Bioreactor/Bio-Stabilization Landfill

**Issue:**

Landfills represent a long-term liability and risk to the environment because the waste remains biologically active for many decades. Evolving technologies may provide opportunities to more rapidly stabilize the organic waste in the landfill. Bioreactor landfill technology can extend the life of a landfill by 30 percent (range 15 to 50 percent).

**Major Question**

1) Pursue the Development of Bioreactor/Bio-Stabilization Technology for Use at the City’s MSW Landfill If it can be Shown to be Technically and Economically Feasible.
   a. Yes
   b. No

**Implementation issues/considerations:**

1) Pursue the Development of Bioreactor/Bio-stabilization Technology for Use at the City’s MSW Landfill If it Can be Shown to be Technically and Economically Feasible.
   a. Added cost of service (construction, operation, monitoring)
   b. Guaranteed long-term supply of additional liquids
   c. Long-term increase in landfill space

**Other Considerations:**

1) Markets for added landfill gas generated
2) Currently only limited term for permit (research, development and demonstration)
Bioreactor/Bio-Stabilization Technologies
(Excerpts from Technical Paper)

- The potential benefits of full-scale bioreactor [landfill] (and to a less extent bio-stabilization) operations include the following:
  - Recovered landfill airspace, which effectively extends landfill life.
    - Retrofitted existing landfill cells are estimated to recover 15 to 30 percent of MSW landfill airspace (Hater, 2003).
    - New construction cells are estimated to recover 30 to 50 percent of MSW landfill airspace (Hater, 2003).
  - Increased revenue opportunities; both for long-term waste disposal and short-term liquids disposal.
  - Landfill stability in less than the 30-year post-closure care period.
  - Reduced long-term pollution potential associated with leachate and LFG.
  - Eliminated (or reduced) off-site leachate treatment/disposal costs.
  - Improved leachate quality as the waste stabilizes.
    - Greater LFG generation rate earlier in the life of the landfill. Research suggests that LFG generation rate is 2 to 10 times the rate associated with conventional landfills.
    - Significantly reduced LFG generation rate 10 years after closure, with potential reduction to post-closure LFG collection and monitoring costs (see Figure 3).
- Site specific aspects that may limit applicability of the bioreactor technology can include:
  - Insufficient quantities of liquids
  - Absence of consistent sources of liquids
  - Absence of an active gas collection system (note: Bluff Road Landfill has an active gas collection system, but currently only in closed areas of the landfill).
  - The landfill owner’s preference to avoid additional bioreactor construction costs and operational issues
  - An abundance of landfill airspace and available land in the region at a low capital cost.
  - Neighborhood concerns with odor
- Typically, bioreactor landfills will cost more to construct and operate.
- If the City of Lincoln were to consider the bioreactor landfill technology now or in future landfill construction, the issues that would need to be addressed include:
  - Risk
  - Regulatory compliance and permitting
  - Design evaluation (calculations) and facility features (required for permit approval)
  - Construction considerations (liquids storage/handling/distribution equipment and monitoring systems)
o Liquid quantities, sources and storage requirements
o Operational changes (including monitoring and record keeping)
o Optimizing site life
o Post-closure (care and duration)
o Costs implications (initial costs, increased operating costs, cost recovery, added revenues)
o Managing odors and emissions