

# Essence of Japanese Sewerage Law

Japan Sewage Works Association

## **Preface**

This paper is intended to communicate the essence and core idea of the Japanese sewerage law. The translation is not made word by word precisely. As English and Japanese are very different, a word by word translation cannot convey the meaning. Especially in the case of law, the original Japanese version contains many wishy-washy and indirect expressions. We intentionally simplified the original upon translation to increase the understanding of international readers. We hope this paper will be of use to those nations who are about to make sewerage law.

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## **History of Sewerage Law**

The original version was made in 1900. At that time, Japan was a developing country. The cholera outbreak and persistent flooding were the main problems. The first version was intended to upgrade the sanitation focusing on the drainage. The law did not require treatment of wastewater. The collected wastewater was mainly storm water runoff with small amount of grey water. Black water/human waste, was recycled as fertilizer. Therefore sewerage system did not target it. Collection and discharge was considered enough.



***Figure 1 First Modern Sewer Installed in 1884, still used, Kanda, Tokyo***

Big changes were made to sewerage law in 1958 and 1969. In those days, Japanese economy was rapidly growing thanks to extensive industrial development. Population increase and urbanization were taking place. Both Industrial and domestic wastewater were polluting natural waters such as rivers, lakes and seas. Under this circumstance, the sewerage law were revised in order to prevent water pollution while protecting public health. Construction of WWTPs became mandatory.



***Figure 2 Pollution in the 60's, Dokai Bay, Kitakyusyu City***

Minor changes were made later in 1996 and 2005 to make progress in sludge recycle, flood control, and advanced wastewater treatment.

Looking back to history, after the enactment, the revisions have been made on the previous versions of the law in order to work on a wide range of problems at different times while keeping the consistency of each article in the law. This makes the sewerage law difficult and complex.

## **Structure of Sewerage Law**

Although it is very rough, the articles of the current sewerage law can be categorized into five subject groups. They include 1 objective, 2 municipal sewerage, 3 prefecture sewerage, 4 municipal drainage channel, and 5 finance & cost sharing. There are several articles that do not fall into the five categories

1 Objective: Articles 1 & 2.2.

2 Municipal sewerage: Articles 2-13, 21-22, 24

3 Prefecture sewerage: Articles 2, 7-8, 15-18, 21-23, 25, 38

4 Municipal drainage channel: Articles 2, 26-29

5 Finance & Cost Sharing: Articles 31, 34



*Figure 3 Japanese Government System*

## Articles of Law

### Article 1: Objective of the Law

In this article, three different levels of objectives are described. The direct objective is stipulation of master planning and standards for design, build & operation of sewerage system. This enables the expansion of sewerage system, which is referred as the medium objective. It leads to the highest level of objective or supreme goal of the law, which includes sustainable urban development, sanitation, and water pollution control.

### Article 2.1: Definition

2.1.1 Sewage = Sanitary Wastewater + Storm Water

2.1.2 Sewerage: Collection and Drainage System including Pumping and WWTP

2.1.3 Municipal Sewerage: With WWTP or Without WWTP. In case of without WWTP, it is connected to Prefectural Sewerage.

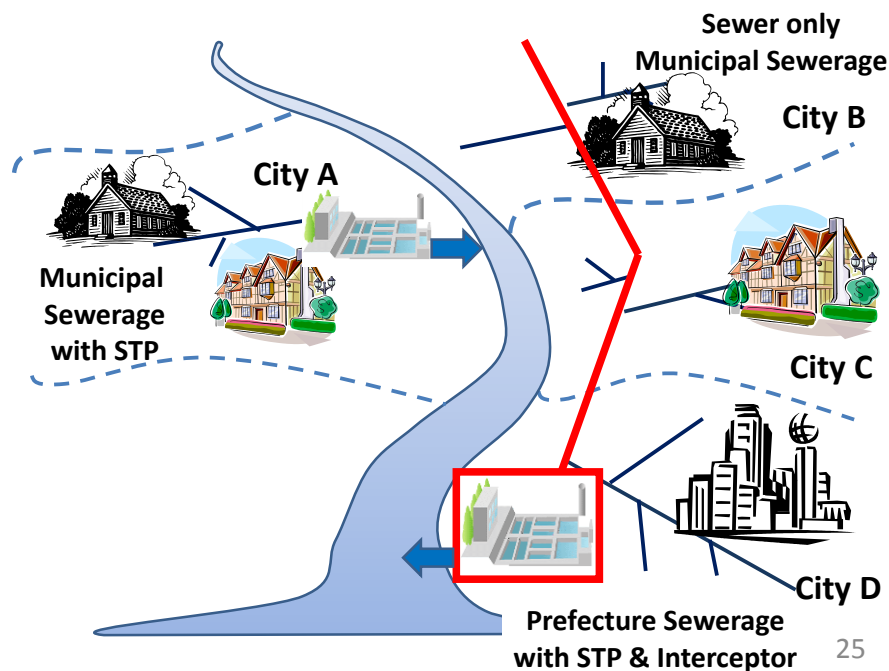
2.1.4 Prefectural Sewerage: accepts sewage from two or more municipal sewerage systems.

