Water Utility Information (FY 2014)

Basics

Name of utility:	Public Enterprises Agency Kanagawa Prefectural Government		Service type:	Water service provider	
Administrative population:	3.03 million people		Start of service:	1933	
Population served:	2.8 million people		Service area:	808.59	km^2

Water supply volume

Average daily water supply:	880,000 m^3/d	Break down	Household use	664,000	m^3/d
			Commercial and Industrial use:	152,000	m^3/d
			Others:	42,000	m^3/d
			From wholesale supplier	25,000	m^3/d
Average daily water supply per capita:	292.6 L/person/d		Service coverage:	99.8 %	
Effectiveness:	92.7 %		Revenue water:	88.5 %	
NRW:	11.5 %		Water loss	6.7 %	

Water rates

Water rate for 10m3/month:	1,043 yen (including taxes) **Calculation condition: The fixed charge is 1,420 yen/two months. The volumetric charge is 128 yen/m3 from 17 to 30 m3 = 1,932 yen x taxes x 1/2
Water production cost: 164.14 yen/m^3	Water supply cost: 156.01 yen/m^3

Facilities

Water Treatment Plant and Facilities (including water from wholesale supplier):

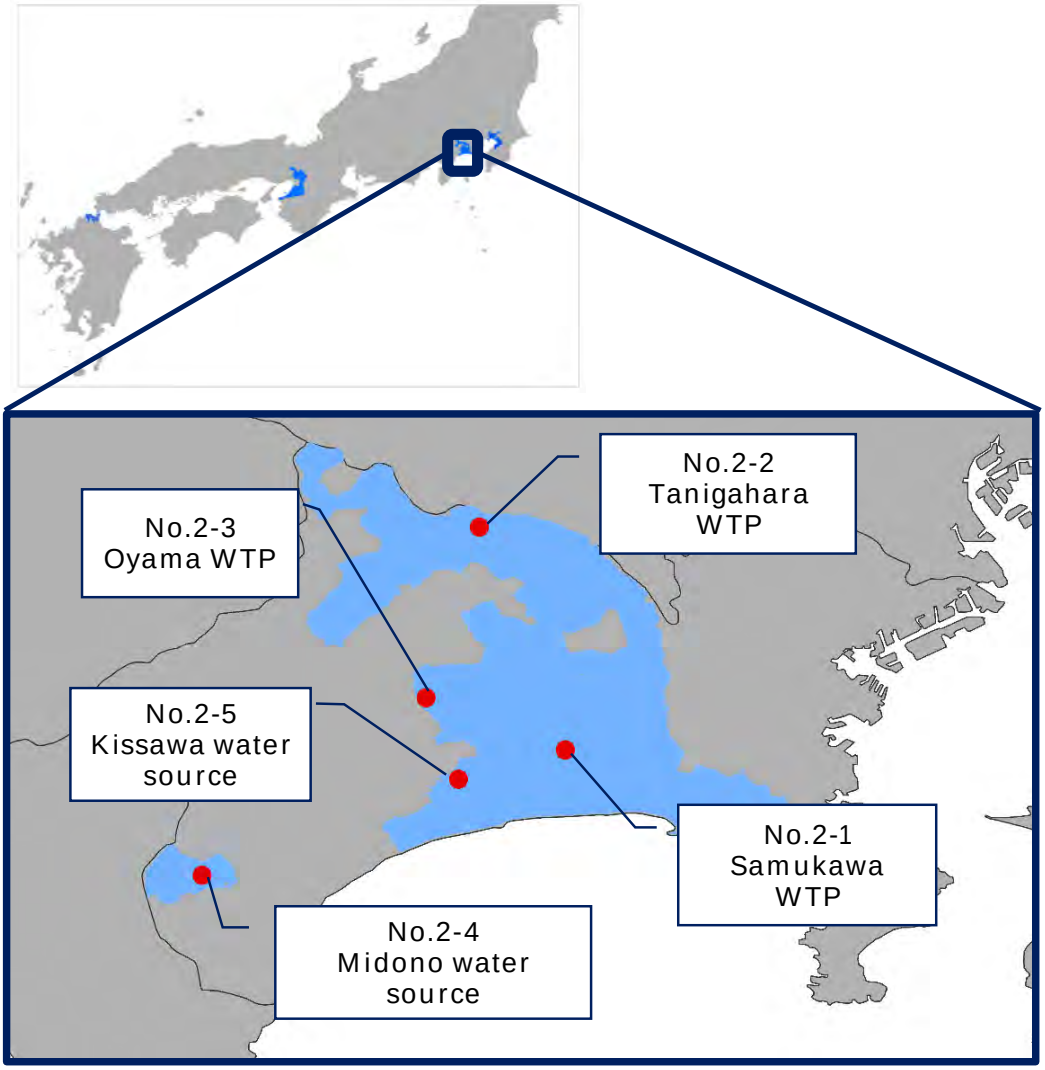
Name	Capacity	Water source	Treatment process
Samukawa WTP	750,000 m^3/d	Surface water	Coagulation/sedimentation + Rapid filtration + Chlorine disinfection
Tanigahara WTP	242,800 m^3/d	Subsoil water Surface water	Sedimentation + Slow filtration + Chlorine disinfection Coagulation/sedimentation + Rapid filtation + Chlorine disinfection
Kamasawa WTP	720 m^3/d	Surface water	Membrane filtration + Chlorine disinfection
Ochiai WTP	1,620 m^3/d	Surface water	Membrane filtration + Chlorine disinfection
Wada WTP	360 m^3/d	Surface water	Membrane filtration + Chlorine disinfection
Oyama WTP	1,100 m^3/d	Surface water	Membrane filtration + Chlorine disinfection
Sokozawa WTP	470 m^3/d	Surface water	Membrane filtration + Chlorine disinfection
Toya WTP	5,550 m^3/d	Subsoil water	Coagulation/sedimentation + Rapid filtration + Chlorine disinfection

