (biochemical oxygen demand) is one of the indicators of organic materials. The lower a BOD level is, the less organic contents, such as waste and dirt, there are in the water.

(2) Restored Dokai Bay

In 1963, when Kitakyushu City started full-fledged construction of the sewer system, Dokai Bay was, just like the Murasaki River, so polluted by smoke and industrial drainage that even the propeller of a ship would corrode, and was known as the "Sea of Death" throughout Japan. However, the water quality was improved along with the spread of the sewer system, and currently, more than 100 kinds of fish and shellfish live in Dokai Bay.

Dokai Bay was once a notorious symbol of Kitakyushu City reflecting the public pollution problems in the city. However, Dokai Bay has currently been restored enough that many creatures may live in it.



Dokai Bay in the 1960s

2. Current conditions of the sewer system project

Public sewer system projects have advanced under the 5 Year Sewerage Construction Plan of the national government based on the Act on Emergency Measures concerning the Construction of Sewerage Systems. Kitakyushu City started full-fledged activities along with the start of the 1st 5 Year Plan (national) in 1963. The percentage of the population connected to the sewer system reached 99.8% at the end of FY 2005.

From now on, we will take necessary measures according to the plan for carrying out the roles of the sewer system, such as measures against the increasing trend of heavy rain and earthquakes, replacement of dilapidated facilities, further improvement of water quality, etc. To this end, under the "Kitakyushu City Sewer System Vision" (drawn up in February 2010) stipulating the policies of activities relating to the sewer system during the next 11 years (from FY 2010 to 2020), we will make collaborative efforts with all the citizens to realize the "Comfortable Water Circulating City," the basic concept of the vision.



Dokai Bay at the present

(1) Coverage conditions

The total coverage area as of the end of FY2018 is about 16,341ha, and the coverage rate (percentage of the population connected to the sewer system to the total population) is 99.8%.

Coverage rate / population (each ward)

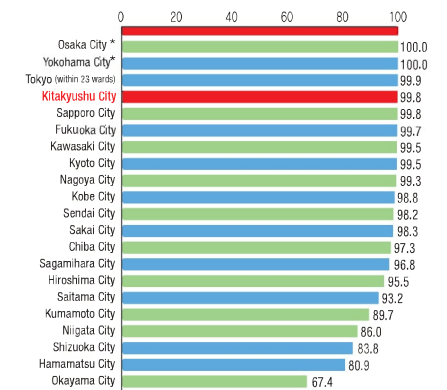
(As of the end of FY 2018)

Ward	No. of population in respective administrative areas	Population covered by sewer system	Coverage rate
Moji	98,335	98,101	99.8
Kokurakita	180,501	180,170	99.8
Kokuraminami	210,710	210,535	99.9
Wakamatsu	82,859	82,527	99.6
Yahatahigashi	66,350	66,294	99.9
Yahatanishi	253,671	180,501	99.9
Tobata	57,756	57,756	100
Kitakyushu City	950,182	948,806	99.8

* The numbers of population are based on registered population (population of registered foreign residents is added to that of the Basic Resident Register).

Sewer system coverage conditions in large cities

(As of the end of FY 2018)



(Population covered by sewer system / Total population)

Note: Items marked with * show that the coverage rate results in 100.0% when it is rounded off.

The functions of the sewer system facilities can be demonstrated through appropriate management and operations. If these functions are not used sufficiently, it will lead to various problems, such as floods, road collapse, water contamination and environmental destruction. Therefore, periodical investigation and maintenance are indispensable. Especially, since the sewer system project of Kitakyushu City started on a full scale in 1963, just after the consolidation of the former 5 cities, and there are some dilapidated facilities and equipment in the sewer system, it is requested to carry out periodical maintenance for such facilities and equipment.

(2) Maintenance and management of the sewer system

Sewage sometimes overflows when a sewer pipe is clogged with sand and mud deposited in the pipe. Also, a sewer pipe may be damaged by the vibration of vehicles and construction work for electricity, gas and water. Therefore, it is effective to make an investigation of the sewer system not only for maintenance, but also for prevention of accidents concerning the sewer system. Damaged places found in the investigation are repaired, and those clogged with waste and dirt are cleaned with a high-pressure cleaning truck.

(3) Pump stations and water purification plants

As of the end of FY2018, 34 pump stations are in operation. In Kitakyushu City, 5 sewage treatment plants (final sewage treatment plants) are currently in operation and the total volume of sewage being treated a day is about 410,000m³, which is about 5 times the volume of the city hall building.



A scene from sewer pipe cleaning

Kitaminato Water Purification Plant (Wakamatsu Ward)

Shinmachi Water Purification Plant (Moji Ward)

• Treatment method

In the water purification plants, sewage is treated by the "activated sludge method", in which sewage is purified in contact with activated sludge (aerobic micro-organisms).

• Mechanism of water purification plant

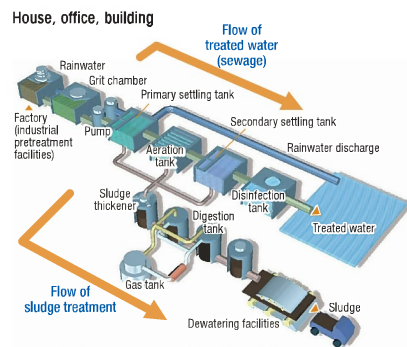
Sewage conveyed to the water purification plant first goes to the grit chamber, where sand, waste, etc. are removed. In the primary settling tank, the sewage from the grit chamber runs slowly, while solid matters easy to precipitate settle down to the bottom before being removed.

Then, the sewage is conveyed to the aeration tank, where the sewage is mixed with activated sludge and aerated. During this period, fine suspended matter and organic matter are decomposed by microorganisms.

Solid-liquid separation is conducted in the secondary settling tank, where activated sludge settles and supernatant water turns to clear purified water. Purified water is sterilized in the disinfection tank and discharged to the sea and the river.

• Measures against odor from water purification plant

As measures against odor generated from the water purification plants, the cover lids on the grid chambers and sedimentation basins, and further soil deodorization equipment and biological deodorization equipment are installed to prevent odor from dispersing.



[Activated sludge utilized in the purification process]

• Vorticella

Vorticella has a cell size of 35 to 150µm, and preys on bacteria (microbes) by making water flow by using its cilia. It moves around actively by expanding and shrinking the stalk on its tail like a spiral. The bell-shaped cell works effectively as a filter for purifying water. This species appears in large quantity in good activated sludge conditions.



Vorticella

• Rotaria

Rotaria has a cell size of 300 to 500µm, and moves in activated sludge while expanding and shrinking itself like a leech. It preys on bacteria or microbes by using the cilia on its head. This species appears in large quantity when nitrification is advanced with much dissolved oxygen content. In many cases under this condition, flocs of activated sludge are likely to settle down and the degree of transparency is high.



Rotaria

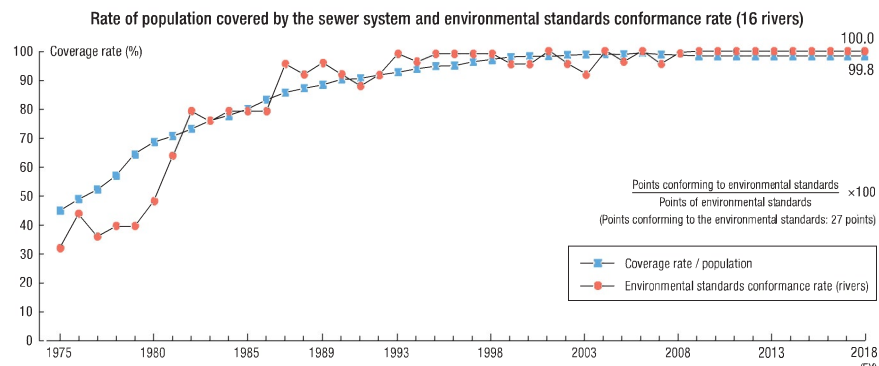
(4) Water quality control

• Water quality conditions

Along with the spread of the sewer system, untreated polluted water from households, etc., which had been directly discharged into rivers and sea, has been increasingly treated in the water purification plants before being discharged. Consequently, the water quality in the public water area has been improved.

The graph of the transition of the spread of sewer system and water quality in rivers shows that the more sewage is treated in the purification plants, the better the water quality in rivers and the sea will become. As stated above, the water purification plants play an important role in the conservation of water quality.

The water treatment in each water purification plant had excellent results in FY2018, and all the discharged water conformed to the effluent standards stipulated in the laws.



* Environmental standards conformance rate: A ratio of points where water contamination conditions conform to the environmental standards.

• Conditions of monitoring and guidance on drainage from factories

In order to prevent hazardous substances from flowing into the water purification plants, monitoring and guidance has been undertaken for the specified business establishments and other selected establishments. As of the end of FY2018, the number of facilities designated as the specified business establishment has reached 773 and 488 facilities were selected from among such specified business establishments and other business establishments as the objects of monitoring, where 787 times of on-site inspections including sampling of water were conducted. Water quality inspections were carried out for 520 facilities in total and the business establishments violating the standards were given administrative guidance (to 18 cases) for correction.

A scene from water quality inspection.

3. Problems and responses for the future

For the sewer system of Kitakyushu City, the projects have steadily advanced with the concepts of "improvement of life environment", "prevention of floods" and "conservation of public water quality" as the primary goals, which has resulted in great achievements, including the facts that currently, the wastewater problems have almost been solved, and public water quality has been remarkably improved.

However, the following problems to be worked on are still left, such as further improvement of the urban environment toward the realization of becoming the World Capital of Sustainable Development and further utilization of existing stock in addition to the responses to natural disasters such as heavy rains and earthquakes, and countermeasures for aging sewer system facilities.

- (1) Preparations against natural disasters such as heavy rains and earthquakes
- (2) Aging sewer system facilities
- (3) Conservation of water quality in rivers and seas
- (4) Contribution to the creation of comfortable waterfront areas
- (5) Measures for the low carbon society
- (6) Utilization of existing stock
- (7) International contribution
- (8) Cooperation with local communities
- (9) Measures for expanding regional cooperation

Kitakyushu City Sewer System Vision

We established the "Kitakyushu City Sewer System Vision" stipulating the policies of the focused activities to be implemented for the sewer system in the future during the planned period from FY2010 to FY2020.

Basic concept

"Aiming to be a comfortable city to live in with abundant clean water"

Targets

1. Support being a safe and comfortable city ~ Protect citizens' life ~
2. Promote water and resource circulation and low carbonization ~ Create a better environment ~
3. Utilize "treasures (resources)" of the sewer system ~ Promote social vitality ~

To achieve the above targets, the basic policies and focused activities are determined for each target to promote specific activities. Upon implementation of the specific activities, numerical targets for each measure are determined as practically as possible to present the contents and results so that the citizens may understand them easily.

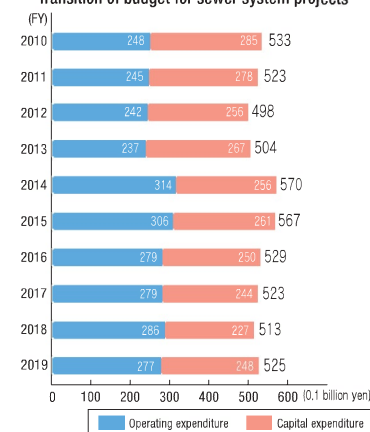
Targets	Basic policies	Focused activities
1 Support being a safe and comfortable city = Protect citizens' life =	1 Create a safe and secure city	A Create a city resilient to rain B Create a sewer system resilient to earthquakes
	2 Maintain a clean and comfortable life	C Maintain and improve sound sewer system facilities D Keep sewer system facilities longer
2 Promote water and resource circulation and low carbonization = Create a better environment =	1 Reduce loads on rivers and seas to conserve water environment	E Improve quality of wastewater and treated water F Reduce sewage flowing out from combined sewer system in rainy weather
	2 Create a comfortable water environment with affluent nature	G Return water circulation to natural state to recover clean water in the city H Use precious water resources for multiple purposes to create affluent waterfront areas
	3 Promote low carbonization for the city toward the prevention of global warming	I Produce new energy from biomass and unused resources J Reduce energy consumption in operations of sewer system facilities
3 Utilize "treasures (resources)" of the sewer system = Promote social vitality =	1 Produce new value from sewer system resources and facilities	K Utilize sewer system treated water and sites, etc. effectively L Improve existing technologies and methods
	2 Contribute to the development of Asian countries through international technical cooperation	M Transfer technologies and know-how to foreign countries and cultivate engineers in the foreign countries
	3 Support the vitality of the city	N Cooperate with local communities to promote activities in waterfront areas

2 Sewer system planning

1. Priority policy program for the development of social infrastructure

The current fiscal year marks the fifth year of the nation's Third Priority Policy Program for the Development of Social Infrastructure. In response to the program, Kitakyushu City will work on the following priority plans.

Transition of budget for sewer system projects



• Rainwater control

For safe urban development, we will increase the capacity of rainwater drainage facilities and promote efficient measures based on the comprehensive plan including measures relating to rivers.

