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Railway Transport as a Potential Source of Polychlorinated Biphenyls in Soil

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Abstract : Surface soil (0 – 10 cm) samples from 52 sampling sites along the length of railway tracks on the territory of Srem (the western part of the Autonomous Province of Vojvodina, itself part of Serbia) were collected and analyzed for 7 polychlorinated biphenyls (PCBs) in order to see how the distance from the railroad on the one hand and dump on the other hand, affect the concentration of PCBs (CPCBs) in the soil. Samples were taken at a distance of 0.03 to 4.19 km from the railway and 0.43 to 3.35 km from the landfills. For the soil extraction the Soxhlet extraction (USEPA 3540S) was used. The extracts were purified on a silica-gel column (USEPA 3630C). The analysis of the extracts was performed by gas chromatography with tandem mass spectrometry. PCBs were not detected only at two locations. Mean total concentration of PCBs for all other sampling locations was 0,0043 ppm dry weight (dw) with a range of 0,0005 to 0,0227 ppm dw. On the part of the data that were interesting for this research with statistical methods (PCA) were isolated factors that affect the concentration of PCBs. Data were also analyzed using the Pearson's chi-squared test which showed that the hypothesis of independence of CPCBs and distance from the railway can be rejected. Hypothesis of independence between CPCB and the percentage of humus in the soil can also be rejected, in contrast to dependence of CPCB and the distance from the landfill where the hypothesis of independence cannot be rejected. Based on these results can be said that railway transport is a potential source of PCBs. The next step in this research is to establish the position of transformers which are located near sampling sites as another important factor that affects the concentration of PCBs in the soil.

Keywords : GC/MS, landfill, PCB, railway, soil
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