CONTINUOUS MONITORING OF DIOXIN EMISSIONS FROM A WASTE WOOD COMBUSTION PLANT

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Introduction

The continuous monitoring of dioxin emissions from incineration plants has been discussed for several years. By means of long-term sampling ranging from 6 hours to 30 days, the AMESA system enables to ensure continuous documentation of PCDD/F emissions during the whole operating time of relevant sources[1]. Fluctuations in the system‘s operation, fuel composition etc. are completely recorded.[2]

Today more than 50 installations with continuous dioxin emission monitoring make a lot of detailed information available. Since in Flanders, domestic waste incineration plants are obliged by law to perform continuous PCDD/F samplings, a complete network of AMESA systems was built up in Belgium in 1999[3, 4]. In 2000 several incineration plants in France, Great Britain, Germany and Sweden were equipped with AMESA as well.

Dioxin emissions from wood combustion plants have already been scrutinised. Especially the combustion of treated (above all with halogenous organic chemicals), varnished or PVC-coated wood can entail high PCDD/F emissions. In Germany, bigger waste wood combustion plants have to keep the same dioxin emissions limit values as all municipal waste incineration plants [5, 6].

This paper describes the long-term sampling for PCDD/Fs in the stack gas of a waste wood combustion plant in Germany during the first three months following the start up of the plant.

To realize a high time resolution and keep the costs for analyses still low, a combination of weekly samplings with analyses of monthly mixed samples was chosen here.

Methods and Materials

In case of the examined waste wood combustion plant, treated wooden residues and packaging material from a furniture and chip board production plant were incinerated. A circulating fluidized-bed combustion is used which presents numerous process-determined advantages such as a good intermixture and thus a good burn-out. Moreover, an effective flue-gas cleaning contributes to low emissions (see Figure1).

From April 2001 to June 2001 a total of 12 long-term samples, each lasting about one week, were taken. Three monthly mixed samples were prepared from four weekly samples each and analysed for PCDD/F. To prove the reliability of sample mixing, analyses of the weekly samples were performed in addition for this study.

All PCDD/F analyses were performed by GfA with respect to VDI guideline 3499, part 3, and EN 1948 by use of HRGC/HRMS (HP 5890A/VG AutoSpec).

Results and Discussion

The results of the PCDD/F analyses of all weekly and monthly mixed samples are shown in Table 1 and Figure 2.

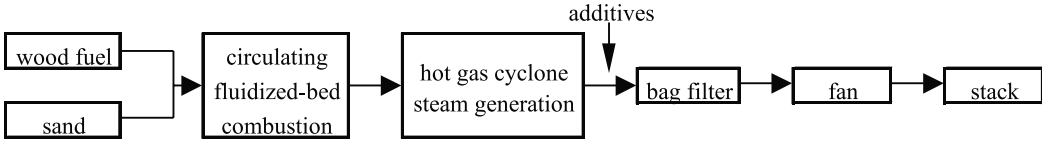

Figure 1. Description of the firing and flue gas cleaning of the waste wood combustion plant.

Table 1. PCDD/F concentrations in the stack gas of the waste wood combustion plant; ng I-TEQ/m^3 refers to 0 °C, 101.3 kPa, dry, related to 11 % O_2

		Cycle A (April 2001)	Cycle B (May 2001)	Cycle C (June 2001)
weekly sample [ng I-TEQ/m^3]	1	0.073	0.046	0.103
	2	0.092	0.050	0.034
	3	0.071	0.038	0.013
	4	0.151	0.073	0.003
mean value of weekly samples [ng I-TEQ/m^3]*	1 - 4	0.100	0.052	0.039
monthly mixed sample [ng I-TEQ/m^3]		0.094	0.051	0.043

* weekly values weighted according to the respective sampling volume

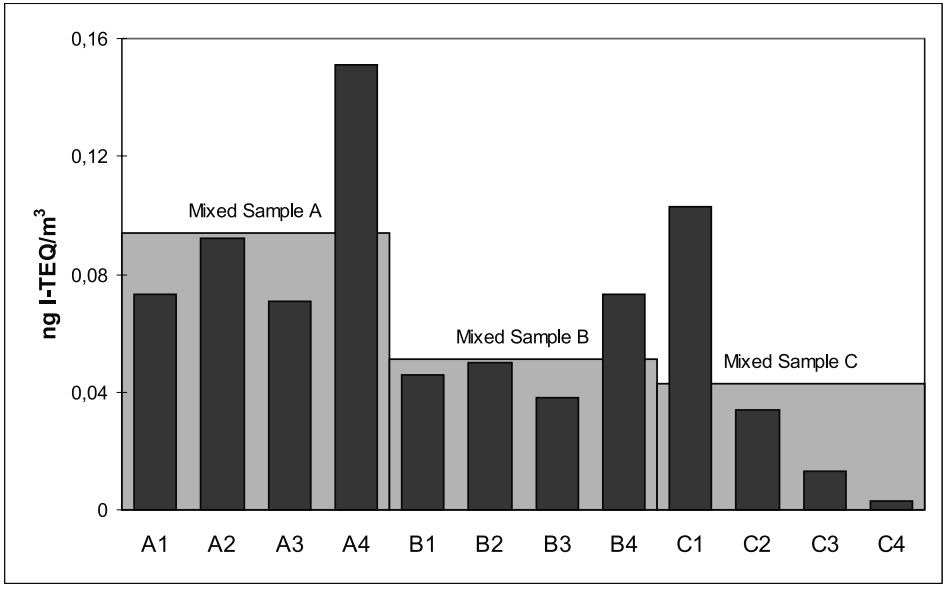

Figure 2. PCDD/F concentrations in weekly (1-4) and monthly mixed (A-C) samples from the waste wood combustion plant; ng I-TEQ/m^3 refer to 0 °C, 101.3 kPa, dry, related to 11 % O_2.

The emissions values of the weekly samples range from 0.0031 to 0.151 ng I-TEQ/m^3 and the values of the monthly samples range from 0.043 to 0.099 ng I-TEQ/m^3.

As can be seen from Table 1, the correspondence between the mean value calculated from the weekly samples and the analyzed monthly mixed samples is quite good even in case of cycle C were the four weekly values range from 0.003 to 0.1 ng I-TEQ. These data show that weekly sampling in combination with analysis of monthly mixed samples is a reliable method for continuous monitoring of PCDD/F emissions.

In routine monitoring the restriction of analyses to the monthly mixed samples allows to keep costs low without renunciation of a higher time resolution. In case of striking emission values or emission limits being exceeded in the monthly mixed samples, one has the option to analyze the weekly samples as well and thus possibly relate periods of higher dioxin emissions to a certain operation status, special feeding etc.

References

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