• Improvement of the combined sewer system

Aiming for water quality conservation in the public water area, we will make efforts for the improvement of the combined sewer system.

• Renovation and renewal

We will renovate and renew dilapidated sewer pipes, pump stations and water purification plants efficiently.

• Preparation of sewage treatment plants and pump stations

Responding to the increase of polluted water and rainwater due to the spread of the sewer system and rainwater control measures, we will construct additional sewage treatment plants and pump stations.

• Sophisticated water treatment

We will work on sophisticated water treatment by stages to increase the removal ratio of phosphorus and nitrogen in line with the water quality environment standards so as to prevent eutrophication in the public water areas.

• Promotion of sewage system connections for toilets

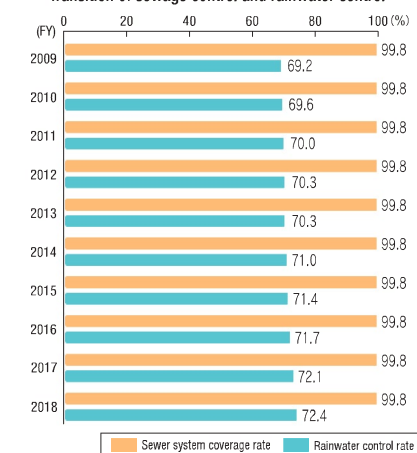
We will aim for the full introduction of sewage system connections for toilets in the area covered by the sewer system by using the aid and support systems, such as subsidies and loans for replacing and remodeling pit latrines.

2. Sewer system improvement project

It takes a long time and costs a lot to improve the sewer system. We have been implementing the projects in a planned manner.

Approved area for sewer system projects: 18,751ha.

Transition of sewage control and rainwater control



(1) Sewage control system

For the areas to be covered by the sewer system, the work for most of the areas were completed at the end of FY 2005. Kitakyushu City, aiming to be an Environmental Capital, continuously works on the improvement of private roads and the spread of septic tanks for realizing comfortable citizens' lives and conserving the natural environment in rivers and the sea, and intends to achieve 100% sewage treatment.

(2) Rainwater control system

Aiming for a city strong against floods, we have been promoting efficient and effective measures for rainwater control from the viewpoints of hardware and software, such as an increase of capacity of rainwater drainage facilities, introduction of rainwater flow control equipment, and introduction of a precipitation information system, etc. We will aim for a 73% rainwater control rate by the end of FY 2020.



Kinzangawa Pump Station

The pump station was designed with an appearance in harmony with the surroundings because it was constructed within the residential area (land readjustment project).

(3) Improvement of the combined sewer system

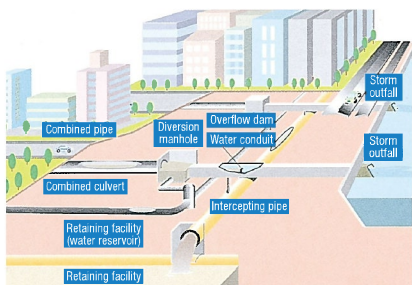
Centered in the urban area of the former 5 cities, about 21% of the area subject to the sewer system, or 3,422ha, is covered by the combined sewer system, in which rainwater and sewage are treated in the same sewer pipe. However, with this method, the volume of rainwater flowing into sewer pipes at one time increases in the event of heavy rain, and untreated sediment in the sewer pipes is discharged directly into the public water area.

Therefore, we have been promoting the renovation and renewal of sewer facilities for reducing the volume of discharged polluted water and for coping with the increased outflow of rainwater, as well as promoting the improvement with the branching sewer system meeting the geographical features of the area and with the rainwater reservoir system.

Further, we drew up the emergency improvement plan for the combined sewer system and have continuously been making efforts to carry out refinement projects in an efficient and effective manner.

• Improvement through the utilization of a rainwater reservoir system

The rainwater reservoir system temporarily retains heavily polluted initial rainwater in rainwater reservoirs, conveys the rainwater to water purification plants after the rain stops, and can reduce pollution in rivers, etc. We constructed the Kantake Rainwater Reservoir beneath the Media Dome and service began in autumn 1998. In addition, we started the services of rainwater reservoirs at Tobata Pump Station in FY2006, at Fujita Pump Station and Mojiko Pump Station in FY2012, and at Higashi-Nakashima Pump Station and Sakuramachi-Kitaminato Rainwater Storage Tube in FY2018.



The system can reduce the pollution load of water discharged from the combined sewer system by retaining heavily polluted initial rainwater temporarily in the rainwater reservoir.



Photograph of the storm outfall from the combined sewer system during a heavy rain storm (Itabitsu River)

Coverage area of the combined / branching sewer system (each ward)

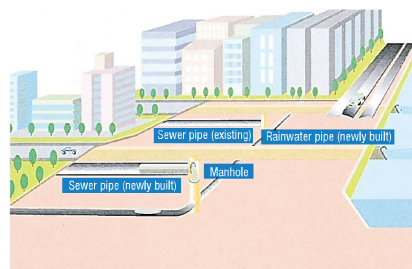
(As of the end of FY 2018)

Ward	Branching system	Combined system	Total
Moji	1,792	38	1,830
Kokurakita	1,588	890	2,478
Kokuraminami	3,290	45	3,335
Wakamatsu	1,913	170	2,083
Yahatahigashi	366	929	1,295
Yahatanishi	3,714	851	4,565
Tobata	316	499	815
Kitakyushu City	12,979	3,422	16,401

(Unit: ha)

• Improvement through the utilization of a branching sewer system

In the Bachi River basin, where a river restoration project is underway, the construction of a branching sewer system has been promoted since FY 1997 in coordination with the river project. Currently, we have been promoting the introduction of the branching sewer system in part of the basins of the Itabitsu River and the Murasaki River.



The system can separate and treat rainwater and sewage, which used to be treated in the same sewer pipe, respectively by newly installing the rainwater pipe, which will eliminate a concern that polluted water may flow into the public water area.

(4) Projects for preparation of pump stations

• Reconstruction of pump stations

It is necessary to reconstruct, renew or reinforce the pump stations due to the increase of rainwater outflow volume along with aging facilities and the progression of urbanization. The Fujita Pump Station in Yahatanishi Ward started its operation in 1963 in order to discharge rainwater around JR Kurosaki Station. However, heavy rains in recent years often caused flood damage, and therefore it has become necessary to reinforce the storm sewage pumps as soon as possible. Furthermore, since the facilities have become older, in addition to the renewal of the storm sewage pumps, a new storm sewage pump station was constructed inside Shiroyama Green Park adjacent to the existing site. And the service started in FY 2012 for the purpose of eliminating flood damage and improving the combined sewer system at the same time.

3 Effective use of sewer system resources

We look upon treated water and sludge generated in the sewage treatment as important "resources" and utilize the resources effectively, aiming for an earth-friendly sewer system.

1. Utilization of treated water

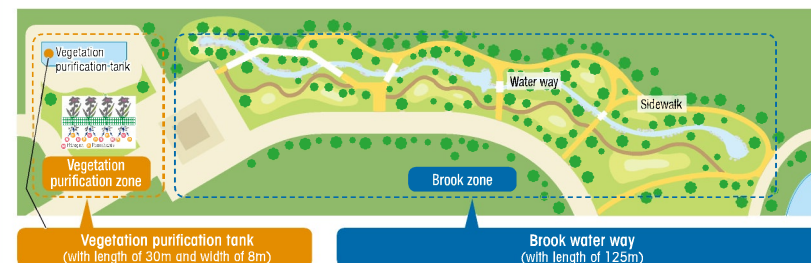
The total treatment capacity of the 5 sewage treatment plants in Kitakyushu City is 620,000m³ per day. The total volume of sewage accepted in these sewage treatment plants is 151.52 million m³ per year, of which the volume of secondary treated water is 149.27million m³ per year, or 410,000m³ per day on an average. The water purification plants in the city have been treating the sewage by using activated sludge, and have achieved excellent results. Treated water generated from the water purification plants has been voluntarily utilized as an important water resource.

Dokai Biopark (visible sewer system)

Purification of treated water made from sewage by the plant life ecosystem in the park.
The waterfront with various creatures serves as a relaxation place for citizens!

Treated water made from sewage conveyed from the Kogasaki Water Purification Plant is further purified in Dokai Biopark by the plant life ecosystem in the park. The re-purified treated water has created a waterfront where various creatures can live, and the information boards showing the water purification mechanism are installed for environmental education and the enlightenment of citizens. Furthermore, a waterfront with a freshwater system created at the inner part of the bay contributes to the preparation of a good living environment for wild birds, etc., and is also useful for the improvement of the environment in Dokai Bay. Moreover, Dokai Biopark is expected to enhance citizens' awareness about the sewer system through PR activities such as the "visible sewer system".

This is the first case in Kitakyushu City where treated sewage is recycled and reused as water for the environment, and there are few water purification facilities in Japan where treated water made from sewage is purified by the plant life ecosystem.



Vegetation purification zone

This is the zone where treated water made from sewage (secondary treated water) is purified by vegetation (advanced treatment). Nitrogen and phosphorous in the water are eliminated in this zone, making use of plants' mechanism to absorb nitrogen and phosphorous as they grow.



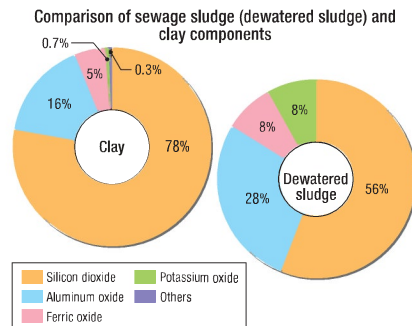
Brook zone

Water purified in the vegetation purification zone flows into the water way, creating the brook zone. Plants grown along the side of the brook zone further purify the water. In addition, the brook zone serves as a habitat for small creatures, such as dragonflies and waterfowl, where citizens can observe and learn about the natural environment up close.



2. Utilization of sludge

Most of the sludge generated by sewage treatment was disposed of in coastal landfills, and the rest was dumped into the sea. However, taking into consideration the impact this has on the environment, disposal in coastal landfills was abolished by the end of September 1998, and sea dumping was also abolished by the end of March 1999. Currently, among the 170 tons of sludge generated a day, 100 tons of sludge is used as material for cement and the remaining 70 tons is made into fuel, and is used in factories in the city as an alternative to coal.



(1) Use of sewage sludge as material for cement

a. Effective use of sludge developed in cooperation with private enterprises

Due to similarities of components between sewage sludge and clay for cement raw material, cement production using sewage sludge in place of clay has been in operation since FY 1997 in cooperation with the private companies.

b. Advantages of using sewage sludge as material for cement

• No waste is generated

Since sludge is added directly into the cement production process, the whole volume of sludge can be used as material for cement and no waste is generated.

• No odor is generated

Since sludge is added into the process with a temperature of about 1,500°C, components of odor are completely decomposed and no odor is generated.

• A large volume of sewage sludge can be recycled

Recycling of 40,000 tons of sewage sludge per year as material for cement is one of the largest scale operations of this kind in Japan.

• Geographical advantage

Since private cement production factories are located near the water purification plants in the city, there are advantages, such as lower transportation cost, less problems with odor during transport, easier cooperation with the cement production factories in the operations, etc.

(2) Producing fuel from sewage sludge (from October 2015 onwards)

a. Recycling waste into fuel

Producing fuel from sewage sludge is a project that has been in place since October 2015, where it replaces the co-incineration of general waste that had been in practice from April 1999 with a sewage sludge treatment method. The purpose of the project is to produce fuel from sewage sludge collected in the Hiagari Sewage Treatment Plant from 4 other sewage treatment plants, sell the recycled resource to business operators in the city that possess coal boilers as an alternative to coal.

b. Characteristics of sewage sludge fuel

Co-incineration with general waste is a unique sludge treatment method in Kitakyushu City, where the water purification plant and the incineration plant are located closely. The sludge drying facility was constructed for this sludge treatment method.

• Generating high-calorific value fuel

"Granulation and drying method" is adopted which is capable of transferring 100% of the energy sewage sludge possess to product fuel.

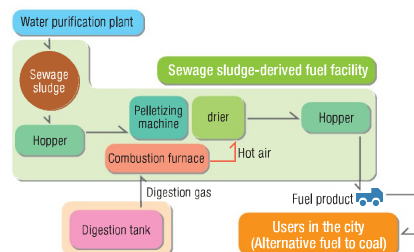
• Contributing to a low-carbon society

Using the digestion gas generated from within the Hiagari Sewage Treatment Plant as fuel, which significantly reduces the amount of CO₂ generated.

Also, as the produced fuel is carbon neutral, substantial reduction of CO₂ generation can be expected when the fuel is used by the business operators in the city, which contributes to a low-carbon society for the city.

c. Project implementation using the DBO approach

When implementing the project, the DBO (Design-Build-Operate) approach is adopted, which allows the application of private-sector know-hows to the project so that the design, construction, maintenance and operation of the advanced sewage sludge fuel facility and sale of the production fuel can take place steadily at low costs over a long period of time.



