

Research on the Methane Estimation and Its Emission Factor from Landfill in China

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Abstract

Municipal solid waste (MSW) landfills have been identified as one of the major anthropogenic sources of greenhouse gas (GHG) emissions. In order to better understand the uncontrolled GHG emissions, a quantitative in-situ measurement and evaluation of methane (CH₄) and carbon dioxide (CO₂) emissions were conducted at experimental landfill site in Beijing, China.

The landfill is currently the largest sanitary landfill for non-hazardous waste in Beijing and covers an area of about 684,000 m². It is divided into 2 main layers. The top layer is divided into six cells and temporarily covered with the geomembrane (HDPE) over worked-out landfill cells before the final capping. A landfill gas (LFG) recovery system for electricity generation had been equipped in 2007.

CH₄ oxidation Factor was analyzed based on in-situ measurement and method of IPCC. CH₄ fluxes were measured by Light Shield Static Chambers; CH₄ concentration was measured by Agilent 7890A gas chromatography with FID detector.

CH₄ and CO₂ emission fluxes from soil covers surface have a large variation range, but the fluxes follow a seasonal variance obviously. Based on the results of strengthening monitoring by IDW analysis, The hot spot area of CH₄ emission on November is the same as that on June, but the methane emission flux value was significantly higher than that in June. CH₄ and CO₂ emission fluxes maintain a high degree of synchrony. The correlation analysis showed that CH₄ and CO₂ emission fluxes had significant positive correlation ($r=0.861$, $P<0.01$) . The annual CH₄ oxidation factor is in the range of 0.01 to 0.82 and the average is 0.42, which is higher than the default value of IPCC (0.1).