

Research Programm on Dioxin/Furan Concentration in Chimney Soot from House Heating Systems in the Bavarian Area

Dumler-Gradl R., Thoma H., Vierle O.

Bayerisches Landesamt für Umweltschutz (Bavarian Department of Environmental Protection) D-81 925 München, Postfach 810129, Germany

1. Introduction

Since the introduction of the 17. BImSchV (17th Decree to the German Immission-Law) the PCDD/F-emission of heating system was limited to 0.1 ng I-TE/Nm³. This leach to a decrease of the dioxin-amount from 313 g I-TE/year to 5 g I-TE/year.

This means that other not limited thermal processes, like emissions from house heating systems with solid burning materials, could grow up to an important and until not controllable dioxin source. First indications for the possible great importance in relation to the dioxin-load of the environment were known about the investigations of Thoma¹⁾, Dumler²⁾, Bröker³⁾ and Marutzky⁴⁾.

About the percentual part of house burning to the dioxin distribution in the environment there are no protected data available. Although no wide spread investigations were carried out. Therefore the Bavarian Department of Environmental Protection wants to investigate in first researches the amount of dioxins in the chimney soot of house heatings in the Bavarian area.

2. Experimental

In cooperation with the TÜV Bayern-Sachsen e.V. and the chimney sweeps chimney soot samples were taken in the cities and rural communes from the seven administrative districts during the regular sweeping times.

The soot samples were collected in brown glass flasks and send to the Bayerisches Landesamt für Umweltschutz.

The sample clean-up was carried out with the method reported by Hagenmaier et al⁵⁾.

GC/MS-conditions:

The analysis of the cleaned up samples were performed using a high resolution mass-spectrometer VG Autospec in the SIM mode and 60 m fused silica SP 2331 column.

SOU

3. Results

The following samples were analyzed:

- chimney soot from wood burning ovens (category I, sample number 33)
- chimney soot from wood burning tiled stoves (category II, sample number 39)
- chimney soot from wood burning heating systems (category III, sample number 9)
- chimney soot from wood/coal burning ovens (category IV, sample number 27)
- chimney soot from wood/coal burning tiled stoves (category V, sample number 5)
- chimney soot from wood, wood/coal and waste burning ovens (category VI, sample number 5)

Figure 1 shows the PCDD/F-concentrations in chimney soot dependent on burning material and oven type.

4. Discussion

Based on the received results the following statements can be made:

- the PCDD/F-concentrations in chimney soot from wood burning tiled stoves, ovens, wood/coal burning ovens and wood burning heating systems are similar
- lower PCDD/F-concentrations were detected in wood/coal burning tiled stoves and waste burning ovens
- in the declaration of fuel only licensed fuel were declared beside the category VI. The result was that there was no direct correlation between waste burning and the high PCDD/F-concentrations. However the result were representative to the Bavarian area.
- this study, which contains firstly a wide spread sampling, shows, that the investigated concentrations were in the similar range like the results published by Thoma et al. 1987¹⁾.
- the calculation made by the German health institute⁶⁾ in 1987 were performed by this report. Therefore in the future it is necessary to carry out wide spread emission investigations and studies to reduce the house burning PCDD/F formation.

