

# Dioxin '97, Indianapolis, Indiana, USA

## Ambient Air Patterns and Concentrations of PCDD/F in the Vicinity of Steelworks in Austria

**Wolfgang Moche, Gerhard Thanner**

Federal Environment Agency, Spittelauer Laende 5, 1090-Vienna, Austria

### 1. Introduction

Recent measurements showed<sup>1,4)</sup>, that metallurgical processes have become one of the major sources of PCDD/F-emissions. In 1995 the Federal Environment Agency Austria started an ambient air sampling program in the area of Leoben/Donawitz. The industrial area of Donawitz is situated northwest of Leoben a Styrian county town of approximately 32000 inhabitants. The production plants comprise LD-steelworks, a sinter plant and a rolling mill. The plants are situated along the right banks of the Vordernbergbach in a small valley surrounded by mountains about 1000 m in height.

### 2. Experimental

The program comprises four sampling sessions covering the climatic influence of the summer and winter period. The location of the sampling sites and the industrial area is shown in Figure 1. The sampling sites BFI (1) Company-kindergarten (2) and St. Peter Freienstein (5) are in the immediate vicinity of the production plants. The sampling site Moserhofstraße (3) located in the Leoben basin is also influenced by the plants of Donawitz, whereas Göss (4) is shielded by mountains in the northwest.

### 3. Methods

Air has been sampled with a two-stage high volume air sampler. The analyses of the air samples were carried out separately for gaseous and particle-bound PCDD/F by HRGC/HRMS. The methods for sampling and analysis are described in a previously published report<sup>5)</sup>.

### 4. Results and Discussion

Previous measurements in the three austrian conurbations Graz, Linz and Wien<sup>5,6)</sup> yielded average summer levels in the range of 20 to 40 fg I-TE/Nm<sup>3</sup> and winter levels in the range of 50 to 220 fg I-TE/Nm<sup>3</sup>. The samples taken at Leoben/Donawitz, see Table 1, showed clearly recognizable higher

# SOURCES

ambient air levels of PCDD/F concentrations. The results showed that only the sampling site Göss lay between the levels of the previously examined conurbations.

**Ambient Air Concentrations of PCDD/F in Leoben/Donawitz-Austria**  
concentrations in fg I-TE/Nm<sup>3</sup>

Sampling date	St. Peter Freienstein	BFI	Company-kindergarten	Moserhofstr.	Göss
27.-30.6. 1995	-	147.2	120.6	43.7	16.4
29.7.-1.8. 1995	-	68.7	-	-	-
26.-29.9. 1995	61.5	121.3	175.6	48.8	34.1
17.-20.1. 1996	306.8	261.6	324.6	141.0	92.9

