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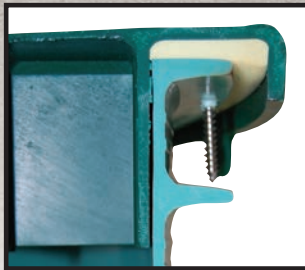
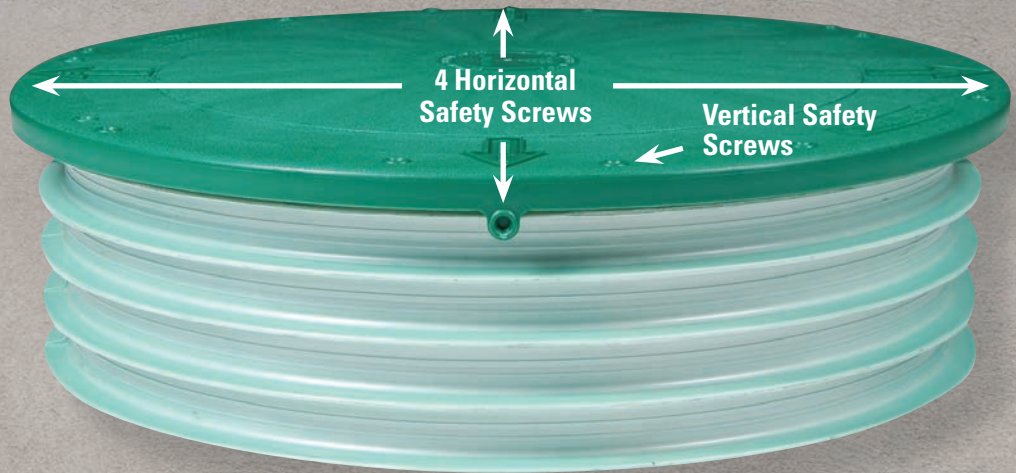
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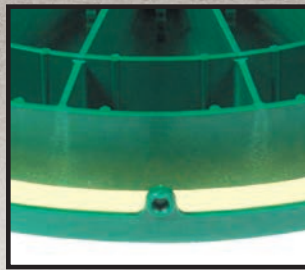
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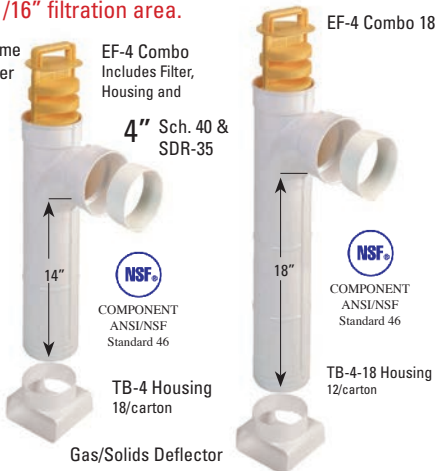


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6" Effluent Filter EF-6

One-piece effluent filter fits in 6" T-Baffle™.

- Injection molded PolyPro
- Simple to install
- Easy to clean

6" Sanitary T-Baffle™

- Injection molded
- Fits 4" Sch. 40 and SDR-35 pipe
- Simple to install
- May also be used as Outlet Tee with Solids Deflector

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INSTALLER PROFILE:

Love of Learning By Ted J. Rulseh

ON THE COVER:

North Carolina's Courtney Stephenson took a degree in biology and chemistry, combined with hard work and a love for machines, and parlayed it into the successful Atlantic On Site Services. She is shown with one of her favorite work tools, a striking pink Bobcat E50 compact excavator. (Photo by Andrew Craft)

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Jim Kneisz



It's Time for a Septic System Reality Check

The onsite industry has to share the hard truth that the private wastewater infrastructure is broken and needs fixing to protect public health

It's refreshing when septic system users verbalize the same things installers, designers and health department regulators are thinking to themselves when homeowners balk at repair or replacement of failed systems.

How many times have you listened to a line of arguments from someone who is used to "free" decentralized wastewater handling but is now dealing with the "sticker shock" of a new septic system?

It might go like this:

County health officer: Sir, your 40-year-old septic system no longer processes wastewater and it must be replaced.

Homeowner in denial: But it's worked perfectly all these years and I've never had to have it pumped ... I'll bet you only required the inspection to collect more money from me ... Nobody's complaining or getting sick from the drinking water around here ... I'm on a fixed income and you're going to drive me out of my house.

We have to face up to the fact that many septic systems in America are well past their replacement date and they are no different than the federal highway system.

Both need upgrading.

Failing Grade

The fine folks from Randolph, Minnesota, probably went through a similar scenario recently when local county officials took over onsite monitoring responsibilities from the tiny village located on a pristine waterway south of the Twin Cities. Since the county assumed the inspection duties, 43 of 149 systems were found to be failing, according to a report in the *Minneapolis Star-Tribune*. Of the 106 in compliance, it was estimated that 30 may fail in the next few years.

One resident who had modernized his septic system said it was the right thing to do. Bob Helgerson is even OK with a discussion that could either lead to septic system repairs for others or connecting to a municipal sewer system.

"It's not an easy problem, but I think as a responsible steward of the water supply, No. 1, and as a responsible participant in the community of Randolph, we've got an obligation to consider all options," Helgerson told the newspaper.

Local officials, however, worry that a projected \$8,000 to \$15,000 septic system replacement would be a burden on some homeowners, pulling out the "fixed income" argument. They recognize the risk of untreated wastewater reaching the well water drinking supply and the need to upgrade some woefully old septic systems. But they hope for low-interest loans to augment a county cost-sharing program to help those in need handle the major expense.

Truth Bombs?

When you scroll beneath the short story, however, you get to some ideas and input from readers. Some of it is constructive. And some of it is lobbying flaming truth bombs you would probably endorse. What's nice to see is that some of the mainstream public we need to reach as an industry have come up with some great insights. See the anonymous quotes and my responses below:

Rural public sewer is not the answer

"Don't fall for the rural sewer option scam that I'm sure will be on the table. We got forced to spend (thousands) to install it up at our lake property along with everybody else, and now every year the monthly bill keeps increasing."

Jim says: Municipal sewer systems have their place, but we're learning over time that they can be costly boondoggles when treatment capacity outstrips user density. Advancing onsite technology offers better wastewater solutions all the time, especially in lake regions where lots are small and site conditions are challenging. Do your homework when the Professor Harold Hill of the Big Pipe shows up in your small town.

Consider private cluster systems

"Some lake property development in northern Minnesota includes a central septic system that serves six or more individual lots. The same setup is used to furnish well water to each of those lots. When individuals purchase one of those lots, they sign on to their responsibility to pay into the maintenance of the well and septic."

Jim says: Sometimes it makes great sense to work with your neighbors to find the right onsite solution. Every family on your block buys their own

lawnmower, but when it comes to a major investment like processing wastewater, you might find cooperating on a private treatment system is the smart way to go.

Where's the personal responsibility?

"I don't care if you bought this house a week ago or 100 years ago, if the septic system is out of code ... fix it. Take out a loan or sell the place if you have to. If you can't afford to take care of a property for the public good and your own, you shouldn't be living on it."

Jim says: What makes a septic system any different from a new roof or a furnace? They are all household components that have a finite life and wear out. I'll tell you what's different: If your roof leaks, it only gets you wet. A broken wastewater system can harm all of your neighbors. Personal responsibility is woefully lacking today when many people would rather fix a septic system on the cheap or ignore the problem all together.

Onsite systems offer good value

"After living on a farm I know that we had to replace septic systems as they aged. Not a mystery. My water/sanitary sewer bill runs \$600/year using very little water. Take that times 40 years and that's \$24,000. In lieu of paying those bills (septic system owners) need a \$6,000 upgrade. That looks cheap to me."

Jim says: I've been singing this tune for years. My annual combined water and sewer bill is well over a thousand dollars. Compare that to a homeowner with a septic system that lasts 30 to 40 years and may spend \$300 every three years to pump the tank. Onsite systems, properly cared for, offer a tremendous wastewater treatment value.

Infrastructure is important

"How could anyone even think that infrastructure would wear out and people would have to replace it? How can we sit and complain about state and federal elected officials deferring responsible infrastructure maintenance when we and our neighbors are far worse at it."

Jim says: We expect smooth roads and scream when we hit a pothole. We would all like better infrastructure and realize that the government needs to spend more money in that area. But we don't recognize the need for improved infrastructure, quite literally, in our backyards. We have to face up to the fact that many septic systems in America are well past their replacement date and they are no different than the federal highway system. Both need upgrading.

Get used to this battle

"This will be a growing concern as septic systems age and counties are pressing new standards that require a compliance check during home sale. We are undergoing the latter as my elderly folks' home failed. My father is a bit stunned, as his generation felt that the old septic tank/cistern was good for the life of the home. You would be surprised how many people don't understand (or accept) that septic systems need to be considered a maintenance cost of owning a home."

Jim says: It's time for a reality check! As members of the wastewater industry, it is incumbent on all of us to continue to make consumer education a top priority. We are environmental stewards sharing what we know about safeguarding our precious freshwater supply. That means passing along the hard truths about the cost of protecting public health. ■



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**COMMERCIAL DESIGN
Management in Mind**

One important step in installing any septic system is making sure the owner understands how to use and maintain the system properly. Read these tips to help you educate your next customer about caring for their new commercial septic system. Stressing the value of maintenance is key. onsiteinstaller.com/featured



Overheard Online

“If you get a good survey response, follow up with that customer via email and ask them directly to leave you a review.”

