

Pump and Treat Aerobic Flushing Bioreactor Landfill (Year 2)

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The objective of this research was to understand the fundamental requirements of a Pump and Treat Aerobic Flushing Bioreactor Landfill (PTAFBL) as a means of sustainable landfilling of municipal solid waste (MSW). The overall goal was to test that sustainable landfilling can be achieved by removing releasable recalcitrant carbon and ammonia-nitrogen at the end of a landfill life, reducing the long-term environmental threat. Laboratory-scale PTAFBL reactors were used to test this hypothesis by conducting laboratory analyses to evaluate both the solid waste and leachate characteristics during operation. These samples were further characterized using advanced spectroscopic techniques, which offer the ability to understand the chemical changes occurring during the waste stabilization process. This information will improve the understanding of waste degradation in terms of defining acceptable final storage quality of solid waste when correlating the spectral data to traditional chemical and biological characterization techniques for waste stability. The evolution (production) of humic acid (HA) will also be characterized during PTAFBL operation to determine the extent of humification, which will be used as an indicator of waste stability. Overall, going beyond the bioreactor landfill can further stabilize solids as well as reduce leachate contaminants. Data have shown that the mature solid waste was further stabilized and leachate quality improved under the three different flushing bioreactor (FB) scenarios. Despite this further stabilization there are components still remaining (including methane potential).

