

Comparison of Four Anaerobic Process Configurations for Food Processing Waste

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Abstract

Lycoming County Resources Management Services, Inc. (LCRMS) would like to identify management strategies that extend the life of its landfill, practice resource recovery, and develop sustainable solid waste management technologies. Bucknell University is assisting (LCRMS) in an investigation of anaerobic biodegradation of food processing wastes and municipal solid wastes that are currently landfilled. A pilot-scale evaluation of four anaerobic systems fed pre-sorted food processing waste has been completed. The pilot-scale system was designed and constructed to evaluate continuous operation and performance of hydrolysis/acidification and methanogenic reactors. The four configurations evaluated are an upflow anaerobic sludge blanket reactor (UASB), a fluidized bed reactor (FBR), and an anaerobic filter (AF), and a mixed batch reactor. The 80-liter UASB, FBR, and AF reactors were designed and operated as phased systems and are preceded by 200-liter hydrolysis/acidification reactors. The 1000-liter mixed batch reactor is a conventional anaerobic vessel. Each configuration was evaluated based on organic loading rate (OLR), solids destruction, gas production and methane content, and chemical supplementation. Maximum OLRs evaluated for the AF, UASB, FBR and batch reactor were 20, 20, 30, and 5 kg COD/m³-d, respectively. Whereas the efficiency of the phased systems is evident, the batch reactor offered more stability when feed composition changed.

This presentation will describe the design, startup, and performance of the four pilot systems with respect to OLR, solids destruction, unit methane generation, chemical supplementation, and process stability.