



Urban solid waste landfills as a soil contamination source: effect of the solid waste composition on the evaluation of the leachate production

Maria-Elena Rodrigo-Clavero and Javier Rodrigo-Illarri

Institute for Water and Environmental Engineering (IIAMA), Universitat Politècnica de València, Spain (marodcla@upv.es)

Leachate and biogas production are two critical environmental issues on the operation of solid waste landfills. From the hydrogeological point of view, leachate is one of the most important sources of groundwater pollution related with landfill operations. The estimation of the leachate production under realistic conditions is critical to perform an environmental analysis of the landfill behavior.

Leachate is formed by the percolation of the fluid that enters the landfill from external sources (e.g. runoff and precipitation) and the loose of humidity of the solid waste mass. Besides, the landfill gas (mainly formed by CH₄, CO₂ and other greenhouse effect gases) is produced from the anaerobic decomposition of the organic matter of the solid waste. Leachate and biogas production processes occur simultaneously in time and they are in fact coupled through the production or consumption of the water that exist inside the waste mass which can be understood to be the vadose zone of a non-saturated aquifer.

This paper introduces BIOLEACH, a new mathematical model programmed on a monthly scale, that evaluates the joint production of leachate and biogas inside a landfill applying water balance techniques. BIOLEACH considers the management of the landfill as a bioreactor. The application of such a model on real landfills allows to perform an environmentally sustainable management that minimizes the environmental impacts produced being also economically more profitable.

Results shown are obtained to analyze the leachate and biogas productions on a synthetic landfill performing a parameter sensitivity analysis. A set of hypothesis is built on a synthetic urban waste landfill for different waste mass mixtures.