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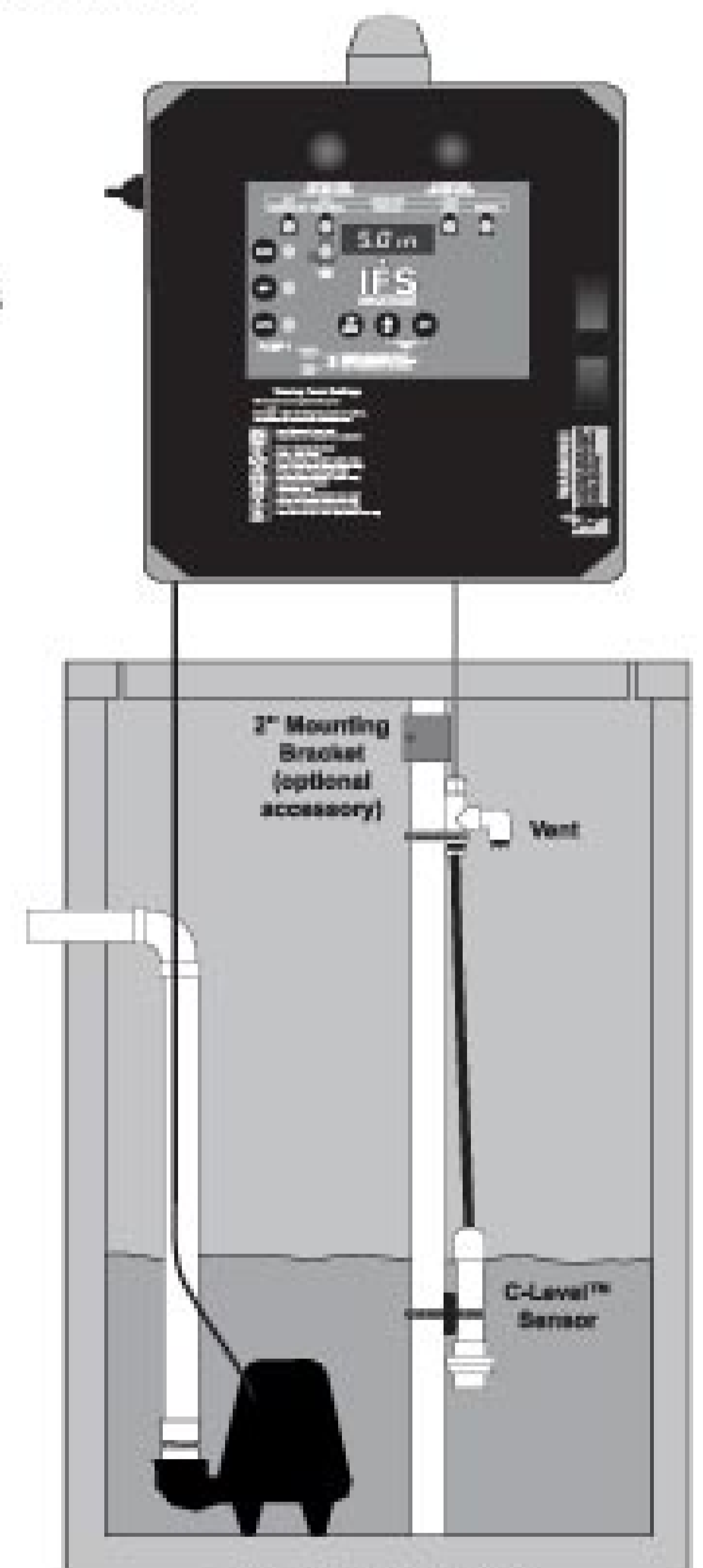
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## About Concrete Tank Deterioration

To the editor:

According to the Portland Cement Association, "ettringite (calcium sulfoaluminate), is found in all Portland cement concretes.

"Any form of attack or disintegration of concrete by freeze-thaw action, alkali-silica reactivity (ASR), or other means, accelerates the rate at which ettringite leaves its original location in the paste to go into solution and recrystallizes in larger spaces such as voids or cracks.

"Both water and space must be present for the crystals to form. The space is often provided by cracks that form due to damage caused by frost action, ASR, drying shrinkage, or other mechanisms. Ettringite crystals in air voids and cracks are typically two to four micrometers in cross section and 20 to 30 micrometers long. Under conditions of extreme deterioration, the white ettringite crystals appear to completely fill voids or cracks."

It appears that the attack of hydrogen sulfide, which would condense to form a weak sulfuric acid, may lead to the migration or translocation of the ettringite found in concrete. This may be a byproduct and marker of deterioration, or part of the process.

In New Hampshire and Maine, it is common to see deteriorated concrete outlet baffle structures

and deteriorated concrete distribution boxes. It is logical to assume that gases originating in the soil disposal area would be the cause, or a significant contributor, to this phenomenon, as in most cases the rest of the tank is much less affected.

Gases from the field area would likely accumulate in the distribution box and in the concrete outlet chimney, condensing there to form weak sulfuric acid, which would attack the concrete. This attack could lead to the translocation of ettringite. This ettringite would thus be a marker of the attack.

Sometimes water treatment is associated with this. We have high iron in many of our wells. The common iron removal system uses salt brine, and the brine backwash ends up in the septic system. There is overwhelming anecdotal evidence of poorly performing septic tanks associated with this.

Black, murky, poorly stratified, emulsified tank contents with effluent strength in the range of 400 to 500 ppm of BOD and TSS is common. Some speculate that the salt may also play a part in the weakening. It is perhaps more likely that the higher-strength effluent will lead to greater gas production during the natural decomposition in the disposal area that produces these gases.

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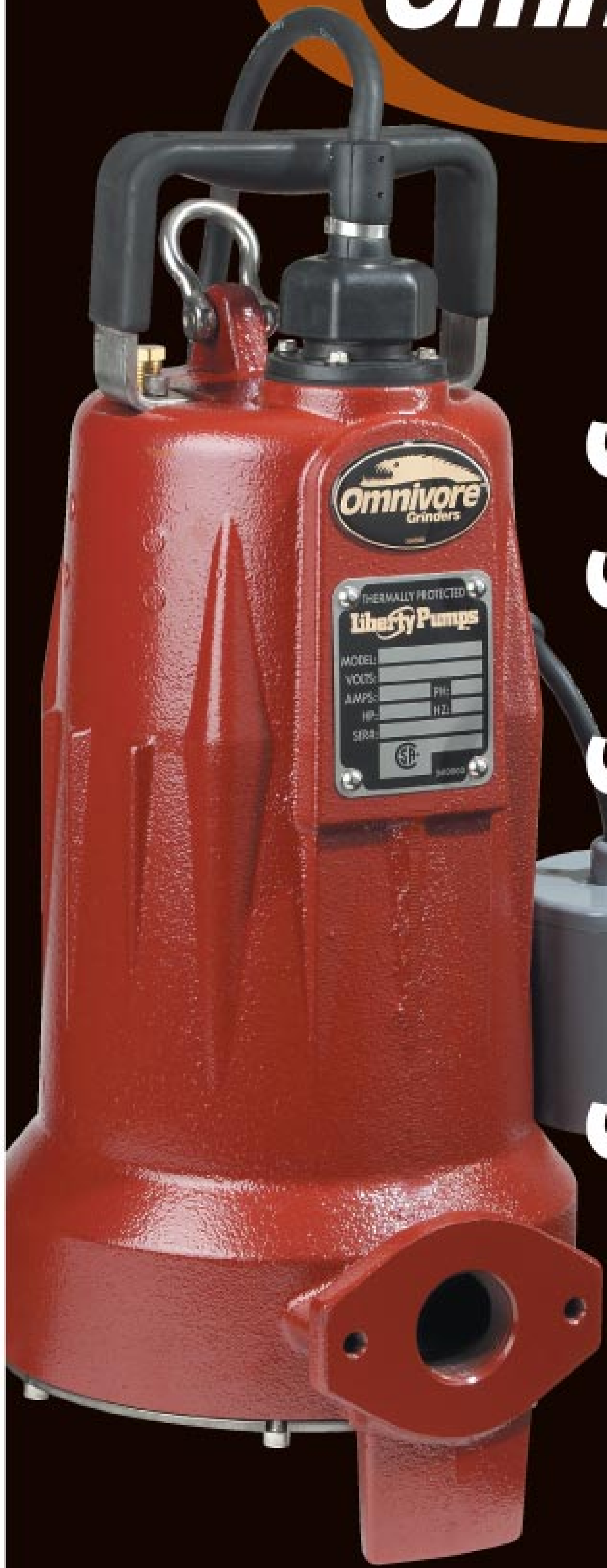
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## Gearing Up for NOWRA

The 19th Annual NOWRA conference is two months away. Something even better is in store for onsite professionals in 2011.

By Ted J. Rulseh, Editor

Quality onsite installers are constantly learning, whether by attending local training programs, reading industry magazines, networking with peers, or visiting national trade shows and conferences.

Often, installers' education focuses on what's directly in front of them: technologies and methods that apply directly to the counties where they work. That makes perfect sense — and yet there's a bigger picture some professionals often miss.

One good place to see that bigger picture is at the annual National Onsite Wastewater Recycling Association conference. It's here that industry practitioners can learn about the latest in approaches to decentralized treatment and about new research, regulations and policies that may someday affect them locally.

The NOWRA 19th Annual Conference will be held at the Millennium Hotel in St. Louis Oct. 25-27, with the theme, "Surface Discharge: Challenges and Solutions." This year there will be a technical conference only — the usual trade show with technology exhibits is taking a one-year break. However, there will be a tabletop trade show for industry suppliers to connect with attendees.

Meanwhile, the organization and its members can gear up for a 2011 Super Conference involving NOWRA, the National Environmental Health Association (NEHA) and the State Onsite Regulators Alliance (SORA).

### Why surface discharge?

The local host for the 2010 con-

ference will be the Missouri Small-flows Organization. It just so happens, in that region of the country, many onsite systems use surface discharge, according to Tom Groves, NOWRA president. These aren't the kind of surface discharges in which raw waste is piped directly into a ditch or creek. Usually the effluent is secondary treated with an ATU.

Still, soil treatment would be preferable. "We're trying to encourage these owners and show them that technology works and that we should be putting that effluent into the ground," he says. "It's too easy to still have new construction that uses surface discharge. The EPA does not like it at all, because technically that would require an NPDES permit under the Clean Water Act. But the state agencies and the counties are not really doing anything to discourage it."

"In an ideal world if the ATU is running perfectly and the ATU had a maintenance contract, and the chlorinator was working, there may not be a problem. But when you have soil, why not take advantage of the soil?"

While surface discharge issues will have top billing, the conference technical program will cover the full range of onsite treatment topics. There will be presentations on regulation, policy and management, case studies of successful technology installations and management approaches, panel discussions, and half-day to full-day seminars.

Programs will cover areas such as nitrogen removal, cluster system design and application, water reuse, system performance evalua-

tion, soil and site evaluation, performance standards, training and certification and integrated water management.

In addition, a one-day learning track is planned specifically for designers, installers and O&M providers to help them understand advances in pretreatment and sub-soil dispersal and the business opportunities those technologies represent.

The State of Illinois has committed to CEU credits for installers

water regulators from all 50 states, plus the United States Territories, tribes and Canadian provinces.

The concept of the joint conference developed under the Memorandum of Understanding with the EPA that NOWRA and many other groups are part of, says Groves. At the last renewal, of the MOU, SORA became an official signatory.

"At one of the annual meetings of the MOU partnership, we discussed ways to work together on

**"It's too easy to still have new construction that uses surface discharge. The EPA does not like it at all, because technically that would require an NPDES permit under the Clean Water Act. But the state agencies and the counties are not really doing anything to discourage it."**

Tom Groves

attending, and at press time other states were reviewing the material for possible approval. The NOWRA Web site has information showing the list of states that have approved CEU units.

### Combining forces

The 2011 conference with NEHA and SORA is exciting to contemplate. It makes a person ask: Why wasn't this done before? NEHA ([www.neha.org](http://www.neha.org)) is the purveyor of the Certified Installer of Onsite Wastewater Treatment Systems national credential, which is gaining momentum around the country.

SORA ([www.nesc.wvu.edu/sora/regulators.cfm](http://www.nesc.wvu.edu/sora/regulators.cfm)) is a national organization that represents onsite waste-

our conferences. We're still working out some of the logistics of the Super Conference. We'd like to do the joint conference maybe every three years or so. The advantage to NOWRA is that NEHA and SORA are county and state regulators, and that's an audience that doesn't usually attend the NOWRA program in big numbers.

"We're also working jointly on a number of initiatives and it's good for us to get together every few years."

It's hard to imagine anything more appropriate than getting members of all three organizations together in the same hotel for three days. It's easy to imagine some great ideas and helpful connections coming out of this conference. ■



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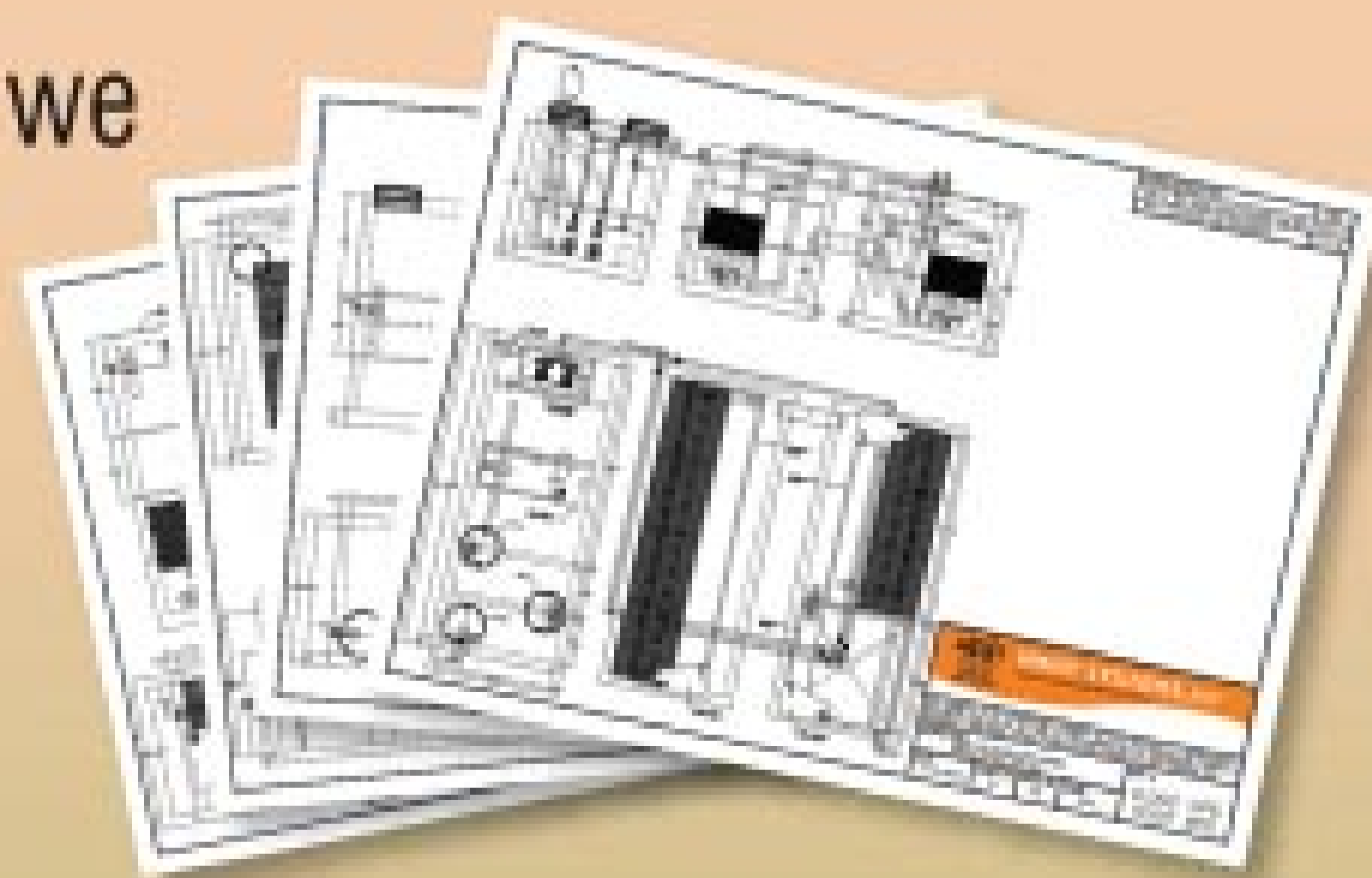


