The advancement of Landfill BioCell (LBC) Technology by evaluating the overall efficacy of the Calgary BioCell

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Introduction – Open Dumps

- Oldest practice of Landfilling
  - Unsightly
  - Cause water pollution

Introduction – Sanitary Landfill

- Sanitary Landfills are designed and constructed to eliminate problems associated with “Open Dumps”

Un-sustainable: Loss of Space. Need to find new space every few years

Long-term liability: Need to monitor potential impact for a long-time (until waste stability is achieved)

Landfill gas: Greenhouse gas, contributes to global warming.

Introduction – Bioreactor Landfill

- Leachate is recirculated
  - Increase moisture, nutrients
  - Provide a microbial seed for rapid biodegradation
- High rates of gas production, enhanced energy recovery

Un-sustainable: Need to find new space every few years

Solution – Landfill Biocell

- Biocell is a holistic approach to sustainable waste management

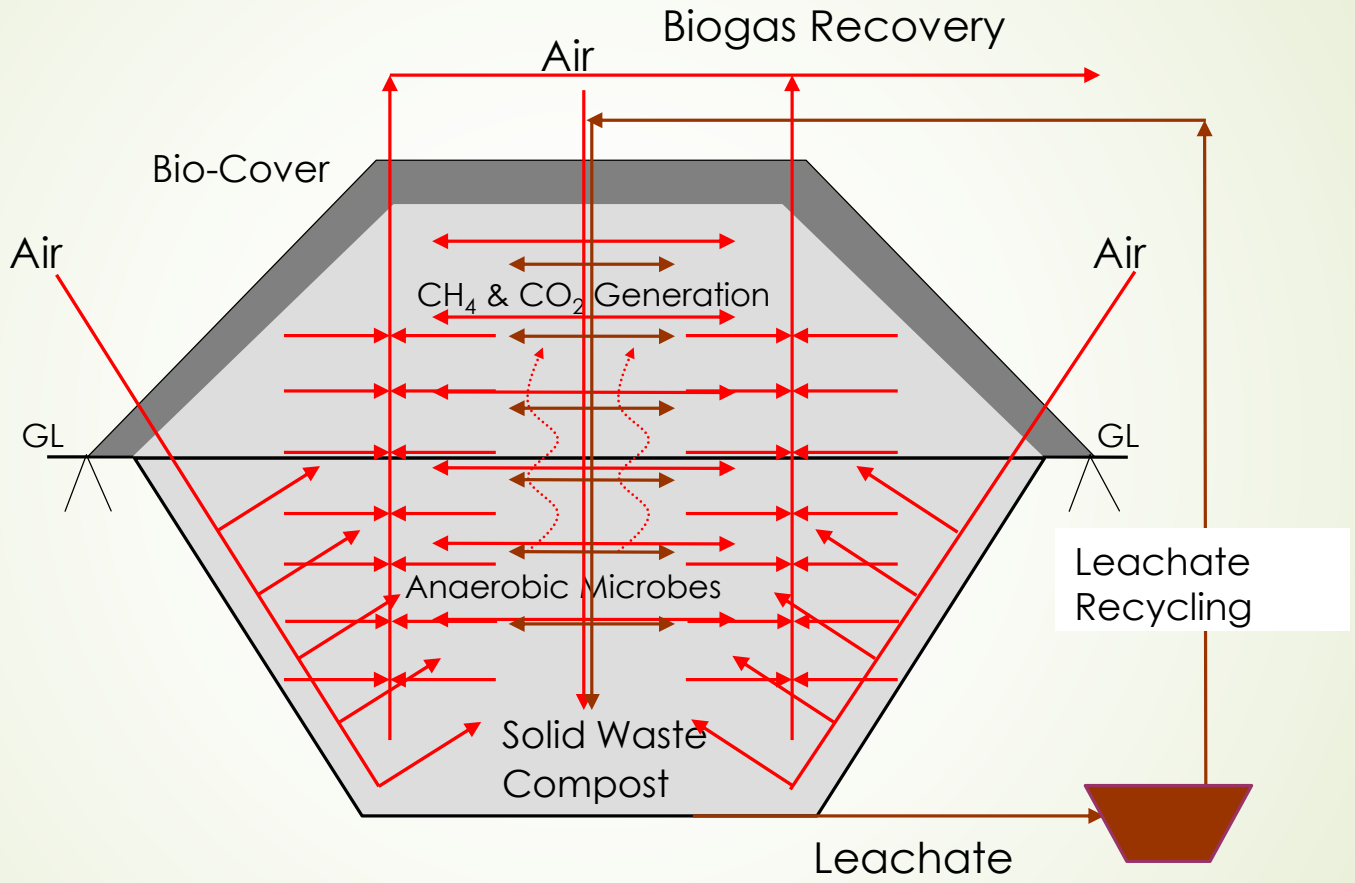
  Operated in three stages:

