

Potentially toxic and alloy elements in an impounded vehicle scrapyard

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Impounded vehicle scrapyard (IVS) overcrowding is currently a subject of concern in Brazilian scenario. The aim of this study was to assess the total levels of potentially toxic elements (PTEs: As, Ba, Ce, Co, Cr, Cu, Mo, Pb, V and Zn) and alloy elements (AE: Fe, Mn, Ni, Nb and Ti) in soil and groundwater in an IVS located in the city of Ribeirão Pires, São Paulo, Brazil. Topsoil, three soil cores and groundwater of three monitoring wells were analyzed. It was verified that the area is mainly affected by three factors: (1) a landfill layer with construction waste; (2) an oily residue from past industrial activities in the area; (3) vehicles parked on topsoil. Statistical techniques, such as multivariate analysis, calculation of pollution, ecological and human health risk index were used. Mass fractions of all PTEs, except Co, Cu, Mo and Zn, were higher than reference values. Hot spots were observed for most elements suggesting vehicular source. Geoaccumulation Index showed minimal to moderate pollution in soil for most elements, except for As and Ba, which showed higher accumulation than other elements. Enrichment factor pointed to a significant enrichment of As and Pb. Arsenic content in soil may pose a moderate to high potential ecological risk. PTEs results and statistical approaches indicated that As, Ce, Co, Cu, Mn, Nb, Ni, Pb and Zn are mainly from anthropogenic sources. The content of most PTEs in topsoil does not pose a potential human health risk, except Cr content. Groundwater levels for most PTEs were below the drinking water recommendation limits, except Mn and Fe content.