



MBBR Process Increases Landfill Treatment Capacity by 209 % Without Requiring Additional Footprint

Background

Keystone Sanitary Landfill, Inc. is a privately owned, 720 acre municipal solid waste landfill located in Dunmore, Pennsylvania that processes 5,000 tons of sanitary wastewater each day. The landfill operates under the revised commonwealth of PA regulations which conform to sub title D requirements and is in full compliance with 25 PA code, chapter 273. Keystone maintains an environmental management system which is second to none and takes pride in its uncompromising commitment to maintain an environmentally friendly operation.

Challenge

Keystone needed an economical retrofit that would increase the capacity of the wastewater treatment process to 108,000 GPD while reducing BOD₅ and NH₃ for effluent discharge. The ActiveCell[®] biological treatment process from Headworks BIO[™] Inc. was selected for the application to retrofit and upgrade four existing biological reactors that were previously used as a static fixed film media process equipped with a down draft mixer.



Customer: Keystone Landfill
Industry: Landfill

KEY FACTS

- **Design Flow:** 408.8 m³/day (108,000 GPD)
- **TBOD:** Influent 2,150 mg/L
Effluent Quality < 73 mg/L
Effluent Limits < 330 mg/L
- **NH₃:** Influent 76 mg/L
Effluent Quality < 12 mg/L
Effluent Limits < 20 mg/L
- **Influent Temperature:** 90 °C (194 °F)

ActiveCell Solution

Moving bed biofilm reactor (MBBR) technology employs robust, reliable next-generation biological technology. The process biodegrades wastewater using thousands of suspended media that operate in a continuously mixed environment. Each piece of media provides an active surface area sustaining heterotrophic and autotrophic bacteria within protected cells. This dynamic population of bacteria achieves high rate biodegradation productivity within the system, while also offering process resiliency and automated operation. MBBR technology enables industrial facilities, marine vessels, communities, and commercial businesses to reliably meet or exceed stringent environmental regulations.

Design

When the static media was removed from the existing biological reactors, it was packed with biosolids and was anaerobic and septic. The down draft mixers were replaced with coarse bubble air diffusers and regenerative blowers. Last, the basins were loaded with ActiveCell₄₅₀ biofilm carriers. The complete mix aerobic ActiveCell process operates without buildup of excess biomass since the carriers are in constant motion where dead biomass is continuously sloughed from the active surface area. This eliminated an anaerobic digester process and as a result, provided the landfill with increased treatment capacity, enhanced performance, and optimized reliability of the wastewater treatment facility. The landfill leachate is directed to a

pretreatment process followed by an ammonia stripper to provide a 62 % reduction in ammonia mass loading on the biological treatment system. After an economizer heat exchanger, the stripper effluent is then directed to four ActiveCell bioreactors plumbed in series to provide optimal biokinetics for COD reduction and nitrification of ammonia. The bioreactor effluent is directed to a clarifier for final discharge to the sewer drain.

Results

The MBBR treatment process eliminated the problematic anaerobic digester process while increasing flow capacity from 35,000 GPD to 108,000 GPD, a 209 % increase, all within the same overall footprint.



Installation of ActiveCell media into the nitrification reactor.