Table 1

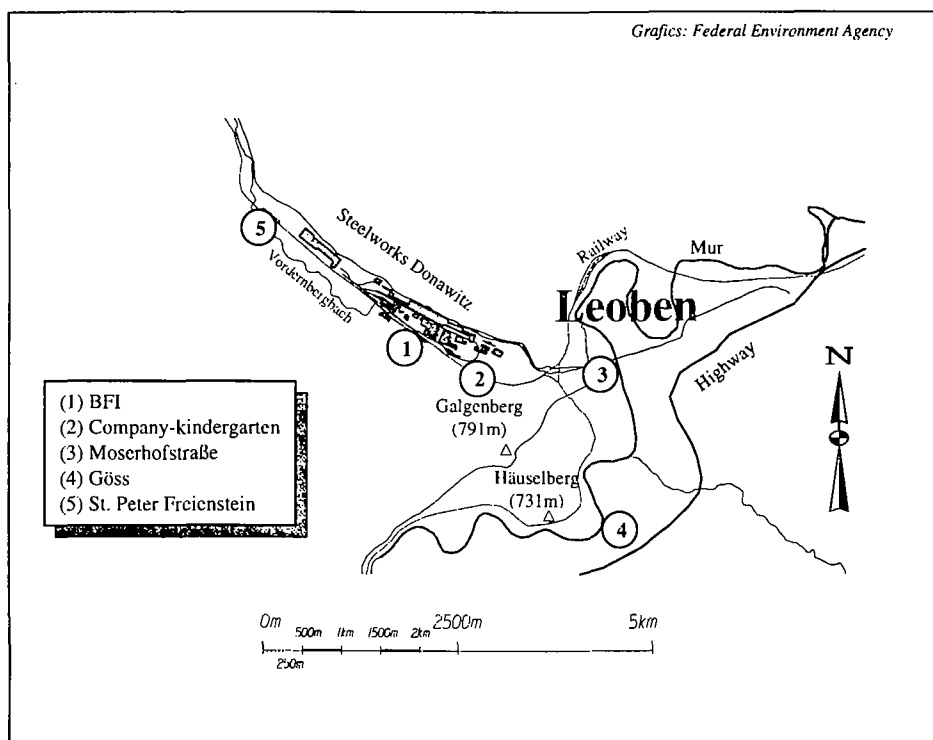


Figure 1

# Dioxin '97, Indianapolis, Indiana, USA

The evaluation of the homologue- and 2,3,7,8,-isomer profiles, shown in Figure 2, revealed a high contribution of the lower chlorinated PCDFs, even at the sampling site Göss. The most abundant homologues are the tetra- through hexachlorinated dibenzofurans. The comparison of the 2,3,7,8-congener-profiles also reveals a significant higher level of the penta and hexachlorinated dibenzofurans, whereas the homologue- and 2,3,7,8-isomer profiles of the PCDD show no significant deviation to profiles of ambient air samples taken previously<sup>1,6)</sup>. The patterns of the samples taken in Leoben/Donawitz are in good agreement with emission profiles of metallurgical processes reported by others<sup>2)</sup>.

For comparison Figure 2 includes the average annual profiles of a sampling site in Linz, the capital town of Upper Austria with approximately 198000 inhabitants. The sampling site there was located nearby an industrial area, comprising steelworks, a sinter plant and several chemical production plants.

This comparison shows that the influence of the industrial area at Donawitz is obviously higher than in Linz. One reason could be the specific geographical situation of Donawitz. The small Vordernberg-valley favors stable weather conditions which hinder the air exchange especially in winter resulting in increasing air pollution. Another reason is a difference in the state of the art of the production facilities<sup>3,4)</sup>, especially the sinter plant. At the sinter plant in Linz a new gas cleaning system has been installed, which is continuously operating since its startup in 1993<sup>3)</sup>.

## 4. References

- 1) Fiedler, H. (1994): Sources of PCDD/F and Impact on the Environment. *Organohalogen Compounds* 20: 229-236.
- 2) Hagenmaier, H., Lindig, C., She, J.(1994): Correlation of Environmental Occurrence of Polychlorinated Dibenzo-p-dioxins and Dibenzofurans with possible Sources. *Chemosphere* 29 (9-11): 2163-2174.
- 3) Kinzel, J., Gebert, W., Gara, S. (1994): PCDD/F Emission Reduction for Iron Ore Sinter Plants. *Organohalogen Compounds* 19: 311-314.
- 4) Lahl, U. (1993): Sintering Plants of Steel Industry - The Most Important Thermal PCDD/F Source in Industrialized Regions? *Organohalogen Compounds* 11: 311-314.
- 5) Thanner, G.; Moche W. (1994): Dioxine in der Luft von Ballungsräumen; Meßergebnisse aus Graz, Linz, Steyregg und Wien; Teil I. Monographie Bd. 50, Umweltbundesamt (Austria), Vienna.
- 6) Thanner, G.; Moche W. (1994): Dioxine in der Luft von Ballungsräumen; Meßergebnisse aus Graz, Linz, Steyregg und Wien; Teil II. Monographie Bd. 76, Umweltbundesamt (Austria), Vienna.