- *The Trick to Receiving Customer Reviews*
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**SEPTIC CARE TIPS
Iron Issues**

Got a customer with iron or manganese issues? An iron filter will do the trick, but the backwash from these filters can cause trouble for septic systems. Whether you're installing a new system or maintaining an existing one, here are some tips to help homeowners deal with their iron problem and still take care of their septic tank. onsiteinstaller.com/featured

IN-HOME PRETREATMENT

New Technology for a Tiny Lot

Facing an onsite system repair on a lakefront lot with extremely limited space and poor-quality soils was a challenge cover star Courtney Stephenson met head on. The answer was installing a new membrane bioreactor treatment system that was the first of its kind in North Carolina. Read more about the pretreatment solution online. onsiteinstaller.com/featured

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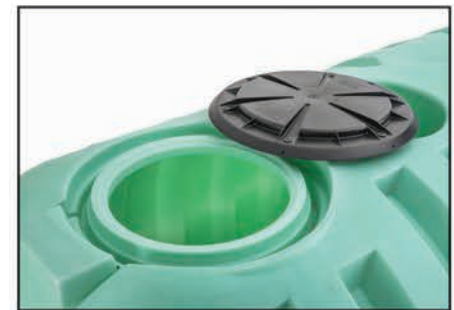
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INSTALLER PROFILE



LOVE OF LEARNING

Courtney Stephenson schooled herself in the onsite business and went on to build a successful and diversified installation company

By Ted J. Rulseh | Photos by Andrew Craft

To Courtney Stephenson, success in business is simple: “My goals are to do a job well, make a decent living, help my employees support their families, and enjoy what I do. That is success.”

Satisfied customers around Holly Ridge near the North Carolina coast might say there’s a lot more to it than that. Her company, Atlantic On Site Services, has earned a reputation for quality work on everything from simple conventional systems to advanced aerobic treatment systems on challenging lots, to multiple systems for sprawling RV campgrounds.

Stephenson and a team of four equipment operators and field workers install 350 onsite systems per year, working mostly with homebuilders and often installing systems in bunches for subdivisions with houses constructed on speculation.

She thrives on challenges, and the coastal region’s high water table and sandy soils bring plenty of them. Always willing to try new approaches, she installs a wide variety of aerobic treatment units, even if that means being first in the state to try a new technology.

Rooted in Science

The onsite business wasn’t on Stephenson’s radar when she graduated from the University of North Carolina at Chapel Hill in 1999 with a bachelor’s degree in biology and a chemistry minor. She went to work doing research in the chemical industry. After a layoff in 2004, Stephenson and a partner started the onsite business she owns today. The partnership later dissolved and she became sole owner.

The company now works almost anywhere between Holly Ridge and Raleigh, the state capital. “The more jobs I did, the more I loved being outside, the physical nature of the work, starting and finishing projects and seeing what I accomplished every day,” she says.

“As I learned more about the industry, I realized how relevant my degree was to it. Water treatment is all about chemical and biological processes. The advanced systems especially are about using some type of media and

◀ Stephenson is at the controls of her pink Bobcat E50 excavator. She likes the excavator so much she bought another one just like it, but wrapped in blue graphics.



some type of bacteria and process in a physical product that brings in dirty water and spits out clean water. I have the education to understand how that happens and how it helps the environment. It even makes my parents a little happy, considering they sent me to college, that my four-year degree wasn't wasted."

Learning by Doing

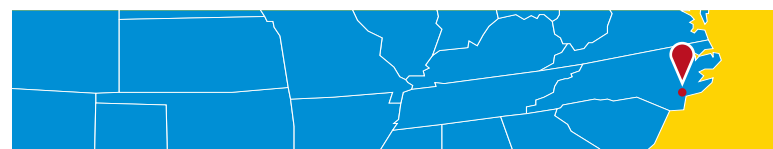
Still, there was the matter of learning the techniques of installing systems. Her partner had experience in the industry, but after they parted ways, she was largely on her own. "As my experience grew, I came in contact with more and more engineers and developers who needed more complex systems in order to build a house, a duplex or an apartment building," she recalls.

"I learned by doing. If a permit was written and called for an advanced system, I call up the manufacturer and say, 'Look, I'm going to be putting in one of your systems.' They'd come on site and help on the first one. The more I did, the more I learned. I also proved that I was trustworthy and would do the job right.

"I am a Type A, highly driven, motivated person. Failure is not an option in my life. If I'm going to do something, I'm going to do it 100 percent. I want to know all about it that I can. I don't settle for mediocrity. If there's something new out there, if there's a challenge or a risk, I want to take it on."

Atlantic On Site was the first in North Carolina to install a compact

▲ The crew lays out a new drainfield using EZFlow media by Infiltrator Water Technologies, while Stephenson digs a trench.



Atlantic On Site Services

- Location:** Holly Ridge, North Carolina
- Founded:** 2004
- Owner:** Courtney Stephenson
- Employees:** 5
- Business mix:** 90 percent onsite installations, 10 percent miscellaneous site work
- Service area:** 150-mile radius
- Specialty:** Pretreatment units and large systems
- Website:** atlanticonsiteservices.com



Technician Jesus Cheluca works on a system install.

"As I learned more about the industry, I realized how relevant my degree was to it. **Water treatment is all about chemical and biological processes.**"

Courtney Stephenson

membrane bioreactor from BUSSE Green Technologies. The system was installed as a replacement on a lakefront lot with extremely constrained space and poor soil conditions. The BUSSE unit, with aeration and membrane filtration steps, was installed in the property owner's garage.

Stephenson also installed one of the first Hydro-Action aerobic treatment units in the state.

She also installs E-Z Treat sand filters, AdvanTex AX20 and AX100 units (Orenco Systems), Singulair systems (Norweco), and Anua and Ecoflo (Premier Tech Aqua) peat systems, along with many American Perc-Rite (American Manufacturing Co.) and Geoflow drip dispersal fields.

Gaining Credentials

During her early years in the business, North Carolina didn't offer credentialing for onsite installers. When the state began doing so in 2008, Stephenson was in one of the first classes and earned Level IV (highest) certification, qualifying her to install essentially any onsite system that can be permitted in the state: "I went for the top-level certification because I didn't want to be limited in what I could do."

She continues learning by attending the annual Onsite Water Protection Conference in Raleigh, along with North Carolina Septic Tank Association conferences and, two years ago, the Water & Wastewater Equipment, Treatment & Transport Show in Indianapolis. "I always look for ways to improve my business," she says.

Meanwhile, she keeps learning on her own and developing her team. "As our company grew, I added equipment and trucks, and I decided that if I was going to own equipment I was going to know how to run it. If I own a big truck, I'm going to know how to drive it."

Among her team members, foreman Israel Cruz and assistant foreman



Jesus Cheluca works a Bobcat E50 excavator to dig a trench for a septic system in Sneads Ferry, North Carolina.

THE RIGHT TOOLS

Knowledge, skills and experience count in the onsite installation business, but to Courtney Stephenson, another ingredient is critical.

"Having the right tools and equipment is the best way to get a job done," says Stephenson, owner of Atlantic On Site Services. "The machines I've chosen I find to be the most versatile, compact and convenient."

Her fleet includes a pair of 12,000-pound Bobcat E50 mini-excavators, model years 2012 and 2016, and a 35,000-pound Case 160 excavator for clearing trees and digging deep holes on large projects. A Takeuchi TL 140 skid-steer loader helps make site work efficient.

"The two mini-excavators I can haul behind my truck," Stephenson says. "I can get them into just about any place I've needed to go in my 12 years. They can go through fence gates. They're on rubber tracks, so they do the least damage. I can cross a driveway if I need to. They also seem to have the best power for their size. I use them every day."

The company also owns 2002 and 2015 Ford F-450 pickups, a 2001 International road tractor with a 40-foot trailer, a 1995 Chevy Kodiak dump truck, and two 7-ton equipment trailers (Hudson and Proline).

Looking to raise her profile, Stephenson recently hired Kixx Outfitters, a local sign and screening shop, to put a hot pink wrap on one of the mini-excavators. "I'm a girl in a man's industry, and I thought it would be kind of cool to have a pink excavator," she says. "I hoped it would help my marketing a little bit. There's some expense involved, but it makes for great advertising."

She liked the work so well that she hired Kixx to wrap the other Bobcat machine — in blue.

Jesus Pina are the primary equipment operators, although Stephenson wants the other crew members, Steven Cruz and Luis Lopez, to learn the equipment as well.

Besides running excavators, Israel Cruz coordinates daily installs, calls county health department personnel for inspections, orders tanks, and generally makes sure jobs get done. Pina covers up and closes jobs using the skid-steer and makes sure installed systems run efficiently and correctly. Steven Cruz is the pump and panel specialist.

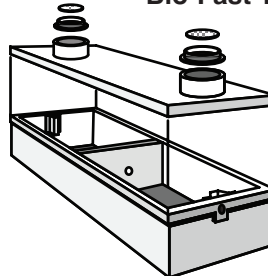
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▲ Courtney Stephenson, center, with her crew (from left), Jesus Cheluca, Luis Lopez, Steven Arzate and Izzy Arzate, standing in front of pink and blue Bobcat E50 compact excavators.

➤ Luis Lopez lays EZFlow drainfield media, while Stephenson digs a trench in the background.

For drainfields they use EZflow media or chambers (both from Infiltrator Water Technologies) almost exclusively. “The majority are EZflow,” says Stephenson. “Most times the determining factor is logistics. With chambers I can haul enough for up to three systems per day. EZflow is a little more challenging to haul. I always use the material my customer prefers, but we really only use rock if it is requested.” For tanks she prefers concrete.

Tackling Big Jobs

Stephenson doesn’t design systems. In North Carolina, county environmental health department staff members typically perform the soil tests and prescribe the systems; installers are largely limited to implementing permitted plans. The challenges come in dealing with the site conditions. Along the coast, tank excavations often require extensive dewatering.

That was the case last summer when Atlantic On Site installed treatment systems for 125 sites in the second phase of the Turkey Point RV Park at Sneads Ferry; the company had also built the first-phase systems. The second phase included 13 septic systems with conventional drainfields using a mix of EZflow media and chambers.

“That job was challenging because it’s right down on the intercoastal waterway in sand,” Stephenson said. “Setting the 26 tanks was the most difficult part. Every tank had to be wellpointed and dewatered. We had to use trench boxes and dig 12- to 15-foot-deep holes.”

continued >>



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» Jesus Cheluca connects PVC piping to a septic tank on a job site in Sneads Ferry, North Carolina.