3. Utilization of unused energy

(1) Utilization of digestion gas (Hiagari Sewage Treatment Plant)

The digestion gas generated from sludge in the sewage treatment process contains a large quantity of methane gas, and is a precious energy source with a calorific value at 24MJ/. Kitakyushu effectively utilizes this as fuel for drying sewage sludge to make sewage sludge fuel and for electric power generation (150kW).

(2) Utilization of natural energy (Shinmachi, Hiagari, Kitaminato Water Purification Plants)

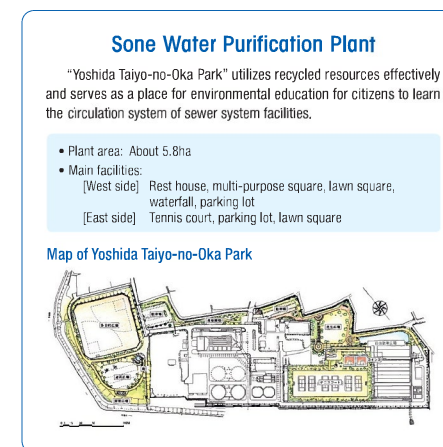
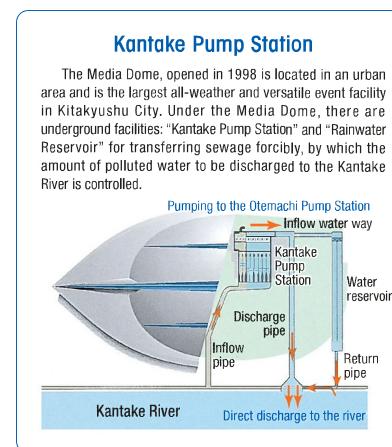
Within the lands and facilities of the water purification plants, solar power, wind power and small hydro power generation systems are installed, and the number of the power generation systems will be increased in the future.

- Solar power generation: Shinmachi (210kW), Hiagari (270kW), Kitaminato (97kW)
- Wind power generation: Hiagari (3kW)
- Small hydraulic power generation: Hiagari (1kW)

4. Effective use of sewer system facilities

(1) Effective use of water purification plants and pump stations

The water purification plants and pump stations are precious spaces with abundant greenery and water in the urban area. Kitakyushu City has been promoting the projects which prepare the spaces as sports facilities, parks, open areas and places where citizens can experience nature, enjoy plays, study and research water. In Sone Water Purification Plant, a part of the premises has been open to the citizens as a community park, where the park and the sewer system have been developed in an integrated manner.

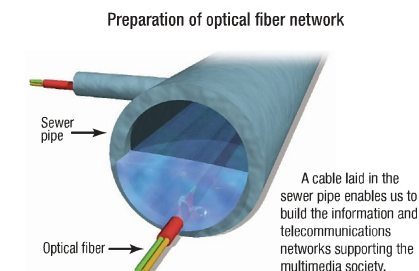


(2) Effective use of sewer pipes

The Sewerage Service Act was revised as part of deregulations in FY 1996, and persons other than administrators for the sewer system became able to use parts of sewer pipes. This revision is for the purpose of facilitating effective use of underground spaces by making the sewer pipes open to telecommunication business operators who intend to install optical fibers in order to promote the preparation of a sophisticated information infrastructure.

Also in Kitakyushu City, the relevant regulations, etc. were prepared in April 1999 to call telecommunication business operators' attention to effective use of sewer pipes.

Consequently, about 6 km optical fibers have been installed so far, making use of sewer pipes.



4 Financial conditions

1. Outline

In FY2018, with the principle of steady implementation of projects based on the "Medium-Term Project Management Plan for Kitakyushu City Water Utility and Sewer System" (FY2016 to 2020), we secured revenue by proper imposition and collection of sewer user charge and reduced maintenance and management cost by the introduction of high-performance equipment and devices in time to their reform or renewal.

From financial aspect, fund revenue and expenditure on single-year basis recorded a surplus of 69.72 million yen to secure a cumulative fund surplus of 2,786.95 million yen.

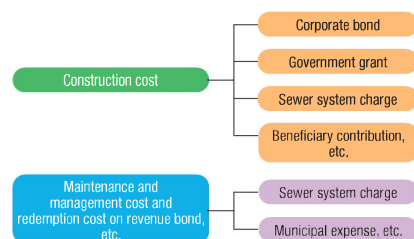
2. Financial mechanism

The expenses of the sewer system projects are classified into construction cost, maintenance and management cost, redemption cost on revenue bond, etc., and the financial resources are as follows.

(1) Construction cost

It costs a lot to construct and renew sewer system facilities. The sewer system construction cost in FY2018 was about 12.9 billion yen. Most of the construction cost is covered by government grants and long-term loans (corporate bond). The procurement of funds by the issuance of corporate bonds gives the following advantages.

- Since many projects can be implemented in a single year, the period of time that citizens wait for the improvement of sewer system facilities is reduced, which will facilitate administrative services.
- As the sewer systems facilities can be used for a long time, 50 years or more, the construction cost can be borne by multiple generations equally.



(2) Maintenance and management cost

It is necessary to maintain and manage sewer system facilities appropriately from the viewpoints of securing the safety of citizen's lives and environmental conservation. The maintenance and management cost includes the repair cost of sewer pipes, operating cost, etc. for pump stations and water purification plants.

In FY2018, the maintenance and management cost amounted to about 6.8 billion yen in total, including the electricity bill, chemicals cost, repair cost, personnel cost and so on, which is equivalent to about 18.63 million yen a day.

Project cost	Sewer construction cost	Maintenance and management cost	Total
FY 2018	About 12.9 billion yen	About 6.8 billion yen	About 19.7 billion yen

[Operating balance and capital balance]

• Operating revenue and expenditure

The operating revenue and expenditure indicates the balance of revenue and expenditure occurred in the business operations of a public enterprise, the main items of which include the maintenance and management cost and depreciation cost of sewer pipes, pump stations and water purification plants, and interest paid on corporate bonds for construction of sewer system facilities.

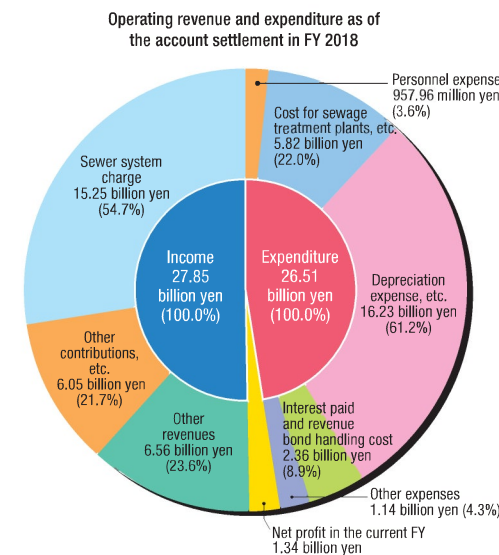
• Capital revenue and expenditure

The capital revenue and expenditure indicates the balance of revenue and expenditure occurred in the construction and improvement for future business operations and redemption cost on the principal of revenue bond, etc. for maintenance and development of continuous services. The main items include the expense for measures for promotion of the sewer system, flood prevention, improvement of the combined sewer system, renovation and renewal of sewer system facilities, etc., and redemption cost on the principal of revenue bond.

3. Account settlement in FY2018 (including tax)

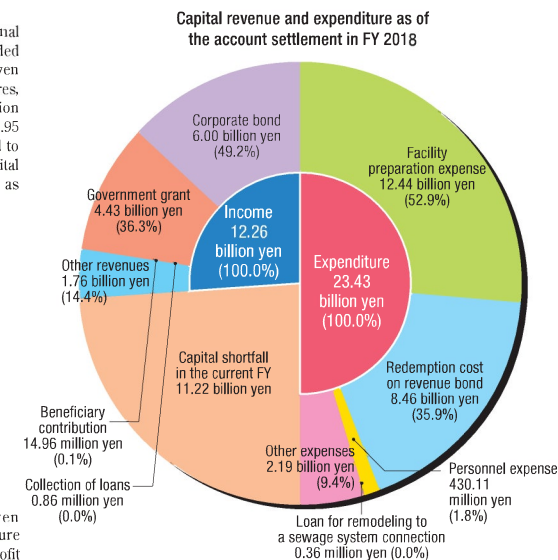
(1) Operating revenue and expenditure

Revenues consisted of operating revenue of 21,646.28 million yen (including a water bill income of 15,246.82 million yen), a non-operating revenue of 6,196.30 million yen and an extraordinary profit of 10.29 million yen, totaling 27,852.87 million yen. On the other hand, expenditures consisted of an operating expense of 23,934.30 million yen, non-operating expense of 2,574.52 million yen, and an extraordinary loss of 2.22 million yen, totaling 26,511.04 million yen. All in all, a profit of 1,341.83 million yen was gained in FY2018.



(2) Capital revenue and expenditure

A corporate bond of 6.00 billion yen, a national subsidy of 4,425.29 million yen, etc. were recorded as revenue, which resulted in 12,205.99 million yen in total. On the other hand, regarding expenditures, a facility preparation expense of 12,403.58 million yen, a redemption cost on revenue bond of 8,405.95 million yen, etc. were recorded, which amounted to 23,430.29 million yen in total. Consequently, a capital shortfall of 11,224.30 million yen was recorded as the balance of revenue and expenditure.



(3) Fund balance

A capital shortfall of 11,224.30 million yen arising out of the capital revenue and expenditure was compensated for by the reserved fund of profit and loss account, etc. Consequently, with a fund surplus of 69.72 million yen on a single-year basis, the cumulative fund surplus of 2,786.95 million yen at the end of FY2018 was ensured.

V International Projects



1 International technical cooperation

The Kitakyushu City Water and Sewer Bureau has held up “International Contribution by Utilizing our Technology and Experience” as one of its policy goals in the “middle-term management plan of Kitakyushu City Water and Sewer Bureau” and the Bureau is working on international technical cooperation activities.

Currently, we are conducting international technical cooperation activities mainly in Kingdom of Cambodia, Vietnam, China, Indonesia, Myanmar, etc.

In addition, to accomplish the 17 goals of United Nations’ “SDGs (Sustainable Development Goals)”, the city was selected by OECD first in Asia as “World Model City for Promotion of SDGs” (in April 2018) and also selected by Japanese government as “SDGs Future City” (in June 2018) to be a model for municipalities.

Based on those results, Water and Sewer Bureau will continuously make efforts for international technical cooperation from the aspect of accomplishing SDGs’ 6th Goal “Provide safe water and clean toilet for all people in the world.”

Main international projects

(1) Kingdom of Cambodia

--- Water utility field

The Kingdom of Cambodia has been coping with “access to water” as one of the most important issues for reconstructing the country since 1991 when the civil war ended, and has been implementing various countermeasures, holding up the national goal which would enable the people in urban and rural districts to “access water”. The Water and Sewer Bureau of Kitakyushu City has been participating in the technical cooperation aiming for human resource development, upon receiving the request from the Ministry of Health, Labor and Welfare and JICA (Japan International Cooperation Agency).

[Technical cooperation for Phnom Penh]

Kitakyushu City made efforts to promote technical cooperation and development of human resources for the period from 1999 to 2006, and consequently, the Phnom Penh public waterworks corporation has made significant progress, including the supply of drinkable tap water, reduction of the non revenue earning water ratio (8% reduction as of October 2006), and realization of 24-hour water supply. This is called “Miracle of Phnom Penh.”

- (1) Specific experts dispatch project (FY 1999 to 2002)
We dispatched experts for giving guidance regarding the “operation, maintenance and management of water supply facilities”.
- (2) JICA Partnership Program (FY 2001)
We dispatched experts and provided equipment and materials (31 units of the telemeter owned by Kitakyushu City) with the theme of “transfer of technology, equipment and materials to the city aiming for the establishment of the distribution monitoring system”.
- (3) JICA Project on Capacity Building for the Water Supply System in Cambodia (from October, 2003 to October,

2006)We implemented the project aiming for human resource development in Phnom Penh Water Supply Authority.

- (4) CLAIR municipality personnel cooperation and exchange program (from July 2007 till present) We accepted trainees from Phnom Penh Water Supply Authority.

[Technical cooperation for 8 local cities]

- (5) JICA Project on Capacity Building for the Water Supply System in Cambodia (Phase II)
(From May, 2007 to March, 2012)
In 8 local cities, including Siem Reap, etc., we worked on the activities for the enhancement of waterworks technologies, including water quality analysis, water purification and treatment, maintenance and management of water distributing facilities, etc.

- (6) JICA Project on Capacity Building for the Water Supply System in Cambodia (Phase III)
(From November, 2012 to June, 2018)
In the above-mentioned 8 local cities, a project for the purpose of enhancing the managerial capacity of the waterworks bureaus was implemented.
We accepted trainees from the 8 local cities and dispatched city personnel to the cities.

- (7) JICA Project on Improvement of Siem Reap’s Capacity on Water Supply Facilities Management (from FY 2013 to 2015)
Utilized project: JICA Partnership Program

[Technical cooperation for improving the performance of water service administration]

- (8) Project for improvement of water service performance in Kingdom of Cambodia (From July 2018 to June 2022)
To foster the personnel of Cambodia Ministry of Industry and Handcraft which takes charge of water service administration in Cambodia, and to give them guidance to the establishment of standards such as ordinance of the ministry, etc.

