Chlorobiphenyls (PCBs) in Wisconsin Natural Waters

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ABSTRACT

The seizure of fish from Lake Michigan because of the presence of chlorinated pesticides and PCBs at concentrations which are greater than that regarded as safe for human consumption has demonstrated that the continuous input of trace quantities of these chemicals may jeopardize major food resources for man. Recent evidence has indicated that the ratio of the PCB concentration in fish to that in the water near the site of capture is on the order of 100,000, although the ratio may vary by more than an order of magnitude. The magnitude of this ratio suggests that the concentration of PCBs in fish from water containing greater than 0.05 µg/l PCBs may exceed the 5 µg/gm action limit established for fish.

Investigations by the Water Chemistry Program and the Wisconsin Department of Natural Resources have shown the PCBs are present in the wastes from all municipalities examined. The concentration of PCBs in the receiving waters for sanitary wastes alone seldom exceeded 0.10 µg/l, whereas the discharge of industrial wastes containing PCBs either directly or in municipal waste effluents resulted in concentrations greater than 2 µg/l (as Aroclor 1248).

Efforts to determine the major sources and current levels of PCBs in the Green Bay area of Lake Michigan have shown that the concentrations of PCBs varied from below the determinable limit of approximately 0.01 µg/l (20 liter water sample) in rivers such as the Big Suamico which drain agricultural and forested areas and receive no municipal wastes to 0.45 µg/l (as Aroclor 1254) in the receiving streams for industrial and municipal wastes. The mixtures of PCBs in municipal wastes generally resembled Aroclor 1248 or 1258 although the earlier eluting isomers of Aroclor 1242 were often observed. The concentration of PCB mixtures resembling Aroclor 1254 in the Peshtigo and Oconto Rivers were 0.31 and 0.45 µg/l, respectively, in November, 1970; 0.38 and 0.16 µg/l, respectively, in April, 1971; but decreased to near or below the detectable limit during the summer of 1971. The concentration in lower Green Bay water varied from 0.04 µg/l at Sturgeon Bay to 0.07 µg/l near Longtail Point. Further study is required to determine if the restricted use of PCBs in industry will lead to a pronounced decrease of the concentration of the chemicals in waste effluents and in nearshore environments such as Green Bay.