“In the past 12 years, the main marketing I’ve done is going to subdivisions, walking up to builders and saying,

‘Hey, this is my company — can I price your septic systems?’”

Courtney Stephenson

“You never know if you’re going to hit water or hit rock. I really just love what I do because it’s challenging. It keeps me outside and in different places. It keeps me in shape, and I can see what I’ve done at the end of the day.”

Her advice to others in the profession: “Success in any business is pretty much based on doing what you say you’re going to do and being honest and straight-up with customers. As long as you adhere to that, you can be successful in anything.” □

Wellpointing for each hole meant driving a series of wellpoints around the perimeter of the excavation, connecting each one to a manifold and hooking that to a large suction pump to pull the groundwater away from the hole to dry it out. Based on her experience at Turkey Point and other sites, Stephenson has added wellpointing as a specialized service.

Last year’s projects included two other RV parks: a conventional system for a park with 25 sites and a conventional system and drip dispersal system for a park with 37 sites. The team also installed a sewer line nearly a mile long, an E-Z Treat system and a spray irrigation field with a dozen spray heads for a private hunt camp.

Landing Business

All this and more traditional work for homes and subdivisions has come about largely through shoe leather and referrals; Atlantic On Site does no media advertising. Stephenson observes, “In the past 12 years, the main marketing I’ve done is going to subdivisions, walking up to builders and saying, ‘Hey, this is my company — can I price your septic systems?’”

“We’ve operated off word-of-mouth and soliciting work in person. I’ll pull building permits and ride around, and I’ll just cold-call people. When I go to conferences, I make it a point to talk to designers and engineers. Sometimes they call me back and sometimes they don’t. If not, I’ll call them and say, ‘I’d like to price something for you.’”

“I’ve mainly stayed with new construction. Builders talk among themselves. Over time, some builders have given my name out. I do a lot of work for tract builders who buy large pieces of land and build subdivisions.”

Stephenson thrives on new challenges.

“You never know what you’re going to run into underground,” she says.

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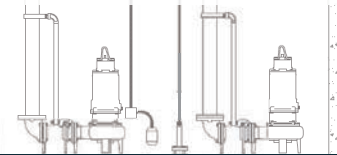
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Virginia Considers Privatizing Onsite System Evaluation and Design

By Doug Day

A report from the Virginia Department of Health outlines a strategy for privatizing the evaluation and design for onsite wastewater systems and private wells. The report is in response to a 2016 bill that required the agency to develop such a plan. According to the executive summary, “VDH should not provide evaluation and design services when and where a sufficient number of licensed private sector professionals are available to perform evaluation and design services.” Instead, it says, the agency should focus on high-priority items. “VDH is unique among state and federal agencies in that it provides some of the same services offered in the private sector,” says the report, which includes draft legislation that would

revise state law to allow the change. “VDH’s dual role of service provider and regulator creates numerous difficulties with enforcement, plan review and work product expectations. The strategic vision includes VDH providing adequate programmatic oversight with a proper ‘check and balance’ system.” In its conclusion, the report recommends a five-year transition period along with funding to help low- and moderate-income families to repair septic systems and private wells.

The U.S. Justice Department has filed a lawsuit against Culpeper County, claiming it denied a septic system permit to prevent construction of a mosque by a local Islamic center. The county claims the mosque needed a pump-and-haul permit because the soil could not support a septic system, but voted to deny the permit. In its suit, the Justice Department says the county has considered 26 such permit applications since 1992 and has never before denied one.

Washington state

Several counties have placed moratoriums on new building permits in light of a state Supreme Court decision dealing with water rights. The Department of Ecology says between 2,000 and 8,000 new wells are added each year, but represent just 1 percent of water consumed because it is returned to the ground through septic systems. The court last fall ruled that counties must independently ensure water is legally available before issuing permits for new wells and that Whatcom County failed to do that by allowing new wells to reduce water flow in streams. Some legislators have promised a fix to state law in the 2017 session.

Australia

Flushable wipes may be the topic of a class-action lawsuit in Australia. The Australian Competition and Consumer Commission has accused Kimberly-Clark and Pental of misleading and deceptive conduct by giving consumers the impression that the wipes were flushable. Kimberly-Clark has stood by its claims, saying its products meet or exceed flushability guidelines. Pental has changed its labeling to remove claims that the wipes disintegrate like toilet paper and later removed the word flushable from its packaging and websites. It is estimated that the flushable wipes have caused around \$15 million in added cleanup expenses for Australian utilities. □

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Rhode Island Needs a New Generation of Wastewater Professionals

While new technology is always a priority in Rhode Island, the pumpers and installers who build and maintain onsite systems are aging and leaving the industry

By Doug Day

Since it formed in 1980, Rhode Island Independent Contractors & Associates has been involved in promoting the use of advanced onsite wastewater systems. Representing contractors in the construction, excavation, utilities and similar industries, around 75 percent of RIICA's 200 members are involved in decentralized wastewater, including Will Wright of Wright Excavating, who serves as second vice president.

Wright explains that 75 percent of his installations are advanced systems because many of them are along the coastline. Statewide, about 30 percent of systems use innovative technology, according to George Loomis, research and extension soil scientist and director of the New England Onsite Wastewater Training Center at the University of Rhode Island. RIICA, the Rhode Island Department of Environmental Management (DEM) and the university work closely together in protecting the state's environment.

Why the long history of advanced systems in Rhode Island?

Loomis: We have been dealing with nitrogen removal since the early 1980s, so promoting advanced systems has been one of our main focuses from the beginning. We have sensitive coastal environments, high groundwater, and high groundwater nitrogen concentrations in some communities. There are about 5,000 advanced installations in Rhode Island — that's in a state the size of a typical county out west.

Under the direction of former RIICA president Dave Burnham (who passed away in 2011), we installed 60 advanced systems in seven different communities from 1996 to 2005. They were proof-of-concept systems to put technologies in the ground, test them, see how they functioned, and get that information to the DEM to make informed decisions whether they wanted to include them in the regulations.

Wright: Dave also sat on the Technical Review Committee with DEM so he was involved in everything that happened. He was an exceptional person in the right place at the right time.

Loomis: These systems were extremely important because we brought hundreds of people out to kick the tires, and we did training with designers and installers about how to put them in and what to be careful about. One of the demonstration projects was on Block Island, an island 10 miles off the coast. Everything had to go on and off on a ferry system, so it was a big logistical challenge. There was a storm and we got stranded on the island for five days.

This was the catalyst in helping the state move forward with innovative technologies. RIICA did all the hard work getting the systems into the ground, the university did all the testing and educational aspects, and DEM integrated the information to improve the regulation to make everything work much better. We have well-trained individuals in the state. Our designers and installers are just top-notch people, very experienced, and they know what they're doing.

What are the continuing education requirements?

Loomis: Those who do design work have to renew their license every three years and need continuing education credits to do that. Installers are licensed, but they don't need continuing education credits. It's up to them to come to a workshop. A good many of them still come because they want to stay current, know what's going on, and they want to understand what everybody else is doing in order to stay competitive. We offer anywhere from 38 to 45 workshops a year and we get a pretty good response.

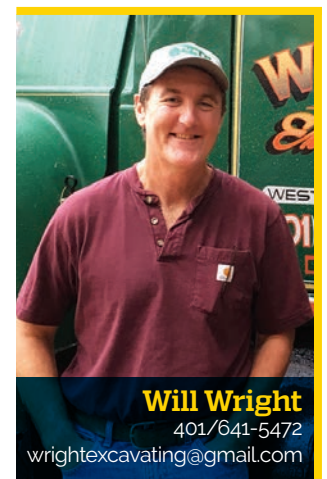
Wright: RIICA also offers classes to help people get their backhoe and heavy equipment licenses.

Are there any issues on the horizon?

Wright: I reached out to one of our members who is a lot younger than me. One of the things he's running into is finding enough people to service these systems. RIICA has 200 members right now. There was a time when we had 1,000 members. It's hard to get people to do these jobs. So one of the issues is keeping all this going, servicing and maintaining these systems.



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Loomis: There's also the question of verifying that the systems are doing what they are supposed to from a treatment perspective. That's probably an emerging area because if you don't have good quality operation and maintenance or don't have enough people to do that effectively, it could influence treatment performance. Those are two pretty big concerns.

Is academia doing anything about that?

Loomis: Formal training at the college level for onsite wastewater is limited, and that's always been a weakness. Most engineering programs around the country have an introduction and design class for municipal collections and treatment systems. Very few would be talking about onsite systems; you could count them on one hand. We give our environmental science students at URI one or two lectures on onsite wastewater treatment, but that is offered in the College of the Environment and Life Sciences, and not in the College of Engineering. We have undergraduate and graduate students in my department who are doing research on onsite systems and other universities across the country have similar research programs. So there is a small amount of higher education in onsite wastewater, but it's nothing like what takes place with large pipe.

Will Wright: What some young practitioners new to the field may know about onsite is often from on-the-job training, what you learn from your boss when you start out. If you happen to have a boss who's pretty sharp, you may learn cutting-edge stuff. If you have somebody who's old-school, you're going to learn old-school techniques.

How has the onsite and septic service business changed in your region?

Wright: I worked for an older gentleman and it was kind of a father/son-type thing. There were a lot of companies where their father started it. What's happening now, it's either one guy by himself or it's a company with four or five guys. And with the new equipment we have now, a company does the work of 10 companies 15 years ago. It seems what's happening is there aren't as many little guys. The companies are getting bigger like every other industry.

There aren't a lot of young pumpers coming along either. They're buying routes when guys retire. So instead of having 50 pumpers, we're getting down to 30 and it's hard for them to keep up. I talked to one who has three trucks and he's scheduling two weeks out. And he said it's the same thing with maintenance.

What do these trends mean for the industry in Rhode Island?

Loomis: The state recently passed legislation so at the time of sale, you have one year to get rid of old cesspools. So it's going to be busy in the future, and there's going to be a lot heavier reliance on innovative technology.

