PCDD/PCDF and PCB, the Scandinavian situation

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In this presentation we try to summarize the situation in Scandinavia. Most material presented emanates from Swedish sources. However, the situation in the other Nordic countries is often quite similar.

Monitoring programmes

The current Swedish environmental monitoring program started at the end of the 1970´s. The program is under re-evaluation with the aim of expanding it. 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.

It is essential to coordinate these activities to give an overall optimal result and to keep the increasing costs as low as possible. A close cooperation between the different programs will hopefully improve the quality and comparability of the data produced.

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. Therefore, 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[2,3]. 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
A Nordic risk assessment of PCDD/Fs has been performed[4]. A tolerable daily intake of 5 pg/kg bodyweight was suggested based on an assumed no adverse effect level of 1 ng/kg bodyweight a day and applying a safety factor of 200. Toxic equivalency factors (TEFs) were suggested for the 2,3,7,8-substituted PCDD/Fs which basically are in agreement with the later suggested international TEFs.

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 use of "new" PCB was regulated and, in fact, since then no new permits have been given.

These closed systems comprise mainly electrical equipment like transformers and power capacitators. However, the major part of this equipment containing PCB is no longer in use, but is set aside waiting for destruction of its PCB. According to the plan, all use of PCB will be terminated in 1995.

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. A couple of hundred objects have been identified so far, but from the experiences from other countries like Denmark, Germany and the Netherlands, it is likely that the number of objects will increase.

Relatively recently, attention has been focused on the fact that substantial amounts of PCB were used in different caulking compounds used in Sweden during 1957 - 1972. It is impossible to calculate the exact figures, but it seems likely that during this period 70 -90 tons of PCB was used in houses in Sweden. Today, when the buildings from the sixties and the seventies are renovated and modernized there is a risk that the PCB in these buildings will be released into the environment. Part of the waste that arises during renovation must therefore be separated and treated as hazardous waste.

Other sources of importance are long range transport and of course the amount of PCB already present in sediments in rivers, lakes and the sea.

Monitoring. Levels and trends

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 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[5], most of which occurred during the middle part of the 1970´s. Annual samples of herring collected in spring from the southern Gulf of Bothnia or series of autumn-collected herring from five different localities in the Baltic Sea do not show significantly altered levels of PCB over the same time period. In a study of human breast milk in Sweden covering the period 1972 - 1985, Norén[6] found a decrease in the PCB levels from 1.05 to 0.60 µg/g lipid weight.

Risk assessment

A recent risk assessment of PCBs[7] 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, Swedish pregnant women are advised to avoid frequent consumption herring and uncultivated salmonids from the Baltic Sea, as well as liver from cod and burbot[8]. Furthermore, dieting after delivery is not recommended as this can lead to increased levels of PCDD/Fs and PCBs in the breast milk.

General policy concerning persistent organic compounds

The Swedish Environmental Agency has recently put forward a programme for action[9]. In this programme it is proposed that future actions to reduce the effects of POC should:

- intensify international cooperation
- prevent the introduction of new POC
- substitute hazardous compounds with less harmful chemicals
- further reduce the emission from point sources and motor vehicles
- improve methods for management and disposal of hazardous waste
- trace and remediate old dumps and contaminated sites
- survey and prevent future emission of POC present in the technosphere

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