

Concentrations of PBDEs in environmental samples from e-waste treatment workshops in Guiyu, China

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Abstract

A potentially important and very specific source of polybrominated diphenyl ethers (PBDEs) in the environment is their release during the treatment and recycling of electrical and electronic waste (e-waste). Such recycling activities are widespread in Asia and often undertaken in many small workshops where obsolete electronic equipment is dismantled, frequently in very rudimentary ways and with little regard for worker health and safety or environmental protection. Following recovery of materials for reuse, the residues are disposed of to land or to water courses leading to environmental contamination with toxic metals and persistent organic pollutants. This study reports concentrations of 14 tri- to deca-brominated PBDEs in 31 samples of soil, sediment, dust and ash collected in the vicinity of e-waste recycling sites in Guiyu (southeast China), engaged in common activities such as dismantling, shredding, solder recovery, acid processing and open burning. The concentrations detected in this study far exceed those reported previously in urban soil and sediment and are consistent with or exceed those reported in previous studies around e-waste processing facilities. For three out of the five workshops studied that carried out acid processing of wastes, PBDE concentrations were substantially higher in samples taken closer to the workshop, providing evidence that such operations are a significant source of PBDEs to the environment. Principal components analysis reveals a complex PBDE congener distribution suggesting contamination by two or even three commercial formulations occurs as a result of the diverse range of wastes processed.