Wright: You look at the average age at RIICA in the 1980s and it was probably 30 or 35 years old. If you look at it now, the average is probably 55. And it's just going to get busier. I don't see us slowing down. But the guys I talk to in RIICA, they can't keep up.

I'm trying to convince my son, who wants to be a plumber, to get into onsite maintenance. This is a business you should be in if you want to make money because I see a big call for it. □

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Learn by Doing

A New Hampshire onsite designer's own system fails, so he plans an industry event around its replacement using new technology

By Scottie Dayton

Corrosion and age collapsed the 550-gallon metal septic tank with dry well serving a four-bedroom home in Littleton, New Hampshire. The timing was perfect.

A month earlier, Presby Environmental had released its EnviroFin passive onsite wastewater treatment and dispersal system. "Here was an opportunity to install one of the first units in the state and in my backyard where I could monitor it," says Mike Carbonneau, the homeowner and proprietor of Connecticut Valley Design. He also used the installation as a Field Day.

The event, approved for CEUs by the New Hampshire Department of Environmental Services, was also sanctioned by Granite State Designers and Installers. It attracted 90 participants, mainly installers and designers from New Hampshire and Vermont, with some from Maine and Massachusetts.

"Typically, most people fly out of the door the minute a training session is over," says Carbonneau. "This event was to finish at 2 o'clock, but we were

inundated with questions and interest in the product. Two hours later, we were still talking to 15 to 20 participants, and were contemplating ordering takeout dinners."

System Components

Carbonneau designed the system to handle 675 gpd. Major components are:

- 1,250-gallon single-compartment concrete septic tank
- Three 225 gpd EnviroFin modules
- 60 tons of ASTM C-33 washed concrete sand with no more than 2 percent fines passing a No. 200 sieve

System Operation

Wastewater flows by gravity 22 feet through a 4-inch Schedule 40 PVC lateral to the septic tank, then runs 32 feet through a 4-inch supply line to the fin distribution unit in the center of the first module. The 24-inch-diameter by 24-inch-deep FDU has four parallel treatment fins on either side, creating a 10.5-foot-diameter footprint. Two 4-inch pipes passing through the FDU connect multiple units. The upper pipe transfers oxygen and the lower pipe distributes effluent.



◀ Some of the 90 attendees observe how multiple Presby EnviroFin distribution units are connected by two 4-inch PVC pipes. The upper one transfers oxygen and the lower pipe distributes effluent. (Courtesy of Presby Environmental)

Effluent enters through a sanitary tee near the top of the FDU, then passes through skimmer tabs that capture grease and suspended solids as the liquid drops to the bottom. More solids settle out as the cooled effluent seeps through perforations in the FDU and into the eight 4.5-foot-long by 6-inch-diameter fins.

The bottom 8 inches of the fins have a thick layer of coarse fibers with a thin layer of geotextile fabric below it. This combination provides large surfaces for bacteria to colonize and digest nutrients. A 4-inch perforated corrugated pipe within the fin and above the layers functions as an air duct, supplying oxygen to the system and enabling waste gases to escape. The basal sand area beneath the geotextile fabric wicks away liquid and transfers air to the bacteria on the fabrics. The system exceeds NSF/ANSI Standard 40 treatment.

Installation

The state Department of Environmental Services and other sources publicized the June 2016 Field Day, with presenters Carbonneau, Presby general manager Lee Rashkin, and technical representatives Don Prince and Mark Vander-Heyden. Ken Wood of Calco Precast provided the septic tank. Presby Environmental supplied the modules and an OrnaVent — a miniature New England Patriots helmet — for the lower air vent. George Papadamatos of Blue Lodge Spray Foam donated the Bayer spray insulation.

“Our property is on top of a hill with minimal tree cover, making strong winds and deep frost an occasional concern,” says Carbonneau. “As a precaution, George insulated the lateral and supply line with Bayer spray foam.”

“We made sure everybody was hands-on because doing it yourself is the best way to understand something. We demonstrated how to click and screw the FDU halves together, then disassembled it and let someone else try.”

Mike Carbonneau

Using a Hyundai Robex 140 LCD-7 excavator, Connecticut Valley Design employee Justin Marvin decommissioned the wet well and septic tank, then dug the new tank hole. Rashkin delivered and set the tank before the Field Day, and Carbonneau plumbed the lateral. “We wanted the tank in place for a visual reference,” he says. “We also installed a 4-inch sanitary tee instead

System Profile

- Location:** Littleton, New Hampshire
- Facility served:** Four-bedroom home
- Designer/installer:** Mike Carbonneau, Connecticut Valley Design
- Site conditions:** Fine sandy loam with gravelly attributes
- Type of system:** EnviroFin passive combination treatment and dispersal system
- Hydraulic capacity:** 675 gpd



▲ Mike Carbonneau, owner of Connecticut Valley Design in Littleton, New Hampshire, demonstrates where to screw together the two halves of the EnviroFin distribution unit. (Courtesy of Presby Environmental)

➤ Ken Wood of Calco Precast lowers the top of the 1,250-gallon septic tank into place. (Courtesy of Connecticut Valley Design)

▼ Two homemade plywood spacers hold the fins in position during backfilling and maintain the required 6-inch separation between them. (Courtesy of Connecticut Valley Design)



of an effluent filter. David Presby is concerned that filters restrict airflow and he is conducting a formal study on that theory.”

Working on a 12 percent grade, Marvin removed numerous fieldstones as he excavated a 32- by 4.5- by 2-foot-deep trench for the drainfield, then he scarified the fine sandy loam with gravelly attributes. Meanwhile, Carbonneau used a self-built Mack dump truck with 14-cubic-yard Bibeau box to haul in three loads of sand. Marvin built up the grade with 6 inches of sand, and extended the fill 3 feet along the toe of the drainfield.

A morning classroom session and PowerPoint presentation at a nearby donated Masonic Lodge launched the Field Day. During lunch at Carbonneau’s home, presenters explained more about how the product worked. Afterward, they divided attendees into three groups, enabling everyone to become involved.

Presby ships the 50-pound system in a 2- by 2- by 4-foot cardboard box, Carbonneau says. Inside the box are the FDU’s two halves, two sets of four treatment fins sewed together, four plastic zip ties, 18 self-tapping screws, a cover for the FDU, and silicone caulk.

After lunch, each group opened a box and removed the pieces. “We made sure everybody was hands-on because doing it yourself is the best way to understand something,” says Carbonneau. “We demonstrated how to click and screw the FDU halves together, then disassembled it and let someone else try.”

Presenters used the same approach when teaching how to attach the top and bottom of fins to the FDU with zip ties. “We brought extra ties,” says Carbonneau. “Two or three people would attach a fin, then we’d cut the ties and let the next group try. We wanted everyone to feel comfortable with how to align the fins with the perforations in the FDUs to ensure proper transfer of effluent.”

After participants carried the components to the drainfield, Carbonneau dug a 24-inch-diameter by 2-inch-deep hole in the sand with a shovel and countersunk the first FDU. “This ensures the fins are level with the sanitary tee,” he says. Attendees dug the two remaining holes.

Working on the slope gave everyone an appreciation for why the Enviro-Fin is suited to steep terrains. “The fins can be arrayed like wheel spokes or laid straight following a contour,” says Carbonneau. “For the steepest terrain or on sites with setback restrictions, the fins can be separated to fit in the limited receiving areas.”

Looking at the grade, installers wondered if it would cause effluent to blow out at the toe. “No,” says Carbonneau, “because concrete sand — a mixture of coarse and fine particles — works like a time-release agent. The sand also transfers oxygen to the pores of the soil, which is critical for an aerobic system.”

A 6-inch separation between fins creates a dry transfer area for water to escape and to reduce biomat buildup. To ensure the exact distance is maintained during backfilling, Carbonneau fabricated two 48- by 15-inch-high plywood spacers with four 6-inch-wide slots for the fins. “Everything good comes with care,” he says. “We set the spacers over the fins, sprinkle in a little sand, compact it with our boots, then shovel in some more.”

“The spacers are 3 inches taller than the top of the fins, giving us the proper cover fill height. After backfilling with sand to the top of the plywood, we walk around making certain it’s compacted and smooth, then we pull up the spacers.” An additional 3 inches of loam completes the installation, which normally takes one day. Homeowners find the lower profile less intrusive.

Maintenance

Carbonneau recommends pumping the septic tank every three years, and looking for leaks or root intrusion. The screw-down lids on FDUs enable service providers to monitor the system’s performance. ■

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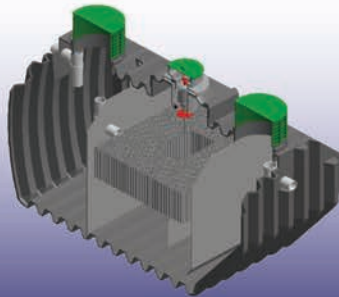


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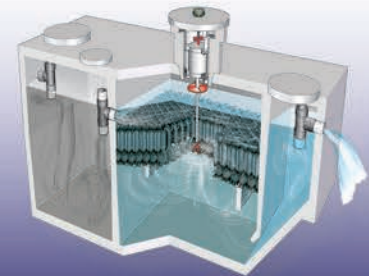
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Reduce Homeowner Frustration by Quickly Sourcing Sewage Odors

When your onsite customers call and say something stinks, you need to get down to business, investigating and eliminating the problem

By Jim Anderson and David Gustafson

A recent reader letter triggered a reminder on the importance of addressing venting and odor issues. A homeowner from Wisconsin wrote complaining about sewage odors both inside and outside the house. He explained they live on top of a hill, which is always windy, indicated by the lack of mosquitoes in the summer. (Only people in upper Michigan, Wisconsin and Minnesota understand the full significance of this.) He also explained their onsite system includes a septic tank and drainfield trenches fed by gravity — so a conventional system.

