PCDD/PCDF, PCB and related compounds; the Scandinavian situation

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1. Introduction

The situation in Scandinavia with respect to dioxins and related compounds will be summarized, mainly based on Swedish information. However, as the situation is quite similar in all the Nordic countries, Sweden could be representative for the other Nordic countries.

2. Monitoring programmes

The final results from the Swedish Dioxin Survey[1)] will be published in the winter of 1994/95. Part of the survey will continue within the current Swedish environmental monitoring programme that has been running since the late 1970's. The programme has recently been evaluated which, among other things, resulted in recommendations that more emphasis should be given to data quality and data interpretation.

Data for several international programs are produced within the Swedish program. There are at present several new international monitoring programs being planned, where persistent organic compounds (POC) are included. The Joint Monitoring Programme (ICES and PARCOM) includes different POC in fish, and the North Sea Task Force has a sediment programme running where some POC are measured.

The Arctic Monitoring Assessment Programme (AMAP) has extensive plans for analysing different types of media. A Baltic Sediment Monitoring Programme is planned and a baseline study of sediments in the Baltic Sea is in progress.

It is essential to coordinate all monitoring activities to give an overall optimal result. A close cooperation between the different programmes will hopefully improve the quality and comparability of the data produced.

3. PCDD/PCDF

Sources
Within the Swedish Dioxin Survey[1)] a number of sources have been quantified during the last years. Due to emission limits in combination with improved technology it has been possible to profoundly reduce the emissions from the dominating (known) sources. The main focus has been on large industrial processes. Results from recent studies[2)] of distillation residues from dry cleaning indicate that it is necessary to include small scale processes in

the search for sources. It is most likely that today, secondary sources like sediments and dumps, together with long range transport and numerous small point sources constitute the most important sources for PCDD/PCDF in the environment.

Monitoring. Levels and trends
Within the Swedish Dioxin Survey levels and trends of PCDD/PCDF have been determined in various media. During the last twenty years an overall decrease in the levels is recorded[3,4]. The major part of this decrease dates back to the late 1970's and the early 1980's . The situation of today seems to be quite constant and resembles what has been found for PCB. Analyses of human breast milk show a similar trend.

Risk assessment
The toxic equivalency factors (TEFs) used in the Nordic countries[5] are basically in agreement with the recommended international I-TEFs[6].

4. PCB

Sources
In Sweden the use of PCB in open systems was banned in 1973 and the use in closed systems has since then decreased considerably. In 1978 the "new" use of PCB was regulated and, in fact, since then no new permits have been given.

There is evidence that PCB is leaking from sites contaminated by different kinds of anthropogenic activities. Such contaminated sites, like old dumps, will continue to emit contaminants long after the primary contamination has ceased. The knowledge of these sites in Sweden is limited, but a nation-wide survey is in progress.

Monitoring. Levels and trends
In the Norwegian and Danish harbour porpoise project[7] PCB and a number of organochlorine pesticides have been analysed. No significant variation in PCB congener pattern was found between geographical areas, whereas the number of congeners was found to increase with age. Geographical differences in the levels of all organochlorines were found except for dieldrin and heptachlor epoxide.

Several POC measured so far have shown decreasing trends. This is apparent for DDT, where the concentration in guillemot eggs from the Baltic Sea decreased by an order of magnitude during the 1970's. The decrease for PCB is less profound. Annual samples of (spring) herring and eggs of guillemot from the Baltic Sea show significant decreases in PCB content over time[8], most of which occurred during the middle part of the 1970's.

In a study of human breast milk in Sweden covering the period 1972 - 1985, Norén[9] found a decrease in the PCB levels from 1.05 to 0.60 µg/g lipid weight. In a Norwegian study[10] of PCBs and other organochlorine compounds in human milk a good correlation between sum PCBs and PCB-153 was demonstrated.

Effects and Risk assessment
Sweden is using the WHO/IPCS interim TEFs for dioxin-like PCBs[11] as they cover a wider range of congeners than the previously suggested Nordic TEFs for PCBs[12].

A risk assessment of PCBs[12] was unable to recommend a tolerable daily intake of either total PCBs or of any individual congener. However, certain dioxin-like PCBs were found to

significantly add to the total exposure to dioxin-like compounds from the environment. It was also concluded that the present exposure to total PCBs in the Nordic populations is of the same order of magnitude as that at which subtle health effects may occur in children exposed *in utero* and also possibly through breast-feeding.

Based on these conclusions, the National Food Administration in Sweden is discussing to recommend that women of fertile age should avoid consumption of feral salmonids and herring from the Baltic Sea more often than once a month. Furthermore, forced weight reduction after delivery should be avoided as this can lead to increased levels of PCDD/Fs and PCBs in the breast milk.

5. General policy concerning persistent organic compounds

The Swedish Environmental Protection Agency has recently put forward a programme for action[13]. In this programme it is proposed that a strategy to reduce the load and effects of POC be based on the precautionary principle. It is necessary, wherever possible, to prevent these compounds from being discharged into the environment. If there is a risk of irreversible or other serious damage, measures will have to be adopted even before the cause and effect relationships are fully known. As is the case with metals, the problems with organochlorines associated with old products and processes, waste and contaminated sites will attract increasing attention.

6. References

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