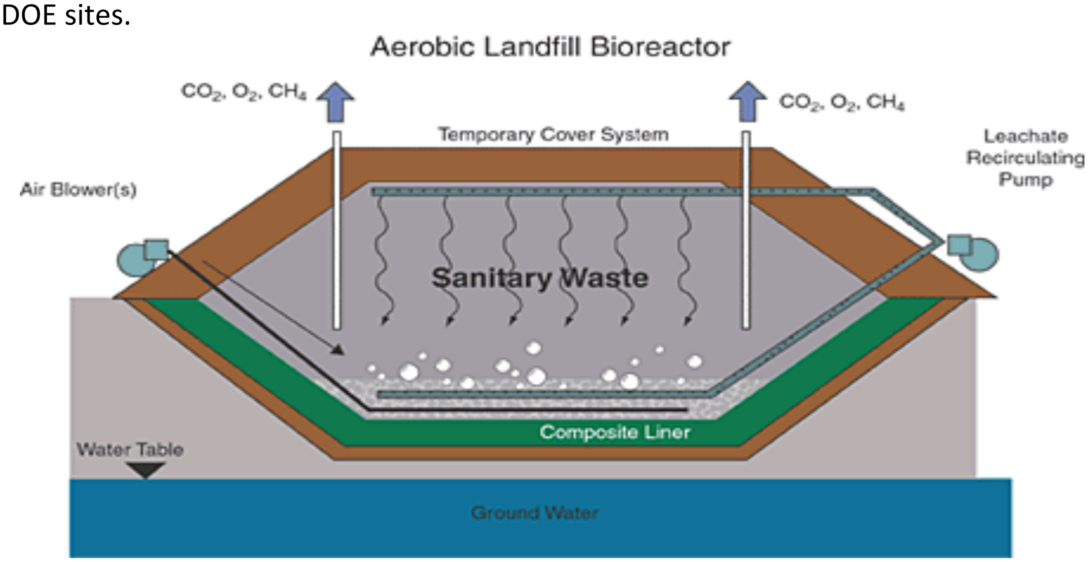
Aerobic Landfill Bioreactors

Previous work on landfills has focused mostly on anaerobic pathways of biodegradation. Modeling of landfills has been sparse due to difficulty in dealing with the heterogeneous nature of the refuse as a media for flow and transport and as a nutrient source, making predictive modeling and real-time control of processes less than optimal There has also been an increasing focus on landfills gases as a major contributor to green house gas and increasing costs of usable land, containment costs, and prolonged liability for landfill sites.

Our approach is to use mesoscale models of landfill refuse to determine aerobic parameters that are critical to optimizing biodegradation and stabilization of refuse and to use LBNL developed codes TOUGH2 and ITOUGH2 to develop a numerical simulation model of aerobic bioremediation of landfills. We are also pursuing field demonstrations to help verify and fine tune simulation model and critical parameters discovered in mesoscale studies at California municipal landfills and western DOE sites.



US Landfill Facts:

Over 3,500 U.S. landfills

214,000,000 tons/year of municipal solid waste

In 1999, the U.S. MSW market was $41.5 billion, with an average ton of waste costing $160 to collect and dispose.

The largest number of landfills-1,221--are located in the West. The south has the next highest number, 1,008.

CH4 accounts for 9.9% of all greenhouse gas emissions

Landfills are largest anthropogenic source of CH4 (32.5% of all methane sources)

CH4 traps heat 21 times more efficiently then CO2

Less than 26% of all CH4 from landfills is trapped or used

Benefits of an Aerobic Landfill Bioreactor:

Increase biodegradation rate

Increase subsidence

Reduce or eliminate need for leachate treatment

Decrease long-term liability and monitoring costs

Decrease leaching of metals and organic contaminants

Decrease methane generation (Green House Gas)