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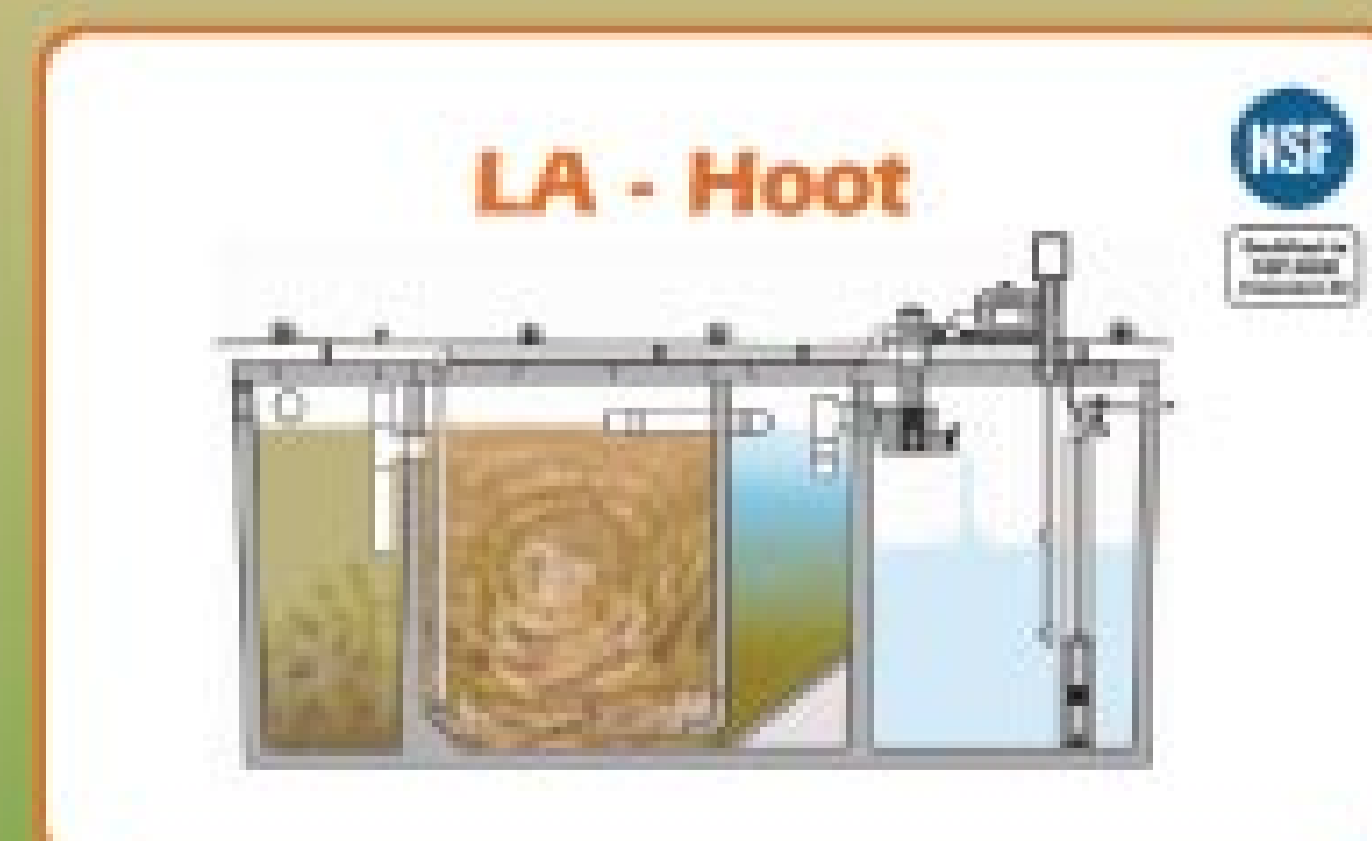
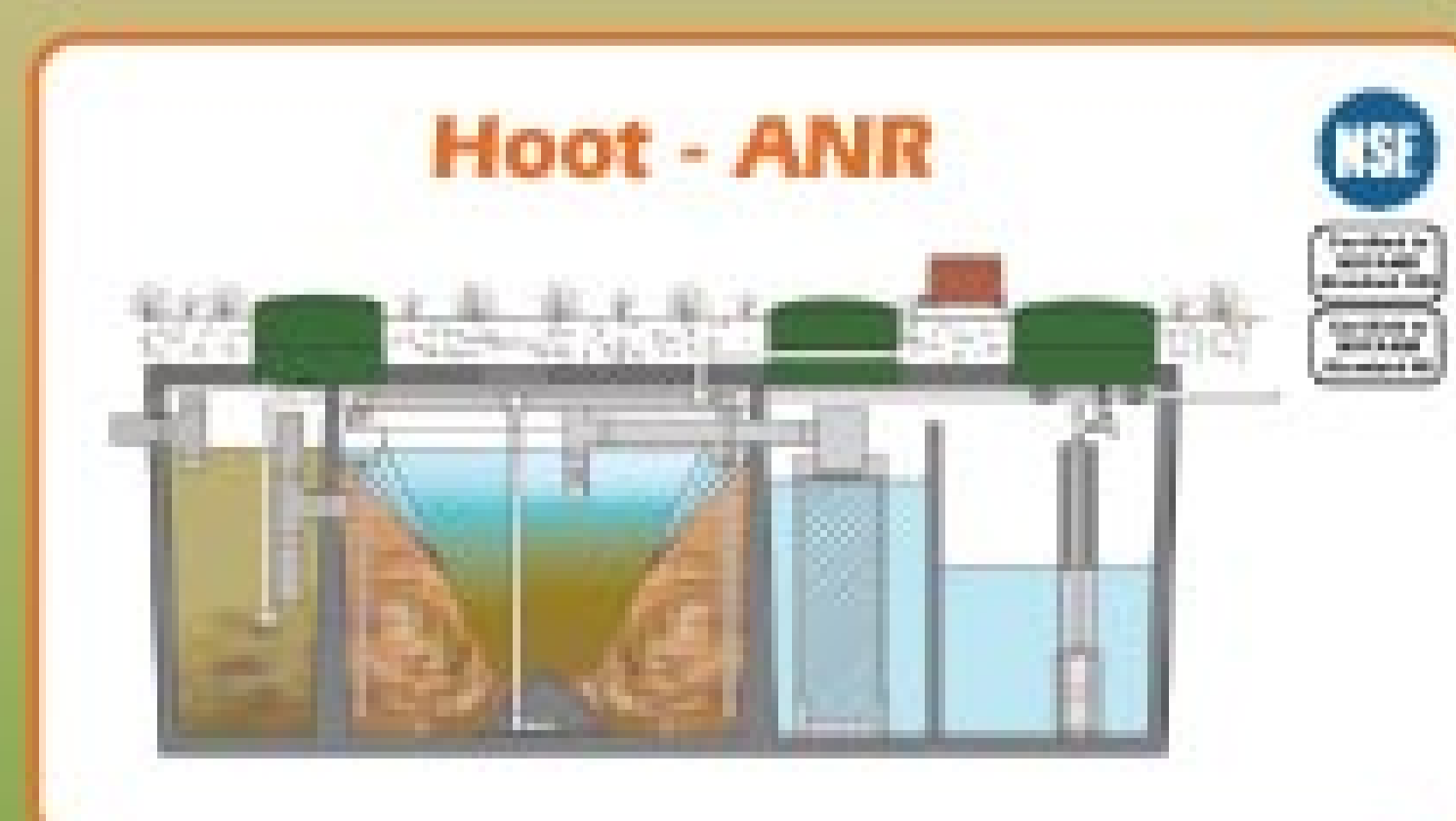
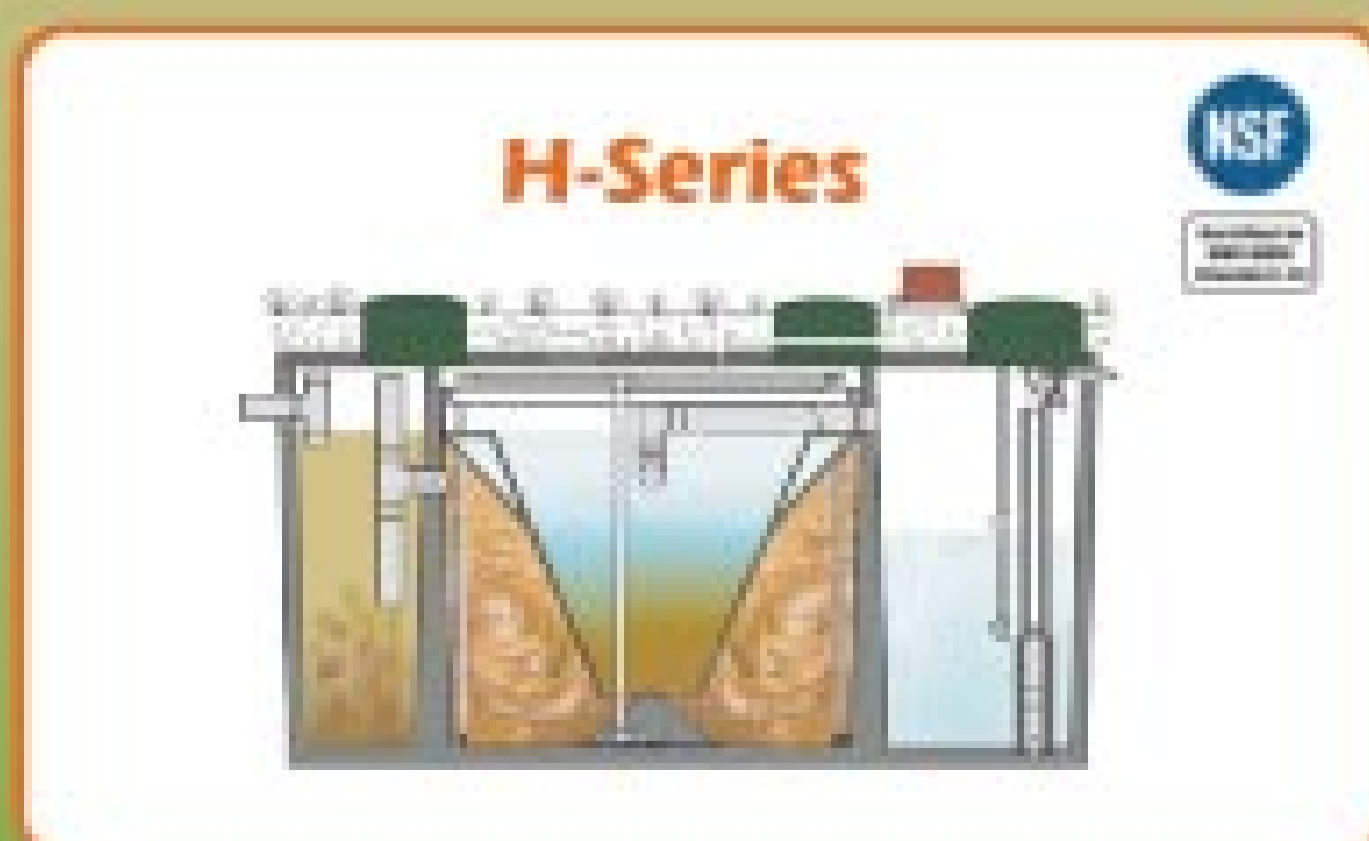
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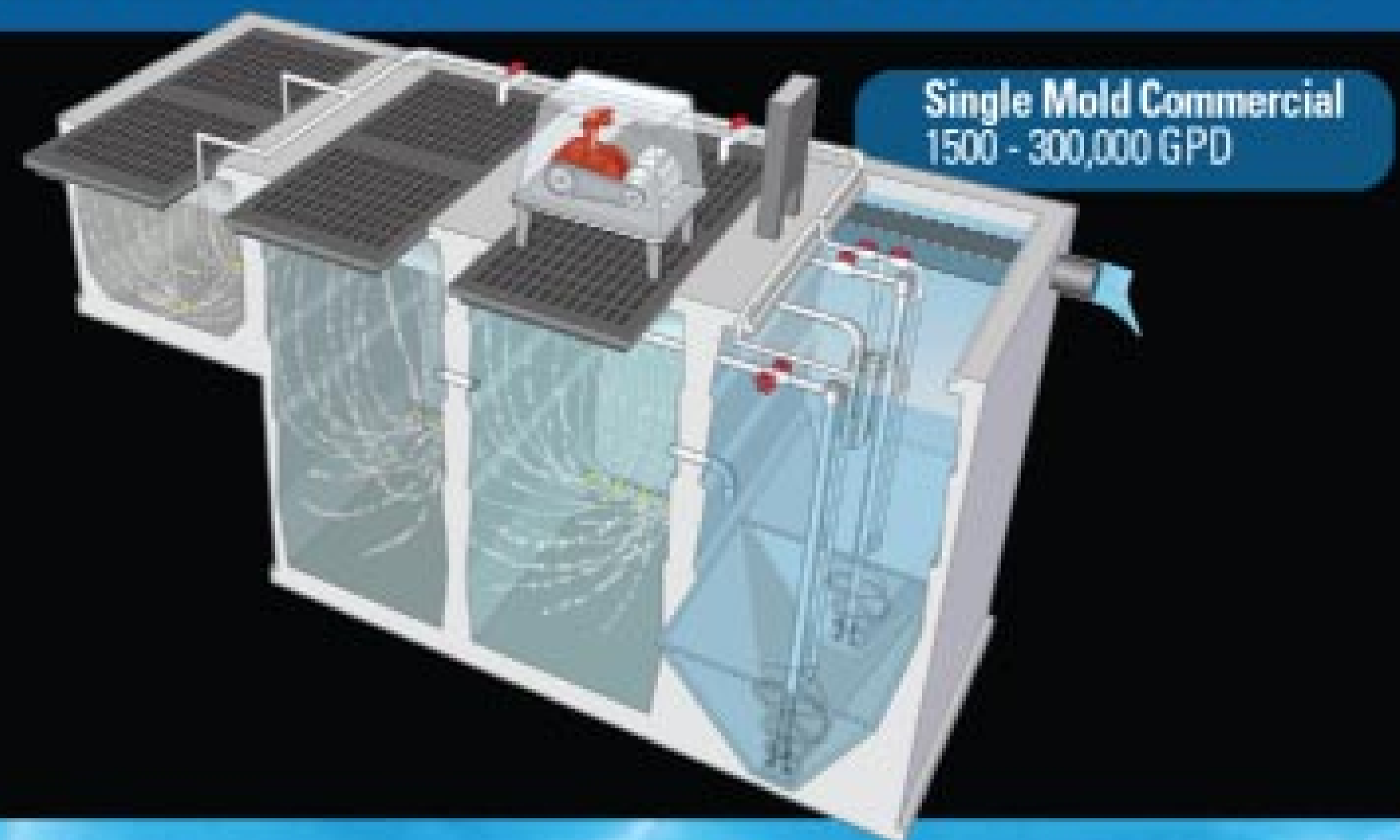
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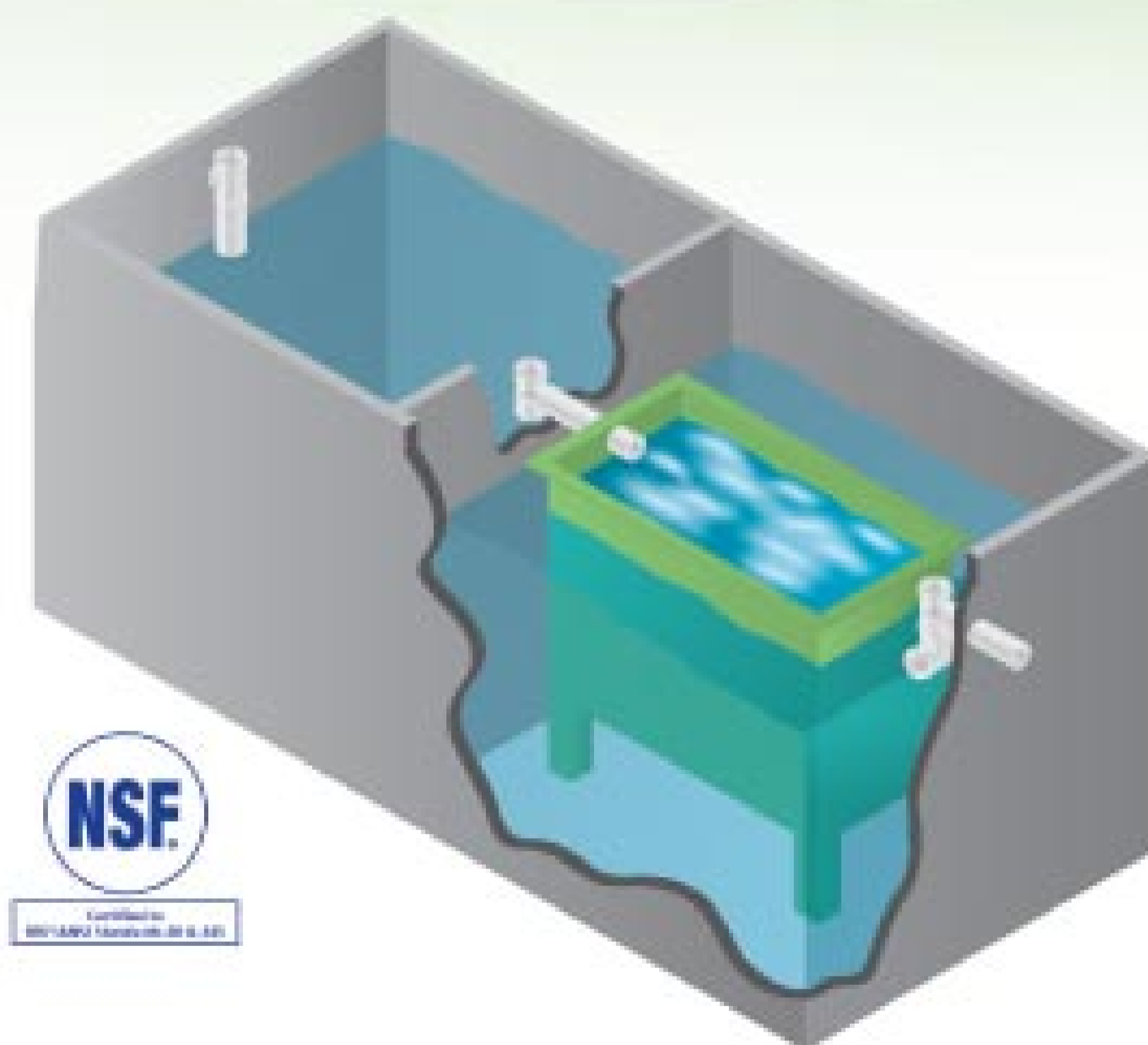


