

# **The Effect of On-site Inspection and Effluent Quality Examination in Fukuoka Prefecture**

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## **Abstract**

In Fukuoka Prefecture, as a measure to reduce pollutant in public water areas, on-site inspection of effluents discharged from industries is carried out and administrative guidance is performed based on the results of the inspection.

As a result of having continued the guidance based on the on-site inspection, the number of case exceeding the effluent standard and the guideline has been decreased significantly, and therefore recently the prefecture seldom performs the orders to improve and suspends discharge of effluent.

## **Introduction**

In order to comply with the environmental standard for quality of public water areas, the reduction of the pollutant discharged to public water areas is essential. It is one of the most important measures to control the effluent discharged from factories and establishments to public water areas.

Water Pollution Control Law (In the following, it is called "the law.") regulates a standard of effluent quality from factories and establishments with facilities which discharge polluted water and wastewater into public waters areas. The Law defines them as "specified facilities".

Fukuoka prefecture establishes stricter effluent standard under an ordinance for the factories and establishments in the prefecture than the national standard, in order to enhance the effluent control of pollutants from them.

Since the items related to living environment in the effluent standard regulated by the law and the ordinance are not applied to the small-scale specified facilities which discharge the effluent below 50m<sup>3</sup> per day on average, Fukuoka prefecture establishes "Fukuoka small-scale commercial facilities effluent water quality improvement guidelines" as the guidance standard for the Fukuoka demarcation area.

In order to monitor the status of the compliance with the effluent standard, the Fukuoka Prefecture examines the water quality of effluent discharged from the specified facilities in Fukuoka demarcation area by the on-site inspection. In case that the result of effluent quality examination shows the sample does not meet the standard or the guideline, the Fukuoka Prefecture conducts the improvement guidance and other administration advices for the facilities.

This report summarizes the system of the on-site inspection and effluent examination but also the actual situation of guidance to the specified facilities which does not comply with standard or guideline as the result of effluent examination in the Fukuoka demarcation area.

### **Target of on-site inspection**

Fukuoka Prefecture prepares an annual plan of on-site inspection. Based on the plan, the inspection is carried out ordinary more than one time by a year for the specified facilities which discharge a toxic substance or the effluent over 50m<sup>3</sup> per day on average or more. Other specified facilities are inspected considering the status of a claim or other condition

In consideration of usage material and pollutants to be included an effluent at each facility, the effluent quality examination items are selected among the items regulated the effluent standard or the guide line. The effluent sample is brought to the analysis office.

### **The on-site inspection method**

The on-site inspection and extraction of effluent are carried out by two or more personnel in the presence of the staff of inspected factory, in principle without any notification.

Simple water quality tests of the extracted drainage using indicator paper or pack-test are conducted at the site. Moreover, the following items are investigated;

- (1) Past record of operation and maintenance of effluent treatment facilities
- (2) Result of voluntary effluent water examination
- (3) Color and turbidity of effluent
- (4) Usage situation of chemical substances
- (5) Difference of actual situation from notified design, numbers and treatment method of the facility based on the law

In case that the water quality level of the investigated effluent is suspected to exceed the value of the effluent standard from the results of these investigations and the simple test, the factory or establishment is advised to address the issues promptly even before the result of effluent examination is released.

### **Guidance and order to the facility exceeding the standard**

When the effluent water quality level exceeds the value of the standard or guideline as a result of an effluent examination, the prefecture conducts again on-site inspection immediately to confirm the result of the first investigation. At the same time, the responsible person of the facility is to be interviewed on the reason of its excess and the improvement plan

Administrative actions to the facility which does not comply with standard or guideline are classified into four levels based on the reason of excesses, improvement plan, excesses item and the past excesses situation and other issues.

Table 1 shows example condition of administrative action level. Actions of Level A and B are called administrative guidance which can be realized by only arbitrary cooperation of an opposite party. On the other hand, ones of Level C and D are called administrative order. Punishment will be applied if one dose not follow the order. In addition, the effluent inspection results are notified to the facilities which meet the standard.

Table 1. Example conditions of administrative action.

Level	Based on	Type	Example of conditions
Level A	Guideline	administrative guidance	-
Level B	Ordinance (Standard)		In the case that improvement has been completed or will be completed immediately
Level C		administrative order	The serious violation or in the case that the establishment does not follow the administrative guidance on Level B.
Level D			In the case that needs to stop an institution and needs to improve on living environment preservation.

The factory discharging exceeded effluent is advised by the prefecture to improve the facility and prepare its improvement plan. Moreover, the establishment which does not follow the administrative advice is to be imposed stiff penalty such as upgrading of effluent treatment facility within a definite period of time or a temporary stop of the discharge of effluent.