		Nagano WTP	500 m^3/d	Subsoil water	Membrane filtration + Chlorine disinfection
		Itarih WTP	4,400 m^3/d	Spring water	Membrane filtration + Chlorine disinfection
		Shinanoki WTP	3,300 m^3/d	Spring water	Membrane filtration + Chlorine disinfection
		Midono water source	12,800 m^3/d	Spring water	UV treatment + Chlorine disinfection
		Others (Kissawa etc)	1,700 m^3/d	Ground water	Chlorine disinfection
		Water from wholesale supplier	669,400 m^3/d	–	–
		Total	1,694,720 m^3/d		

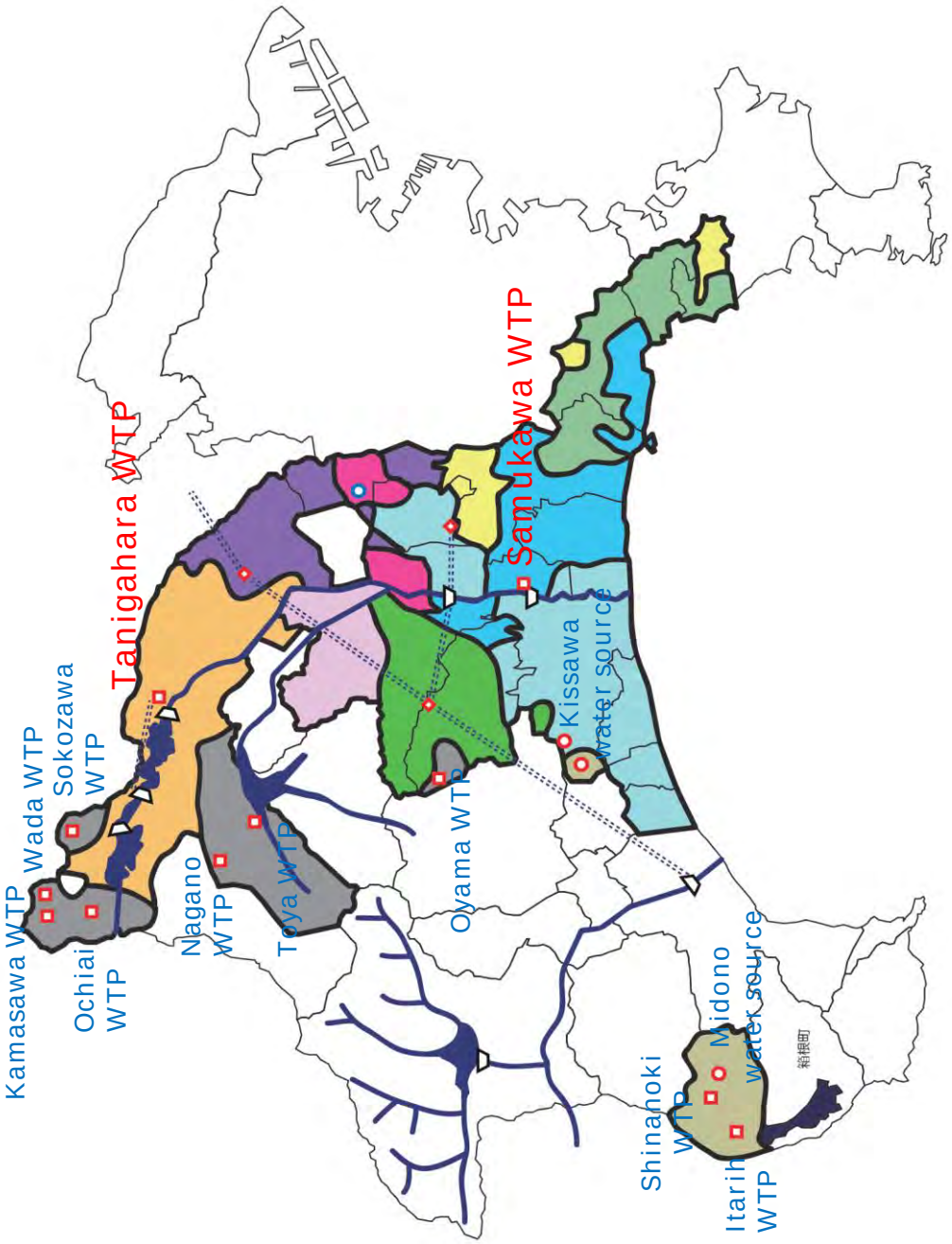
Pipes	Pipieline length:	9,217 km	Conveyance:	12 km	Transmission:	221 km
			Distribution:	8,984 km	Others:	– km
	Type of material:	・Cast iron: 6,381km ・Steel: 481km ・Stainless: 14km				
Others	Other information:	・Number of employees: 623 ・Seismic reinforcement rate of pumping stations: 4.8% ・Seismic reinformcement rate of distribtuion reservoirs: 21.6% ・Maximum daily supply: 1.04 million m3/day ・Maxiumum facility utilization rate: 68.5% (Maximum daily supply/treatment capacity) ・Facility utilization rate: 62.9% (Average daily water supply/treatment capacity)				
	Remarks:	・The informaiton in the Basics, Facilities and Pipes sections (except for the pipeline length, pipe material and ratio of lead service pipe) was cited from the Annual Statistics Report FY2014 of the Kanagawa Prefectural Government. http://www.pref.kanagawa.jp/uploaded/attachment/801189.pdf ・The pipeline length and pipe material is based on the registry of the fixed assets of the Kanagawa Prefectural Government. ・The information on the lead service pipe and the seismic reinforcement ratio (except for the one of primary mains) was cited from the PI guidelines for water supply services FY2014. http://www.pref.kanagawa.jp/uploaded/life/1005094_3294728_misc.pdf ・The seismic reinforment ratio of primary mains is based on the reference material below. http://www.pref.kanagawa.jp/uploaded/attachment/832973.pdf				