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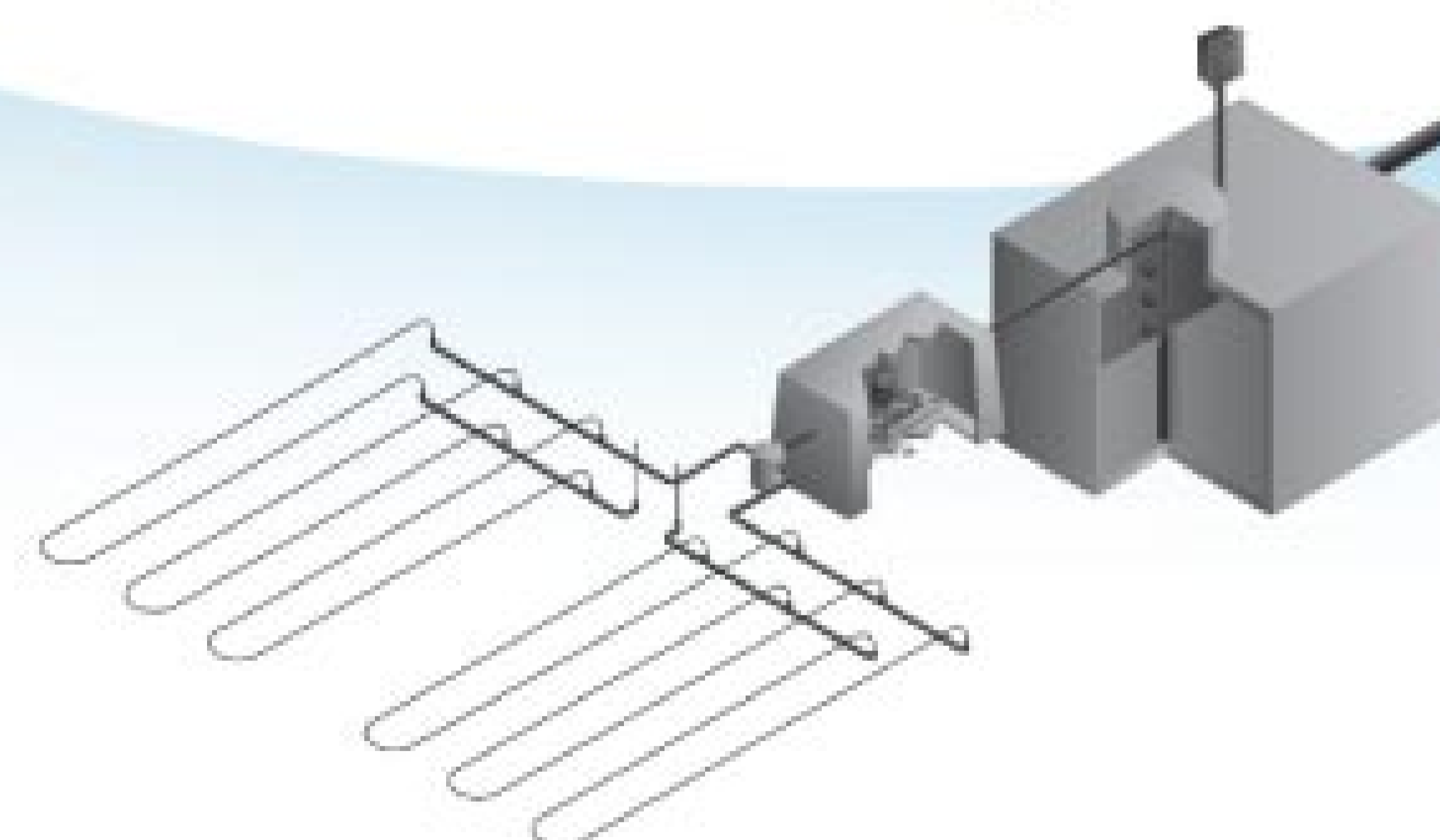
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The Brownlee fleet includes this Kubota Super Series KX 161-3 excavator, operated by company owner Levi Brownlee. (Photography by Shelly Rogers)

# Opportunities Everywhere

Levi Brownlee thrives on creative solutions that help families and homeowner associations meet onsite treatment challenges

By Gil Longwell

**Levi Brownlee  
Excavating and  
Wastewater  
Systems,  
Payson, Ariz.**

**OWNER:** Levi Brownlee

**YEARS IN BUSINESS:** 2

**MARKET AREA:** 300 miles north-south, 100 miles east-west

**SPECIALTY:** Problem-solving and management services

**EMPLOYEES:** 3

**AFFILIATIONS:** National Association of Wastewater Transporters



**L**evi Brownlee's happiest days are spent overcoming serious challenges and solving customers' problems. Tiny or odd-shaped lots and failing systems all fuel his drive to prevail with long-term, quality solutions.

Levi Brownlee Excavating and Wastewater Systems, near Payson in north central Arizona, serves a territory that extends about 300 miles north to south — as far south as Phoenix — and about 100 miles east to west. Within a 40-mile radius of Payson, Brownlee is the only system management provider in a bright and sunny countryside.

In business on his own for about two years, Brownlee has been in the onsite industry for more than 14 years. "When I was 16, I started working for an installer," he says. "I liked the work and learned all I could. After a while, I thought, 'I might as well do it myself.'" About five years ago, he and a partner set out on their own. Brownlee Excavating and Wastewater Systems began

when he bought out his partner.

The business mix includes about 35 percent new systems, 25 percent excavating and landscaping, 20 percent repairs, 10 percent management contracts and 10 percent property sale inspections.

### **Unseen, unrecognized**

"Most owners of most systems do not know what they have in the ground," says Brownlee. "Replacing an entire system can get pricey. When the neighbors take notice of the construction, they wonder about what system they have. Then they call me. They want to avoid the same problem if they can."

Every existing system is a business opportunity, and because of that Brownlee does not see a 50 percent drop in the local new housing market as an obstacle to growth and success. "My growth in the management market has been significant," he says. "In the first year, I established about 40 management contracts. By the end of this year, I

**"My growth in the management market has been significant. In the first year, I established about 40 management contracts. By the end of this year, I expect to have 200 systems under contract."**

**Levi Brownlee**

expect to have 200 systems under contract."

Brownlee has identified about 20 system configurations that he routinely encounters. The effect of regulation changes and installer preferences results in clusters of similar systems in neighborhoods built at about the same time. This clustering helps him anticipate what he might encounter, yet every failing system requires a complete evaluation before he can propose a course of action. There is no place for guesswork.



Owner Levi Brownlee builds his own control boxes for use on a variety of onsite systems.

### Broad skill set

Brownlee must be familiar with newly emerging and long discontinued technologies and components. Specialized equipment, parts and knowledge are a small piece of the tool set he carries to each job site.

"Changing filter socks, checking aerator shafts, servicing pumps, adjusting or replacing control floats or level-sensing transducers, jetting

distribution laterals, adding effluent filters, and replacing baffles are dirty jobs that no one else wants to do," he says. He gladly does them because they bring peace of mind to customers and income to him.

"I have seen some advanced treatment units running just fine after 15 or 20 years in the ground, even though they were never serviced," he says. "Other units or system configurations have been less successful and have far shorter life spans." No matter what he encounters, he must be prepared to recognize, diagnose, troubleshoot, and then restore performance wherever possible.

Installations for new construction or complete replacements of exhausted systems require those skills and more. An understanding of soils, local regulations and regulator preferences all converge on the job site wherever it is in his four-county service area.

### It's the network

Brownlee's network assures his success. A Jet Inc. distributor, he partners with other installers, helping them find solutions and coaching them on installation techniques. "Through these contacts, I get to meet new system owners, who turn

**Levi Brownlee uses air-driven cleaning tools from Jet Inc. to clean filter media.**



Levi Brownlee started working with an installer at the tender age of 16 and now has been in the onsite business for 14 years.

## When the Going Gets Tough

Tough going energizes Levi Brownlee, owner of Levi Brownlee Excavating and Wastewater Systems. "The harder the job, the more fun it is," he says. "I love a challenge because it makes the day go faster.

"I build my own headworks or control boxes for use on a variety of advanced treatment systems. My designs are crafted to make them easier to work with and to work on after they are in service." Each component is positioned with future access in mind.

Brownlee takes on the jobs that other installers have walked away from. Without sacrificing safety, he has installed systems where others would not even consider going. He does this without

bravado, but definitely with enthusiasm and gusto.

Understanding and matching different systems to challenging sites is another way in which Brownlee overcomes obstacles. He finds the Ecoflo peat biofilter from Premier Tech Aqua light and easy to transport in rough terrain, with its fiberglass shell.

"If necessary, a few guys can carry it into the site," he says. "The AdvanTex unit from Orenco Systems is another awesome technology that is also lightweight and easily transported."

New and different are concepts that, like challenge, energize Brownlee and bring new opportunities for fun and success.

to me for management services," he says. "Their installer could do this work; they just don't want to be bothered, I guess."

Network building can start with a long-held professional friendship. It can also start when an installer

needs a particular technology or component for a challenging job and seeks Brownlee out.

Network points can be close by or far away. Brownlee recently partnered on a 5,000 gpd replacement system for a commercial facility.

"This job was about five hours away, in a state where I do not have the needed licenses," he says. "Working with an established local business that knows the local infrastructure and that can satisfy community-specific requirements makes these relationships work."

Quality comes first with Brownlee, regardless of which installer's job site he is on. "I am there to assure a quality job," he says. "If I am called to repair someone else's work, I re-evaluate our business relationship."

"Keeping up with required training is just part of the total quality approach. Quality craftsmanship and good customer skills also play a part." In most cases, Brownlee returns to the site repeatedly to perform management services. By assuring quality construction, he can diminish the need for non-routine service and repairs.

Resources in his network also include designers, tank and pipe suppliers, and others who bring needed components, hardware or a local awareness to the team. All these are needed to accelerate projects, minimize obstacles and achieve success. Brownlee plans to continue using this network approach to multiply and leverage his presence in many dispersed market areas.

### Community focused

Homeowner associations are a central target in Brownlee's marketing strategy. The job of these associations is to help preserve the character and value of the neighborhood. Their internal communication linkages are a resource he likes to tap. When working a repair job, he asks the customer if there is a neighborhood association. If so, that referral is his door opener.

"I use one homeowner's repair experience to help the association educate all members about general system and management concepts," he says. "The association becomes my promoter. Through them, I may reach 100 or more owners, not just the two or three neighbors near the current repair job."

Most owners do not know that their systems require management. Many jurisdictions require a service contract for the first year of a system's life, after which homeowners



Levi Brownlee checks the control floats in a pump chamber tank.

**"I use one homeowner's repair experience to help the association educate all members about general system and management concepts. The association becomes my promoter. Through them I may reach 100 or more owners, not just the two or three neighbors near the current repair job."**

Levi Brownlee

are on their own to locate a provider. Associations sharing Brownlee's message of responsible maintenance help their members while also helping Brownlee.

If the association is responsible for a community system, then the association itself becomes his customer. Marketing to these owners has its own set of challenges. For example, when a board of directors is involved, the decision-making process becomes more complex.

Community systems are themselves often more complex, but when management practices are established, they are easier to preserve, and there is less need for remedial work. In general, community system owners are also more committed to sound management practices.

"Until recently, word-of-mouth and personal contacts had been my sole marketing effort," says Brownlee. "Now we have begun mailings to past customers reminding them of their systems' management needs. Health departments are making their listings of large system owners available as well."

### Leveraging resources

Brownlee's personnel and equipment inventory are well matched and flexible. Brownlee is on every job site himself, often working with equipment operator Jerry Morris. Levi's mom, Terrea Brownlee, handles office duties and the books. Not on the payroll, but clearly in the family network, Elecia Guerrero is his go-to person for soil evaluations, conventional system designs, and inspection of existing systems as part of property transactions.

"Referring work back and forth benefits both of our businesses," Guerrero says. "Working with the same resource people on a routine basis enables both of us to have a good understanding of each other's expectations."

Because he works in an area of great geologic and topographic diversity, Brownlee uses a 2008 Kubota Model KX 161-3 tracked excavator as his workhorse tool. It's equipped with a Huskie hydraulic hammer to deal with rock formations.

Brownlee can also dispatch a 2000 Cat 416C backhoe when it is

better suited for the job at hand. For hauling these machines and general transportation to job sites, he relies on a 2006 3/4-ton Chevy Silverado pickup truck. As needed, he deploys other equipment from local rental sources. A dump truck purchase is on the horizon.

In both equipment and people, Brownlee has found a model that lets him mobilize the best resources for the job while holding fixed costs down. The model is lean, flexible and readily adjustable.

### Pondering change

Brownlee sees service as his foremost responsibility. "Good customer relationships, prompt response to service calls, a live voice answering the phone, two years of post-construction maintenance and a free six-month inspection and check-up all build customer relationships," he says.

Brownlee has seen recent changes in business patterns and knows more are on the way. "For about 10 years I kept busy in November and December as an outfitter and hunting guide in the northern mountains," he says. "This winter, I was too busy with management work to do any guide work. Who would have expected that?"

More understandable is his belief that the big opportunities in the onsite industry are in the management and maintenance of systems. "There will always be a need for installations which are, by definition, a single transaction," he says. "Management offers continuing relationships, continuing income and continuing growth."

