

TECHNOLOGY

Separator Produces Higher Bacteria Levels, More Solids Destroyed

Municipal wastewater treatment plants will be able to reduce solids processing time to as little as 5 days with an anaerobic digestion technology featuring a new anoxic gas flotation (AGF) separator, according to Dennis Burke, president of Cyclus Envirosystems Inc. in Olympia, Wash., which invented the technology. Conventional anaerobic systems, he says, average a solids processing time of 20 to 25 days. In pilot tests, the new system destroyed 13% more organic solids than conventional digesters, the company says.

The AGF separator is designed to increase the capacity of anaerobic digesters. In one version of the process, thickened solids are fed to an anaerobic reactor, digested, and transferred to a methane gas flotation unit, where microscopic gas bubbles gently separate bacteria and waste solids that are then

returned to the digester for further processing. High levels of bacteria and solids concentrated in the digester improve volatile solids reduction and solids retention time, Cyclus says.

Anaerobic activated solids processing for soluble and particulate wastes is yet to be practiced. Anaerobic bacteria tend to rise because of methane gas bubbles and cannot be concentrated through settling. Consequently, standard systems require large, expensive, heated reactors to digest particulate organics, Cyclus says, while the AGF separator removes bacteria from the digester effluent, substantially reduces hydraulic retention time (HRT), increases solids destruction, and produces more methane than conventional technologies.

Also, Burke says, no other high-rate anaerobic system can handle such large quantities of particulate matter — typically more than 500 mg/L.

The AGF separator can be used for wastewater, solids, food processing waste, the organic fraction of municipal solid waste, and other slowly consumed organic wastes, such as animal wastes.

The technology is yet to be used at full scale. The King County Department of Natural Resources East Division Reclamation Plant in Renton, Wash., and a potato processing plant near Boise, Idaho, have conducted pilot tests.

In the municipal tests, which ran from July 1995 to June 1996, researchers compared the digestion of thickened primary and waste activated sludge in an AGF-equipped digester and a conventional digester set up side by side. The HRT of the anoxic system dropped to 6 days, compared with 31 days for the

conventional digester, according to Cyclus. The AGF process also destroyed 59%, 62%, and 67% of the solids at 6-, 9-, and 19-day HRTs, respectively, while solids destruction in the conventional system was 54% at a 19-day HRT, the company reports.

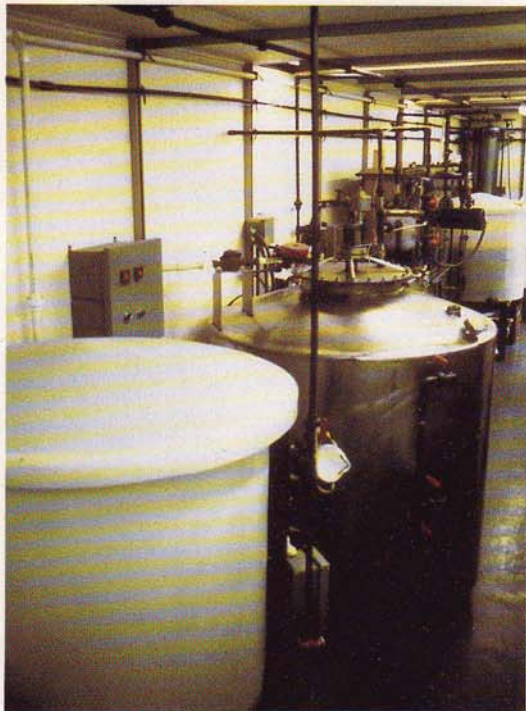
The methane production rate, researchers also learned, was 18% higher with the AGF separator, which they attributed to the AGF-equipped digester's ability to convert more chemical oxygen demand (COD) to gas, according to Cyclus.

The main advantage to the AGF separator, Burke says, is it can be retrofitted to any digester that is overloaded, a move, he says, that could help a treatment plant save 50% to 75% of the cost of a new digester. The separator also can be installed with a new digester, and dissolved air flotation units can be converted to AGF separators, he says.

Dick Finger, acting manager of wastewater operations at the King County West Point Treatment Plant in Seattle, says the AGF technology can benefit municipal operations that want to either reduce HRT and still achieve the same level of solids destruction or destroy more solids to lower biosolids hauling and land application costs. At press time, county officials were completing a cost-benefit analysis on the AGF unit, he says.

"The driving factor to use it would be the costs for specific plants, and there are questions about the costs of operating an extra piece of equipment associated with gas flotation," says Finger, process control supervisor at the Renton plant during the pilot tests. "Certainly, the ability to increase digester capacity would have capital cost and site-saving implications. On the other side, enhanced solids destruction and more methane production also [have] potential cost savings."

In pilot studies at the potato plant, ongoing at press time, researchers are



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During pilot tests at a municipal wastewater treatment plant in Renton, Wash., the stainless steel AGF digester outperformed a conventional digester at a 19-day hydraulic retention time.

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