Water Utility Information (FY 2014)

Service area



Overview of facilities



Case Study Report (Samukawa Water Treatment Plant)

Water treatment process

Case #2-1 Samukawa Water Treatment Plant

Key word:	Surface water (river), Rapid filtration
Outline:	<Characteristics> ●Features of the Samukawa Water Treatment Plant ・Reliable water supply: The Samukawa Water Treatment Plant has a distribution management system to monitor and control reservoirs and pumping stations in the utility's distribution network. On the premises there are two water treatment plants called No. 2 and No 3 WTPs (No. 1 WTP has been demolished). These two plants are responsible for an efficient and reliable distribution management based on demand forecasts as well as for mutual water transfers with other utilities. ・Environmental measures: Solar power generation system. Surplus soil from on-site excavations is recycled as raw materials of cement additives. ・Private sector involvement: A Private Finance Initiative (PFI) has been used for the construction and operation of the drainage facility. <Outline> ・The Samukawa Water Treatment Plant is situated in the Samukawa Town approximately 6.5 km upstream from the estuary of the Sagami River. The Samukawa intake weir located in the town abstracts water from the river. The water treatment process consists of a coagulation/sedimentation, filtartion and disinfection. ・Service area: 11 Cities and 4 Towns ・Capacity: 750,000 m3/d (No. 2 WTP: 210,000 m3/d + No. 3 WTP: 540,000 m3/d)
Address:	Miyagawa 4271, Samukawa Town, Kanagawa Prefecture
Land area:	487,229m^2
Water treatment process:	Coagulation/sedimentation + Rapid filtration + Chlorine disinfection
Capacity	750,000 m3/d
Water source:	Surface water (Sagami River)
Raw water quality:	■Since the raw water is taken from downstream of the Sagami River, it tends to be adversely affected by phytoplankton growth and aritificial contaminations in upstream river bodies and lakes. <Average raw water quality in FY2014 (maximum)> ・Turbidity: 9.1 degrees (51 degrees) ・Hardness: 59 mg/L (68mg/L) ・TOC: 0.8 mg/L (1.3 mg/L) ・p H: 7.8 (7.9) ・Color: 3.4 degrees (12 degrees) ・Geosmin: 0.002μg/L (0.004μg/L) ・2-MIB: <0.002 μg/L (0.007 μg/L) ・TON: 8 (17)
Chemical dose	Sulfuric acid (pH adjustment), Sodium hydroxide (alkalinity adjustment), Polyaluminum chloride (coagulation), Sodium hypochlorite (disinfection)
Start of operation:	Dec-63

