RISK FOR HUMANS DUE TO DIOXINS FORMED DURING THERMAL PROCESSES

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Introduction

Since the late seventies it is known that thermal processes can be a source of chlorinated dioxins and chlorinated dibenzofurans. Contrary to what was known about the production of e.g. herbicides like 2,4,5-T the thermal processes do produce a complex mixture of all kinds of dioxins and dibenzofurans, ranging from the extreme toxic 2,3,7,8,-TCDD to nearly non toxic compounds like 1,2,3,4-tetrachloro-*p*-dibenzodioxin and mono-, di-, and trichlorodioxins and dibenzofurans.
For a long time these compounds have entered the environment and were and are a source for humans
In this paper soil, air, and water will be considered as potential risk factors.

Materials and methods

Samples round an incinerator are measured and calculations have been made based on physical parameters.

Results and discussion

Soil ingestion:

Humans

Contrary to what was estimated by Kimbrough *et al.*[1] who suggested a daily intake of infants of 25 g/day, Van Wijnen *et al.*[2] determined that the real amount is between 30 to 200 mg/day for the group that did ingest most (a camping group).

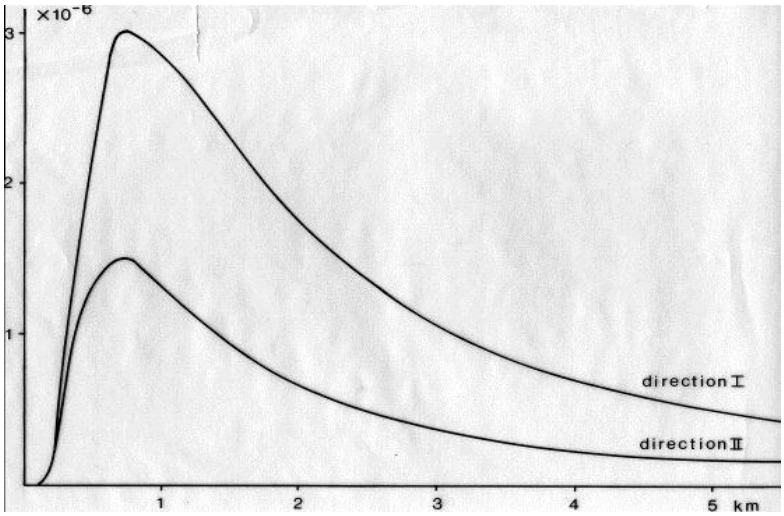

Fig1. Calculated dispersion factor for maximum (direction I) and minimum (direction II) for Immission of PCDD and PCDF from a municipal incinerator.

Olie *et al.*[3] calculated with the dispersion factor and the expected deposition rate that less than 1 pgTEQ/m^2 deposition (Fig1.) can be expected at the most contaminated place round a modern incinerator that emits less than .1 ngTEQ/M^3.
Soil round an incinerator or metallurgic facility that emits less than .1ngTEQ/m^3 is not harmful for children as far as PCDD/F's are considered. One of the problems still exists is that metallurgic facilities do emit sometimes more than .1ngTEQ/M^3. Sometimes high soil concentrations are measured round an incinerator but that is probably not due to emissions from the stack but the result of bad handling of the flyash.

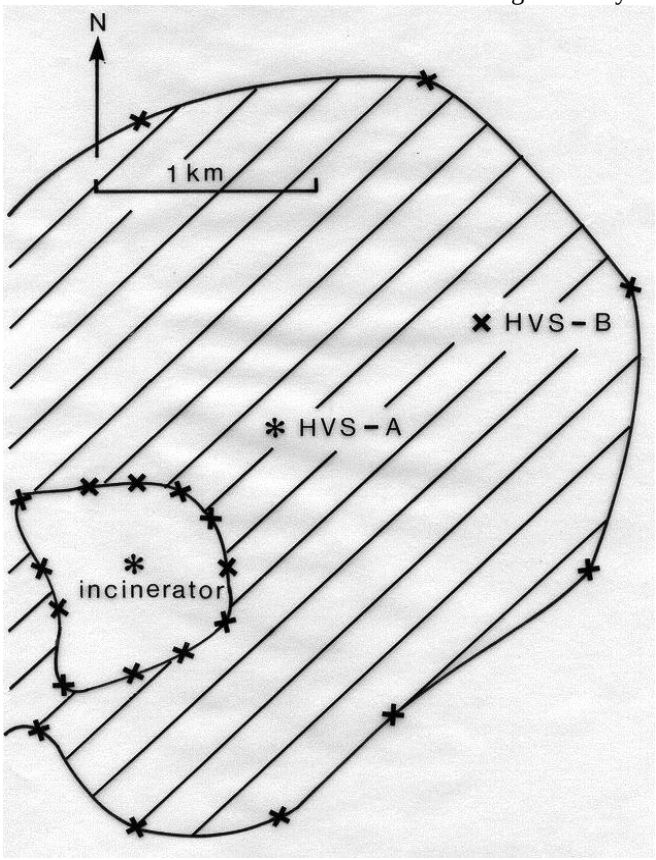

Fig.2 Location of area of maximum PCDD and PCDF Immission round a thermal facility.

Animals
The situation is different for animals. Cows grazing in the neighbouthood of a source of dioxins can produze milk that is to much contaminated for consumption. This situation happened in the past in the neighbourhood of incinerators that emited much higher amounts of PCDD/F's than the limit of .1ngTEQ/m^3 . The reazon is that cows eat about 60m^2 of grass per dag. And also depending on the kind of soil sometimes more than 1 kg soil.

Air
Inhalation of air can normally be no problem because the concentration at the place where the highest concentration can be found a dilution of the stackair of a factor 10^7 has taken place.
An exception is occupational contamination We have found that that workers in a PCP plant were heavely contaminated because the inhaled fumes from an open vessel in which the non gamma isomers of hexachlorocyclohexane were cooked. Outside the factory also elevated levels were found in hair of humans[4]. The hair did also contain non 2,3,7,8 substituted PCDD/Fs. This was also the case for the blood of one of the workers.

Water
Water itself cannot be a risk for Humans because of the very low solubilty of the PCDD/F's and the low consumption quantity by humans.
Water can be an indirect source due to the transport of particles by water. Rivers have transported contaminated particles to the sea . The particles have settled and the sediments form a source for fish and other sea animals.

Acknowledgements
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