

Policies and Regulatory Frameworks on Wastewater Management and Water Reuse in Japan

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Abstract. Japan developed regulatory frameworks on wastewater management taking account of severe water pollution in the past. The frameworks include the regulation of effluent from industries and the promotion of sewage works. In terms of developing sewerage systems, local governments are required to treat wastewater in order to satisfy environmental quality standards. Currently, treated wastewater is considered to be one of valuable water resources in water shortage areas, Japan. To utilize it in an adequate manner, technical standards have been developed.

Keywords: Wastewater management, Water reuse standard, Regulatory framework.

1. WASTEWATER MANAGEMENT

(1) Pollution session of the diet in 1970

Japan experienced water contaminations in rivers and seas around the 1960's due to the rapid economic growth. Therefore, Japanese government was urged to take countermeasures. Taking account of these situations, members of parliaments discussed intensively on pollution issues and developed frameworks of environment and sanitation policies in 1970. We still call this session in 1970 as the pollution session of the Diet. In this diet, we enacted water pollution control law and amended sewerage law. Water pollution control law established environmental quality standards to protect human health and to conserve living environment. To meet environmental quality standards, local governments should regulate effluent from factories or commercial facilities and monitor water quality at public water areas.



Figure 2 Water quality of Murasaki River
in Kitakyushu City (present)

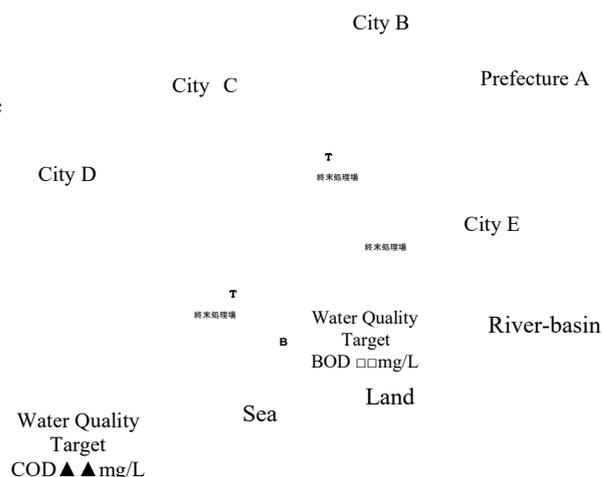
Figure 1 Serious water pollution in
Kitakyushu City (1960s)

(2) Revised sewerage law

Sewerage law was amended in 1970. Based on the law, national and local governments share responsibilities to promote sewage works in Japan. National government is responsible for making vision, law/regulation, technical standards and providing subsidies. On the other hand, local governments are implementing organizations. The revised sewerage law obliged local governments to construct wastewater treatment plants. Before that, they had not been required to treat wastewater in sewerage systems prior to discharging them into public water bodies. Now, local governments should treat wastewater in order to satisfy environmental quality standards. Based on the law, in sewerage service areas, landowners, in principle, are compelled to use the sewerage systems. They are obligated to install drainage facilities (so-called private sewers) to connect the public sewerage system. Also, according to the law, those who discharge industrial toxic wastewater into sewerage systems are responsible for the establishment of pretreatment facilities to eliminate toxic substances, in order to maintain the function of sewerage facilities. To ensure this pretreatment, direct-penalty, prior-checking and improvement order system by local government are stipulated.

(3) Comprehensive watershed management system

In order to preserve water quality in public water bodies, comprehensive watershed management is essential from the viewpoint of reducing pollutant loads in the whole river basin. According to amended sewerage law in Japan, in the basin related to some municipalities, prefecture should make the most rational and effective sewerage construction plan to meet environmental quality standards. Based on this comprehensive plan, each municipality is supposed to construct a wastewater treatment plant and adopt a necessary treatment process at the plant, including advanced treatment one.



2. WATER REUSE

(1) Current treated wastewater reuse

In Japan, treated wastewater is utilized for various purposes such as sound water environment, agriculture, industry and urban uses. For developing sound water environment, we use treated wastewater for landscaping, recreation and so on. And we use as industrial water and agricultural water, as well as use for toilet flushing, car washing, snow melting and so on. Fukuoka City is famous for water reuse in Japan. The city experienced a severe drought in 1978, when water outage continued for long time. Based on this experience, Fukuoka city government enacted save-water promotion ordinance so that large buildings are required to install double pipe system. One pipe is for drinking water and another pipe is for toilet flushing and landscaping water. Treated wastewater is utilized at large buildings in the neighborhood of treatment plants. The Wastewater treatment plants adopt advanced treatment processes; coagulation settling, ozonation and sand filtration processes.

(2) Technical standards for reuse in Japan

We compiled technical standards for treated wastewater reuse in Japan in 2005. We selected 7 items; E- coli, Turbidity, pH, Appearance, Color, Odor and Residual chlorine. Each value is decided according to reuse purposes; toilet flushing, sprinkling, landscaping and recreation. Especially, for recreation, since humans may contact with treated wastewater, the standard is strict.

Table 2 Water quality standards

	location at which standards are applied	toilet flushing water	water for sprinkling	water for landscaping	recreational water
Escherichia - coli	Exit of treatment facility for reuse	Not detectable		Total Coliforms count of 1000CFU/100mL is applied (tentative)	Not detectable
Turbidity		[Management target] 2 degrees or less			2 degrees or less
pH		5.8~8.6			
Appearance		Not unpleasant			
Color 1)				40 degrees or less	10 degrees or less
Odor1)		Not unpleasant			
Residual chlorine 2)	Responsibility demarcation point	[Management target] Free residual chlorine 0.1mg/L or more; or combined residual chlorine 0.4mg/L or more		Not regulated	[Management target] Free residual chlorine 0.1mg/L or more; or combined residual chlorine 0.4mg/L or more

1) Standards may be set for color and odor as necessary depending on the inclinations of the users.

2) The residual chlorine in water for landscaping use is not regulated since it can be treated by methods other than disinfection by chlorine in order to protect the ecosystem and it is used on the assumption that humans will have no contact with it. Standards for

residual chlorine in water for sprinkling and recreational water are not applied in the event that the residual effect of disinfection is not necessary. Standards for residual chlorine in water used in applications other than landscaping water can be based on individual agreements in the event that additional chlorine is implanted by the user.

Concerning facility standards, for toilet flushing, sprinkling and landscaping, wastewater should be treated by sand filtration facility or facility with equivalent or superior functions. And for recreation, wastewater should be treated by coagulation settling and sand filtration facility or facility with equivalent or superior functions

(3) ISO standard for water reuse

ISO now is developing the standard for water reuse. Originally, PC 253 (Project Committee) was inaugurated in 2010 based on a proposal by Israel regarding treated wastewater reuse for irrigation. In 2013, Japan proposed to establish new TC “water re-use” with Israel and China. This proposal was approved and TC282 has been established. This new TC expands the scope of PC253 to cover not only irrigation reuse but also other reuses. The TC consists of three SCs (sub-committees), so called “Treated wastewater use for irrigation”, “Treated wastewater use in urban area” and “Risk and performance evaluation of water re-use system”.