

Technology separates waste from water

Waterloo Biofilter Systems uses a type of foam to treat sewage



MATHEW MCCARTHY, RECORD STAFF

Craig Jowett, president of Waterloo Biofilter Systems, stands next to tanks used to treat waste water from the Cedar Creek Fuel Centre in Ayr. Treated water can be later used to wash trucks.

How it works

The Waterloo Biofilter system consists of four steps

- Fermenting — A septic tank treats raw sewage by fermentation (just like making wine or beer). For residential systems, it is important to minimize the use of household disinfectants, so as not to kill the bacteria that carry on the fermentation process.
- Screening — A filter on the septic tank screens out large particles to ensure effective treatment by the biofilter.
- Decontaminating — Aerobic

filtration treatment is done with an absorbent biofilter medium which houses microbes that degrade and oxidize organic pollutants, coliform bacteria, ammonium and other contaminants in the septic tank effluent.

- Disposal — The treated water is discharged to a shallow area bed or trench. With additional treatment, such as disinfection and phosphorus removal, the water can be reused for applications such as toilet flushing, irrigation and vehicle washing.

By Duane Sharp, special to The Record

While most of us take clean water for granted, a company in Rockwood has been working hard at removing contaminants from the waste water we generate every time we turn on a tap or flush a toilet.

Waterloo Biofilter Systems Inc. designs and manufactures waste water treatment systems, including an innovative process for removing toxic substances such as raw sewage from waste water. The process uses a synthetic foam filter installed in a shallow bed or trench to dispose of the effluent within the ground. It even works in clay and bedrock.

Craig Jowett, the company's president, developed the patented Waterloo Biofilter in 1991 at the University of Waterloo, where he was a professor in the Waterloo Centre for Groundwater Research. Waterloo Biofilter Systems Inc. was incorporated in 1995 and operated out of a small rented facility in Guelph. The business moved to the nearby village of Rockwood, where Jowett lives, in 1999.

The Waterloo Biofilter system uses polyurethane foam pieces, similar to upholstery foam, as a medium for natural biological treatment of sewage. The foam itself is non-biodegradable. In fact, units have been operating continuously for more than 15 years without needing replacement.

Here's how the system works: Septic tank effluent, which is the fermented liquid portion of raw sewage, is sprayed intermittently over the filter. As it drains into the foam by gravity, microbes consume and remove the organic pollutants, coliform bacteria, ammonium and other suspended solids, leaving non-greenhouse gases and water as by-products.

The company has installed thousands of residential waste water treatment systems across Canada and the United States, as well as numerous systems in other areas, including Europe, the Middle East and Korea. It also has installed hundreds of large commercial and communal systems, some of which treat up to 200,000 litres a day.

Jowett, a member of the board of the Ontario Onsite Wastewater Association, notes that the system has undergone extensive lab and field testing to compare it to other types of filters.

"Our synthetic foam filter was determined to be the most effective treatment with the least power consumption of all methods, based on comprehensive third-party testing by university and government agencies," he says.

The third-party programs included testing by the U.S. Environmental Protection Agency. In two years of "high load" testing in Massachusetts, high treatment levels were observed even during cold winters, Jowett says.

The effectiveness of waste water treatment systems is measured by the removal rates of toxic substances such as organics, suspended solids, bacteria and nitrogen. Typical removal rates for the Waterloo Biofilter are about 95 per cent

for organics, 95 per cent for suspended solids, 99 per cent for E. coli and 60 to 65 per cent for total nitrogen. The system removes nitrogen by returning a portion of the nitrate-rich effluent back to the septic tank.

Not content with those results, the company developed an anoxic biological filter. This chemical filter contains little or no oxygen and can remove certain undesirable elements, such as iron, manganese and hydrogen sulphide, which may make waste water smell like rotten eggs. The anoxic filter can remove 99 per cent of the nitrate passing through it. This is done by gravity and without the use of mechanical means, so it is long-lasting and doesn't consume energy.

The cost of the company's biofilter systems depends on the size, application and flow rates, which are customized for each installation. For a typical residential system, it ranges from \$12,000 to \$14,000, but it may be as high as \$20,000 for a large system.

"We deal directly with the builder or the general contractor on a commercial or residential development site," says Marianne Willson, southwestern Ontario technical representative for Waterloo Biofilter. "The system is suitable for cold weather and seasonal operation and can easily be scaled for different size applications and flow rates from 1,500 litres per day to more than 100,000 litres per day, by increasing medium depth and by adding biofilter modules."

The biofilter medium provides several benefits to users, says Willson.

"The filter does not require cleaning, pumping or rinsing. It can be used seasonally or permanently year round, and lasts 20 to 30 years before changing. When the biofilter media requires changing, users remove two baskets and replace them."

Willson adds that the system provides treatment in compact spaces with little maintenance and low intermittent power use, equal to a 60-watt light bulb.

Waterloo Biofilter also is a pioneer in reusing treated waste water on-site.

It has installed systems that treat waste water and reuse it for irrigation, toilet flushing, vehicle washing and recharging aquifers. At the Toronto Healthy House demonstration project, treated waste water is used for toilet flushing, bathing and laundry.

Cedar Creek Fuel Centre, located in Ayr just off Highway 401, installed a biofilter system when the facility was built in 2006 because it wanted to ensure that waste water that ends up in the nearby Cedar Creek doesn't have high nitrogen levels. Nitrogen levels in the creek already are relatively high due to fertilizer runoff from neighbouring farms, said Martin Sommer, the fuel centre's general manager.

The system treats sewage from the facility and reuses it for truck-washing and irrigation. The project also includes a large tank that is connected to a sink for the collection of degreasers, chemical cleaners, disinfectants, and waste coffee and soup. The contents of the tank are trucked away and treated off-site.