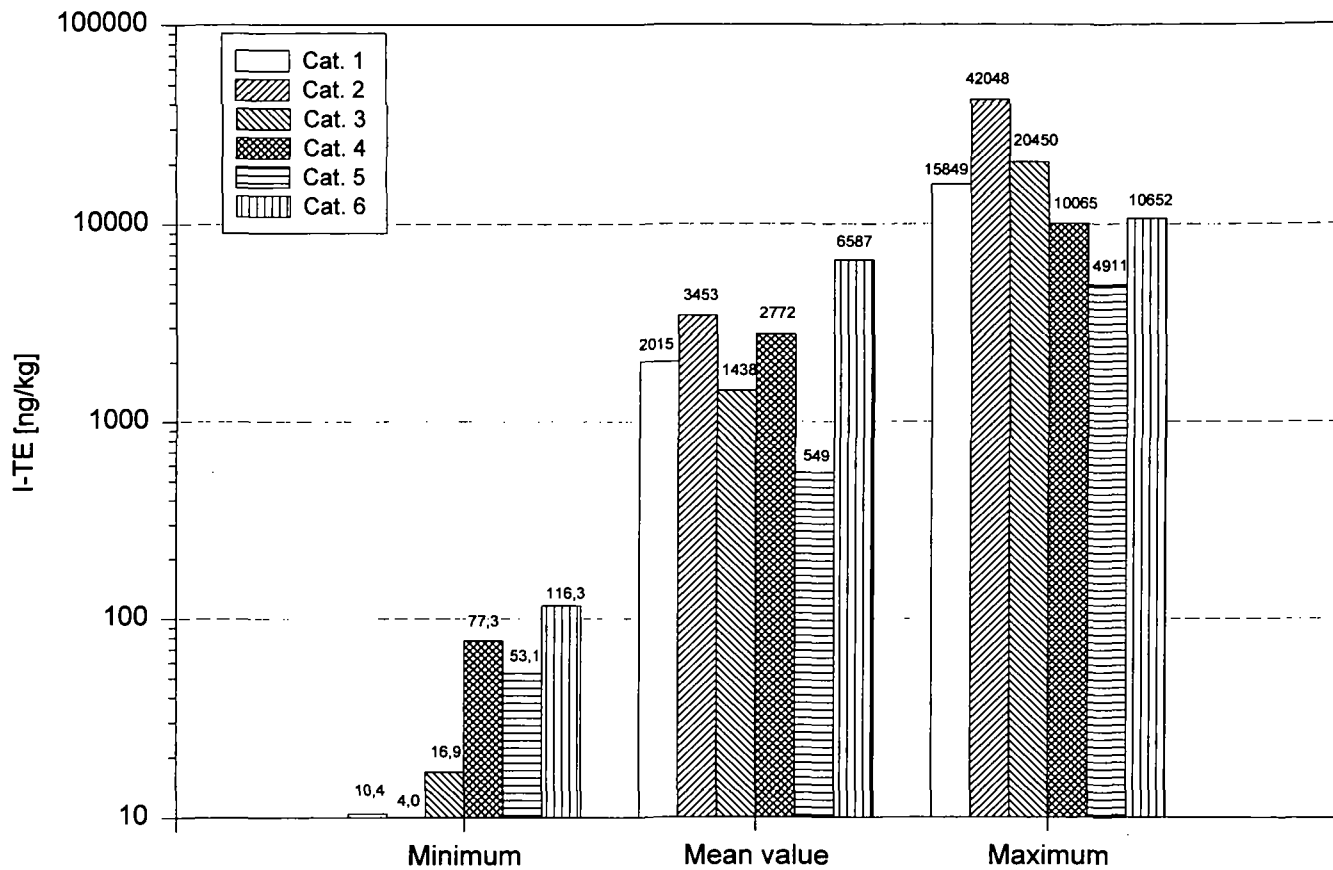


Fig. 1: PCDD/F-concentrations in chimney soot in dependence on burning material and oven type

5. References

- 1) Thoma, H.: PCDD/F-Concentrations in chimney soot from house heating systems, *Chemosphere*, Vol. 17, No. 7, pp 1369 - 1379, 1988
- 2) Dumler, R., Köhler, J., Peichl, L., Thoma, H., Vierle, O.: Berichte aus dem Bayerischen Landesamt für Umweltschutz, Schriftenreihe Heft 126, S. 173
- 3) Bröker, G., Geueke, K.-J., Hiester, E., Niesenhaus, H.: Emission polychlorierter Dibenzo-p-dioxine und -furane aus Hausbrand-Feuerungen, LIS-Berichte Nr. 103
- 4) Marutzky, R.: Erkenntnisse zur Schadstoffbildung bei der Verbrennung von Holz und Spanplatten, Habilitationsschrift, Oktober 1991, WKI-Bericht Nr. 26
- 5) Hagenmaier, H., Brunner, H., Haag, R., Kunzendorf, H.-J., Kraft, M., Tichaczek, K., Weberruß, U.: VDI-Berichte 634, S. 61 (1987)
- 6) Wintermeyer, D., Rotard, W.: Dioxin-Emission und -Deposition in der Bundesrepublik - Versuch einer Bilanzierung nach dem derzeitigen Erkenntnisstand, Inst. für Wasser-, Boden- und Umwelthygiene, Bundesgesundheitsamt, Corrensplatz Berlin, Mai 1992