

# ENVIRONMENTAL LEVELS II

## DISTRIBUTION OF POLYCHLORINATED DIBENZO-*P*-DIOXINS AND POLYCHLORINATED DIBENZOFURANS IN SOIL AT CHANGWON OF KOREA

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### Introduction

Polychlorinated dibenzo-*p*-dioxins(PCDDs) and polychlorinated dibenzo furans(PCDFs) are well known as persistent and ubiquitous organohalogen compounds in environment. Many researchers have investigated a local contamination degree by PCDDs/DFs using soil samples<sup>1-3</sup>. Soil is the last reservoir of pollutants emitted from various sources to atmosphere. Therefore, the aim of this work is to evaluate distribution of PCDDs/DFs in soil at Changwon area which exists various source.

### Experimental methods

#### *Sampling*

Soil samples were collected at 13 points of Changwon area in November, 1999. Collected soils were classified as industrial, residential and road area in accordance with a potential source. Sampling sites were illustrated in Fig. 1.

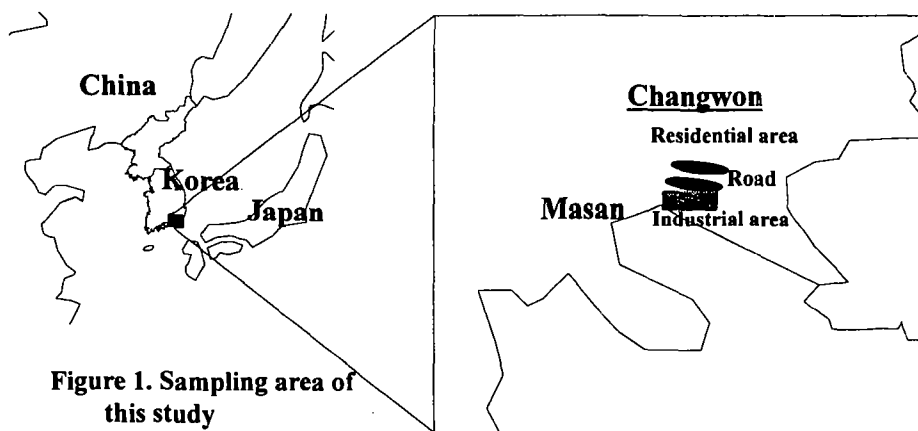


Figure 1. Sampling area of this study

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## Analytical method

Soil samples were taken within a depth of 5cm and sufficiently dried at room temperature. Dried samples (20g) sieved and then was extracted with 150ml of toluene for 6 hours under reflux and then filtered. After addition of keeping solvent(n-nonane 0.5ml), the extract was transferred to n-hexane and adjusted to a volume of 10ml. After spiking of internal standards(EDF-8999, CIL Inc.), purified using multi-layer silica gel chromatography, alumina column(Neutral, Activate I, Merck) chromatography and analyzed with HRGC(HP 6890) /HRMS(JMS 700). Analytical methods and conditions described in several papers described previously.<sup>4-5</sup>

## Results and Discussion

### Concentration

Table 1 shows concentration of PCDDs/DFs in soil collected at Changwon area, Korea.

Table 1. Total and I-TEQ concentration of PCDDs/DFs in soil(pg/g dry wt).

Source types & sites	Total concentration			I-TEQ concnetration		
	PCDDs	PCDFs	Sum	PCDDs	PCDFs	Sum
<b>Residential area</b>						
A	14.14	6.18	20.32	0.45	0.12	0.57
B	117.58	48.78	166.36	1.22	0.75	1.97
C	60.11	34.18	94.29	1.24	0.62	1.86
D	42.34	29.12	71.46	0.73	0.45	1.19
E	71.84	47.36	119.20	1.06	0.86	1.92
<b>Industrial area</b>						
F	63.46	104.44	167.89	4.97	2.16	7.14
G	89.11	140.89	230.00	3.16	3.08	6.24
H	56.66	76.14	132.80	1.50	1.56	3.05
I	89.56	91.92	181.48	2.87	1.79	4.66
J	272.36	461.38	733.72	10.68	10.11	20.79
<b>Road</b>						
K	42.36	57.02	99.39	0.67	1.00	1.67
L	91.62	91.21	182.83	1.47	1.51	2.98
M	82.95	34.54	117.49	0.50	0.38	0.88

Average concentration of PCDDs/DFs measured at Residential area was 94.33pg/g and I-TEQ concentration was 1.50pg/g. In the case of Industrial area, average total concentration was 289.18pg/g and I-TEQ concentration was 8.38pg/g. Road area represented 33.24pg/g and 1.85pg/g for mean total and I-TEQ concentration, respectively. Total and I-TEQ levels of PCDDs/DFs in soil were the order of Industrial area>Road area>Residential area. Especially, J site at Industrial area was the highest value in Changwon. Therefore, average total concentration of PCDDs/DFs in Changwon was 178.25pg/g and I-TEQ concentration was 4.22pg/g.

