

Awareness is Key to a Clean Environment

BY AMY SORKIN KURLAND

With the increasing reports of global warming and environmental waste (not to mention the current state of world politics), it's easy to adopt a "we're all doomed" kind of attitude in terms of protecting the environment.

But the truth is, we can play a more active role in protecting our water than most of us realize. Often the only thing standing in our way is simply a matter of not being informed of all our options. And that's largely why the National Onsite Demonstration Program (NODP) was created—to raise awareness.

Co-funded by The City of Syracuse (NY) Department of Water and the United States Environmental Protection Agency, the NODP was invited to encourage the use of alternative, onsite wastewater treatment technologies. The NODP, which began in 2003, is basically a showcase of effective alternative onsite wastewater technologies in action at various sites on the

The watershed of New York state's Skaneateles Lake is the second-largest unfiltered water source in the country, and less than 10% of its surrounding properties are sewer-served—the perfect location for showcasing the cutting-edge, market-ready technologies for handling wastewater onsite.

Skaneateles Lake watershed in Onondaga County, NY.

Although it might sound like a marketing effort, selling the equipment right then and there is really not the point of the NODP. The program's mission is to introduce these technologies to homeowners, developers, engineers, and regulators as a means of protecting public health, ensuring water quality, and sustaining the environment. "So far, these new technologies have been regionalized and not yet absorbed fully into other parts of the country," says Eric Murdock, NODP project manager. Other objectives include establishing performance-based design standards, developing uniform regulatory framework, and providing training for project personnel.

Many of the NODP onsite wastewater technologies are not only as—or more—effective than conventional centralized treatment systems, but they are often more cost-efficient as well. In addition, one of their biggest advantages is that many can perform in areas where conventional systems fail. The sites chosen for the NODP

are lakefront properties that have had a history of onsite wastewater treatment system (OWTS) failures due to challenging conditions for conventional systems. Examples of such challenges include shallow depth to bedrock, poor percolation rate, steep slopes, shallow groundwater table, and poor soils for biological treatment, to name a few. On these selected sites, OWTSs have been installed to replace the ineffective conventional drainage systems.

About Skaneateles Lake

Skaneateles Lake, the fourth largest and third deepest of the Finger Lakes, is one of the few large-system surface water supplies in the country that's still approved as an unfiltered water supply. Enjoying a long history of watershed protection, the Skaneateles Lake watershed was one of the first in New York state to have formal watershed rules and regulations. This watershed includes one village and seven towns within the counties of Onondaga, Cayuga, and Cortland. Since 1894, this lake has been the primary supply of drinking water for the city of Syracuse and its surrounding communities.

For its approximately 15 miles of length, one mile of width, and 300 feet of maximum depth, it has a relatively small watershed covering 59 square miles and a water surface area of 14 square miles. This is one of the reasons why it's such a challenge to use conventional drainage systems on the watershed properties.

The lake's water is of exceptionally high quality, partly due to its watershed protection history and partly due to the small watershed-to-lake surface area, which is believed to be responsible for the lake's low biological productivity level. In other words, there's only a minimal amount of algae and other plant forms living in the lake as compared with other bodies of water. As a result, the water has a high level of clarity allowing light to penetrate deep into the lake and giving it a beautiful, rich, blue-green color.

Knight In Sparkling Armor?

The Glen Haven restaurant, a popular seasonal tourist attraction on Skaneateles Lake in Cortland County, is currently the only commercial property participating in the NODP. The Glen Haven has a long history of what many would call a restaurant nightmare: untreated sewage surfacing in its parking lots and running into the lake. Several factors are responsible for the drainage problems, including the restaurant's proximity to the lake, the high strength of the restaurant waste (grease, oil, etc.), poor soils, shallow depth to bedrock, and limited area in which



The excavation is made on a cut-and-fill bed for Eljen In-Drains.

to place a septic system.

Before the restaurant was part of the NODP, it had been using an outdated and undersized septic tank that had been discharging to failing dry wells (aka seepage pits). The equipment being demonstrated at the restaurant now, installed in May 2005, is Knight Treatment Systems' microbial inoculator generator. The system was cleverly named the White Knight because it "comes to the rescue" of septic systems that are not working properly. The White Knight enhances the performance of and restores biologically clogged septic absorption systems.

"We don't make onsite water treatment

systems," says Mark Noga, vice president of the Oswego, NY-based company, "we make them better." The White Knight accomplishes this by introducing selected, task-specific microorganisms to the existing septic system. The White Knight itself is literally placed inside the septic system.

