

Odour monitoring of landfill gas using a novel ambient air monitoring device at a Municipal Solid Waste Landfill Site in London Ontario Canada

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ABSTRACT

A novel combined landfill trace gas odour characterization and ground flux rate measurement system was designed for the tipping area of a Municipal Solid Waste Landfill (MSW) in London Ontario Canada. The system used a combination of Passive Air Sampling (PAS) and Metal Oxide (MOS) based electronic ambient air monitoring technology for hydrogen sulfide, ammonia gas, methane, and carbon dioxide as analogous trace gases for Landfill Gas (LFG). Validation of the combined technique was performed in laboratory experiments where it was determined that the relationship between PAS and electronic ambient air monitoring to be direct over a prescribed sampling period. Fixed concentration values at intervals of 2 ppm, ranging between 0 ppm to 10 ppm, were generated in an evacuated enclosed chamber for two odorous traces gases found within LFG: hydrogen sulfide and ammonia gas. Two types of PAS samplers, a radial type and a cylindrical type, were combined with the two MOS selective gas concentration Sensors. The time weighted average concentration values determined by the MOS sensors matched the mass up-take rate for both samplers over the sampled time periods in each gas concentration experiment. Analytical analysis of the PAS samplers based on their respective accumulated masses matched the exposed gas concentrations produced inside the chamber. Combined, the results validated the use of both techniques as a novel ambient LFG monitoring system for application in odour monitoring in the tipping area of MSW landfills.

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