

## PCDD/F-Immission Measurements in different distances from a emission source

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### 1. Introduction

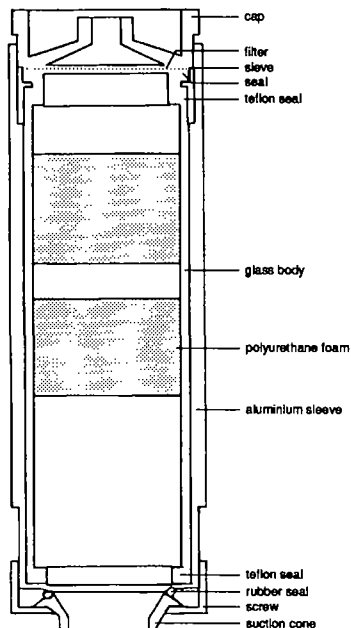
During the last years intensive investigations for PCDD/F in exhaust gas, waste, soil and biological samples were carried out in the bavarian area<sup>1)</sup>. Simultaneously in the years 1992 and 1993 a measurement program of ambient air was made, determining the PCDD/F-concentrations on places of different pollution characteristic (rural regions, urbane and industrial areas)<sup>2)</sup>. In Germany the emission limit for PCDD/F-concentrations of municipal waste incineration plants (MWI) was determined to 0.1 ng I-TE/Nm<sup>3</sup>. The emissions of these plants can be lowered considerably e.g. by installation of carbon filters. At the MWI Schwandorf the emission concentrations were 0.001 to 0.01 ng I-TE/Nm<sup>3</sup><sup>3)</sup>. For this reason and the fact, that PCDD/F-emissions of house heating are known, air pollution measurements were carried out at different distances of the supposed main emission source (MWI Schwandorf).

### 2. Experimental

location		
1	distance 1.3 km	east form the MWI
2	distance 2.0 km	north-east from the MWI
3	distance 3.3 km	north-north-east from the MWI

#### Sampling

The air sampling was carried out using GS 050 low volume samples according to the VDI guide line 2463 part 7<sup>5)</sup> and the guide line 3498 page 1 (draft)<sup>6)</sup> (see fig. 1).



*Fig. 1: Sampling System*

The sample volume stream was adjusted to  $1.4 \text{ m}^3/\text{h}$ . Sampling time was about 30 days.

The air was sucked through two cylindrical polyurethane foam-pieces (diameter 50 mm, length 50 mm). Gaseous PCDD/F and parts of particles were collected on this foam. A glassfibre filter (Type nr. 8 Schleicher and Schüll) was used as a back up filter. Different to the VDI guideline 3498 part 1 (draft) the glassfibre filter was placed behind the polyurethane foam. The advantage of this design was that in winter the water steam would not freeze on the filter stopping the sampling. In spite of this change the recovery was similar to that of the normal sampling systems. Before starting the sampling the first polyurethane foam piece was spiked with  $1,2,3,4\text{-}^{13}\text{C}_{12}\text{-TCDD}$ .

#### Clean up

The glass fibre filter and the polyurethane foams were extracted with toluene for 20 h in a soxhlet apparatus after addition of an internal standard mixture. The further clean up was done in the same way described by Hagenmaier et al<sup>7)</sup>.

# ENVI (po)

## GC/MS analysis

All 17 2,3,7,8-PCDD/F-isomers were analyzed and quantified. The GC/MS-Conditions were summarized in Table 1.

gaschromatograph:	HP 5890, KAS 3 Injector
column:	SP2331 60 m x 0.32 mm i.d. 0,25 $\mu$ m film thickness
carrier gas:	Helium
injection volume:	5 - 10 $\mu$ l in toluene
temperature programm:	100°C, 4 min. isothermal 20°C/min to 180°C 5°C/min to 250°C 30 min isothermal
transfer line temperature:	250°C
mass spectrometer	VG Autospec EI resolution 6000 multiple ion monitoring

### 3. Results

Figure 2 show the results of the air pollution measurements.

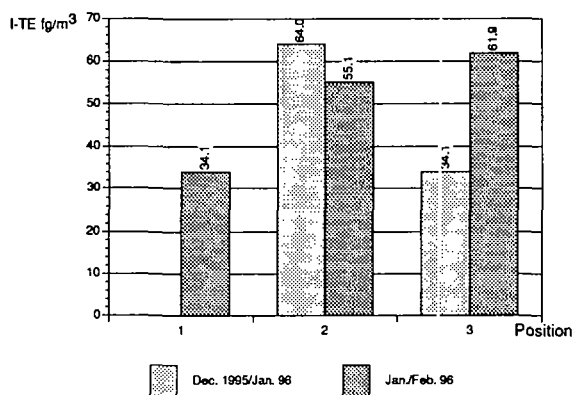


Fig. 2: PCDD/F-concentrations of the air pollution measurements.

## 4. Discussion

The results in figure 2 show, that the PCDD/F immission-concentrations at locations with different distances (1.3 km, 2 km and 3.3 km) are quite similar. Small differences could be interpreted by faults during the sampling collections and the clean up procedures. These nearly constant concentrations leads to the conclusion, that this concentrations are typical background concentrations typical in this city. An influence of the waste incineration plant is not evident. From the literature it is known, that burning of waste in house heating systems emit up to 2 763 pg I-TE/m<sup>3</sup> 4), burning of wrapping waste up to 312 pg I-TE/m<sup>3</sup> and burning of newspapers, cartons etc. up to 98 pg I-TE/m<sup>3</sup>.

Compared to other locations these data are in the lower range of urban pollution<sup>9</sup>.

These investigation show too, that house burning emissions may play a more important part in the pollution of the ambient air with PCDD/F.

## 5. Literature

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- 3) **Frede, M.:** Einsatz eines Oxidationskatalysators zur simultanen Stickoxid- und Dioxinminderung im Müllkraftwerk Schwandorf, Bericht aus dem Bayerischen Landesamt für Umweltschutz, Schriftenreihe H. 131, S. 82
- 4) **Bröker, G., Geueke, K.-J., Hiester, E., Niesenhaus, H.:** FIS-Berichte Nr. 103
- 5) **VDI-Handbuch** Reinhaltung der Luft, Band 4, Richtlinie VDI 2463 Blatt 7: Messen von Partikeln - Messen der Massenkonzentrationen (Immission) Filterverfahren - Kleinfiltergerät GS 050. Beuth Verlag, Berlin, Kohn 8.1992
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- 7) **Hagenmaier, H., Brunner, H. Haag, R., Kunzendorf H.-J., Kraft, M., Tichaczek, K., Weberruß, U.;** VDI-Berichte 634, S. 61 (1987)
- 8) **Launhardt, T., Strehler, A., Thoma, H., Vierle, O.,** 26th International Symposium On Environmental Analytical Chemistry, Vienna 1996
- 9) **Fiedler, H.;** Organohalogen Compounds 22 (1995),7