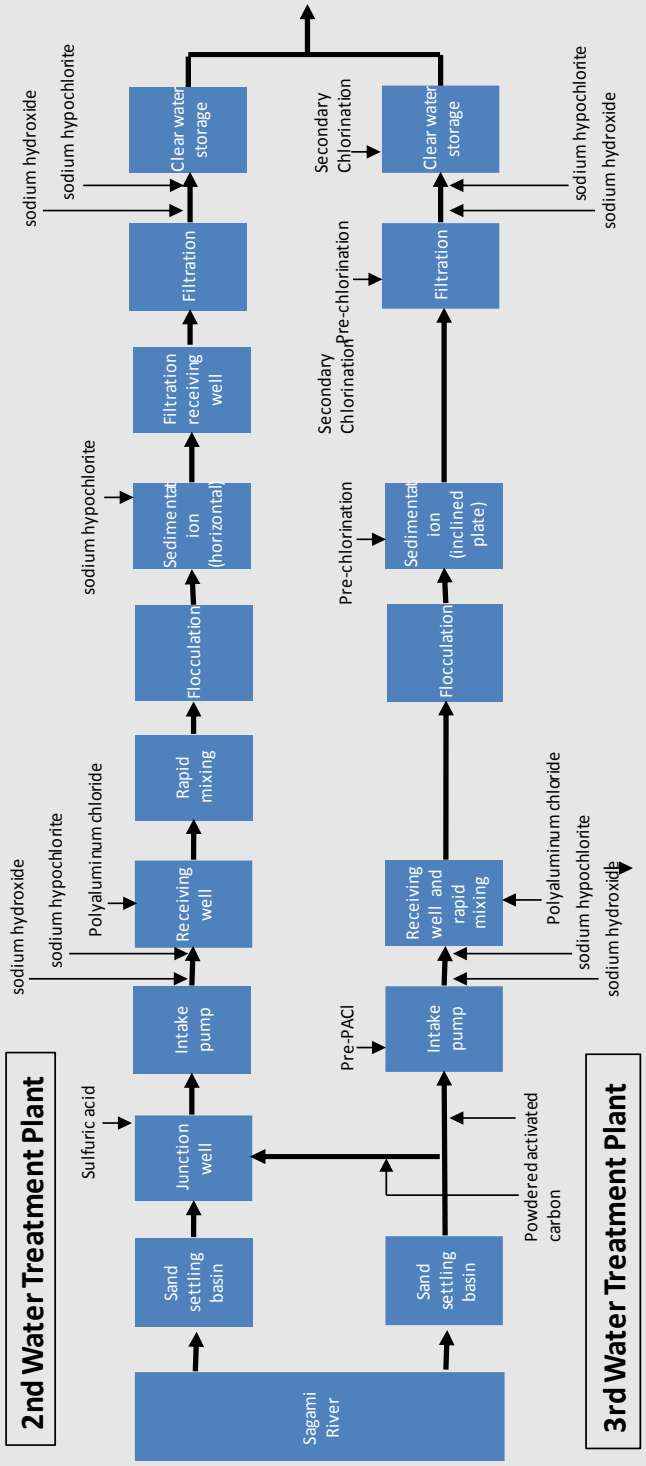
Case Study Report (Samukawa Water Treatment Plant)

Water treatment process

Layout:

● Arial view

Water treatment process



Case Study Report (Samukawa Water Treatment Plant)

water treatment process

Pictures:

● Intake point

● Sand settling basin

● Flocculation basin

● Sedimentation basin

● Rapid filtration basin

Other facilities:

● Solar Power Generation System for CO2 reduction
Maximum output: 120 kw (daily output varies depending on the weather)
Installation: Feb 2005
Location: on the top cover of filtration basins

● Backup Power Supply System
The backup power supply system enables the No. 2 and No. 3 water treatment plants to continue operation when a blackout cuts the commercial power supply from the Tokyo Electric Power Company.