In addition to unclogging septic systems, the White Knight helps break down fats, oils, and grease (FOG) that make treating restaurant wastewater such a challenge. To get an idea of the strength of the waste produced by the Glen Haven, a typical residence produces approximately 150-300 mg per liter of biochemical oxygen demand (BOD), whereas for the year prior to the placement of the White Knight, the Glen Haven was producing approximately 2,000-2,500 mg per liter of BOD.

The White Knight changed the Glen Haven's existing septic system from an anaerobic ecology to an aerobic ecology. "Aerobic microorganisms are far quicker in terms of taking and degrading these waste compounds to their elemental forms," explains Noga. "Every technology out there, until this came along, simply focused on creating a work space and environment that would allow biology to naturally happen. This technology is like an employment agency that screens prospects and places only the best. We put it in the septic tank and use the tank as a breeding reactor for a team for selected microorganisms. Then we release them into the rest of the system to degrade the waste into carbon dioxide and water."

As of now, over 1,000 White Knights are in use across the US and in Canada. The systems are installed and maintained by trained professionals and can be used in both residential and commercial facilities. For residential use, they require maintenance about twice a year. For commercial use, this



An Orenco Biotube unit is readied for an AdvanTex treatment system.



A sample collection point is installed for drip irrigation effluent. The perforated piping is 12 inches below the drip tubing.

can be anywhere from four to six times a year, depending on the circumstances.

Quanics' Aerocell

The Pollock residence, located on the lake, sits on a very small and narrow lot that is not large enough to be able to place the drainfield outside the required 100-foot separation distance to the lake. As part

of the NODP, an advanced treatment unit, Quanics Engineering Water Solutions' Aerocell foam trickling filter, was installed in December 2005 to provide pretreatment of wastewater prior to discharge to subsurface trenches located within 100-feet of the lake. This is the first installation of the Aerocell in the state of New York.

The Aerocell was added to work in conjunction with the Pollock residence's existing septic tank system, which was undersized and outdated and had been discharging to dry wells within 40 feet of the lake. Groundwater had been infiltrating the septic tank and overloading the dry well with liquid, which had created the flooding on the grounds.

The Aerocell is a fixed-film media filter. The foam material, which functions in an aerobic environment, acts as media, as opposed to a suspended growth unit. "There's a primary septic tank and a recirculation tank," says Brian Borders, president of Quanics. "The effluent is pumped to the Aerocell module, where it is sprayed over the top of the open-cell foam media, which allows microorganisms to attach to it. Then with the help of gravity, it trickles through the media and travels back to the recirculation tank. In the recirc tank there's a recirculation device, a flow splitter, which drops 80% of that wastewater into the recirc tank. Twenty percent of that effluent goes out to the final treatment and disposal field."

Measuring 6 feet by 9 feet, the Aerocell is often installed on top of the septic tank. Quanics, based in Crestwood, KY, is one of two companies to use this particular type of patented open-cell foam material media. The advantage is that it has a really high surface area, so the footprint is smaller. "You can load it with 10 times what you can with sand, for example," says Borders. "And because it's synthetic, it doesn't break down."

The Aerocell can be used in any application: industrial, residential, or commercial. It's sold as a complete system, including a STEP (septic tank effluent pump system) package, the module, a recirc device, and an effluent filter that goes into the primary septic tank. Installation is a simple process that usually takes about one to two days, and Quanics recommends a maintenance visit every six months.

"The quality of effluent that we have documented is some of the best in the industry," says Borders. "When we did our NSF test, our average was 2 on the BOD and TSS and 9 on TN." (Typical might be 30 TSS 25 on BOD to pass.) "This is ideal for people who are working in environmentally sensitive areas and are looking for high quality wastewater."

AdvanTex

The Kelly residence, another NODP site, has a small, narrow lot that is too close to the lake for proper treatment of the home's wastewater. It also has a steep slope, poor soil for biological treatment, and high groundwater. Before Wastewater Technologies installed an AdvanTex AX treatment system at the Kelly home in August 2004, septic waste had been surfacing from failing dry wells.

Manufactured by Orenco Systems Inc., of Sutherlin, OR, the AdvanTex works in conjunction with a septic system, providing advanced secondary treatment. The AdvanTex utilizes a patented AdvanTex AX filter, a lightweight, engineered, and highly absorbent textile material that sits in a watertight, fiberglass basin. One of its biggest advantages—and why it's great for the Kelly residence—is that it treats a tremendous amount of wastewater in a small area.

