DIOXIN COUNTERMEASURE AND DIOXIN EMISSION FROM SMALL INCINERATION PLANTS

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Introduction

Great concern has been aroused in Japan about dioxin emissions from municipal solid waste incineration. Committees to study measures against dioxins were organized by the Ministry of Health and Welfare, the Environment Agency, etc. to carry out a national dioxin control program.

The Ministry of Health and Welfare introduced stricter design and maintenance/management criteria for waste incinerator to reduce dioxin emission. (all these went into effect on Dec.1, 1997). The basic functions demanded for incineration plants in Japan are control of the generation of dioxins by complete combustion of waste, prevention of the re-formation of dioxins by quick cooling the flue gas and reduction of the dioxin concentration in that gas through advanced gas treatment system. The dioxin emission should be reduced by fully meeting these requirements.

Initially, technical measures and dioxin concentration control were carried out for municipal solid waste incinerators, and especially relatively large incinerators. Later 11,556 facilities with an incinerator capacity for processing 200kg/h or more came under the Environment Agency's control under the Air Pollution Control Law. A new dioxin emission control criteria prescribe that the existing incineration plants are required to limit the dioxin concentration in flue gas to less than 80ng-TEQ/Nm^3 by Dec.1, 1998. The dioxin emission standard applicable to a new incinerator with the capacity of 4t/h or more is 0.1ng-TEQ/Nm^3.

On the other hands, facilities with less than 200kg/h were not subject to control. These facilities are used in many business enterprises' and hospitals' own incinerators and in many incinerators operated by industrial waste management companies. Although small in scale, these facilities are large in number probably more than 80,000 and are not considered negligible as a source of dioxins.

This study is to survey the correlation between the dioxin emission and the related factors including waste type, facilities design, and combustion condition for facilities with a throughput

capacity of less than 200kg/h.

Outline of Facilities Under Study

Fifty-one facilities with a throughput capacity less than 200kg/h were investigated for this study as shown in Table 1. Most of the facilities are relatively new facilities set up in the past 10 years. One facility, however, was set up 20 years ago. Half of the facilities are capable of processing 100kg/h or more. Paper and wood are major components of the waste incinerated. The flue gas control system installed is, in many instances, a cyclone scrubber.

Table 1 Facilities selected in this study.

Category	No. of plants
Business enterprises' own incinerator	21
Hospitals' own incinerator	18
Incinerator operated by waste management company	11
Incinerator for municipal waste	1
Total	51

Results and Discussion

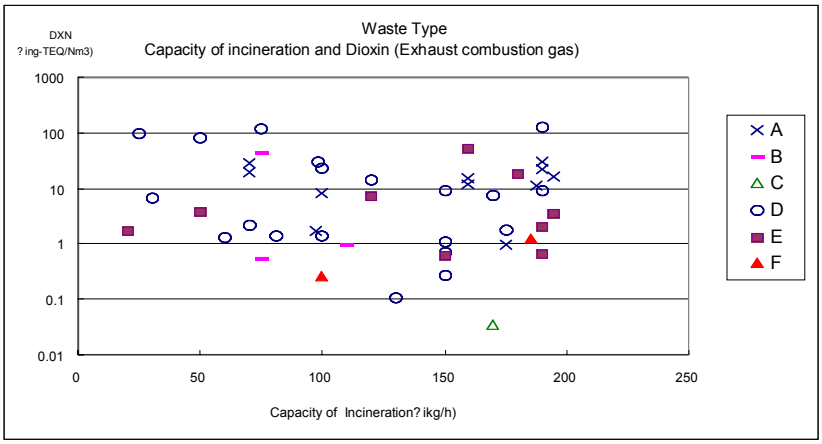
The correlation between the dioxin level and the capacity, furnace design and combustion conditions of the facility was analyzed to understand the dioxin emission from small scale incinerator. Dioxin level is presented by type of waste burnt in Fig.1. It can be seen from this figure that the dioxin concentration is remarkably high at facilities burning plastics-containing waste. The emission data are presented by sources in Fig.2. As can be seen there, the dioxin concentration is relatively high at hospital incinerators.

The combustion temperature is generally low at small incineration plants than at larger plants, and many of the small incineration plants lack for flue gas processing equipment. But it was shown that the dioxin distribution at small incineration plants is virtually the same as that at larger plants.

The government's design and maintenance/management criteria for waste incinerator, however, are not applicable to the small incineration plants covered by this survey. It will be essential to prepare a documented guide from the standpoint of proper waste disposal on the basis of the survey results and give the necessary directions to the small incineration plants.

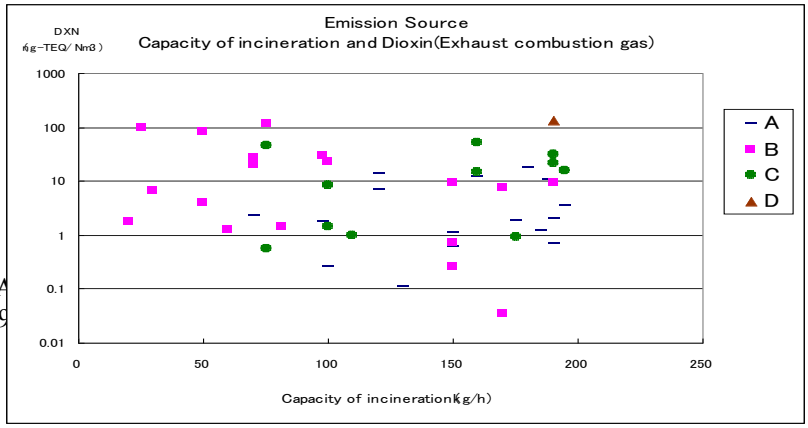
Expansion of the incinerator capacity (to 100t/d or more) is required in Japan for a purpose of a

dioxin control. But waste enough to justify such a large incineration plant is not discharged in some areas in Japan, and a small plant may be still necessary in such areas. Further study should be made in respect of the design, maintenance/management, etc. of small incineration plants in those areas.



A, One item of paper, wood, cloth, food or the like.
(Plastics are not included.)
B, Waste oil
C, Two or more kinds of waste item including plastics.
D: Two or more kinds of waste item not including plastics.
E: Two or more kinds of waste item not including plastics but including waste oil.
F: Two or more kinds of waste item not including plastics but including waste oil.

Fig.1 Dioxin Emission by Waste Type.



ORGANOHA
Vol. 41 (1999

A; Business enterprises' own incinerator
B; Hospitals' own incinerator
C; Incinerator operated by waste management company
D; Incinerator for municipal waste

Fig.2 Dioxin Emission by Source

Acknowledgements

This study is a part of a project entitled “Dioxin Control Study for Small Scale Incinerators” conducted using FY1998’s Supplementary Budget allotted to the Ministry of Health and Welfare. Authors wish to express our sincere appreciation to the facilities which cooperated with us in the survey and Ms. Shinobu Kan of the Pacific Consultants Co., Ltd. for a preparation of this manuscript.

References

Masaru Tanaka: Proceedings of the 18th Symposium on Halogenated Environmental Organic Pollutants (Dioxin 98), Stockholm, Sweden, Aug. 17-21, 1998.