Health risk assessment of some dominant PAHs species detected in soil near Kolkata MSW landfill site

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A research study was undertaken to examine the extent of polycyclic aromatic hydrocarbon (PAHs) contamination in the neighbourhood lithospheric environment around Dhapa MSW disposal site, Kolkata, India. On the basis of observed experimental data, the associated carcinogenic risks were quantitatively estimated as per USEPA[1] guidelines. The collection and analytical tests were perfomed for the duration of one calendar year covering all prevailing seasons in the local geographical condition. Soil samples (nos-10) have been collected and were analysed for its PAHs content by standard procedure as laid down in EPA. The average concentration of 16 USEPA priority PAHs in surface soil is found as 402.55μg g^{-1}. The total concentration of ΣPAHs ranged from 212.8 μg g^{-1}-782.1 μg g^{-1}. The carcinogenic risk is expressed as the probability of contracting cancer through exposure to site related chemicals. Among 16 priority PAHs, seven of them including Naphthalene, Benz[a]anthracene, Benzo[b]fluoranthene, Benzo[a]pyrene, Indeno[1,2,3-cd]pyrene, Dibenz[a,h]anthracene, Benzo[k]fluoranthene are established to induce cancer in the study area. Cancer risk owing to ingestion and dermal exposure is 4.20E-04 and 1.40E-04 respectively. The total value of incremental lifetime cancer risk (ILCR) for resident is found as 5.74E-04. Data analyses allowed to state that the PAHs in surface soils near a landfill were predominantly from pyrogenic sources in the wastes. The cancer risk for the combined exposure to potentially carcinogenic PAHs is assumed to be additive, but this is a source of uncertainty. In cases where site information is insufficient to determine the source of PAHs contamination, the uncertainty factor is applied to evaluate the risk. Alarming values of such hazardous organic compounds addresses that there is a risk factor in all kinds of environmental receptors and concerning stake holders. A step would be taken to clean and adopt some technology to restore the soil environment as pollution free zone. The risk assessment data provides a rational tool for decision makers in corporation level to take up risk management strategies at the polluted site.

[1] USEPA Risk Assessment Guidance for Superfund (1989), *Human Health Evaluation Manual*, vol.**1**, Part A, EPA/540/1- 89/002.