Other information

- The Brochure of the Samukawa Water Treatment Plant (June 2015)
- The Water Quality Report of the Kanawaga Prefectural Government's Water Supply Service (Jan 2016)

Case Study Report (Tanigahara Water Treatment Plant)

water treatment process

Case #2-2 Tanigahara Water Treatment Plant

Key word:	Surface water (lake), Slow filtration
Outline:	<Characteristics> ・Efficient and Reliable water supply: The Tanigahara Water Treatment Plant has a monitoring and control system for not only on-site facilities but outside reservoirs and pumping stations of the utilty's distribtuion network, providing an efficient and reliable water supply. To improve the treated water quality, automated feeders of activated carbon were instlalled in 2010. ・Multiple water treament processes: the plant has two trains of water treament processes with the one using slow filtration and the other rapid filtration. The latter has three types of sedimentation methods: horizontal, inclined plate, and rapid ones. ・Environmental measures: Surplus soil from on-site excavations is recycled as raw materials of cement additives <Outline> ・Built in 1942 to address a rapid increse in water demand in the Sagamihara Region. ・Service area: 2 Cities and 1 Town ・Capacity: 242,800 m3/d (slow filtartion system: 32,800 m3/d + rapid filtration system: 210,000 m3/d)
Address:	Tanigahara 2-6-1, Midori-ku, Sagamihara City, Kanagawa Prefecture
Land area:	91,492m^2
Water treatment process:	1. Slow filtration system: Sedimetation + Slow filtration + Chlorine disinfection 2. Rapid filtration system: Coagulation/sedimentation + Rapid filtration + Chlorine disinfection
Capacity	242,800 m3/d
Water source:	Surface water, Subsoil water (Sagami River)
Raw water quality:	■ Mostly abstracted from the Sagami Lake, the raw water tends to contain a range of phytoplanktons including synedra (clogging filtration basin), mycrocystis (affecting filtrate turbidity) and anabaena (musty odor). <Average raw water quality in FY2014 (maximum)> ・Turbidity: 7.6 degrees (35 degrees) ・Hardness: 53 mg/L (61 mg/L) ・TOC: 0.8 mg/L (1.3 mg/ L) ・p H: 7.8 (8.5) ・Color: 6 degrees (22 degrees) ・Geosmin: 0.003μg/L (0.008μg/L) ・2-MIB: <0.001 μg/L (0.002 μg/L) ・TON: 3 (5)
Chemical dose:	Sulfuric acid (pH adjustment), Calcium hydroxide (alkalinity adjustment), Polyaluminum chloride (coagulation), Sodium hypochlorite (disinfection)
Start of opeation	Mar-40

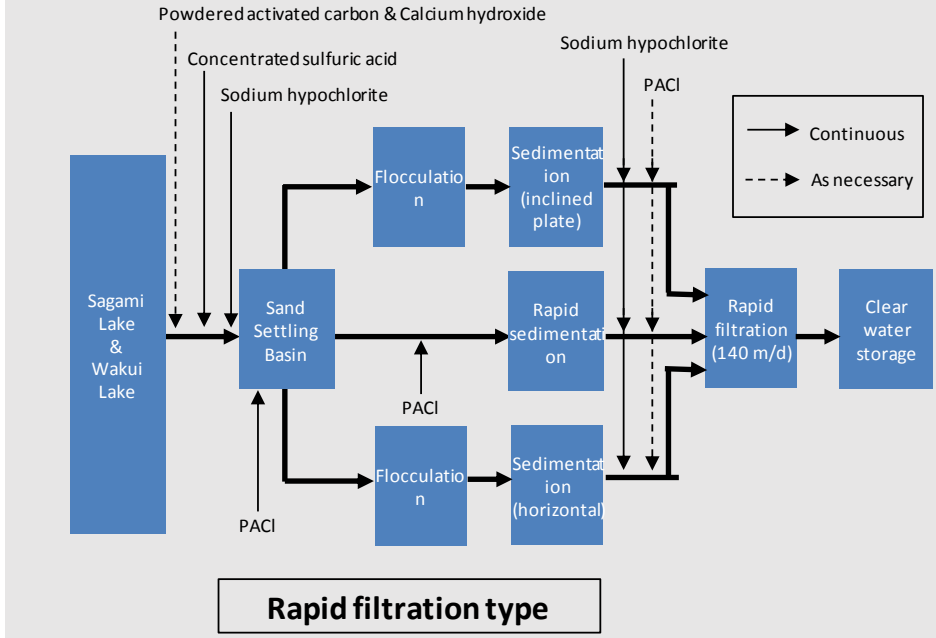
Case Study Report (Tanigahara Water Treatment Plant)

