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Environmental Exposure Assessment for the Environmentally Sound Management of E-Waste

The E-Waste Problem

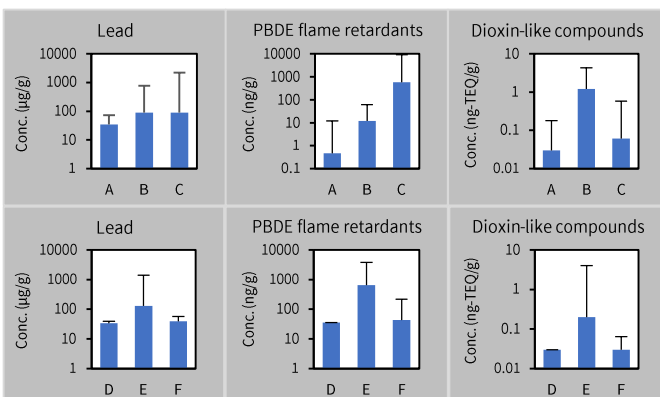


Global production of e-wastes in 2014 was estimated at approximately 41.8 million tons, and it is expected to increase to 49.8 million tons by 2018, with an annual growth rate of 4 to 5% according to a press release by United Nations University.

There is considerable interest in recovery of valuable and reusable materials from e-wastes for both environmental and economic reasons. However, concerns were raised about environmental and human health risks posed by hazardous components, such as heavy metals, plastic flame retardants, and dioxins, associated with various types of e-waste-processing activities.

Uncontrolled dumping and primitive processing of e-wastes in developing countries have been recognized as causing localized environmental contamination and human exposure levels, as well as more widespread contamination due to subsequent emissions of hazardous components into indoor and outdoor environments.

Results and Recommendation



We identified potential processes for contaminant formation, and then proposed appropriate measures for the environmentally sound management of e-wastes.

Our findings suggested that open-storage, open-dismantling and open-burning of e-wastes should be prohibited and that wastewater treatment should be implemented at each workshop to reduce hazardous component emissions into outdoor environments.

What We Do



We firstly investigated current status of environmental emissions of hazardous components from Vietnamese informal e-waste-processing sites, 2012 to 2014.

We collected soil samples from footpaths in rice paddies (A, n=57), near e-waste-open-burning sites (B, n=9), and near e-waste-processing workshops (C, n=30). We also collected river sediment samples from an upstream site (D, n=3), e-waste-processing workshop sites (E, n=9), and downstream sites (F, n=12).

Ongoing study

Lead is a developmental neurotoxicant, and blood lead levels of $\geq 5 \mu\text{g/dL}$ in early childhood are recognized as having adverse effects.

Dioxin-like compounds are known to bind to the aryl hydrocarbon receptor and induce the expression of related genes, causing a multitude of adverse effects including reproductive and developmental abnormalities, immune deficiency, tumor promotion and endocrine disruption.

PBDE flame retardants are persistent, bioaccumulative, and have also been shown to have hormone-disrupting effects, in particular, on estrogen and thyroid hormones.

Further studies are continuing to investigate human exposure to hazardous components via indoor workplace dusts, outdoor surface soils, and foodstuffs grown around e-waste-processing sites.

