Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

GAS RETENTION EFFICIENCY OF A COMPACTED SOIL LANDFILL FINAL COVER IN A SEMI-ARID CLIMATE

Maria Josicleide Felipe Guedes[1*], Francisco Gleson dos Santos Moreira[2], Jeovana Jisla das Neves Santos[3], Pabllo da Silva Araujo[3], Marcus Vinícius Melo de Lyra[3], Márcio Camargo de Melo[3], Veruschka Escarião Dessoles Monteiro[3]

[1]Federal University of the Semi-Arid Region - UFERSA, Francisco Mota Ave., 572, Mossoró, RN, 59625-900, Brazil
[2]Federal University of Ceará – UFC, Universidade Ave., 2853, Fortaleza, CE, 60020-181, Brazil
[3]Federal University of Campina Grande - UFCG, Aprígio Veloso St., 882, Campina Grande, PB, 58429-900, Brazil

Abstract

The soil final cover in municipal solid waste containment facilities plays the main role in controlling landfill gas emissions and its efficiency depends on geoenvironmental aspects (e.g. weather conditions and soil characteristics). This study aimed to evaluate the gas retention efficiency of a compacted soil final cover of a landfill located in the Brazilian semi-arid region. The researched area was a municipal solid waste landfill cell with approximately 62 million kg of disposed waste. Landfill gas emissions to the atmosphere were monitored through gas flux readings in the i) vertical gas drainage system; ii) soil-waste interface and iii) compacted soil final cover. There was no methane emission time lag and methane concentrations above 50% were observed right after landfill cell closure. However, there was a 70% reduction in methane emissions in a short-time period. The methane flux through the final cover corresponded to 9% of total methane emissions over the monitored period and it was significantly lower than the flux in the gas drainage system. Hence, the landfill final cover demonstrated an adequate gas retention efficiency.

Key words: carbon dioxide, methane, municipal solid waste, sustainable management

Received: December, 2020; Revised final: April, 2021; Accepted: October, 2021

[*]Author to whom all correspondence should be addressed: e-mail: mjosicleide@ufersa.edu.br; Phone: +55 83 987551796