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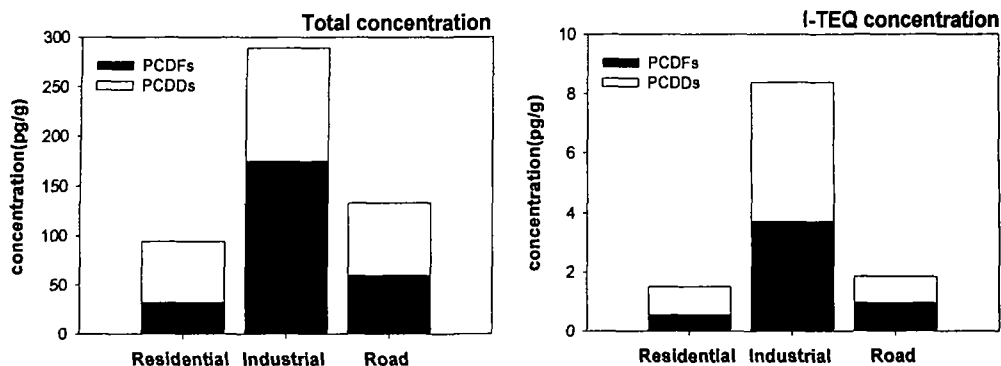


Fig. 2. Average total and I-TEQ concentration of PCDDs/DFs at sampling site.

## Congener profiles

Congener profiles of mean total concentration for each source area presents in Fig. 3. In the case of Residential area, OCDDs occupied 25.8% and TCDDs was 16.2% and TCDFs was 12.2%. Road area was similar to congener pattern of Residential area. Namely, the low chlorinated compounds such as TCDDs and TCDFs were predominant congener. This result indicates that this site is influenced by same source like automobile. In the case of Industrial area, the ratio of PCDFs was higher than PCDDs, it means that a pattern of stationary source attributed to combustion processes at contamination area.<sup>7</sup> HxCDDs occupied the high ratio for PCDDs and the ratio of PeCDFs, TCDFs and HxCDFs were high for PCDFs.

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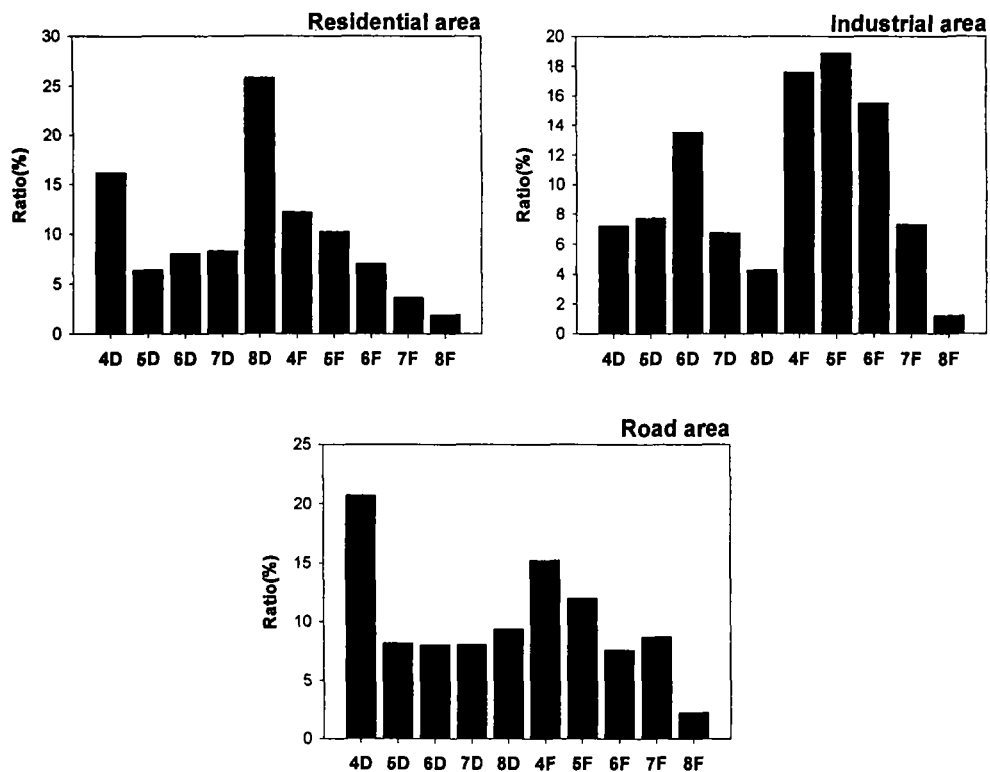


Fig. 3. Average total homologue profiles of PCDDs/DFs in Changwon