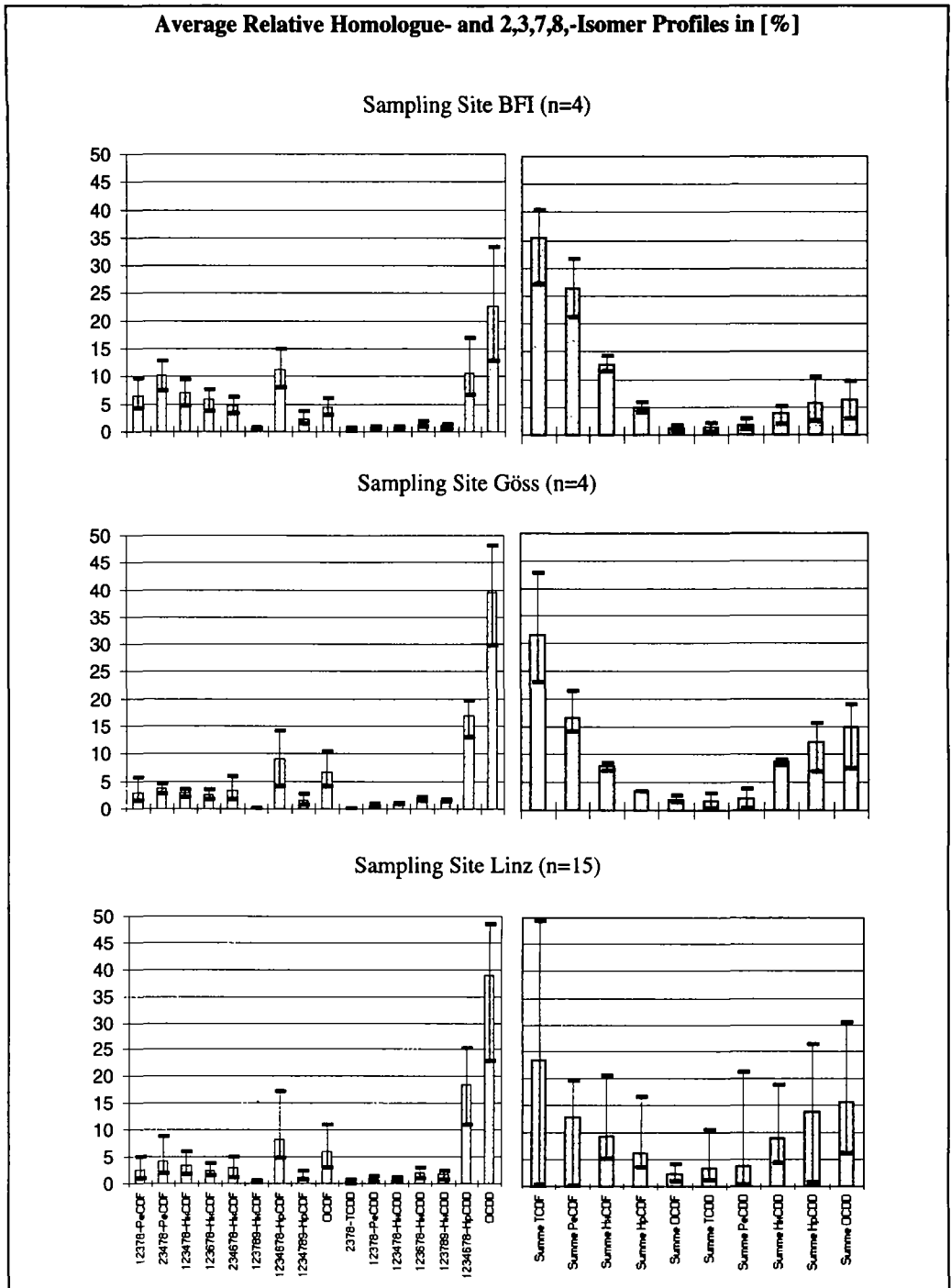


Figure 2