--- Sewer system field

Concluding a memorandum on an exchange of technology in February 2017, we started the technical cooperation toward development of the sewer system and improvement of the water environment of Phnom Penh Capital City in cooperation with JICA, the Ministry of Land, Infrastructure, Transport and Tourism and private enterprises.

- (1) For the purpose of drawing up a master plan concerning the improvement of sewage and drainage conditions, we implemented a survey for drawing up a detailed plan jointly with JICA (April 2014).
- (2) Phnom Penh Sewage and Drainage Facilities Capacity Improvement Project (from FY 2016 to FY 2019) Applied Project : JICA Grass-root Technical Cooperation Project.
- (3) Project for improving the sewer system administration performance of Phnom Penh Municipality Government and Cambodia Ministry of Public Works and Transport (from FY2019 to FY2022).

(2) Hai Phong City in Vietnam

--- Water utility field

Taking the opportunity of the conclusion of the memorandum for basic guidelines for technical cooperation with the public waterworks corporation of Hai Phong City in December, 2009, we started the technical cooperation with the purpose of transfer of sophisticated water purification technologies from Kitakyushu City.

- (1) (From FY 2010 to 2012)
Implemented project: Water purification enhancement program for organic materials
Utilized project: JICA Partnership Program
- (2)(From FY 2013 to 2015)
Implemented project: Project for enhancement of conduit steel management capacity
Utilized project: JICA Partnership Program

--- Sewer system field

We concluded a memorandum with the Hai Phong Drainage and Sewerage Company (SADCO) in November 2010, and started technical exchanges. Based on the sister city agreement with Hai Phong City (April 2014), we concluded a memorandum in October 2014 to continuously work on the technical exchanges we had implemented so far.

- (1) Utilized project: Local Authorities International Cooperation Promotion Project by CLAIR (from FY 2011 to 2012, from FY 2014 to 2015)
JICA Partnership Program (from FY 2012 to 2013, from FY 2014 to 2016, from FY2018 to 2020)
Local Government Officials Training Program in Japan by CLAIR (FY 2014)
Contents: Acceptance of trainees, on-site technical guidance and holding of seminars in Hai Phong

(3) Dalian City in China

--- Water utility field

We implemented technical cooperation by utilizing the JICA Partnership Program, etc. for the “Dalian Water Supply Group Co., Ltd.” which operates the water supply business in Dalian City in China which has a friendly relationship with Kitakyushu City.

- (1) 1st Stage (from FY 2001 to 2004)

Cooperation theme: “Development of the secondary water resource through water leakage prevention”

Guidance on water quality inspection

Utilized project: Local Government Officials Training Program in Japan by CLAIR (acceptance of trainees) JICA Partnership Program

- (2) 2nd Stage (from FY 2005 to 2007)

Cooperation theme: “Improvement of safe and stable water supply”
Utilized project: JICA Partnership Program

- (3) 3rd Stage (from FY 2008 to 2011)

Cooperation theme: “Technological cooperation for peripheral cities of Dalian City”
Utilized project: JICA Partnership Program

--- Sewer system field

We concluded a memorandum with the Construction Management Bureau of Dalian City in April, 2011, and technical exchange has been progressing.

- (1) (In FY 2012)
Acceptance of government officials of Dalian City
Acceptance of personnel of the Construction Management Bureau of Dalian City (utilizing the Local Government Officials Training Program in Japan by CLAIR)
- (2) (In FY 2014)
We invited executive officials of the Construction Management Bureau, Dalian City.
- (3) (FY2019)
We invited executive officials of the Construction Management Bureau, Dalian City, on the sidelines of the International Symposium on Sewerage in Kitakyushu.

(4) Indonesia

--- Sewer system field

We started technical assistance for improving the water environment of the Special Capital Region of Jakarta and Surabaya, the Green Sister City of Kitakyushu City, in cooperation with the Ministry of Land, Infrastructure, Transport and Tourism and private enterprises.

- (1) Utilized project: Local Government Officials Training Program in Japan by CLAIR (FY 2013)
JICA Project for Capacity Development for Improvement of Water-related Problems in the Special Capital Region of Jakarta, Indonesia - Survey for drawing up the detailed plan (from June to July 2014)
Contents: Acceptance of trainees, on-site survey
- (2) Utilized project: Japan International Cooperation Agency (JICA) Project for Improving Planning Capacity for Sewerage System in DKI Jakarta (from June 2015 to March 2018)
Contents: Long-term dispatch of city personnel for services as a chief adviser

(5) Mandalay City in Myanmar

--- Water utility field

In response to the request from Mandalay City, we started the technical cooperation in December 2013, aiming at improving the water purification facilities (sterilization facilities) to secure stable supply of safe water, as well as assisting the appropriate operation, maintenance and management of the water purification plants and improving the water quality analysis technology.

Utilized project: JICA Partnership Program

(6) Additional information

We implemented training organized by the Japan International Cooperation Agency (JICA), etc., upon the request of the training implementation agencies (Kitakyushu International Techno-cooperative Association (KITA), etc.)

Dispatch of personnel and the acceptance of trainees

(As of the end of March, 2019)

	Dispatch of personnel to foreign countries		Acceptance of trainees from foreign countries	
	Total number of personnel	Number of countries	Total number of trainees	Number of countries and areas
Water utility	140	7	1,688	128
Sewer system	59	10	4,514	136

2 | Overseas water business

Along with the increasing population and the urbanization in Asian countries, overseas water business is expected to expand into an 87 trillion yen market by 2025, which is regarded as one of the pillars of the national government's "Japan Revival Strategy" and the "Kitakyushu City New Growth Strategy."

By utilizing the strengths we have developed through international technical cooperation and networking with several cities in Asia, we are engaged in overseas water business and international contributions by making concerted efforts in cooperation with government organizations and private entities centered on Kitakyushu Overseas Water Business Association.

Major activities

(1) Establishment of "Kitakyushu Overseas Water Business Association"

In August, 2010, the "Kitakyushu Overseas Water Business Association (hereinafter referred to as the Association)" was founded by a wide range of entities, including enterprises in various industrial fields (57 companies at the time of initial establishment), academic experts, and ministries and organizations of the national government, which made us prepare Japan's first organization for promoting overseas water business through the cooperation of the government and private sector.

The Association has set the target for water business in the Kingdom of Cambodia, Hai Phong City in Vietnam, Dalian City in China, and Indonesia, each of which has a strong human network which has been cultivated through previous technical cooperation. And they have been carrying out the activities to work out specific orders with concerted efforts, sharing information between participating enterprises and related organizations, while considering effective methods of overseas business development.

Organization of "Kitakyushu Overseas Water Business Association"

(As of September 1, 2019)

Kitakyushu Overseas Water Business Association

Chairman Noriaki Kiyota
(Vice President, Kitakyushu Chamber of Commerce and Industry)

Deputy Chairman Hitoshi Arita
(President and Representative Director, Kitakyushu Water Service, Co. Ltd.)

Member Yuya Sato
(Associate professor, Institute of Water Cycle System, Waseda University)

* "Kitakyushu Overseas Water Business Association" is positioned as one of the members of the "Water Business Promotion Society" established in the Kitakyushu Asian Center for Low Carbon Society.

Private enterprises (150 companies)

- Enterprises in Kitakyushu City (83 companies)
- Enterprises outside Kitakyushu City (67 companies)

Related organization (9 organizations)

- Kitakyushu Chamber of Commerce and Industry
- Japan Bank for International Cooperation (JBIC)
- Japan Water Works Association
- Japan Global Center for Urban Sanitation
- Kitakyushu Asian Center for Low Carbon Society
- JICA Kyushu
- Development Bank of Japan Inc.
- Organization for Small & Medium Enterprises and Regional Innovation, JAPAN, Kyushu Headquarters
- Japan External Trade Organization (JETRO)

Academic expert (5 professors)

- Tetsuya Kusuda, Professor Emeritus of Kyushu University
- Katsumi Moriyama, Professor Emeritus, Kyushu Kyoritsu University
- Sam Tabuchi, Professor, Graduate School of Toyo University
- Hidenari Yasui, Professor, The University of Kitakyushu
- Yuya Sato, associate professor, Institute of Water Cycle System, Waseda University

Related Bureaus of Kitakyushu City (4 bureaus)

- Planning and Coordination Bureau
- Environment Bureau
- Industry and Economics Bureau
- Water and Sewer Bureau

Observer (6 organizations)

- Ministry of International Affairs and Communications
- Ministry of Health, Labour and Welfare
- Ministry of Economy, Trade and Industry
- Ministry of Land, Infrastructure, Transport and Tourism
- Japan Sewerage Works Agency
- Japan Institute of Wastewater Engineering and Technology

Secretariat • Kitakyushu Water Service Co., Ltd.

(2) Dispatch of missions

As the first specific activity of the Association, we dispatched a mission to Hai Phong City in Vietnam in November, 2010.

In April, 2011, we dispatched a mission to Dalian City, upon the request from the municipal government of Dalian City, China, and held "Kitakyushu City water business seminar" and "exhibition and business meetings".

(3) PR activities

The Association exhibited a booth in "VIETWATER 2013" (October 2013), and further participated in the exhibition and business talks at the water business seminar held in Phnom Penh City, Kingdom of Cambodia to advertise the technologies of the member enterprises toward the world.

Additionally, in December 2018, Kitakyushu City held "Seminar on Water and Sewer Works Cambodia-Japan" together with the Ministry of Health Labour and Welfare and the Ministry of Land, Infrastructure, Transport and Tourism. With the 20th anniversary of exchange of water works technology, we held a discussion meeting on improvement in the management of private water utilities. We also held a conference on the improvement of sewage treatment and technical cooperation program in the future and a meeting on the introduction of technologies and products of member enterprises of the Association.

Exhibition and business meeting at Water Business Seminar in Phnom Penh City

(4) Achievements so far

Results have been gradually achieved through concerted efforts by the government and private sector.

[Major orders we received from Kingdom of Cambodia]

- Mar. 2011: Project for supplementing the basic design for constructing a water purification plant in Siem Reap City
- Dec. 2011: We concluded a memorandum on the project for technical consultation relating to the formulation of the master plan on waterworks (over the next 4 years) in 9 major cities with the Ministry of Mining, Industry and Energy of Cambodia
- Jan. 2012: Basic research relating to the plans of waterworks and sewer pipes in Kampot City and Kep City
- May 2012: Preparatory research for developing waterworks in Battambang City and Kampong Chan City
- Feb. 2013: Project for planning sewage systems in Siem Reap City
- Jun. 2013: Project for improvement of main water supply network in Sen Monorom City
- Jul. 2013: Project for supporting the feasibility of the JCM project in Phnom Penh
- Aug. 2013: Project for expanding waterworks in Kampong Chan City and Battambang City
- Oct. 2013: Assistance for sewer system trainings in Japan for Cambodians
- May 2014: Preparatory research for planning the expansion and development of local waterworks in Kampot and Sihanoukville
- May 2014: Project for energy saving by raising the efficiency of water purification plant equipment in the Phnom Penh Water Supply Authority, Cambodia (JCM project planning research)
- Aug. 2014: Project for improvement of urban sewage and drainage systems in Phnom Penh
- Jun. 2015: Ministry of Economy, Trade and Industry FY2015 project for infrastructure systems overseas development promotion survey etc.
- Sep. 2015: Detail design for the project for expanding waterworks facilities in Kampot City
- Dec. 2015: Detail design for the water supply network expansion project in Siem Reap City
- Jan. 2016: Conclusion of a memorandum concerning activities for sustainable development of waterworks in the Kingdom of Cambodia
- Mar. 2016: Project for improvement of main water supply network in Sen Monorom City
- Apr. 2016: Construction work in Kampot City water supply network improvement project
- Feb. 2017: Conclusion of a "memorandum concerning the technical cooperation and exchange" with Phnom Penh
- May 2017: Preparation and investigation for main water supply network expansion and improvement plan in Pursat Town and Svay Rien Town
- Oct. 2017: Collection of information and investigation for confirmation about main water supply sector in Phnom Penh Capital City
- Apr. 2018: Preparation and investigation for sewage treatment plant improvement plan in Phnom Penh Capital City

- Dec. 2018: Project for expansion of main water supply network (expansion of water distribution network) in Siem Reap City
- Mar. 2019: Project for expansion of main water supply network in Kampong Thom City

[Major orders received from Vietnam]

- Oct. 2011: Conclusion of a memorandum concerning water and sewage development with Hai Phong City
- We agreed to provide technical advice for water distribution block system to be introduced in 5 years
- Nov. 2011: PPP initial research project by the Ministry of Health, Labor and Welfare
- Feb. 2012: Project for developing human resources for the sewer system in Hai Phong City
- May 2013: A member enterprise (local corporation) of the Association received an order for U-BCF Development Project in Hai Phong City
- May 2013: We concluded an agreement for mutual cooperation for the "Diffusion of U-BCF with Hi Phong City Waterworks Public Corporation in Vietnam."
- Dec. 2013: U-BCF was completed in Bingbao Water Purification Plant
- Dec. 2013: Information gathering and investigation about local water service sectors in Vietnam
- Jun. 2014: Digging up and embodying of a project for public-private cooperation type overseas water business in water supply field in Ilo Chi Minh City
- Jul. 2014: Preparatory research for the upgrade plan of the An Duong Water Purification Plant in Hai Phong City
- Mar. 2015: Project of reconstructing the mapping system of Hai Phong City Waterworks Public Corporation
- Feb. 2016: Demonstration experiments of U-BCF in 6 local cities (Small and medium-sized enterprises overseas development support project)
- Jul. 2016: Detail design for the upgrade plan of the An Duong Water Purification Plant in Hai Phong City
- Feb. 2017: Project of Preparing Sewage facility Information Management System in Hai Phong City
- Aug. 2018: A plan of upgrading the An Duong Water Purification Plant in Hai Phong City

[Major orders received from Indonesia]

- Nov. 2012: We received an order for planning a sewer system development in Surabaya City from the Ministry of Land, Infrastructure, Transport and Tourism (in collaboration with the member enterprises of the Association)
- Jun. 2013: We cooperated in technical assistance for developing a low-carbon city plan in Surabaya City (JCM project)
- Feb. 2014: Complementary research for a sewer system development project in the Special Capital Region of Jakarta
- Sep. 2014: Project for assisting sewer system trainings for Indonesians
- Apr. 2016: Implementation of training in Japan related to the project for capacity development of drawing up plans concerning sewer system development in the Special Capital Region of Jakarta

(5) Establishment of the global strategic center for water business

In April, 2012, Kitakyushu City was certified by the Ministry of Land, Infrastructure, Transport and Tourism as the municipality which conducts international projects in an advanced manner, and was registered as a member of the Water and Environment Solution Hub (WES Hub).