"The wastewater from a residence or an office building goes into a septic tank," begins Norm Schreib, engineer at Wastewater Technologies. "Then it's pumped through the filter and recirculates there five times. In the filter there's naturally occurring biological activity, and these bugs eat the waste so that what's produced is a clear, odorless effluent."

The AdvanTex is used for residential buildings and commercial

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facilities like office buildings and restaurants. The filter is a geotextile pod that acts like housing for the bacteria. "The bacteria want to live on the surface of something, and the textile has an extraordinarily high surface-to-volume ratio. So this property allows us to reduce the footprint size of the volume while increasing the surface areas of media," explains Schreib. "Also, the media is a polypropylene nonwoven textile, so it's not subject to degradation."

The AdvanTex came out in 2001, and since then Orenco has sold in excess of 10,000 units. It's modular and comes in two pod sizes: 200 square feet and 100 square feet. To accommodate sites with high wastewater loads, the pods can be ganged up. At the Kelly residence, the AdvanTex pod fits right in the footprint of the septic tank, reducing the drain field there by as much as one third.

It takes about two to four hours to install an AdvanTex pod. As far as maintenance goes, an annual visit is recommended, which generally takes about 45 minutes to one hour. If the system is installed correctly and properly maintained, it should last the life of the facility. A big benefit for the customer is that the AdvanTex is sold with a control panel that provides the system with a constant sentry. If it identifies anything suspicious, it will alert the service provider. As a result, the home or project owner is relieved of the burden of determining when there are problems not otherwise readily detectable.

Eco-Pure

In the town of Skaneateles, the Carroll and Reiffenstein homes were both challenged with shallow depth to groundwater and poor soils for biological treatment. Their septic tanks were undersized and their leachfields were just not up for the job. The result was untreated wastewater seeping into the groundwater.



The rich hues of autumn surround Skaneateles Lake.

Both homes were installed with Eco-Pure 300 series peat filtration units, which provide advanced secondary treatment to septic wastewater. The Eco-Pure is a natural treatment unit that filters wastewater by working with fungi in a bacteria colony. It does this by using a specially select harvest spagnum peat moss.

"What we did is we compacted the peat moss into a watertight roto-molded tank that was especially designed for this system," begins Ed Festa, CEO of Eco-Pure, in Fort Myers, FL. "The wastewater goes

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from the house to the septic tank, then can be pumped or gravity-flowed into the peat filter. Instead of relying on soil to do all the treatment, the treatment takes place in the peat filter. The soil then becomes a third step in the treatment train instead of the second."

Once the septic tank solids settle out, the black water flows into the peat filter. The filter has a special distribution plate that allows the wastewater to seep slowly into the peat moss so that the fungi colony will digest the wastewater. One of the heroes in fungi colony is penicillium. Penicillium allows the peat moss to treat 99% of the faecal coliform. (Other systems do not treat faecal coliform, and the treated waste from those systems needs to be run through chlorination or UV light to do so.)

Made to treat mainly residential-strength waste, the Eco-Pure system is not merely



Air bubbles roll in a Knight Treatment Systems White Knight microbial inoculator generator.

added to an existing septic system. It is a septic system, complete with the peat moss filter and its own septic tank. "It's also a passive system," says Festa, "which means you don't need any pumps if you have the right

topography." Systems can be paired up to accommodate any size building, but typically it takes one system for a four-bedroom, single-family home. Since 1999, the Eco-Pure is being used on both commercial and residential sites throughout the US.

Maintenance, which takes only about a half hour, is recommended annually. Installation takes about a day and a half. To empower owners, Eco-Pure hands out owner's manuals and informs owners about the responsibilities that come with using and maintaining the system.

Wasteflow

After treatment with the Eco-Pure system, the wastewater at the Carroll and Reiffenstein homes is released back into the environment by Geoflow's Wasteflow dripline to prevent flooding. Wasteflow is half-inch tubing pierced with evenly spaced holes and buried 6-10 inches underground. Because it operates underground, there is no surface contamination, no ponding, no runoff issues, and no odor.

Wasteflow's success results from the time-dosed application of effluent, with resting periods. "Slow and steady" is the key here. "This is a very slow, determined dispersal," says Karen Ferguson, president of the Corte Mesa, CA-based Geoflow. "Slow dispersal is better because, when the water is dispersed underground, if it comes out too fast it will percolate to the surface or go down into the groundwater or wells." Wasteflow is ideal for tight or shallow soil or steep slopes because the application is slow and uniform across the entire drip dispersal field.