Levi Brownlee is deeply involved in the onsite industry. Riding the wave of change is exactly where he wants to be. ■

### MORE INFO:

**Jet Inc.**  
800/321-6960  
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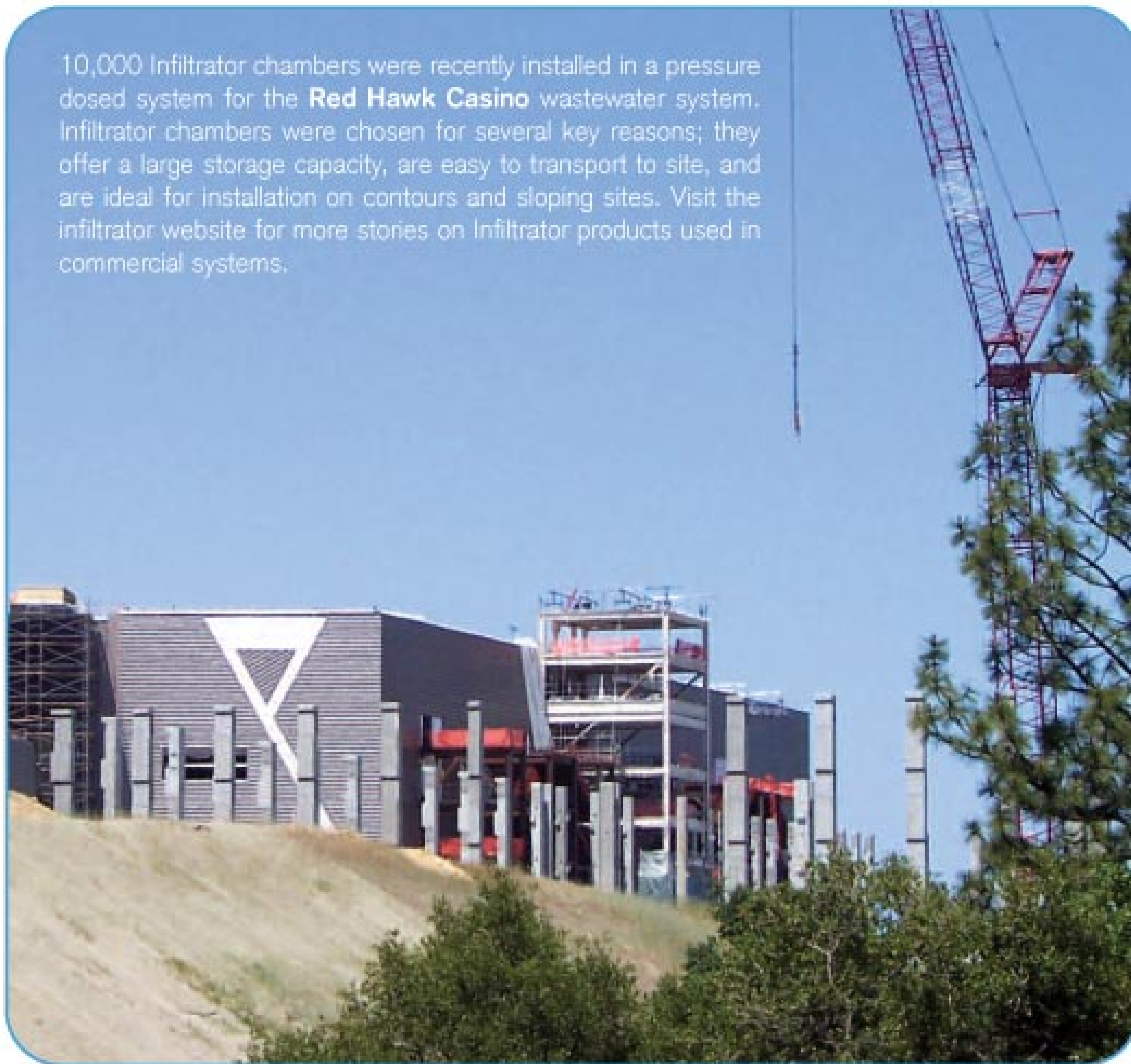
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Jim Anderson and David Gustafson are connected with the University of Minnesota onsite wastewater treatment education program. David is extension onsite sewage treatment educator. Jim is former director of the university's Water Resources Center and is now an emeritus professor, as well as education program coordinator for the National Association of Wastewater Transporters. Readers are welcome to submit questions or article suggestions to Jim and David. Write to [ander045@umn.edu](mailto:ander045@umn.edu).

# Getting It Wired

As advanced and alternative treatment systems become more common, proper electrical connections become critical. Here is some practical advice.

By Jim Anderson, Ph.D., and David Gustafson, PE.

**D**uring recent workshops one recurring area of questions deals with proper wiring for onsite wastewater treatment systems. This issue is coming to the fore because more sites require alternative systems with pumps, or use treatment units that need electrical connections.

In addition, numerous states now require effluent screens, and these need alarms to prevent backups into the house in case they clog.

First and foremost, electrical installations must comply with all applicable laws and ordinances, including the latest codes, rules and regulations of the public authority having jurisdiction. Proper wiring materials and installation procedures are critical to the safety of the installer, sewage system users, and anyone who will work on the system in the future.



An example of how manufacturers are getting better at providing electrical connections.

The key regulations generally incorporate the National Electrical Code, and only licensed or authorized professionals should do the electrical work. Having said that, one thing we often hear from installers is: "I had an electrician come out and do the wiring and connections, but they did not understand what they were working with, so it was a poor installation."

Whether you are not qualified to do your own electrical installations or hire electricians to do the work, here are some critical items to consider.

## Outdoor vs. indoor

Materials and installation procedures for outside wiring are considerably different from those for indoor wiring. Outdoor wiring must withstand exposure to water, weather and corrosive environments. This is certainly true for wiring septic system pump tanks. So if your electrician starts using indoor wiring boxes and other indoor components, you can highlight that this is not the place for them.

The pump must be properly wired. This means making sure that:

- The fittings are watertight.
- The conduit is properly sealed so that gases cannot advance through the control panel.
- The wire from the electrical box to the pump is properly sized.

The inside of the tank is a very corrosive environment, so the splices or wiring must be protected if connections will be made there. Sealing of the conduit is also critical. In many states, there must be a vent or separation of the conduit from the control panel.

The best situation is to avoid making electrical connections inside the tank — including plug-ins, screw-type connections, twisted wire, boxes, relays, or any other connection that requires movement to connect or operate. If you must make connections or splices inside the tank, locate them in a watertight, corrosion-resistant junction box with watertight, corrosion-resistant fittings and a cover sealed by a gasket.

## Keep out the weather

Outdoor equipment used in wiring must be weatherproof. The two most common types are driptight and watertight. Driptight equipment seals against water falling vertically. The boxes are usually made of painted sheet metal and have shields that deflect rain falling from above. These boxes are not waterproof and should not be used where water can spray or splash on the unit. Driptight boxes are usually used for control or circuit breaker panels.

Watertight boxes seal against water coming from any direction. Individual junction boxes, switch



An example of a good wiring installation with the wiring box outside the pump station.



An example of the right idea, but poor execution. The wiring box is not watertight or sealed.

boxes and receptacle boxes will usually be watertight. They are commonly made of cast aluminum, zinc-dipped iron, bronze or heavy plastic. They will have threaded entries for watertight fittings and covers sealed by gaskets.

Power to the pump and alarm system control box, when located outside a building, will most often be supplied by an underground

branch circuit from a nearby service panel. To prevent wiring damage in the future, avoid routing buried wiring through areas where the homeowner may plant a garden or landscaping features. Power to the control center should be on a separate circuit and must be clearly labeled on the control panel to make sure the homeowner does not inadvertently shut off the power.

Two methods, or a combination of the two, are commonly used in outdoor wiring. One method is to place the electrical wires inside a conduit. The other is to use cable. In either case, you must protect the conductor from physical damage, water and corrosion.

Rigid conduit made from aluminum or steel provides protection. Aluminum is not recommended where it is directly in contact with soil. Rigid PVC pipe can be used above ground. High-density polyethylene conduit can be used underground. Do not use thin-wall conduit (EMT) for underground or any outdoor installations.

An underground feeder cable

**First and foremost electrical installations must comply with all applicable laws and ordinances, including the latest codes, rules and regulations of the public authority having jurisdiction. Proper wiring materials and installation procedures are critical to the safety of the installer, the sewage system users, and anyone who will work on the system in the future.**

can be buried without conduit protection, but physical protection is recommended to reduce the risk of someone spading through the cable at a later date. This is particularly important around the septic tank. A treated board buried just above the cable will afford protection. Do not use nonmetallic cable for underground installations. It will not withstand the moisture conditions in the soil.

**Proper capacity**

Make sure the wire has the proper capacity for the electrical demands of the pump. You can do this by comparing the length of wire necessary from the pump to the power box and the horsepower

required for the pump. Using these two values, you can select the proper wire size. Run a separate wire for the alarm, and put it on a separate circuit.

You can combine the conduit and cable methods. Conduit can be used around cable for physical protection and is particularly useful to protect cables where they enter and exit the soil. If you use conduit and cable together, you need appropriate connections and bushings for the transitions from one system to the other.

The power cable or wiring should run in conduit into the tank. Seal the area around the conduit entering the tank to keep surface water from entering the tank. If the con-

duit provides a continuous connection between the control center box and the tank, plug the conduit entrances with electrical putty to keep moisture and corrosive gases from entering the control box.

We hope these guidelines highlight some things to look for as you install wiring or oversee an electrician in installing onsite treatment systems. ■

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"Rules and Regs" is a monthly feature in Onsite Installer. We welcome information about state or local regulations of potential broad interest to onsite contractors. Send ideas to editor@onsiteinstaller.com.

# Florida Adopts Law Requiring Inspections

By **Scottie Dayton**

**F**lorida governor Charlie Crist signed a septic tank inspection bill, requiring the state's 2.6 million tanks to be inspected every five years. The rule also creates a grant program for low-income homeowners whose tanks need repairs or replacement.

Half the tanks are more than 30 years old, and regulators estimate that one in every 10 is failing. Under the program, contractors will inspect about 500,000 tanks per year, charging no more than \$30. State health officials must have the inspection system operational by 2016.

■ ■ ■  
An April sting operation at marinas on Merritt Island and in Vero Beach resulted in 10 citations and 35 warnings to boat operators illegally dumping septage into the Intracoastal Waterway. Complaints of human waste in the water prompted the Florida Fish and Wildlife Conservation Commission action.

### California

A state assemblyman has proposed a ban on some chemical treatments for holding tanks in

boats and RVs that can harm bacteria in sewage systems. AB 1824, introduced by Bill Monning (D-Santa Cruz), would prohibit bronopol, dowicil, formaldehyde, glutaraldehyde, paraformaldehyde and para-dichlorobenzene in "a chemical toilet, recreational vehicle, or waste facility of a vessel."

The California Association of RV Parks & Campgrounds issued a statement supporting the bill in early April. "We fully support this legislation and think it will encourage businesses to step up their marketing and distribution of environmentally friendly holding tank products in California," said the group's executive director, Debbie Sipe. The group also said it has spent five years "trying to find ways to protect its members' septic systems and nearby groundwater supplies."

### Iowa

Seven counties now require onsite installers to be certified through the National Environmental Health Association's Certified Installer of Onsite Wastewater Treatment Systems national credential.

According to the spring 2010

newsletter of the Iowa Onsite Waste Water Association, the certification was first required in Bremer County in 2008. The group reports that 158 installers in Iowa hold the credential, more than in any other state. IOWWA is assessing the requirements for credentials or continuing education in all 99 counties. "It's not required, but it's good business," says the group's spring newsletter.

### Missouri

An EPA grant of \$970,000 will be used to extend sewer service in Gravois Mills near the Lake of the Ozarks. The grant will fund the hooking up of about 360 homes to the local sewer district's system.

An agreement between the EPA and Kansas City will result in a 25-year, \$2.5 billion sewer improvement plan. The EPA had alleged that sewer overflows violated the Clean Water Act. The agreement provides for about \$720,000 in civil penalties and \$1.7 million to fund the connection of low- and moderate-income homes to the sewer system. ■

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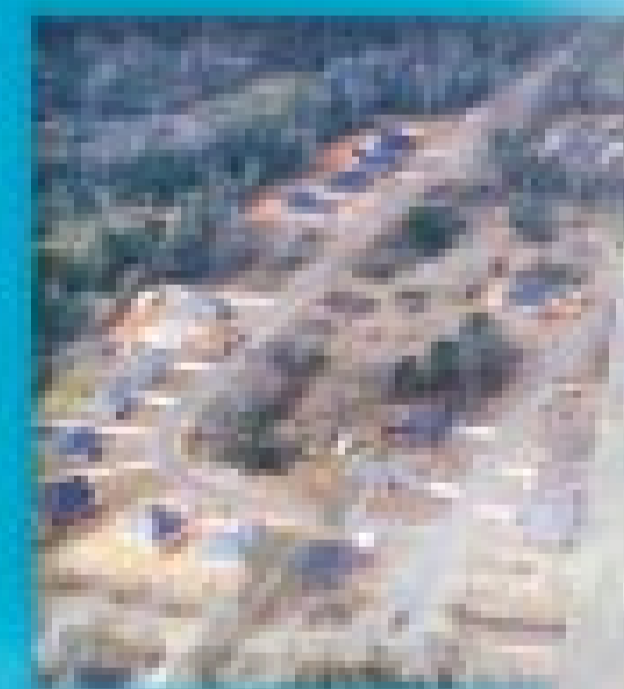
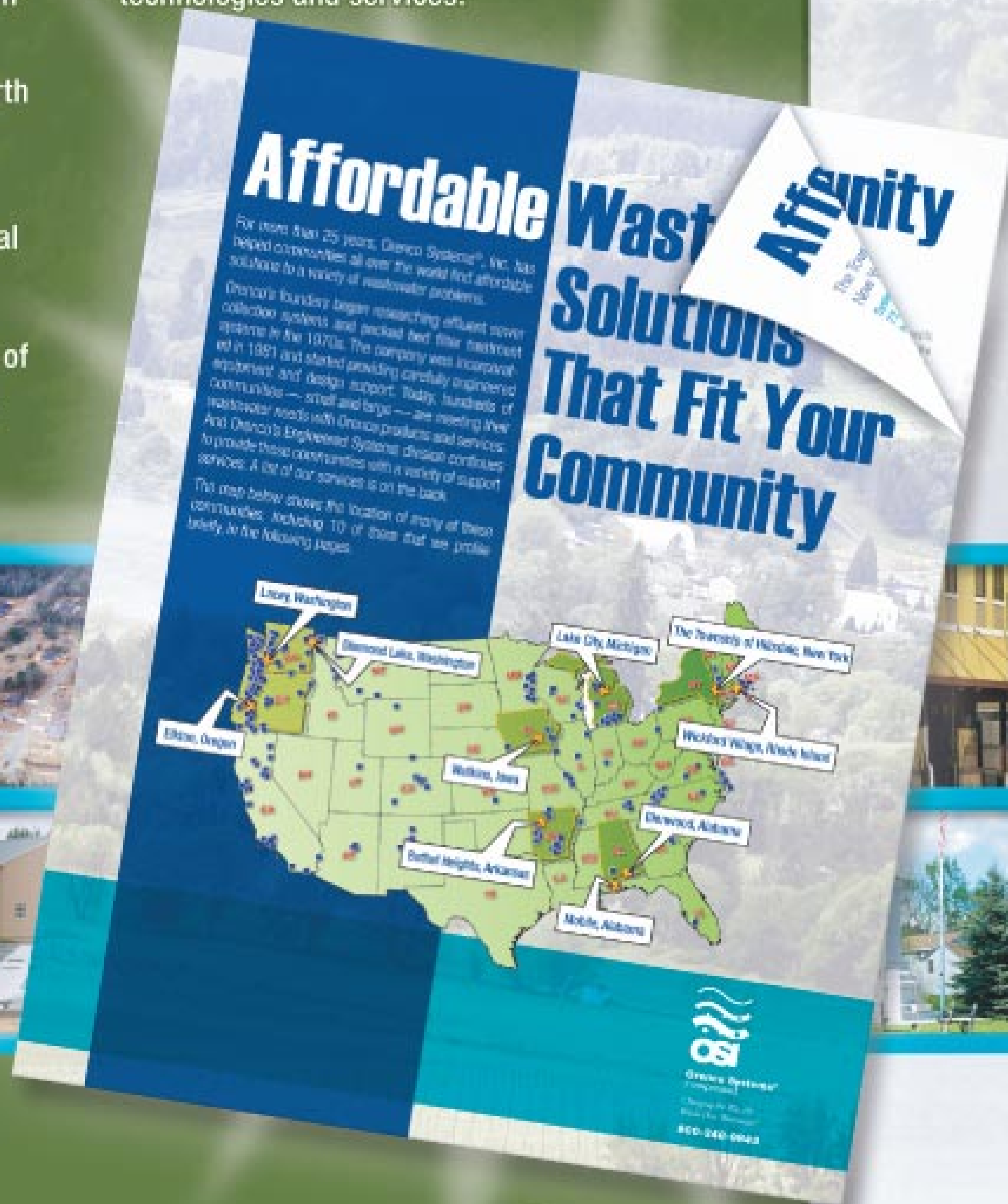
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Machine Matters is designed to help readers get the most from excavators, backhoes, skid-steers and other mechanical equipment through proper maintenance, operation and financial practices. Readers are welcome to submit ideas for this column and can send them to Ted J. Rulseh, editor, by calling 800/257-7222 or e-mailing [editor@onsiteinstaller.com](mailto:editor@onsiteinstaller.com).

# Easy Hauling

Towable excavators and hitch innovations simplify the process of moving equipment from job to job

By Ed Wodalski

Getting machinery to and from installation jobs can be a chore. Innovations in excavators are making it easier. For certain jobs, some installers find towables highly convenient. And now, for those machines and for many devices pulled behind a truck, there's an ingenious hitch that makes it much easier to hook up and go.

Towable excavators include the Go-For-Digger unit from R.H. & M. Machine Co., and the TMX unit from Extend Manufacturing LLC. Meanwhile, Williams Innovations offers the TeleSwivel moveable hitch, which makes it much easier to posi-

tion a vehicle for making the towing connection.

## Easy on yards

The multi-function mini-excavators have lockout drive hubs that enable a half-ton pickup truck, van, vacuum truck, or light-duty tow vehicle to pull them at highway speeds up to 65 mph. There's no need for a trailer or CDL license.

"With the high cost of labor, efficiency is vital," says Dave Edgell, co-owner of R.H. & M. Machine. "The Go-For-Digger is for the small onsite jobs when you have to go on yards, like uncovering a lid, pumping a tank, putting in a riser or doing an inspection. It's not meant to install a complete onsite system."

