

PRELIMINARY ASSESSMENT OF PCB RISKS TO HUMAN AND ECOLOGICAL HEALTH IN THE LOWER PASSAIC RIVER

Brent L. Finley, Kim R. Trowbridge

ChemRisk Division of McLaren/Hart Environmental Engineering,
Cleveland, Ohio, USA

Scott Burton

Chemical Land Holdings, Kearny, New Jersey, USA

Deborah M. Proctor, Julie M. Panko

ChemRisk Division of McLaren/Hart Environmental Engineering,
Pittsburgh, Pennsylvania, USA

Dennis J. Paustenbach

ChemRisk Division of McLaren/Hart Environmental Engineering,
Alameda, California, USA

Concentrations of Aroclor mixtures and specific polychlorinated biphenyl (PCB) congeners were measured in surface sediments and aquatic biota (striped bass fillet, mummichog, and blue crab muscle and hepatopancreas) collected from the lower Passaic River. Several of the 47 surface sediment samples contained Aroclor concentrations that exceeded a National Oceanic and Atmospheric Administration (NOAA) benchmark level for "total PCBs" (22.7 µg/kg). Each of the 18 PCB congeners analyzed in aquatic biota was detected in one or more tissue samples, and numerous congeners were detected in every sample (IUPAC numbers 77, 105, 114, 118, 123, 126, 156, 157, 167, and 189). PCB congener concentrations were similar to those that have been reported in fish from other waterways that contain elevated levels of PCBs. Congener 118 was present at the highest concentration in almost all samples, and constituted 14–60% of the total PCB mass (sum of all congener masses) measured in any given tissue sample. In spite of the prevalence of PCB congeners in biota tissues (up to 1314 µg/kg total PCBs), Aroclors were not detected in bass or crab samples at a limit of detection of 33–55 µg/kg. This anomaly may be due to selective degradation of certain PCB congeners that are used to analytically recognize and quantitate Aroclors. Using the measured sediment concentrations, a food web model accurately predicted blue crab muscle concentrations of individual PCB congeners (typically within a factor of two) and was also fairly accurate for mummichog (typically within an order of magnitude). Concentrations in striped bass fillet were underestimated by factors of approximately 20–140. Increased cancer risk estimates associated with fish and crab consumption were obtained using four different methods. Using Aroclor tissue concentrations (one-half the limit of detection) and an Aroclor slope factor, total risks were 2.6×10^{-6} ; using the "total PCB" measurements and an Aroclor

Journal of Toxicology and Environmental Health, 52:95–118, 1997