Environmental Toxicology and Chemistry: **Vol. 21, No. 12, pp. 2654–2662.**

EFFECT-DIRECTED FRACTIONATION AND IDENTIFICATION OF CYTOCHROME P4501A-INDUCING HALOGENATED AROMATIC HYDROCARBONS IN A CONTAMINATED SEDIMENT

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(*Received* 9 *January* 2002; *Accepted* 7 *June* 2002)

Abstract—On the basis of a new fractionation method combined with in vitro ethoxyresorufin-*O*-deethylase (EROD) induction in a rainbow trout liver cell line (RTL-W1) and chemical analysis, halogenated aromatic hydrocarbons with dioxin-like activity were identified in a sediment extract from Bitterfeld, Germany. The fractionation method allowed a separation of different nonplanar and coplanar polychlorinated biphenyls (PCBs), polychlorinated naphthalenes (PCNs), dibenzo-*p*-dioxins (PCDDs), and dibenzofurans (PCDFs) with different degrees of chlorination. The dioxin-like activity at the investigated site could be quantitatively assigned to PCDD/Fs. Both PCBs and PCNs could be excluded as the cause of the measured effects on the basis of the fractionation procedure and bioanalytical results. Thus, the method allowed the chemical analysis to focus on PCDD/Fs, with significant reduction of the analytical expense. The EROD-induction potency of sediment-extract fractions was quantified, and toxicants were confirmed by the application of induction equivalent quantities on the basis of fixed-effect-level concentrations that exhibit 15% of the maximum induction by 2,3,7,8-tetrachlorodibenzo-*p*-dioxin. This approach was designed to minimize methodological limitations due to superimposing inhibitory effects.

Keywords—Effect-directed fractionation Ethoxyresorufin-*O*-deethylase Toxicant identification Sediment extract