The unit is designed to be yard-friendly. It weighs 2,800 pounds and offers 2,500 psi hydraulic pres-



TMX



Go-For-Digger



sure and 4,500 pounds of digging force. It can be bought with a diesel engine and a backfill blade that attaches to or replaces the bucket. Bucket sizes range from 8 to 36 inches.

"The four-point stance makes it easy to level on a taper," Edgell says. "Four independent stabilizers allow users to park on hillsides." With two hydraulic drive motors, the unit can turn a circle in forward and reverse. It has joystick controls, a maximum digging depth of 8 feet, fully raised operating height of 110 inches, loading height of 6 feet and loading reach of 59 inches.

The bucket offers 180-degree rotation and 145-degree swing arc. The machine measures 168 inches long in the towing position. It has a transport height of 90 inches and 7-inch ground clearance, and is 77.5 inches wide with a stabilizer spread of 80 inches in the operating position.

## Zero-turn technology

The TMX uses zero-turn technology similar to that found on lawn

mowers, enabling it to get in and out of tight corners easily. A 72-inch, 4-way finishing blade with 21 degrees of tilt is well suited to precision grading, a plus when there is a need to expose a tank or make a repair, says Chris Osswald, managing partner for Extend Manufacturing.

The blade also acts as a stabilizer. "So if I'm on a side hill, I don't have to go down or up," Osswald says. "I can actually work on the side hill because I can level the machine completely." The unit has two joystick controls on either side of the slightly offset business-class seat. The seat is positioned four inches from center, giving the operator a clear view of the bucket, digging arm and backfill blade.

The machine has an auxiliary hydraulic circuit with 10 gpm flow and 2,000 psi for attachments.



TeleSwivel

**"You can run all the auxiliary tools like jackhammers, dewatering pumps and compactors while the machine is still digging. So if I have a hole with water problems, I can run that dewatering pump while I'm digging."**

Chris Osswald

"You can run all the auxiliary tools like jackhammers, dewatering pumps and compactors while the machine is still digging," Osswald says. "So if I have a hole with water problems, I can run that dewatering pump while I'm digging."

The 2,941-pound unit has an 8-foot digging depth, 7-foot, 2-inch loading height and bucket digging force of 4,050 pounds. Maximum bucket height is 121 inches. The boom has a 140-degree swing (70 degrees right or left) and 32-inch minimum swing radius.

It's powered by a 20 hp Kohler, air-cooled gasoline engine, and a 21.5 hp Kubota diesel is available. The machine measures 151 inches long, 74.5 inches wide and 79 inches high with a tongue weight of 380 pounds. It has a three-speed transmission and top drive speed of 6 mph.

Two-speed electronics enable experienced operators to work at top speed, or the unit can be programmed down for novice users. The color-impregnated cab and body are made of oil-, gasoline- and crack-resistant plastic that withstands temperatures from -30 to 230 degrees F.

#### Bigger target

The TeleSwivel hitch makes tow-

ing even easier, providing a target zone about 25 times larger than a standard ball and coupler. Instead of repositioning the truck or wrestling the tongue and excavator, the user swings the hitch into place and locks it for towing. The device fits any standard 2-inch receiver hitch. It telescopes out five inches and up to five inches from side to side. It has a 10,000-pound rated towing capacity with 1,000-pound tongue weight limit.

The company also makes a TeleSwivel BX model hitch adapter. Rated at 10,000 pounds of towing capacity, it telescopes out about four inches and swivels six inches from side to side. The Pro model, made for commercial or fleet use, is Class IV rated and has a towing capacity of 14,000 pounds. It comes with 2-inch and 2 5/16-inch balls and with pintel capability.

Designed for military use, the swivel hitch has been scaled down for commercial applications. The basic model comes without a ball, so that users can mount any size ball they need, says Jeff Allen, commercial sales manager.

"Our BX allows you to use an existing adapter, such as a three-ball or pintel," he says. The Pro also has an adjustable drop of seven inches to make positioning easier. ■

#### MORE INFO:

**Extend Manufacturing LLC**  
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# Going Commercial

Businesses and clusters of homes increasingly use onsite treatment solutions. Here's a look at some of the latest treatment technologies for larger projects.

By **Scottie Dayton**



Fusion systems from Clarus Environmental



Segflo from Premier Tech Aqua



PuraM from Bord na Mona



Module construction from Jet Inc.

MyFAST from Bio-Microbics Inc.



As central sewers become more costly, and as businesses continue to spring up in rural areas, demand is rising for commercial-grade and larger-scale onsite systems. Manufacturers are responding with treatment units built to accommodate larger flow and treat higher-strength waste than residential applications generate. Here are some of the more recent innovations.

## Fusion Systems

**Fusion systems** from **Clarus Environmental** treat 2,800 gpd and can be installed in a parallel configuration for more capacity. The all-in-one units receive raw sewage and output secondary effluent. They are efficient to operate and easy to maintain. **877/244-9340; [www.clarusenvironmental.com](http://www.clarusenvironmental.com).**

## Recirculating biotower

The **Segflo** recirculating biotower from **Premier Tech Aqua** treats domestic wastewater from mobile home parks, strip malls and housing developments. It relies on bacterial segregation and efficient oxygenation to reduce BOD, TSS, and fats, oils and grease to below regulatory standards. It has stable performance even in peak periods.

Compact modular components arrive pre-assembled for multi-phase projects. A kit option is available for local assembly. A panel controls and monitors the system for simple operation and maintenance. **800/632-6356; [www.premiertechaqua.com](http://www.premiertechaqua.com).**

## Membrane bioreactor

The **PuraM** wastewater treatment and reuse system from **Bord na Mona** uses ultrafiltration membrane technology to meet reuse and total nitrogen standards within a reduced footprint. The pre-engineered units are for municipal, community and commercial applications requiring reliability, reduced operational input through extended periods between chemical cleans, and ease of maintenance. **800/787-2356; [www.bnm-us.com](http://www.bnm-us.com).**

## Modular construction

**Module construction** of extended aeration treatment packages from **Jet Inc.** supports numerous plant sizes and phased commercial or residential developments such as hotels, shopping centers, restaurants and subdivisions. Designs can support 1,500 to 300,000 gpd based on loading levels. **800/321-6960; [www.jetincorp.com](http://www.jetincorp.com).**

### Monolithic scalable system

**MyFAST** systems from **Bio-Microbics Inc.** treat wastewater from small communities, commercial properties, isolated schools, and business parks or upgrade municipal package plants. Three systems treat 40,000 gpd to 160,000 gpd. The pre-engineered segments bolt together, creating one monolithic module per tank.

The integrated fixed-film media provides a high surface-to-volume ratio to maintain microbial growth during low, average and peak usage. A remote blower, the only moving part, injects air to circulate wastewater through the media's channeled flow path. Robust agitation allows complete aeration, mixing, and self-cleaning of the attached growth reaction, while the fixed activated sludge technology produces minimal sludge. The effluent is clear and odorless. **800/753-3278; www.biomicrobics.com.**

### Mobile solution

The **SYNERGY** trailer from **Quanics Inc.** is a mobile advanced treatment system for camps, arctic conditions, disaster relief, temporary events or remote locations. The self-contained system combines treatment, distribution, recirculation and disinfection in a single pre-engineered design. AeroCell open-cell foam biofilters treat wastewater to secondary and tertiary levels. The passive-air fixed-film media filter produces little or no sludge and needs no chemicals or backwashing. The system has only a few pumps, filters, and distribution mechanisms that need maintenance. **877/782-6427; www.quanics.net.**

### Aerobic bacterial generator

Scalable modular **SludgeHammer** technology treats flows ranging from high-strength winery wastewater to restaurant grease and can be used for cluster systems and retrofits of full-sized package treatment plants. These aerobic bacterial generators oxygenate and circulate effluent in septic tanks at up to 25,000 gpd. Every unit has 150 square feet of coiled lattice with dense bacterial colonies that digest solids and sludge. Microbes reaching the drainfield consume the biomat and remediate the bed. **800/426-3349; www.sludgehammer.net.**

### Fixed-film treatment

A **Bioclere** wastewater treatment plant from **Aquapoint Inc.** replaced failing systems in two plazas in a suburb south of Boston and enabled the developer to build a third shopping plaza with an office complex. The centers included restaurants, retail outlets and a supermarket.

The unit uses modified trickling filters over clarifiers to accommodate intermittent flows, extreme temperature variations, and fluctuations in organic load. It was permitted under Massachusetts groundwater discharge standards requiring BOD and TSS less than 30 mg/l and total nitrogen less than 10 mg/l. The 60- by 70-foot plant handles 40,000 gpd of influent at 800 mg/l BOD and 100 mg/l TKN. **508/998-7577; www.aquapoint.com.**

### Permanent or temporary

**Packaged treatment plants** from **Delta Environmental Products Inc.** handle 3,000 to 500,000 gpd. The extended aeration and oxidation process consumes volatile materials, converting them to carbon dioxide, ash, and clear, odor-free effluent. Pad-mounted, self-contained, permanent or temporary plants require minimal assembly. Secondary and tertiary treatment systems include aeration, settling, filters, clear well chambers, disinfection and ancillary equipment. Options include gratings, handrails, stairways and flow measuring equipment. **800/219-9183; www.deltaenvironmental.com.**

### Suspended growth

**AT Series** units from **Aero-Tech** are extended aeration activated sludge systems that treat 500 to 1,500 gpd. Wastewater is infused with air from a submerged aerator pump at the bottom of the aerobic treatment plant. The venturi created by the pump pulls fresh air from the surface and mixes it with the effluent from the bottom of the tank.

Finely diffused air bubbles are pushed through the exhaust ports into the mixing chamber in a swirling motion that keeps sludge suspended. As new wastewater enters the mixing chamber, it replaces the mixed liquor in the clarifying zone. In the clarifying chamber, the liquid is suspended in the quiet zone, allowing the suspended solids to settle back into the mixing chamber for further treatment. Clear water in the upper clarifying chamber is discharged. **574/935-0908; www.aerotech-atu.com.**

### High purity

A cost-effective **onsite system** engineered by **Lombardo Associates Inc.** for Malibu Village Plaza in Malibu, Calif., uses Nitrex nitrogen removal technology and treats 16,000 gpd of high-strength wastewater, equivalent to 40,000 gpd residential flow.

The 18,000-square-foot shopping center has a restaurant seating 300 and is next to environmentally sensitive Malibu Lagoon and Surfrider Beach. The treatment train has a septic tank effluent pump (STEP) collection system, recirculating media pretreatment, the Nitrex unit and ozone-UV disinfection. The effluent averages BOD and TSS less than 5 mg/l, total nitrogen less than 3 mg/l and turbidity less than 2 NTU. **866/964-2924; www.lombardoassociates.com.**

### Wide capacity range

**Commercial aerobic treatment plants** from **Hoot Aerobic Systems Inc.** handle 2,000 to 1,000,000 gpd from convenience stores to shopping centers, schools to prisons and churches to entire developments or communities. Systems can be designed and permitted for BOD, TSS, fecal, *E. coli*, nitrogen and phosphorus reduction throughout the country. **888/878-4668; www.hootsystems.com.**

*(continued)*



Bioclere from Aquapoint Inc.



Onsite system from Lombardo Associates Inc.



Commercial aerobic treatment plants from Hoot Aerobic Systems Inc.



**NextGen Living Machine from Worrell Water Technologies LLC**



**AdvanTex AX100 from Orenco Systems Inc.**



**Advanced Enviro-Septic from Presby Environmental Inc.**



**WaterNOx from Waterloo Biofilter Systems Inc.**



**ExtremeSTP from Lifewater Engineering Co.**

### Natural process

The **NextGen Living Machine** decentralized system from **Worrell Water Technologies LLC** uses subsurface packed beds of engineered gravel to treat wastewater in plant-filled basins. Effluent is usable for non-potable applications such as cooling towers, toilet flushing and irrigation. A 150-square-foot system handles 1,000 gpd and can be scaled to treat more than 100,000 gpd. The process uses 2.8 kWh/day/1,000 gpd.

A tidal wetland system at the Esalen Institute in Big Sur, Calif., treats 7,000 gpd with BOD, total nitrogen, and TSS averaging less than 5 mg/l. Effluent is used for drip irrigation in gardens and for aquifer recharge. 434/973-6365; [www.livingmachines.com](http://www.livingmachines.com).

### Modular layout

**AdvanTex AX100** treatment systems from **Orenco Systems Inc.** handle wastewater from residential clusters, subdivisions, commercial sites and communities. Each 5,000 gpd pre-engineered pod has an absorbent nonwoven textile media that produces effluent clean enough for reuse in subsurface drip systems. The 16- by 8- by 3.5-foot units install and service easily, have telemetry monitoring, and draw 3 kWh/1,000 gallons. An 8-pod array treated 40,000 gpd from the Jack's Point resort development near Queenstown, New Zealand. It is part of a modular layout designed for 200,000 gpd. 800/348-9843; [www.orenco.com](http://www.orenco.com).

### Passive ecosystem

**Advanced Enviro-Septic** treatment systems from **Presby Environmental Inc.** treat wastewater from restaurants, resorts, national parks, cluster homes, schools and hospitals. Units create a passive ecosystem using pipe underlain by a bio-accelerator surrounded by a mat of fibers with a nonwoven geotextile covering. The lightweight, snap-together components install in system sand. Third-party testing showed BOD and TSS levels at 2 mg/l. SPD and CTD models are NSF Standard 40 Class 1 certified. 800/473-5298; [www.presbyenvironmental.com](http://www.presbyenvironmental.com).

### Denitrification system

The **WaterNOx** passive biological anoxic filtration denitrification system from **Waterloo Biofilter Systems Inc.** needs no backwashing or reactive media replacement. After testing continuously for two years with various carbon sources and loading rates, the units are now installed for

high removal of nitrate and nitrite ion at campgrounds, truck stops, restaurants, subdivisions, schools and offices where enhanced nitrogen removal is required but constant or complex maintenance is impossible.

The treatment train includes nitrification of effluent in a standard biofilter, nitrate removal, and final polishing of residual organics in a smaller biofilter. Units arrive pre-assembled in shipping containers or as an ISO container. 519/856-0757; [www.waterloo-biofilter.com](http://www.waterloo-biofilter.com).

### Emergencies, extreme environments

Portable or permanent **ExtremeSTP** sewage treatment plants from **Lifewater Engineering Co.** use membrane bioreactors to treat 40,000 gpd to 1 mgd or more from villages, subdivisions, remote resorts, construction camps and tourist centers.

Permanent systems have ceramic membranes with a 20-year life. Portable systems to provide sanitation in emergencies have tubular membranes that winterize easily and resist damage during land, air and sea transport. Pre-engineered or custom-engineered systems are built inside 20- or 40-foot shipping containers. Installation is plug-and-play; a SCADA system allows remote monitoring and control. Effluent meets surface water discharge quality standards. The units work on permafrost soils and down to -60 degrees F. 866/458-7024; [www.lifewaterengineering.com](http://www.lifewaterengineering.com).

### Cyanobacteria fighter

**BIONEST** systems from **Bionest Technologies Inc.** are suitable for all types of soil and land configurations, offering high purification of commercial and industrial wastewater to meet the most rigorous standards and help fight cyanobacteria. Units are concealed and odorless, easy to install and economical to operate. 819/538-5662; [www.bionest.ca](http://www.bionest.ca).

### Light applications

**Aqua Safe** plants from **Ecological Tanks Inc.** treat 500 to 1,500 gpd from multiple homes or light commercial applications using an extended aeration activated sludge process. The fiberglass or concrete tanks can be combined for larger flows. Testing in accordance with ANSI/NSF Standard 40 requirements showed effluent averaged 2.37 mg/l BOD and 2.11 mg/l TSS, or 98.6 percent removal of pathogens. Nitrates levels were 7.52 mg/l without additional components. 800/277-8179; [www.etiaquasafe.com](http://www.etiaquasafe.com). ■

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## Tank Adapter Ring

New - Horizontal Safety Screw.

Safety Pan™ to Riser attachment with 6 vertical stainless steel screws.

Riser to Riser attachment with 6 vertical stainless steel screws.

Patent Numbers  
5,617,679 &  
5,852,901; other  
pats. pending.

## Riser Lid

with Molded-in gasket.  
Available in 12", 16", 20" and 24" diameters.