After the registration, we prepared "an international strategic base of water business" and plan to utilize it in order to secure the competitive advantage and excellence overseas, and to reinforce the foundation of the international business.



[Topics] Youth Training for Water and Sewer Technology in FY2019

Aiming at "Development of human resource to play a key role in infrastructure improvement" in the water and sewer field and "Transmission of information such as international technical cooperation", Kitakyushu City Water and Sewer Bureau held "Youth Training for Water and Sewer Technology" jointly with JICA Kyushu.

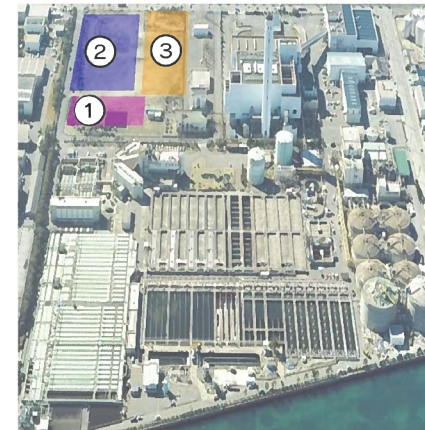
From among 34 applicants, 6 high-school students in the city were selected and, after having a domestic training at the end of July, participated in an overseas training in Hai Phong City, Vietnam between August 5 and 10.

In November, at "Eco Life Stage", the participant high-school students made a presentation of the result of training.

Reporting of the results to the Mayor

Study on water environment at the world heritage, Halong Bay

International strategy hub for water business
~ Showcase of cutting-edge technologies ~



① Visitor Center
(former Higashi Sewage Treatment Center's Administration Building)

(Structure and floors) 3-floor reinforced concrete structure
(Total floor space) About 2,900 m²



3rd floor
Technology & product display



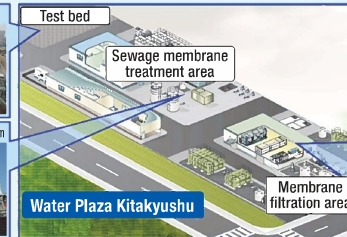
2nd floor
For learning sewage system

1st floor
Water quality test room

2nd floor
Presentation room

② Water plaza

- Advanced water production system combining seawater desalination and sewage membrane-treatment
- Implementation of experimental studies for promoting international commercialization with the government and the private sector in cooperation



③ Conversion of sewage sludge to fuel

(service started in Oct. 2015)

Utilized as a fuel alternative to coal

- Capacity: Generating about 20t fuel from 70t sewage sludge per day
- Usage: Thermal power generation and heat source for cement plants
- * A process from fuel generation to fuel consumption is completed in the city.



Sewage Sludge Fuel Center

Kitakyushu City

Sewage sludge

SPC (Special Purpose Company)



Sold as fuel

End user



CO₂ reduction by the entire project: 11,300 tons

VI Customer Service

1 | Contact point for customers

Since the water and sewer projects are indispensable to the citizens' lives and their work must be operated appropriately and effectively, we have made efforts to have contact points in appropriate locations, and to integrate and reinforce their functions.

Currently, we provide "Water and Sewer Customer Center" as a general contact point, "Administration Section" to perform the procedures from meter-reading to receipt of payments, and two construction offices in the east (for Moji, Kokurakita, Kokuraminami Wards), and the west (for Wakamatsu, Yahatabigashi, Yahatanishi and Tobata Wards, and Ashiya Town, Mizumaki Town of Onaga-gun) as the contact points of construction work, and we have been making further efforts to improve the services for the customers.

These contact points have been performing their respective roles with responsibility and mutual collaboration, which has enabled seamless and immediate responses.

Customers Service Center

1. Water and sewer customer center's main duties

(1) Acceptance of customers' applications to start, disconnect, change name on contract, etc. for water services.

We accept and process customer's applications by phone, FAX, mail and from the Internet.

(2) Responses to inquiries

We respond to inquiries concerning customers' information, such as water bill payments, water consumption, etc., accept consultations on water leakage, etc., communicate with related departments, and give guidance to customers as needed.

(3) Other duties

We perform input processing of information on account transfer for water bill payment, reissue and send payment notices, in addition to communicating with construction offices about mounting water meters.

2. Water bill payment center's main duties

(1) Collection of water bills

Meter-reading personnel read water meters bimonthly, and water bills are calculated based on the water consumption and sent to customers.

The collection methods are either by a payment notice (to be paid at a bank or convenience store) or by automatic bank transfer, however, we have promoted payment by automatic bank transfer.

(2) Other duties

The center's duties include the water bill settlement relating to starting or disconnecting the water supply, accepting requests for water leak investigation, coping with complaints and inquiries relating to water consumption, organization of unpaid water bills, giving guidance to meter reading personnel and so on.

Water tariff table

Enforced in April 1, 2009

Type, usage, tap dia.	Rate (per month)	Basic charge (yen)	Meter rate (yen/m ³)					
			1~10m ³	11~25m ³	26~50m ³	51~200m ³	201~1,000m ³	1,001m ³ ~
For exclusive use For general use	13mm	680	10	122	156	208	288	310
	20mm	900						
	25mm	1,260						
	40mm	4,500						
	50mm	9,840						
	75mm	21,600						
	100mm	45,200						
	150mm	124,100						
	200mm	255,700						
	250mm	432,000						
300mm or more	687,000							
For bathhouse	680	10				78		
For ship	—					200		
For extra use	—					370		
For common use	520	10				102		
For private fire hydrant						1,370 (for every 10 minutes of practice)		

* Water tariff shall be determined as the amount which is obtained by multiplying an amount as calculated from the table above by consumption tax rate, including local consumption tax rate (fractions of less than 1 yen to be rounded off).

2 | Beneficiary charge for sewer system projects

In the areas where public sewer system is prepared, the living environment becomes better to improve the safety, convenience and comfortability there and, as a result, the land owner obtain a benefit, that is, increase of convenience and advantage; however, this benefit can't be received equally by citizens. Accordingly, this system has such a beneficiary bear a part of the cost required for the construction of the sewer system, depending on the amount of the benefit gained by the beneficiary to equalize the citizen's charge. Kitakyushu City started the system in 1968, and the beneficiary charges have become a part of the financial resources for sewer system projects.

3 | Sewer service charge

Sewer service charges have been collected pursuant to the ordinance concerning the sewer system of Kitakyushu City as a main financial resource for the cost for the operations and management of sewer system projects. The charges are collected depending on the volume of sewage discharged by users.

Monthly basic charge

Basic charge (up to 10m ³)	Volume-based charge (per 1m ³)					
	11-25	26-50	51-200	201-1,000	1,001-10,000	10,001-
634 yen	141 yen	208 yen	257 yen	307 yen	407 yen	412 yen
	13 yen (for public baths)					

* The sewer service charge shall be determined as the amount which is obtained by multiplying an amount as calculated from the table above by consumption tax rate, including local consumption tax rate (fractions of less than 1 yen to be rounded off).

4 | Measures for the promotion of sewage system connections for toilets

In an area which is newly covered by the sewer system, the residents are obligated to "replace pit latrines with sewer system connections for toilets within 3 years" (Article 11-3 of the Sewerage Service Act). In order to exhibit the effects of the sewer system sufficiently, Kitakyushu City drew up the following measures for the promotion of sewage system connections for toilets.

• Subsidy and loan system for installing a sewage system connection for toilets

We provide a subsidy or loan for a part of the cost of installing a sewage system connection for toilets.

• Counseling system for promotion of sewage system connections for toilets

We send a counselor to households to give guidance and recommendation on the introduction of sewage system connections for toilets.

• Mediation system for promotion of sewage system connections for toilets

We send a mediator to households in case trouble relating to installing a sewage system connection for toilets occurs.

• Subsidy for installation of common drainage equipment, etc.

We provide a subsidy for a part of the cost for installation of drainage equipment to be used commonly by citizens.

• Subsidy for installation of sewage pumps, etc. on lowlands

We provide a subsidy or a part of the cost for installation of sewage pumps, etc. for houses on lowlands to which the public sewer system can't be connected.

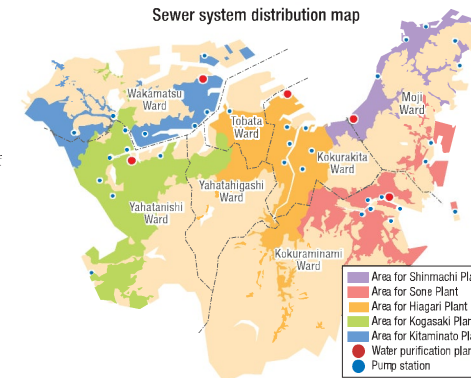
• System for installation of the public sewer system on private roads

We prepare the standards for installing the public sewer system on private roads for the promotion of sewage system connections for toilets for the whole town.

• The system for installation of sewage pumps in lowlands covered by the public sewer system

We install a sewage pump in a place where the sewer

Sewer system distribution map



system is not available because of lowlands even though sewage system connections for toilets have already been introduced in the surrounding area.

• System for designated drainage equipment contractors

No contractor, excluding those who satisfy the requirements and are designated by the city, can carry out any work for new installation, etc. of drainage equipment.

• System for having a responsible engineer for drainage equipment

The designated drainage equipment contractors are obligated to employ a qualified engineer responsible for making drainage equipment work without fail.

5 Main duties of the construction offices

1. Duties concerning water utility

(1) Duties relating to construction of water service installation

The constructions relating to new construction, remodeling, repair and removal of water service installation have been executed by designated plumbing contractors for service installation (about 550 firms), and the construction offices have been giving guidance to the designated plumbing contractors for service installation, as well as conducting the duties, including the design examination and completion inspection of these constructions, etc.

Meanwhile, the designated plumbing contractors for service installation are obligated to nominate a chief plumbing engineer under the Waterworks Law.

Water Supply Construction Status for FY 2018 (Unit: case)

New construction		Modification		Removal		Total	
Yearly	Monthly average	Yearly	Monthly average	Yearly	Monthly average	Yearly	Monthly average
7,013	584	3,903	325	2,000	166	12,916	1,075

Payments classified by meter diameter when newly constructing water service installation (Unit: yen)

Meter diameter	13mm	20mm	25mm	40mm	50mm	75mm	100mm	150mm	200mm	250mm	300mm or more
Payment with diameter	44,000	72,000	220,000	734,000	1,280,000	3,530,000	7,210,000	20,000,000	40,000,000	71,000,000	112,000,000

* The payment by classified meter diameter shall be determined as the amount which is obtained by multiplying an amount as calculated from the table above by consumption tax rate, including local consumption tax rate (fractions of less than 1 yen to be rounded off).

(2) Repair work

The maintenance and management of water supply facilities, including distribution pipes, etc. have been implemented on consignment to the Pipe repairing center, which has prepared a system which could immediately respond to the accidents, etc. occurring even in the nighttime or holidays.

Repair Work Status for FY 2019 (Unit: case)										
Distribution pipe	Gate valve	Air valve	Fire hydrant	Shap bit	Service pipe	Stop valve	Water meter	Service tap	Total	Total
812	456	126	217	345	5,436	1,170	1,406	243	10,121	

(3) Other duties

The construction offices have also been conducting the design, supervision and leakage survey of the capital improvement constructions of water service installation, and response to the complaints about waterworks, etc. In addition, a financing system for constructions of water service installation, etc. is instituted in Kitakyushu City, and the construction offices have also been accepting the application, etc. relating to the financing system.