In a typical setup like this, the drainfield and septic tank vent back through the roof stack of the house. One common cause of odors outside the house is that the roof vent does not extend far enough above the roofline to carry away gases and odors. Before moving directly to the roof vent, though, the service provider should check the septic tank and soil treatment area to make sure the outside odor is not caused by sewage coming to the surface in the drainfield. In addition, all manhole covers and inspection ports on the septic tank should be checked to ensure a tight fit.

Search for Leaks

If the openings to the septic tank are not watertight and airtight, wind blowing across the tank will draw the air and odors from the tank into the yard. If the manhole covers are buried 6 inches under the soil this is not a

problem. However, many states now require manhole risers and covers be brought to the surface for easier maintenance. So, it is important the covers (lids) be on tight.

In no case should a sealant or glue be used on the lids.

This defeats the purpose of allowing access for maintaining the system. Unfortunately, we still see this when we visit some sites.

When concrete covers seem to be part of the odor problem, weather stripping can usually be installed around the lid. However, in no case should a sealant or glue be used on the lids. This defeats the purpose of allowing access for maintaining the system. Unfortunately, we still see this when we visit some sites. We realize that homeowners can be very upset with odors, but if it takes replacing the risers and lids to provide a good seal, that should be the solution.

If you eliminate the tank and drainfield as the source of odors, turn your attention to the roof vent. Look at other houses in the area and you may see vents extending only a foot to 18 inches above the roof and there are no apparent odor problems. Tall trees around the house or a hill behind the house can cause air currents to swirl, creating downdrafts that send odors down to the ground around the house. Homeowners may say things like, "I only get the odors when the wind shifts to the north." Wind direction and speed can impact the presence of odors.

Venting Issues

For a typical ranch-style-home roof with a 4 to 12 pitch (4 inches vertical in 12 inches) the house sewer vent should extend 6 feet 2 inches above the roof or 2 feet above the roof ridge. The 4 to 12 pitch is a very common slope and you see very few 6-foot vent pipe extensions. For roofs with steeper pitches, the pipe extension will need to be even longer to meet the 2 feet above roof ridge criteria. So even though the home is situated on a hill, if the vent pipe does not extend above the roofline, sewer odors can be directed downward under certain conditions.

Moving Inside

In terms of odors in the house, first make sure they are not coming from outside through an open window or door. Odors due to effluent surfacing or from the roof vent can be drawn into the house. One of the main causes we have seen for indoor odors is when a plumbing trap has dried out or been emptied for some reason. The empty trap allows sewer gases to be vented back through the house plumbing.

Moving Inside

A common reason for a dry trap is in older houses where either a floor drain or drain for a washing machine is no longer used, and either the

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owner has forgotten about it or they bought the house and were not aware of the drain. We have seen floor drains covered over during basement remodeling and then drying out over time, creating odor problems. The solution, of course, is to locate the drain and either properly close it off so it is airtight, or to periodically add water to the trap. Homeowners who must tear out walls or flooring to get at the offending drain are usually not happy!

Investigating further, make sure sewer is airtight to the inside and properly vented through the roof vent. Depending on age and service, the lids may not fit tight or the vent piping may not be properly glued, allowing sewer gas and odors to enter the basement. We hope readers share their own take on sewer odors and problems they have seen. □



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The Service Body – Your Ultimate Tool Caddy

If you don't want tools and supplies rattling around unsecured in the back of your pickup, a rig carrying a service body can become your rolling workshop

By Peter Kenter

From durable surfaces to optimized tool and material storage, service bodies can help bring the shop out into the field. But the market offers a lot of choice, from standard-issue to fully customized. Making sure the service body matches the needs of an installer will help to ensure that it will deliver the best performance at an optimal price.

Highway Products has produced both standard and custom service bodies for more than 30 years in White City, Oregon. All of its service bodies are made of welded aluminum, not only because aluminum is durable and rust-resistant, but because it's less than half the weight of an identical steel service body. The reduced weight can make a significant dent in contractor fuel cost.

“With a lighter service body you might be able to use an F-150 instead of an F-250 and save some money on the vehicle,” says Highway Products consultant Jim Lenford. “That would more than cover the initial higher price of aluminum over steel.”

Standard utility service bodies are designed for a broad range of industries that could include onsite installers carrying a host of supplies and tools.

Built of 1/8-inch aluminum, Highway Products models bolt into place on existing pickup truck frames. Doors are typically smooth aluminum, while decks, bodies, top boxes and tailgates are diamond plate or other textured finish. These models consist of six storage compartments, fenders, bed, tailgate and a bumper with lighting. Inside the body are four storage compartments with adjustable shelving, two located in front of the wheel well and two behind. Two smaller compartments are located above each fender. The location of a fuel filler bezel depends on the model of the truck.

Contractors can also choose options including toolboxes, headache racks and ladder racks. Highway Products offers a Truckslide option, a steel or aluminum platform that slides out like a drawer along the bottom of the truck bed, allowing material to be off-loaded more easily.



Custom service bodies can offer additional made-to-measure storage space, including lift-out tool trays. (Photos courtesy of Highway Products)



◀ The Highway Products Pickup Pack fits in the truck bed, creating a lockable storage space and overhead rack.

▼ The Highway Products' Truck-slide option provides a platform that slides out like a drawer for easier material handling.



“If you’ve never ordered a custom service body before, you may not know what questions to ask. We talk about what they do from day to day. I can suggest options that customers in similar businesses have selected or found beneficial.”

J.D. Martin

A Pickup Pack model slips into the back of a pickup and turns the bed into lockable storage. The standard model includes two full-length lockable low-side boxes and a flat or domed center hatch. A space underneath the toolboxes provides room for additional cargo.

But no two businesses operate alike, even among installers. Customized service bodies can help improve workflow and provide unique features to accommodate tools and materials.

Making Choices

“Often, our standard service body with options will cover most of our customers’ needs,” says J.D. Martin, sales team leader at Highway Products. “Every now and then we get customers who want cabinets of a certain depth to fit a specific tool, want to build the service body around a particular item, or build something completely off the wall, like a service body built entirely around transporting a drone with camera equipment.”

Customers typically begin by identifying the model of their truck, providing the VIN number to ensure that a design fits the vehicle exactly.

“We ask them if they’ve changed anything on their trucks since buying it,” says Lenford. “Maybe they’ve installed oversized tires or Kelderman Air Ride. A typical truck off the lot measures 56 inches from the back of the cab to the axle, whereas a cab chassis is 60 inches. The 4 inches are critical, as is the fact that the bed won’t have humps in the frame to accommodate the axle.”

Martin next asks customers about their business.

“If you’ve never ordered a custom service body before, you may not know what questions to ask,” he says. “We talk about what they do from day to day. I can suggest options that customers in similar businesses have selected or found beneficial. For example, one of the big options for contractors is topper boxes featuring removable tool trays with handles on them. They can lift them out just like trays in a tool chest and take them to the job site instead of going back and forth.”

For Installers

For installers, Lenford has a series of suggestions.

“Drawers with dividers and compartments are a good option to organize smaller parts and fittings,” he says. “We offer pipe and lumber racks to carry pipe to the job site. We can also add tunnel boxes for pipe, accessible from the back.”

Other options include LED lighting strips that automatically switch on when a compartment is opened. Specialty pole lighting attachments can illuminate a job site at night. Service body baskets can be used to carry hand tools such as shovels, hoes and rakes. Some customers also request a LINE-X spray-on bedliner to ensure that items stored in the bed are less likely to move during transit.

Some requests are discouraged, for example building a service body designed to extend the length of the truck.

continued >>

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"If you have a 6 1/2-foot bed, it's problematic to order an 8-foot body," says Lenford. "You can get frame extensions to make it work, but it throws off the center of gravity of the truck. From an aesthetic standpoint, it doesn't look right either."

Other customers have requested service bodies with canopies that are too tall for the truck, something the company discourages because it subjects the vehicle to destabilizing winds. Service bodies wider than the truck bed also catch wind and affect handling.

Mostly DIY

Although they can drive their trucks to the shop to have the service body bolted on, customers most often have the service body shipped, along with a mounting kit containing from 16 to 24 bolts.

"If you were thinking of installing it yourself, you'd want enough people or a forklift to lift it into position," says Martin. "After that, it's easy to bolt on." □

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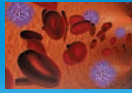
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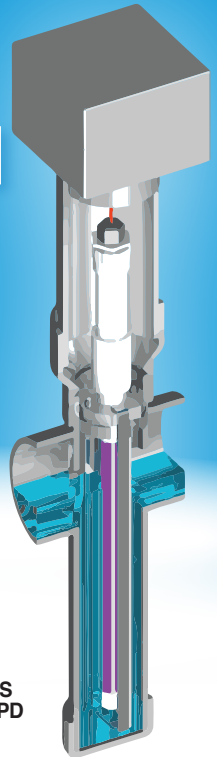


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Large-Scale and Commercial Treatment Systems

By Craig Mandli

COMMERCIAL TREATMENT SYSTEMS

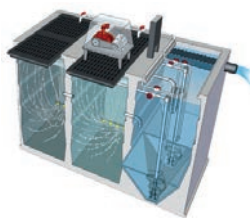
Bio-Microbics FAST

High-strength FAST wastewater treatment systems from Bio-Microbics can be used where infrastructure may or may not be available. They are engineered to treat wastewater containing high BOD concentrations often having FOG levels significantly higher than standard sanitary-strength sewage. The stability of the treatment process with fully-submerged, fixed-film media and the effectiveness of activated sludge treatment helps in applications where a particular facility may have additional challenges due to unique characteristics of the wastewater. Other systems, options and accessory products such as screening devices, clarifiers and grease traps can customize the system for particular treatment needs. 800/753-3278; www.biomicrobics.com.



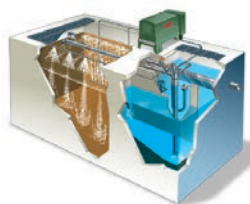
Jet Inc. Commercial Wastewater Treatment Plant

Commercial Wastewater Treatment Plants from Jet Inc. are modular in design, can treat flows up to 300,000 gpd and allow for phase build-out. This makes it possible for motels, shopping centers and service stations to be constructed along interstate highways far from any town. Subdivisions can be developed miles beyond sewer lines. Factories can be erected in rural areas. The plants treat wastewater through an aerobic digestion process that enables microscopic living organisms to transform wastewater into a clear, odorless liquid. Jet offers assistance with design, engineering and construction, as well as tech support, plant startup commissioning and operator training. 800/321-6960; www.jetincorp.com.