Concrete Lid w/handle

## Safety Pan™

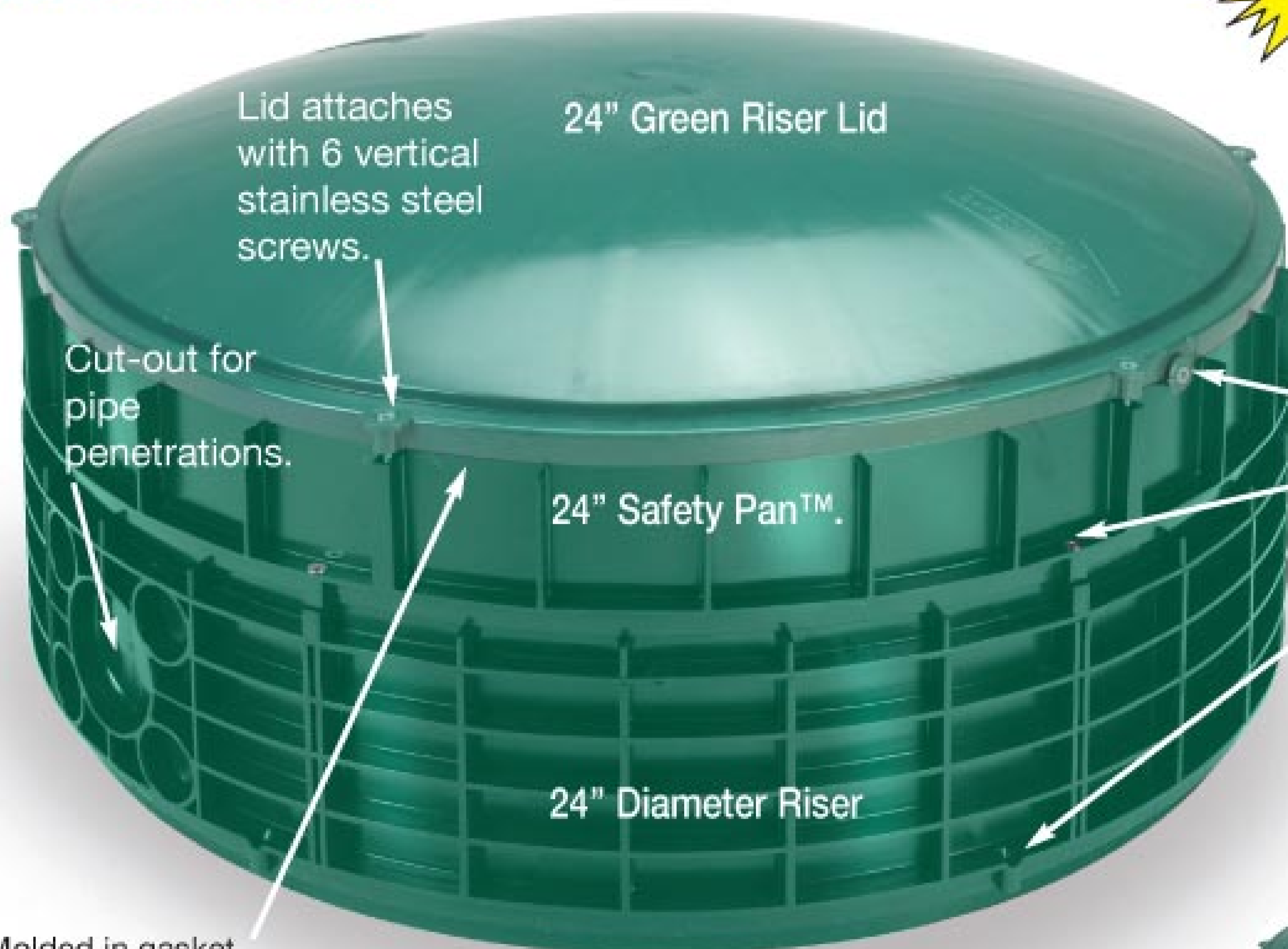
Safety Pan™ available in 16", 20" and 24" diameters.

## Riser

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## Tank Adapter Ring

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Lid attaches with 6 vertical stainless steel screws.

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Cut-out for pipe penetrations.

24" Safety Pan™.

24" Diameter Riser

Molded in gasket.

Available in 12", 16", 20" and 24" diameters.

## Effluent Filters

Patent Numbers  
6,319,403; D 431,629; other  
pats. pending.

800 GPD  
ANSI/NSF  
Standard 46



4" Sch. 40 &  
SDR-35

**EF-4**  
4" Filter



1500 GPD  
ANSI/NSF  
Standard 46



4" Sch. 40 &  
SDR-35

244 ft. of  
1/16" filtration  
area.

**EF-6**  
6" Filter

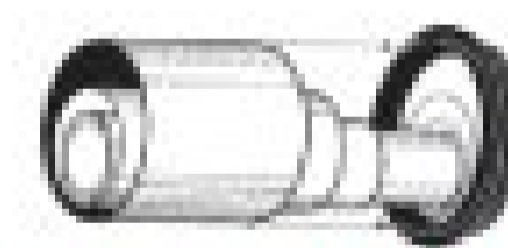
Gas/Solids  
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Mounts with or without concrete flash.



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(will hold 10psi)  
**TS-4PRO TANK SEAL**  
(will hold 5" vacuum)



Free Freight: 32¢

Patent No's  
5,624,123  
& 5,711,536;



12", 17", or 20"

Tested to 10" vacuum

# Drawing on Computer

Contractors offer varied opinions on their favorite applications for designing onsite treatment systems digitally

## Question:

Is anyone using CAD or other computer-generated drawings for onsite submittals? I'm not referring to professional designers or engineers. I am an installer and designer in Indiana, and I do the drawings by hand for the health department. I am interested in a way to do it on computer without spending big bucks. Any suggestions?

## Answers:

➔ Septic Planner comes to mind. I think it is tailored for use here in North Carolina, but it may serve your purposes.

➔ I use TurboCAD. It's a knockoff version of AutoCAD and completely compatible. There are free learning versions available on the Internet. I am self-taught, and

my early efforts are pretty laughable, but it still beats the heck out of hand drawing. And you can cut and paste almost all of your basic designs once you have built up a library of images.

➔ I use TurboCAD since it's a lot less expensive than AutoCAD. It still has lots more power and functions than I will ever use.

➔ We are an engineering firm and use AutoCAD, and have almost always since it came out. It is likely more complicated than what you need, but I wanted to pass along something to you and others that I once heard or read. The beauty of CAD is not that you can draw faster. It is that you never have to draw the same thing twice.

➔ I am one of your fellow installers from northern Indiana. I am using SketchUp by Google. It is an older version, but it is really easy to learn and does all you should need. I just checked, and the SketchUp Pro Version 7 with all the bells and whistles is \$495.

If you consider your time worth anything, it's a pretty good value. I

don't know if you charge for site plans or not, but regardless, we often use SketchUp in estimates to show the customer exactly what we plan to do. It gives them a better idea what to expect. We have found that by doing site plans on CAD, we get a better idea of well setbacks than if we tried to figure out all the angles around obstructions. If you have access to the lot dimensions, it also helps you to better assess what might be available on tiny lots.

➔ I work for a local health department in Ohio, and I use a free application called BlueCAD for well permit site plans and sewage-system-related drawings. I don't think it's super user-friendly, but it's the only CAD application I've used, so I really don't have anything to compare it to. It definitely allows me to generate much more professional drawings than I can by hand.

I also have a free pdf writer called PDF Redirect that allows me to create pdf files of my drawings so that I can e-mail them to anyone, and they can be viewed without a CAD application. BlueCAD and a bunch of other freeware CAD applications can be found at [www.freecad.com](http://www.freecad.com). ■



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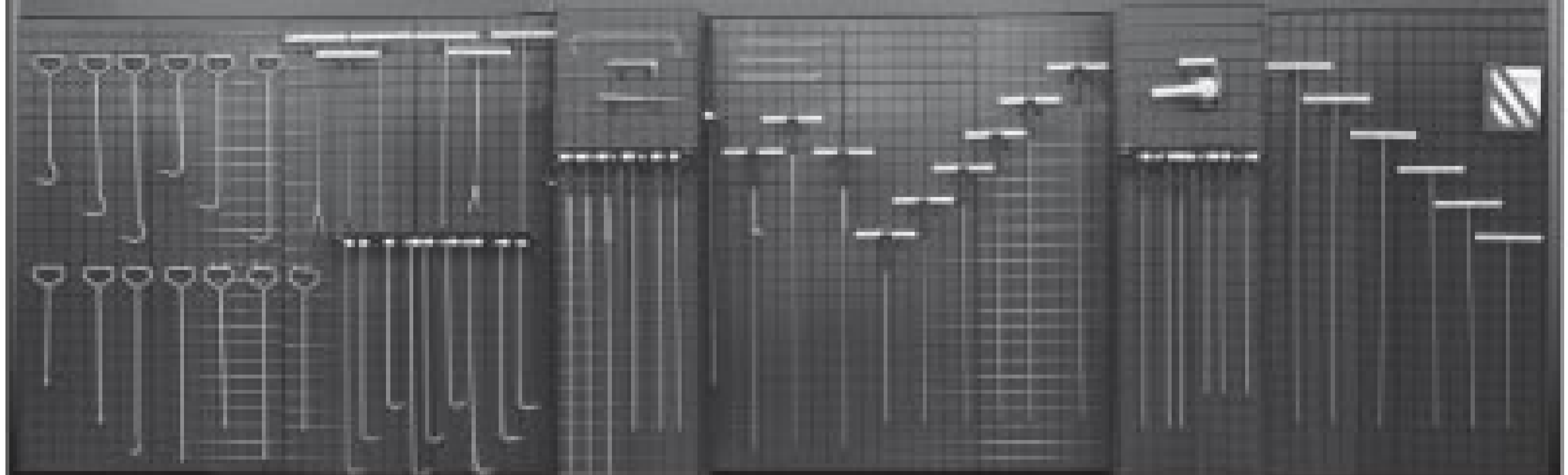


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# Tundra Tough

Treatment plants specially designed for cold climates provide a solution for two seasonal cabin complexes in Denali, Alaska

By **Scottie Dayton**

**G**rizzly Bear Cabins and Campground in Denali, Alaska, needed a larger onsite system to handle a major expansion. Across the road, the undersized system for Denali River Cabins complex also needed replacement.

Bio-Microbics engineer Reza Shams, Ph.D. helped design engineer Bob Tsigonis, P.E., owner of Lifewater Engineering Co. in Fairbanks, to address numerous challenges. Both properties had potable wells and minimal space, ruling out new or replacement drainfields. Effluent discharging to the Nenana River had to meet stringent requirements.

“The systems operate May through September, so winter storage was an issue,” says Tsigonis. “We had to wait until the snow melted and the ground thawed to install

them, leaving only a few weeks before the first guests arrived.”

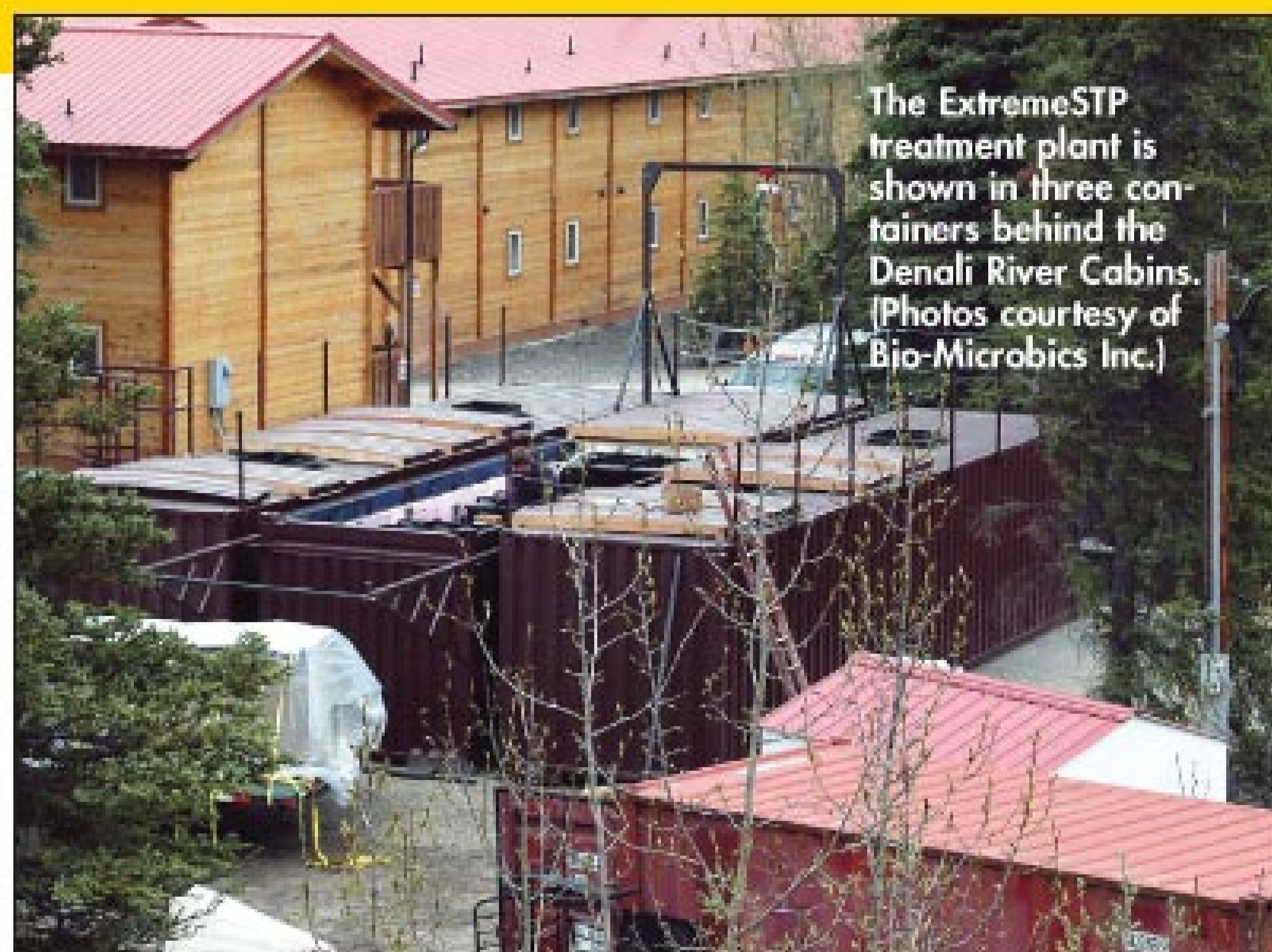
His solution used ExtremeSTP sewage treatment plants from Lifewater Engineering. The units, designed to work on permafrost soils, use bioreactors and BioBarrier flat-plate membrane technology from Bio-Microbics Inc. to produce extremely high-quality effluent for environmentally sensitive areas.

### Site conditions

The systems are above ground on compacted gravel pads. The sites are less than 500 feet from the Nenana River and next to Denali National Park.

### System components

Tsigonis designed the Grizzly Bear system to handle 8,000 gpd and the DRC system to handle 24,000 gpd on completion of the complex.



The ExtremeSTP treatment plant is shown in three containers behind the Denali River Cabins. [Photos courtesy of Bio-Microbics Inc.]

The Grizzly Bear system’s major components are three 1,750-gallon dual-compartment plastic septic tanks with BioSTEP pump vault systems from Bio-Microbics, two 1,000-gallon dual-compartment plastic septic tanks in series with the BioSTEP system, and an 8,000-gallon ExtremeSTP plant with BioBarrier membranes in a 40-foot-long shipping container.

The Denali River Cabins system included a 500-gallon grease interceptor, 1,000-gallon plastic tank with BioSTEP system for the laundry and employee kitchen, an existing 12,000-gallon, two-compartment steel septic tank, and a 24,000-gallon ExtremeSTP plant in three side-by-side 40-foot-long containers.

Both systems have custom-built Web-based control systems from Lifewater Engineering.

