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Pollution and health risk assessment of industrial and residential area based on metal and metalloids contents in soil and sediment samples from and around the petrochemical industry, Serbia

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Within this study the investigation of pollution state of metal and metalloids contamination in soils and sediments samples of the petrochemical and nearby residential area is present. The pseudo-total concentrations of Ba, Cd, Co, Cu, Cr, Mn, Ni, Pb, V, Zn, As, Hg, and Se were monitored with ICP/OES. The pollution indices applied in this work, such as the enrichment factor, the pollution load index, the total enrichment factor, and the ecological risk index showed that some of the soil and sediment samples were highly polluted by Hg, Ba, Pb, Cd, Cr Cu and Zn. The highest pollution indices were calculated for Hg in samples from the petrochemical area: chloralkali plant, electrolysis factory, mercury disposal area, and in samples from the waste channel. The pollution indices of the samples from the residential area indicated that this area is not polluted by investigated elements. Besides the pollution indices, the metal and metalloids concentrations were used in the equations for calculating the health risk criteria. We calculate no carcinogenic and carcinogenic risks for the composite worker and residential people by usage adequate equations. In analyzed samples, the no carcinogenic risks were lower than 1. The highest values of carcinogenic risk were obtained in sediment samples from the waste channel within the petrochemical industry and the metal that mostly contributes to the highest carcinogenic risk is Cr. Correlation analysis of pollution indices and carcinogenic risks calculated from the residential area samples showed good correlations while this is not the case for an industrial area.