2.1.5 Municipal Drainage Channel: for flood control

2.1.6 WWTP

2.1.7 Drainage Area: Publicly announced area by article 9-1

2.1.8 Treatment Area: Publicly announced area by article 9-2

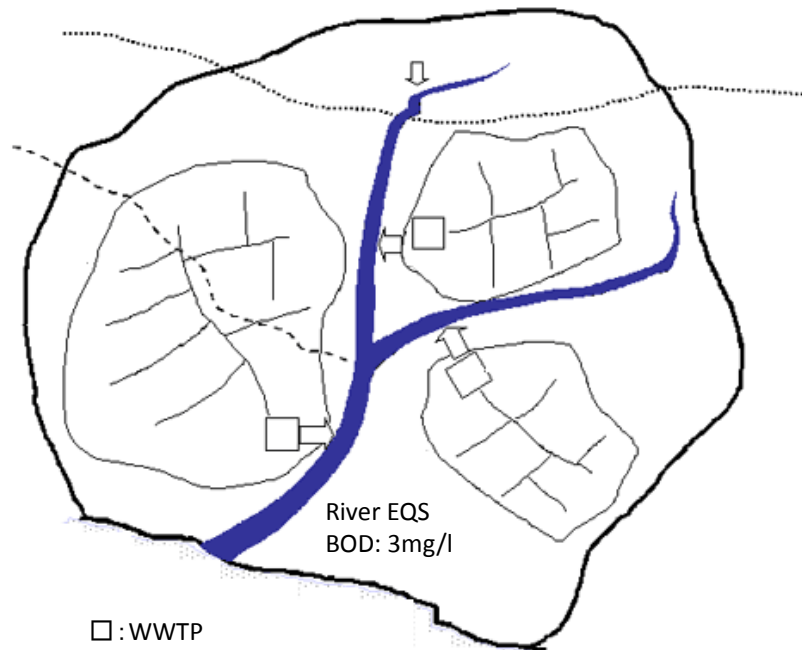


**Figure 4 Sewerage Systems in Japan**

**Article 2.2: Master Plan**

2.2.1 Prefecture Gov. shall make a sewerage master plan for a public water body where environmental quality standards are set by Environmental Law. The master plan shall include sewerage systems to achieve EQSs.

2.2.2-2.2.9 Omitted



**Figure 5 Schematic of Master Plan**

**Article 3: Operator of Municipal Sewerage**

3.1 Municipal gov. shall design, build, operate, and maintain municipal sewerage.

3.2 omitted

**Article 4: Implementation Program**

4.1 Municipal sewerage operator shall make an implementation program when they start a sewerage project.

4.2 Municipal sewerage operator shall consult with prefecture gov. upon making the implementation program.

4.3-4.6 Omitted.

**Article 5: Contents of implementation program**

5.1 The followings shall be included in the implementation program.

5.1.1 Location, structures, & capacities of drainage & collection system and treatment area

5.1.2 Location, structures, & capacities of WWTPs or connection spot to prefecture sewerage

5.1.3 Omitted

5.1.4 Dates of commencement & completion of construction works

5.2 omitted

**Article 6: Requirements of implementation program**

6.1 Location & capacity of sewerage shall be decided by considering precipitation, population, and others that affect quality and quantity of sewage, geography, land use, and conditions of receiving waters.

6.2 Structure of sewerage shall conform to the article 7.

6.3 Treatment area shall harmonize with the location & capacity of collection system & WWTP.

6.4 The implementation program of municipal sewerage connecting to prefecture sewerage shall harmonize with the implementation program of prefecture sewerage.