### System operation

Three of the new Grizzly Bear

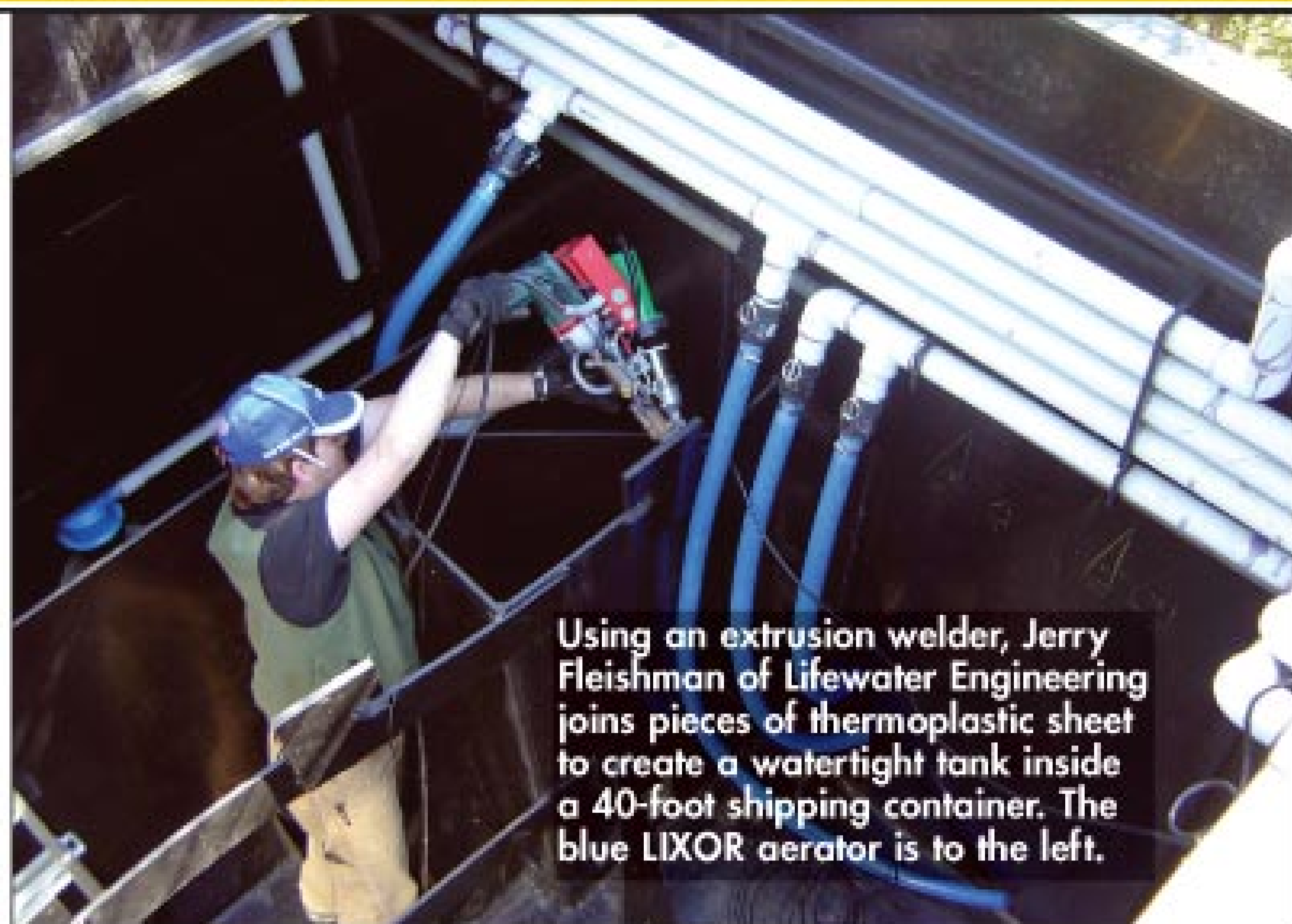


Four microfiltration flat-sheet membrane modules in the bioreactor for the Grizzly Bear system screen solids through pores of 0.03 to 1.1 microns. A piping system attached to each module transfers permeate to a tank in the control room.

buildings have 1,750-gallon septic tanks. The fourth has the 1,000-gallon tanks. Wastewater flows by gravity into the primary settling compartment. Effluent passes through angled slots in the sides of two 4-inch-diameter SaniTEE effluent screens, travels up, and passes into the pump chamber through key-

## System Profile

<b>Location:</b>	Denali, Alaska
<b>Facilities served:</b>	Grizzly Bear Cabins and Campground and Denali River Cabins
<b>Designer/installer:</b>	Bob Tsigonis, P.E., Lifewater Engineering Co., Fairbanks, Alaska
<b>Site conditions:</b>	Systems are above ground
<b>Type of system:</b>	ExtremeSTP sewage treatment plants from Lifewater Engineering
<b>Hydraulic capacity:</b>	8,000 and 24,000 gpd



Using an extrusion welder, Jerry Fleishman of Lifewater Engineering joins pieces of thermoplastic sheet to create a watertight tank inside a 40-foot shipping container. The blue LIXOR aerator is to the left.



An extrusion welded insulated membrane tank in a compartment for the Denali River Cabins system.

hole weirs. A water level sensor triggers the pump, transferring effluent through a 1.25-inch PVC pipe to the ExtremeSTP plant.

The plant has a two-compartment treatment tank in the rear of the container and a control room in front. The first compartment has a 10,000-gallon bioreactor with three LIXOR 1.0 aerators from Bio-Microbics. Regenerative blowers, one per module and one per aerator, send large volumes of air to the submerged aerators and mixing diffusers.

A venturi in the aerators breaks the incoming air stream into smaller bubbles, producing a vacuum that pulls in surrounding liquids. The turbulent plume creates horizontal and vertical mixing patterns.

The second treatment compartment has a BioBarrier High-Strength Membrane BioReactor 9.0 with four micro-filtration flat-sheet membrane modules that screen solids through pores of 0.03 to 1.1 microns. A piping system attached to each module transfers permeate to a tank in the control room.

An on-demand pump in the

**"The units were designed to be plug-and-play and ready to run. It took four to five days to commission each system after they were installed."**

**Bob Tsigonis**

tank sends liquid through a UV disinfection unit discharging through a 4-inch HDPE pipe to the river. The total hydraulic retention time is 18 hours. "The membrane system meets the discharge permits for fecal coliform, so the UV units are merely backup," says Tsigonis.

The grease interceptor in the Denali River Cabins system plumbs to the steel septic tank. Pumps in the two septic tanks deliver wastewater to the chamber with four 8-inch-diameter SaniTEE screens. They remove most stringy materials that could disrupt flow between the membrane plates.

Water then flows into the treatment plant's first container housing a 10,000-gallon bioreactor. Three LIXOR 1.0 aerators mix the wastewater before it flows through a 6-inch pipe to an identical bioreactor in the third container. Between them is another container housing the equipment room and nine BioBarrier HSMBR 9.0 membrane modules. (The tanks will hold 18 modules when the facility is completed.)

Piping attached to each module transports permeate to a tank in the equipment room. A submersible pump in the second bioreactor transfers mixed liquor to the membrane tanks. To prevent TSS from rising too high in the tanks, the pump delivers a larger amount than

the membranes can handle.

The excess mixed liquor overflows into the first bioreactor tank, then is piped to the second bioreactor tank in a closed-loop system through a 6-inch HDPE pipe. An on-demand pump runs about 100 times per day at peak capacity, sending 60 to 500 gallons through a 4-inch effluent line to the river. The total hydraulic retention time is 16 hours.

A programmable logic controller controls all equipment and logs operational data. A Web camera in the equipment room lets the

to achieve mechanical strength and watertight joints. The copolymer polypropylene plastic does not corrode or need painting.

The membrane plates set into frames that formed the modules. The automated operation sequence includes rest periods for the membranes and requires no backwash. "The membranes are ruined if they dry out, so they stay in their tanks year-round," says Tsigonis. "To prevent freezing, the resorts have redundant heating systems."

### Maintenance

Lifewater Engineering has maintenance contracts at both establishments. At the end of the tourist season, technicians pump and wash the bioreactor tanks and shut down the system. When the businesses open, technicians seed the units with sludge from a municipal treatment plant and start up the systems.

A technician draws monthly samples from the Denali River Cabins system while it is operational. Normally, the TSS level is undetectable, and the BOD is less than 3 mg/l. Regulations do not require measuring nitrogen. Lifewater remotely monitors the Denali River Cabins RC system year-round. ■

**The Grizzly Bear system's headworks and control panel are shown in the bioreactor's partially finished control room.**

Lifewater Engineering staff see what is happening. "Our server in Fairbanks automatically downloads the data and sends an alarm to our office and to three people's cell phones if anything gets out of range," says Tsigonis.

### Installation

Components were assembled and tested in Fairbanks, then trucked 100 miles to the site. "The units were designed to be plug-and-play and ready to run," says Tsigonis. "It took four to five days to commi-



ssion each system after installation."

Lifewater workers built the insulated bioreactor tanks from CNC router-cut thermoplastic sheets 5 by 10 feet by 0.25, 0.50 or 0.75 inches thick. They joined the precision pieces using extrusion welders

### MORE INFO:

**Bio-Microbics Inc.**  
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**Chicago-Area Biosolids, Land Application, Dredging and Industrial Services Business.** Established in 1985, owner is retiring. Reputable business includes real estate servicing the entire Chicagoland area with sludge and biosolids disposal and treatment services. Real estate and shop included with sale valued at \$750,000, business grosses in excess of \$3 million annually, \$6.3 million in equipment and assets including several TerraGators, Vac Trailers, dump trailers, loaders and much more. **\$4,900,000.** Huge potential, good profit and priced right. Non-Disclosure Agreement required, all P&L statements, list of assets, and financials available to qualified buyers.

### **New Jersey VIP Restroom/ Portable Toilet Business.**

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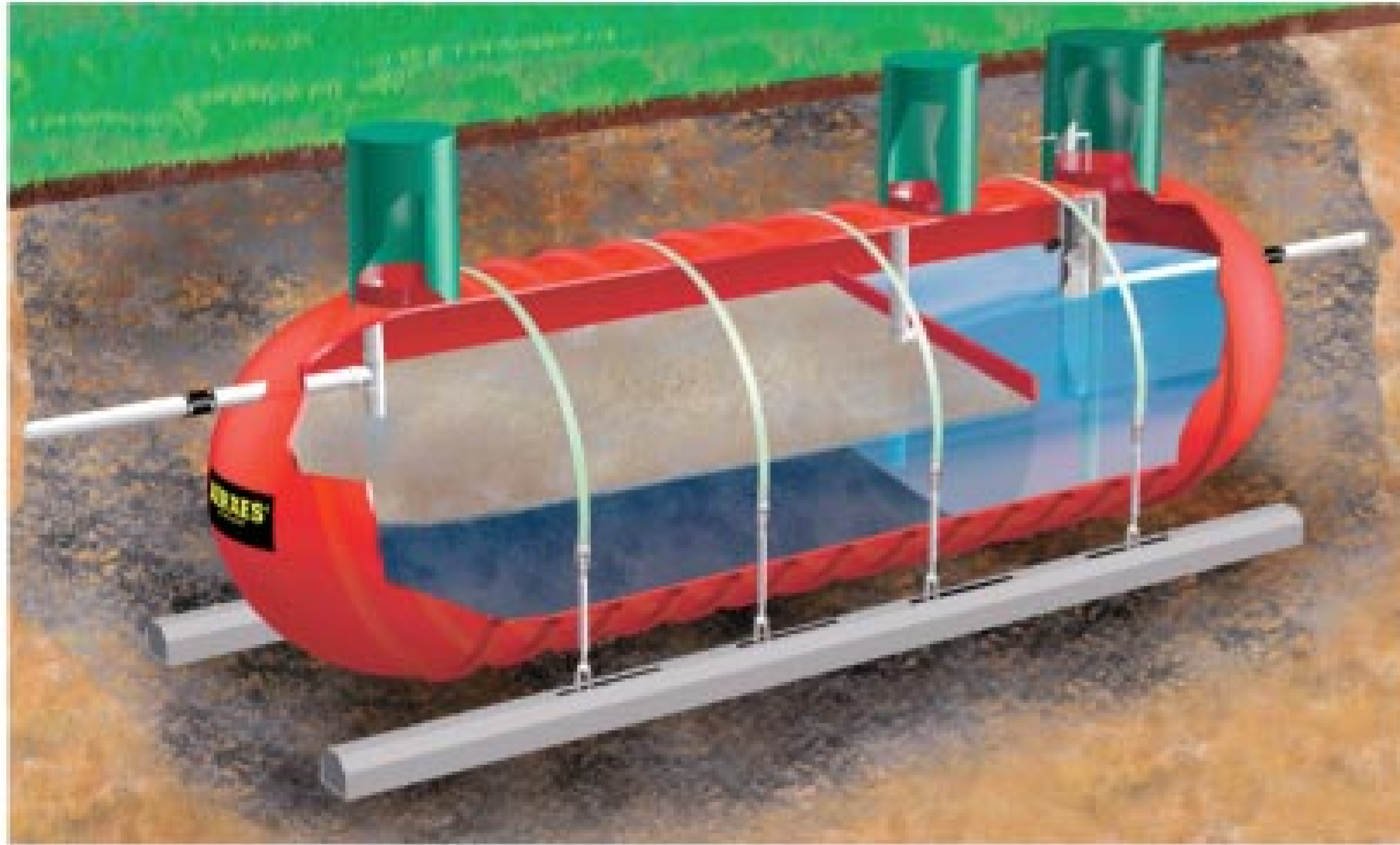
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**South Florida Commercial Real Estate, Plumbing & Sewer Business For Sale.** Established in 1969, owner is moving on. Nearly 8,000 customers in database including some contracted. Established name with real estate on turnpike. Real estate appraised in excess of \$2 million, business grosses in excess of \$1 million, close to \$1 million in equipment including Vactor, Guzzler and Safe Jet trucks. Equipment has been featured in Cleaner magazine. Assumable SBA loan for bulk of selling price. **\$2,799,000 for the entire package.**

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August 2010

## Infiltrator Acquires Blue Diamond Corrugated Pipe

Infiltrator Systems has acquired the Corrugated Plastic Pipe Division of Blue Diamond Industries, makers of drainage and gravelless septic pipe products. Infiltrator will continue to service Blue Diamond Corrugated's customers in the Southeast. Blue Diamond Corrugated will be rebranded as Blue Diamond Corrugated by Infiltrator and will be available in the areas surrounding its Oneonta, Ala., and Roseboro, N.C., plants.

## SJE-Rhombus Expands Sales Force, Adds Global Web Content

SJE-Rhombus has hired Preferred Sales and Shamrock Agencies as sales representatives. Preferred Sales will represent Ohio, West Virginia, Western Pennsylvania and parts of Kentucky. Shamrock Agencies will represent Manitoba.

SJE-Rhombus also has added a world map to its Web site, [www.sje-rhombus.com](http://www.sje-rhombus.com), with links to Italian, Chinese, German, French and Spanish language content.

## Bord na Mona Installs 600th Odor Control System

Bord na Mona Environmental Products U.S. has completed installation of a series of MONOSHELL odor control systems at sites throughout the U.S., Europe and Asia to reach the 600th installation milestone.

## Presby Environmental's AES Receives Ohio Approval

Presby Environmental's Advanced Enviro-Septic wastewater treatment system has received approval in the state of Ohio in accordance with the Ohio Revised Code. AES was earlier approved in Maine. Other state approvals are pending. AES is designed to reduce TSS, BOD and fecal coliform in a restrictive footprint. ■

## The Rest of the Story

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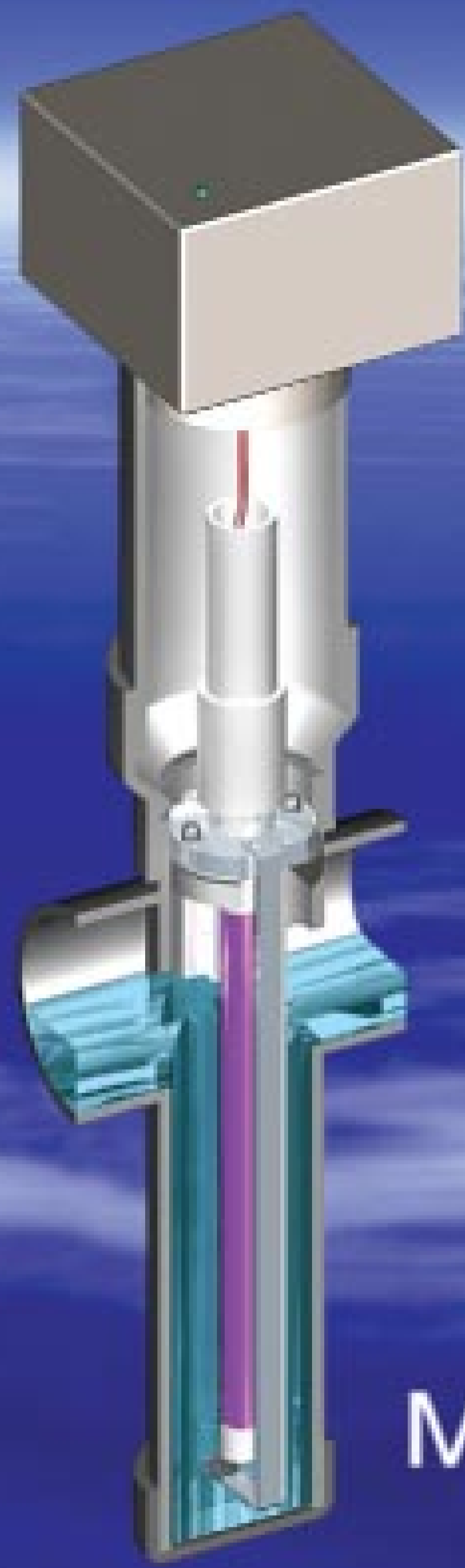
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August 2010