Outline of the financing system for constructions of water service installation, etc.

Classification	Contents
Target person	① A person who owns water service installation. ② A person who has sufficient ability to repay the financed amount and interest thereon.
Object constructions	① A renewal for old water service installation, or against rust-colored water and poor water pressure. ② A construction for a person who shares water service installation to install new water service installation in his own house or room. ③ A new construction or renewal of the waterworks equipment in the downstream of the receiving tank. ④ A construction to newly install a water pipe of 30 meters or over in a private road, or a public road where no water pipe of Waterworks Bureau is installed (excluding water pipes relating to a housing land). ⑤ A construction to install water service installation in an existing house where no water service installation is installed.
Financing conditions	① Financing limit: 50,000 or over up to 500,000 yen for 1 subject person (in units of 10,000 yen). ② Financing amount for jointly owned facilities: Total of the amount which could be financed for the subject persons relating to the relevant construction (up to 500,000 yen for 1 subject person), provided, however, the amount is limited to 25 million yen for 1 construction. ③ Financing interest rate: 1.60% per annum (FY 2019). ④ Financing time : After the completion of the completion inspection of a construction. ⑤ Repayment method: Monthly principal and interest equal repayment from the next month of the execution of the financing. ⑥ Redemption period: 2 years if the loan amount is up to 150,000 yen, 5 years if it is over 150,000 yen and up to 500,000 yen, and 10 years if it is over 500,000 yen. ⑦ Guarantor: 1 person living in Kitakyushu City who earns his own living. ⑧ Arrearages: 14% per annum.

2. Duties concerning sewer system

(1) Design and supervision of sewer system facilities

We are carrying out supervision of the construction, reconstruction and relocation projects for the sewer system facilities and design and supervision of the projects for the small-scale sewer system facilities.

Number of construction projects in FY 2018

Moji	Kokurakita	Kokuraminami	Wakamatsu	Yahatahigashi	Yahatanishi	Tobata	Total
17 (4)	29 (5)	26 (7)	11 (1)	24 (1)	36 (7)	10 (0)	153 (25)

() Figures in the parentheses indicate the number of construction projects ordered by the offices.

(2) Duties of sewerage equipment

We are carrying out such services related to the sewerage equipment as acceptance of applications, examination of the contents and completion inspections in the object areas of sewerage treatment.

In addition, we are carrying out such services related to the installation of public pits as acceptance of applications and execution of works.

Number of inspections for sewerage equipment in FY2018

Moji	Kokurakita	Kokuraminami	Wakamatsu	Yahatahigashi	Yahatanishi	Tobata	Total
276	473	763	313	122	610	102	2,659

Number of public pits installed in FY2018 (including maintenance of existing pits)

Moji	Kokurakita	Kokuraminami	Wakamatsu	Yahatahigashi	Yahatanishi	Tobata	Total
64	84	171	53	27	165	20	584

(3) Other duties

We have been receiving various complaints from the citizens concerning discharge or odor of miscellaneous drainage, etc. In this case, we conduct an investigation on the site, and give instructions for improvement to the causative persons.

6 Public relations activities

It is important to win the understanding and cooperation of the citizens for smooth operation of the water utility and sewer system projects. In Kitakyushu City, we have been conducting a variety of public relations activities in order to have the significance of water utility and sewer system projects understood such as the importance of water and functions of the sewer system.

Implementation of various events

(1) Organizing various events

a. Events about "the Waterworks Week"

"Waterworks Week," which has begun in 1959, is the week from the 1st of June to 7th, when various events sponsored by the Ministry of Health, Labor, and Welfare, are held. In Kitakyushu City, promotion events to promote knowledge of and interest in waterworks and to have people realize safety and taste of tap water were held.

b. Events related to the Sewer Systems' Day

Each ward office in the city displayed vertical banners for the "Sewer Systems' Day" around September 10, exhibited panels at "Murasaki-gawa Festival" and "Municipal information counter", distributed PR brochure in front of JR Kokura Station and performed other activities in order to boost citizens' awareness about sewer system.



Exhibition booths of Murasaki River festival 2019

(2) Distribution of pamphlets etc.

a. "Outline of Water Utility and Industrial Water Supply Business"

b. "Outline of Water and Sewer Bureau's Facilities"

Outline of facilities of each water purification plant, sewage treatment plant and the Water Quality Research Laboratory is explained for distribution to the visitors, etc.

c. "Our water supply and sewer system"

As a social studies supplementary reader for elementary school pupils, this document has been distributed to the pupils in the 3rd and 4th grade elementary school classes in Kitakyushu City.



Pamphlets

d. "Water supply and sewer system in our lives"

As a PR magazine relating to water utility and sewer system, this pamphlet describes the activities of the water utility and sewer system projects in an easy-to-understand manner and has been distributed to all households once a year.

e. "Water and Sewer Bureau's website"

Website URL: <https://www.city.kitakyushu.lg.jp/suidou/>

(3) Water utility and sewer system monitoring project

We implemented this project for the purpose of making the monitors consisting of the citizens selected from among applicants understand and deepen their confidence in the water utility and sewer system projects of Kitakyushu City through experimental learning such as study sessions, visits to the facilities, as well as having them convey their knowledge they have learned in the study sessions to the people of the community.

VII Organization of Kitakyushu City Water and Sewer Bureau

(4) On-demand lectures

In order to proactively hear citizens' opinions and requests with regard to the water utility and sewer system projects, and to make use of such opinions and requests as a reference for future business operation, we carried out on-demand lectures.

(Results of FY2018: number of lectures: 46, total number of participants: around 2,000)

(5) Acceptance of facility visits

We accepted facility visits of mainly elementary school pupils as follows.

Water Utility and Sewer System Monitoring Project
(Parent-and-child fureai class)

Breakdown of Facility Visits in FY 2018

(Unit: people)

Visitors	Ideura water purification plant	Ano water purification plant	Honjo water purification plant	East Sewage Treatment Plant	West Sewage Treatment Plant	Total
Elementary School Students	4,011 (63 schools)	2,798 (41 schools)	1,226 (21 schools)	1,307 (19 schools)	26 (2 schools)	8,601 (134 schools)
Others	176	160	70	2,817	53	3,237
Total	4,187	2,958	1,296	4,124	79	11,838

(6) Intercommunication with the communities of headwater areas

For the purpose of preventing deterioration of headwater conservation forests and contamination of river water and deepening mutual understanding with the residents of headwater areas, we carried out various intercommunication projects.

a. Participation in the forest cultivation project at Yaba

Since FY2000, we have been participating in the activities for conservation of headwater forests held in Yabakei Town, Nakatsu City, Oita Prefecture, the location of Yabakei Dam, which is one of the water sources of Kitakyushu City.

- Participation in the "Gathering for planting trees in the forest of Yaba"

We invited participants from among the citizens and sent them to the "Gathering for plant cultivation in the forest of Yaba" held by the Council for Cultivation of Forest of Yaba.

(Number of participants in FY2018: 136)

b. Participation in the Activities for improvement of the environment around Aburagi Dam

Aburagi Dam, one of the water sources of Kitakyushu City, was completed in 1971. Currently, moso bamboo and miscellaneous trees have spread, and illegal dumping occurred frequently in recent years, which could cause a serious deterioration in the environment.

Amid such circumstances, as one of the headwaters conservation activities, since FY 2002 we have been participating in the activities for improvement of the environment around the dam in which the local residents have been playing the main role.

(Number of participants in FY2018: 56)

c. Holding of Kitakyushu-Nakatsu Walking Event 2018

Commemorating the 20th anniversary of Yabakei-dousui, a walking event promoting the appreciation to the water source and importance of water was held (Number of participants in FY2018: 1,426).

(7) Bottled water in celebration of the 100th anniversary of Kitakyushu Waterworks

This bottled water was first manufactured in FY 2010 as part of the 100th anniversary commemorative activities, and has been used mainly for PR activities of the waterworks projects and sold as well so that the good taste of tap water from Kitakyushu City may be widely known.

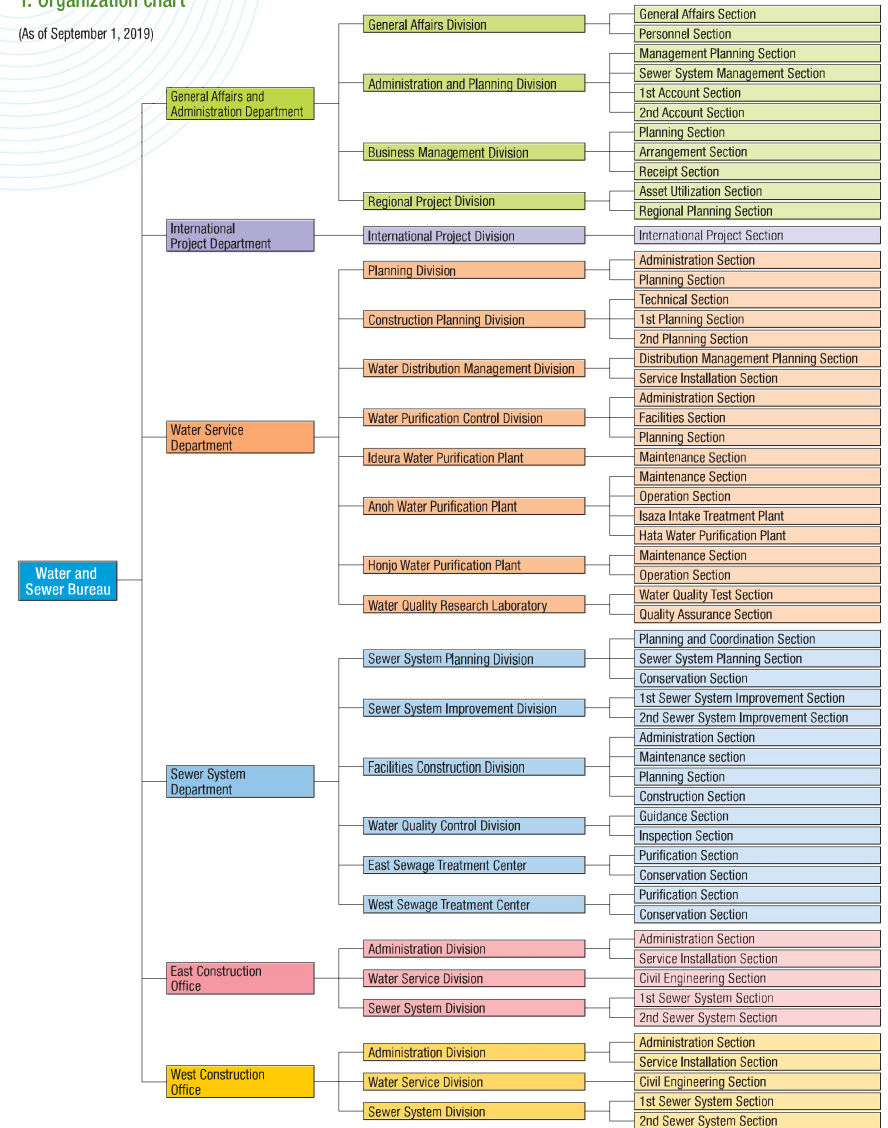
<Product contents>

Product name	"Kitakyushu Waterworks"
Primary ingredient	Tap water (Ideura Water Purification Plant)
Type and capacity of bottle	Aluminum resealable can (490ml)
Expiration date	5 years from the date of manufacture
Retail price	100 yen a bottle (tax included)



1. Organization chart

(As of September 1, 2019)



2. Segregation of duties (As of September 1, 2019)

- General Affairs and Administration Department

- General Affairs Division

- (1) General affairs in the bureau, department and division
- (2) Correspondence and coordination of clerical work in the bureau
- (3) Correspondence to City Assembly
- (4) Correspondence to Japan Water Works Association (JWWA) and Japan Industrial Water Association (JIWA)
- (5) Liaison with Japan Sewage Works Association of Fukuoka Prefecture (excluding those under jurisdiction of Sewer Planning Division)
- (6) Public relations and public hearing activities
- (7) General management of receiving dispatch and preservation of documents, etc.
- (8) Examination of rule-books and other important documents
- (9) Publication of announcements, as well as issuance of orders and notifications within the bureau
- (10) General management of suits, claims and other important complaints
- (11) Management of official seals
- (12) Other duties which would not be under the jurisdiction of any other departments, divisions, offices and plants
- (13) Correspondence to appointment and dismissal, status, discipline, service and others concerning personnel
- (14) Recognition of personnel
- (15) Correspondence to the organization
- (16) Fixed number and allocation of personnel
- (17) Correspondence to labor union
- (18) General management of trainings for personnel (excluding those relating to technology)
- (19) Human resource development for personnel
- (20) Personnel evaluation
- (21) Correspondence to salary of personnel
- (22) Correspondence to child-care allowance of personnel
- (23) Safety and health management of personnel
- (24) Correspondence to welfare of personnel