6.5 The implementation program shall harmonize with the master plan if any.

6.6 Omitted

**Article 7: Structural Requirement**

7.1 The structure of municipal sewerage shall conform to the technical requirements stipulated in the order of the sewerage law in order to keep sanitation and to secure pollution control.

7.2 The structure of municipal sewerage shall conform to the technical requirements stipulated in the municipal law based on the order.

**Article 8: Effluent Quality Standard**

The effluent quality standard of municipal sewerage shall satisfy the requirements made by the order of sewerage law.



**Table 1 Effluent Quality Standard for BOD, TN, & TP in the order**

Design Effluent	BOD mg/l	10 or under						above 10 to 15		
	TN mg/l	10 or under			above 10 to 20			20 or under		
	TP mg/l	0.5 or under	above 0.5 to 1.0	above 1.0 to 3.0	1.0 or under	above 1.0 to 3.0	1.0 or under	above 1.0 to 3.0	3.0 or under	3.0 or under
<b>Process Type</b>										
AS/ABF/SFBB										⊙
AS/ABF/SFBB+RSF								⊙		⊙
AS/ABF/SFBB+CO										⊙
AS/ABF/SFBB+CO+RSF							⊙	⊙	⊙	⊙
BN									⊙	⊙
BN+ORG										⊙
BN+RSF							⊙			⊙
BN+CO									⊙	⊙
BN+ORG+RSF							⊙			⊙
BN+ORG+CO									⊙	⊙
BN+CO+RSF							⊙	⊙	⊙	⊙
BN+ORG+CO+RSF			⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
BP										⊙
BP+RSF								⊙	⊙	⊙
BP+CO										⊙
BP+CO+RSF								⊙	⊙	⊙
BNP									⊙	⊙
BNP+ORG									⊙	⊙
BNP+RSF							⊙	⊙	⊙	⊙
BNP+CO									⊙	⊙
BNP+ORG+RSF							⊙	⊙	⊙	⊙
BNP+ORG+CO									⊙	⊙
BNP+CO+RSF							⊙	⊙	⊙	⊙
BNP+ORG+CO+RSF		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊙: Recommended

○: Allowed

AS: Conventional Activated Sludge Process, Oxidation Ditch, Extended Aeration, Sequence Batch Reactor, Pure Oxygen

ABF: Aerobic Biological Filtration Process with Plastic Media

SFBB: Submerged Fixed Bed Biofilm Process

RSF: Rapid Sand Filtration

CO: Addition of Coagulant

BN: Biological Nitrogen Removal Activated Sludge Process

ORG: Addition of Organics for enhancing denitrification

BP: Biological Phosphorus Removal Activated Sludge Process

BNP: Biological Nitrogen & Phosphorus Removal Activated Sludge Process

The other standards for PH, SS, & Total Coliform in the order are 5.8-8.6 in PH, 40mg/l in SS, & 3,000/cm<sup>3</sup> in Total Coliform.

**Article 9: Public Notice of Commencement of Sewerage Service**

Municipal sewerage operator has to issue a public notice on the dates of commencement of new sewerage service, drainage/treatment area, and the others stipulated in the ordinance of sewerage while ensuring public access to the plans & sections in the offices of municipal governments.

**Article 10: Mandatory Connection**

10.1. Once sewerage service becomes available, land owners, tenants, or occupants shall install house or lateral sewers without delay by the following classification.

