Chapter 3 WATER POLLUTION CONTROL LAW

1. Historical background on enactment of water pollution control low

In Japan, river water pollution problems had been observed even before the industrial modernization of the country. One of the first recorded cases of river water pollution affecting human activity was the outflow of pit water from the Asio Copper Mines into the Watarase River during the late 19th century. The outflow of mine pit waters damaged paddy fields on the riverside. With the advent and growth of industrial activities, there had been a subsequent increase in wastewater flowing into rivers, giving rise to pollution problems in various parts of Japan. During the period of industrial reconstruction after World War II, there were social disputes related to problems arising out of river water pollution by industries. Great damage to fisheries had been observed at that time as a result of wastewater from paper mills being discharged into the Edo River in Tokyo. The problem also began to affect people's health, as in the case of the Minamata incident in the late 1950s, when mercury from the chemical industry caused a previously unknown disease among people who ingested the waste-contaminated fishes caught in the area around the factory. In the 1960s, during the period of rapid economic growth, water pollution became more widespread and severe. Reports of mercury contamination in the Agano River and cadmium in the Jinzu River were seen to lead to Itaiitai disease and Minamata disease as in earlier years.

Several countermeasures have been taken by the Japanese government and people to control and abate water pollution, specifically that which affected human health and the living environment in water systems.

Based upon the above mentioned serious water pollution problems, "Water Quality Conservation Low" and "Factory Effluent Control Low" have been enacted in 1958. Water quality standard (WQS) was established for the Edo river based on the above two lows. WQS for the Yodo river, the Kiso river, the Ishikari river, the Ara (Sumida) river were established as well soon after the enactment of those two lows.

"Water Quality Conservation Low" requires, 1)central government establish the water quality control basic plan of public waters based upon the opinion of the local governor(s), 2)central government sets up designated water bodies, 3)Organization of council for water quality control is required in the local government. "Factory Effluent Control Low" requires the factories to set up the designated facilities and to report it to the government. The government can enforce the factory to revise the reported plan and to improve the facility if the effluent water quality does not meet the water quality standard of the water bodies where the effluent is discharged. "Water Quality Conservation Low" and "Factory Effluent Control Low" were applied to the Edo river (water quality standards: pH, COD, SS) in 1962, the Mizushima water area (water quality standards: pH, COD, SS, oil content, cyanide, total chromium, phenols, alkylated mercury, organic phosphorus, cadmium, lead, arsenic, total mercury, chromate). During these period number of water quality parameters increased due to the deterioration of water quality in the public water areas. 81 areas had been set up as the designated water bodies.

2. Enactment of Water Pollution Control Low and Outline

Japan has a long and rich experience in controlling and abating river water pollution. In the 1950s, in response to the many concerns raised relating to industrial pollution, local ordinances were enacted to enable local government to take measures against water pollution. In 1958, the central government promulgated two laws on water pollution control. One dealt with water quality protection in public water areas while the other was a law regulating effluents from factories. These two laws, however, were not sufficient to prevent water

pollution. The regulations were applied only to some designated water areas.

In 1967, the government enacted the Basic Law for Environmental Pollution Control to promote comprehensive measures against various forms of environmental pollution. In 1970, the so-called "pollution Diet" adopted several environmental laws to reinforce laws on environmental pollution control. Several old laws were unified in the form of a new reinforced Water Pollution Control Law. The national government then set the Environmental Quality Standards and the Effluent Standards, and enacted or revised other laws related to water quality management. Local governments have likewise enacted many laws and regulations for their specific areas of concern.

In 1971, concentration of pollutants in the effluent was regulated based upon the Water Pollution Control Law. The Water Pollution Control Law was rectified for closed water area such as Tokyo bay, Ise bay, Seto inland sea using COD as water quality parameter to conserve the designated environmental water quality standard.

The objectives an outline of the water pollution control law are as follows:

1)The purpose of the low is to prevent the pollution in public water areas , thereby, to protect human health and to conserve the living environment, by regulating effluents from factories and establishment into the public water areas, and protect the suffers by deciding the liability of the proprietor of the factories and establishments to compensate for the damage in cases when human health has been damaged by the polluted water and waste liquid to be discharged from the factories and establishments.

