

ATMOSPHERIC MERCURY EMISSIONS FROM MUNICIPAL SOLID WASTE LANDFILLS

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The volatility of mercury is well known and the possibility that Hg may be emitted to the atmosphere from municipal landfills has been suggested but rarely quantified. From 1997 to 1999, we conducted three studies of Hg emissions from four Florida landfills. Our original data documented that Hg losses occurred via two primary pathways; fugitive losses from the working face, and losses with landfill gas (LFG) emissions. Hg concentrations in LFG appear to decrease strongly with increasing landfill age, suggesting that once buried, Hg may be sequestered. This presentation describes our recent studies to reduce the uncertainties in Hg losses from waste management by (1) measuring Hg fluxes from additional landfills, (2) monitoring Hg emissions during the storage and processing of Hg-bearing wastes, and (3) speciating Hg emissions in LFG.

Mercury emissions from the landfill surface were quantified using an automated flux chamber approach that relies on in-field near-real-time mercury analyses using a Tekran Mercury Analyzer 2537A. Fluxes were measured at various landfill locations, as well as at a waste transfer station. Waste was collected and sorted to identify sources of mercury. Ambient Hg measurements were made approximately 30-50 m downwind from the landfill working face during routine placement and compaction of wastes.

Briefly, our new data indicate that the most significant quantities of Hg are lost to the air during waste handling and dumping, and that volatile methylated Hg compounds are being formed in landfills. We identified several sources of Hg in waste, including broken thermometers, fluorescent bulbs, and old batteries. Fugitive emissions from the working face were correlated with waste dumping and spreading activities. Perhaps of most interest was the identification of highly elevated levels of gaseous dimethylmercury in LFG, and methylmercury in LFG condensates. If LFG is not combusted, landfills could also be important sources of atmospheric methylated Hg compounds.

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