In case that the exceeded effluent is due to temporary accident, its improvement is comparatively completed within a short period by replacing or repairing the fault parts. When the capability of effluent treatment plant is not enough, it takes a long time to improve its treatment capacity because its redesign and reconstruction are required. Until the improvement is completed, not only emergent measures should be arranged but also the implementation of countermeasure is monitored by on-site inspection and the result of voluntary effluent quality examination. The specified facilities of which the effluent has already exceeded the standard in the past, the on-site inspection without effluent examination as well as the supervision and advice of effluent discharge improvement are carried out several times per year.

#### **The result of the inspection of the 2006 fiscal year**

The number of specified facilities is 5350 at the end of the 2006 fiscal year in Fukuoka prefecture jurisdiction area. Among the specified facilities, 855 factories are applied to the effluent standard. The total number of effluent quality examination in the 2006 fiscal year is 658 times. The result of the test shows that 31 and 29 facilities did not comply with the standard and the guideline, respectively.

Table 2 shows the number of cases that exceeds the standard classified by both administrative action level and pollutant at the 2006 fiscal year. Most of the exceeded pollutants are the items related to living environment. Especially, the number of cases of hydrogen-ion activity (pH) and biochemical oxygen demand (BOD) or chemical oxygen demand (COD) is significantly large.

Table 2. The number of excess cases at the 2006 fiscal year.

Level	pH	BOD or COD	SS	n-Hex	phosphorus	F	total
A	23	5	2	3	-	-	29
B	20	6	4	-	2	1	30
C	-	1	-	-	-	-	1
D	-	-	-	-	-	-	0
Total	43	12	6	3	2	1	60

\* SS : suspended solids, \* n-Hex : n-hexane extracts, \* F : Fluorine and its compounds

The main reason that pH level of effluent exceeds the standard is over-aeration of a septic tank. Over-aeration can be generated by the following conditions. If influx amount of waste water is much less than the planning one in the effluent treatment facility with microorganism treatment system, influx of air to a reaction tank becomes excessive and then nitrification of nitrogen takes place. As the result of these reactions, pH level is fallen.

Over-aeration can be easily improved by intermittent air supply to the reaction tank. However, if the volume of supplied air is decreased, BOD or other items level in the tank is to be increased because of inadequate microorganism treatment.

Excesses of BOD and COD are caused by lack of ability of effluent treatment facilities, under the following example conditions.

- (1) Change of manufacturing process or the increase in the amount of production.
- (2) Trouble of effluent treatment facility.

### Effect of on-site inspection

On-site inspection and administrative action as the result of the inspection have been implemented since 1971 when the law was enforced. Figure 1 shows the trend of the number of specified facilities and the ratio of the annual effluent quality examination number to total number of the specified facilities. According to Figure 1, the number of specified facilities was rapidly increased between 1971 and 1976, because new type of facilities such as hotel and other business were added to the specified facilities due to the legal revision. Then, the number of specified facilities has been constant since 1976. The ratios of the number of specified facilities which comply with the effluent standard and the annual effluent inspection number to the total number of specified facilities are 11% and 15%, respectively.

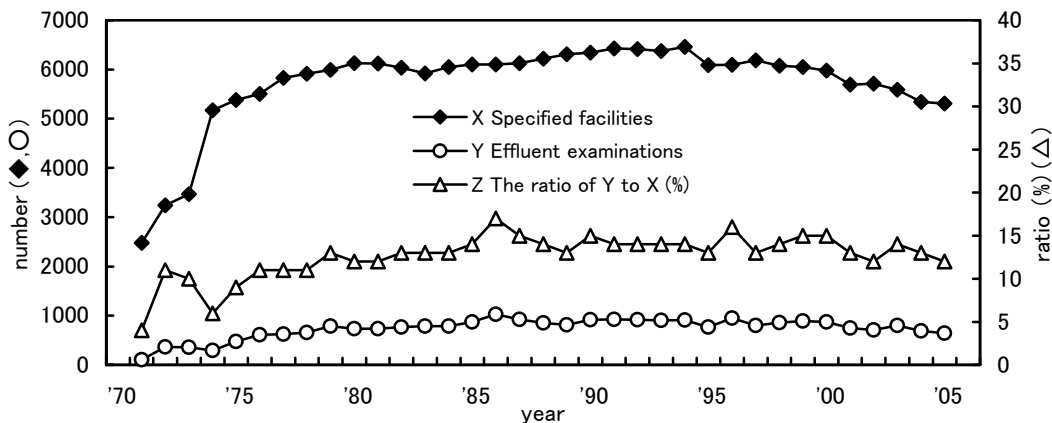


Figure 1. The trend of number of specified commercial facilities and effluent inspection.