Water treatment process

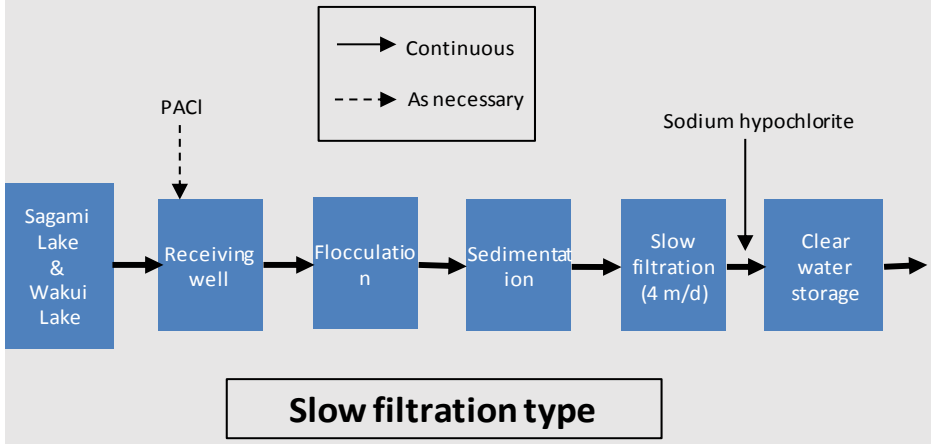
Layout

● Arial view

Water treatment process flow



Rapid filtration type



Slow filtration type

Water treatment process

Pictures

● Intake point

● Sedimentation basin
(slow filtration system)

● Coagulation/sedimentation basin
(rapid filtraion system - horizontal)

● Coagulation/sedimentation basin
(rapid filtraion system)

● Slow filtration basin

● Rapid filtration basin

Other facilities:

● Backup Power Supply System

In the event of a blackout cuts the commercial power supply, a backup power generator enables the operation for up to one fourth of the total plant capacity.

Other information

- The Brochure of the Tanigahara Water Treatment Plant (March 201)
- The Water Quality of the Kanawaga Prefectural Government's Water Supply Service (Jan 2016)

Case Study Report (Oyama Water Treatment Plant)		
Water treatment plant	Case #2-3	Oyama Water Treatment Plant
	Key word:	Membrane filtration, surface water (river)
	Outline:	<Characteristics> ・Demand fluctuation management: Situated in a tourist zone, the Oyama Water Treatment Plant has relatively broad water demand fluctuations throughout the year but has been producing drinking water in a safe and reliable manner. <Outline> ・With a capacity of 740 m3/d, it abstracts water from the Oyama River and suppies about 270 households in the Oyama and Koyasu Districts. ・Service area: portions of 1 City
	Address:	Sakamoto 671, Oyama, Isehara City, Kanagawa Prefecture
	Land area:	592m^2
	Treatment process:	Sedimentation + Membrane filtration + Chlorine disinfection
	Capacity	1,000 m3/d
	Water source:	Surface water (Oyama River)
	Raw water quality:	■Abstracted from a mountaineous region, the raw water has a high quality with little artificial contaminations. <Average raw water quality in FY2014 (maximum)> ・Turbidity: 0.6 degrees (2.3 degrees) ・Hardness: 36 mg/L (38 mg/L) ・TOC: 0.5 mg/L (1.7 mg/L) ・p H: 7.6 (7.7) ・Color: 2.1 degrees (6.4 degrees) ・Geosmin: <0.001μg/L (-) ・2-MIB: <0.001 μg/L (-) ・TON: 3 (5)
	Chemical dose:	Sodium hypochlorite (disinfection)
	Start of operation:	April 1986 (membrane filtration since 1998)

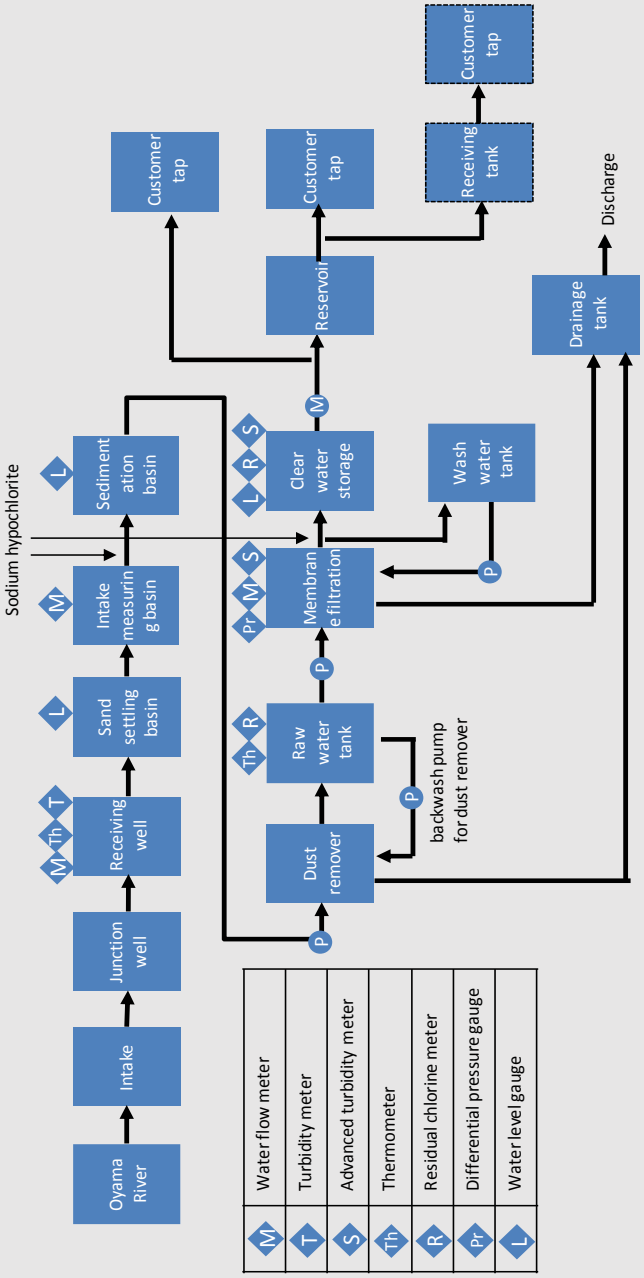
Case Study Report (Oyama Water Treatment Plant)

