

Track: Integrated Environmental Assessment and Management

Session: Emerging Contaminants in the Marine Environment: Presence, Effects, Regulation

Abstract Title: Emerging and Conventional Contaminants in River Waters Discharging into the Black Sea along the Ukrainian Coast

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Abstract:

The major rivers of Ukraine, including the Dnieper, Dniester, Southern Bug and Danube, discharge approximately 8500 m³/s of freshwater into the northern and western portions of the Black Sea. As one of the largest countries in Europe, Ukraine also has one of the largest human populations (45,000,000 (2013)), and active heavy and agricultural industries. The presence of a large population and active industries has resulted in decades of environment contamination, including the rivers and Black Sea, by conventional contaminants (CCs). More recently, contamination of the environment by emerging contaminants (ECs) has been recognized. In a one year preliminary investigation, we measured the concentrations of an array of emerging and conventional contaminants in the fall of 2012 and spring of 2013. Samples were collected from four cities on the Dnieper, Dniester and Southern Bug Rivers nearby to where they discharged into the Black Sea. Emerging contaminants included stimulants, antibacterials/antifungals, hormones/estrogens, antibiotics, and pain relievers. Conventional contaminants included PCBs, PAHs, DDT and its degradation products, hexachlorobenzene, hexachlorocyclohexane, and metals (Cd, Cr, Cu, Ni, Pb, Zn). For analysis, water samples were filtered (0.45 µm) prior to extraction to assess the distribution of contaminants between suspended particulate and aqueous phases. Emerging contaminants were dominated by three categories: stimulants, antibiotics, and pain relievers. The majority of ECs were present in the aqueous phase except for the antibacterial/antifungals, while CCs were associated primarily with suspended particulates. For example, the aqueous ECs ranged in concentration from 0.03 to 1.63 µg/L with suspended particulate concentrations ranging from non-detected to 0.54 mg/Kg (dry). All of the organic CCs, dominated by PAHs, were associated primarily with the suspended particulates. Specifically, concentrations of PAHs ranged from 95 to 242 µg/L in the suspended particulate phase and 11 to 164 µg/L in the aqueous phase. Chromium, copper and zinc were the most abundant toxic metals occurring

primarily in the aqueous phase. Based on our fall and spring sampling scheme, seasonal trends were not strongly evident for either ECs or CCs. This investigation, demonstrates the presence of ECs in riverine waters discharging into Ukraine's Black Sea coast and suggests further study of the fate and effects of ECs in the Black Sea is worthwhile.