2)Effluent wastewaters from factories and establishments are widely regulated regardless of kind of industries.

3)Effluent standards are set in terms of permissible concentration of each harmful substance for protecting human health and each parameter for preserving the living environment. Effluent standards are classified into common national standards and the more stringent effluent standards. The uniform national effluent standards shall be set by the Prime Minister's Office Order. For Public water areas where it is reorganized that the common national minimum effluent standards are insufficient for protecting human health to preserve the environment water quality for Cabinet order Effluent water and/or for preserving the living environment to attain the environmental quality standards of water, the water pollution control law provides that the more stringent effluent standards may be decided by enacting necessary prefectural regulations in accordance with national minimum standards.

4)Public sewer systems and river basin sewerage systems connected to wastewater treatment plants are excluded from the public water area.

5)Prefectural governors and mayors designated by Prime Ministers Office order may call for necessary reports from persons who discharge effluent from specified factories and establishments and may inspect the specified factories and other related matters. And the governors and the mayors, when they acknowledge that it is possible that unsatisfactory effluent is discharged, may order the persons who discharge the effluent into pubric water areas to improve the structure of the wastrewater treatment facility. Absolute liability concept was applied to the health hazard derived by the water pollution in 1972. Factories and establishment are responsible to their effluent into the

public water areas.

6)Area wide total pollution Load control system was introduced to preserve water environment in closed sea area in 1978. The governor of each prefecture concerned must determine, according to the plan for reducing the total pollution load, pollution load control standards for the pollutant loads of the effluents from those designated factories and establishments in the specified area which have wastewater discharged in 50 m3 or more in daily average.

The Environmental Water Quality Standards were first established by a Cabinet decision in 1970. These standards are divided into two types - those that need to be achieved and maintained to protect human health and those that need to be achieved and maintained to conserve the living environment (refer to Table 3-1). The standards set are almost equivalent to drinking water quality standards with regard to the items related to the protection of human health. Standards relating to the protection of human health are applied as minimum criteria nationwide, while those relating to the conservation of the living environment are set for each category according to water usage, the level of pollution, and other factors. Prefectural governments are responsible for setting standards for water bodies in their respective areas except for the 47 inter-prefectural water bodies administered by the national Environment Agency. Prefectural governments also have the power to establish standards more stringent than the national standards when the latter are not enough to conserve the water quality of public water bodies within their area of jurisdiction. Effluent standards have also been set to control discharges into public waters by factories or establishments which have specified facilities (see Table 3-1).

3. Environment Quality Standard for Water

3.1 Out line of Environment Quality Standard

The water quality standards are established as standards which should be maintained to protect the health of the people and to preserve the living environment. They are standards which will serve as goals when national and local governments draft measures to prevent pollution. In the environmental quality standards for water, there are the standards concerning protection of the human health and those for the preservation of living environments. Different criteria are applied to the water area according to the utilization water, while the standards for human health are applied to the water area uniformly throughout the country.
The general outline of the environment quality standards is shown in Table-1. In the notification of Environment Agency the parameters and their analytical procedures are shown as well.

3.2 Standards for human health

The parameters of standards for human health are 23 as shown in Table-2. Nine organochlorine compounds and 4 agricultural chemicals are included. Criteria of each parameter was decided for the supply of safe drinking water. Biological concentration in fishes, shell fishes were taken into consideration to determine the criteria.

Table 3-1 Standards related to the protection of human health (mg/L or less)