Norweco Modulair

The Modulair package wastewater treatment system from Norweco is designed as a maintenance-free method of wastewater treatment with system capacities ranging from 1,500 to 500,000 gpd. Plants employ the extended aeration treatment process to quickly and efficiently oxidize organic compounds, according to the maker. The system can be easily enlarged or modified and has the flexibility for any treatment requirement, including pretreatment, AFE, ASH, tertiary, disinfection, denitrification and phosphorus removal. Nonclog Evenair diffusers reduce plant maintenance, and the air-lift surface skimmer simplifies maintenance. Heavy-duty rein-



forced precast concrete tanks provide durability and long life. The complete system is installed and serviced by licensed, factory-trained distributors. 800/667-9326; www.norweco.com.

Orenco Systems AdvanTex AX-Max

AdvanTex AX-Max wastewater treatment systems from Orenco Systems are containerized, fully plumbed plug-and-play units sized for larger commercial and municipal applications. Units come in a variety of configurations, measuring up to 42 feet long by 8.5 feet wide. They can be installed as a single unit or in multiunit arrays, either above ground or buried to grade. Systems use an attached-growth treatment method to produce clear effluent with significant nutrient reduction, suitable for subsurface irrigation or surface discharge after disinfection per local regulations. One unit can process up to 5,000 gpd of raw sewage or 15,000 gpd of primary-treated effluent. Units reduce nitrogen up to 90 percent, depending on configuration, and provide reliable performance with only a part-time operator, according to the maker. Units are easy to ship and set, and have been installed in a variety of soils and climates worldwide. 800/348-9843; www.orenco.com.



SeptiTech STAAR

SeptiTech STAAR (Smart Trickling Anaerobic/Aerobic Recirculation) filter systems are designed for both multifamily domestic and high-strength commercial wastewater from 100 to more than 150,000 gpd. Commercial systems use a biopack plastic media to treat high organic loads that integrate with other technologies and accessories. The biological trickling filter technology maintains low levels of Nitrate-N with all below-grade components that fit in concrete, plastic or fiberglass tanks. Smart technology allows the system to go into a sleep mode that will dial down activity and eventually shut all power off until normal flow conditions are detected. This allows the system to achieve lower operating costs and power requirements. 800/318-7967; www.septitech.com.

Fuji Clean USA Model CE6KG

The Model CE6KG from Fuji Clean USA is a one-tank system with built-in septic tank and treated effluent pump station chamber. It has a hydraulic capacity of 6,000 gpd, treating to NSF 40 standards. It has a compact overall footprint of 36 feet 3 inches by 9 feet 7 inches, with a height of 7 feet 3 inches. Risers and covers are included. Seven



access ports allow for comfortable access for operation and maintenance. It has a power draw of 12.2 kWh/day. Systems are delivered to the job site fully assembled for plug-and-play installation. A total system weight of 2,900 pounds allows off-load and setting with basic excavation equipment or a boom truck. Multiple controller options are available based on site requirements. 207/406-2927; www.fujicleanusa.com.

CONTROL PANELS



Environment One iota OneBox

The **iota OneBox** telemetry system from **Environment One** allows for complete command of a fleet of pressure sewer grinder pumps from an office desktop or smartphone. It can be integrated seamlessly into a SCADA network to provide information about tank storage capacities, power failures, blockages and faults instantly, according to the maker. It provides diagnostics for individual properties, streets or whole networks in real time. It enables remote control and monitoring of individual grinder pumps, alerts before the customer becomes aware of any faults, trend analysis, report generation, peak flow demand determinations and flow smoothing, and maximized efficiency of downstream infrastructure. 518/346-6161; www.eone.com.

Godwin, a Xylem brand PrimeGuard 2

The **PrimeGuard 2** controller from **Godwin, a Xylem brand**, when combined with **Field Smart Technology (FST)**, can provide contractors with pump operating data from a remote location. It is a fully programmable microprocessor engine control system that allows for inputs from flowmeters, level transducers, pressure transducers or standard floats. Using the data from any of these systems, **Dri-Prime** pumps can be programmed to start/stop automatically with no operator intervention required. **FST** can monitor engine, motor, and pump operation conditions, as well as pump parameters such as suction and discharge pressure, sump level and flow data. Pump data can be accessed remotely from any device with an internet connection. 800/247-8674; www.xylem.com/dewatering.



See Water Simple Simplex

Simple Simplex control panels from **See Water** can alert of a high liquid level and are designed to control a 120-volt single-phase pump. Applications include sewage pump chambers, sump pump basins, lift stations and onsite installations. The controls are housed in an 8- by 6- by 4-inch NEMA 4X indoor/outdoor polycarbonate enclosure and are UL listed in the U.S. and Canada. 888/733-9283; www.seewaterinc.com.



SJE-Rhombus EZ Series In-Site CL

The **EZ Series In-Site CL** data-logging control panel from **SJE-Rhombus** is designed to control one or two 120-, 208- or 240-volt single-phase pumps. It includes a **Bluetooth Smart Ready** module for wireless connection to a smartphone or tablet, allowing users to configure the panel, view system status or download data via the **EZ Connect Mobile App**. This enables safe and secure access to the control panel in all weather conditions, without having to bring a laptop to the job site and open the panel door to access information. It uses a **C-Level** sensor for continuous level monitoring and records up to 4,000 system events, including pump runtimes, pump cycles, alarm conditions, **HOA** settings, power outages and service calls. **In-Site** software formulates system data, creating reports quickly and easily so system conditions can be identified and corrected. Each panel is **UL/cUL** listed. 888/342-5753; www.sjrhombus.com.

DISINFECTION

Leopold - A Xylem Brand FilterWorx

The **FilterWorx** system from **Leopold - a Xylem Brand** is designed and engineered to achieve process performance requirements for water and wastewater filtration. The systems are customized to accomplish maximum filtration efficiency at the longest possible filtration cycles. Optimum suspended solids removal is achieved through customized filter media. Filter runtimes, filter life and filtrate quality are optimized at the lowest costs due to continuous monitoring provided by filter controls. Backwash is designed to restore original headloss and solids storage conditions, increasing filter runs and reducing backwash waste. 855/995-4261; www.xylem.com/treatment.



Salcor 3G UV Wastewater Disinfection Unit

The **3G UV Wastewater Disinfection Unit** from **Salcor** is for residential, commercial and municipal uses, and is **UL-certified NEMA 6P** flood-proof and **NSF/Washington State Protocol** six-month-tested (with 21 upstream treatment systems). It inactivates pathogens, including deadly superbugs, according to the maker. Rated at 9,000 gpd gravity flow, it can be used as a building block for large water recovery/reuse systems. When installed in 12-unit parallel/series arrays with **ABS** pipe fittings, systems are disinfecting over 100,000 gpd. Gravity flow equalizes without distribution boxes. Identical modular units increase plant reliability and reduce the need for spare parts, facilitating plant expansion. Each unit has a foul-resistant **Teflon** lamp covering, two-year long-life lamp, easy installation, minimal annual maintenance, and energy usage of less than 30 watts of electric power. 760/731-0745.

Scienco/FAST SciCHLOR

SciCHLOR from Scienco/FAST is a sodium hypochlorite generator designed to provide a safe and effective way to disinfect. With salt, water and electricity, the system with multi-pass SciCELL Electro-Chemical Activation technology will produce an available supply of 10 to 60 pounds of chlorine equivalent per day, according to the maker. Connected to an incoming water source and with operating modes of batch, continuous, clean, setup and diagnostic, the brine solution multi-passes through the low-voltage DC electrolytic cell to provide a reliable method for the needs of medium to large on-site disinfection applications. Recirculation method keeps control of desired chlorine concentration, while the assembly minimizes maintenance downtime. 866/652-4539; www.sciencofast.com.



Sim/Tech Filter pleated filter units

Pleated filter units from Sim/Tech Filter provide gravity effluent filtration in septic tanks and turbine pump filtration in pump tanks. The filtration size is 3/32 inch in two dimensions. Flow channels in the pleated material result in increased longevity. All filter types start at over 2,000 square inches of filtration area. The 45 percent open area (over 900 square inches) is equivalent to 800 linear feet of 3/32-inch slots. Various configurations and larger units are available. 888/999-3290; www.simtechfilter.com.



DRAINFIELD MEDIA

Pagoda Vent septic vent

Septic vents from Pagoda Vent can help enhance system function with landscape appeal and homeowner approval. The premade units are designed to provide the necessary ventilation to the drainfield, and have a durable, lightweight exterior that won't fade or rust. The units encourage a healthy subsurface environment, mitigate harmful gases and preserve concrete component integrity by diminishing the opportunity for microbial-induced corrosion. Optional odor filter cartridges are available and fit concealed in the vent unit. 888/864-1468; www.pagodavent.com.



The Dirty Bird

The Dirty Bird provides an alternative to the standard septic vent required by many towns in new residential and commercial construction. It is a septic vent shaped like a birdbath. Meeting U.S. Environmental Protection Agency septic venting regulations, it controls odors through a replaceable charcoal filter and vents gases through holes at the bottom of the pedestal, so nothing enters the septic system. It installs in five minutes. Fade-resistant (UV stabilized), lightweight and recyclable, it is available in granite, sandstone and terra-cotta colors. It is constructed of 100 percent low-density polyethylene and stainless hardware. It is

32 inches high, with a basin width of 23 inches and footprint of 12 1/4 inches. 866/968-9668; www.thedirtybird.com.