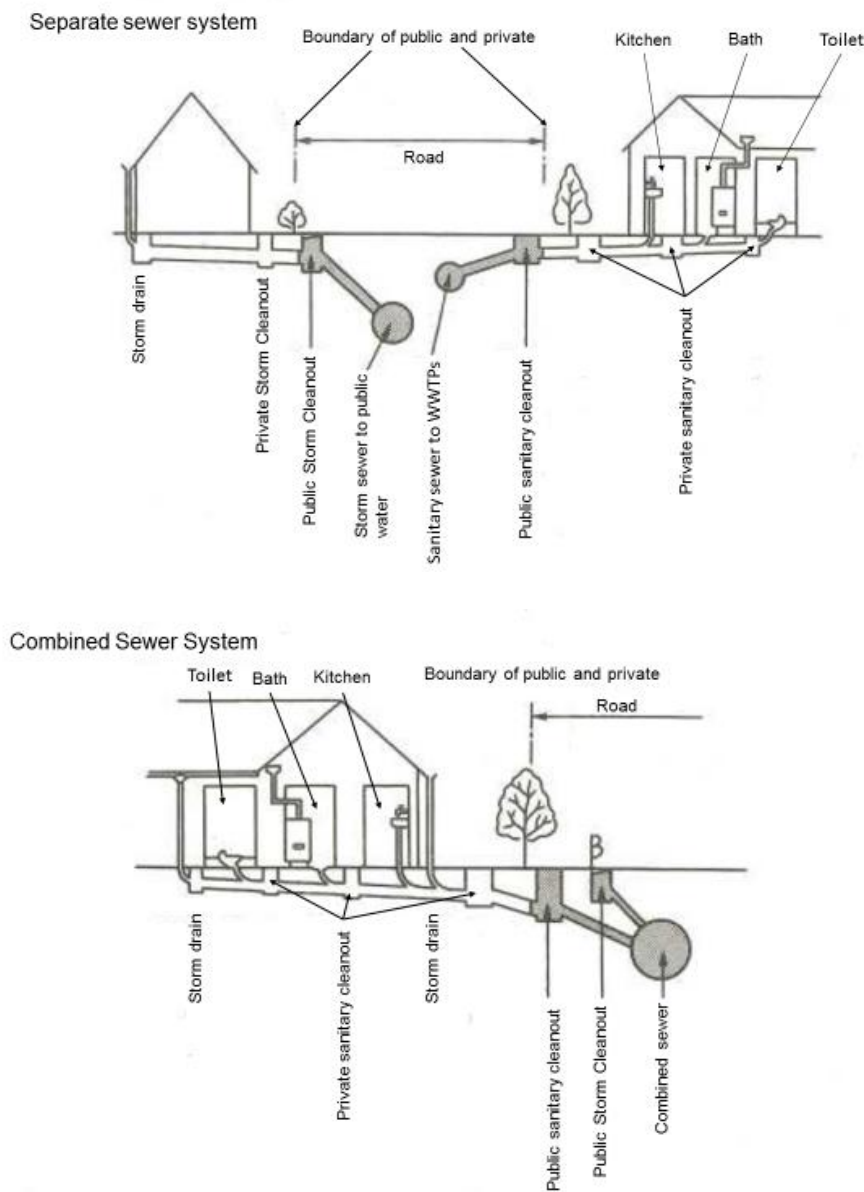
10.1.1 Where a land has a building, the building owner has the duty.

10.1.2 Where a land does not have a building, the land owner has the duty.

10.1.3 Where a land is public roads or used by other public authorities, the concerned authorities have the duty.

10.2 The repair & rehab of house or lateral sewers shall be made by those who shall install them. The cleaning and other maintenance work shall be conducted by the occupants of the land.

10.3 The installation work & structure of house or lateral sewers shall comply with Building Law & the Order of Sewerage Law.



**Figure 6 Connection to Sewer Main**

**Article 11.1: Mandatory Acceptance of Sewage from Other Property**

11.1.1. Those who shall connect sewage into public sewerage can use land and house sewers of others if necessary. In this case, minimum disturbance to the property of others shall be kept.

11.1.2 Those who use sewers of the others shall bear the cost of installation, rehabilitation, and repair in accordance with the benefits they receive.

11.1.3 Omitted

**Article 12.1: Installation of Pretreatment**

12.1.1 Municipal sewerage operator can stipulate in the local ordinance that those who discharge wastewater with the possibility of damaging sewerage system shall build a pretreatment system to prevent the damage in line with the standard of the order of sewerage law.

12.2.2 Omitted.

**Article 12.2: Permit of Public Sewerage Acceptance**

12.2.1 Designated industries shall meet the permit of public sewerage acceptance on discharge water quality, which is stipulated in the order, at the entry points to public sewer.

12.2.2 Omitted

12.2.3 Municipal sewerage operator can stipulate the permit of public sewerage acceptance on discharge water quality from designated industries in line with the order of sewerage law.