  1. Anaerobic Bioreactor
  2. Aerobic Bioreactor (in-ground composter)
  3. Biocell Mining

- Stabilize waste quickly (Anaerobic and Aerobic)
- "Mine" the cell, and extract recyclables & compost
- Reuse the space

Biocell is not a "landfill" but a low cost "waste processing facility"

Calgary Biocell - 2006



Unique Features

- Anaerobic Bioreactor stage – Completed
- Aerobic Bioreactor stage – Completed
- Biocell Mining stage

Research Goal and Objectives

- Evaluate the efficacy of BioCell to perform as an "in-ground waste processing system", by completing the final phase of the Calgary BioCell project; mining for resource and space recovery.

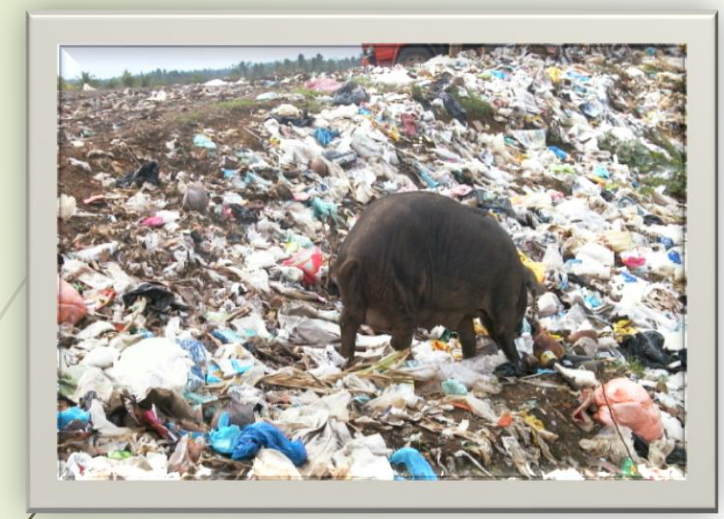
  - Evaluate the integrity of infrastructure elements recovered from the Calgary BioCell
  - Evaluate the greenhouse gas (GHG) mitigation efficiency of BioCells
  - Assess the feasibility of using the recovered bio-stabilized organic material (BSOM) as potential landfill biocover material
  - Assess the waste-to-energy potential of recovered high energy components as Refuse derived fuel (RDF)

Ongoing Research – Next Steps

- Excavate and mine material from the Calgary Biocell.
- Determine reusability of piping and valves for gas recovery, leachate collection and recirculation, and geosynthetic material including the LDPE final cover and the HDPE bottom liner.
- Recover and separate BSOM, recyclables, and combustible fractions
- Compare physical and chemical characteristics of each fraction with raw waste characteristics
- Determine the life-cycle carbon balance
- Evaluate the feasibility of using excavated BSOM as landfill biocover material to mitigate landfill CH_4 emissions
- Determine the energy potential of excavated combustible material.

Significance

- Biocell technology is a sustainable, cost effective (and risk-based), and integrated approach to reduce the risks of waste management and recover resources from waste.
  - Eliminate potential contamination of groundwater systems by landfill leachate.
  - Eliminate the threat of landfill fires and mitigate greenhouse gas emissions from landfills.
  - Eliminate the need to locate new landfill space.
  - Utilize the full potential of waste by generating energy and compost.
- Successful completion of this research will greatly benefit implementation of future Landfill BioCell projects in Canada.
- Biocell technology could be applied in other industries like forestry (wood waste) and agriculture (agricultural waste residue, cattle manure, pig slurry ponds as well.



Thank you!

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