LEVEL ALARMS

Level-Sense

The Wi-Fi-enabled Level-Sense unit can be used in utility rooms, water heaters, kitchen sinks, sump pumps and crawl spaces. It not only senses temperature and humidity but also functions as a water level measurement device, a leak detector and a high (or low) water alarm. The unit joins the customer's local home wireless network and sends notifications by email or text message. It has a 110 dB siren and rechargeable backup battery. The unit can be configured to send a copy of all notifications to the installer, providing the opportunity to contact the customer and follow up with service. It has a relay output for integration into alarm systems and external valve control. 314/787-8059; www.level-sense.com.



Sump Alarm Wi-Fi Version

The Wi-Fi Version outdoor tank alarm from Sump Alarm provides e-mail, text and voice notifications to up to five numbers. The unit can call installers when a client's tank is full. The weatherproof high tank alarm requires no on-site wiring, and includes a 90 dB horn and 1-inch LED indicator. Versions are available for high and low level detection. It joins the household's Wi-Fi network. Email notifications are free for life, while a small monthly fee is associated with the voice and text monitoring plan. It is available in 120- or 220-volt, completely preassembled, and suitable for extreme temperatures. 314/787-8059; www.sumpalarm.com.



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Eliminite Grizzly

The Eliminite Grizzly system is designed for large-scale, high-volume, high-strength commercial applications where advanced nitrogen reduction is necessary. The system was originally developed to serve high-altitude commercial and resort developments in the Rocky Mountains where winter temperatures linger at or below 0 degrees F, and seasonal use patterns/dramatic fluctuations in flow and wastewater strength are the norm. It functions with little operator input and simple maintenance. C-Series systems serve high-altitude highway rest areas, resort communities, golf courses, ski areas, mixed-use residential communities, restaurants, RV parks, worker camps, corporate retreats, business parks and convenience stores. It is suited for use in multistage treatment trains and as a means of reducing waste strength prior to conveyance to municipal treatment facilities. 888/406-2289; www.eliminite.com.



PUMP STATION

Polylok PL-PS40

The PL-PS40 prepackaged basin assembly from Polylok comes ready to assemble. It is made of high-density polyethylene, and is lightweight and compact. To install, glue three pieces of PVC and connect the inlet and outlet pipes, and provide power. The design allows for an adapter ring to add up to 24 inches of risers to reach the desired height. The prepackaged basin assembly is easy to access and disconnect for future servicing, according to the maker. The installation kit includes a 24- by 40-inch basin, 24-inch heavy-duty cover, 4 hp effluent pump with a piggyback float for automatic on/off operation, indoor/outdoor audible and visual alarm with float, internal piping system (2-inch PVC piping and a gate, check and union in one valve assembly), three grommets, one 4-inch inlet, one 2-inch discharge and one 1 1/2-inch for electrical, and a junction box with three watertight connectors. 877/765-9565; www.polylok.com.



PUMPS

Champion Pump CPES5

The 1/2 hp CPES5 effluent/sump pump from Champion Pump provides up to 37 feet TDH and flows up to 73 gpm. It has an efficient permanent split capacitor, and comes oil-filled, with upper and lower ball bearings and a single-phase motor. The replaceable power cord is available in lengths up to 100 feet, and a sealed cord entry allows the pump to be replaced in the field without having to replace the cord, and prevents water from entering the motor housing through a cut cord. It can handle up to 3/4-inch solids and can be used for septic systems, basement sumps, dewatering and elevator pits. It can run off most piggyback switches, allowing the customer to replace the switch as needed or bypass it in the case of an emergency and run the pump manually. 800/659-4491; www.championpump.com.



Franklin Electric FPS IGPH Series

The FPS IGPH Series of high-head grinder pumps from Franklin Electric are engineered for demanding higher head conditions found in many low-pressure sewage transfer applications. Available in an automatic or manual version, they use a proven cutter system with tight clearances for superior grinding at 414,000 cuts per minute, according to the manufacturer. They incorporate two nonclogging impeller stages for efficient pumping of sewage slurries with a shut-off head of 200 feet. They have 16 full-load amps at minimum head requirements of 100 feet. Available in single- or three-phase versions, the pumps employ a 2 hp, 3,450 rpm motor designed to handle the demands of grinding domestic sewage. They include corrosion-resistant upper and lower brass impellers to minimize downtime and maintenance, and built-in



overload protection to prevent over-current/over-temperature damage. 866/271-2859; www.franklinengineered.com.

Septic Services Whirlwind Linear Air Pump

The Whirlwind Linear Air Pump from Septic Services can be used in applications that require reliable aeration, including septic tanks and pond aeration. It doesn't require lubrication or any tools to replace the included filter. The heat-resistant, powder-coated lightweight aluminum with outer steel cover provides reliable outdoor unprotected performance. They are designed to be energy-efficient and provide reliable aeration. A pump can be added to any small aerobic system up to the largest aerobic treatment unit. Pumps range from 1.7 up to 7 cfm, and are available with or without an external alarm. 877/583-0809; www.septicsuppliesinc.com.



Vertiflo Pump Company Model 1312

Model 1312 close-coupled, horizontal end suction pumps from Vertiflo Pump Company can be used for service in general pumping, chemicals, wash systems, deionized water, process and OEM applications. According to the manufacturer, the pump is especially useful for pumping from tank to tank and into transport delivery trucks. It is designed for long life in tough services with heads to 160 feet TDH and flows to 240 gpm. It is available in 1,750 and 3,500 rpm sizes. Back pull-out design construction allows the rotating element to be easily removed while the casing remains in the piping. The casing may be rotated in 90-degree increments to accommodate various piping and discharge orientation options or requirements. The close-coupled design saves installation space. Suction and discharge connections are threaded NPT. Construction options include cast iron, 316 stainless steel fitted or all 316 stainless steel. The pump volute, impeller and mounting bracket are heavy cast metal. 513/530-0888; www.vertiflopump.com. □



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Large-Scale and Commercial Treatment Systems

By Craig Mandli

Remediators used to reduce high-strength waste

Problem: The Merton Custard Shoppe in Merton, Wisconsin, had a septic system designed and installed to treat the wastewater from its new operation.



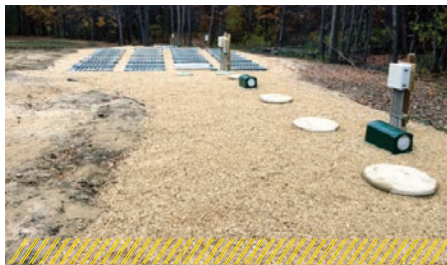
Within a year of operation the system was tested for BOD, TSS and FOG to confirm the system was functioning as designed. The data revealed that the effluent flowing to the distribution field was considered high-strength rather than low-strength as designed. The owners were issued a corrective action letter by the local county health department. Because of the required site work and equipment, the upgrade to meet the code requirements was nearly \$40,000.

Solution: The owners contacted Aero-Stream. Because of the design of the proposed equipment, the existing tanks could be used with no modifications. Four Pro Line Plus M Remediators were ganged together and installed in the second chamber of a 1,750-gallon two-chamber tank.

Result: The installation was completed in less than two hours for a total project cost under \$10,000. The system was processing 900 to 1,000 gpd of wastewater, and yielded a 71 percent reduction in BOD₅ and a 76 percent reduction in TSS. The system now operates with a Six Sigma process that is below the maximum limit by 79 percent for BOD₅ and by 29 percent for TSS. 262/538-4000; www.aero-stream.com.

Providing treatment solutions for noncompliant camp system

Problem: Stony Glen Christian Camp in Madison, Ohio, had an NPDES treatment system that was in noncompliance, and septic odors were a persistent nuisance. The Ohio Environmental Protection Agency required an equipment upgrade for compliance.



Goals included low maintenance and operating cost, with the ability to handle variable hydraulic flows of 500 to over 4,000 gpd combined domestic and

kitchen waste, with NH₃ reduction from levels of 140 mg/L, treatment equipment in two locations, and meeting NPDES performance limits.

Solution: Existing septic tanks were converted into biological reactors for first-stage primary treatment, using IMETTM bioreactors for high strength and NH₃ reduction. Influent alkalinity was increased to aid in NH₃ reduction using Anua Puralinity modules. Time-dosed pump stations transfer treated effluent to 36 Anua Puraflo peat fiber biofilters. The center camp system required 28 Puraflo modules and the A-frame camp system required eight Puraflo modules for peak-season hydraulic loading. Secondary treatment is provided by surface sand filtration, re-aeration and UV disinfection through Salcor 3G units. Programmable control panels and Ethernet/IP connections allow use of SCADA for remote management.

Result: System design requirements were fully achieved and along with other facility improvements provide an environment for year-round camping and retreat opportunities for participating churches. 336/547-9338; www.anuainternational.com.

Fixed-film media system helps restaurant comply with effluent objectives

Problem: A yacht club and marina restaurant in Ontario, was exceeding effluent objectives of 10 mg/L cBOD and TSS with its existing aerated septic system.



Solution: Nine stands of ClearPod fixed-film media were incorporated into the main aeration chamber of an existing 3,170 gpd treatment system to improve performance and meet/exceed effluent objectives. Prior to the installation, effluent levels were averaging 15.7 mg/L cBOD and 40.6 mg/L TSS. The fixed film is designed to be easily integrated with new or existing systems and provide maximum utilization of new or existing aeration.

Result: With no excavation or new tanks required for the ClearPod installation, effluent levels met or exceeded the objectives, obtaining an average concentration of 3.6 mg/L cBOD and 5.2 mg/L TSS. Removal of these solids improved hydraulic conductivity in the leachfield and extended the life of the

system. An out-of-compliance system was brought into compliance for significantly lower capital cost than replacing a single tank in the system. 819/598-7153; www.clearpodwater.com.

Units help reduce effluent nitrogen levels at school

Problem: A school in Ontario, Canada, had an undersized wastewater treatment plant that was not meeting the Provincial Ministry of the Environment total nitrogen effluent criteria for subsurface discharge. Incoming flow was measured at 1,850 gpd with an ammonia concentration that ranged between 175 to 311 mg/L.