Parameters and criteria	reference and related information (unit: mg/L)
Cd 0.01	Same with the water quality standard for drinking water: 0.01----1/100 through 1/50 of Zinc concentration in surface water and in ground water. World standard suggested by WHO, standards in the United States and in Russia: 0.01 Europa standard suggested by WHO: 0.05 No information is available on the accumulation of Cd in fishes and plants.
CN ND	LD50 of KCN:150-300mg/person (LD50 of CN:60-120mg/person). 100 times safety factor was considered. The criteria in Japan was decided as ND (<0.1) by referring the criteria in U.S.: 0.01, Russia: 0.1, and in Europe by WHO: 0.2 by taking the 100times safety factor into account.
Organic phosphorus* ND	Agricultural organic phosphorus: parathion, methyl parathion, EPN, methyl demeton, LD50 of parathion (6mg/kg-mouse) was referred to decide the criteria:ND (<0.1)
Pb** 0.01	acute toxicity and long term exposure. unclear threshold value. AWWA reported that daily uptake more than 1.0 mg/person may bring about the accumulation in human body. Same criteria with drinking water standard was set due to poor removal efficiency in drinking water treatment.
Cr (VI) 0.05	Symptoms of poisoning: vomiting, convulsions, coma, dermatitis, Poor removal efficiency in drinking water treatment. No toxicity less than 0.1 mg/L. Criteria in drinking water quality standard is 0.05 mg/L. Same criteria with the drinking water was selected.
As** 0.01	Symptoms of chronic poisoning: sensory disturbance, cirrhosis, edema. skin cancer, etc. Poor removal efficiency in drinking water treatment. Same criteria with the drinking water was selected.
Hg (total) 0.0005 Hg (alkylated) ND(<0.0005)	Substance caused Minamata disease. Symptoms of poisoning: decease by central nervous system paralysis Bio-concentration factor via fishes and accuracy of analyses were considered for food. Temporal criteria of fishes for food: Total mercury-0.4 mg/kg, methylated mercury-0.3 mg/kg.
PCBs ND(<0.0005)	Symptoms of poisoning: eyelid edema, amblyopia, skin ailment. Accumulation of PCBs in water and in sediments by food chain was considered to determine the criteria. Bio-concentration factor was estimated as 7360 (average) through 10000. The criteria was determined as ND not to exceed the temporal value of food (3 mg/kg) after bio-concentration.

b)Additional parameters and standards

Parameters	Standard values
Trichloroethlene	0.03
Tetrachloroethlene	0.01
Carbon tetrachloride	0.002
Dichloromethane	0.02
1,2-dichloromethane	0.004
1,1,1-trichloroethane	1.0
1,1,2-trichloroethane	0.006
1,1-dichloroethylene	0.02
cis-1,2-dichloroethylene	0.04
1,3-dichloropropene(D-D)	0.002
Thiuram	0.006
CAT (simazine)	0.003
Thiobencarb	0.02
Benzene	0.01
Selenium	0.01

*These parameters are added to the Standards related to the protection of human health in 1993

3.3 Standards for Living Environment

Environment Agency has announced in 1971 the parameters of environment quality standards such as BOD, COD, Suspended solids, Dissolve oxygen, Number of coliform group as shown in Table 3-2. Criteria of nitrogen and phosphorus were set for the preservation of environmental water quality in lakes.

Table 3-2 Standards for rivers related to the conservation of living environment (mg/L)

category	water use	pH	BOD	SS	DO	CG*
AA	Water supply class 1, conservation of natural environment, and uses A-E	6.5-8.5	1	25	7.5	50
A	Water supply class 2, fishery class 1, bathing, and uses B-E	6.5-8.5	2	25	7.5	1,000
B	Water supply class 3, fishery class 2, and uses C-E	6.5-8.5	3	25	5.0	5,000
C	Fishery class 3, industrial water class 1 and uses D-E	6.5-8.5	5	50	5.0	-
D	Industrial water class 2, irrigation water and use E	6.0-8.5	8	100	2.0	-
E	Industrial water class 2, conservation of environment	6.0-8.5	10	no floating matters	2.0	-

*CG: number of coliform groups, MPN/100ml

Note: Category of water area is specified by the minister of Environment Agency or by prefectural governor.

1.Conservation of natural environment: conservation of nature and natural resources

2.Water supply class 1: no or simple purification, slow sand-filtration
Water supply class 2: conventional purification, coagulation and rapid sand-filtration
Water supply class 3: advanced purification, biofilter, ozone, activated carbon, etc.

3.Fishery class 1:Oncorhynchus masou, Salvelius pluvius, etc.
Fishery class 2: Salmon, sweet fish (ayu), etc.
Fishery class 3: Carp, Prussian carp, etc.

4.Industrial water supply class 1: simple treatment such as sedimentation before distribution
Industrial water supply class 2: advanced treatment required before distribution
Industrial water supply class 3: high level advanced treatment required before distribution

5.Conservation of environment: no unpleasant odor at riverside or beach