Treatment of the municipal landfill leachate including selection of the best management solution

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Received 3 January 2018; Accepted 3 May 2018

ABSTRACT

In the current work, the multicriteria decision analysis (MCDA) is used for the selection of the optimal variant of municipal leachate management. The investigated leachate comes from a municipal, non-hazardous and neutral waste landfill located close to the urban area in Southern Poland. Four different variants of leachate disposal were assumed, including the construction of a leachate treatment plant, discharge of leachate to the sewage system and recirculation of leachate in the landfill. The results of the MCDA revealed that the most advantageous solutions for leachate management (based on economic, environmental and social criteria) are variant I – integrated membrane system: coagulation – ultrafiltration and variant II – integrated membrane system: coagulation – nanofiltration. Variant I was chosen as the best technology for the disposal of leachates from municipal waste dumps, it already has sufficient environmental performance at lower costs than the variant II and comparable social acceptance scores. Discharge of leachate to the sewage system and treatment together with municipal wastewater in the municipal treatment plant (variant III) is not recommended. Recirculation of leachate in the landfill (variant IV) is indicated as the worst option, compared with other evaluated methods of leachate management.

Keywords: Multicriteria decision analysis (MCDA); Economic criteria; Environmental criteria; Social criteria; Waste management; Municipal landfill leachate; Leachate treatment

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