



Assessment of the PCDD/F pollution in the bottom sediments in Izmit Bay, Turkey

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The study includes an assessment of PCDD/F pollution in the bottom sediments in Izmit Bay at the east of Marmara Sea. The bottom sediment samples were collected from about 20 points along the Izmit Bay and were analyzed for 2,3,7,8-substituted PCDD/F congeners by using HRGC/LRMS according to the EPA Method 8280. PCDD/F concentrations in the bottom sediment samples were ranged between 23-2945 pg/g dw, corresponding to TEQ values between 2.3-15 pg TEQ/g dw. The results were similar to those measured in the polluted bays and estuaries in the world, indicating a considerable PCDD/F pollution in the Izmit Bay. By using the PCDD/F levels measured, a PCDD/F pollution map was obtained for the bottom sediments in the Izmit Bay by a mapping software. As the map shows, PCDD/F levels were high especially in the north-middle part of the Bay, probably due to the possible PCDD/F sources located along the north coast of the Bay, including the largest refinery of Turkey, a huge petrochemical complex and many industrial plants in different scales. This also explains why the PCDD/F levels in the north part of the Bay were higher than those in the south part generally. Low levels, on the other hand, were observed in the west part, at about 5-15 km distance from the industrial area. The PCDD/F pollution was also in considerable levels in the east part also, probably due to the wastewaters of the industrial plants located on the east of the Izmit Bay. By assessing the congener profiles, OCDD and OCDF were the dominant congeners, showing a long term accumulation of the pollutants, which may be related to the rapid and irregular industrialization taken place in the last 40 years in the Izmit Bay and surroundings. The dominance of OCDD is a widely-observed pattern for the long term PCDD/F pollution in soil and sediments, but that of OCDF, especially in the samples collected from the east and middle parts, is exceptional, and as a previous study indicates, it may be attributed to the discharges from the petrochemical complex with many chemical processes including vinyl chloride monomer (VCM) production, and a chlor-alkali plant. Although the VCM production was ceased and the chlor-alkali plant was closed down due mainly to the environmental concerns in 1990s, the "chlorine fingerprint" in the PCDD/F profiles in sediments showed the effect of 30-years-long discharges prior to that date.