- Administration and Planning Division

- (1) General affairs of the division
- (2) Planning, investigation and study of administration
- (3) General coordination of important matters relating to administration
- (4) Correspondence to Master Plan for Water Utility of Kitakyushu City
- (5) Financial planning
- (6) Statistics of projects
- (7) General management of water tariff system
- (8) Performance review of clerical services
- (9) General management of the administration of depreciable assets (limited to those relating to water utility and industrial water supply service, the same shall be applied to (10).)
- (10) General management of the administration of construction in progress account
- (11) Making, execution and management of budget
- (12) Correspondence to corporate bond
- (13) Settlement of account
- (14) Planning and managing of fund
- (15) Receipts, disbursements and preservation of cash, securities and collaterals
- (16) Examination of income and expenditure
- (17) Examination of qualification for tender and register of qualified tenderer
- (18) Management of service contracts (excluding those relating to simple constructions)

- Business Management Division

- (1) General affairs of the division
- (2) Investigation and planning of business

- operations
- (3) Statistics of business operations
- (4) Investigation and planning of clerical administration concerning water tariff
- (5) General management of information management relating to computers
- (6) Water and Sewer User Support Center
- (7) Water and Sewer service charge Center
- (8) Correspondence to water supply contracts
- (9) Meter-reading of used water amount
- (10) Arrangement of water charge, sewer system charge, etc.
- (11) Management and operation of metering terminals
- (12) Imposition of water quality addition on sewer system charge
- (13) Metering, arrangement, payment notification, receipt and summing up of unpaid charges, concerning industrial water charge
- (14) Correspondence to the comprehensively entrusted water supply business of Munakata District Administration Association
- (15) Summing up of unpaid water charge, sewer system charge, etc.
- (16) Payment notification and receipt of water charge, sewer system charge, etc.
- (17) Imposition and collection of sewer beneficiary's contributions
- (18) Correspondence to subsidy and loan for modification of flush toilet

- Regional Project Division

- (1) General affairs of the division
- (2) General management for the administration of fixed assets (for those relating to water utility and industrial water supply service, limited to lands and standing trees)
- (3) Registration of assets
- (4) Acquisition and transfer of lands, manufactured articles, and compensation and disposal or disposal arising therefrom
- (5) Correspondence to property insurance of fixed assets
- (6) Management and operation of vehicles
- (7) Compensation for damages caused by traffic accidents
- (8) Permission for lease and usage of lands, buildings
- (9) Car parking business
- (10) Operation and maintenance of general properties
- (11) Investigation of lands and confirmation of the border of lands
- (12) Registration of properties
- (13) General management for the administration of construction in progress account (limited to those concerning sewer system project)
- (14) Planning, investigation and research relating to regional cooperation for waterworks projects
- (15) General coordination relating to regional cooperation for waterworks projects

- International Project Department

- International Project Division

- (1) General affairs for the division and section
- (2) Promotion of international cooperation
- (3) Promotion of overseas projects

- Water Service Department

- Planning Division

- (1) General affairs of the department, division, Construction Planning Division and Water Distribution Management Division (concerning the affairs of the division, excluding those relating to Water Purification Control Division, Water Purification Plant and Water Quality Research Laboratory (hereinafter, called "Water Purification Control Division, etc."))

- (2) Start and conclusion of contracts (limited to those relating to simple constructions) and settlement of the accounts under the jurisdiction of the department (excluding Water Purification Control Division, etc., the same shall be applied to (3) and (5) below)
- (3) Management of construction materials relating to works under the jurisdiction of the Department
- (4) Receipts, disbursements and preservation of construction materials relating to water and industrial water supply projects
- (5) Other administration of the Water Supply Department which would not be under the jurisdiction of any other divisions
- (6) Application for approval of water utility projects and notification of industrial water supply projects
- (7) Planning for preparation and improvement of water and industrial water supply facilities
- (8) General management of the comprehensively entrusted water supply business of Munakata District Administration Association
- (9) Correspondence to industrial water supply contracts
- (10) Correspondence to Waterworks Technology Committee
- (11) General management of civil engineering trainings

- Construction Planning Division

- (1) General management of design unit prices, unit costs, etc. relating to water and industrial water supply projects
- (2) Management of design standards and examination of designs under the jurisdiction of the department (excluding Water Purification Control Division, etc.; the same shall be applied to (3) to (5))
- (3) Correspondence to the construction management standards under the jurisdiction of the department and the Construction Offices
- (4) Research and development of new technology under the jurisdiction of the department and the Construction Offices
- (5) Implementation of civil engineering trainings under the jurisdiction of the department and the Construction Offices
- (6) General management of application for subsidies relating to water utility and industrial water supply projects
- (7) Design of the constructions for preparation and improvement of water supply facilities (excluding those under the jurisdiction of the Construction Offices)
- (8) Design of the constructions for operation and maintenance of water supply facilities (excluding those under the jurisdiction of the Construction Offices)
- (9) Design of the constructions for relocation of obstacles (excluding those under the jurisdiction of the Construction Offices)

- Water Distribution Management Division

- (1) Planning and coordination of distribution management
- (2) Investigation and planning of distribution management system
- (3) Operation and management of distribution blocks
- (4) General management for operation and maintenance of water supply facilities (excluding those under the jurisdiction of the Water Purification Control Division, etc.)
- (5) Planning for water leakage prevention
- (6) Correspondence to the countermeasures to improve accountability for water
- (7) Management of pipeline diagrams and

- completion drawings and documents relating to water and industrial water supply projects
- (8) General management of installation of water supply equipment
- (9) Guidance and coordination of constructions for water supply equipment
- (10) Correspondence to the designated contractors for constructions for water supply equipment
- (11) Entrustment of maintenance and management of water supply facilities (excluding those under the jurisdiction of the Water Purification Control Division, etc.)
- (12) Purchase and disposal of water meters

- Water Purification Control Division

- (1) General affairs of the department and division (concerning the general affairs, limited to those relating to Water Purification Control Division, etc.)
- (2) Correspondence and coordination of clerical work in Water Purification Control Division, etc.
- (3) Start and conclusion of contracts (limited to those relating to simple constructions) and settlement of the accounts under the jurisdiction of Water Purification Control Division, etc.
- (4) Other administration of Water Purification Control Division, etc. which would not be under the jurisdiction of any other divisions
- (5) Execution of the constructions under the jurisdiction of the division and the Water Quality Research Laboratory
- (6) General management of the operation and maintenance of the facilities of the water purification plants
- (7) General management of the safety and protection of electrical equipment relating to water and industrial water supply projects
- (8) General management of drainage treatment relating to water and industrial water supply projects
- (9) Planning for implementation of the improvement of purification plant facilities
- (10) Design of the constructions under the jurisdiction of the division and the Water Quality Research Laboratory
- (11) Planning and coordination of raw water and purified water
- (12) Statistics of water volume, etc. relating to water and industrial water supply projects
- (13) General management of technology training under the jurisdiction of Water Purification Control Division, etc.

- Water Purification Plants (Ideura, Anoh and Honjo water purification plants)

- (1) General affairs of the plants
- (2) Operation and maintenance of the plant facilities
- (3) Design and execution of simple constructions
- (4) Implementation of drainage treatment
- (5) Security and operation of raw water and purified water

- Water Quality Research Laboratory

- (1) General affairs of the laboratory
- (2) Execution of water quality tests relating to water and industrial water supply projects
- (3) Investigation and research on water quality and water treatment relating to water and industrial water supply projects
- (4) Operation and maintenance of the laboratory facilities
- (5) Assurance of the reliability of the water quality tests relating to water and industrial water supply projects

- Sewer System Department

- Sewer System Planning Division

- (1) General affairs for the department, division and Sewer System Improvement Division (concerning

- the general affairs of the department, limited to those relating to Sewer System Planning Division and Sewer System Improvement Division)
- (2) Conclusion of contracts for simple construction works and approval of completion of construction works under the jurisdiction of the division and Sewer System Improvement Division
- (3) Liaison with Japan Sewage Works Agency and Japan Sewage works Association
- (4) Liaison with Japan Sewage Works Association of Fukuoka Prefecture (limited to those relating to test and lecture courses)
- (5) Preparation of long-term plans (limited to those relating to sewer system projects, the same shall be applied to (6) through (9) below)
- (6) Budgeting and account settlement of construction projects
- (7) Coordination of projects
- (8) Coordination of budget and general management of requests for government grants
- (9) Development, investigation and research of new technologies
- (10) Investigation and planning (limited to those relating to water supply projects; the same shall be applied to (11).)
- (11) Determination of projects and applications for approval
- (12) Collaboration with river projects and coordination
- (13) Guidance on and inspection of the installation and management of sewer system relating to the permission for developments, etc. (limited to those with an area of 1ha or larger; the same shall be applied to (14) below).
- (14) Guidance on the installation and management of disaster-prevention water reservoirs, etc. relating to the permission for developments, etc.
- (15) General management for the maintenance, management and relocation of sewer pipes and drains
- (16) Registration and preservation of sewerage ledger
- (17) Announcement of start of sewer system service, etc.
- (18) Investigation and planning for service life extension and earthquake resistance of sewer system
- (19) Correspondence to the standards for installation of sewer system under private roads
- (20) Diffusion of flush toilets and giving guidance
- (21) Certification, registration, guidance and supervision of designated drainage facility contractors and responsible engineers
- (22) Drawing up and general management of design standards, etc. relating to installation of drainage facilities
- (23) Investigation of drainage facilities, etc. (limited to those relating to the permission set forth in the proviso of Article 10 of the Sewerage Act (Act No.79, 1958))

- Sewer System Improvement Division

- (1) Investigation and designing of new construction, relocation and renovation of sewer pipes and drains
- (2) Guidance and coordination relating to new construction, relocation and renovation of sewer pipes and drains
- (3) Investigation, designing, guidance and coordination relating to civil engineering works for water purification plants, pump stations, etc.
- (4) Design standards and examination of designing relating to sewer system project

- Facilities Construction Division

- (1) General affairs for the Department, Division and Water Quality Control Division (for the general affairs of the Department, excluding those relating to Sewer System Planning Division and Sewer System Improvement Division)
- (2) Conclusion of simple construction work contracts under the jurisdiction of the division, Water Quality Control Division and water

- purification plants, and approval of completion of the instruction works
- (3) General management of maintenance and management of water purification plants, pump stations, etc.
- (4) Environmental investigation along with the operation of water purification plants, pump stations, etc.
- (5) Planning and coordination concerning recycling of sludge, treated water, etc.
- (6) General management of outsourcing of operations of water purification plants, pump stations, etc. guidance and supervision for contractors
- (7) General management of water treatment in water purification plants
- (8) Investigation, planning and coordination relating to renovation, renewal and improvement of water purification plants and pump stations, etc.
- (9) Application for grants relating to renovation and renewal of water purification plants and pump stations, etc.
- (10) Designing, construction and supervision of works for the equipment in water purification plants and pump stations, etc.
- (11) Drawing up of construction work management standards

- Water Quality Control Division

- (1) Investigation, guidance, etc. relating to drainage discharged from factories, etc. in the area covered by sewer system
- (2) Inspection, guidance and supervision relating to the installation, etc. of industrial pretreatment facilities
- (3) Water quality control for water purification plants and pump stations, etc.
- (4) Investigation and research of sewage treatment

- East and West Water Purification Centers

- (1) General affairs for the centers
- (2) Final treatment of sewage and human waste, etc.
- (3) Maintenance and management of water purification centers and relevant pump stations, etc.
- (4) Repair works for water purification centers and relevant pump stations, etc.
- (5) Renovation and renewal of water purification centers and relevant pump stations, etc. (excluding those under the jurisdiction of Facilities Construction Division)
- (6) Part of supervision over the renovation and renewal works for water purification centers and relevant pump stations, etc.