Once the wastewater has gone through the secondary treatment train (or in this case, through the Eco-Pure system), it goes to the pump tank. From the pump tank it goes to Wasteflow for dispersal. To regulate the amount of water that comes in, there's an emitter at each hole on the Wasteflow tubing. The emitters are usually spaced 2 feet apart, and the dripline itself is laid down in rows that are also usually 2 feet apart. "A timer prompts the pump to dose the wastewater periodically throughout the day. This can be as frequently as every hour," says Ferguson.

Drip irrigation, the slow release of water, has been around since the late '60s and has traditionally been used in agricultural applications. The technology has been used with onsite wastewater since the late '80s. What Geoflow has done that other technologies like it haven't was to apply two chemicals that protect the tubing. Each of the emitters on the Wasteflow pipes are impregnated with

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a chemical called ROOTGUARD, which prevents the growth of roots into the holes. The Wasteflow pipes are also coated with Ultra-Fresh, an antibacterial chemical that inhibits bacterial growth on the walls of the tube and the emitters. These chemicals prevent clogs experienced by similar systems.

Wasteflow is not a new product, but this is the first time it's been part of the NODP. Geoflow's main purpose for including Wasteflow in the NODP is not so much for marketing purposes as it is for demonstration and to provide training for those in the industry. It's currently being used worldwide in residential, commercial, and industrial applications.

Bord na Mona

The Davidson residence, in the town of Skaneateles, is challenged with a small, narrow lot and poor soils for biological treatment. The previous septic system was outdated and discharging to dry wells, resulting in untreated wastewater leaching into the lake. To provide advanced treatment to the property's septic tank effluent, Bord na Mona's Puraflo peat filtration unit was introduced to this site for the NODP in September 2004.

After the treated wastewater moves out of

the septic tank into a pump tank, it's dosed through the Puraflo peat filter (typically there are 12 doses a day) where an aerobic treatment process occurs. "The wastewater percolates down through the peat media," says Martin Hally, president of Bord na Mona, based in Newbridge, Ireland. "And as it's going through the filter, the cleanup processes take place. Peat has a high residence time. From the time it goes in to when it leaves is a 36-48 hour period."

Puraflo has three mechanisms: physical (filtration and absorption), chemical (adsorption and cation exchange), and microbiology (microbial assimilation). "The first dose of wastewater from a household introduces all the microbes from nature into our system. This natural biology settles in the peat filter and these guys eat away the toxics that come in afterwards. Then they stay in the peat, which gives them a natural environment to live in."

What's different about the Puraflo system in comparison to similar systems is that it uses peat fiber, not peat moss. Even though Bord na Mona produces both peat moss and peat fiber, Hally believes that peat fiber is the superior choice for the Puraflo system: "Peat fiber is only 1-2% of the peat harvested. You get a longer life out of it."

Each Puraflo module measures 7 feet by 4.5 feet by 30 inches and can be used with any septic tank. Normally the modules sit to the side of the septic tank, and the rule of thumb is one module per bedroom. They are best used for treating domestic-strength waste that comes from residential and light commercial buildings where there is not a preponderance of FOG.

Puraflo has been used in Ireland since 1987 and in the US since 1993. Currently it's being used in 31 different states in the US. Installation of the modules is simple, taking half of a day on average. Annual maintenance is recommended.

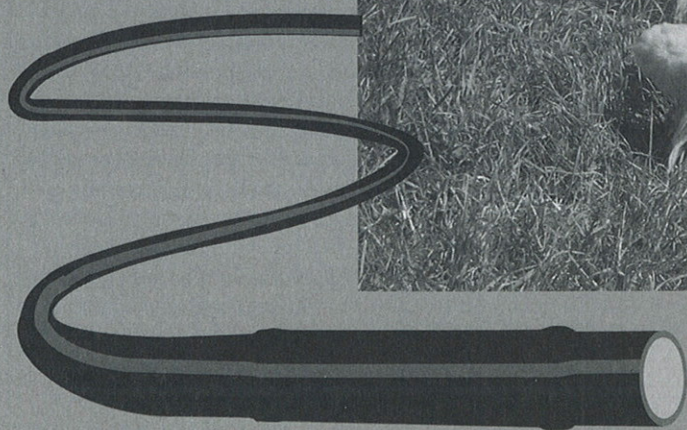
"We recommend that the homeowner includes maintenance in the contract with the installer," adds Hally. If you don't abuse the filters, they're highly reliable. "We say you should get in the order of 15 years of life from our system. But we actually have some that are 22 years old and not showing any signs of media decay."

The high level of treatment, reliability, and associated low operating cost make Puraflo an attractive alternative for wastewater system designers and homeowners. **OW**

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