Solution: Modifications were made to treat the increased flows and to facilitate nitrification/denitrification processes to reduce TN. The design concept included the addition of ECOPOD-N units from Delta Environmental to the existing system to provide tertiary treatment, including further BOD/TSS reduction, nitrification and denitrification. The first unit is operated in an aerobic mode. The second is operated in an anaerobic mode to facilitate denitrification. The third is operated in an aerobic mode to provide polishing of the effluent. The units are fixed-bed biological reactors. A carbon feed is added to the anaerobic unit to provide a carbon source for the denitrifying bacteria. The system recirculated 100 percent of plant effluent discharging from the ATU units back to the initial anaerobic septic holding tanks.

Result: With a combination of the ECOPOD-N's ability to reduce total nitrogen along with some simple process modifications, test data shows the system is able to consistently reduce TN below the Ministry's criteria of 5 mg/L. 800/219-9183; www.deltaenvironmental.com.

Treatment solution provided for office complex bordering nature preserve

Problem: Consolidation of two corporate campuses in Pennsylvania required a new parking garage to be constructed over the existing treatment system and drainfield. The site overlooks a nature preserve with hiking paths and an environmentally sensitive waterway running through it. The increase in flow required a new permit to be issued, which allowed for no net increase in nitrogen released into the environment, but a doubling of the people served. Aesthetics and sound were a major concern to the client, the township and environmentalists. Stringent regulations through the Pennsylvania



Department of Environmental Protection required high-quality effluent with nitrogen discharge standards of 10 mg/L prior to discharge to the drainfield.

Solution: The chosen system begins with a full day of flow equalization in front of an 18,000 gpd MTS-IFAS system from Hoot Systems with energy-saving variable-frequency drives, paired with dissolved oxygen sensors that deliver only the amount of air necessary to accomplish the level of treatment. The system includes the Hoot Advanced Nitrogen Reduction System to ensure nitrogen performance prior to discharge to a four-zone drainfield.

Result: The system was installed cut into a hillside, and is not visible from either the campus or down in the preserve. A building was erected to house blowers, controls, chemical feed and provide a space for the operator to wash up. The site has accomplished the goals of the client and protected the environment. 888/878-4668; www.hootsystems.com.

Problem: Blue Oak Ranch Reserve is a field station and ecological reserve owned and operated by the University of California. Proposed facility renovation including new housing construction and a large utility infrastructure building required the design of a wastewater treatment system that would protect the surrounding environment and recharge the aquifer.

Chambers provide reduced carbon footprint and aquifer recharge at biological field station

Solution: A wastewater recharge system designed by Biosphere Consulting and installed by Battle Mountain Excavation accommodates the calculated peak usage design flow of 3,280 gpd and includes 231 Quick4 Plus high-capacity chambers from Infiltrator Water Technologies in a shallow system installation. Wastewater is dispersed in two leachfields. The first serves the faculty residences and student cabins, and is a combination of gravity flow and pressurized (pump up) trenches. The second is a conventional gravity flow system. The systems have septic tanks as primary treatment with the soils providing final treatment and polishing of the effluent prior to it returning to the local aquifer.



Result: The chambers were installed in trenches with minimal invasiveness and site disruption. The specification of recycled products for the wastewater system resulted in a reduced carbon footprint compared to labor-intensive mined aggregate, which met the research station's sustainability commitment. The decentralized wastewater treatment system design also met the goal of completing the water cycle and replenishing the local aquifer. 800/221-4436; www.infiltratorwater.com.

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Biofilm reactor provides treatment at craft brewery

Problem: Cartwright Springs Brewery was looking for a solution for treating high-strength wastewater generated by its newly constructed microbrewery located in a rural area of Pakenham, Ontario. The wastewater was a combination of all the streams: the yeast and mash dump (high strength, low pH), wash water (low strength, high pH) and domestic wastewater from the pub. The combined flow after seven days of equalization was estimated to be 628 gpd.



Solution: After extensive sampling performed by Cartwright's engineering firm on similar installations, the Ecoprocess moving-bed biofilm reactor from Premier Tech Aqua was chosen. In compliance with the Ontario Building Code, the objective-based design suggested that the combined streams be pretreated with Ecoprocess MBBR to primary domestic effluent (BOD 100 to 180 mg/L) and then discharged by gravity to a leaching bed. The chain of treatment therefore included a balancing tank, septic tank, MBBR units (two stages), final clarifier with sludge management and leaching bed. To benefit from lower electricity rates, the treatment unit integrated a smart control strategy operating mainly at night, whenever the incoming wastewater flow was lower than the one set for the design.

Result: The system has performed well. The BOD concentration at the inlet varies between 1,500 and 2,500 mg/L and the laboratory results show a steady removal rate of 99 percent. 800/632-6356; www.premiertechaqua.com.

Advanced system used to service rural Australian school

Problem: The 110-student Benaraby State School in Australia operates an onsite wastewater system, as connecting to the nearest town's sewer system is not an option. In 2007, school administrators did a design report for an onsite system to replace their current system of a 2,642-gallon storage tank that required pumping and hauling the effluent off-site. They estimated the cost at \$170,000 not including about \$30,000 in annual maintenance fees. Due to the high cost, the system was put on hold and subsequently never installed while they looked for different cost-effective options.



Solution: In 2014, the school looked for alternative systems and analyzed the Advanced Enviro-Septic system from Presby Environmental as an option for the school because it was quoted significantly below \$70,000 with no maintenance and operation cost or no quarterly servicing. The 674 gpd AES system is 51 feet wide and 27 feet long.

Result: The system saved the school significant money with the low up-front and maintenance cost. The system in total cost significantly less than the 2007 quote. The school also no longer has to pump the effluent and haul it offsite. 800/473-5298; www.presbyenvironmental.com.

Units help winery meet BOD concentration compliance

Problem: Winery process waste typically has extreme variation in load and BOD concentrations, and low pH. French Road Cellars on the Leelanau Peninsula in Michigan had all those problems. With just a 1,500-gallon septic tank discharging to two open-bottom leach tanks, it didn't take long to fail.



Solution: SludgeHammer installed its ABG units and Medusa air diffusers, pH monitoring and buffering equipment, along with a second treatment tank and restored percolation in the leach pits. But the Michigan

Department of Environmental Quality still had problems. The footprint of the leach units meant that the pounds BOD loaded on a per-acre basis greatly exceeded 50 pounds BOD per acre per day. This could result in anaerobic soil conditions under the leachfield, causing solubility of heavy metals and potential groundwater contamination. Since the technology is modular, adding extra treatment was straightforward. The leach tanks were sealed with concrete to provide extra storage. SludgeHammer added extra treatment and a Pagoda vertical lamellar clarifier to bring the effluent quality to where subsurface drip irrigation became possible. French Road had no room for leach trenches, but the hill behind the winery was perfect for a 2,000-square-foot dripfield.

Result: The latest sampling with a BOD of less than 100 mg/L showed that the load was now only 11 pounds BOD per acre per day at their 500 gpd load, well below the DEQ limit, bringing the system into compliance. 800/426-3349; www.sludgehammer.net. □

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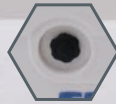
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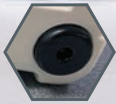
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PRODUCT NEWS

Franklin Electric PowerSewer System

The redesigned FPS PowerSewer System from Franklin Electric is a low-pressure system that pumps residential and commercial wastewater to a collection or treatment area, providing an alternative to gravity sewer systems and septic tanks. The float tree is spring-loaded and easily removable, with a progressive lift handle to simplify pump removal. The system also features an isolated pump support that can accommodate heavier pumps for expanded applications. 260/824-2900; www.franklinwater.com.



SJE-Rhombus EZconnex System

The EZconnex Float Connection System from SJE-Rhombus installs float switches in a wet well for level control applications. It includes an electrical wiring manifold with mounting bracket and hardware. The manifold features three quick-release float switch connection ports. A single six-conductor direct burial cable has red-blue-yellow wire pairs that match the R-B-Y imprint on float housing to aid installers in field wiring. The EZconnex system is rated for short-term water submersion and is CSA certified. 888/342-5753; www.sjerhombus.com.



ASV VT-70 vertical-lift compact track loader

ASV's Posi-Track VT-70 mid-frame, vertical-lift compact track loader features a vertical-lift loader linkage for applications requiring extended reach and level loads. The undercarriage has Posi-Track rubber track suspension with two independent torsion axles per undercarriage, providing a smooth ride over rough terrain and speeds as fast as 11 mph. The VT-70's auxiliary hydraulic system operates with an optional 28.4 gpm high flow and 3,300 psi. The machine includes large line sizes, hydraulic coolers and direct-drive pumps, transferring more flow and pressure directly to the attachment and preventing power loss. 800/205-9913; www.asvllc.com.



The two styles of Little Beaver horizontal boring kits, wet and dry, turn mechanical and standard hydraulic earth drills into versatile machines for horizontal boring applications, including installing wiring, cable and telephone lines. The dry kit attaches to the drill to create bores as long as 5 feet. It includes a 3-inch by 5-foot auger, a horizontal drill key and a 5-foot extension with a universal wiggle joint. The wet kit includes a choice of a 2-, 3- or 4-inch water drill bit plus a swivel adapter, swivel assembly and horizontal drill key. 800/227-7515; www.littlebeaver.com.

Little Beaver attachments for horizontal boring



INDUSTRY NEWS

Tank Holding acquired Agri-Plastics' material-handling division

Tank Holding Corp., which includes polyethylene tank manufacturers Norwesco and Snyder Industries, has acquired Agri-Plastics' material-handling division. Darren Van Buuren, director of Agri-Plastics, will continue to lead the company in pursuing growth opportunities for their remaining core business. □

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Arkansas Onsite Wastewater Association;
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IDAHO

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www.owpi.org

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Kansas Small Flows Association;
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Maine Association of Site Evaluators;
www.maine.com

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www.mapss.org

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www.mowpa.org; 443/570-2029

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Michigan Septic Tank Association;
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Missouri Smallflows Organization;
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Long Island Liquid Waste Association, Inc.;
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Water Environment Federation;
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