Figure 2 shows the trend of ratio of the number of administrative action to the effluent quality examination "Action rate". From the Figure 2, the Action ratio is stable at 10% or less in recent years, although it was 30 to 50% in the 1970s. As a result of having continued administrative action on the upgrading of the effluent treatment facilities and proper control of maintenance to each facility, it is considered that water quality of discharged effluent is improved, and therefore, the number of effluent samples which do not meet the standard is decreased.

Figure 3 illustrates the trend of the number of administrative order. According to Figure 3, the number of administrative order is stable from none to 2 cases per year in recent years, although it was 40-50 cases per year during 1970s. Administrative order is performed when a factory does not follow the improvement advice or commit a serious violation. Therefore, it is assumed that the number of administrative order is decreased, because the factory addresses promptly the issues on effluent quality based on the administrative improvement advice.

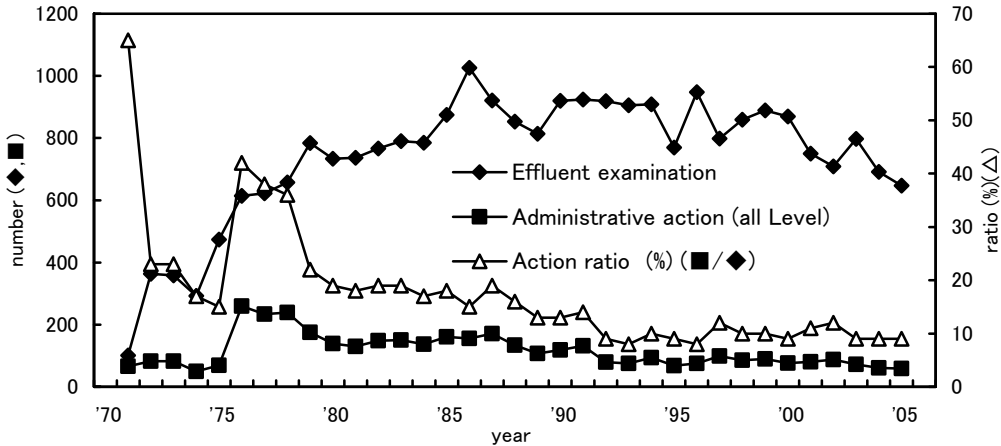


Figure 2. The trend of the number of effluent examination and administrative action  
 Note: The number of case Level B in 1971 is unknown. 1974 and 1975, since the number of coaching is unknown, the number of excess the effluent standard was made into number of administrative action.

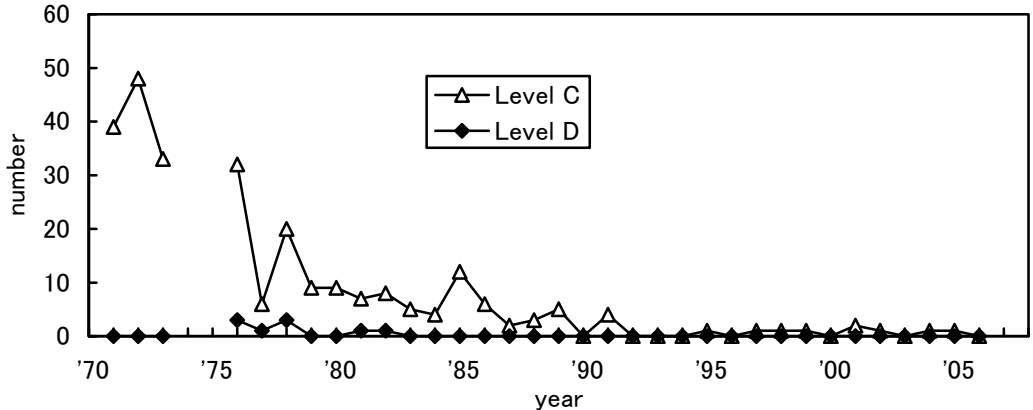


Figure 3. The trend of administrative order. Note: 1975 and 1974, the number of administrative order is unknown.

## **Conclusions**

In Fukuoka prefecture, the on-site inspection of specified facilities has been performed since the law was enforced (1971). Administrative order is hardly implemented in recent years.

On-site inspection not only can control the effluent exceeding the standard and guideline from the following reasons, but also becomes effective in reduction of public water pollution.

- (1) Once the factory does not comply with the effluent standard and guideline, it should continue to receive the administrative guidance until its improvement will be completed.
- (2) Educational activities on effluent treatment is performed for the factory at the on-site investigation.