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Source Identification of Chemical Contaminants in Environmental Media of a Rural Settlement

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Abstract: Principal Component Analysis (PCA) was used to identify the source of contaminants in Ubeji settlement. The contaminants assessed are oil and grease, TPH and related heavy metals (Cd, Cr, Cu, Ni, Pb and Zn). A total of 48 groundwater, 100 surface water, 160 soil and 100 sediment samples were collected from the study site from March to August, 2011. Measurements of oil and grease and TPH in samples were done gravimetrically, while atomic absorption spectrophotometry was used for determination of heavy metals. The results show significant contamination, as TPH levels in groundwater and surface water range from 22 to 96 mg L⁻¹, while soil and sediment levels range from 600 to 2300 mg kg⁻¹. Also, Cd, Cr and Pb levels in the groundwater and surface water range from 0.02 to 0.47, 0.51 to 1.3 and 1.7 to 4.1 mg L⁻¹, respectively while soil and sediment levels range from 0.04 to 0.48, 28 to 66, 45 to 69 mg kg⁻¹, respectively. However, Cu, Ni and Zn are within safe limits. PCA revealed that the source of the contaminants is a refinery and petrochemical company located close to the settlement.

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