### Scienco/FAST Offers FOG Tablets

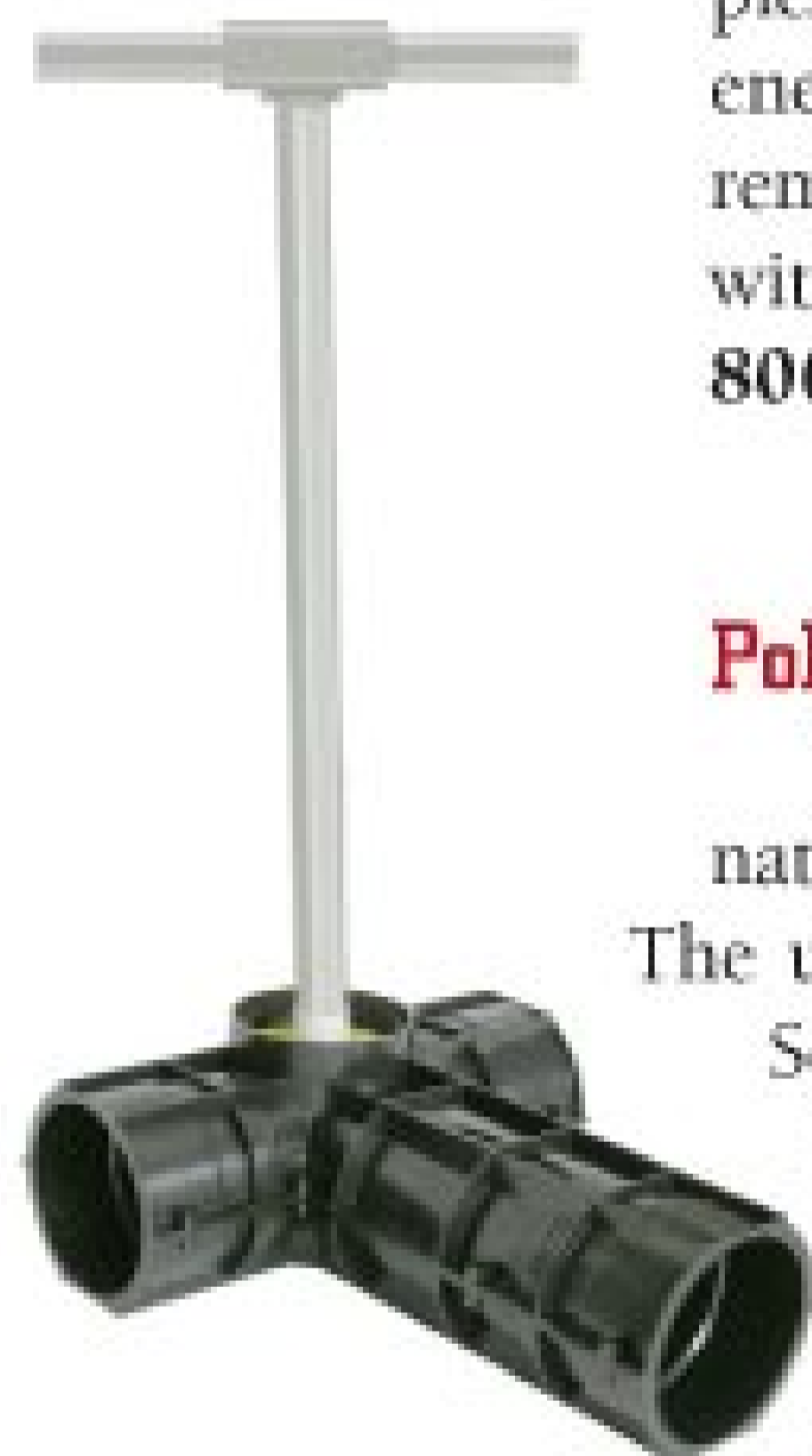
Mighty Mike grease-reduction tablets from Scienco/FAST, a division of Bio-Microbics, features live bacteria that consume and decrease the amount of fats, oils and grease in sewer lines, pump stations and septic systems. The pre-measured tablet can be flushed, dissolved, poured down a drain or tossed into a troubled area. Tablets come in three ready-to-use sizes: 100 gpd, 250 gpd and 500 gpd. 314/645-6540; [www.sciencofast.com](http://www.sciencofast.com).

### Bord na Mona Offers Puraflo Treatment System

The Puraflo peat fiber biofilter wastewater treatment system from Bord na Mona is designed for difficult soil, shallow water table and restrictive lot



sizes. The single-pass system requires no blowers, complex control panels or recirculation pumps. The zero energy, low power, time-dosed system is engineered to remove more than 99.9 percent of harmful bacteria without the need for chlorination or UV treatment. 800/787-2356; [www.bnm-us.com](http://www.bnm-us.com).



### Polylok Offers Flow Controller

The flow controller from Polylok is made for alternating or dividing flows between two separate fields. The unit installs by attaching directly to Schedule 40 or Schedule 35 pipe. The channel split design provides for an equal split of the waste stream. The valve can be set for equal distribution (factor setting) or all distribution to the right or left. 877/765-9565; [www.polylok.com](http://www.polylok.com).

### BrenLin Adds Ring Sizes to Product Line

Seal-R Rings from the BrenLin Company are available in 12-, 15- and 36-inch diameters, as well as 18-, 24- and 30-inch diameters. The company now offers rings for each size of its Seal-R Lids septic system riser covers. 888/606-1998; [www.seal-r.com](http://www.seal-r.com). ■

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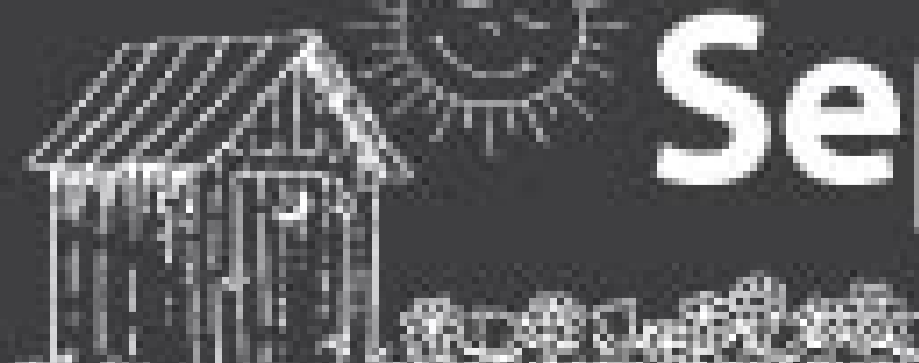
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## Tax Audits

The Wisconsin Onsite Water Recycling Association May newsletter reported that the state Department of Revenue is auditing more septic system installer companies as part of a crackdown on sales tax collections. The agency requires contractors to collect sales tax for grading the topsoil and laying sod or planting seed on job sites. The department's sale tax brochure is available from WOWRA at 608/256-7757.

Thirteen members completed the two-day Onsite Evaluator course in May, bringing the total of certified professionals to 70.

## Researchers Track Groundwater

In the first study of its kind, Stanford University researchers installed 120 data loggers in wells to monitor a large onsite system serving homes and public toilets close to Stinson Beach, Calif. The wells, placed in parallel rows several hundred yards long, allowed researchers to assess the degree of contamination flowing from the system through the beach and out to sea.

Tests revealed low concentrations of fecal indicator bacteria in a plume of nitrogen-enriched groundwater that caused spikes in phytoplankton. The research team presented its findings to the National Park Service, at public meetings, and to the Stinson Beach County Water District.

## CALENDAR OF EVENTS

### Aug. 4-6

North Carolina Septic Tank Association Symposium, Convention Center, Greenville. Call 336/416-3564 or visit [www.ncsta.net](http://www.ncsta.net).

### Aug. 5-7

Florida Onsite Wastewater Association Conference and Trade Show, Daytona Beach Convention Center. Call 407/937-2228 or visit [www.fowaonsite.com](http://www.fowaonsite.com).

### Aug. 27-28

Georgia Onsite Wastewater Asso-

ciation Conference, Callaway Gardens, Pine Mountain. Call 678/646-0379 or visit [www.onsitewastewater.org](http://www.onsitewastewater.org).

## TRAINING & EDUCATION

### NAWT

The National Association of Wastewater Transporters has these sessions:

- Sept. 15-16 – Waste Treatment Symposium, Washington, Pa.
- Oct. 14-15 – Inspector Certification, Monterey, Calif.

For Pennsylvania classes, call NAWT at 800/236-6298 or visit [www.nawt.org](http://www.nawt.org). For California classes, call Kit Rosefield at 530/513-6658 or visit [www.cowa.org](http://www.cowa.org).

### Alabama

Licensing classes are the joint effort of the Alabama Onsite Wastewater Association (AOWA) and University of West Alabama (UWA). Courses are at UWA-Livingston campus unless stated otherwise:

- Sept. 9-10 – Continuing Education, Florence
- Oct. 7-8 – Pumper
- Oct. 13-15 – Advanced Installer II
- Oct. 28-29 – Continuing Education, Mobile

The first day of Continuing Education classes is for installers and the second day is for pumpers and portable restroom operators. Call 334/396-3434 or visit [www.aowatc.uwa.edu](http://www.aowatc.uwa.edu).

### California

The California Onsite Wastewater Association is offering a NAWT Inspector Certification class on Oct. 14-15 in Monterey. Call Kit Rosefield at 530/513-6658 or visit [www.cowa.org](http://www.cowa.org).

### Iowa

The Iowa Onsite Wastewater Association has a Servicing Alternative Technology course on Sept. 24 in Waverly. E-mail Alice Vinsand at [execdir@iowwa.com](mailto:execdir@iowwa.com) or visit [www.iowwa.com](http://www.iowwa.com).

### Michigan

The Michigan Onsite Wastewater Training and Education Center at MSU Tollgate Center in Novi is offering these courses:

- Sept. 28-29 – Onsite System Maintenance
- Oct. 6-7 – Onsite Systems Evaluator Training

Call Barb DeLong at 517/355-4720 or visit [www.egr.msu.edu/age/outreach.html](http://www.egr.msu.edu/age/outreach.html).

### Missouri

The Missouri Smallflows Organization is offering these CEU courses:

- Sept. 14 – Media Filters, St. Louis
- Sept. 15 – Aerobic Treatment Units, St. Louis
- Sept. 28 – Media Filters, Springfield
- Sept. 29 – Selling System to the Site, Springfield
- Oct. 4 – Media Filters, Liberty
- Oct. 5 – Aerobic Treatment Units, Liberty
- Oct. 12 – Media Filters, Cape Girardeau
- Oct. 13 – Aerobic Treatment Units, Cape Girardeau

Call Tammy Yelden at 417/739-4100 or visit [www.mosmallflows.org](http://www.mosmallflows.org).

### New England

The New England Onsite Wastewater Training Center at the University of Rhode Island in Kingston has these workshops:

- Sept. 2 – Conventional Onsite Wastewater Treatment Basics for Installers
- Sept. 16 – Innovative & Alternative Technology Overview
- Sept. 22-23 – Conventional Onsite Wastewater System Inspection Overview
- Sept. 30 – Innovative & Alternative Technology Field Overview, URI Peckham Farm
- Oct. 7 – Bottomless Sand Filter Design and Installation
- Oct. 14 – Functional Inspections

Call 401/874-5950 or visit [www.uri.edu/ce/wq](http://www.uri.edu/ce/wq).

### North Carolina

North Carolina Soils and On-Site

Wastewater Training Academy has an Introductory Installer Training course on Sept. 27-29 in Fletcher. Call Joni Tanner at 919/513-1678 or visit [www.soil.ncsu.edu/training](http://www.soil.ncsu.edu/training).

### North Carolina

The North Carolina Septic Tank Association offers these continuing education courses:

- Oct. 6-7 – Installers and Inspectors, Sunset Beach
- Oct. 8 – Pumpers and Land Application, Sunset Beach
- Oct. 11-12 – Installers and Inspectors, New Bern
- Oct. 27-28 – Installers and Inspectors, Greensboro
- Oct. 29 – Pumpers and Land Application, Greensboro

Call 336/416-3564 or visit [www.ncsta.net](http://www.ncsta.net).

### Pennsylvania

The Pennsylvania Septage Management Association has these courses:

- Sept. 14-15 – Basic and Advanced Onlot Wastewater Treatment System Inspection, Williamsport
- Sept. 29-30 – Advanced Onlot Wastewater Treatment System Inspection, Apollo

Call 717/763-7762 or visit [www.pasma.net](http://www.pasma.net).

### Utah

The Utah On-Site Wastewater Treatment Training Program is offering these Onsite Wastewater Treatment Certification Workshops:

- Sept. 20-21 – Level 1 Certification, Heber City
- Sept. 22 – Level 1 Renewal Certification, Heber City
- Sept. 23 – Level 2 Renewal Certification, Heber City
- Sept. 29 – Level 3 Renewal Certification, Logan
- Oct. 19-20 – Level 2 Certification, Logan
- Oct. 26-28 – Level 3 Certification, Logan

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## POSITIONS AVAILABLE

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**SALES POSITION: United Liquid Waste Recycling Inc.,** located in Southeastern Wisconsin, is looking for a salesperson with a direct knowledge of the solid and liquid waste industry. Contact us at 888-558-9611 ext. 119. united\_hr@yahoo.com. (PBM)

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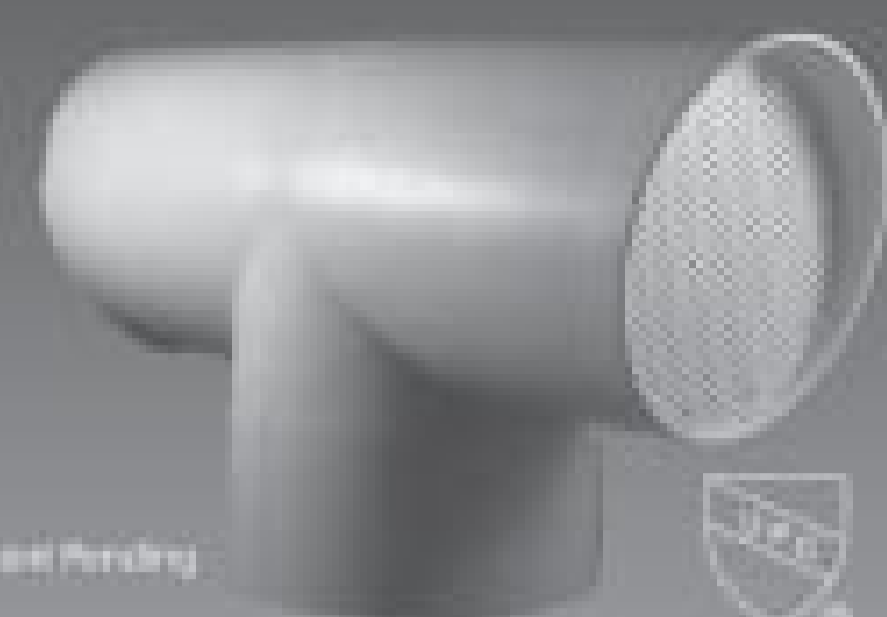


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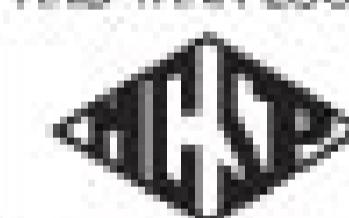


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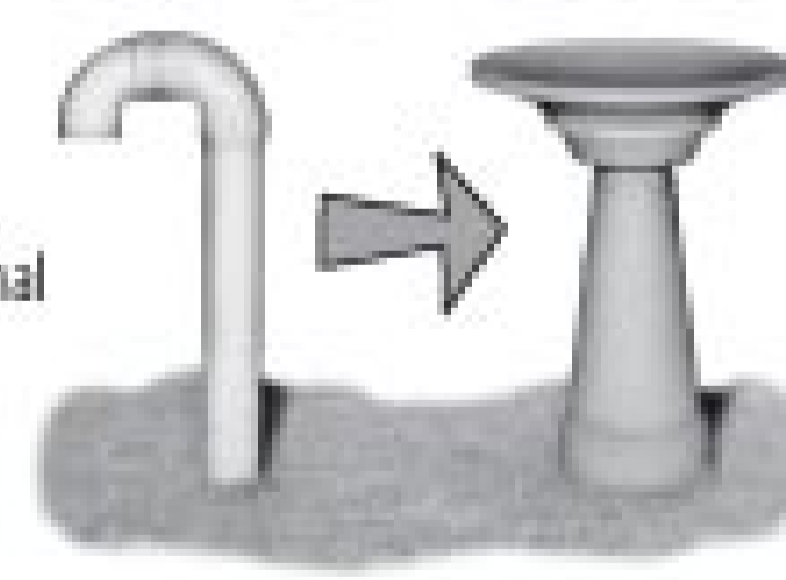
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