

Marine Pollution Bulletin

Biological toxicity estimates show involvement of a wider range of toxic compounds in sediments from Durban, South Africa than indicated from instrumental analyses

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Abstract

The toxic equivalences (TEQs) of polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) from sediment of aquatic systems in Durban, South Africa were determined in two ways: 1) TEQs of PAHs and PCBs were determined by instrumental analyses and converted to 2,3,7,8-tetrachlorodibenzo-para-dioxin equivalence (TCDDeq). 2) Bioassay equivalences (BEQs) of aryl hydrocarbon receptor (AhR) ligands were analysed using the H4IIE-luc bioassay. TEQs of PCBs ranged from below limit of detection (<LOD) to 57 pg TCDDeq·g⁻¹ while PAHs ranged from <LOD to 790 pg TCDDeq·g⁻¹. BEQs were 100- to 1000-fold greater than TEQs. Potency-balance revealed <10% of the BEQs were explained by instrumentally analysed compounds. Sediment quality guidelines indicated di minimis risk relating to TEQs, however had potential risk due to BEQs. The results reveal that far more AhR ligands were present in the sediments than what was instrumentally analysed and capable of causing AhR-mediated toxicity.