

James Bonany

B. Eng. Environmental Engineering, Carleton University, 2010

Title:

Heat Budget for an Anaerobic Bioreactor Landfill in Sainte-Sophie, Quebec, Canada

Abstract

This thesis examines the heat energy balance in an operating bioreactor landfill. The landfill was instrumented with sensors to record the temperature, total load, settlement, percent oxygen, moisture content, electrical conductivity and mounding of leachate. While the ambient temperatures during the summer increased above 30°C, the temperatures recorded in the middle of a waste layer placed during the winter months remained at minus 2-3 °C. Modelling of the instrument bundle temperature data has confirmed the waste is a great insulator, having a low thermal conductivity and high latent heat of fusion. A sensitivity analysis of the thermal parameters indicated the latent heat of fusion and heat generation from biodegradation are important parameters when modelling a landfill in northern climates. The heat budget indicated a significant portion of the heat entering the waste is stored as latent heat. Ultimately, the model can help landfill operators improve their current operating practices.

Date of Completion:

2012

Degree:

Master of Applied Science in Environmental Engineering,

Supervisor:

Paul Van Geel