12.2.4-6 Omitted

**Table 2 Permit on Discharge to Public Sewer, Example, Tokyo Downtown**

Parameter	Unit	Permit Value	
Cd	mg/l	0.1 or under	
CN	mg/l	1 or under	
organophosphorus compound	mg/l	1 or under	
Pb	mg/l	0.1 or under	
Cr(VI)	mg/l	0.5 or under	
As	mg/l	0.1 or under	
Total Hg	mg/l	0.005 or under	
Alkyl Hg	mg/l	ND	
PCB	mg/l	0.003 or under	
trichloroethylene	mg/l	0.3 or under	
tetrachloroethylene	mg/l	0.1 or under	
dichloromethane	mg/l	0.2 or under	
tetrachloromethane	mg/l	0.02 or under	
1,2-dichloroethane	mg/l	0.04 or under	
1,1-dichloroethylene	mg/l	1 or under	
cis-1,2-dichloroethylene	mg/l	0.4 or under	
1,1,1-trichloroethane	mg/l	3 or under	
1,1,2-trichloroethane	mg/l	0.06 or under	
1,3-Dichloropropene	mg/l	0.02 or under	
thiuram	mg/l	0.06 or under	
Simazine	mg/l	0.03 or under	
Thiobencarb	mg/l	0.2 or under	
benzene	mg/l	0.1 or under	
selenium	mg/l	0.1 or under	
Boron when STP effluent to fresh waters	mg/l	10 or under	
Boron when STP effluent to sea	mg/l	230 or under	
fluorine when STP effluent to fresh waters	mg/l	8 or under	
fluorine when STP effluent to sea	mg/l	15 or under	
1,4-dioxane	mg/l	0.5 or under	
Dioxin	pg-TEQ/l	10 or under	
Total Cr	mg/l	2 or under	
Cu	mg/l	3 or under	
Zn	mg/l	2 or under	
phenols	mg/l	5 or under	
Soluble Fe	mg/l	10 or under	
soluble Mn	mg/l	10 or under	
Parameter	Unit	Permit Value	
Classification by Discharge Flow		50m3/d or over	Under 50m3/d
BOD	mg/l	below 600	NA
BOD for Manufactureing & Gas indutry	mg/l	below 300	NA
SS	mg/l	below 600	NA
SS for Manufactureing & Gas indutry	mg/l	below 300	NA
n-Hexane Extracts, mineral oil	mg/l	5 or under	NA
n-Hexane Extracts, animal & vegetable oil	mg/l	30 or under	NA
N	mg/l	below 120	NA
P	mg/l	below 16	NA
PH	NA	between 5 and 9	between 5 and 9
PH for Manufactureing & Gas indutry	NA	between 5.7 and 8.7	between 5.7 and 8.7
Temperature	Celsius	below 45	below 45
Temperature for Manufactureing & Gas indutry	Celsius	below 40	below 40
iodine demand	mg/l	below 220	below 220

**Article 12.3-12: Duties of Designated Industries**

Omitted.

(Note)

In the articles, the duties of designated industries are described; registration details, structure and process of pretreatment, order by municipal gov. for change of plan on pretreatment, emergency program, communication from municipal sewerage operator to prefecture sewerage operator, monitoring of discharge quality by industries.

**Article 13: Inspection of House Sewer, Designated Industries, and Pretreatment System**

13.1 Municipal sewerage operator can inspect house sewer, designated Industries, and pretreatment system while entering the properties in order to secure the function and structural integrity of sewerage and to keep the effluent of WWTP meet the permit.

13.2-3 Omitted

**Article 14: Suspension of Sewer Use**

14.1 Municipal sewerage operator can temporarily suspend the use of sewerage partially or entirely when necessary for the works on sewerage.

14.2 Municipal sewerage operator has to notify the affected persons of the timing and area on the suspension of sewerage service.

**Article 15: Sewerage Works by Other Public Authority**

Municipal sewerage operator can allow other public authorities to implement construction works of sewerage when the sewerage is under the public facilities such as roads, levees and others upon the agreement of the both authorities.

Article 16 to 17 are related to article 15.

Translation omitted.

**Article 18.1: Compensation for Damage**

Municipal sewerage operator can request the person or body who inflicted damage on sewerage for compensation.

Article 18.2 & 19 are related to Article 18.1.

Translation omitted.

**Article 20: Tariff**

20.1 Municipal sewerage operator can charge tariff on service users by stipulation in local ordinance.

20.2 Tariff shall be calculated by considering the followings

20.2.1 Quality and quantity of sewage

20.2.2 Tariff revenue shall be smaller than the cost of sewerage service.

20.2.3 Clarity with fixed charge and proportional charge to usage

20.2.4 Equity to all

20.3 Omitted.

**Article 21.1: Monitoring of effluent of WWTP**

21.1.1 Municipal sewerage operator shall monitor effluent quality from WWTPs and keep the records as prescribed in the order of sewerage law.