Water treatment process

Layout

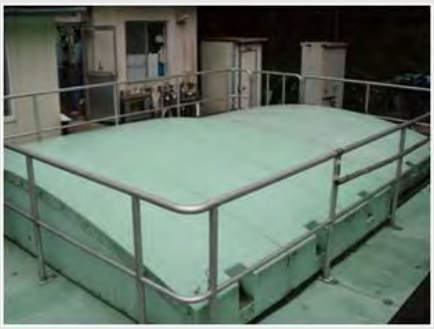
● Outside appearance

Treatment process flow diagram:



Case Study Report (Oyama Water Treatment Plant)

Water treatment plant

Pictures	● Intake point  ● Intake point  ● Settling basin, Sedimentation basin (when covered)  ● Settling basin, Sedimentation basin (when opened)  ● Membrane filtration system  ● Membrane filtration system 
Other facilities:	● Membrane module 12 m3 x 34 modules x 3 trains (102 modules in total) Filtration method: external pressure type dead-end filtration Filtration velocity: 1.0 m3/m2*d (maximum) Modle size: φ114×1,078 mm

Other information

- The Brochure of the Oyama Water Treatment Plant (June 2010)
- The Water Quality Report of the Kanawaga Prefectural Government's Water Supply Service (Jan 2016)

Case Study Report (Midono Water Source)		
water treatment process	Case #2-4	Midono Water Source
	Key word:	UV treatment system, Spring water
	Outline:	<Chracteristics> ・Environmental measures: Because of a very high raw water quality throughout the year, a UV treatment system has been adopted, saving energy required for water treatment. ・Service area: portions of 1 Town ・Design capacity: 12,800 m3/d
	Address:	Sengokuhara Daigatake 1277-2, Hakone Town, Kanagawa Prefecture (location of the UV treatment system)
	Land area:	16,127m^2
	Water treatment process:	UV treatment + Chlorine disinfection
	Capacity:	12,800 m3/d
	Water source:	Spring water
	Raw water quality:	■Although influenced by volcanic soil, the raw water has a very high quality with little contaminations. <Average raw water quality in FY2014 (maximum)> ・Turbidity: <0.1 degrees (<0.1 degrees) ・Hardness: 110 mg/L (110 mg/L) ・TOC: <0.1 mg/L (0.1 mg/L) ・p H: 7.2 (7.2) ・Geosmin: <0.001μg/L (-) ・2-MIB: <0.001 μg/L (-) ・TON: <1 (<1)
	Chemical dose:	Sodium hypochlorite (disinfection)
	Start of operation:	Mar-68

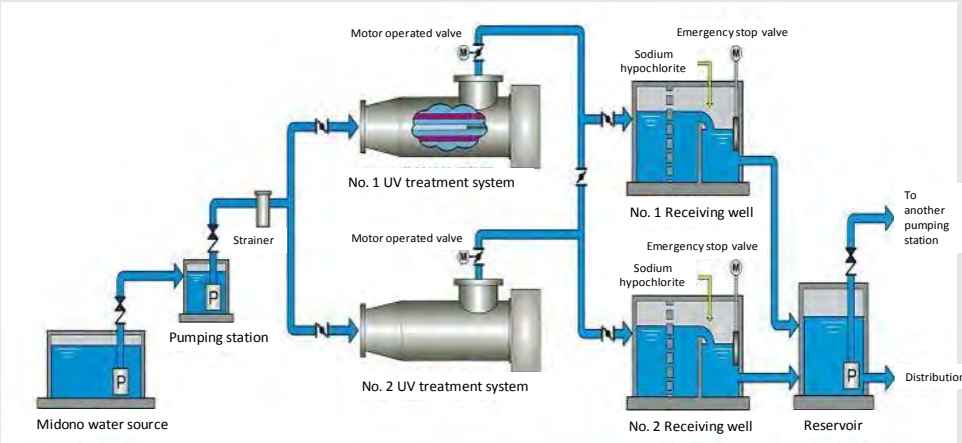
Case Study Report (Midono Water Source)

water treatment process

Layout

● Midono Water Source

Treatment process flow diagram:



