

ENVIRONMENTAL LEVELS AND TRENDS

AMBIENT AIR MONITORING OF PCDD/F AND PCB IN AUSTRIA

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Introduction

In November 1992 the Federal Environment Agency Austria started a one year monitoring programme for ambient air concentrations of dioxins (PCDD/F) at industrial and population centres of Linz, Graz and Vienna. This programme^{1,2} was the first systematical approach to record the situation of ambient air concentrations of dioxins in Austria. Based on the results of this initial monitoring programme in 1997 a long lasting monitoring programme started with the objective to observe long term trends of PCDD/F and additionally PCB in the air.

Experimental

Sampling & Analysis

Air has been sampled with a two-stage high volume air sampler with a suction speed of app. 14 m³/h and a sampling duration of 72 h resulting in a sampling volume of app. 1000 m³. The detailed description of sampling and analysis can be found in a previously published report¹.

Sampling sites

The sampling sites of the initial monitoring programme of 1992/93 were located at Graz, Linz and Vienna. The current monitoring programme comprises eight sampling sites of different topographical types, including the three sites of the initial programme. The following table gives a short description of the sampling sites.

Table 1. Sampling Sites for Monitoring of PCDD/F and PCB in ambient air

Sampling Site	Topography	Surrounding
Graz	basin	suburban settlement, fields
Leoben-Donawitz	valley	suburban settlement, industry
Linz	plain	city centre, industry
St. Pölten	plain	suburban settlement, industry
Lustenau	plain	suburban settlement, fields
Zöbelboden	mountain top	forest
Tamsweg	basin	rural settlement
Vienna	plain	city centre, traffic

Monitoring scheme

The initial monitoring programme consisted of simultaneous ambient air sampling at three locations every two weeks. This programme lasted for one year.

For the current monitoring programme the selected sampling sites have been divided into two groups of four. Each group will be sampled simultaneously three times during winter and three times during summer. The programme consists of monitoring cycles which last three years. In the first year

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the first group of sampling sites is monitored and the second group in the second year. The third year of the cycle is free of sampling.

Results and Discussion

The results of the initial monitoring programme, carried out in 1992/93, are shown in Table 2. In Table 3 the results of the first cycle of the current monitoring programme, which started in winter 1997, are summarized.

The datasets of 1992/93 compared with those of 1997/99 show a decrease of PCDD/F in the air during winter, whereas the summerlevels are almost equal. Nevertheless for reliable evaluation of time trends the data are too limited. The results of the future monitoring cycles will show a clear picture.

As can be seen in the results PCDD/F show a clear seasonal trend with highest concentrations in winter. PCDD/F-data compared with ambient temperatures clearly indicate domestic heating as the major source for increasing dioxin levels in air during winter. For PCB too a seasonal trend can be observed, but in contradiction to PCDD/F the PCB show highest concentrations during summer. This observation indicates different sources for PCB in the air than for PCDD/F.

Table 2. Mean Winter and Summer Concentrations of PCDD/F in Ambient Air Monitoring Programme 1992/93

Sampling Site	PCDD/F (I-TEQ) fg/Nm ³	
	winter	summer
Graz	221.6	28.4
Linz	120.9	33.7
Vienna	125.6	32.2

Table 3. Mean Winter and Summer Concentrations of PCDD/F and PCB in Ambient Air Monitoring Programme 1997-1999

Sampling Site	PCDD/F (I-TEQ) fg/Nm ³		PCB (TEQ-WHO 97) fg/Nm ³		PCB (Σ Ballschmiter) pg/Nm ³	
	winter	summer	winter	summer	winter	summer
Graz	125.0	42.1	8.4	14.3	139.1	329.4
Donawitz	353.1	132.4	12.8	11.3	126.8	268.0
St. Pölten	48.6	6.9	7.7	8.4	199.1	264.8
Linz	59.5	41.8	8.2	15.6	312.6	500.6
Lustenau	74.5	10.3	4.7	7.1	74.1	184.6
Zöbelboden	4.4	2.7	1.5	4.9	56.5	122.2
Tamsweg	51.6	15.4	3.6	13.2	59.3	156.2
Vienna	59.0	13.0	6.2	12.6	93.3	336.1

References

1. 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.
2. 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.