21.1.2 Omitted.

**Article 22: Qualification of Designer, Supervisor, and Operator**

22.1 Municipal sewerage operator shall task design & supervision of works to those who have qualifications stipulated in the order.

22.1 Municipal sewerage operator shall task operation and maintenance works to those who have qualifications stipulated in the order.

**Article 23: Sewerage Information Database**

23.1 Municipal sewerage operator shall create asset information database.

23.2 The contents of database shall be decided by the ordinance

23.3 Municipal sewerage operator shall show the database to persons if requested.

**Article 24: Prohibited Action to Sewerage**

24.1. Those who conduct the following actions shall obtain the permission of municipal sewerage operators.

24.1.1 To build structures on the open channels of sewerage

24.1.2 To build structures below the open channels of sewerage

24.1.3 To build structures on the underground sewers

24.2 Omitted

24.3 Omitted

**Article 25.1: Local Ordinance**

Municipal sewerage operator shall stipulate the necessary rules for the sewerage service operation other than the prescriptions in the sewerage law and related order.

**Article 25.2-9: Prefecture Sewerage**

These articles are about prefecture sewerage operator in article 25.2, implementation program in article 25.3, things to be decided in implementation program in article 25.4, requirements of implementation program in article 25.5, notice of commencement of service to municipal sewerage operators in article 25.6, suspension of sewer use in article 25.7, and prohibited action to sewerage in article 25.9. The descriptions of each article are quite similar to the articles for municipal sewerage from articles 3, 4, 5, 6, 9, 14, & 24 with minor differences. The article 25.8 is quite different as follows.

25.8 Request on investigation to municipal sewerage operators

25.8.1 Prefecture sewerage operator can request municipal sewerage operators who connects to the prefecture sewerage to find out the reasons with a deadline when there arise the possibility of harming the function and structural integrity of sewerage and violating the permit on effluent from WWTP.

25.8.2 Omitted.

**Article 25.10: Application of Articles of Municipal Sewerage for Prefecture Sewerage**

25.10.1 The articles 7, 8, 11.2, 12 to 12.9, 12.11 to 13, 15 to 18.2, 21 to 23, & 25 shall be applied to prefecture sewerage.

25.10.2 Omitted

**Article 26-31.1: Municipal Drainage Channel**

Municipal drainage channel has been built for flood control separately from sanitary/combined sewer system. In many cases, it has been built away from the downtown where sewer system installation was prioritized. The article 26 is about operator, similar to article 3. The article 29 is about prohibited action to channel, similar to article 24.

**Article 27: Designation**

27.1 Municipal drainage channel operator shall designate the area with the drainage channels in public notice and shall ensure public access to the plans and sections in the offices of municipal governments.

27.2 Omitted

**Article 28: Operation & Maintenance**

28.1 Municipal drainage channel operator shall operate and maintain the channel so that it works effectively.

28.2 Omitted

**Article 30: discharging to municipal drainage channel**

30.1. The industries and other facilities that wish to discharge to municipal drainage with the quality and quantity above the levels stipulated in the order shall comply to the technical requirements in the order.

30.2 Omitted

**Article 31: Application of Articles of Municipal Sewerage for Municipal Drainage Channel**

The articles 15 to 18, 23, & 25 shall be applied to municipal drainage channel.

**Article 31.2 to 44: Miscellaneous**

31.2 Cost sharing on prefecture sewerage between municipal and prefecture governments. 32 Right to use of land of others by operators if necessary. 33 Permission with conditions in the law. 34 Subsidy from national government. 35 Loan from national government. 36 Free use of national land for sewerage. 37 Emergency order from national government to operators. 37.2 Order from operators to designated industries on suspension of sewer use for their continuous discharge over the permit. 38 Cancellation of permission by operators on violation of the law, order, & ordinance. 39 National government's right to obtain report from operators. 39.2 Operators' right to obtain report from designated industries. 40-42 omitted. 43 Dispute handling time limit on decision by operators

**Article 45-51: Penalty**

Imprisonment or fine is charged on those who inflicted the damage on structure and function of sewerage, who violated the order of operators in 12.5, 37.2, 38.1-2, who violated the quality permit of public sewerage acceptance in 12.2, 12.9, who refused the use of land in article 32, who neglected or falsified the registration in 12.3, who violated the conversion of cesspool in 11.3, who neglected or falsified the mandate in 11.2, 12.3, 12.6, 12.12, 13.1, 39.2, 12.7, 12.8

End