

Improved Inventory Methods for Landfill Methane Emissions from California Landfills

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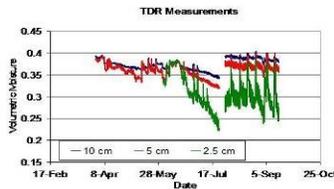
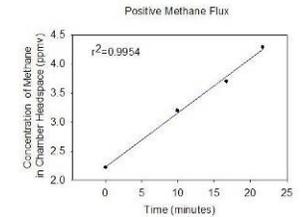
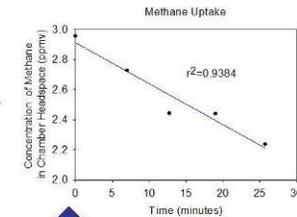
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This project was initiated by the California Energy Commission (CEC) in cooperation with the California Integrated Waste Management Board (CIWMB) to develop improved methods for landfill CH₄ emissions in the context of the California GHG inventory. Begun in February 2007, this 3-year project includes inventory method development with theoretical/empirical modeling; selective data collection, analysis, and validation; and field validation of methodology with feedback for method/model adjustments. Internationally, the IPCC/UNFCCC (Intergovernmental Panel on Climate Change/United Nations Framework Convention on Climate Change) develops national inventory methods to estimate GHG emissions from many sources and provides default values if country-specific data are lacking. The new 2006 UNFCCC inventory guidelines for CH₄ from solid waste disposal sites waste recognize the current state-of-the-science with respect to validated methods for field measurements, an expanded database of field measurements in the refereed literature, and evolving theoretical and empirical models appropriate for national or regional inventories. For the first time, these guidelines permit higher tier methods based on historic field measurements and models for improved national and regional inventories. This project for California would thus be consistent with new UNFCCC guidelines and would be the first such regional project for landfill CH₄. Project methods are based on expansion of previously-published field-validated modeling and measurement approaches (Bogner et al., 1997, 2000; Chanton and Liptay, 2000; Spokas et al., 2003, 2006), use of currently-collected site-specific data, integration of regional soils and climatic databases into an improved model, and field validation at 2-3 California landfills over an annual cycle. A CH₄ mass balance approach (Bogner and Spokas, 1993) will be used on a site-specific basis to partition CH₄ generation to emissions, recovery (via active gas extraction), oxidation to CO₂ by methanotrophic microorganisms in aerobic cover soils, lateral migration, and temporary storage within the landfill volume.

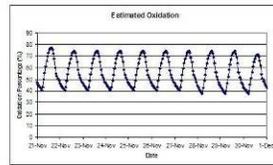
Field measurements to validate model predictions of soil temperature and moisture contents within landfill cover soils



Field emission measurements



Improved mathematical models for diurnal and seasonal predictability of methane oxidation potentials and rates accounting for changing soil conditions.



Improved methodology for the assessment of landfill methane emissions from California landfills (Java Computer Tool)

California GHG Inventory: Landfill Data Input Tool (Beta Version 1)



Prepared for PIER by Landfills+, Inc. & USDA/ARS

Laboratory incubations for determining base moisture and temperature for methane oxidation kinetics as a function of soil type



Mathematical modeling is validated with field and laboratory data

References Cited:

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