- East and West Construction Offices

- Administration Division

- (1) General affairs of the offices, division and Sewer System Division
- (2) Correspondence to the start, conclusion of contracts and settlement of the constructions designed by the offices
- (3) Investigation and settlement, payment notices and receiving of construction costs, etc. of installation of water supply equipment
- (4) Management of the construction materials relating to the constructions under the jurisdiction of the offices
- (5) Operation and maintenance of the facilities for installation of water supply equipment
- (6) Investigation of water supply conditions and water supply equipment
- (7) Maintenance and management of water supply pipes
- (8) Correspondence to the water supply construction center
- (9) General management for the improvement of water supply facilities relating to development, etc.
- (10) Management of water meters

- Water Supply Division

- (1) Design of the construction for improvement of distribution pipes with a diameter of 250 mm or less
- (2) Design of the construction projects with an amount of 20 million yen or less to relocate obstacles
- (3) Design of the construction projects with an amount of 20 million yen or less for maintenance and management of water supply facilities (For industrial water supply projects, limited to that of West Construction Office; the same shall be applied to (5) and (6).)
- (4) Correspondence to distribution pipe preparation works
- (5) Execution of the construction projects for preparation and improvement of water supply facilities

- (6) Maintenance and management of water supply facilities
- (7) Reception and examination of water distribution pipe preparation projects

- Sewer System Division

- (1) New construction, relocation and renovation of sewer pipes and drains, water purification centers, pump stations, etc. (excluding those under the jurisdiction of the Sewer System Department)
- (2) Application for approval, investigation, designing and construction works relating to disaster restoration project for sewer system facilities (excluding those under the jurisdiction of the Sewer System Department)
- (3) Conclusion of contracts for construction works relating to sewer system projects (excluding

those under the jurisdiction of the Sewer System Department) and approval for completion of the construction works

- (4) Exclusive possession, use and other management of sewer system
- (5) Clarification of boundaries of sewer system
- (6) Maintenance and management of sewer pipes and drains (including pumps installed in low-lying lands)
- (7) Preparation of sewer system relating to private roads and local roads
- (8) Examination, confirmation and inspection relating to new construction and renovation of drainage facilities
- (9) Installation of drainage basins along with new construction of drainage facilities
- (10) Investigation of drainage facilities (excluding those relating to the permission set forth in the proviso of Article 10 of the Sewerage Act)

3. Number of personnel

Organization		Administrators	Engineers						Total	
			Civil	Electrical	Mechanical	Chemical	Biological	Environment		
General Affairs and Administration Department	General Affairs Division	9							9	
	Administration and Planning Division	18	3	3					21	
	Business Management Division	24							24	
International Project Department	Regional Project Division	7	4	4					11	
	International Project Division	6	11	5	2	4			17	
Water Service Department	Planning Division	7	10	10					17	
	Construction Planning Division		18	18					18	
	Water Distribution Management Division	1	12	12					13	
	Water Purification Control Division	4	24	1	14	9			28	
	Ideura Water Purification Plant	1	19		11	8			20	
	Anoh Water Purification Plant	1	53		28	25			54	
	Honjo Water Purification Plant	1	32		18	14			33	
Water Quality Research Laboratory	1	16				12	3	1	17	
Sewer System Department	Sewer System Planning Division	3	16	16					19	
	Sewer System Improvement Division		18	18					18	
	Facilities Construction Division	4	18		9	8	1		22	
	Water Quality Control Division		11				10		1	11
	East Sewage Treatment Center	1	15		7	8				16
West Sewage Treatment Center		11		5	6				11	
East Construction Office	Administration Division	7	10	10					17	
	Water Service Division		27	27					27	
	Sewer System Division		11	11					11	
West Construction Office	Administration Division	7	10	10					17	
	Water Service Division		36	36					36	
	Sewer System Division		12	12					12	
Total		102	397	193	94	82	23	3	2	499

* Excluding 1 Chief Executive, 4 dispatch workers and 8 short-time worker for reemployment.

(As of September 1, 2019)

4. List of offices of Water and Sewer Bureau

(As of September 1, 2019)

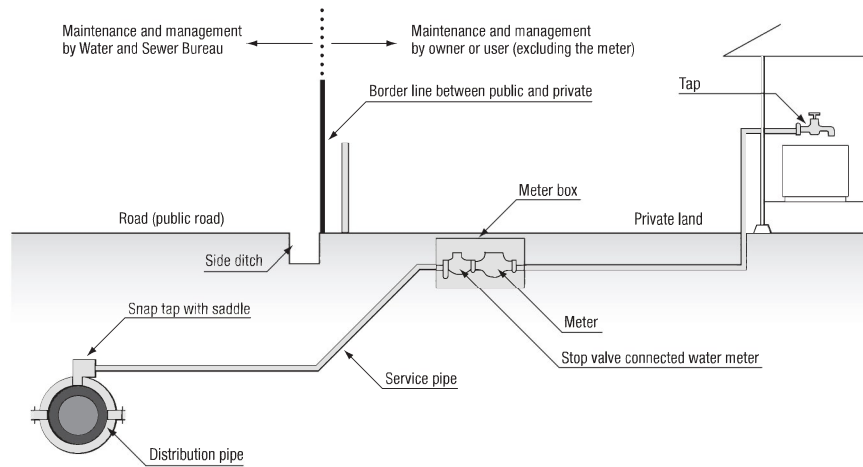
Name	Address	Phone number
Headquarters of the Bureau	1-1 Otemachi, Kokurakita-ku	+81-93-582-3131
East Construction Office	35-1 Hachiman-cho, Kokuraminami-ku	+81-93-932-5790
West Construction Office	1-1-46 Takesue, Yahatanishi-ku	+81-93-644-7820
Ideura Water Purification Plant	418 Ohaza-Ideura, Kokuraminami-ku	+81-93-451-0262
Ano Water Purification Plant	3-10-16 Takanosu, Yahatanishi-ku	+81-93-641-3338
Isaza intake treatment plant	4-14-1 Futanishi, Mizumaki-machi, Onga-gun	+81-93-201-3675
Hata Water Purification Plant	17-1 Shimohata-machi, Yahatanishi-ku	+81-93-617-4813
Honjo Water Purification Plant	5-4-1 Ohiraki, Yahatanishi-ku	+81-93-693-1385
Water Quality Research Laboratory	3-10-16 Takanosu, Yahatanishi-ku	+81-93-641-5948
East Sewage Treatment Plant	96-3 Nishiminato-machi, Kokurakita-ku	+81-93-581-5661
West Sewage Treatment Plant	1-1 Yubaru-machi, Yahatanishi-ku	+81-93-631-4635

References

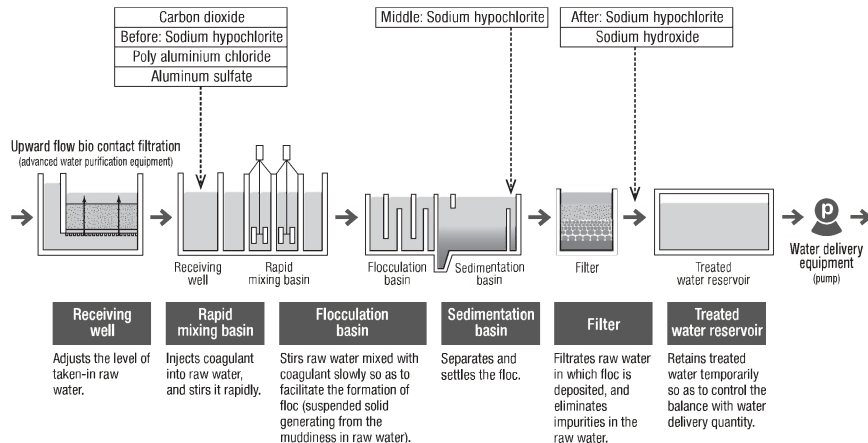
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3. Terminology 57



1. Standard drawing of water service installation



2. Water purification mechanism (rapid sand filtration method)



3. Terminology

- **Waterworks**
The Waterworks Law defines as "waterworks indicates an integration of facilities which supply water suitable for drink for human beings by use of conduit pipes and other equipment."
- **Water right**
The right to use flowing water in rivers, streams continuously and exclusively, which is classified into one that is granted by the permission of the river administrator, and one that would have been granted through conventional use.
- **Reservoir (dam)**
A facility to retain raw water, constructed by closing rivers, streams or hollows, etc. between mountain, including estuary weirs.
- **Intake station**
A facility to take in water, including grit chambers and those which have a function of primary treatment.
- **Water conveyance facility**
A facility to lead taken-in raw water to a water purification plant, including water conveyance pipes, water conveyance channels, etc.
- **Water purification plant**
An integration of facilities to purify taken-in raw water so far as to meet the water quality standards as stipulated in the Waterworks Law: These facilities are mainly classified into those adopting a rapid sand filtration method, and those adopting a slow sand filtration method, depending on the methods of water purification, and in case of Kitakyushu City, Anjo, Ideura and Honjo water purification plants belong to the former, and Dobaru water purification plant belongs to the latter.
- **Sedimentation basin**
A pond to settle suspended solid in the raw water deposited, which are broadly classified into the plain sedimentation basin and the chemical sedimentation basin: The former is installed in the water purification plants adopting the slow sand filtration method, and has the suspended solid deposited by spontaneous sedimentation, on the other hand, the latter is installed in the water purification plants adopting the rapid sand filtration method, and has the floc (suspended solid) which are formed through the processes of chemical dosing, mixing and coagulation separated and deposited.
- **Filter**
A pond to purify water by using filter media (mainly sand), which are classified into the slow filtration basin and the rapid filtration basin: The former adopts the water purification method which has the filter media passed through the water at a comparatively slow speed, captures impurities in the water and causes an bio-oxidation in the impurities by the microorganism which would be proliferated in the sand layers, on the other hand, the latter adopts the water purification method which has comparatively coarse sand layers passed through the water at a fast flow speed, conducts a coagulation sedimentation in advance and eliminates impurities in the water by having the floc which could not have been eliminated by the sedimentation attached to the filter layers, etc.
- **Treated water reservoir**
A facility of water purification plant to retain treated water temporarily in order to adjust the amounts of treated water and water to be delivered.
- **Upflow biological contactor filtration equipment (sophisticated water purification plant)**
This is the equipment utilizing natural purification by microorganisms which can effectively remove manganese and ammonia nitrogen, etc. causing abnormal odor or taste and black water due to musty odor materials, etc. to create safe and high-quality water. This equipment is introduced in Anoh Water Purification Plant and Honjo Water Purification Plant.
- **Residual chlorine**
Residue in the water after chlorine treatment, classified into effective free chlorine and effective combined chlorine: The amount of residual chlorine contained in the water from purified water is stipulated in the Waterworks Law. Because it is one of the extremely important requirements for purified water to be hygienically safe without any contamination by pathogenic organisms, it is obligated to disinfect purified water without fail. As the disinfection methods, there are methods by ozone, etc. besides chlorine, however, because it is stipulated in the notice of the Ministry of Health, Labor and Welfare that "water shall be disinfected by chlorine", any materials other than chlorine agent are not allowed to be used as a disinfectant currently.
- **Transmission pipe**
A pipeline to transmit treated water from water purification plant to distribution reservoir and pump station, from pump station to distribution reservoir.
- **Distribution reservoir**
A facility to retain treated water temporarily in order to facilitate a smooth water service.
- **Distribution pipe**
A piping, mainly starting from a distribution reservoir, to distribute treated water to coverage area of water supply.
- **Fire hydrant**
A water faucet for fire fighting prepared in distribution pipelines, which are installed at such places as convenient for fire fighting activities, such as at road intersections, junctions, etc.: Each fire hydrant is prepared at intervals of 100 to 200 meters depending on the conditions of buildings and the density of houses along a road if it is installed on the way of the road.

- **Sluice valve**
A valve installed in a pipeline disconnecting or controlling flowing water in the pipeline in order to keep the area without water supply as small as possible in case of a shutdown.
- **Pressure reducing valve**
A valve, installed on the way of a pipeline, to transform upstream high-pressure water into low-pressure water to deliver it to downstream.
- **Safety valve**
A valve to discharge water automatically in case of an abnormal water pressure, for the safety of its pipeline.
- **Air valve**
A valve installed at a high place in a pipeline, discharging air from the pipeline or inhale air from outside automatically.
- **Water service installation**
A service pipe branched from distribution pipe and water service implements (taps, etc) directly connected to the service pipe: In Kitakyushu City, maintenance and management of the water service installation must be done by its owner or user. Meanwhile, equipment in the downstream of receiving tank in receiving tank type water supply is not defined as water service installation under the Waterworks Law, but is generally called water supply facility.
- **Service pipe**
A pipe taken into a housing land or a house in order to supply water from distribution pipe or existing water service installation.
- **Tap**
A faucet installed at the end of a service pipe which is generally called a "tap".
- **Coverage area of water supply**
The district as stipulated in the project plan relating to the permission of the operation of Water Utility where the water supply is available through distribution pipes: In Kitakyushu City, the whole city area (excluding mountain-ringed regions) and Asiya Town are designated as the coverage area of water supply.
- **Population served**
The number of people who receive water supply in coverage area of water supply.
- **Population served by water supply**
A rate of the population served to the population within the coverage area of water supply (or population within the administrative district).
- **Revenue earning water**
Amount of water (settled water consumption) subject to the collection of water tariff.
- **Non-revenue earning water ratio**
Amount of water not have been subject to the collection of water tariff, such as those not measured by water meter, used for fire fighting, etc.
- **Revenue earning water ratio**
The rate of revenue earning water to the amount of water supply.
- **Revenue bond**
One of the municipal bonds, which is financed by a long-term debt in order to apply to the fund necessary for construction, improvement of the facilities relating to regional public enterprises, and is redeemed by the income of the enterprises to be gained in and after the next FY.
- **Government grant**
A national treasury disbursement delivered to municipalities when it is particularly necessary for the government to implement the policies, or when it is recognized by the government to be particularly necessary for financial reasons for the municipalities: The former incentive grant is delivered to the Water Utility.
- **Reserved fund of profit and loss account**
The account which is recorded as an expense without any cash expenditure in terms of capital expenditure, including depreciation expense, etc.: The reserved fund can be used as the financial resource for compensating for the capital expenditure.
- **Construction account brought forward**
A brought-forward fund, among the expenses as budgeted for the construction and improvement of facilities but not spent in the pertinent FY due to a delay in construction, etc.: to be used only in next FY: Meanwhile, the construction account brought forward has the same effect as a budget without being included in the budget of the next FY if an accounting statement is reported in the City Assembly.