
Executive summary

Polychlorinated biphenyls (PCBs) in soils or sediments can pose a hazard to biotic communities. For proper management of the risk involved, recommended exposure limits based on ecotoxicological research are required for these organochlorine compounds. Since they form the basis for standard setting, these recommended exposure limits also provide a basis for decisions concerning measures to be taken in cases of soil pollution. The RIVM (National Institute of Public Health and the Environment) has developed a new method for deriving recommended exposure limits for PCBs in soils and sediments. On 15 March 2000, the Minister of Housing, Spatial Planning and the Environment requested the Health Council's opinion regarding this new method. A Health Council committee has reported its findings in the present advisory report.

The Committee endorses the major principles used by the RIVM to derive recommended exposure limits for PCBs in soils and sediments. This is in relation to the attempt to better illustrate the uncertainties involved and to view as mixtures substances with a common mechanism of action which occur together in the environment. However, in terms of its execution, this has proved deficient in a number of areas. For this reason, the Committee feels that the method is not useful for deriving ecotoxicological recommended exposure limits for PCBs in soils and sediments.

With regard to the recommended exposure limits for individual PCB compounds, the major objection is that the species sensitivity distributions (SSDs) are generally based on toxicity data from less than four species of organisms, and sometimes even on data

from a single species. Furthermore, different toxicological endpoints (NOECs, LD₅₀s and EC_xs) are used for different organisms, which tends to distort the differences in sensitivity between species. As a consequence of this, the spread of the probability distributions mentioned above is only marginally based on actual interspecies differences in sensitivity. Accordingly, the probability distributions cannot be regarded as genuine SSDs. The recommended exposure limits based on these distributions cannot, therefore, be considered to provide protection to 95% of all species. It should be pointed out that recommended exposure limits for individual PCBs (inasmuch as these exert their effect via a common mechanism of action) are of secondary importance, because, in soils and sediments, these substances are always present as mixtures.

Nor can the Committee endorse the method used to derive the recommended exposure limit for a mixture of planar PCBs, which exert their effect via an interaction with the Aryl hydrocarbon receptor (Ah receptor). This receptor occurs in the cells of vertebrates. The RIVM erroneously based its recommended exposure limit for the mixture partly on toxicity data for species of organisms which do not possess a classical Ah receptor. Furthermore, the scaling factors which describe the relative toxicity of the various planar PCBs are based on highly incongruous sets of toxicity data. This produces a distorted picture of the relative toxicity in question. In addition, the institute uses a single scaling factor for each planar PCB compound. This approach tends to overlook the fact that the relative toxicity of the various PCBs is specific to certain groups of animals. It is precisely for this reason that the World Health Organization (WHO) has established separate scaling factors (TEF values) for mammals, birds and fish. Finally, the Committee would like to point out that the recommended exposure limit for a mixture of planar PCBs takes no account of dibenzodioxins and dibenzofurans. Yet these substances, like PCBs, exert their effect via the Ah receptor, and they are also present in considerable quantities in Dutch soils and sediments.

The Committee recommends that future recommended exposure limits for PCBs and related substances be based on a few, closely related, sensitive species or on just one such species. It feels that the most eligible candidates would be birds or mammals at the top of the food chain. Since it is not known exactly which species is the most sensitive, the toxicity data for this limited group of species could be used to derive a probability distribution, which in turn could provide the basis for a recommended exposure limit. This would require the availability of toxicity data on at least four different species of animals. In conclusion, the Committee urges that WHO's internationally accepted TEF concept be adopted. This would enable all relevant substances, whose effects are known to be based on their interaction with the Ah receptor, to be taken into consideration.