# PCDD/PCDF BALANCE OF DIFFERENT MUNICIPAL WASTE MANAGEMENT METHODS IV. RECYCLING

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### Introduction

The Federal Waste Law gives a priority list for waste management methods in order to minimize waste amounts: avoidance > recycling > removal. Especially recycling has won great importance in the last few years. Recycling consists of physical, thermal and chemical treatment of wastes, and there seem to be no remarkable differences between waste or primary stuff treatment in regard to pollutants (1). The authors examined not only composting (see III) as one form of recycling, but waste recycling within industrial processes, especially of non-ferrous metals, too.

#### Experimental

The authors examined 70 soil samples from the area and in the vicinity of a cable pyrolysis plant. The soil samples in the neighbourhood of the plant were selected in regard to the main direction of the wind. Soil samples were taken mainly down to 5 cm depth, in case of profiles in 0 - 20 cm, 20 - 40 cm and 40 - 60 cm. Samples included (2):

- \* 4 samples (2 soil, 1 dust, 1 sand-heap) from the area of the plant
- \* 36 soil samples from gardens in the north of the plant
- \* 2 samples from vegetables beds enriched with compost produced in the corresponding gardens
- \* 6 soil samples from a camping site in the west of the plant
- \* 3 soil samples from a building-material stock
- \* 19 soil samples from different places in the vicinity of the plant.

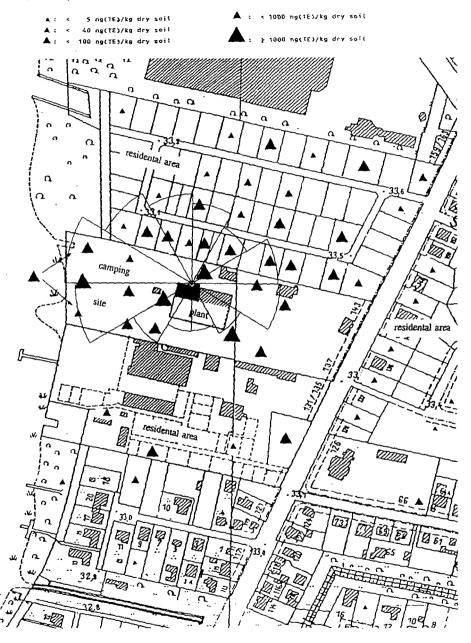
## Results

The highest amounts of PCDD/PCDF were found in the samples from the area of the plant, as expected. The highest burden of 4958 ng/kg PCDD/PCDF (TE) was found in the dust sample from the plant. The other samples derived directly from the plant area, amounted to 1646 ng/kg (sand-heap), 948 ng/kg and 405 ng/kg (soil) PCDD/PCDF (TE). Up to a distance of 150 m, the area in the vicinity of the plant is highly contaminated with PCDD/PCDF with amounts up to 100 ng/kg (TE) and much higher. Especially soils at the camping place and the residential area show contaminations above 40 ng/kg, the limit for growing vegetables. Having 89 resp. 30 ng/kg (TE), both compost enriched soils lie clearly under the untreated soils in the same site (203 resp. 89 ng/kg (TE)), but on the other hand above the limit for unrestricted agricultural use (5 ng/kg (TE)). As can be expected, PCDD/PCDF - burdens Tab. 1: Samples from the area and vicinity of a cable pyrolysis plant

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Organohalogen Compounds 4

Fig. 1: Survey of the examination area around a cable pyrolysis plant



Organohalogen Compounds 4

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become smaller with increasing distance to this plant. The soil profiles show the contamination to be reduced 10-fold each step. Figure 1 gives a survey of the investigation area. The sample collection points with high burdens are marked. Table 1 shows the results of the highest contaminated samples. Additional to the map of the investigated area a 'compass card' is included, which illustrates the frequency of distinct directions of the wind.

## Discussion

Dioxin emissions for the outlet to Air Pollution Control (APC) of secondary copper plants are cited in literature (1) with

- \* 27 1421 ng/dscm (dry standard cubic meter) 7 % O<sub>2</sub> (scrap insulated copper and aluminium wire, reclamation with afterburner for APC)
- \* 7610 12100 ng/dscm 7 % O<sub>2</sub> (copper and other metals, recovery from scrap, telephone and circuit boards, with afterburner and baghouse for APC).

The sources for PCDD/PCDF - production are suspected mainly to be PVC, which is present in large amounts in the cable covering. Copper recycling by cable pyrolysis seems to offer optimal conditions for PCDD/PCDF - generation. Other recycling processes which gather PVC or other organics (plastics etc.) and chlorine (e.g. hydrogene chloride) under high temperature (secondary aluminium smelters, scrap recycling within steel and iron processing) are probably dioxin - producers, too.

## References

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