



AIR DISPERSION MODELING OF VOCs EMITTED FROM MSW LANDFILLS

Fatih Taspinar^{1*}, Ertan Durmusoglu², Aykan Karademir²

¹*Environmental Protection Program, ARV College, University of Kocaeli, 41100, Turkey;*

²*Environmental Engineering Department, University of Kocaeli, 41040, Turkey*

Abstract

In Turkey, landfilling is the most preferred method of municipal solid waste management strategy since it is still considered to be the most cost-effective method of waste disposal. Landfills are very complex systems in which various interactive processes proceed simultaneously. Following waste deposition, a landfill gas mainly comprised of methane and carbon dioxide is generated due to the microbial decomposition. Various trace volatile organic compounds (VOCs) besides main components of landfill gas are also produced. The main components and the trace gases from landfills contribute to the greenhouse effect and influence the ozone layer. In addition, adverse effects of landfill gas on human health and vegetation as well as complaints due to unpleasant odor at landfills have been also reported in the literature. Particularly, during landfill operations and after landfill closure, VOCs emitted from landfills should be determined and evaluated due to their probable carcinogenicity.

In this study, the dispersion of VOCs emitted at the IZAYDAS landfill (Kocaeli, Turkey) was modeled. The landfill has been in use since 1998, and covers an area of 363,000 m² with a total capacity of 3,163,000 m³. First, USEPA's Landfill Gas Emissions Model (LandGEM V3.2) was used to determine the concentrations of the VOCs emitted from the landfill. Then, USEPA's ISCST3 model (ISC-AERMOD V5.3) was employed for the air dispersion modeling. Following the model inputs such as meteorological parameters, VOC concentrations, digital maps, etc., the wind rose for a five year (2000 – 2004) period and the concentration gradients were obtained.

Keywords: Solid waste landfilling, Landfill gas (LFG), VOCs, LandGEM, ISCST3

*Author to whom all correspondence should be addressed: Phone/Fax: +90-262-335 5559; e-mail: fatihfsp@kou.edu.tr