Case Study Report (Midono Water Source)

water treatment process

Pictures:

● Intake facility

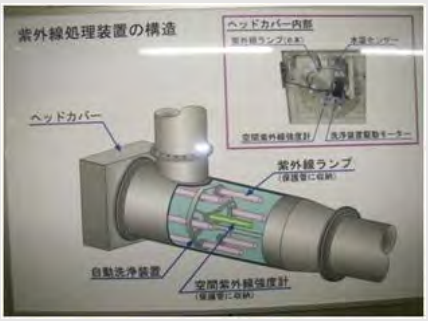
● Intake facility

● Spring water
(inside the intake facility)

● UV system (outside)

● UV system

● UV system structure



Other faciliteis:

● UV treatment system
Irradiation dose: over 10mJ/cm2
Size of irradiation tank: φ500 mm x 2400 mm
Number of UV lamps: 6 lamps/unit
Size of a UV lamp: φ19 mm x 1500 mm

Other information

- The Brochure of the Kanagawa Prefectural Government's Water Service in the Hakone Town (Apr 2014)
- The Water Quality Report of the Kanawaga Prefectural Government's Water Supply Service (Jan 2016)

Case Study Report (Kissawa Water Source)		
water treatment process	Case #2-5	Kissawa Water Source
	Key word:	Ground water, Chlorine disinfection only
	Outline:	<Characteristics> ・Safe and refreshing drinking water: the ground water has a very good quality throughout the year. <Outline> ・Service area: the ground water is used to suppliment reservoirs of other water treatment plants. ・Maximum capacity: 1,100 m3/d 1st well: φ75×60m 2nd well: φ125 x 12 m、φ100 x 48 m
	Address:	Tsuchiya 1760, Hiratsuka City, Kanagawa Prefecture
	Land area:	322m^2
	Water treatment process:	Chlorine disinfection
	Capacity:	1,100 m3/d
	Water source:	Ground water
	Raw water quality:	■The raw water has a very high quality with little contaminaions. <Average raw water quality in FY2014 (maximum)> ・Turbidity: <0.1 degrees (<0.1 degrees) ・Hardness: 140 mg/L (140 mg/L) ・TOC: 0.2 mg/L (0.3 mg/L) ・p H: 7.6 (7.9) ・Geosmin: <0.001μg/L (-) ・2-MIB: <0.001 μg/L (-)
	Chemical dose:	Sodium hypochlorite (disinfection)
	Start of operation:	Unknown

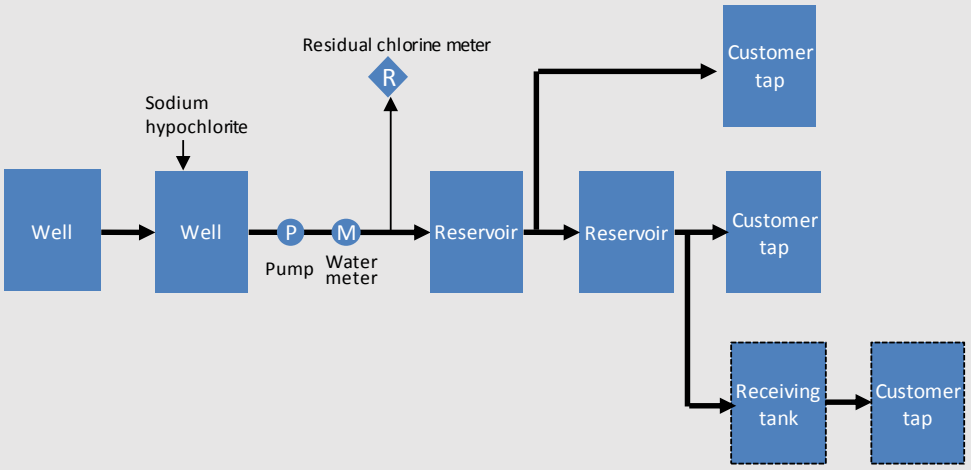
Case Study Report (Kissawa Water Source)

Water treatment process

Layout:

● Overview

Treatment process flow diagram:



Case Study Report (Kissawa Water Source)

Water treatment process

Pictures	●Well (outside)  ●Well (inside)  ●Intake facility  ●Pumping facility 
Other facilities:	–

Other information:

・The Water Quality Report of the Kanawaga Prefectural Government's Water Supply Service (Jan 2016)